Development of the Disaster Victim Identification Forensic Odontology Guide for the Australian Society of Forensic Odontology

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A thesis submitted in fulfilment of the requirements for the degree of

Doctor of Philosophy

Oral Health

The University of Newcastle

Australia

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Declaration

Statement of Originality

The thesis contains no material which has been accepted for the award of any other degree or diploma in any university or other tertiary institution and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made in the text. I give consent to this copy of my thesis, when deposited in the University Library, being made available for loan and photocopying subject to the provisions of the Copyright Act 1968.

Jane Amelia Taylor

Date
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Senior Sergeant Ian Parker and Inspector Mark Sweeney for allowing and facilitating access to historic case files of the New South Wales Police service.

And finally, Mike, for being the most important part of my life.
Dedication

This project is dedicated to all the victims of past and future mass fatality incidents who have a need of forensic odontology.

Hello my friend from distant lands…
I see you without my eyes, and still you look upon my face as though I am watching you
I feel your touch without my senses, and still you treat my body with unbridled kindness
I hear you even though I am without ears, and still you speak softly to me as you do your work
I know I am not what I used to be, but please remember me as I was
You may mourn my passing but you must not be saddened by it
As my life began, so it must end
Know that your work for me, my family and my country will never be forgotten
Know that your smile throughout adversity lifts my spirits, as well as those of your friends and others around you
Always live your life as though it may end at anytime, for it is then that you will truly live

My eternal love and blessings
Your unknown dead

Barham JR Ferguson
12 January 2005
# Table of Contents

INDEX .................................................. v

LIST OF TABLES ........................................ x

LIST OF FIGURES ...................................... xiii

GLOSSARY ............................................... xiv

ABSTRACT ............................................... xv
## INDEX

### CHAPTER 1
**INTRODUCTION**

1.1 Context  
1.2 Disasters and Mass Fatality Incidents  
1.3 Disaster Victim Identification  
1.4 Personal Identification via Forensic Odontology  
1.5 Forensic Odontology and Disaster Victim Identification  
1.6 This Project  

### CHAPTER 2
**THE HISTORY OF DISASTER VICTIM IDENTIFICATION WITH PARTICULAR REFERENCE TO THE USE OF FORENSIC ODONTOLOGY IN AUSTRALIA**

2.1 Forensic Odontology  
2.2 History of Disaster Victim Identification  
2.3 Forensic Odontology and Disaster Victim Identification  
2.4 Forensic Identification in Australia  
2.5 Disaster Victim Identification in Australia  
2.6 The Development of Forensic Odontology Services in Australia  
  2.6.1 New South Wales  
  2.6.2 Victoria  
  2.6.3 South Australia  
  2.6.4 Queensland  
  2.6.5 Western Australia  
  2.6.6 Tasmania  
  2.6.7 Northern Territory  
  2.6.8 Australian Capital Territory  
  2.6.9 Consistencies across State and Territory Services  
2.7 Summary  

### CHAPTER 3
**CASE STUDY: THE ASIAN TSUNAMI**

3.1 The Disaster  
3.2 First Responses
### CHAPTER 3

**3.3 Management of the Deceased**  
**3.4 Identification of the Deceased**  
**3.5 The Disaster Victim Identification response in Thailand**  
**3.6 The Forensic Odontology Response**  
**3.7 Other Scientific Disciplines**  
**3.8 Some Peculiarities**  
**3.9 Conclusions and lessons Learned**

### CHAPTER 4

**EXISTING GUIDELINES: AN INTERNATIONAL PERSPECTIVE**

**4.1 Introduction**  
**4.2 Existing Guidelines**  
**4.3 Documentation Specific to Forensic Odontology**  
**4.4 Problems in Forensic Odontology in Disaster Victim Identification**  
**4.5 Disaster Victim Identification Guidelines for Forensic Odontology**  
\[4.5.1 \text{ Phase 1 – The Scene} \]
\[4.5.2 \text{ Phase 2 – The Mortuary} \]
\[4.5.3 \text{ Phase 3 – Ante-Mortem Information Collection} \]
\[4.5.4 \text{ Phase 4 – Reconciliation} \]
\[4.5.5 \text{ Phase 5 – Debrief} \]
\[4.5.6 \text{ Additional Issues} \]

**4.6 Conclusions**

### CHAPTER 5

**THE DELPHI TECHNIQUE**

**5.1 Introduction**  
**5.2 Techniques for the Development of Guidelines**  
**5.3 Formal Methods for Achieving Consensus**  
**5.4 The Delphi Technique**  
\[5.4.1 \text{ Strengths of the Delphi Technique} \]
\[5.4.2 \text{ Limitations of the Delphi Technique} \]
\[5.4.3 \text{ Use of Delphi Technique in Dental and Forensic Research} \]

**5.5 Summary**
## CHAPTER 6

### DEVELOPMENT OF THE DISASTER VICTIM IDENTIFICATION PRACTICE GUIDE FOR THE AUSTRALIAN SOCIETY OF FORENSIC ODONTOLOGY: MATERIALS, METHODS AND RESULTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.1</td>
<td>110</td>
</tr>
<tr>
<td>6.2</td>
<td>114</td>
</tr>
<tr>
<td>6.2.1</td>
<td>114</td>
</tr>
<tr>
<td>6.2.2</td>
<td>118</td>
</tr>
<tr>
<td>6.2.3</td>
<td>118</td>
</tr>
<tr>
<td>6.2.4</td>
<td>119</td>
</tr>
<tr>
<td>6.2.5</td>
<td>120</td>
</tr>
<tr>
<td>6.2.6</td>
<td>122</td>
</tr>
<tr>
<td>6.2.7</td>
<td>123</td>
</tr>
<tr>
<td>6.2.8</td>
<td>123</td>
</tr>
<tr>
<td>6.2.9</td>
<td>124</td>
</tr>
<tr>
<td>6.2.10</td>
<td>127</td>
</tr>
<tr>
<td>6.2.11</td>
<td>131</td>
</tr>
<tr>
<td>6.2.12</td>
<td>134</td>
</tr>
<tr>
<td>6.2.13</td>
<td>139</td>
</tr>
<tr>
<td>6.2.14</td>
<td>142</td>
</tr>
<tr>
<td>6.2.15</td>
<td>152</td>
</tr>
<tr>
<td>6.2.16</td>
<td>160</td>
</tr>
<tr>
<td>6.2.17</td>
<td>163</td>
</tr>
<tr>
<td>6.2.18</td>
<td>165</td>
</tr>
<tr>
<td>6.2.19</td>
<td>167</td>
</tr>
<tr>
<td>6.2.20</td>
<td>170</td>
</tr>
<tr>
<td>6.2.21</td>
<td>171</td>
</tr>
<tr>
<td>6.3</td>
<td>172</td>
</tr>
</tbody>
</table>
Appendix 4: Letter of Invitation AuSFO Members, Consent Form, Participant Information Sheet, Pre-Delphi Survey, Post-Delphi Survey 251

Appendix 5: Australian Society of Forensic Dentistry Inc, Disaster Victim Identification Forensic Odontology Guide 261
LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table 1a</td>
<td>Contribution of forensic odontology to identifications in aviation mass fatality incidents</td>
<td>26</td>
</tr>
<tr>
<td>Table 1b</td>
<td>Contribution of forensic odontology to identifications in rail mass fatality incidents</td>
<td>27</td>
</tr>
<tr>
<td>Table 1c</td>
<td>Contribution of forensic odontology to identifications in traffic mass fatality incidents</td>
<td>27</td>
</tr>
<tr>
<td>Table 1d</td>
<td>Contribution of forensic odontology to identifications in marine mass fatality incidents</td>
<td>27</td>
</tr>
<tr>
<td>Table 1e</td>
<td>Contribution of forensic odontology to identifications in miscellaneous mass fatality incidents</td>
<td>27</td>
</tr>
<tr>
<td>Table 1f</td>
<td>Contribution of forensic odontology to identifications in military and war related mass fatality incidents</td>
<td>28</td>
</tr>
<tr>
<td>Table 2</td>
<td>Results of pre-participation survey: AuSFO members</td>
<td>115</td>
</tr>
<tr>
<td>Table 3</td>
<td>Police response to Pre-participation Survey</td>
<td>116</td>
</tr>
<tr>
<td>Table 4</td>
<td>Response rates to the four rounds of the Delphi survey</td>
<td>117</td>
</tr>
<tr>
<td>Table 5</td>
<td>Comments per section per round for four rounds: Delphi survey</td>
<td>120</td>
</tr>
<tr>
<td>Table 6</td>
<td>Responses to determine appropriate levels of consensus in questionnaire: Round 1</td>
<td>121</td>
</tr>
<tr>
<td>Table 7</td>
<td>Responses to ‘need for ASFD to have a DVI practice guide’ question in questionnaire: Round 1</td>
<td>122</td>
</tr>
<tr>
<td>Table 8</td>
<td>Responses relating to the title of the document in Questionnaire: Round 1</td>
<td>123</td>
</tr>
<tr>
<td>Table 9</td>
<td>Responses for 5 principal concerns in deployment of forensic odontologists: AuSFO members</td>
<td>124</td>
</tr>
<tr>
<td>Table 10</td>
<td>Responses for 5 principal concerns in deployment of forensic odontologists: police respondents</td>
<td>125</td>
</tr>
<tr>
<td>Table 11</td>
<td>Responses to importance of Sections 1-6 in Questionnaire: Round 1</td>
<td>128</td>
</tr>
<tr>
<td>Table 12</td>
<td>Responses to satisfaction with contents of Sections 1-6 in questionnaire: Round 1</td>
<td>129</td>
</tr>
<tr>
<td>Table</td>
<td>Description</td>
<td>Page</td>
</tr>
<tr>
<td>-------</td>
<td>-------------------------------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>13</td>
<td>Responses to new Sections 2,3,5 and 6 in questionnaire: Round 2</td>
<td>129</td>
</tr>
<tr>
<td>14</td>
<td>Responses to the importance of Role, Organisation and Management section in</td>
<td>131</td>
</tr>
<tr>
<td></td>
<td>questionnaire: Round 1</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Levels of support for the contents of the 'Role, Organisation and Management'</td>
<td>132</td>
</tr>
<tr>
<td></td>
<td>section over four rounds of the Delphi survey</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Police responses to the contents of 'Role, Organisation and Management'</td>
<td>132</td>
</tr>
<tr>
<td></td>
<td>section in questionnaire: Round 1</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Responses to the importance of Personnel section in questionnaire: Round 1</td>
<td>134</td>
</tr>
<tr>
<td>18</td>
<td>Responses to questions relating to the Personnel section in questionnaire:</td>
<td>135</td>
</tr>
<tr>
<td></td>
<td>Round 1</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Responses to questions relating to the Personnel section in questionnaire:</td>
<td>137</td>
</tr>
<tr>
<td></td>
<td>Round 2</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Levels of support for the contents of the 'Documentation' section in</td>
<td>139</td>
</tr>
<tr>
<td></td>
<td>questionnaire: Round 1</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>Responses to questions relating to the Documentation section in questionnaire:</td>
<td>137</td>
</tr>
<tr>
<td></td>
<td>Round 2</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>Responses to the importance of the Procedures section in questionnaire:</td>
<td>146</td>
</tr>
<tr>
<td></td>
<td>Round 1</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>Levels of support for the contents of the 'Procedures' section in</td>
<td>147</td>
</tr>
<tr>
<td></td>
<td>questionnaire: Round 1</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>Levels of support for the contents of the 'Procedures' section in</td>
<td>148-150</td>
</tr>
<tr>
<td></td>
<td>questionnaire: Round 2</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>Responses to the importance of Competencies/Responsibilities section in</td>
<td>157</td>
</tr>
<tr>
<td></td>
<td>questionnaire: Round 1</td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>Levels of support for the contents of the 'Competencies/Responsibilities'</td>
<td>158</td>
</tr>
<tr>
<td></td>
<td>section in questionnaire: Round 1</td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>Levels of support for the contents of the 'Competencies/Responsibilities'</td>
<td>159</td>
</tr>
<tr>
<td></td>
<td>section in questionnaire: Round 2</td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>Responses to questions relating to Equipment section in questionnaire: Round</td>
<td>160</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Table 29</td>
<td>Police responses questions relating to Equipment section in questionnaire: Round 1</td>
<td>161</td>
</tr>
<tr>
<td>Table 30</td>
<td>Responses to questions relating to the ‘Equipment’ section in questionnaire: Round 2</td>
<td>161</td>
</tr>
<tr>
<td>Table 31</td>
<td>Levels of support for the contents of the ‘Training’ section Over four rounds of the Delphi survey</td>
<td>163</td>
</tr>
<tr>
<td>Table 32</td>
<td>Responses to the importance of the Complaints section in questionnaire: Round 1</td>
<td>165</td>
</tr>
<tr>
<td>Table 33</td>
<td>Responses to questions relating to the ‘Review’ section in questionnaire: Round 1</td>
<td>167</td>
</tr>
<tr>
<td>Table 34</td>
<td>Responses to questions relating to the ‘Review’ section in questionnaire: Round 2</td>
<td>168</td>
</tr>
<tr>
<td>Table 35</td>
<td>Responses to questions relating to the ‘Remuneration’ section in questionnaire: Round 1</td>
<td>170</td>
</tr>
<tr>
<td>Table 36</td>
<td>Results of post-participation survey: AuSFO members</td>
<td>171</td>
</tr>
</tbody>
</table>
# LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Figure 1</td>
<td>Research Plan Flow Diagram</td>
<td>112</td>
</tr>
<tr>
<td>Figure 2</td>
<td>Responses to invitation to participate: AuSFO members</td>
<td>113</td>
</tr>
<tr>
<td>Figure 3</td>
<td>Age range of respondents</td>
<td>114</td>
</tr>
<tr>
<td>Figure 4</td>
<td>Distribution of years of experience in Forensic Odontology</td>
<td>114</td>
</tr>
<tr>
<td>Figure 5</td>
<td>Responses to invitation to participate: Police personnel</td>
<td>116</td>
</tr>
<tr>
<td>Figure 6</td>
<td>Response rates of AuSFO members to the four rounds of the Delphi survey</td>
<td>118</td>
</tr>
<tr>
<td>Figure 7</td>
<td>Number of comments per round for the four rounds of the Delphi survey</td>
<td>119</td>
</tr>
<tr>
<td>Figure 8</td>
<td>Comments per section per round for four rounds: Delphi survey</td>
<td>121</td>
</tr>
<tr>
<td>Figure 9</td>
<td>Principal concerns in deployment of forensic odontologists: AuSFO members</td>
<td>124</td>
</tr>
<tr>
<td>Figure 10</td>
<td>Principal concerns in deployment of forensic odontologists: Police respondents</td>
<td>125</td>
</tr>
<tr>
<td>Figure 11</td>
<td>Trends in support for Sections 1-6</td>
<td>130</td>
</tr>
<tr>
<td>Figure 12</td>
<td>Trends in support for the Role, Organisation and Management section over four rounds of the Delphi survey</td>
<td>133</td>
</tr>
<tr>
<td>Figure 13</td>
<td>Trends in support for the Personnel section over four rounds of the Delphi survey</td>
<td>138</td>
</tr>
<tr>
<td>Figure 14</td>
<td>Trends in support for the Documentation section over four rounds of the Delphi survey</td>
<td>141</td>
</tr>
<tr>
<td>Figure 15</td>
<td>Trends in support for the Equipment section over four rounds of the Delphi survey</td>
<td>162</td>
</tr>
<tr>
<td>Figure 16</td>
<td>Trends in support for the Training section over four rounds of the Delphi survey</td>
<td>164</td>
</tr>
<tr>
<td>Figure 17</td>
<td>Trends in support for the Complaints section over four rounds of the Delphi survey</td>
<td>166</td>
</tr>
<tr>
<td>Figure 18</td>
<td>Trends in support for the Review section over four rounds of the Delphi survey</td>
<td>169</td>
</tr>
</tbody>
</table>
### GLOSSARY

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABFO</td>
<td>American Board of Forensic Odontology</td>
</tr>
<tr>
<td>ADF</td>
<td>Australian Defence Forces</td>
</tr>
<tr>
<td>ANEFPAP</td>
<td>Australian National Emergency Forensic Pathology Activation Program</td>
</tr>
<tr>
<td>AuSFO</td>
<td>Australian Society of Forensic Odontology</td>
</tr>
<tr>
<td>CAPMI</td>
<td>Computer-Assisted Post-mortem Identification System, developed by US Army Institute of Dental Research</td>
</tr>
<tr>
<td>D.A.V.Id</td>
<td>Disaster and Victim Identification software program.</td>
</tr>
<tr>
<td>DNA</td>
<td>Deoxyribonucleic acid</td>
</tr>
<tr>
<td>DVI</td>
<td>Disaster Victim Identification</td>
</tr>
<tr>
<td>F1 &amp; F2</td>
<td>Dental information pages in Interpol DVI forms</td>
</tr>
<tr>
<td>HDI</td>
<td>Human Development Indices</td>
</tr>
<tr>
<td>INTERPOL</td>
<td>International Police Organisation</td>
</tr>
<tr>
<td>IOFOS</td>
<td>International Organisation for Forensic Odontology</td>
</tr>
<tr>
<td>MFI</td>
<td>Mass Fatality Incident</td>
</tr>
<tr>
<td>RAND</td>
<td>Research and Development Corporation</td>
</tr>
<tr>
<td>TTVI</td>
<td>Thai Tsunami Victim Identification</td>
</tr>
<tr>
<td>WinID</td>
<td>Computer matching program, see <a href="http://www.winid.com">http://www.winid.com</a></td>
</tr>
</tbody>
</table>
ABSTRACT

Identification of the victims of a mass fatality incident is considered a basic human right. Forensic odontology frequently makes a significant contribution to the identification process following major disasters, and is considered a primary identifier in the Interpol Disaster Victim Identification (DVI) Guidelines.

Many authors have indicated that to achieve identification with dignity and respect requires practical guidelines and standard operating procedures. No internationally accepted guidelines currently exist for the practice of forensic odontology in DVI situations.

This report documents the development of a comprehensive practice guide for use by Australian forensic odontologists in a mass fatality incident. To understand the value of this document in a professional context the project also looked at the development and application of forensic odontology in multiple fatality incidents in Australia. This evolution has seen forensic odontology grow from a spasmodically used ad-hoc service to the consistent professional service delivered by practitioners today.

The research question addressed in this project was “Is the Delphi technique is an appropriate tool to assist the Australian Society of Forensic Odontology to develop a set of guidelines and Standard Operating Procedures for Disaster Victim Identification practices”?

Thirty one members of the Australian Society of Forensic Odontology and four members of various Australian police services and the private disaster management sector participated in the project. The participants set the level of consensus against which they wished to work and took 4 rounds to reach agreement on the contents of the document.

The resultant document, the “Disaster Victim Identification Forensic Odontology Guide” is comprehensive in coverage, meets many of the criteria established to define quality and places the Australian Society of Forensic Odontology at the vanguard of professionalism in the forensic odontology community, and confirms the Delphi technique was an appropriate tool to assist in the development of a set of guidelines and Standard Operating Procedures for Disaster Victim Identification practices.
CHAPTER 1
INTRODUCTION

This report documents a case based study which used the Delphi technique to develop a comprehensive practice guide for use by Australian forensic odontologists in a mass fatality incident.

1.1 Context

Society accepts that each and every person has an identity, and would in fact cease to function if this were not the case. This concept is enshrined in the United Nations Universal Declaration of Human Rights where Article 6 states “Everyone has the right to recognition everywhere as a person before the law” (United Nations 1948). The need for this identity is also paramount after the death of the individual and represents a basic human right (de Ville de Goyet 2000, Perera 2005, Pretty 2007). To this end Articles 16 and 17 of the 1949 Geneva Convention (I) for the Amelioration of the Condition of the Wounded and Sick in Armed Forces in the Field stipulate that, as far as circumstances permit, every effort should be made to formally identify and honourably inter, in an individually marked grave, the fatalities of armed conflicts; thus recognising that victims of war have a right to an identity and their families to the knowledge that they were afforded a respectful laying to rest (Geneva Convention 1949).

National and international statutes, legislations and Bills of Human Rights impart to authorities the responsibility to do all they can to provide the deceased with an identity (Castiglione 2004). Without a proven identity a death certificate cannot be issued by the relevant authorities. This certificate enables family and friends to initiate personally important rituals and customs to honour and remember the deceased, and also dispose of the remains in a legally appropriate manner, usually by burial or cremation.

Attached to this social function are additional legal considerations. A death certificate permits estates to be settled, insurances to be claimed and paid,

Authorities accept a variety of methods to confirm identification of the deceased. These are generally divided into non-scientific and scientific methods (Stimson & Mertz 1997, Milroy 2005).

Visual recognition is the most frequently used non-scientific method of identification. It is well accepted that both the stress associated with the death of a relative or friend coupled with even slight post-mortem changes in the deceased make visual recognition highly unreliable (Busuttil, Jones & Green 2000, Milroy 2005, Morgan, Tidball-Binz & Van Alphen 2006, Scanlon 2006). Many reports of incorrect visual identifications exist in the literature (Amoedo 1897, 1899, Rosenbluth 1902, Gustafson 1966, Furuhata & Yamamoto 1967, Knott 1967, Zugibe, Constello & Segelbacher 1996, Soomer, Ranta & Penttila 2001, Lain, Griffiths & Hilton 2003), and the resultant stress caused to families when incorrect identifications occur (Nelkin & Andrews 1998). Lain, Griffiths & Hilton (2003) reported that half of the visual identifications of victims of the Bali bombings were subsequently found to be incorrect by scientific methods. The use of property and personal effects, for example personal papers or jewellery, is also untrustworthy as these items are easily relocated either inadvertently or deliberately (Harke, Bifano & Koeller 2002).

When the condition of the remains is deemed inappropriate for visual recognition, identification using a scientific technique for determining identity is required. Scientific or primary methods include comparison of fingerprint patterns, medical and dental evidence and analysis of Deoxyribonucleic Acid (DNA). Scientific methods are frequently described as being either comparative, where high quality pre-death (ante-mortem) records exist for use in the comparison; or reconstructive, where no ante-mortem information exists
and all knowledge about the deceased must be derived from the remains. It is possible to determine gender and age quite readily from the remains, including the cranial structures and teeth. Evidence of personal habits and some systemic diseases are occasionally present in the dentition and restorations in the teeth may provide an indication of the nationality of the deceased (Gustafson 1966, Pretty & Sweet 2001).

It is important that the outcomes of identification investigations are accurate but also that they are provided in a timely manner (Keiser-Nielsen 1963, Kraft, Liebhardt & Lindemaier 1991, Busuttil, Jones & Green 2000, Morgan, Tidball-Binz & Van Alphen 2006, Perrier et al. 2006), to help ease stresses on the bereaved and allow them to move through the phases of the grieving process (Perrier et al. 2006). This is relatively easy to accomplish when one individual dies either of natural causes or unexpectedly, but when large numbers of people lose their lives at the same time it can be more difficult to achieve. Such incidents are referred to as mass fatality incidents or mass disasters.

There is no fixed definition for what constitutes a mass fatality incident (MFI). Most authorities accept that while a MFI is technically any situation leading to the death of more than one person, working definitions need to be jurisdictionally specific and flexible as they relate to the number of victims that the local services and resources can comfortably deal with (Nocera & Garner 1999, Jensen 2000, Fixott et al. 2001, de Villiers & Phillips 2002a, Jumbelic 2005). In this context a MFI becomes any number of deaths that a given jurisdiction is unable to cope with at a given point in time. A number of jurisdictions within Australia treat any multiple death situations as a MFI to ensure preparedness for larger incidents.

1.2 Disasters and Mass Fatality Incidents
The Shorter Oxford Dictionary defines disaster as “anything ruinous or distressing that befalls; a sudden or great misfortune, or mishap a calamity”. In a forensic context a disaster is referred to as ‘natural’ or ‘man-made’ and there is an associated assumed loss of human life, hence the terminology of
mass fatality incident. Natural disasters are often called natural catastrophes to denote their spontaneous nature, and refer to events like earthquakes, hurricanes, tsunami like events, floods, landslides, volcanic eruptions and bushfires (Alexander 1997). Man-made disasters frequently involve technology and include transport accidents (aircraft, train etc), bombings and other terrorist activities, building collapses and other incidents where human intervention can be observed either in the development of the machinery or equipment involved or is in some way concerned in causing the disaster, either accidentally or deliberately (Vale & Noguchi 1977).

Another valuable subdivision of mass fatality incidents is open versus closed or controlled versus uncontrolled. Closed or controlled disasters are those where there is a ready reference of potential victims, for example a passenger manifest for an airline flight and the accident occurs in an otherwise uninhabited area. Open or uncontrolled incidents are the more frequent and there is no guide as to the number or presumed identity of the victims.

In the period 1977 to 1996 over 500,000 people lost their lives in natural disasters worldwide (Alexander 1997). Morgan et al. (2006) indicated that every year there are at least six natural disasters that result in the death of a minimum of 500 people in each incident. Alexander (1997) reported that on average 23,850 people die in natural disasters annually, and that this rate is remarkably constant over time, despite increases in populations globally. Walker et al. (2005) pointed out that death rates vary when human development indices (HDI) of countries are taken into account. HDI combines life expectancy, literacy, education, standard of living and gross domestic product per capita to give an indication of the development level of a country. Countries with high indices (more developed) report 23 deaths per disaster but those with low indices (under-developed) show 1052 deaths per disaster. Walker et al. posited that technological development mitigates disaster by providing more resilient infrastructure and superior warning systems.
Although universally recommended for humanitarian, social and legal purposes, unfortunately only a small proportion of the people who lose their lives in large natural disasters will be subject to formal identification processes (Morgan, Tidball-Binz & Van Alphen 2006). This is not evidence of a lack of compassion or disrespect for a societal need for confirmation of identity of the deceased, but merely a reflection of the circumstances and location of the disaster. Many natural catastrophes occur in countries without highly developed scientific and forensic services and many victims are never recovered. Concomitant with this is a widespread cultural belief that the deceased will be a source of infection and disease and must be disposed of as quickly as possible irrespective of a need for identification (de Ville de Goyet 2000, Ranson 2005, Morgan 2004, Morgan, Tidball-Binz & Van Alphen 2006). The majority of identifications completed in these incidents are via visual recognition and the ability to recognise an individual decreases significantly after decomposition has begun. The availability and accessibility of ante-mortem information against which to make a scientific identification comparison are also limiting factors in many countries, with either the information having been destroyed in the disaster or not existing in the first place (Pan American Health Organisation 2004).

Scanlon (2006) commented on the difficulties faced by Indonesian authorities after the 2004 Boxing Day Tsunami. The level of destruction made long term storage and preservation of the nearly 200,000 deceased and the location of reliable ante-mortem information impossible. The Indonesian Police did make a concerted effort to identify service members and their families, but of the 14,000 who died less than 50 were able to be identified.

While the social and legal consequences of non-identification are well understood, an additional interesting corollary was described by Duartes (2004) in his case study of the eruption of the Casitas Volcano in Nicaragua in 1988. None of the 2,500 victims of the eruption were formally identified which meant that their names were not legally removed from any public registers, including the electoral role. At the local Mayoral elections held one year later
all the adult victims were still legally entitled to vote, with the consequent obvious potential for electoral fraud.

1.3 Disaster Victim Identification

Disaster Victim Identification (DVI) is a series of highly coordinated multidisciplinary procedures used to recover and identify the victims of mass fatality incidents. While managed and coordinated by police, many scientific and specialist forensic disciplines, for example pathology, odontology and biology, contribute to the process. These identification activities form part of all the investigations that accompany any incident where many people lose their lives.

The International Criminal Police Organisation (Interpol) was established as The International Criminal Police Commission in 1923, and aims to assist international and cross-border criminal police cooperation. Global police communication services, operational data services and databases for police, operational police support services and training and development are core functions. Approximately 186 of the 195 countries of the world are members of Interpol. The Interpol DVI Guidelines and associated forms, published originally in 1984 (see Chapter 4 for more detail), are recognised by the vast majority of countries outside the United States as the best practice method for data collection in multiple fatality incidents to facilitate identification of victims (Griffiths, Hilton & Lain 2003, Payne-James et al. 2005, Vermylen 2006, Sidler et al. 2007).

These guidelines divide the DVI process into five phases. Phase 1 details activities at the scene; Phase 2 is the procedures in the mortuary; Phase 3 covers ante-mortem information retrieval; Phase 4 involves reconciliation and Phase 5 personal and incident debriefing. These processes are aimed at collecting data that will result in the maximum number and certainty of identifications in a timely manner but also provide information that may assist in any investigation into the incident.
DVI activities at the scene can only begin after any survivors have been triaged and evacuated. It is accepted that this may result in loss of evidence that might both aid in identification of the victims and also assist in investigations into the cause of the incident, including any criminal activity. With potential criminal activity in mind the location of the incident is treated as a crime scene to ensure as much information as possible is preserved and recorded. The Interpol Guidelines (Interpol 1997) recommend that the location of each body, body part and piece of property is recorded with reference to a known point by experienced police officers. Pathologists and odontologists may be included in the scene teams to identify body parts and dental structures, particularly where severe body fragmentation has occurred. Scanlon (2006) observed that the ability of jurisdictions to meet this recommendation was largely incident specific.

In a compact well controlled disaster site it is easy to manage the recovery process but this is not the usual occurrence, particularly in large scale natural disasters. More regularly in such incidents, the 2004 Asian tsunami being a good example, victims are spread over a large area and survivors begin collecting the deceased before authorities arrive at the scene.

Phase 2 covers the activities that occur in the mortuary where all post-mortem information about the victims is collected. This involves recording the condition of the remains and any clothing and associated personal effects, taking fingerprints, performing medical and dental autopsies, and exposure of radiographs. Samples for the analysis of DNA may also be taken. This process is time consuming with precision and attention to detail being paramount. The time necessary to accurately collect information from all the victims of a large disaster can be considerable and frequently causes consternation and distress to families of victims who are unaware of the importance of these procedures.

Phase 3, collection of ante-mortem personal information, is a critical aspect of the DVI process and is best conducted by highly trained and experienced
police officers. Part of the information collection in this phase is the gathering of medical and dental records, and DNA reference samples. For this information to be useful in the identification process it needs to be transcribed onto the appropriate Interpol forms by members of the relevant specialist disciplines.

Phases 1, 2 and 3 entail the systematic collection and recording of information. The reconciliation phase, Phase 4, constitutes the formal identification process and involves comparison of the post-mortem and ante-mortem information. Separate specialist groups (e.g. pathologists, odontologists, fingerprint experts) examine the available information and reach identification conclusions individually. This information is then amalgamated and potential or likely identifications formally documented, via the use of elimination tables. This is then presented to a multidisciplinary oversight group called the Identification Board for final verification. Remains of victims will only be repatriated to families at the successful completion of the reconciliation formalities.

The last phase, debriefing, is often divided into two aspects. Personal debriefing is recommended for all participants in a DVI incident both during and immediately after the event in an effort to minimise and manage stress. Incident debriefing usually occurs some time after the incident is complete and is procedural in nature and aimed at improving practices and activities.

1.4 Personal Identification via Forensic Odontology

Forensic odontology has been defined as “the application of dental science to the administration of the law and the furtherance of justice” (Taylor 1963) and “that branch of dentistry, which in the interest of the law, deals with the proper handling and examination of dental evidence and the proper evaluation and presentation of such evidence” (Keiser-Nielsen 1970) and “the overlap between the dental and the legal professions” (Pretty & Sweet 2001). In practice it primarily has application in identification of the deceased, and on occasion the living; age estimation; bite mark analysis; and in some jurisdictions issues of jurisprudence and dental negligence.
Age estimation uses the developmental stages of deciduous and permanent teeth to ascribe a chronological age, with appropriate biological margins of error or range (Liversidge & Molleson 1999, Liversidge, Lyons & Hector 2003, Liversidge et al. 2006, Maber, Liversidge & Hector 2006, Cameriere et al. 2008, Meinl et al. 2008). The analysis of bite mark injuries is predicated on an interpretation of bruise patterns left on human skin, although marks left on inanimate objects are also considered (Sheasby & MacDonald 2001, Wright & Dailey 2001, Freeman, Senn & Arendt 2005, Bowers 2006, Blackwell et al. 2007). These marks may have been made by either human or animal dentitions and may be offensive or defensive in nature (James et al. 2002, Cirillo & James 2004, James & Cirillo 2005, James 2006, Murmann et al. 2006). Dental jurisprudence investigates the professionalism of dentists in their practicing lives, including charges of malpractice and negligence, and is part of the remit of forensic odontologists in European countries.

The underlying tenet of identification via dental comparison is that human teeth are unique enough to be able to discriminate between individuals (Pretty 2007). Underpinning this principle are two factors. First, that teeth are the hardest structures in the human body and are able to survive most traumas (Scholl & Moody 2001, Adams 2003a, Clement & Hill 2005, Milroy 2005, Pretty 2007), and second, in western countries at least, the majority of the population have attended a dentist at some stage in their lives, and that this dentist has kept detailed records of the patient’s dental status either in written or radiographic form (Keiser-Nielsen 1963, Gustafson 1966, Scholl & Moody 2001). These conditions provide consistent pre- and post- death information to make reliable comparisons possible.

Although recognised and used spasmodically since the beginning of the twentieth century, the specialty of forensic odontology only really began its professional development from the 1960’s (Luntz 1977). In many countries it is now used routinely to identify deceased individuals. As an example, in New South Wales on average 45,000 people die each year (NSW Registry of Births
Of these registered deaths, approximately 5,500-6,000 annually are referred to the State Coroner for an investigation into the circumstances surrounding the death. Seventy five percent of the referred deaths require a forensic autopsy. Annually the NSW Forensic Dental Unit assists in the formal identification of approximately 200 of these individuals. Other identifications will have been achieved via visual recognition, fingerprint or DNA comparisons. These figures are fairly consistently repeated, per head of population, across all other states of Australia.

Considerable discussion in the forensic odontology literature has addressed the validity of the concept of uniqueness in human dentition. Thompson observed in 1897; “There are so many variations of peculiarities of the teeth and of artificial operations upon them, that there is but a remote chance of the same case ever being exactly supplicated. Every practicing dentist can testify to that fact”. While this statement reflects the generally accepted convention it provides no actual evidence in support of uniqueness. This contention was not challenged scientifically for many years. Keiser-Nielsen (1977) pointed out that no physical feature is in fact unique. He also correctly explained that a dental identification does not rely on the presence of a single feature, but on the presentation of the features evident on 32 teeth in the complete adult dentition. He posited that the multiplication of combined occurrences allows an odontologist to be confident that duplications in other individuals are unlikely to occur. To highlight the individuality of a given dentition he cited the case with 4 missing teeth and 4 restored teeth which would give 736,281,000 possible combinations, leading him to conclude that it would be just about impossible to observe 2 identical combinations.

Working against this argument is the fact that we know that certain teeth are more commonly extracted or filled than others. It is very common to have first and second molars restored and less common to have lower incisors filled. Gustafson (1966) reported on a study of school children aged between 10 and 16 years. Of these children, 164 had a filling that would be charted identically to that of another child. He concluded that additional information, including
fluorosis stains and radiographs would be necessary to discriminate between these children should forensic identification be required.

More recently Adams (2003b) argued that the statistical analysis used by Keiser-Nielsen was not correct as it had assumed that the presentation of individual dental characteristics, for instance carious lesions, were independent events, something now known not to be the case. Adams looked at the occurrence of specific dental patterns, for instance all four first molar teeth being restored, and concluded that the diversity was great, and significant enough to support identification by dental comparison (Adams 2003a, b).

Some researchers have attempted to weight the presence or absence of given dental procedures to incorporate regional diversity of dental patterns and idiosyncrasies of dental treatment, all in an attempt to refine the reliability of identifications (Clement et al. 2006, Al-Amad et al. 2007). These weightings need to be population specific as it is also known that caries experiences are not consistent across populations and communities, due to a number of factors including exposure to fluoride and dental education. They also need to be regularly updated as practices in dentistry change over time.

Forensic recording of dental characteristics involves dividing each tooth into five surfaces; mesial (front), distal (back), lingual (toward the tongue), vestibular (toward the cheek) and occlusal (biting), and recording the status of each of these surfaces both graphically on an odontogram and descriptively in words. Information recorded includes the presence or absence of the tooth; the presence of anatomical variations both of the teeth and surrounding structures; the location and material of any restorations; evidence of any habits or personal behaviours and other features that could contribute to the identification of the individual. Given that an adult dentition has a maximum of 32 teeth, and each tooth is divided into 5 surfaces this provides 160 points of potential comparison. Comparisons are made of entire dentitions, individual teeth and individual surfaces.
The use of a minimum number of concordant points to establish identity has been advocated as a method to guarantee reliability of the dental identification process. This use of comparative points is similar to that historically used in fingerprint analysis, where matches were attested by a predetermined number of corresponding ridge details, variously anywhere between 10 and 16 (Cole 2004, Leadbetter 2005). For dental comparisons Keiser-Nielsen (1977) and Sognnaes (1976) recommended a minimum of 12 points of similarity to increase accuracy, while Stimson (1975) proposed 8. In these discussions ‘points’ referred to the matching of entire teeth not single surfaces.

Acharya and Taylor (2003) reviewed 690 cases from the files of the Forensic Odontology Unit at the University of Adelaide and found that 80 percent of confirmed identities, and 52 percent of ‘consistent with’ cases did have 12 or more points of concordance. There were, however, a number of cases where identity was confirmed with less than 12 points; in fact 7 were confirmed with 1 point only. These authors concluded that a minimum number of concordant points was unnecessary, and that each identification should be determined on its individual merits as some dental features do carry more evidentiary weight than others and could be considered unique on their own. Sopher (1976), Mertz (1977) and Adams (2003a, b) have made similar recommendations.

Hill (1989) cautioned reliance on the use of points of correspondence as he felt there was a risk of short-cuts being made by investigators where concordant points to the minimum might only be calculated and the entire details of the case not given full consideration. He also felt that lay people may be misled by the presentation of numbers and statistics and could misinterpret a lower level of correspondence as indicating a less convincing identification. These changes in philosophy, from use of a minimum number of concordant points to an analysis of all available information, also mirror those that have occurred in fingerprint analysis where the emphasis has moved toward a systematic review of details with the examiner determining that two patterns have ‘sufficient uniqueness to individualize’. In addition, each fingerprint

As the profession of forensic odontology has matured greater emphasis has been placed on the use of dental radiographs as part of the identification procedure. This has increased the ability to characterise individuality as it is possible to include outlines and borders of restorations as unique attributes. The majority of restorations are created manually by the dentist using a high speed air turbine drill, meaning that no two fillings will be identical in shape. Matching the shape of restorations provides increased confidence in the comparison process (Mertz 1977, Stene-Johansen, Solheim & Sakshaug 1992, Andersen et al. 1995, Raitz et al. 2005, Bux et al. 2006, Jackowski et al. 2006, Nuzzolese & Di Vela 2007).

1.5 Forensic Odontology and Disaster Victim Identification

The ability of dental comparisons to achieve rapid and accurate identifications in both single and multiple fatality situations has long been recognised (Dahlberg 1976, Mertz 1977, Hill 1988, Hill, Howell & Jarmulowicz 1988, Clark 1990, Brkic et al. 1997, Pretty & Sweet 2001, Schuller-Gotzburg & Suchanek 2007). The eminent English pathologist Sydney Smith commented in 1928 “I have had so much help from the teeth in identification that I strongly advise a complete record of the condition of the teeth to be kept in every examination of unknown bodies”.

The utility of dental comparison as an important, and reliable, identification tool in mass fatality incidents is recognised in the fact that odontology is considered a primary, or stand alone, identifier in the Interpol guidelines. This means that once identification is confirmed by dental information no additional supporting evidence is required by the authorities. Fingerprints and DNA comparisons are also considered as primary identifiers in the DVI process.
Hill (1988) commented that the courts expect forensic odontology to be a professional skill whose practitioners have completed graduate training in the discipline. Cox et al. (2008) indicated that forensic odontologists are “qualified dental practitioners with additional formal training and relevant experience in the medicolegal aspects of dentistry”. The forensic application necessitates standardised, internationally recognised procedures be employed by all practitioners. This has long been recognised by practicing forensic odontologists as Brown commented in 1988 “well organised protocols will not only expedite the identification process and improve morale of the personnel involved, but more importantly, will project an image of professionalism that will inspire the confidence of relatives of the deceased thus minimising their mental trauma and distress.” Morgan et al. reiterated this in 2006 with their comment “the rights of survivors to see their dead treated with dignity and respect requires practical guidelines and technical support.” Cox et al. (2008) reinforced these sentiments by indicating that professionals involved forensic practise have “moral imperative to undertake these services to the highest possible standard” and that a failure to do so is a disservice to both the deceased and their families. They indicated that the common approach afforded by the use of standardised procedures and protocols ensures maximum recovery and application of evidence aimed at meeting these high standards.

While the need for guidelines and procedural documentation is regularly reinforced in the literature (Byard, Cooke & Ledistsche 2006, De Valck 2006, Lessig, Thiele & Edelmann 2006, de Villiers & Phillips 2007b, Nuzzolese & Di Vella (2007), there are few recommended procedures actually published. Personal experience of the author indicated that while the vast majority of forensic odontologists do employ similar practices, very few can identify a formal document which guides their practice. This shortcoming is duplicated within Interpol, which has acknowledged that no international agreements actually exist between police services regarding disaster victim identification practices (www.interpol.org).
1.6 This Project
The geneses of this project were the experiences of the author following, initially, the 2002 Bali Bombings and subsequently, the 2004 Boxing Day Tsunami. Approximately 20 Australian trained forensic odontologists, and a small number of international specialists, were deployed to Denpasar to assist the Indonesian authorities in identifying the 202 victims of the bombings of Paddy’s Bar and the Sari Club. Many international forensic odontologists assisted the Thai authorities, variously reported as anywhere up to 200 from 33 countries (James 2005, De Valck 2006, Petju et al. 2007), after the Asian tsunami. Variations in practice and procedures among the Australian odontologists highlighted that the professional body representing forensic odontologists in Australia (AuSFO see page 21) would be well served by the development of an overarching and consistent set of operating principles that could be adopted nationally and used when assistance of AuSFO members was requested internationally.

This thesis documents the development of a comprehensive practice guide for use by Australian forensic odontologists in a mass fatality incident. To understand the value of this document in a professional context the project also looked at the development and application of forensic odontology in multiple fatality incidents in Australia. This evolution has seen forensic odontology grow from a spasmodically used ad-hoc service to the consistent professional service delivered by practitioners today.

The research question addressed in this project will be “is the Delphi technique is an appropriate tool to assist the Australian Society of Forensic Odontology to develop a set of guidelines and Standard Operating Procedures for Disaster Victim Identification practices”?

Chapter 2 will provide a brief overview of the history of forensic odontology internationally and recount early attempts at achieving international agreement for best practices in disaster victim identification. The role and value of forensic odontology in disaster victim identification will be considered and finally the
development of services in both forensic odontology and disaster victim identification in Australia will be discussed.

Chapter 3 explores the 2004 Asian Tsunami as a case study of experiences of a forensic odontologist in an international disaster victim identification response, and to comment on the use of guidelines as part of this operation.

Chapter 4 will address the need for descriptive procedures and look at those that currently exist both for Disaster Victim Identification and in particular for the practices of forensic odontology at a disaster. These are discussed against the activities that occur in each of the phases of a DVI response, thereby giving the reader a broader understanding of the principles of disaster victim identification. Aspects pivotal to a professional forensic odontology response will also be addressed.

Chapter 5 discusses formal techniques available to achieve consensus among groups of people, in particular the Delphi technique. The appropriateness of the Delphi technique for this project will also be addressed.

Chapter 6 presents the materials and methods and results of the Delphi based project used to derive the Australian Society of Forensic Odontology Disaster Victim Identification Forensic Odontology Guide.

Chapter 7 discusses the results of the Delphi based project used to derive the Australian Society of Forensic Odontology Disaster Victim Identification Forensic Odontology Guide.

Chapter 8 summarises the project and its expected importance in the fields of forensic odontology and disaster victim identification.
CHAPTER 2

THE HISTORY OF DISASTER VICTIM IDENTIFICATION WITH PARTICULAR REFERENCE TO THE USE OF FORENSIC ODONTOLOGY IN AUSTRALIA

This chapter will provide a brief overview of the history of forensic odontology internationally and the early attempts at achieving international agreement for best practices in disaster victim identification. The role and value of forensic odontology in disaster victim identification will be considered and finally the development of services in both forensic odontology and disaster victim identification in Australia will be discussed.

2.1 Forensic Odontology

Although it has been reported that forensic odontology was used to identify victims of a fire in the Vienna Opera House in 1878 (Strom 1954, Gustafson 1962, 1966, Griffiths 2004), the modern era of forensic odontology is said to have commenced with the identification of the victims of the Bazar de la Charité fire which occurred on May 4, 1897 in Rue Jean-Goujon, Paris. One hundred and twenty six members of the Parisian aristocracy perished after an ether-oxygen film projector ignited a rapidly destructive fire. All but 30 of the victims were identified visually or by personal effects, mainly jewellery, on the day after the fire.

The honour of being the ‘father of forensic odontology’ is often bestowed on Oscar Amoedo, a Cuban dentist working in Paris at the time of the fire, but he did not in fact do any of the odontology work at this incident. The author of “L’Art dentaire en Medecine Legale” (Amoedo 1898), which was a considerable text on many aspects of the use of teeth for legal purposes, merely reported the outcomes of the work done by other dentists after the fire. The credit for the idea of using dental information to assist the final identifications actually belongs to the Paraguan Consul, Mr Albert Haus. With the identification of the last 30 victims seeming almost impossible Mr Haus suggested consulting the dentists who had treated the remaining missing persons. One of the unidentified victims was the Duchesse d’Alencon who
was a daughter of the Duke of Bavaria and sister of Elisabeth, Empress of Austria and Anne, Queen of Naples. A Dr Isaac B Davenport had provided dental services to the duchess and many of the other victims. He was apparently a trained botanist as well as a dentist and his detailed notes included excellent drawings of the dentition (Paoli 1997). He examined the majority of the remaining unidentified bodies and was eventually able to identify the duchess via her dentition. Subsequently, a number of other dentists were invited to examine the remains of the deceased, and eventually all but 5 of the victims were able to be identified. The police accepted these dental identifications and released the bodies to the families (Amoedo 1897, Hill et al. 1984, Keiser-Nielsen 1992, Paoli 1997).

Prior to the Bazar de la Charité fire the most frequently cited examples of the use of teeth and dental work in the identification of the deceased were those of Lollia Paulina by Agrippina using visual recognition of ‘distinctive teeth’ in AD49; Charles the Bold in 1477; General Joseph Warren by Paul Revere via a fixed wire silver bridge in 1776; Dr Parkman by Nathan Keep from the fit of dentures on study models in 1849 and Napoleon the IV in 1879 (Prinz 1915, Humble 1933, Schirnding 1934, Luntz 1977, Hill et al 1984, Keiser-Nielsen 1992). Reid (1884) and Humble (1933) also cite other cases where dental information was used to identify deceased persons.

Strom (1954) reported that the use of teeth to aid identification in the modern understanding had in fact initially been proposed by Godon in 1887, but a report by M’Grath in 1869 described the use of dental characteristics to differentiate between two incinerated females, and a paper by Reid in 1884 discussed many cases using dental science for both personal identification and age assessment, one as early as 1835. Schirnding (1934) indicated that the Coroners Act of 1886, the Prussian Regulations of 1875 and the Austrian Instructions for the holding of an inquest dated 1855, all contained reference to the use of teeth to establish identity.
After the Bazar de la Charité fire many authors published case studies on the use of forensic odontology in both single and multiple fatality incidents. Rosenbluth (1902) described a case in the United States in 1898 where dentistry played a pivotal role in a murder case. Ryan (1937) mentioned the identification of US Sailors from an accident in 1927, commenting on the high quality of the dental records kept by the Navy, and Gustafson (1962) recounted a fire in Oslo in 1938 where 29 people died. Simpson (1951) summarised a number of English cases of the early 20th century. Strom (1954) and Gustafson (1962) reported on the identification of victims of the Second World War via forensic odontology. Teare (1951) discussed the identification of the 28 victims of a plane crash in 1950, Frykholm (1956) described a Swedish shipping accident in 1950 where 15 were killed and Mercer, Reid & Uttley (1954) and Warren (1955) a rail accident in New Zealand in 1953 where 151 perished. Bradley & Miller (1955) described the use of odontology in the identification of victims of a plane crash in Canada. The odontology aspects of the identification of the 118 victims of a fire aboard the SS Noronic in Toronto Harbour were described in detail by Grant, Prendergast & White in 1952.

While these reports would appear to indicate that forensic odontology was well recognised as a discipline, Frykholm (1956) did comment that both the German and Swedish authorities involved in his case report ‘reflected a certain disbelief’ about the value of forensic odontology, and that the assisting dentists had no personal experience in forensic odontology prior to this case. It would be reasonable to assume that both appreciation of the value and experience in forensic odontology were varied across the globe, as can be expected with any relatively new and emerging area of knowledge and investigation.

Histories of forensic odontology acknowledge that the next significant publication after Amoedo was that of Gustafson in 1966 (Gustafson 1966). This comprehensive text covered principles of identification in single and multiple death situations, information that can be ascertained from the dentition, the responses of teeth and restorations to various traumas and the investigation of bite mark injuries. Although more than 40 years old, the text
remains relevant for contemporary practitioners. Texts by Japanese (Furuhata & Yamamoto 1967), American (Luntz & Luntz 1973, Sopher 1976) and British (Cameron & Sims 1974, Harvey 1976) authors, and an edition of the Dental Clinics of North America in 1977 soon followed, marking the arrival of a new specialist discipline within the field of dentistry. Professional associations relating to forensic odontology soon followed, for instance the Canadian Society of Forensic Odontology was formed in 1970 (Burgman 1987), the British Association of Forensic Odontology in 1983 (Robson 2008), the New Zealand Society of Forensic Dentistry in October 1985 (Bell 2008) and the Japanese Society of Forensic Odontology in 1988 (Suzuki 1996), thereby exposing the discipline to larger numbers of interested dentists.

The American Society of Forensic Odontology formed in 1970 as a group open to any person with an interest in forensic odontology (Luntz 1977). In 1976 the American Board of Forensic Odontology (ABFO) was incorporated under the auspices of the American Academy of Forensic Sciences to “establish, enhance and revise qualifications and standards” and has developed a role as a certifying board of forensic odontologists (Dorion 1990). This is the only international society to take on such a formal role.

The International Association of Forensic Odonto-Stomatology (IOFOS) held its inaugural meeting in Paris in June 1973 (Danielsen 1977, Rotzscher 1992). Membership was initially open to any individual with an interest in forensic odontology, and was not limited only to dentists. It has since grown to be a group where membership is country based, having 21 member countries in 2007, and is the organisation representing the majority of forensic odontologists internationally.

The only international journal dedicated to forensic odontology, The International Journal of Forensic Dentistry was published from 1973 - 1977 and was the fore-runner to The Journal of Forensic Odonto-Stomatology, which commenced publication in 1982 (Rotzscher 1992).
In Australia, The Australian and New Zealand Forensic Science Society was formed in 1971 with the aim of bringing together scientists, police, pathologists and members of the legal profession (Payne-James et al. 2005). Dentists were, and still are, members of this group. Dentists with a special interest in forensic odontology formed The Australian Society of Forensic Dentistry, now known as the Australian Society of Forensic Odontology (AuSFO) in 1984.

Forensic odontology is now a well recognised specialty within dentistry. It is a core component of the curriculum in many dental schools and postgraduate training programs exist in many countries (Johanson, Drinnan & Keiser-Nielsen 1981, Clark 1985, Fixott 2001, Acharya 2006).

### 2.2 History of Disaster Victim Identification

The importance of rapidly identifying the victims of multiple fatality incidents has long been acknowledged. As previously discussed, formalised methods of victim recovery and scientific identification practices have been used sporadically throughout history. There does not, however, appear to be a universally acknowledged incident which has served to initiate the development of consistent disaster victim identification practices. Strom (1954) and Gustafson (1966) reported that Norway is considered to have established the first Identification Committee in 1945. In the police orders of 1948 relating to this Committee the following was reported: “In all cases where several victims are found at the same spot, the local prefect of police should appoint an identification committee consisting of three members; a police officer, a dentist and a doctor. This committee has the whole responsibility for the procedure of identification. The committee has to give a report of all details concerning the identification in relation to each body. Each single identification certificate is to be signed by all members of the committee. A body, therefore, is not considered identified unless the committee members are in complete agreement as to a positive identification. In cases of doubt the Prefect of Police should decide either whether the body is to be considered as identified or whether it should be buried as unknown. In the last event or in cases where it is impossible to establish the identity at that time, the body
should not be buried until an exact description of the teeth is obtained.” (Gustafson 1966, p 59). This was very forward thinking for the time, and is still sound policy sixty years later. The FBI report having formed a disaster squad in 1940 (FBI 1961) but the identification emphasis of this group was on the use of fingerprints, although the report does mention dental charts as a ‘valuable identification tool’. With no pathologists and odontologists on the squad the DVI activities were not as comprehensive as the Norwegian model.

Several incidents have served to progress the development of international standards in both DVI practices and the use of forensic odontology for identification in multiple fatality incidents.

A fire aboard the S.S. Noronic in Toronto Harbour in 1949 claimed 118 lives. The investigation and DVI process employed many of the currently recommended procedures for body recovery and identification. This incident was also the first reported use of elimination tables to simplify and add strategy to the final reconciliation process (Grant, Prendergast & White 1952).

Pedoussaut (1952) reported on the identification procedures used after a plane crash in France in 1950 killed 50 people. Of particular note was the use of an identification questionnaire which appeared similar in philosophy to the post-mortem and ante-mortem forms now promulgated by Interpol. The presentation of conclusions in a formal identification report for each victim was also an important development. The author also commented on the potential role of the International Criminal Police Commission (later Interpol) in the coordination of the identification procedures where international victims were involved. Indeed, the editor of the journal included a draft of an international convention then being considered by the International Criminal Police Commission for the identification of victims of air accidents. This could be considered as the first attempts at drafting the Interpol DVI guidelines.

The recovery and identification of the victims of the plane crash into Mt Erebus in the Antarctic in 1979 was reported as the first use of a grid reference for
recording the scene and the location of body and body parts (Pert 1980, www.nzhistory.net.nz).

Spurred by a fuel tank explosion tragedy in Spain in July 1978, Interpol explored the need for improved co-ordination and consistency in the identification of victims of mass fatality incidents and established a working party on Disaster Victim Identification in 1982. In this incident, a road tanker carrying liquefied petroleum gas (LPG) exploded outside a camping ground during the European summer holidays, killing over 200 people from a number of countries (Stinton 1983, Kletz 1986, Abbasi & Abbasi 2007). Victim identification had proved difficult and highlighted the need for guiding principles that would enhance international cooperation and improve the coordination of responses to similar incidents. Interpol’s working party evolved into a Standing Committee, and built on the work of Pedoussaut (1952). The Standing Committee still meets annually and a section of its agenda is devoted to analysis of case presentations, to enable practitioners to learn from the experiences of actual incident responses. The first Guide to Disaster Victim Identification was published in 1984 (Edwards 2007). This guide is now considered international best practice for disaster victim identification (Griffiths, Hilton & Lain 2003, Payne-James et al. 2005, Vermylen 2006, Sidler et al. 2007).

2.3 Forensic Odontology and Disaster Victim Identification

As mentioned previously, forensic odontology is one of the three disciplines that are considered to provide stand alone identifications in the Interpol Guidelines, the others being fingerprints and DNA (Interpol 1997).

There is some debate about the earliest use of forensic odontology in the identification of victims of multiple fatality incidents. Clark (1990) reported that the first use of forensic odontology in a multiple fatality incident in the current era of forensic odontology occurred after the crash of a BEA Viking at Heathrow Airport in October 1950, which killed 28 people. Grant, Prendergast & White (1952) and Burgman (1987), however, indicated forensic odontology
was used to assist identification of the victims after the fire on the S.S. Noronic claimed 118 lives in Toronto Harbour in 1949.

Tables 1a to 1f present a summary of deaths and percentages of victims identified by forensic odontology from 50 mass fatality incidents, covering aviation, rail, traffic and other accidents. Although comprehensive, these lists are by no means exhaustive yet serve to illustrate the value of forensic odontology in disaster victim identification. Dental comparisons contributed anywhere between 5 and 100 percent of identifications. The average percentage of dental identifications for the 50 disasters was 62 percent and the median 65 percent. Aviation disasters figure large in the forensic odontology literature, presumably because they represent the most frequent non-natural disasters, and entail large loss of life. For the 29 aviation disasters presented, 64 percent of identifications were achieved via forensic odontology, with the median 66 percent; very similar to the overall disaster statistics.

The world’s two largest aviation disasters are not included in this analysis due to lack of accurate published data. The accident resulting in the most fatalities occurred on the island of Tenerife in 1977 where a KLM Boeing 747, attempting to take off in poor visibility because of fog, collided with a Pan Am Boeing 747 on the runway killing 583 people. The greatest loss of life involving a single aeroplane accident was 520 people when a Japan Airlines Boeing 747 crashed about 30 minutes after take off from Tokyo International Airport in August 1985. The loss of a vertical tail stabiliser culminated in the plane crashing into the side of Mount Takamagahara. Four passengers actually survived this crash, although there was speculation at the time that many more may have survived the initial impact but perished awaiting the arrival of rescuers at the remote accident site. The vast majority of the victims of both these incidents were identified by forensic odontology. Eighty eight percent of the passengers on the Pan Am jumbo at Tenerife and 45 percent of the Japanese victims were identified from their dental information (Suzuki 1986, Brannon & Morlang 2001).
Another incident of note is the 1983 crash of Gulf Air Flight 771 where only 12 percent of the 112 victims were able to be identified. Clark (1986) reported that the low levels of both total and dental assisted identifications were due to severe fragmentation of the bodies making non-dental identification methods difficult and the lack of available ante-mortem dental records; records for only 6 passengers were able to be located. The vast majority of passengers were from Pakistan where dental treatment and quality record keeping are not as common as in western countries. The accessibility of dental records in different countries was also commented on by Petju et al. (2007) in their review of the value of dental records in identifying victims of the 2004 tsunami in Thailand. Of the 81.6 percent of the 3750 victims positively identified, 46.2 percent were achieved by dental comparison. Of these, only 2 percent were of Thai nationals, whereas 76.4 percent were European victims. It was possible to locate ante-mortem dental records for only 18 percent of Thai missing persons, and of these only 7 percent provided information useful in the identification process.

Dumancic et al. (2001) also commented that limited availability of ante-mortem dental records restricted the use of dental identifications following a rail accident in Croatia in 1974, with only 5 percent of identifications being achieved by dental comparisons. In contrast, significantly high levels of dental identifications are possible where access to ante-mortem records is almost guaranteed, for example when the deceased are military personnel, as can be evidenced from the results of identifications from Operation Desert Storm (100 %), the explosion of USS Iowa (96 %) and the crash of a US Air Force aircraft at Indianapolis airport (90 %) (Harke, Bifano & Koeller 2002, Kessler & Pemble 2003, Clark et al. 1994, Brannon & Morlang 2004).

The quality and availability of ante-mortem dental records, and other issues that affect the success of forensic odontology in the identification of victims of mass fatality incidents will be discussed in more detail in Chapter 4.
<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
<th>Victims</th>
<th>ID's</th>
<th>Dental ID</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1967</td>
<td>Stockport</td>
<td>72 (100%)</td>
<td>100</td>
<td>55 (47/8)</td>
<td>Haines 1967</td>
</tr>
<tr>
<td>1968</td>
<td>SAA Flight 228 (Windhoek)</td>
<td>122 (100%)</td>
<td>91</td>
<td>25</td>
<td>van Wyk et al. 1969</td>
</tr>
<tr>
<td>1970</td>
<td>Air Canada Flight 621</td>
<td>109 (100%)</td>
<td>81</td>
<td>60</td>
<td>Petersen, Kogon 1971</td>
</tr>
<tr>
<td>1971</td>
<td>Charter Flight (Rijeka)</td>
<td>78 (100%)</td>
<td>96</td>
<td>64</td>
<td>Haines 1972</td>
</tr>
<tr>
<td>1971</td>
<td>Allegheny Airlines (Connecticut)</td>
<td>28 (100%)</td>
<td>100</td>
<td>89</td>
<td>Luntz &amp; Luntz 1972</td>
</tr>
<tr>
<td>1974</td>
<td>Pan Am – Pago Pago</td>
<td>90 (100%)</td>
<td>100</td>
<td>57</td>
<td>Vale &amp; Noguchi 1977</td>
</tr>
<tr>
<td>1975</td>
<td>Eastern Airlines flight 66 (JFK)</td>
<td>113 (100%)</td>
<td>100</td>
<td>42</td>
<td>Glazer et al. 1977</td>
</tr>
<tr>
<td>1976</td>
<td>BA + Slovenian Plane (Vrbovec)</td>
<td>176 (100%)</td>
<td>94</td>
<td>22 (8/14)</td>
<td>Dumancic et al. 2001</td>
</tr>
<tr>
<td>1977</td>
<td>Tenerife – Pan Am + KLM jumbos collide</td>
<td>326* (100)</td>
<td>66</td>
<td>88 (74/14)</td>
<td>Brannon et al. 2001 (*US victims only)</td>
</tr>
<tr>
<td>1979</td>
<td>Air New Zealand Flight TE901 (Mt Erebus)</td>
<td>257 (87%)</td>
<td>96</td>
<td>66</td>
<td>Pert 1980 Alexander, Foote1998</td>
</tr>
<tr>
<td>1982</td>
<td>Pan AM Flight 759 (New Orleans)</td>
<td>154 (100%)</td>
<td>100</td>
<td>75 (60/15)</td>
<td>Barsley et al. 1985</td>
</tr>
<tr>
<td>1983</td>
<td>Gulf Air Flight 771 (Abu Dhabi)</td>
<td>112 (100%)</td>
<td>12</td>
<td>6</td>
<td>Clark 1986</td>
</tr>
<tr>
<td>1985</td>
<td>Galaxy Airlines Flight 203 (Reno)</td>
<td>70 (100%)</td>
<td>100</td>
<td>94</td>
<td>McCarty et al. 1987</td>
</tr>
<tr>
<td>1985</td>
<td>Air India flight AI182</td>
<td>329 (40%)</td>
<td>100</td>
<td>92 (75/17)</td>
<td>Clark 1994</td>
</tr>
<tr>
<td>1985</td>
<td>British Airtours (Manchester Airport)</td>
<td>55 (100%)</td>
<td>100</td>
<td>94</td>
<td>Hill et al. 1988</td>
</tr>
<tr>
<td>1985</td>
<td>Arrow Airways Flight 950 (Newfoundland)</td>
<td>256 (100%)</td>
<td>100</td>
<td>76 (70/6)</td>
<td>Brannon et al. 2003</td>
</tr>
<tr>
<td>1986</td>
<td>Aeromexico Flight 498 (LAX)</td>
<td>82 (unknown)</td>
<td>84</td>
<td>49</td>
<td>Vale et al. 1987</td>
</tr>
<tr>
<td>1987</td>
<td>US Air Force aircraft at Indianapolis Airport</td>
<td>10 (100%)</td>
<td>100</td>
<td>90</td>
<td>Clark et al. 1994</td>
</tr>
<tr>
<td>1987</td>
<td>Eysines</td>
<td>16 (100%)</td>
<td>100</td>
<td>100</td>
<td>Poisson et al. 2003</td>
</tr>
<tr>
<td>1988</td>
<td>Pan Am Flight (Lockerbie)</td>
<td>270 (100%)</td>
<td>94</td>
<td>83 (7/76)</td>
<td>Moody, Busuttil 1994</td>
</tr>
<tr>
<td>1988</td>
<td>Torghatten, Norway Dash 7</td>
<td>36 (100%)</td>
<td>100</td>
<td>89</td>
<td>Stene-Johansen et al. 1992</td>
</tr>
<tr>
<td>1989</td>
<td>British Midlands flight</td>
<td>44 (100%)</td>
<td>82</td>
<td>86</td>
<td>Clark 1994</td>
</tr>
<tr>
<td>1991</td>
<td>US Air and Metroliner at LAX</td>
<td>34 (100%)</td>
<td>100</td>
<td>65 (56/9)</td>
<td>Vale et al. 1991</td>
</tr>
<tr>
<td>1992</td>
<td>Thai Flight TG311</td>
<td>113 (13%)</td>
<td>73</td>
<td>45</td>
<td>Fernando et al. 1998</td>
</tr>
<tr>
<td>1992</td>
<td>Air Inter Flight IT5148 (Mount Ste-Odile)</td>
<td>87 (100%)</td>
<td>98</td>
<td>69 (18/51)</td>
<td>Ludes et al. 1994 Hutt et al. 1995</td>
</tr>
<tr>
<td>1992</td>
<td>Pakistan Internat flight PK268</td>
<td>167 (100%)</td>
<td>45</td>
<td>22 (18/4)</td>
<td>Clark 1994</td>
</tr>
<tr>
<td>1994</td>
<td>American Eagle flight 4184</td>
<td>68 (100%)</td>
<td>100</td>
<td>50</td>
<td>McGue 2006-2007</td>
</tr>
<tr>
<td>1995</td>
<td>Malaysian Airlines</td>
<td>34 (100%)</td>
<td>100</td>
<td>76</td>
<td>Nambiar et al. 1997</td>
</tr>
<tr>
<td>2001</td>
<td>Milan Airport – 2 planes collided</td>
<td>118 (100%)</td>
<td>100</td>
<td>25</td>
<td>Piccinini et al. 2004</td>
</tr>
</tbody>
</table>

1. number of victims, percentage of victims recovered in parentheses
2. percentage of victims identified (of victims recovered)
3. percentage of identifications where forensic odontology made a contribution. Numbers in parentheses; first number dental only, second number dental made a contribution to final identification where known.

Table 1a: Contribution of forensic odontology to identifications in aviation mass fatality incidents.
<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
<th>Victims&lt;sup&gt;1&lt;/sup&gt;</th>
<th>ID’s&lt;sup&gt;2&lt;/sup&gt;</th>
<th>Dental ID&lt;sup&gt;3&lt;/sup&gt;</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1994</td>
<td>Zagreb</td>
<td>152 (100%)</td>
<td>73</td>
<td>5</td>
<td>Dumancic et al. 2001</td>
</tr>
<tr>
<td>1997</td>
<td>Port-Sainte-Foy</td>
<td>13 (100%)</td>
<td>100</td>
<td>92</td>
<td>Chapenoire et al.1998 Poisson et al. 2003</td>
</tr>
</tbody>
</table>

1. number of victims, percentage of victims recovered in parentheses
2. percentage of victims identified (of victims recovered)
3. percentage of identifications where forensic odontology made a contribution.

**Table 1b: Contribution of forensic odontology to identifications in rail mass fatality incidents**

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
<th>Victims&lt;sup&gt;1&lt;/sup&gt;</th>
<th>ID’s&lt;sup&gt;2&lt;/sup&gt;</th>
<th>Dental ID&lt;sup&gt;3&lt;/sup&gt;</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1993</td>
<td>Saint-Martial de Mirambeau 40 vehicles</td>
<td>15 (100%)</td>
<td>100</td>
<td>53</td>
<td>Poisson et al. 2003</td>
</tr>
<tr>
<td>1996</td>
<td>Bus (Bailen)</td>
<td>28 (100%)</td>
<td>100</td>
<td>57</td>
<td>Valenzuela et al. 2000</td>
</tr>
<tr>
<td>1997</td>
<td>Bus (Illascas)</td>
<td>10 (100%)</td>
<td>100</td>
<td>80</td>
<td>Valenzuela et al. 2002</td>
</tr>
</tbody>
</table>

1. number of victims, percentage of victims recovered in parentheses
2. percentage of victims identified (of victims recovered)
3. percentage of identifications where forensic odontology made a contribution.

**Table 1c: Contribution of forensic odontology to identifications in traffic mass fatality incidents**

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
<th>Victims&lt;sup&gt;1&lt;/sup&gt;</th>
<th>ID’s&lt;sup&gt;2&lt;/sup&gt;</th>
<th>Dental ID&lt;sup&gt;3&lt;/sup&gt;</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1949</td>
<td>SS Noronic, Toronto Harbour</td>
<td>118 (100%)</td>
<td>100</td>
<td>50 (17/33)</td>
<td>Grant et al. 1952</td>
</tr>
<tr>
<td>1987</td>
<td>Herald of Free Enterprise Zeebrugge</td>
<td>193 (99%)</td>
<td>100</td>
<td>66 (55/11)</td>
<td>Clark 1994</td>
</tr>
<tr>
<td>1988</td>
<td>Piper Alpha Oil Rig explosion</td>
<td>167 (100%)</td>
<td>81</td>
<td>76 (66/10)</td>
<td>Clark 1991</td>
</tr>
<tr>
<td>1989</td>
<td>USS Iowa – accidental explosion</td>
<td>47 (100%)</td>
<td>100</td>
<td>96 (30/66)</td>
<td>Brannon &amp; Morlang 2004</td>
</tr>
<tr>
<td>1990</td>
<td>Scandinavian Star</td>
<td>158 (100%)</td>
<td>100</td>
<td>92 (68/24)</td>
<td>Solheim et al. 1992</td>
</tr>
<tr>
<td>1994</td>
<td>MS Estonia</td>
<td>852 (11%)</td>
<td>100</td>
<td>60</td>
<td>Soomer et al. 2001</td>
</tr>
</tbody>
</table>

1. number of victims, percentage of victims recovered in parentheses
2. percentage of victims identified (of victims recovered)
3. percentage of identifications where forensic odontology made a contribution. Numbers in parentheses; first number dental only, second number dental made a contribution to final identification where known.

**Table 1d: Contribution of forensic odontology to identifications in marine mass fatality incidents**

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
<th>Victims&lt;sup&gt;1&lt;/sup&gt;</th>
<th>ID’s&lt;sup&gt;2&lt;/sup&gt;</th>
<th>Dental ID&lt;sup&gt;3&lt;/sup&gt;</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1985</td>
<td>Bradford City Football Ground fire</td>
<td>50 (100%)</td>
<td>100</td>
<td>66 (48/18)</td>
<td>Ayton et al. 1985</td>
</tr>
<tr>
<td>1994</td>
<td>Solar Temple</td>
<td>48 (100%)</td>
<td>100</td>
<td>44</td>
<td>Krompecher 2000</td>
</tr>
<tr>
<td>1997</td>
<td>Blaye, exploding grain silo</td>
<td>11 (100%)</td>
<td>100</td>
<td>18</td>
<td>Poisson et al. 2003</td>
</tr>
<tr>
<td>2000</td>
<td>Jonestown mass suicide</td>
<td>923 (99%)</td>
<td>73</td>
<td>33 (11/22)</td>
<td>Brannon et al. 2002</td>
</tr>
<tr>
<td>2003</td>
<td>Cedar Fire California</td>
<td>15 (100%)</td>
<td></td>
<td>33</td>
<td>Cardoza 2004</td>
</tr>
</tbody>
</table>

1. number of victims, percentage of victims recovered in parentheses
2. percentage of victims identified (of victims recovered)
3. percentage of identifications where forensic odontology made a contribution. Numbers in parentheses; first number dental only, second number dental made a contribution to final identification where known.

**Table 1e: Contribution of forensic odontology to identifications in miscellaneous mass fatality incidents**
<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
<th>Victims¹</th>
<th>ID's²</th>
<th>Dental ID³</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1983</td>
<td>Beirut bombing of US Marine HQ</td>
<td>241 (100%)</td>
<td>99</td>
<td>83 (28/55)</td>
<td>Gillespie et al. 1985</td>
</tr>
<tr>
<td>1991</td>
<td>Operation Desert Storm</td>
<td>251 (100%)</td>
<td>97</td>
<td>100</td>
<td>Kessler, Pemble 1993</td>
</tr>
<tr>
<td>1993/4</td>
<td>Mass graves in Croatia, Bosnia and Herzegovina</td>
<td>61 (100%)</td>
<td>57</td>
<td>43</td>
<td>Primoric et al. 1996</td>
</tr>
<tr>
<td>1997</td>
<td>Mass graves in Croatia (Petrinja)</td>
<td>46 (100%)</td>
<td>59</td>
<td>16</td>
<td>Brkic et al. 1997</td>
</tr>
<tr>
<td>2000</td>
<td>Mass graves in Croatia</td>
<td>1000 (100%)</td>
<td>82</td>
<td>89</td>
<td>Brkic et al. 2000</td>
</tr>
</tbody>
</table>

1. number of victims, percentage of victims recovered in parentheses
2. percentage of victims identified (of victims recovered)
3. percentage of identifications where forensic odontology made a contribution. Numbers in parentheses; first number dental only, second number dental made a contribution to final identification where known.

Table 1f: Contribution of forensic odontology to identifications in military and war related mass fatality incidents

2.4 Forensic Identification in Australia

Pounder and Harding (1984) have reported that the first autopsies were conducted in Australia in 1790, one on a victim of inanition (starvation) and the other on the governor’s gamekeeper who was allegedly murdered by Aborigines. Pounder (1984) reporting on death investigations in the early years (1839 – 1840) of South Australia indicated that both the coroner and jurors were required to view the body of the victim as part of the inquest procedures. Although the stated purpose was for the examination of marks of violence, it could also be surmised that it was also for the formal identification of the victim. This practice remained until 1907. Cordner, Ranson & Singh (1992) indicated that the first lectures on forensic medicine were held in Melbourne in 1866.

It is not really known when forensic odontology was first used in Australia. A report in the New South Wales Police News in 1943 reported the identification in Melbourne, Victoria of a murder victim, Bertha Couphlin, in 1923 and of Norman List in 1924, using dental evidence (Anonymous 1943). This article also mentioned that the identity of three victims of a plane crash in the Dandenong Ranges in 1938 “could only be established by means of the teeth”. Cleland (1944) mentioned the identification of a New Zealand citizen in Western Australia in 1930, although this identification appeared to rely more on circumstantial dental evidence than to be a true dental identification.
The most famous identification case from that era occurred in New South Wales in 1934. Colloquially known as the Pyjama Girl Case, the outcome highlights the value of dentistry in identification, but also the pitfalls that can derail the well intentioned but ill-prepared, both dental practitioners and investigating police officers. It involved a murdered woman who remained unidentified for 10 years, ostensibly due to unreconciled dental information. The badly burned remains of the victim were discovered by a farmer in a road culvert near Albury in September 1934. The body was clothed only in pyjama remnants and revealed little other identifying information. A post-mortem was carried out and a local dentist, Dr Francis Jackson, was asked to complete a dental autopsy. His unorthodox procedures can best be explained by his inexperience in forensic odontology, but mitigated by the fact that few people had any experience at that time. At the subsequent Supreme Court trial he admitted that this was his only experience of forensic odontology and he found the process “revolting and unnerving” (Coleman 1978, Brown 1982b).

Dr Jackson’s unconventional examination occurred over three visits. On the first he made some observations and extracted two teeth, on the second he extracted an additional four teeth and on the third he took upper and lower impressions of the jaws. The extracted teeth were then mounted into the stone dental models made from the impressions “in approximately the same position as they were in the mouth”. During the course of these examinations Dr Jackson incorrectly identified one tooth and failed to observe restorations in two other teeth. These inaccuracies proved pivotal in the inability to identify the remains for 10 years. Photographs of the casts with the extracted teeth in situ were distributed to dentists in Australia and New Zealand, and every dentist in metropolitan Melbourne and Sydney was personally contacted by police. Information about this case, including images of the extracted teeth, was also displayed as ‘ads’ in movie theatres. Unsurprisingly, none of these activities yielded any useful information.
The police relied on public appeals to attempt to identify the victim. Apparently over 500 women who had been reported missing were located in the course of the investigation. Ultimately the remains were preserved in a formalin bath and it became quite a social outing to visit “the body in the bath” at Sydney University. Many false identifications were offered to police from these viewings. About 9 months after the victim was found police interviewed a man, Antonio Agostini, whose wife Linda had been reported missing by a family friend. This gentleman indicated that he did not recognise the lady in the bath but provided police with the details of his wife’s dentist.

The information provided by this dentist did not match the post mortem information provided by Dr Jackson and the investigation continued. Interestingly the dental information provided by the treating dentist was also somewhat unorthodox. It transpired that he kept no formal clinical records and the information he provided was an amalgamation of personal recollection and ledger entries of fees paid. This information would be legally inadmissible today.

In 1944 new investigating officers decided to review all the information relating to the case and asked another dentist, Dr Magnus, to re-examine the body. Dr Magnus was more thorough in his work, correctly identifying all the teeth and locating previously unobserved restorations. On comparison the new charting matched the ante-mortem dental information of Linda Agostini. Antonio Agostini subsequently admitted to having murdered his wife in 1934 (Coleman 1978, Brown 1982a, b).

This case highlights the importance of experience and procedure in forensic odontology, the value of comprehensive clinical records and attention to detail during the collection of post mortem information.

2.5 Disaster Victim Identification in Australia
The first regularly cited use of DVI practices in Australia is subsequent to the crash of a Vickers Viscount aircraft leased to Ansett Airlines by Trans
Australian Airlines (TAA) into Botany Bay on 30 November 1961 resulting in the death of 15 people. The chief investigating officer, Detective Sergeant WB Ross, realised the challenge that would be faced in identifying the victims and indicated in his final report that he had researched extensively prior to planning recovery and identification procedures.

Ninety four body parts were recovered over 12 days. All identifications were confirmed by visual recognition by family and friends. Several references to the use of teeth and dentistry are made in the case file. Several of the identification summaries of the victims made reference to “favourable comparison of dental charts”. There is no explanation as to why this comparison was favourable, except in one instance where reference is made that “..dentist identified the teeth mentioned in the morgue book as that of the deceased”. There is no indication of what the entries in the morgue book contained, or who made them. It would also seem that the dentist making this comparison was the dentist of the victim and not an experienced forensic odontologist (NSW Police Case File).

An outcome from this investigation was the development of a Disaster Victim Identification Form for use by the NSW Police. Detective Sergeant Ross indicated that he modelled these forms on information published by a French police officer in a 1952 edition of the International Criminal Police Review (Pedoussaut 1952). Both these forms bear a striking resemblance to the current Interpol DVI forms, and it is reasonable to surmise that they provided the skeleton from which the Interpol forms evolved as both French and Australian police officers attended early Interpol standing committee meetings (Edwards 2007).

2.6 The Development of Forensic Odontology Services in Australia

In order to gain an appreciation of the origin and evolution of forensic odontology and its use in DVI in Australia the senior forensic odontologist(s) and a senior Police officer involved in DVI in each state and territory were interviewed as one element of this thesis. These interviews were conducted
in a manner consistent with the University of Newcastle ethics approval processes (Number H-091-0805) (see Appendix 1). Potential interviewees were invited to participate, either by face-to-face interview or via telephone or email communication. A set of semi-structured questions relating to the introduction of forensic odontology, early cases where forensic odontology was used, and the development of Disaster Victim Identification practices were compiled (see Appendix 2).

The senior forensic odontologist in each state and territory participated in the interviews, and a police officer in all states, except Victoria, was also interviewed.

These interviews revealed that the development of formal services in forensic odontology followed a similar path in most states and territories. From around the early 1960s there was spasmodic use of dentists to assist police in identification procedures. This was generally an informal arrangement with little or no remuneration which meant that the dentists providing the services frequently had to complete examinations and prepare reports after hours and at weekends. In the vast majority of cases a single practitioner provided the entire service. Limited training in forensic odontology was available to these dental practitioners and it is a credit to their dedication and professionalism that the discipline has developed to the high standard and international reputation it enjoys today.

2.6.1 New South Wales

The New South Wales Forensic Dental Unit is currently headed by Associate Professor Chris Griffiths AM. Associate Professor Griffiths first exposure to forensic odontology was in 1974 when as the senior Air Force dentist stationed in Butterworth, Malaysia, he was asked to identify the remains of 2 airforce personnel who died when 2 mirage fighters crash landed on the runway. With no experience or training in forensic odontology he was able to complete the identifications, and gained an interest in the discipline. After returning to Sydney he enrolled in a Master of Public Health program and wrote his
dissertation on aspects of disaster victim identification. He also contacted Dr Norbert Wright the then Chief Dental Officer of New South Wales, who in conjunction with Drs Max Bullus and John Wild, had provided the odontology services for the state since the early 1960’s, and began to assist them in their work. On leaving full time military service in 1981 Associate Professor Griffiths accepted a position at Westmead Hospital and over the next few years found that his forensic workload was increasing. At this stage the service was still relatively unstructured and minimally remunerated, so Associate Professor Griffiths commenced the process of getting forensic odontology formally recognised and funded in New South Wales through the Health Service.

Associate Professor Griffiths also maintained his involvement with the Defence Forces as a reservist and he has been instrumental in developing an ADF capability and ensuring the majority of dentists are well trained in DVI principles. Associate Professor Griffiths was awarded a National Medal in 1979 and made a Member of the Order of Australia (AM) in 1995 for his contribution to forensic odontology (Griffiths C 2007).

Although the police in New South Wales had been using odontology regularly for single identifications since the 1960’s it was not routinely used in multiple fatality incidents. The 83 victims of the 1977 Granville train accident were identified visually and using jewellery and documents, and the formal review of this incident saw the NSW Police form a dedicated DVI squad. It was the Grafton bus crash in 1989 which highlighted the limitations of visual identification and changed identification practices in New South Wales. One of the 21 victims of this accident was initially incorrectly visually identified so when just over 2 months later 35 people were killed when 2 buses collided near Kempsey forensic odontology was used to identify the majority of the victims. Subsequently, forensic odontology has been used as part of the identification repertoire in all mass fatality incidents in New South Wales including the Newcastle earthquake in 1989 (13 deceased), the Thredbo landslide in 1997 (18 deceased), the Glenbrook train accident in 1999 (7 deceased) and the 2003 Waterfall train disaster (7 deceased).
2.6.2 Victoria

Dr Gerald (Gerry) Dalitz provided the early forensic odontology services in Victoria. In 1961 he was awarded a Doctor of Dental Science for a thesis entitled ‘Some aspects of dental science - Identification of human remains’ by the University of Melbourne. While collecting data for his research his expertise came to the attention of the Victoria Police and they slowly began utilising his services (Dalitz 2008). Dr Ross Bastiaan started working with Dr Dalitz in 1979, continuing until 1989.

The Victorian DVI odontology team was formed in 1981, and over 35 dentists volunteered to help Dr Bastiaan when the need arose (Bastiaan 1984). Twenty two of these volunteers assisted after the Ash Wednesday bushfires of 1983 claimed 47 lives in Victoria. Fourteen of the 22 (64%) Victorian victims who could not be visually recognised were identified via forensic odontology (Bastiaan 1984).

Professor, then Dr, John Clement arrived from the UK in 1989 to take up a position in the dental school at the University of Melbourne. Professor Clement had considerable experience in the forensic odontology and had worked on a number of mass fatality incidents including the Free Enterprise at Zeebrugge in 1987. Upon arriving in Melbourne Professor Clement was instrumental in establishing a broader and more professional forensic odontology service in Victoria, including the introduction of the first graduate training program and the only Chair in Forensic Odontology in Australia (Clement 2008, Hill 2008).

Forensic odontology now forms a routine part of single and multiple death investigations in Victoria, including the Kew Cottages Hostel fire in 1996 (9 deceased), the Linton bushfires in 1998 (5 deceased), a light plane crash at Myrrhee in 2002 (6 deceased), the Mt Hotham plane crash in 2005 (3 deceased), a car accident at Donald in 2006 (8 deceased), the Kerang train crash in 2007 (9 victims) and the crash in the Burnely Tunnel in 2007 (3 deceased). All of these victims were identified by forensic odontology.
2.6.3 South Australia

Dr Kenneth Brown’s interest in forensic odontology was sparked in 1961 when he attended a lecture entitled ‘Dental aspects of forensic medicine’ presented by Professor Gosta Gustafson who was the Professor of Oral Pathology at the University of Lund in Sweden. In 1967 he responded to a request by the South Australian Police Department who were looking for volunteer dentists to provide them with dental expertise. Dr Brown read widely but as there were no formal training programs in Australia at the time he used a Churchill Fellowship in 1976 to travel internationally to increase his knowledge and experience in the field of forensic odontology. His honorary work for the South Australian Police continued until a formal post in forensic odontology, the first such position in Australia, was created at the University of Adelaide in 1980. Dr Brown was the Director of the Forensic Odontology Unit until his retirement in 2000, and can be considered one of the pioneers of the field in Australia. He was made a Member of the Order of Australia (AM) in 2006 for his contribution to the discipline. Drs Jane Taylor (2000 – 2003) and Helen James (2004 – present) have succeeded Dr Brown as leaders of this unit, which has a strong commitment to education, service and research in forensic odontology (Brown 2007b).

The largest mass fatality incident in the recent history of South Australia was the ‘Ash Wednesday’ bushfires of 1983. Twenty eight South Australians lost their lives in fires in the hills surrounding Adelaide and in the south east of the state near Mount Gambier. This incident saw the first activation of the newly written State Disaster Plan. Eight (29%) of the South Australian victims were identified by dental comparison (Pounder 1985). Prior to this at accidents such as the 1970 crash of a passenger train and bus at Gawler (17 deceased) and the 1972 crash of a light aircraft at Golden Grove (8 deceased) scene recovery protocols were well established but not the use of the standardised forms to document body recovery, ante-mortem and post-mortem information. Identification of the victims of these incidents was achieved through personal effects and fingerprints. South Australian Police used these experiences and those of the New Zealand Police after the Mt Erebus plane crash to develop
DVI protocols and procedures to be used in South Australia (Telfer 2008, Van Dijk 2008, Wright 2008).

South Australia seems to have developed a national reputation as the locale for bizarre murders with the victims of many of these incidents being formally identified by forensic odontology. In what became known as the Truro murders seven young women were murdered over a seven week period commencing just before Christmas in 1976. The final set of remains was not located until two years after the last murder. Dental records were used to identify five of the victims, with additional corroborative identification information being provided by craniofacial superimposition. This was one of the first reported uses of this adjunct identification technique which subsequently became widely used internationally (Brown 1983, Brown 1993, Aulsebrook et al. 1995). It is believed that this series of murders only ceased when the principle offender was killed in a car accident. The public success of this case was one of the reasons why the Forensic Odontology Unit was established.

Not long after the memory of these murders faded, another series of linked killings occurred, this time involving 5 young males. The media referred to these as the ‘Family’ murders as the perpetrators were believed to be a close group of homosexual friends. Once again forensic odontology was crucial in the identification of these victims.

More recently has been the serial murders which became known as the Snowtown ‘Bodies in the Barrels’ making reference to the location of 8 of the 11 victims and the method of storage employed by the murderers. These bodies were discovered in May 1999. Forensic odontology was central to the identification of 8 of the victims, and contributed to the identification of 2 others (Brown 2007).
2.6.4 Queensland

Dr Kon Romaniuk moved from New Zealand to take up a position in the dental school at the University of Queensland as an oral pathologist in the early 1970’s. As appears typical for most developing services in Australia he provided an honorary consultation service in forensic odontology, later establishing a more formalised arrangement that provided a modicum of remuneration.

Dr Alex Forrest started working as an assistant to Dr Romaniuk in 1985, and became the consultant forensic odontologist in 1994 after a traffic accident necessitated Kon’s retirement (Forrest 2007).

The Queensland Police Service has been very forward thinking with regard to DVI. In 1981 approximately 40 officers were seconded to a new “DVI Squad” and instructed to be prepared to “recover dead bodies from disasters and identify them” (Rach 2007). This was prior to the establishment of the Interpol DVI Standing Committee and little in the way of formal guidelines and documentation existed so the new team had to learn and refine as they went. The first incident for the new squad occurred after a boarding house fire in the inner city suburb of Highgate Hill claimed 7 lives. Although the identification of the victims was completed via visual recognition and circumstantial evidence, the incident highlighted to the DVI officers that training and use of scientific identification techniques were going to be very important to the future success of the squad. Over the subsequent years the team attended many incidents including a bus crash in October 1994 where 11 people lost their lives. Throughout this time identification of the victims of these incidents was completed using a variety of methods including visual recognition and forensic odontology. The Moura coal mine explosion in 1986 required scientific identification of the 13 deceased miners as recovery of the victims was severely delayed due to high methane levels in the mine, resulting in marked decomposition of the remains when they were recovered.
Perhaps the most defining DVI incident for Queensland was the crash of 2 Blackhawk helicopters near Townsville in June 1996. Although an army incident the state DVI Squad recovered the bodies and coordinated the identifications. Dr Alex Forrest was asked to help with the identification of the 15 victims with Australian Defence Force (ADF) assistance provided by Associate Professor Chris Griffiths, and all victims were identified by dental comparison (Forrest 2007).

Subsequent to the Blackhawk accident all major mass fatality incidents in Queensland have employed forensic odontology identification techniques as the first preference. These have included the Childers Backpackers Hostel fire in June 2000 (15 victims) and the Lockhart River plane crash in May 2005 (15 victims).

2.6.5 Western Australia

Pocock in his 1979 paper on the provision of a forensic pathology service in Western Australia commented that a part-time forensic odontologist was “available for consultation in and problem of identification”. This position had been established in early 1960s and was held by Dr Frank Digwood, and became a formal part-time position in the 1980s. Dr Stephen Knott provided assistance to Dr Digwood from 1991, and succeeded him on his death in 1993.

Significant cases in Western Australia where forensic odontology has made a valuable contribution include the Sideris murder in 1981; the Merredin bus crash in 1982 and the 1988 crash of a light aircraft near Leonora which killed 10. In the Sideris murder Dr Digwood was able to match 3 teeth recovered from a remote site, thought to be the murder scene, back to the mouth of the deceased (Zanetti 1985). Forensic odontology provided the identification for eight of the 10 victims of the Merredin bus crash, and 7 of the 10 victims of the Leonora plane crash (Knott 2008). Case load in Western Australia is approximately 80 cases per year, with the majority (about 85%) being identification.
Superintendent Hayden Green has been the DVI Commander in the Western Australian Police since January 2005. He recalls using DVI principles being used in the Merredin bus crash, but believes DVI practices were probably first used seriously in WA at the Gracetown cliff collapse which killed 18 teenagers in 1998 (Green 2006).

2.6.6 Tasmania
Dr Paul Taylor has been the consultant forensic odontologist in Hobart since 1990. Case load is not high in the sparsely populated state and Dr Taylor believes he may have undertaken around 100 cases in just over 17 years of work. He was ably assisted by Dr Marie Wilson during the years she worked in Hobart. The DVI case of note in recent memory for Tasmania is the Port Arthur massacre of 1996, where Martin Bryant shot and killed 35 and wounded 19. Three of these victims were subsequently burnt beyond recognition in a fire set by the gunman in a nearby guest house where he had held them hostage overnight. The identification of these three victims was assisted by odontology evidence. The fire was so extensive and intense that almost 30 kilograms of debris was collected during the recovery of the bodies to ensure all possible remains were located. One body was so severely incinerated that only fragments of both jaws and a few teeth were able to be located. Two of the victims wore dentures, one a full upper against some remaining lower natural teeth, the other full upper and lower dentures. One full upper denture survived the conflagration. Dental and medical radiographs of the head area were instrumental in confirming the identification of these victims (Taylor, Wilson & Lyons 2002). The identification of the other 32 victims was completed by visual recognition by family and friends, and use of engraved jewellery and documents found on the deceased (Taylor 2007).

Prior to Dr Taylor becoming involved in forensic odontology, limited odontology services were provided by Dr Canning, a non-practicing dentist who worked in the anatomy department at the University of Tasmania. Dr Canning assisted in an ad hoc arrangement with the Tasmanian Police and would have assisted in identifying some of the victims of the 1967 bushfires (62 victims), the Mt St
Canice Boiler explosion in September 1974 (8 victims) and the Tasman Bridge collapse in January of 1975 (12 victims). Inspector John Bird, the current Officer in Chief of Forensic Services in Tasmania has indicated that no formal DVI procedures were used for any of these incidents but that forensic odontology was used to identify victims where appropriate (Bird 2007).

### 2.6.7 Northern Territory

Tyas (1974) has reported the use of dental evidence to identify a skeleton discovered near Alice Springs in 1971. It is believed that early forensic odontology services were provided by Dr T Paul Boyd who worked part time as an oral surgeon in the public health system. Dr John Plummer had an interest in forensic odontology from his undergraduate years but his first exposure came in the late 1970s when he was the government dentist in Katherine and was asked to help identify a family who had been drowned after a flash flood had washed away their homestead. Dr Plummer continued his professional development in forensic odontology by using a Churchill Fellowship, awarded in 1985, to travel extensively and meet and work with a number of forensic odontologists internationally. As a health service employee Dr Plummer continued his involvement in forensic dentistry on an honorary basis until his retirement in 2002, which proved satisfactory as the case load in the Northern territory was not large.

Although the Northern territory has not experienced many mass fatality incidents, one of Australia’s largest did occur in Darwin. Cyclone Tracy, which struck on Christmas Eve in 1974 resulted in the death of 71 people. While it is believed that those who were recovered at the time of the cyclone were identified visually a number of victims who were recovered in later years were identified via forensic odontology. All 13 victims of the collision of two hot air balloons over Alice Springs in 1989 were also identified via dental comparison (Plummer 2007).

Dr Mark Leedham, a Darwin based orthodontist, currently provides the forensic odontology service for the Northern Territory.
2.6.8 Australian Capital Territory

Covering a small geographic area, the Australian Capital Territory has not experienced many multiple fatality incidents. Incidents such as the 1991 plane crash in the Brindabellas (4 killed) and the 1993 MIG crash at Canberra airport were co-ordinated and managed by the Search and Rescue division of the Australian Federal Police ACT with identifications being completed via dental comparison (Travers 2007).

These identifications were performed by Dr David Griffiths who has been the ACT consultant forensic odontologist since 1991. His desire to be involved in forensic odontology was heightened after a murder in Canberra in 1988 where the victim remained unidentified for approximately 3 months. Dr Griffiths thought this was both unacceptable and unnecessary and after completing some training courses offered his services the ACT police. He continues to work in an honorary capacity although does admit that the annual work load is not excessive (Griffiths D 2007).

The Australian Federal Police increased their experience and involvement in DVI with their participation in the investigation and identification of the victims of the 2002 Bali bombings (Australian Federal Police 2003). This, and involvement in the identification of victims of the 2004 Boxing Day Tsunami in Thailand, have led the AFP to refine their practices and equip themselves with a considerable amount of readily deployable equipment (Griffiths D 2007, Travers 2007).

2.6.9 Consistencies across State and Territory Services

These interviews revealed some consistencies in practices across the states and territories and some areas of difference. All states and territories use the Interpol forms (F1 and F2, see Appendix 3) for collation of both ante-mortem and post-mortem information. The Northern Territory and Tasmania do not have documented protocols and procedures for their activities, while the Queensland documents, written after the Tsunami, were identified as being
‘draft’ and in need of updating. All other states and territories have formalised procedures.

The use of computerised matching programs to assist dental identifications also varied, with South Australia being the only state to use a computerised program as part of routine case work. This program, called OdontID, was written by a former staff member of the Forensic Odontology Unit (Taylor 1987). The comparison program D.A.V.ID was created in Victoria (Clement et al. 2006, Al-Amad et al. 2007) but is not used in routine casework. Similarly, the program Identic was written by a postgraduate student in New South Wales (Arneman 1991) but is not used routinely. At the time of writing the Australian Federal Police had purchased multiple licences for the Plass Data™ DVI System International program (see page 52 for discussion) for use by state and territory police forces. Most state odontology services were in discussion with their jurisdictional police to arrange access to this program.

2.7 Summary
Disaster Victim Identification principles have been employed by some police services from the 1940s, but it was the establishment of the Interpol Standing Committee on Disaster Victim Identification in 1982 which brought the importance of a coordinated and well documented response to both the recovery and identification of the victims of a mass fatality incident to the attention of most western police forces and associated forensic specialities.

The value of dental characteristics to identify deceased individuals has been well recognised since the late nineteenth century. Earliest accounts of the use of forensic odontology in Australia date to the 1930s. An organised and semi-formal service commenced in most states sometime in the 1960s although its use by police forces was spasmodic. Today the service provided by qualified and experienced forensic odontologists is highly professional and regularly utilised by police and coronial services. The majority of Australian forensic odontologists have considerable experience in the identification of victims of mass fatality incidents, both within Australia and internationally.
Uniformity of procedures across the country would be desirable and enhance community trust in the services provided. The development of the Australian Society of Forensic Odontology Disaster Victim Identification Forensic Odontology Guide would be a positive initial step toward this. This consistency of approach would ensure appropriate rigour in the services provided by Australian forensic odontologists and readily facilitate regular quality assurance.
CHAPTER 3

CASE STUDY: THE ASIAN TSUNAMI

The Asian Tsunami of late 2004 provides a good case study against which to describe and analyse the phenomenon and experiences of a forensic odontologist in a multiple fatality incident. It will also provide context and experience against which to judge the value of protocols and procedures such as those that have ultimately been documented and designed as part of this project. As indicated earlier the experiences of the researcher and others in the DVI aspects of both the Bali Bombings in 2002 and the Tsunami in Thailand was the impetus for the development of the DVI Practice Guide and ultimately this project.

While much has been written about the impact of, and recovery from the tsunami, little of the published literature addresses the use, or adequacy of, standardised procedures. This discussion will use the available literature and personal experience to describe the strengths and limitations of the forensic odontology activities utilised in Thailand. The researcher spent 8 weeks in 2005 over 4 rotations between January and October in Thailand assisting the DVI process. The breadth of this exposure enabled a thorough understanding and appraisal of the various phases through which the response developed and both the positive and negative aspects of the forensic odontology response.

3.1 The Disaster

The Sumatra-Andaman Islands earthquake measured 9.0 on the Richter scale with an epicentre off the west coast of Sumatra, Indonesia (Cummins & Leonard 2005, Kohl et al. 2005, Yamada et al. 2006). The resultant tsunami caused massive coastal destruction in 12 countries bordering the Indian Ocean including Indonesia, Thailand, Malaysia, Sri Lanka, India, The Maldives and Kenya. The earthquake ruptured for 10 minutes but the tsunami waves travelled for many hours afterwards. The speed of travel of the waves was governed both by distance from the epicentre of the earthquake and also by
the depth of water traversed. This helps explain the arrival times of the tsunami in both Thailand and Sri Lanka. The affected areas of Thailand lay 580 kms from the epicentre while those of Sri Lanka were 1,815 kms away, but the tsunami arrived at approximately the same time, about 100 minutes, after the earthquake.

It was reportedly one of, if not the, largest recorded earthquake of the preceding 100 years (Cummins & Leonard 2005, Kohl et al. 2005), one of the tsunamis of greatest magnitude (Kohl et al. 2005) and one of the most extensive disasters of the modern era (Lessig, Thiele & Edelmann 2006, Morgan et al. 2006). The magnitude and ferocity of the waves varied but have been reported as being 15-30 metres high in Indonesia, 10 metres high in Thailand and 1-5 metres high in the Maldives. The water travelled anywhere up to three kilometres inland depending on the coastal geography and vegetation (Kohl et al. 2005). The resultant damage and destruction was enormous with nearly half a million people being left homeless and a further 2 million being internally displaced over the affected countries (Kohl et al. 2005).

The total fatalities will never truly be accurately known but have been variously reported as nearly 217,000 (Tun et al. 2005), 226,408 (Morgan et al. 2006), more then 227,000 (Telford & Cosgrove 2007), 230,000 (Wahlstrom 2005), 275,000 (Sweet 2006, Pate 2008) and over 280,000 (Kwak et al. 2006). Due to the timing of the disaster with most men being away at work, the death tolls featured a disproportionately large number of women and children and it is believed that this will impact heavily on the affected communities in the future (Kohl et al. 2005, Nishikiori et al. 2006, Roy 2006, Doocy et al. 2007).

3.2 First Responses
Early responses to the devastation were understandably chaotic and poorly organised. Perera (2005, 2006) commented that the lack of a formalised national disaster plan hampered responses in Sri Lanka. Similar responses were probably experienced in most countries affected by the tsunami (Morgan et al. 2006). Tun et al. (2006) commented that prior to the tsunami Thailand
did not have a mass fatality plan. Morgan et al. (2006) reported that when the tsunami struck there were no technical guidelines for managing the fatalities from large natural disasters, and that this lack compounded the early disorganisation. Roy (2006) believes that the uncoordinated response was inevitable in the situation regardless of the degree of pre-planning.

Any natural disaster will generate shock, disorientation and bewilderment in survivors, no matter how well prepared they are. For the majority of countries affected by the tsunami, and the individuals involved in early responses, this disaster produced the most severe damage, loss of life and personal injury they had ever have experienced, or will likely ever experience again. It is also important to remember that early priorities properly focussed on the care and safety of survivors before any attention was given to the deceased. Even countries with the most well developed disaster plans will experience some chaos and disorganisation in an initial post-disaster period.

Roy (2006) reported that the Indian response to the tsunami was a typical disaster response, with initial rescue and recovery activities being undertaken by locals and outside assistance arriving at a later stage. Lau, Tan and Tan (2005) commented that the events in Thailand unfolded like a “textbook-like” disaster, progressing from chaos and confusion to relative order over time.

### 3.3 Management of the Deceased

Early body recovery and storage was directly affected by the lack of pre-planning and preparation, but also because physical infrastructure was so extensively destroyed by the tsunami (Morgan et al. 2006, Sweet 2006, Tun et al. 2006).

While easy to be critical in hindsight, not many nations could reasonably have anticipated the need to plan for a disaster of this scale and extent. Some authors have subsequently commented that since the events of September 11, 2001, in the United States and the tsunami in 2004, planning for large scale
incidents has become imperative, even for smaller nations (Lau, Tan & Tan 2005, Oyegbite 2005, Tun et al. 2005).

As mentioned in Chapter 1, management of deceased victims of disasters is frequently primarily governed by public health concerns. Widespread and understandable beliefs exist that decaying bodies are a source of infection and disease and the most common response is to dispose of the remains rapidly, usually by mass burial. A number of authors have indicated that this belief is unfounded; unless the deceased directly contaminate drinking water or are infected with plague or typhus (de Ville de Goyet 2000, Wisner & Adams 2002, Scanlon 2006, Tsokos et al. 2006). Thieren (2005) referred to the practice of mass burial as “public health malpractice”. Morgan et al. (2006) observed that no epidemics occurred in Indonesia during the two months it took to bury the majority of victims. Refrigerated body storage is frequently mentioned as the best way to calm public health concerns but Morgan et al. (2006) also noted that all countries involved in the tsunami lacked adequate facilities for body storage, let alone refrigerated storage.

Some authors have also commented that the practice of mass burial adds to the long term psychological suffering of the bereaved and for this reason alone should be considered as unacceptable (Thieren 2005, Tun et al. 2005, Morgan et al. 2006, Roy 2006).

Lack of pre-planning and descriptive guidelines or awareness of the pressing need to identify the victims had other consequences. Recovered bodies were not tagged or their location recorded (Perera 2005, Sribanditmongkol et al. 2005, Schuller-Gotzburg & Suchanek 2007). As described by Scanlon (2006) this was primarily due to early body recovery being undertaken by volunteers. It could not reasonably be expected that these people, many of whom were disaster survivors, would have any appreciation of the need to allocate each body an identifying number or record the location from where they were recovered. Once authorities took over this responsibility it might be expected that body recording became part of the procedure, but this was not routinely
the case. This contributed to later difficulties with body tracking during the examination and identification phase, confusion and errors including duplication of body numbers, and potentially on reconciliation of family members. All of these problems were experienced in Thailand (Sribanditmongkol et al. 2005).

3.4 Identification of the Deceased

Few formal identification procedures were undertaken in the vast majority of countries affected by the tsunami (Centers for Disease Control and Prevention 2005), particularly in Indonesia where the majority of fatalities (~165,000) occurred. Eight of the affected countries (Kenya, Madagascar, Malaysia, Maldives, Myanmar, Seychelles, Somalia and Tanzania) reported less than 100 deaths each due to the tsunami (James 2005, Kohl et al. 2005) and it is not known how the management of the deceased was handled in these nations.

Most of the literature has concentrated on experiences in three countries; Indonesia, Sri Lanka and Thailand, where a large number of international victims were located. Little has been published about the response in India where it is reported that nearly 11,000 people died, but it appears that no forensic identification procedures were employed (Roy 2006).

Indonesian authorities completed less than 500 identifications by visual recognition and personal effects, but decomposition made this impossible after the first few days (Morgan et al. 2006).

Sri Lankan authorities initially attempted to identify the deceased, estimated at between 30,000 and 35,000 (Kwak et al. 2006, Morgan et al. 2006, Yamada et al. 2006), but were overwhelmed by the process and ended up recording fingerprints only and then burying victims in mass graves (Perera 2005, Morgan et al. 2006, Yamada et al. 2006). A number of these graves were later re-opened and bodies exhumed in an attempt to identify missing foreigners (Aboshi 2005, Perera 2005, Morgan et al. 2006, Scanlon 2006).
Victims who were obviously foreign nationals were transported to Colombo where British, French, German and Austrian experts assisted local specialists. These identifications were mostly achieved by dental and DNA comparisons (Perera 2005, Morgan et al. 2006, Scanlon 2006).

The large number of foreign tourists killed in Thailand (approximately 3,500 of 5,500 – 6,000 deceased), and the expectations of their home nations that these victims be formally identified, saw this country become the focal point for international identification activities for victims of the tsunami.

3.5 The Disaster Victim Identification Response in Thailand

De Valck (2006) commented that there was a lack of structure and standard routines evident in the initial response to the tsunami in Thailand. Sribanditmongkol et al. (2005) indicated that although all disasters in Thailand are managed by the Department of Disaster Prevention and Mitigation (DPM) of the Ministry of the Interior, the scale of the tsunami disaster overwhelmed the response in the first few days. By the 29th December the DPM was organised, in charge and delegated the responsibility for identifying the victims to the Royal Thai Police Force, except in the Province of Phang Na where this was under the control of the Forensic Science Institute within the Ministry of Justice. This division of responsibility did cause some tensions at higher administrative levels but the impact was minimal on the day-to-day activities of the forensic workers (Scanlon 2006).

As the DPM employed few pathologists and only one forensic odontologist it was recognised quite early that additional expert scientific assistance would be required. A dual approach was adopted with requests to both local and selected international groups (national police services) for assistance (James 2005). An impressive response was received from local Thai dentists with over 500 volunteering. The majority of these had no prior forensic experience, necessitating some training before examinations could begin. This training was provided by a member of the Australian dental team who could speak some Thai (James 2005).
Prior to the arrival of international specialist groups local authorities and volunteers managed as best they could (Sribanditmongkol et al. 2006). Sribanditmongkol et al. (2005) and Tun et al. (2005) believe that the initial lack of a central command and the confusion this caused were the fundamental reasons why many of the initial activities departed from accepted DVI practice. They commented that bodies were not numbered nor the recovery location mapped. The majority of bodies were photographed and many, but not all, were fingerprinted. A large number of bodies were released to families in this period with identifications being achieved only via visual recognition (Sribanditmongkol et al. 2005, Scanlon 2006, Tsokos et al. 2006, Szibor et al. 2008). Morgan et al. (2006) reported this figure to be about 500 bodies, while Petju et al. (2007) indicated it was as many as 1600. It will never be known if these identifications were correct or not. Scanlon (2006) reported an incident where two bodies released in this period were later discovered as having been incorrectly identified. Initial lack of storage facilities prompted authorities to bury several hundred bodies in mass graves (Lau, Tan & Tan 2005, Szibor et al. 2008). These graves were subsequently re-opened and the victims examined as part of the identification process (Tsokos et al. 2006).

International specialist DVI groups began arriving in the first few days after the disaster. As is consistently seen with MFI’s involving international victims many uninvited countries sent police and specialists to assist with the identification of their own citizens. Though arriving for admirable reasons, this inundation of specialists added to the confusion and chaos of the situation (Emerson et al. 2005, Cox et al. 2008). In Thailand some of these international groups refused to follow agreed procedures (James 2005, Tun et al. 2005, De Valck 2006, Scanlon 2006) and did not respect the jurisdiction of the police services or local customs. Unfortunately many of these groups arrived in Thailand without equipment provisions and expected the local authorities to be able to meet their requests (James 2005). This added to a sense of disorganisation in the mortuaries and undoubtedly slowed the identification process down on occasions.
Facilities for storage of bodies and post-mortem examinations were initially established at 4 locations; ‘Site 1A’ at Wat Yang Yao and ‘Site 1B’ at Wat Ban Muang in Takua Pa province, ‘Site 2’ at Mai Khoa and ‘Site 3’ at Krabi. These facilities were located in Buddhist temples and required the conversion of existing structures to accommodate the various disciplines in the mortuary phase (Centers for Disease Control and Prevention 2005, James 2005, Tan 2005). The use of these locations in Buddhist temples, separated by quite a distance from each other, was an attempt to meet and respect traditional Thai customs and beliefs about the management of the dead. Site 2, provided by the Norwegian company Normeca, ultimately became the central, and only, autopsy facility with dedicated temporary hospital facilities (James 2005).

On January 12th 2005, a little over a fortnight after the event, an executive committee for the management of the identification of the victims was established. The Thai Tsunami Victim Identification (TTVI) was under the overall command of the Thai authorities with assistance provided by Interpol and a number of nations including Australia, the Netherlands and the United Kingdom. One of the responsibilities of the TTVI was to determine protocols for use in all aspects of victim identification (Centers for Disease Control and Prevention 2005, Lau, Tan & Tan 2005, Sribanditmongkol et al. 2005, De Valck 2006, Tsokos et al. 2006, Petju et al. 2007, Robertson 2008).

3.6 The Forensic Odontology Response
Dental post-mortem operating procedures were established early within the larger DVI process (James 2005, Tan 2005, De Valck 2006, Kieser, Laing & Herbison 2006). These procedures were based on the Interpol guidelines and were thus soundly grounded in international best practice. One immediately evident shortcoming was that they were not universally employed across the 4 sites (Grampp & Huckenbeck 2005, James 2005, Scanlon 2006, Tsokos et al. 2006) leading to variable quality of post-mortem results (James 2005, Kieser, Laing & Herbison 2006). Kieser, Laing and Herbison (2006) assessed the quality of a sample of post-mortem dental records generated at the various
mortuaries. They looked at a number of aspects including legibility of handwriting, compliance with operating procedures, correspondence of the odontogram with the written recordings, and whether the mortuary charting matched the information revealed in the radiographs and photographs of the dentition. Their investigation showed an unfortunate inconsistency in quality control, as 32 percent of radiographs and 51 percent of photographs revealed additional information which had not been recorded into the written chart. This inevitably resulted in identification uncertainty and the consequential need to re-examine many of the bodies (Grampp & Huckenbeck 2005).

Many factors contributed to this high anomaly rate. As noted by Kieser, Laing & Herbison (2006) post-mortem dental charting should normally be a relatively straightforward and mechanical procedure with a concomitant low error rate, yet this was not the case. Lau, Tan & Tan (2005) and Kieser, Laing & Herbison (2006) commented that fatigue was likely to have been a big causal factor in errors. Contributing to this fatigue would have been the large distances that many DVI personnel were required to travel each day. The intensity and extent of the devastation meant that many countries had to locate their personnel many kilometres from the mortuaries necessitating anywhere up to 3 hours travel each day, in addition to several hours of intensive work in hot, humid and uncomfortable conditions. Coupled with this, working conditions in the mortuaries were less than optimal, primarily due to poor lighting which made visualisation of some dental structures difficult. In addition, lack of DVI knowledge and experience is known to contribute to errors in recording (Dailey 1995). A number of dentists who participated in the TTVI had no previous DVI experience; some even had no experience in forensic odontology. As James (2005) sagely understated “a major disaster is not the place to learn the theory of DVI”.

Other dental protocols for ante-mortem and reconciliation processes were easier to maintain as these activities were located in a single facility (James 2005), although in their quality review of a random pool of 106 ante-mortem records Kieser, Laing & Herbison (2006) determined nearly two-thirds to be of
sub-standard quality. Inconsistencies in the quality of information received from different countries were also noted (De Valck 2006, Kieser, Laing & Herbison 2006, Scanlon 2006), and this undoubtedly slowed the reconciliation process.

Data management for such a large number of victims was, understandably, a major issue. The TTVI elected to use a Danish developed program Plass Data™ DVI System International, which is based on the Interpol forms. Essentially a database and sorting program it collated information input from physical, pathology and odontology examinations, both post-mortem and ante-mortem, and applied sophisticated searching and matching algorithms to highlight probable or potential matches. Final comparisons were then completed manually by the relevant specialists (Andersen Torpet 2006, James 2006).

A number of limitations were readily apparent with the utilisation of this software. Computing capabilities required to run the program over such a large scale response were initially not available and it took a while for the hardware and infrastructure to accommodate the needs of the process. Direct entry of data from the mortuaries was not available until the Normeca mortuary was constructed in the middle of 2005. This meant that all data recorded by hand on paper forms had then to be entered manually into the program, with the concomitant risk of additional errors. As this data entry was undertaken by local Thai volunteers with no previous experience of the program or DVI, the various specialist groups were obliged to add an additional quality control procedure to review first the accuracy of the data entry and then the activities of their own team members.

A further difficulty was that not all DVI practitioners were familiar with the program. Although widely used in Scandinavia, Europe and Australia, many other nations had no prior experience. This necessitated training of new arrivals, with the associated down time needed to become familiar with the program’s capabilities. Further, although English was the designated
language of the TTVI, the lack of a good command of the language by a number of practitioners increased the difficulty of training. Personally, this researcher recalls the challenge of training a group of French odontologists who were enthusiastic but not particularly computer conversant and had minimal technical English. Although a pleasant experience at the time, it served to underscore the comments of James (2005) and Nuzzolese and Di Vella (2007) regarding the need for comprehensive prior experience in all aspects of DVI.

Finally, the program itself had never been used for a disaster involving more than some 100 deceased (Andersen Torpet 2005). Although members of the parent company were always on site to assist and amend the program, operational problems were frequent. The sheer volume of data meant the system was frequently overwhelmed. Given that all data management was electronic, such stoppages meant little work could be achieved during those periods, frustrating many. With so many practitioners using the program it was also inevitable that many felt the need to advise the system administrators of ways to improve the program, or complain of perceived inadequacies with it. While always accommodating and ultimately beneficial for the ongoing development of the program, this must have been a great source of additional frustration for the programmers at the time.

Despite all these difficulties forensic odontology proved to be the single most useful identification method. As the primary means of identification, dental identifications accounted for 46.2 percent of the total, with fingerprints contributing 34.4 percent and DNA 18.6 percent of identifications (Petju et al. 2006). Successful dental identifications were noticeably predominant in the first months of the operation (James 2005, Petju et al. 2006). By May 2005, 79 percent of all identification had been based solely on dental evidence, and dental information had contributed to an additional 8 percent of identifications.
3.7 Other Scientific Disciplines
The DVI System International program did not have capabilities to record or match fingerprints or DNA information and separate systems were required for these two disciplines. Some authors have observed that protocols proved problematic in these other scientific areas, and that activities did not run as smoothly as those in the dental area. It is thought that the many refinements made to DNA sample collection and processing guidelines during this period contributed to the lower than anticipated identification rates by this discipline (Deng et al. 2005, Lessig, Thiele & Edelmann 2006, Szibor et al. 2008).

3.8 Some Peculiarities
“Disaster tourism” is a phenomenon frequently referred to in the disaster management literature and describes the early influx of both voyeuristic sightseers and altruistic volunteers who arrive with inappropriate aid and stay for only a few days (Emerson et al. 2005, Oyegbite 2005, Roy 2006).

James (2005) reported a different, but nonetheless similarly unacceptable, presentation of ‘disaster tourism’ where a non-accredited foreign dentist attempted to infiltrate the facilities and unfortunately was able to make contact with bereaved family members and provide them with erroneous information. This event reinforces the need for rigorous security at the sites where DVI activities are being carried out and for strict protocols for handling and disseminating reliable identification information.

Another unintended form of ‘disaster tourism’ was the attendance of foreign dignitaries and celebrities wishing to add their support to the Thai people and the endeavours of the identification teams. Although well intentioned and appreciated, the need for these people to visit the mortuaries was perhaps not great and did delay identification activities on the days of the visits. It does, however, serve to reinforce that disasters bring out the humanity in people and many wish to contribute in any way they can.
Scanlon (2006) highlighted one particular occurrence that is frequently seen in MFIs involving international victims. Often referred to as ‘cherry picking’, a small number of experts make a concerted effort to identify citizens of their own country, and on occasion go outside of agreed procedures to achieve this end. This may involve refusing to complete post-mortem examinations on victims obviously not of their own nationality; withholding post-mortem or ante-mortem information from general circulation; or taking of additional samples of, for example, fingerprints or DNA to be processed in their own laboratories. Tun et al. (2005) reported instances of this occurring in Thailand, and the researcher personally observed this happening on more than one occasion. The most common problem was not making ante-mortem information available to all those working in the reconciliation section, meaning that these practitioners were only ever searching for matching post-mortem information for people from their own countries. While in a narrow sense understandable, withholding information from the general pool is unprofessional and potentially detrimental to the process as a whole, and thereby evinces a disregard for the fundamental human need to identify the deceased, regardless of their nationality.

Roy (2006) also reported another variant of this behaviour where international rescue teams were alleged to have selectively rescued foreigners over locals. If true this would be profoundly unethical.

3.9 Conclusions and Lessons Learned

Patterson (2006) and Scanlon (2006) have stated that the international identification effort overall was an excellent model of cooperation because most involved generally strived to work to agreed standards. While this is superficially true it is fair to say that these authors were observers to the DVI process rather than participants so may not have experienced some of the actual shortcomings of the process. Robertson (2008) commented that actual practices in most specialist areas varied considerably.
Despite all the problems mentioned, the operations of the TTVI are widely regarded as successful. Petju et al. (2006) reported that 81.6 percent of victims were identified. As with the World Trade Centre disaster of September 11, 2001, the identification process remains ongoing and not all victims will ultimately be identified.

There are many reasons for non-identification of victims. There is the likelihood that not all victims of the tsunami were recovered. It is possible that some may have been swept out to sea and the currents were not sufficient to return them to the shore. Kohl et al. (2005) reported that approximately eight weeks after the tsunami bodies of victims from Sri Lanka and Indonesia were washed up on the shores of the Maldives. It is also possible that some of the early identifications and body releases were incorrect. We must also accept that there will be inadequate ante-mortem information for some victims meaning that any form of scientific identification will be impossible. Unfortunately, this was particularly so for the many Thai and other Asian hospitality workers, but may also have applied to some western tourists. Petju et al. (2006) commented that only 18 percent of Thai victims had dental records, and only 7.4 percent of these contained information adequate to assist in identification. Collection of DNA reference samples was severely curtailed by the destruction of the environment, and the loss of entire family groups, thereby diminishing the possibility for indirect identification using kinship analysis (Alonso et al. 2005, Budowle, Bieber and Eisenberg 2005).

The whole experience was valuable in reinforcing the value of dental evidence in the efficient and expedient identification of victims of mass fatality incidents (De Valck 2006, Scanlon 2006, Schuller-Gotzburg & Suchanek 2007).

The low level of identifications achieved via DNA and particularly the time taken for procedures to be agreed upon and results to be delivered, has been a source of great discussion in the forensic community. As previously mentioned, collection of samples from victims and reference samples from family members was complicated and in some cases compromised. This
overall poor result has reinforced the value of multiple identification tools and a need to never rely on one modality only.

Lessig, Thiele & Edelmann (2006) and Nuzzolese & Di Vella (2007) have commented that it is imperative that agreed international standards and procedures are developed. De Valck (2005) commented that practitioners must be willing to be educated in and abide by such guidelines, and that it is likely that in the future some form of formal accreditation of DVI practitioners will be introduced.

Even experienced forensic odontologists learnt much from their involvement in the DVI processes put into place for the victims of the Asian Tsunami. The experience has reinforced the need for development and application of standard guidelines necessary for smooth and efficient operations, but also the need for all forensic practitioners to be both flexible in their willingness to work with others and follow procedures that may not be exactly the same as they work to in their home jurisdictions. It is a professional and personal privilege to be able to contribute to such a process and as such professional and ethical behaviour must always outweigh any personal discomfort or advantage.

That agreed procedures in any of the specialist disciplines, including forensic odontology, were not able to be readily established and approved by the myriad of practitioners reinforces the need for more work to be done in this aspect of international cooperation. If any of the first response nations in Thailand had been in a position to produce well documented procedures and protocols that could be shown to have been democratically generated, there may have been a greater capacity to achieve cohesiveness in the application of these procedures.

This project aimed to develop a set of well structured and comprehensive procedures and practices for the forensic odontology response in a mass fatality incident for use by Australian odontologists. By using the Delphi method of consensus generation it would be hoped that the democratic nature
of the resulting document would facilitate its ready application in future incidents where many international specialists are required to work together.

The final lesson learnt must surely be that identification of the deceased serves a fundamental human need well beyond the technical and legal aspects generally surrounding it. The humanity and care shown to so many who had lost their lives in an unfortunate freak of nature was humbling, and it can only be hoped served to ease the suffering of the bereaved just a little.
CHAPTER 4

EXISTING GUIDELINES: AN INTERNATIONAL PERSPECTIVE

The previous chapter identified the value that can be afforded the response to a large multi fatality incident by well structured protocols and procedures. Also highlighted were the limitations that exist when practitioners from different backgrounds assemble but are unwilling to adapt personally held preferences.

Chapter 2 indicated the need for, and importance of, documented procedures for a disaster victim identification response for the Australian forensic odontology community.

This chapter will address the need for descriptive procedures and examine those that currently exist both for Disaster Victim Identification and in particular for the practices of forensic odontology at a disaster. These will be discussed against the dental activities that occur in each of the phases of a DVI response, thereby giving the reader a broader understanding of the principles of disaster victim identification. Aspects pivotal to a professional forensic odontology response will also be addressed.

4.1 Introduction

Almost all aspects of our society, particularly those that involve community services, are demanding higher standards of performance and accountability. One way of ensuring this enhanced functioning is to insist on greater detail in documented practices and procedures. Many professional disciplines have used guidelines to address these needs (Hill 2006). Standards, procedures, protocols, and policies are also mentioned as devices to deliver these improved services. The frequent and inconsistent interchanging of these terms between and even within disciplines can make understanding of the exact intention of each descriptor and the resultant document difficult and confusing.

The Australian Concise Oxford Dictionary has defined a guideline as “a principle or criterion guiding or directing action”. Guidelines aim to streamline
processes but are often considered discretionary (Australian Concise Oxford Dictionary, p 622). Guidelines are generally issued by an organisation to make outcomes more predictable, and of higher quality. In contrast, a protocol, or set of rules, could be considered mandatory.

The same dictionary has defined a procedure as “a mode of performing a task; a series of actions conducted in a certain order or manner” (Australian Concise Oxford Dictionary, p 1121). The desired outcome of these procedures would be to obtain always the same result in the same circumstances.

According to Standards Australia a standard “is a published document which sets out specifications and procedures designed to ensure that a material, product, method or service is fit for its purpose and consistently performs in the way it was intended” (www.standards.org.au). Standard operating procedures (often shortened to SOPs) are regularly used in military and similar (including police) organisations as a set of instructions that are considered mandatory. They frequently form the basis of a quality system.

The use of clinical practice guidelines in medical, dental and para-medical disciplines has increased, and in many circumstances been mandated, over the past twenty or so years. The American based Institute of Medicine and the Australian National Health and Medical Research Council (NHMRC) have defined clinical practice guidelines as “systematically developed statements to assist practitioner and patient decisions about appropriate health care for specific clinical circumstances” (Lohr 1995, NHMRC, 1998).

The American Board of Forensic Odontology (ABFO) has defined guidelines as an “outline of procedures to help direct” and indicated that they are “suggested but not mandatory procedures” and are therefore not enforceable. They consider guidelines to represent the optimum or most desirable approach, but that any deviation from the recommended would be “excusable” (Herschaft et al. 2007).
The ABFO consider standards to be “a model to be followed” that establish a protocol. They represent a “method of practice that has met the scrutiny of scientific study and verification” and define the minimal level of practice. Although the ABFO indicate that standards are more enforceable than guidelines and any deviation may result in sanction, there is no indication given of who would impose the sanction or what it may involve.

Finally, the ABFO defined a policy as “a predetermined, selected and planned prescription of conduct”, which is absolutely authoritarian and any deviation would result in loss of affiliation from the prescribing organisation. Interestingly they commented that a “policy” would not necessarily have anything to do with correctness but would carry the maximum imperative to comply and is not appropriate for scientific investigation (Herschaft et al. 2007).

Vermylen in his 2006 publication addressing the legal implications of guidelines in forensic odontology defined guidelines as “systematically developed statements and protocols to assist forensic odontologists in arriving at decisions on forensic dental work”. He referred to them as “rules” that “preferably have to be followed”, which seems contradictory, but as he summarised, the legal system reflects on the practice of any individual in the medical and dental fields by comparing their behaviour and practices against the standards used by the majority in their field. Hill (2006) reinforced this legal aspect. This would tend to indicate that adherence to procedures and guidelines, while desirable can never be truly mandated.

In an attempt to make comprehension more straight forward this report will use the following descriptors. A ‘manual’ will refer to a more generalised descriptive document that contains overarching and guiding principles but not step-by-step details of activities and procedures. ‘Guidelines’ on the other hand, contain detailed procedural criteria, and may include protocols or standard operating procedures for given activities. It would appear that procedural documentation in the DVI area falls into these two distinct categories; manuals or guidelines.
4.2 Existing Guidelines

Jumbelic (2005) provided a comprehensive list of recommended inclusions for a disaster manual. These included: advance team; establishment of a morgue; family assistance centre; personnel; consultants and volunteers; scene processing; transportation; body processing; identification; release of bodies and personal property; records management; media; communication; critical incident stress debriefing and biological, chemical and radiologic agents.

As mentioned in Chapter 2, in response to a fuel tank explosion in Spain in 1978 which killed over 200 people, Interpol established a working party on Disaster Victim Identification in 1982. This working party evolved into a Standing Committee, which published the first Guide to Disaster Victim Identification in 1984 (Edwards 2007). This guide was updated in 1997 (Interpol 1997), and underwent considerable revision in 2007 (Interpol 2007). The original guide covered disaster handling procedures, identification and victim identification, elimination tables and international cooperation, and was descriptive in nature detailing general principles and rationales, and as such is really more of a manual than a guideline. A detailed procedural manual would not be appropriate from an international organisation, as each member country would need to derive their own procedures and protocols to accommodate national laws, customs, and community expectations.

Associated with the guide are the Disaster Victim Identification Forms, which comprise a set of guided steps for gathering ante-mortem and post-mortem information. These forms are published in English, French, Spanish and Arabic to encourage wide international use, and therefore consistency. These forms were originally compiled by a working party of the Standing Committee and are regularly reviewed by members of the Standing Committee, including forensic odontologists. The majority of western countries, with the exception of the United States, regularly use these forms in DVI situations, and they are regarded as the ‘gold standard’ in the forensic community (Griffiths, Hilton &

Most jurisdictional areas and organisations across the world have disaster plans or similar that documents the obligations, roles and responsibilities of various authorities and community resources on a general scale. They contain information such as preventive activities, appropriate responses and duties of various organisations and individuals (e.g. police, emergency services, NGO’s) in the event of a disaster (Fixott et al. 2001). The importance of such documents was highlighted by Perera (2005, 2006) who commented that many of the problems associated with body handling and non-identification of victims of the Asian Tsunami in Sri Lanka arose from the lack of a national disaster plan, including guidelines for disaster victim identification.

DVI manuals have been prepared by many national and police organisations including, but not limited to, the US Department of Justice (NIJ 2005), the Royal Canadian Mounted Police (RCMP 2003), Association of Chief Police Officers of England, Wales and Northern Ireland (Clarke 2001), the Home Office (Home Office 2004), the Metropolitan Police (Clarke 2001) and the Disaster Mortuary Operational Response Team (DMORT 2006). The National Association for Medical Examiners have even provided a template for mass fatality plans (NAME 2002). Emergency Management Australia worked with the DVI community in Australia over 1994 and 1995 to develop the first Australian DVI National Guidelines, which were published in 1996 (EMA 1996). This document was succinct at only 29 pages and addressed the aims and principles of DVI. It documented required procedures only briefly. The Australasian Disaster Victim Identification Committee (ADVIC) commenced revision of this document in 2003, subsequent to its involvement in the DVI process after the Bali Bombings of October 2002, where 202 people, including 81 Australians, lost their lives. The Australasian DVI Standards Manual published in 2004 at 189 pages was a far more substantial document (ADVIC 2004). It addressed activities of all sections and responsibilities of team leaders in all areas.
As a general rule these manuals contain details of the management of a DVI incident and general discussions about the roles, functions and responsibilities of all members of a DVI team without providing detailed procedures for any particular activity. The development of detailed procedures and protocols for each discipline is left to that respective speciality. Examples of this can be found in both the Interpol Guide to Disaster Victim Identification and the Australasian DVI Standards Manual.

The Interpol Guide to Disaster Victim Identification contains the following entry about forensic odontology:

“3.4.3 Dental examination
Dental evidence is a particularly important and effective method of identification and can often be so accurate that it will positively identify an individual by itself. The examination of teeth and jaws can only be properly carried out by a forensic dental expert who will perform the oral examination as part of the general autopsy. Because of the exact detail which can be obtained from this examination it is accepted procedure for dental experts, when necessary, to remove teeth for sectioning and age evaluation, or jaws (complete or in part) for maceration and radiography, perhaps at forensic dental laboratories. N.B.: X-ray equipment will be of great advantage in both internal and dental examinations, particularly when an estimate of a victims age is required, and also to discover fractures or other unique identification information. X-ray examination is also a very effective method of locating and identifying evidential material such as bullets or bomb fragments. X-ray equipment, preferably portable, should always be made available in the mortuary.”

The Australasian DVI Standards Manual contains the following references to the mortuary activities of forensic odontologists:

“10.13 DVI Forensic Odontology Team Leader
The DVI Forensic Odontology Team Leader shall be responsible to the DVI Mortuary Manager for the following:
(i) Ensuring that an adequate number of forensic odontology teams are available;
(ii) briefing forensic odontology staff in relation to any specific directions from the DVI Mortuary Manager;
(iii) identifying forensic odontology related issues pertinent to each case;
(iv) overseeing post mortem forensic odontological examinations;
(v) liaising with other team leaders to ensure the timely movement and examination of human remains;
(vi) ensuring pink Interpol DVI Post Mortem Form F is complete and accurate; and
(vii) monitoring the occupational health, safety and welfare of all personnel in accordance with Section 7, Occupational Health, Safety and Welfare of this manual.

10.14 DVI Forensic Odontology Team
A DVI Forensic Odontology Team shall be composed of a minimum of two forensic odontologists, one of whom is DVI experienced.

10.20.5 Forensic Odontology
Forensic odontological examinations should be performed in accordance with jurisdictional forensic odontological policies, and will include:
(a) forensic odontological examination;
(b) charting carried out by two assigned forensic odontologists;
(c) photographs, further radiographs;
(d) impressions if needed; and
(e) DNA samples.”

The operating procedures derived as part of this project will form the “jurisdictional forensic odontological policies” mentioned above (10.20.5), for the Australasian DVI Standards Manual.

4.3 Documentation Specific to Forensic Odontology
Consistent with the above discussion, and particularly in the early years of forensic odontology, many articles dealing with the dental aspects of Disaster Victim Identification included general principles of the activities of members of the dental team, but did not include specific criteria relating to these tasks (Grant, Prendergast & White 1952, Keiser-Nielsen 1963, Vale & Noguchi 1977, Pert 1980, Petersen & Kogon 1971, Clark 1992, Hutt et al. 1995, Morlang 1997, Fixott et al. 2001).

Vale & Noguchi in 1997 recommended “there should be written procedures followed in a disaster situation, particularly standardized methods of charting”. Warnick (1995) provided a descriptive summary of the role of the dental team in mass disasters, and although he covered all phases of the DVI process and activities required of odontologists, the inclusion of qualifiers such as “should
suggest” and “it may be helpful”, tended to dilute the importance of some of these activities. Stimson and Mertz (1997) also provided a comprehensive account of the areas that need to be addressed in a procedures manual.

Fixott et al. (2001) commented that in 1995 the American Society of Forensic Odontology (ASFO) had identified that one of the contributing factors to successful dental identification was the adoption of written protocols for team members. These protocols detailed “membership criteria, chain of command for the medical examiner coroner, supply and payment issues, and go team and team notification details”, without mention of specific procedural protocols. One of the case studies reported in this paper did, however, refer to the dental team identification manual used by the relevant group, which “outlines job descriptions and individual commitments required during activation”.

In 1994 the American Board of Forensic Odontology (ABFO) published their ‘Body Identification Guidelines’ to “provide direction to the forensic dentist and greater accuracy in forensic dentistry”. They acknowledged that some odontologists may use alternate techniques, and that these were not invalid, just not used by the majority of American odontologists (ABFO 1994). DVI activities in the United States tend to be state based, and it would appear that many states have created their own specific procedural guides. This is understandable in the federal constitution which is the United States where differing laws may apply in different states. Similar principles apply to the Commonwealth of Australia, and consequently each state and territory has individual practices and procedures but there is no overarching national documentation of recommended practices.

In 2004 the International Organisation of Forensic Odonto-Stomatology (IOFOS) attempted to address the lack of international procedural conformity in forensic odontology and introduce quality assurance into international forensic odontology by arranging a meeting “with the aim of establishing IOFOS guidelines for quality assurance”. The then IOFOS Executive drafted suggested procedures for each phase of dental identification, both for single
identifications and DVI situations (IOFOS 2004, 2005). At the meeting participants were asked to consider and refine these procedures, with the aim that each member society would adopt them and recommend them as the base line for national procedures. After the meeting the President commented “To my astonishment, the colleagues were more occupied with deletion of steps rather than supplementing” (IOFOS Newsletter 2004). This experience highlights the difficulties involved in establishing procedures that will be acceptable across multiple legal jurisdictions. Although presented as procedures, the published results once again were more descriptive than prescriptive and focused on the principles of forensic odontology rather than the details.

A recent publication by Cox and colleagues (Cox et al. 2008) documented the protocols and standard operating procedures used by an English Non-Government Organisation, The Inforce Foundation, in their text about investigations of mass graves. Forensic Odontology is one component of these protocols, but, although well referenced the presentation is more discursive than regulatory.

All these observations reinforce the need for individual national organisations or jurisdictions to develop guidelines and procedures which are relevant to their legal and operational environment and meet the needs of all stakeholders. This project aimed to develop a set of guiding principles for the management and practices of disaster victim identification for the Australian Society of Forensic Odontology.

4.4 Problems in Forensic Odontology in Disaster Victim Identification
Many authors have discussed problems that regularly arise in the dental aspects of DVI. Pretty and Sweet (2001) summarised it well when commenting that mass disasters are complex situations which are both physically and emotionally demanding. Many of the problems that are encountered are met on a daily basis by odontologists in their identification work but become magnified just by the increased number of victims. Dailey
(1995) acknowledged that even with good preparedness and planning many of the problems seem depressingly repetitive. One of the ways in which these regular problems can be ameliorated is to address them in regular training and also in procedural guidelines.

A number of these problems are outside the direct control of odontologists. Brannon & Kessler (1999) classified these as external problems, and included such things as the condition of the remains, the quality of the ante-mortem dental records, and dysfunctional administrative structures. In contrast, their list of internal problems which included stress, inexperience and recognition of newer dental materials would appear to be influenced by the lack of clear procedural guidelines.


For the odontology component in each of the phases of DVI it is recommended that these guidelines should include roles and procedures, and should also address all issues that can be anticipated to relate to the involvement of odontologists in a disaster victim identification incident, including team membership criteria, team notification details, management structures,
organisational responsibilities, logistics, team size and composition and payment issues (Fixott et al. 2001).

4.5 Disaster Victim Identification Guidelines for Forensic Odontology

The remainder of this chapter will address contents that could be reasonably expected to be included in DVI guidelines for forensic odontology and compare and contrast known guidelines that currently exist. Initial focus will be on the phases of DVI, then moving to other aspects of an odontology response including the necessary experience of practitioners and other criteria discussed above.

4.5.1 Phase 1 – The Scene

Phase 1 activities refer to actions that occur at the scene of the disaster. The earliest responses including identification of the exact and full extent of the disaster site; and survivor search and rescue require no forensic odontology involvement. Only after survivor triage and declaration of site safety do specific DVI activities commence. These are usually conducted by highly trained police officers (van den Bos 1980) but the involvement of forensic odontologists may be required in certain incidents. In ideal circumstances the location of human remains will be documented before removal from the scene (Byard, Cooke & Ledistsche 2006). In some situations, for example high speed impact accidents, severe fragmentation and associated incineration can make identification of these remains difficult, and the addition of forensic odontologists to the scene team can aid in the recognition of dental and facial structures (Keiser-Nielsen 1963, Vale & Noguchi 1977, Solheim et al. 1992, Stene-Johansen, Solheim & Sakshaug 1992, Warnick 1995, Morlang 1997, Pretty & Sweet 2001, Brannon & Morlang 2002, Kvaal 2006). It is important that recovery methods ensure no additional damage to structures and forensic odontologists at the scene can assist by advising appropriate storage and transportation techniques. Brannon and Morlang (2001) in their report on the identification of the American victims of the Tenerife accident noted that identifications were hampered by lack of recovery of dental structures by scene teams, and the removal of dentures from the mouths of victims. These
dentures were numbered differently to the body from which they were removed, thus limiting reconciliation.

Although these principles are well expressed in the literature (see above) little detailed documentation, in formal published guidelines appears to address the involvement of forensic odontologists at the scene.

The IOFOS guidelines for identification after disasters have the following entry covering the activities of forensic odontologists at the scene (IOFOS 2004):

“If possible, forensic odontologists should participate in the work at the scene of disaster, where the task is to:
• help in search for bodies
• give a preliminary description of the dentition at the recovery
• make sure no teeth are lost
• in the case of fire, assess the value and possibility of taking radiographs on site
• secure the head for transport
• assist whenever required.”

Although more a manual than a guide, the US Department of Justice publication ‘Mass Fatality Incidents: A Guide for Human Forensic Identification’ (NIJ 2005) does, under the ‘Document the location of Remains, Personal Effects, and Evidence’ section, list Procedure D.4 as “When necessary, wrap the head before moving it to protect cranial/facial fragments and teeth”. In the ‘Identification of Human Remains – Odontology’ section the functions of the dental team at the scene are listed as being to:

“Identify, collect, and preserve dental evidence:
1. Consider wrapping the craniofacial remains (i.e. the head) at the scene to prevent loss of teeth.
2. Examine the body bag for possible loose dental remains and consider the use of large format (whole body/screening) radiography.
3. Consider on scene dental radiographs/x-rays for fragile evidence that may not survive transport to the morgue.”.
Although succinct, there is commonality in both with recommendations to ensure recovery of all teeth, to consider scene radiography if remains are very fragile, and to appropriately prepare the remains for safe transportation.

A number of authors (Clark 1994, Sweet & Pretty 2001, Leclair et al. 2007, Nuzzolese & Di Vella 2007) have commented that the condition of the remains critically impacts on the potential for successful dental identification. The nature of the collapse of the twin towers of the World Trade Centre on September 11 2001 meant that the remains were severely fragmented, commingled, pulverised and incinerated but also that recovery had to be delayed for quite some time leading to additional degradation of remains. More than 20,000 body fragments were recovered from the approximately 2,800 individuals reported missing (Bleseker et al. 2005) highlighting the difficulty that identification specialists faced. This impacted on the techniques that were able to be used and the majority of identifications that were able to be completed were done by DNA analysis. In the four years after the incident only 1594 of the victims were formally identified and 53 percent of these were by DNA alone. Genetic information also contributed in many of the other identifications (Vastag 2002, Budimlija et al. 2003, Marchi 2004, Bleseker et al. 2005, Graham 2006, Leclair et al. 2007).

Although not extensively addressed in current guidelines, recovery of remains and the role of the forensic odontologist at the scene would seem an appropriate area of odontological activity in a DVI incident to be addressed in future documentation. Ideally the coverage would be more detailed that that currently available.

4.5.2 Phase 2 – The Mortuary
Phase 2 relates to the activities that involve the collection of maximum post-mortem information from the victims including full body photographs; collection and documentation of personal effects; fingerprint records and completion of medical and dental autopsies (Clark 1992, Fixott et al. 2001). The progress of
a body through this process is highly coordinated and controlled and the dental autopsy is usually performed last (Fixott et al. 2001).

The dental examination is recognised as the slowest of all examinations to be completed, with anything up to 5 hours per examination having been mentioned (Vale & Noguchi 1977). The mandible is resected from the skull for ease of access to the dentition but is never removed from the remains (Kvaal 2006). The jaws are photographed and radiographed and a comprehensive charting of the dental status recorded (Vale & Noguchi 1977, Clark 1992, Warnick 1995, Fixott et al. 2001, Kvaal 2006). The dental autopsy is not considered complete until the visual charting has been cross referenced with the information revealed by the dental radiographs.

It is recommended that forensic odontologists work in pairs when undertaking the post-mortem examination (Keiser-Nielsen 1963, Vale & Noguchi 1977, Pert 1980, Dorion 1990, Clark 1992, Warnick 1995, de Villeirs & Phillips 2002b, Herschaft et al. 2005, Kvall 2006). This is both an occupational health and safety issue (to keep documentation clean) and a quality assurance measure. It is important that all information is gained from the body at a single examination, as re-examinations are difficult and time consuming (Keiser-Nielsen 1963).

Some authors have recommended specific numbers of forensic odontologists to manage various disasters, but this is really dependent on the nature of the victims (fragmented remains take longer to examine than intact bodies) and the available facilities. Vale & Noguchi (1977) and de Villiers & Phillips (2002b) indicated that 10 dentists per 150 victims were necessary, although this number referred to mortuary staff only. Harvey (1976) recommended a minimum of 5 forensic odontologists for an incident of less than 50 victims.

More detailed procedures are provided for the mortuary activities (Phase 2) than any other phases of the DVI incident in the published guidelines.
The ABFO Body Identification Guidelines (1994) provide detailed procedures for photography and jaw resection as well as the following entries for compiling the post-mortem dental record:

**“Dental Examination**

The universal tooth numbering system should be used. The record should reflect any missing dental structures or jaw fragments as well as those present and available for evaluation. The chart should illustrate as graphically as possible the following:

- Configuration of all dental restorations (including prosthesis), caries, fractures, anomalies, abrasions, implants, erosions or other features for all teeth.
- Materials used in dental restorations and prosthetic devices, when known.
- Periodontal conditions, calculus, stain.
- Occlusal relationships, malposed teeth; anomalous, congenitally missing and supernumerary teeth.
- Intraoral photographs should be used to show anatomic details of teeth restorations, periodontium, occlusion, lesions, etc.

**Narrative Description and Nomenclature**

The anatomic dental chart may be supplemented by a narrative description of the postmortem findings with particular emphasis on unusual or unique conditions. Standardized dental nomenclature should be used as follows:

**Universal Numbering System**

The system of numbering teeth used in the United States. The teeth are numbered from 1 to 32. The upper right third molar is #1, the upper central incisors are #8 and #9, the upper left third molar #16, the lower left third molar #17 and the lower right third molar is #32. The universal tooth numbering system plus the actual name of the tooth should be used (e.g. tooth #3, upper right first permanent molar).

**Dentition Type and Tooth Surfaces**

Primary, Permanent and Mixed Dentition. •
Mesial, Occlusal, Distal, Facial and Lingual. • Surfaces.
Prosthetics and other Appliances
Crowns: full, 3/4 or 7/8 coverage restorations. • Prostheses: Partial, full, or fixed.
Orthodontic bands, brackets, space maintainers and retainers.
Mouth guards and night guards. •

**The FDI Numbering System**

Odontologists should be aware of the FDI system of numbering teeth. This system is used throughout the developed world. Quadrants are
numbered from 1 to 4. The upper right quadrant is 1, upper left 2, lower left 3 and lower right 4. Teeth are numbered from the midline to the posterior. Central incisors are #1, canines #3 and third molars #8. Teeth are represented by a two digit code with the quadrant first and the tooth second. Thus, the upper left first molar is #26.

**Dental Radiology**

Postmortem radiographs graphically complement the visual examination/charting of the oral and perioral structures and can provide significant data essential for identification (see section III). In general, radiographs are required in cases where there is no putative ID, antemortem records have not yet been located and/or the jaws can not be retained. Postmortem radiographs must be considered the prime method of identification. A comprehensive postmortem radiographic examination might include all or some of the following views, depending on the circumstances of the case:

**Intraoral Radiographs**

Bitewing and periapical radiographs of anterior and posterior teeth comparable to those taken antemortem. ("Bitewing" views need not be taken in the conventional manner with the teeth in occlusion; rather, periapical film can be used for separate views of the upper and lower teeth, using a horizontal bitewing angulation.)

**Dental Fragments, Dissociated Teeth**

Appropriate radiographs of all dental fragments, dissociated teeth, bone and restorations should be obtained. Occlusal or lateral plate film may be used for objects larger than a periapical film.

**Edentulous Areas**

- Periapical radiographs of edentulous arches or areas, especially the third molars, which may be impacted or previously extracted.
- Periapical radiographs of sockets of teeth lost postmortem should be taken, since antemortem radiographs of these same teeth may be the only evidence that becomes available.

**Extraoral Radiographs**

Extraoral radiographs (e.g., lateral jaw, maxillary or frontal sinus and panoramic radiographs) are often useful.

**Disposition of Radiographs**

- Double pack intraoral film is recommended.
- One set of films should be retained by the forensic odontologist for his case file. The second set may be mounted and forwarded with a written report to the medical examiner/coroner for the master file.

**NOTE:** All duplicate films should bear right and left notations.”
The IOFOS guidelines for identification after disasters have the following entry covering the activities of forensic odontologists in the mortuary (IOFOS 2004):

“The dental status of each body should be described by a team of two forensic odontologists either by
(a) both examining individually and cross-checking with each other
(b) one examine while the other take notes and controls the findings.

• The teeth should be photographed
• If possible, the jaws should be resected
• The jaws and teeth should be described
• Radiographs should be taken in a systematic manner
• If required, one intact tooth should be extracted for DNA analysis.”

They also provide the following procedures for single cases but these would be applicable to DVI activities as well (IOFOS 2005):

“The post-mortem examination
1. Note material available
2. Assess the condition of the material
3. Describe any injuries to the teeth, jaw bones and intra and peri-oral soft tissues
4. Relate these injuries to the time and manner of death
5. Describe how you get access to the teeth and jaws
6. Describe if the material
   a. remains with the body
   b. is removed and where it is kept
7. Describe each the tooth
   a. The clinical status: sound, carious, filled, crown, remaining root, lost post mortem or missing ante mortem
   b. Additional characteristic features of the tooth
   c. Material used in restorations
   d. Surface(s) involved
   e. Use a standard set of abbreviations
   f. Keep a list of abbreviations used
8. Give a special description of prosthetic works
9. Describe anatomical details
   a. Occlusion
   b. Attrition
   c. Tooth colour
   d. Periodontal condition
   e. Calculus
   f. Staining
   g. Any other detail which could be important for identification
10. Radiographs taken and characteristics shown
11. Photos taken and characteristics shown
12. Supplementary examinations and findings
13. Give an estimate of the age and the method(s) used.”
The British Association of Forensic Odontology (BAFO) uses the following post mortem protocols (Robson 2007):

**“POST-MORTEM DENTAL PROTOCOL IN TEMPORARY MORTUARY**

Dignity of the deceased must be respected at all times.
Assume you have only one attempt to get all the information that may be helpful for a dental identification.
Risk assessment should be in place for health and safety issues

**EXAMINATION PROCESS**

- 2 dental examiners - 1 clean, 1 dirty, working together

**Dirty dentist:**

- Check unique PM identifying numbers on body bag and body
- Photograph facial structures - AP and both laterals-? retract lips for comparison with smiling photographs
- Examine facial skeleton
- Facial flap to expose mandible, maxilla and associated teeth - never make direct cuts into facial soft tissues
- Disarticulate mandible but always keep with body ....only if necessary
- Clean teeth with tooth brush and alcohol to remove debris
- If avulsed teeth with body replace in correct anatomical position. Make a note of this.
- Photograph jaws and teeth - AP in and out of occlusion, both laterals in and out of occlusion, mandibular and maxillary occlusals. Photograph dentures / orthodontic appliances if present, in and out of the mouth. Remember to include unique PM number, time and date.
- X-ray jaws and teeth of ALL victims - full mouth periapical including roots of developing teeth, right and left bitewings, occlusals if clinical or radiographic evidence of eg impacted canines or premolars or pathology. Minimum x2 bitewings (right and left) and x10 periapicals.
- Check radiographs prior to further examination.
- Full dental examination of teeth noting teeth present, missing, restorations occlusion, orthodontic appliances, arch shape, anomalies of tooth position, congenital abnormalities, trauma and pathology.
- If orthodontic appliance present take silicon dental impressions These will need to be sterilized and castoff site. Photographs may also be taken off site with unique identifying number, time and date and added to PM files.
- Extract tooth for DNA. Preferably sound fully developed (closed apices) 1st molar tooth, if this is unavailable then extract another molar or premolar tooth AVOID extracting anterior teeth and using teeth avulsed post mortem found in body bag with body.

**Clean dentist**

- Process radiographs
- Mount radiographs in correct orientation. Label with unique identifying number, time and date. Both dentists should sign as being correct
- Compile composite dental chart using information from clinical
examination and radiographs in consultation with dirty dentist.

- Place tooth extracted for DNA into appropriate container, secure container and label with unique PM identifying number date, time and place of examination
- Ensure that ALL relevant dental information is entered onto PM charts particularly Fl and F2 sheets.
- The odontogram should be filled with an accurate representation of the position, size and shape of any restorations present.
- Check radiographs

Quality assurance

- Change dentists (ie dirty becomes clean and clean becomes dirty) and repeat dental examination and check composite charting and information on Fl and F2 are correct.
- Make sure disarticulated mandible is retained in situ if possible when body bag closed at end of examination if necessary label mandible with unique PM identifying number
- Do age estimation from clinical and radiographic examination
- Both dentists should sign the mounted radiographs with time and dates.
- Both dentists should sign tooth exhibit for DNA analysis and Fl and F2 as being correct

- Make sure Fl and F2 forms are re-united with rest of PM forms relating to body with same unique PM identifying number if for some reason they have become separated. Both dentists should check ALL details are correct on PM forms, dental photographs, dental radiographs and dental DNA sample.

As sign of respect make body presentable as possible even if it will not be viewed.”

The procedures listed above are all remarkably similar and variations reflect jurisdictional, legal or regional preferences or techniques and do not detract from the intentions of the procedures.

It is essential that post-mortem information is collected in a timely, comprehensive and respectful manner. A failure to do so would add to the trauma of the family of the victim. To ensure that all members of the DVI team in a given incident are able to readily work together it is important that documented procedures are available prior to an incident and reinforced once the investigation begins. These guidelines should comprehensively document what is required at each stage of the post-mortem examination.
4.5.3 Phase 3 – Ante-Mortem Information Collection

Although activities in the mortuary are frequently seen as the core DVI function, it is actually the information gained in Phase 3 - the collection of ante-mortem information and family liaison - which frequently proves to be the rate limiting aspect of the identification process (Clark 1992, De Valck 2006, Schuller-Gotzburg & Suchanek 2006, Hinchliffe 2007). Clark (1986) reported that dental records could not be located for 100 Pakistani nationals killed in Gulf Air flight 771, which crashed near Abu Dhabi, thus rendering dental identification impossible.

All information pertaining to missing persons, including dental data, is gathered in this phase of the investigation. Information about potential missing persons is generated quickly after the incident has occurred, as people become concerned about the safety of their family members and friends and contact authorities with, or seeking, information. From this information it requires considerable effort and investigation to prepare a reliable master list of persons likely to have been fatally involved in the disaster. The enormous task of gathering adequate and reliable ante-mortem information about the missing persons then begins. It is appropriate for trained investigative police officers to obtain the information about treating dental and medical practitioners, but it is recommended that any direct contact with the dentist and transcription of the information contained in the dental records is the purview of forensic odontologists (Clark 1991).

As for many medical records, dental information is recorded in such a way that accurate interpretation can often be difficult for those not in the field. There are thought to be over 50 different dental nomenclature systems in use worldwide, about 15 of which are used regularly in different countries, and treatment symbols and abbreviations abound (Keiser-Nielsen 1963, Mertz 1977). It is, therefore, essential that only forensic odontologists interpret and transcribe this information onto the Interpol forms (Keiser-Nielsen 1963, Warnick 1995, Solheim et al. 1992, Herschaft et al. 2005, Blau et al. 2006, Kieser, Laing & Herbison 2006). In a review of a sample of the ante-mortem data sets
provided for missing foreign nationals of the Asian tsunami in Thailand, Kieser, Laing and Herbison found that only 49 percent could be considered acceptable. Many of the records had been provided directly by dental practitioners with no training in forensic odontology and had to be returned as they were either incomplete or of unacceptable quality (Kieser, Laing & Herbison 2006). Prieto et al. (2007) in their discussion of the 2004 Madrid bombings indicated that the ante-mortem dental information gathered by inexperienced police officers was “highly insufficient”, rendering it impossible to use. Consequently, no identifications were confirmed by dental comparison in this incident.

As with all forensic odontology activities it is recommended that two odontologists perform this task to ensure quality and accuracy (Warnick 1995). Solheim and colleagues (1992) acknowledged that transcription errors occurred in the ante-mortem information collection phase of the Scandinavian Star disaster when dentists worked alone. It is important that original written records and radiographs are provided to the investigators (Keiser-Nielsen 1963, Interpol 1995). Collection of dental records and information from dental practitioners must be gathered according to the Privacy Laws that apply in the country of residence of the putative deceased, not the country of the disaster (De Valck 2006, Brown 2007a). International transfer of these records is now expedited by new generation secure electronic services (Perrier et al. 2006, Sweet 2006).

are also frequently evident (Hill 1988). Borrman et al. (1995) found that only 40 percent of Swedish dental records could be considered comprehensive and complete. Platt & Yewe-Dyer (1995) reported that only 48 percent of Scottish dental records accurately recorded present and missing teeth. Ermenc and Rener (1999) surveyed the quality of dental records in Slovenia and concluded that a significant percentage would not provide enough information to enable a dental identification to be conducted. They found that only 49 percent of records contained radiographs, and in some cases treatments were not documented at all. Delattre and Stimson (1999) found that only 56 percent of records in their American sample would have been "extremely useful" for identification purposes. Dierickx et al. (2006) found that the quality of dental records in Belgium was directly linked to the age of the practitioner, with younger dentists keeping better records. They hoped this was due to an increased awareness of the importance of forensic odontology from its inclusion in undergraduate curricula. A study of the dental records of edentulous patients at the University of Manchester School of Dentistry found that only 18 percent of records contained enough information to enable forensic identification (Richmond & Pretty 2007).

Consequently it is important to locate dental records promptly, and to ensure that all available records are sourced. It is also most important that investigators do not limit the nature or volume of ante-mortem information they collect (Clark 1992, De Valck 2006). The identification method of choice may not prove possible or adequate thus hindering progress. De Valck (2006) reported that preferential collection of ante-mortem data of victims of the Asian tsunami caused unnecessary delays in some identifications.

International cooperation among forensic odontologists is frequently cited as important in the location and transfer of dental records (Clark 1991, Kullman et al. 1993, De Valck 2006), particularly for international victims of mass fatality incidents. Although protocols recommend international communication via official channels (national embassies or Interpol), there are many reports where these formal channels failed to provide dental records in a timely

The ABFO Body Identification Guidelines (ABFO 1994) only provide advice about sources of antemortem dental data and comment that “The discovery and collection of antemortem records is ordinarily the responsibility of the investigative agency who has access to missing persons reports at the local, state or national level. However, the forensic odontologist may recognize additional characteristics (e.g., prior orthodontic treatment) which could be helpful in establishing a potential ID.”

The IOFOS guidelines for identification after disasters have the following entry for activities of forensic odontologists in the antemortem phase of DVI (IOFOS 2004):

“The forensic odontologist should

• help the police locate the dentists and ask for all available a.m. material
• if required, talk to the dentist and describe the material needed
• in urgent cases, ask the dentist to describe the teeth and to send in the material later
• transcribe the dental information on to the forms used
• another forensic odontologist should check the transcription
• keep the original material in the ante mortem file”

These guidelines also provide the following procedures for single identification cases, the greater clarity of which would also be applicable in DVI incidents (IOFOS 2005):

“Examination of the ante-mortem material of a missing person (records, radiographs, photos, models etc.)
1. Note what material is available
2. Assess the quality of the material
3. Concerning the missing person give
   a. Full name
   b. Date of birth
   c. Address
   d. Gender
   e. Age
4. Note when the person was reported missing
5. Note the circumstances under which the person was missing
6. Note dental information given by relatives or others
7. Note the dentist(s) from whom the record(s) is/are obtained
   a. Name
   b. Address
   c. Telephone/fax no
   d. E-mail
8. Describe each tooth
9. Use the same nomenclature as under the post mortem examination
10. Give a special description of prosthetic works
11. Describe anatomical details
    a. Occlusion
    b. Attrition
    c. Tooth colour
    d. Periodontal condition
    e. Calculus
    f. Staining
    g. Any other detail which could be important for identification
12. Note radiographs available and characteristics shown
13. Note additional examinations and findings.”

The British Association of Forensic Odontology (BAFO) has the following ante-mortem protocol (Robson 2007):

“1. Check all identifying details on records
2. If records suggest other records may be available contact relevant dentist
3. Copies of all records and radiographs (hard copy or digital)
4. Compile composite dental charting from information from all records available
5. Fill in all available details onto F1 and F2 forms
6. Quality assure with another forensic dentist and both sign F1, F2 and copies of radiographs
7. Copies will stay in exhibits office and originals will be available for reconciliation process
8. Ensure that part A0 is also completed with duration of treatment and relevant dates.”

The ABFO guidelines provide an overarching statement but no procedural information. Both the IOFOS and BAFO guidelines document similar principles and reinforce the need for peer review for quality assurance and the need to keep original documents for use in the reconciliation process. The IOFOS guidelines indicate information that should be collected.
The importance of ante-mortem information in a DVI incident cannot be underestimated, nor can the need for it to be sensitively but professionally gathered. It is essential that experienced forensic odontologists interpret and record the information contained in the dental records of registered missing persons. Standard operating procedures should document not only the principles behind accurate collection and collation of ante-mortem information but also detail correct activities to be followed.

4.5.4 Phase 4 - Reconciliation

In the reconciliation phase of the DVI activities the ante-mortem information of the missing persons is compared against the post-mortem information collected from the victims, and conclusions about similarities and discrepancies reached. The final conclusion regarding identity relies on “comparison” and “exclusion” (Keiser-Nielsen 1963, Nuzzolese & Di Vella 2007). Although agreements in the information between the two sets of data are important it is the discrepancies that finally determine identification.

While relatively straightforward in single identification cases, this process becomes quite complex in a DVI incident. Ideally the files, comprising ante- and post-mortem information, are divided into gender and then into groupings by age (<15 years, 15-70 years, >70 years) and ethnicity (Caucasoid, Mongoloid, Negroid), giving 18 possible subgroupings to reduce the size of groups for manual comparison. Initially all specialist disciplines (medical, fingerprints, dental, photography, property and DNA) perform relevant comparison processes independently. After the specialist groups have completed their individual comparisons, the results are combined into a master composite elimination table. This table is reviewed by senior reconciliation staff and potential identifications highlighted. Identification by odontology, fingerprints or DNA is classified as ‘stand alone’, and not requiring corroborating information, although Clark (1992) has advised that it is wise in all cases to use as many methods of identification as possible.
Subsequent to these deliberations identification reports are compiled by the relevant sections. These reports are then presented to the Identification Board, who must approve the process before the family can be notified of the identification and the body released. The Identification Board is composed of a number of senior members of the DVI team including police officers, odontologists and pathologists (Griffiths, Hilton & Lain 2003), and acts as a final review process.

Traditionally in dental reconciliation comparisons were done manually, with a single ante-mortem file being compared against the relevant sub-group of post-mortem files. Griffiths, Hilton and Lain (2003) have referred to this as “dental bingo”. Increasingly, electronic assistance has been utilised for the initial sorting and potential matching of dental records. It is important to emphasise that the final detailed comparison and decision regarding identity is always completed by forensic odontologists and any computer program merely removes the time consuming early sorting and elimination in an effort to save time (Warnick 1995, Kvaal 2006, Nuzzolese & Di Vella 2007). Several programs have been written to assist in this activity including CAPMI (Computerized Assisted Postmortem Identification System), WinID, DVI System International and D.A.V.Id (Stimson & Mertz 1997, Andersen Torpet 2006, Clement et al. 2006, Al-Amad et al. 2007).

The ABFO Body Identification Guidelines (1994) provide the following on reconciliation:

“The following subsections provide examples of objective findings in the teeth, periodontium, and/or jaws, which may be demonstrable in both antemortem and postmortem records. While the factors listed are by no means comprehensive, they may serve as a checklist and demonstrate the range of objective findings that may be applicable in difficult identification cases.

Dental Features Useful in Identification

Teeth
• Teeth present.
• Erupted.
• Unerupted/impacted.
• Missing teeth.
  • Congenitally missing.
  • Lost antemortem.
  • Lost perimortem/postmortem.
• Tooth Type
  • Permanent.
  • Mixed dentition.
  • Retained primary teeth.
  • Supernumerary teeth.
• Tooth Position
  • Malpositions: facial/linguoversion, rotations, supra/infra positions, diastemas, other occlusal discrepancies.
• Crown Morphology
  • Size and shape of crowns.
  • Enamel thickness.
  • Location of contact points, cemento-enamel junction.
  • Racial variations: e.g. shovel-shaped incisors, Carabelli cusp, etc.
• Crown Pathology
  • Caries.
  • Attrition/abrasion/erosion.
  • Atypical variations: e.g. peg laterals, fusion/gemination, enamel pearl, multiple cusps.
  • Dens in dente.
  • Dentigerous cyst.
• Root Morphology
  • Size, shape, number, dilaceration, divergence of roots.
• Root Pathology
  • Root fracture.
  • Hypercementosis.
  • External root resorption.
  • Root hemisections.
• Pulp Chamber and Root Canal Morphology
  • Size, shape, number.
  • Secondary dentin.
  • Pulp stones, dystrophic calcification.
  • Root canal therapy: e.g. gutta percha, silver points, endo paste and retrofill procedures.
  • Internal resorption.
• Periapical Pathology
  • Periapical abscess/granuloma/cyst.
• Cementoma.
• Condensing osteitis.
• Dental Restorations
  • Metallic restorations: amalgams, gold or nonprecious metal crowns/inlays, endo-• posts, pins, fixed prostheses, implants.
  • Nonmetallic restorations: acrylics, silicates, composites, porcelain, etc.
  • Partial and full removal prostheses.
• Periodontium
  • Gingiva: Morphology/Pathology.
  • Contour: gingival recession, focal/diffuse enlargements, interproximal craters.
  • Color: inflammatory changes, physiologic or pathologic pigmentations.
  • Plaque and concretions oral hygiene status, stains, calculus.
• Periodontal Ligament: Morphology/Pathology
  • Thickness.
  • Widening (e.g. scleroderma).
  • Lateral periodontal cyst.
• Alveolar Process and Lamina Dura
  • Height/contour/density of crestal bone.
  • Thickness of inter-radicular alveolar bone.
  • Exostoses, tori.
  • Pattern of lamina dura (loss, increased density).
  • Periodontal bone loss.
  • Trabecular bone pattern osteoporosis, radio-densities.
  • Residual root fragments, metallic fragments.

Maxilla and Mandible
• Maxillary sinuses: Size, shape, retention cyst, antrolith, foreign bodies, oral-antral fistula, relation ship to adjacent teeth.
• Anterior nasal spine, incisive canal, median palatal suture, incisive canal: Size, shape, cyst.
• Pterygoid hamulus: Size, shape, fracture.
• Mandibular canal/mental foramen: Diameter, anomalous (bifurcated), canal, relationship to adjacent teeth.
• Coronoid and condylar process: Size and shape.
• Temporomandibular joint:
  Size, shape, hypertrophy/atrophy, ankylosis, fracture, arthritic changes.
• Other pathologic processes/jaw bones:
  Developmental/fissural cysts, hemorrhagic (traumatic) bone cyst, salivary gland depression, reactive/neoplastic lesions, metabolic bone disease, other disorders inducing focal or diffuse radiolucencies or radiopacities, evidence of orthognathic surgery, or prior evidence of trauma (e.g. wire sutures, surgical pins, etc).”

The IOFOS guidelines for single identifications provides the following recommendations for reconciliation activities (IOFOS 2005):

1. Search for non-concordant features
   a. If non-explicable -> exclude identity
   b. If explicable - > do not exclude identity, but continue to find compatible features
2. Find compatible features
   a. note each one and relate to which tooth.”
The IOFOS guidelines for identification after disasters has the following entry relating to reconciliation activities (IOFOS 2004):

“Assess the value of the results of the computer search. Compare information where identity is indicated. If exclusion, give the appropriate authority immediate information/notification. If identity possible, compare and evaluate immediately and inform the appropriate authority.

In the final identifications, the forensic odontologist should
1. participate in the discussions and be prepared to describe and explain the dental findings and the importance in the identification
2. be prepared to stop a wrong identification
3. participate in the signing of the final identification together with the other expert groups.”

The ABFO entry provides a list of sources of potential comparative structures upon which to base an opinion. There is no direction about how to use this information and no quality control measures. The more succinct IOFOS procedures are more descriptive about procedure, but also do not contain any quality assurance recommendations.

Detailed procedural guidelines for conducting a reconciliation of ante- and post-mortem dental data would be of value for practicing forensic odontologists, but also enable community and stakeholder confidence in the procedure and final outcome.

One of the important considerations for the reconciliation section is the level of certainty they can apply to the final conclusions. There is little consistency among international forensic odontologists regarding the specific criteria that apply to the various categories of identification.

The ABFO Body Identification Guidelines (1994) recommend the following classifications:
“Positive Identification: the antemortem and post-mortem data match in sufficient detail to establish that they are from the same individual. In addition, there are no irreconcilable discrepancies.

Possible Identification: the antemortem and post-mortem data have consistent features, but, due to the quality of either the post-mortem remains or the antemortem evidence, it is not possible to positively establish dental identification.

Insufficient Evidence: the available information is insufficient to form the basis for a conclusion.

Exclusion: the antemortem and post-mortem data are clearly inconsistent. However, it should be understood that identification by exclusion is a valid technique in certain circumstances.”

The IOFOS guidelines (IOFOS 2004, 2005) recommend the following classifications:

“The comparison should end in a conclusion about the likelihood of identity. One of the following conclusions should be used:

a. Identity established
   i. Less than 1:10 000 other person may fit the details
   ii. This conclusion may stand alone as evidence of identity
   iii. The experts should feel confident that the identity is correct

b. Identity probable
   i. The conclusion needs to be supported by other evidence for the final identification

b. Identity possible
   i. More than 1:100 persons may fit the details
   ii. The conclusion needs to be supported by other strong evidence for the final identification

The conclusion should be agreed by two forensic odontologists and the report should be signed by both.”

There is no similarity or consistency between these two guidelines. While the ABFO guidelines are entirely descriptive the IOFOS classifications do meet current legal recommendations for the use of statistics. Unfortunately, there is no discussion about how to statistically determine or distinguish the say
‘1:10,000’ data, and no evidence of error rates (Saks & Koehler 2005, Pretty 2006).

Higgins and James (2006) reported on the identification categories used across Australia. They found that no states or Territories used the categories recommended by IOFOS; three states used the ABFO classifications; and the remainder used variations of the ABFO categories. They concluded that as there were no “significant legal, cultural or religious differences” across the country, national standard terminology should be encouraged.

Guidelines for the Australian Society of Forensic Odontology should recommend identification categories which can be used by all states and territories.

4.5.5 Phase 5 - Debrief

Formal debriefing and review is an important part of any activity and is aimed at improving future endeavours. As Phase 5 of DVI procedures, it is recommended that an operational debrief be held at the completion of every DVI incident to address such issues as effectiveness of all administrative structures and activities and any occupational health, safety and welfare issues that may have arisen (Interpol 1997).

The health and safety of workers must always be of primary concern. Landigran (2002) commented that the protection for workers at the World Trade Centre after the September 11 2001 attacks was “seriously inadequate”. The Centres for Disease Control and Prevention reviewed the mortuary facilities set up in Thailand after the Asian tsunami and observed that although no overall site safety and health plan was in effect many procedures were being utilized to promote worker health and safety (Centres for Disease Control and Prevention 2005). Many of these procedures had been instigated as part of the operating procedures for the incident (James 2005, De Valck 2006, Kieser, Laing & Herbison 2006) or by the individual disciplines themselves. The Centres for Disease Control and Prevention report identified
potentially risky tasks as including body lifting and movement, conducting autopsies, dental examination and radiographs which involved the use of scalpels, knives, ‘dental pliers’ (extraction forceps) and dental radiograph equipment. They provided a list of recommendations to maximise workers safety during the establishment of temporary mortuaries. The health and safety issues of temporary mortuaries have also been addressed by Byard, Cooke and Ledistsche (2006).

An important part of any Phase 5 activities is critical stress debriefing for all participants (Taylor & Frazer 1982). Exposure to the deceased victims of a disaster is an understandably stressful experience. Jones (1985) surveyed 225 US Air Force personnel who were involved in body movement and identification subsequent to the Jonestown mass suicide. Thirty two percent of respondents reported feeling anxious and depressed immediately after the mission, and for 21 percent these symptoms continued long term. Those most severely affected were reported to be younger (less than 25 years of age), African-American and had a higher level of direct exposure to the remains of victims. Ursano et al. (1999) reported that identifying with the deceased, particularly as a friend, by disaster workers increased the risk of Post Traumatic Stress Disorder (PTSD).

McCarrol et al. (1996) looked at the post traumatic stress experienced by forensic odontologists after the Waco, Texas siege where 85 Branch Davidian sect members were incinerated. They found that higher levels of stress were directly related to longer periods of exposure, younger age, less previous disaster experience and the level of personal support. Epstein, Fullerton and Ursano (1998) reviewed 355 workers for an 18 month period after their involvement in the aircrash at the Ramstein airshow in 1988. The crash killed 70 and injured many more. They found that lower levels of education, personal exposure to those affected by gross burns, a feeling of numbness and stressful personal circumstances in the 6 months following the accident were useful indictors for PTSD. Brannon & Kessler (1999) commented that stress experienced by DVI practitioners is frequently not reported as it tends to
be covert or silent. They concluded from their personal experiences, in 10 disasters, that stress was less of a problem for older, more experienced practitioners. These comments were reinforced by Perrin et al. (2007) who reported that PTSD in workers at the World Trade Centre disaster was more likely to occur in those with no or limited prior experience or training. Galea, Nandi and Vlahov (2005) indicated that the level of PTSD experienced among disaster rescue workers is 10-20 percent in the first year after the disaster. This is perhaps, reasonably logical, but of little comfort for the new and enthusiastic members of a DVI team.

Recommendations and strategies for the management of personnel and procedural should be well documented in any DVI guidelines.

Guidelines and procedures are also regularly reviewed and revised particularly after investigations into major incidents. One such example is the public inquiries convened by Lord Justice Clarke after the crash of the Marchioness passenger vessel on the Thames River on 20 August 1989 resulting in the loss of 51 lives (Clarke 2001). One of the recommendations from the non-statutory inquiry into the identification of the victims was improved services for the bereaved and the increased use of Family Liaison Officers (FLOs). It is now accepted practice in DVI that a Family Liaison Officer is appointed to each family of a victim or victims, and these officers are chief in gathering the majority of the ante-mortem information.

4.5.6 Additional Issues
The appropriate levels of experience and training of members of a DVI team is frequently raised in the literature (Dorion 1990, Timperman 1991). Hill (1988) indicated that courts expect forensic odontologists to have completed training, similar to any specialist discipline. Dorion (1990) described the “stringent” system used by the American Board of Forensic Odontology to assess qualifications and competency. Dailey (1995) stressed that extensive training and experience is required to appreciate both the complexities and limitations of forensic odontology in a DVI situation, and that less experienced
practitioners often experience a “false sense of confidence” about their abilities. He analysed 32 ante-mortem charts compiled by inexperienced odontologists working at a disaster and categorised the errors present. The charts were divided into complex or simple depending on the degree of difficulty of their compilation, and the observed errors into critical (would result in failure to identify, incorrect exclusion or misidentification), moderate (would not necessarily lead to incorrect exclusion or misidentification, but would increase work required to resolve discrepancies) and minor (would not impact on identification). Six records were classified as complex. None of these were error free. Four (66%) contained critical errors, and all 6 contained moderate and minor errors. Twenty – five records were classified as simple and 11 of these (44%) were error free. Five charts (20%) contained critical errors, 12 (48%) moderate errors and 3(12%) minor errors. One record contained minor errors only. Overall, 28 percent of all records contained critical errors.

Dailey concluded that only trained and experienced odontologists should be given leadership roles and inexperienced dentists should be teamed with experienced odontologists in all areas. These comments echo those of Vale and Noguchi (1977) and Warnick (1995) and support those of Busuttil, Jones and Green (2000) and Nuzzolese & Di Vella (2007). Soomer et al. (2003) also reported that inexperienced forensic odontologists were less accurate than their more experienced colleagues. Nuzzolese & Di Vella (2007) cautioned against allowing the altruistic humanitarian spirit of the unqualified and inexperienced to be given voice in disaster situations.

Persistent application of ongoing quality assurance procedures during the disaster was also advocated to reduce potential errors (Dailey 1995).

Other important aspects of this organisational model are issues of confidentiality, communication and the behaviour of members of the team. Warnick (1995), Morlang (1997), Fixott et al. (2001) and Herchaft et al. (2005) have all addressed some of these issues including the need for confidentiality and having a designated media spokesperson.
The British Association of Forensic Odontology (BAFO) has included the following code of conduct in their DVI protocols (Robson 2007):

“1. *Team members should exhibit the highest standard of competence and integrity.*

2. *Members of the team are expected to act responsibly and respectfully, to dress appropriately and at all times be professional in attitude, to work cooperatively and work as a team to obtain the best results.*

3. *Discussions, debriefs etc. are not to be undertaken in public places (ie bar, restaurant etc.) only in private. Discretion should be shown at all times.*

4. *Dental team leader (suggested if more than 2 members) is responsible for allocation of tasks, any disciplinary measures etc. and any final decisions. (usually in consultation with other team members).*”

Logistics and supply of resources are also important to the successful operation of a DVI incident. Some authors have provided suggested necessary equipment (Gillespie *et al.* 1985, Clark 1992, Warnick 1995, Herschaft *et al.* 2005) although these seemed to relate to mortuary activities only. The British Association of Forensic Odontology (BAFO) does provide an equipment list as part of their protocols (Robson 2007). Once again this is for Phase 2 requirements only.

The only references to remuneration of forensic odontologists deployed for DVI incidents were those of Warnick (1995) and Herschaft *et al.* (2005) who indicated that financial recompense was appropriate, but determining appropriate levels difficult. They did, however, comment that forensic odontologists should not expect large financial reward for their services.

All of the issues discussed above are appropriate categories to be addressed in any DVI documentation.
4.6 Conclusions

Although it is relatively straightforward to determine what should be included in both manuals and guidelines describing the practices and procedures of forensic odontology in disaster victims identification it is striking that there is such diversity in the available documentation. It is readily apparent that international agreement on these procedures has been difficult to achieve in the past and unlikely to be reached in the near future.

As discussed in Chapter 2, the majority of states and territories in Australia have documented procedures and protocols that relate to activities in their jurisdictions only. It is understood and accepted that if a forensic odontologist was requested to assist in another state or territory they would work within the procedures of that jurisdiction. Although similar in procedural content there are noticeable variations in practices that could initially confuse practitioners from different jurisdictions.

At the commencement of this project there was no overarching national documentation that gave guidance to forensic odontologists working in Australia, but more so when they were invited to work outside of Australia as occurred after the Bali bombings in 2001. Personal experience with many forensic odontologists at this incident highlighted the subtle differences that existed in the procedures used across Australia.

Subsequent to this experience and reinforced by involvement in the Asian tsunami, the Australian Society of Forensic Odontology (AuSFO) acknowledged the desirability of developing procedures and protocols that could be used by all members when deployed to assist in DVI incidents, be they national or international.

The author prepared a draft document using the Interpol Guide to Disaster Victim Identification (Interpol 1997), various Australian state procedures (Forensic Odontology Unit 2005, NSW Dental Identification Group 2002), the ABFO Body Identification Guidelines (ABFO 1995) the IOFOS guides for
single and disaster identification (IOFOS 2004, 2005) and the draft Interpol application for International Standards compliance ‘Interpol Quality Management Guidelines for Disaster Victim Identification – ISO/IEC 17025 Application’ as directive documents, combined with personal experience of 20 years as a practicing forensic odontologist. This draft document forms the basis of the project discussed in Chapter 6.
CHAPTER 5
THE DELPHI TECHNIQUE

Although it is acknowledged that there is no panacea for preparedness for the management of disasters, it is accepted that discipline specific guidelines will help in the training and preparation of practitioners who will participate in the event of a disaster (De Winne 2006). Cox et al. (2008) reinforced that the use of protocols and procedures will ensure the recovery of the maximum amount of evidence and identification to the highest possible standards which will enable repatriation of the deceased in a timely manner.

This chapter will look at the various techniques available for the preparation of guidelines utilising large groups of people.

5.1 Introduction
Vermylen (2006) has defined forensic dental guidelines as “systematically developed statements and protocols to assist forensic odontologists in arriving at final decisions in forensic dental work”. He advised that they must reflect the common opinion of a group of experts and not just that of a single forensic practitioner.

The Australian Society of Forensic Odontology (AuSFO) required a set of guidelines that could be recommended to its members as best practice procedures in Disaster Victim Identification (DVI) and would promote consitency in procedures, particularly when members were required to work outside of their home jurisdiction and with colleagues they would not usually work with.

Vermylen (2006) acknowledged the difficulty in achieving international agreement on procedures in many disciplines in forensic science, citing the experiences of Interpol and the International Organisation of Forensic Odontostomatology (IOFOS). This highlights the benefit to AuSFO of developing a set of guidelines specifically for its members. Lohr (1995)
indicated that professional societies are appropriate groups to develop clinical guidelines.

Guidelines for practices in Disaster Victim Identification for forensic odontologists are analogous to clinical practice guidelines for medical and dental procedures. Clinical practice guidelines aim to raise the general level of practice to meet a minimum standard (Kane 1995, Samanta, Samanta & Gunn 2003). They also assist in quality assurance and improvements within a discipline (Lohr 1995, Hill 2006).

The criteria for compilation of quality guidelines are thus applicable to this project. It is recommended that guidelines be evidence-based to ensure reliability, reproducibility and validity; unbiased and clearly documented. In addition they need to be flexible enough to be applicable in a variety of situations (Lohr 1995, Samanta, Samanta & Gunn 2003). They should also be regularly reviewed, including review by persons external to the discipline (Lohr 1995, Shekelle et al. 1999).

5.2 Techniques for the Development of Guidelines

It is worth exploring the conditions surrounding the development of operating guidelines in other practical fields. Clinical guidelines are frequently developed using groups of relevantly qualified persons, by means of formalized and explicit consensus generating methods (Hutchings et al. 2006). Van der Sanden and colleagues (2004) commented the quality of clinical guidelines was superior when they were developed by experts rather than peer groups.

Group decisions are considered more reliable and accurate than individual opinions (Woudenberg 1991), and this fits well with the recommendations for the development of clinical guidelines. A group brings a broader range of experiences and knowledge to a given situation allowing more ideas to be generated. The group interaction is also believed to encourage consideration of a broader range of options, and to generate outcomes that are more rational and likely to attract ongoing acceptance. The outputs from group interactions
are also thought to carry more weight with external individuals and groups (Murphy et al. 1998, Black et al. 1999).

Unstructured or informal group interactions are known to be fraught with many limitations and pitfalls, the predominant being the ability of a strong or opinionated person to direct the proceedings, and thus the outcomes of the group. The personal dynamics of a group can greatly influence the interactions. Some individuals of these informal groups, particularly new or junior members, may feel unable to participate fully for a variety of reasons including unwillingness to challenge the opinions of a senior colleague (Reid 1988, Rowe & Wright 1999).

It was, therefore, necessary to identify a strategy or tool that would meet the criteria for solid establishment of guidelines as well as work well and readily for the Australian Society of Forensic Odontology.

5.3 Formal Methods for Achieving Consensus
Several formal methods are available for obtaining consensus from groups including; the use of questionnaires, the Delphi technique, the nominal group technique (NGT), consensus conferences, and the staticised nominal group technique.

Single round questionnaires serve to gather opinions from people, and as such consensus will only exist if the opinions expressed are in agreement at that given point in time. Questionnaires can be designed to allow people to explain why they hold a particular view but there is no opportunity for feedback, discussion or further development of ideas or outcomes. It is known that better response rates are achieved when questionnaires are short and succinct and are the most appropriate for gathering factual information (Yammarino, Skinner & Childers 1991, Leung 2001).

Initially developed by the RAND (Research ANd Development) Corporation, the Delphi technique is a tool which also employs questionnaires, but uses
multiple rounds and provision of feedback to encourage further deliberation and consideration, with the ultimate aim of gaining agreement in a systematic way. An initial questionnaire is designed and the results and comments summarised and returned to the participants with the second round questionnaire. This provides participants the opportunity to reevaluate their opinions and responses in light of the comments of the group. There is no set number of rounds required to achieve consensus or acknowledge that the point of diminishing returns has been reached. Being paper based it is well suited to groups of geographically disperse people and the anonymity provided by the participants never meeting is thought to enhance the openness of responses. It is also possible to use larger sample sizes than is recommended with other consensus techniques (Fink et al. 1984, Williams & Webb 1994, Hutchings et al. 2006). The iterative nature of the methodology is also said to produce more robust levels of consensus. The Delphi technique has been recommended as a tool for the development of treatment protocols and best practice guidelines (Baker 2006).

The Nominal Group Technique (NGT) is a method used to formalise the interactions within a small face-to-face group meeting. At the start, participants are asked to record ideas about the topic independently and privately. A facilitator records these ideas via a round-robin format and coordinates discussion of each idea. Participants then privately record their judgments or vote on issues raised and individual judgments are aggregated to define the group outcome. More than one round of facilitated discussion may be employed. It is thought that this structured approach avoids over-discussion and elaboration during the ideas forming section of the process, a problem that is common in many informal group interactions (van de Ven & Delbecq 1974, Fink et al. 1984, Jones & Hunter 1995, Murphy et al. 1998). In a modified version of the NGT participants are provided with a postal questionnaire prior to assembling as a group. This allows more time for considered ideas to be generated. These ideas then form the skeleton of facilitated discussions. A follow-up questionnaire is completed again in private at the completion of the discussion. The opportunity in the face-to-face
meetings to facilitate clarification of any disagreements is thought to make the technique superior to Delphi (Murphy et al. 1998, Hutchings et al. 2006), but depends on the practicality and feasibility to assemble all participants at the same time, and the likelihood that decisions can be reached in a short space of time.

Consensus conferences were developed in Denmark initially to enable ordinary citizens to have an input into the assessment of technology (Andersen & Jaeger 1999). At the outset a small group of lay people (about 10-14) determine the questions to be posed to an expert panel, whom they also have a role in selecting. At the conference proper, the experts answer the lay questions, and both groups participate in discussion and clarification. These discussions are open to the public and media, after which the lay group make their deliberations in private, like a jury, and deliver an outcome and recommendations. The conference may take a number of days, nominally four, to reach completion. All aspects of the conference, both the open and private sessions, are chaired and facilitated (Murphy et al. 1998, Andersen & Jaeger 1999). This format is predominantly aimed at allowing controlled public and political debate on policy issues seen to be potentially contentious. Considerable financial and time commitments are required to establish and run a consensus conference.

Examples of the recent use of Consensus Conferences in Australia include the Gene Technology in the Food Chain conference in 1999, and the National Peoples Assembly on Climate Change in 2008. There is no imperative on the host organization to take notice of the recommendations of the lay panel, but the recommendations of the 1999 Gene Technology conference provided impetus for the establishment of the Office of Gene Technology Regulator (Ockham’s Razor 2008).

In a staticised nominal group, individuals work on a problem independently, and the aggregated views are regarded as the group view (Murphy et al.)
Similar to one round questionnaires this is a single event outcome not admitting any review of opinions.

An appraisal of these techniques indicated that the most appropriate choices for this project would be a choice between the modified nominal group technique and the Delphi technique. The advantages of a single face to face meeting of the nominal group technique were negated by the recommended small size of the working group. It was desirable that as many members of the Australian Society of Forensic Odontology as wished to participate would be able to do so, and the known length of the draft document predicated that a face to face meeting would be extremely long. The cost involved in convening a meeting of members of the society was also seen as prohibitive.

The ability to reach a large number of participants and use the iterative feedback model to achieve consensus identified the Delphi technique as a suitable tool for this project.

**5.4 The Delphi Technique**

Variously described as a technique, process, method and approach, Delphi has been used extensively in the social sciences, education and health sectors for a wide range of research, including gathering data and opinions; planning curricula; and defining professional practice procedures, protocols, standards and guidelines. Defined by Linstone and Turoff (1975) as “…a method for structuring a group communication process so that the process is effective in allowing a group of individuals, as a whole, to deal with a complex problem”, and by Reid (1988) as “…systematic collection and aggregation of informed judgments from a group of experts on specific questions or issues”, it is a communication and facilitation strategy used most widely to garner opinions, and theoretically achieve consensus, from a geographically dispersed but potentially cohesive group of people.

Strict protocols for the use of the technique appear not to exist but the method is reported to be flexible and robust enough to cope with the multitude of
variations (Hasson, Keeney & McKenna 2000). Originally used by the RAND Corporation in the early 1950’s (Dalkey & Helmer 1963) the underlying principle of the technique involves a series of structured questionnaires (often called rounds) distributed to a group of ‘experts’ or informed individuals. The first round of the classic Delphi is composed of open ended questions. A summary (often presented statistically) of the responses to the previous round is provided to participants prior to, or as part of, the subsequent round. Each round or iteration builds on the previous and is aimed at refining the outcomes by allowing participants to reconsider their opinions in light of the group responses. The process continues until consensus is achieved, or it becomes obvious that no further refining of outcomes is likely.

Several variations from the early ‘conventional’ and ‘conference’ forms (Linstone & Turoff, 1975) are reported, including the ‘policy Delphi’, the ‘decision Delphi’ (Crisp et al. 1997) the ‘reactive Delphi (McKenna 1994) and the ‘real time Delphi’ (Beretta 1996). Ishikawa et al. (1993) have also reported the ‘Max-Min Delphi’ and the ‘fuzzy Delphi method’. All of these illustrate the diverse range of applications and refinements of the technique.

As indicated by Beretta (1996) a group of characteristics are common to all these techniques: the participants are considered to be experts in their field; sequential series of written questionnaires are used; the ultimate aim is to achieve a consensus of opinion; anonymity of participants and their opinions is assured; and iteration and controlled feedback are essential components.

The large number of variations has opened the technique to several criticisms, the most severe being that the technique lacks scientific rigour and, by inference, merit. Hasson, Keeney & McKenna (2000) have provided one of the few concise guidelines for the use of the technique, aimed at removing the variability in application and helping to redress some of these criticisms. It could be argued that lack of scientific rigour is an irrelevant argument as the technique is merely one of group facilitation where the outcome is never intended to be a scientific fact but simply a form of agreement. As such the
technique is not claiming scientific merit as it is operating in the arena of social interaction.

5.4.1 Strengths of the Delphi Technique
A number of authors have highlighted the advantages of using the Delphi technique. In her discussion Reid (1988) identified the following: it allows the involvement of more people than frequently possible in face-to-face meetings; removes the influence of dominant personalities, enabling all members of the group to make a contribution; provides for considered thought and opinion-making in private; provides the opportunity for thoughtful responses and reduces the likelihood of hasty responses often found in public forums; permits a diversity of opinions to be aired; and enables people to give ground or change their mind on previously stated opinions without embarrassment.

Other reported strengths of the technique have included its ability to generate consensus, and the ability of the feedback to improve knowledge and stimulate ideas within the participants (Rowe & Wright 1999, Powell 2003); the anonymity of responses encourages honest responses (Williams & Webb 1994, Beretta 1996); the process and the outcomes are well accepted by participants (McKenna 1994), and it is generally a cost effective research method (Reid 1988, McKenna 1994, Williams & Webb 1994, Beretta 1996). Also beneficial is that it is seen as a collaborative rather than combative process which does not aim to eliminate minority views (Mead & Moseley 2001).

5.4.2 Limitations of the Delphi Technique
The most frequently cited criticisms of the technique concern the selection of experts and the size of the participant group (Reid 1988, Beretta 1996, Baker 2006); what constitutes consensus (Williams & Webb 1994); the reliability of the results (Reid 1988, Williams & Webb 1994, Beretta 1996, Crisp et al. 1997); and the validity of the results (Beretta 1996, Crisp et al. 1997).

One of the documented tenets of the Delphi technique is that the participants are ‘experts’. It would seem that the use of experts is pivotal to the success
and validity of the technique although a number of authors have commented the lack of definition and direction for selecting 'the experts' is a major limitation (McKenna 1994, William & Webb 1994, Crisp et al. 1997, Reid 1998, Baker 2006). Keeney, Hasson and McKenna (2001) summarised some of the definitions that have been provided to describe an expert which included: an informed individual; a specialist in their field; someone with specific knowledge about a subject; or representative of their professional group. Knowledge or accreditation as a specialist is generally predicated on professional qualifications and registration but does not automatically infer expertise. To address this potential limitation it has been recommended that participants should not only possess knowledge but have practical experience as well (Baker 2006). Different groups of people and experts will be appropriate for each and every application of the Delphi technique, and should reflect the questions under investigation (Hardy et al. 2004). Baker (2006) summarised his discussion on the concept of the expert in Delphi techniques by saying that there will always be difficulties and issues with the definition and selection of experts and that ultimately it is “...the responsibility of each researcher to choose the most appropriate group of experts and defend that choice.”

The criticisms relating to panel selection and size and consensus appear to reflect the lack and variety of precise guidelines relating to the execution of the technique. A number of authors feel the wide range of sample sizes, everything from less than 10 to more than 2,000, indicates a scientific weakness of the technique. Linstone and Turoff (1975) indicated that accuracy is poor with a sample size of less than seven, and improved as the sample size increased. Response and drop out rates are also critical to the success and reliability of the technique (Mullen 2003), as these can impact on sample size considerably.

That no guide exists for what should be taken as consensus is also seen as a weakness, with recommendations ranging from 51 percent through to 100 percent. More specifically, Williams and Webb (1994), Crisp et al. (1997), and Powell (2003) have all highlighted that many researchers fail to set the
consensus level prior to the enquiry, but only after data analysis. This would
tend to reinforce another criticism of the technique, that of susceptibility to
researcher influence (Beretta 1996), as being valid. Graham, Regehr and
Wright (2003) recommended a topic specific definition be established for each
individual project.

Arguments that the technique lacks reliability and validity abound. The most
frequently cited and most critical review appears to be that of Sackman in 1974
Part of this criticism argues that the final consensus arrived at is, firstly, not
necessarily a reflection of a correct answer, and secondly, “not based on
genuine agreement but on strong peer group pressure to conform”
(Woudenberg 1991) and thus ultimately nothing more than a diluted opinion.

Woudenberg (1991) did acknowledge that the accuracy and reliability of
judgment methods, such as Delphi, are difficult to evaluate as judgments
cannot be equated to measurements. Crisp et al. (1997) summarised these
criticisms by acknowledging that results using the Delphi technique did not
appear to reflect high levels of reliability and validity, but also commented that
the vast array of different forms of Delphi, and the fact that some of the early
studies were not methodologically sound, in fact make it difficult to quantify this
criticism.

Another realistic criticism relates to the time required for the research to be
conducted. While some have indicated that a ‘round’ can be completed in 30
days, others have cautioned that as long as 8 weeks should be set aside for
each round (Beretta 1996). Others have commented that an extended time
frame may contribute to poorer response rates in later rounds as individual and
group enthusiasm wanes (McKenna 1994, Williams & Webb 1994).

As early as 1975 Linstone and Turoff commented that the technique “is more
of an art than a science”, which in part may be responsible for the persistent
criticisms. Considered reflections of the technique appear to acknowledge the
limitations, different aspects of which are present in all forms of research, but offer that methodologically strong use of the technique to answer an appropriate research question is valid (Jones & Hunter 1995, Crisp et al. 1997, Rowe & Wright 1999).

5.4.3 Use of Delphi Technique in Dental and Forensic Research

Delphi appears to have been rarely used in forensic settings; the only examples found being in the development of service and treatment models in the forensic psychiatry and mental health fields and forensic podiatry (Burns, Fiander & Audini 2000, Vernon, Parry & Potter 2003, Mohan, Slade & Fahy 2004). Although not reported as such, it would appear that a version of Delphi or similar was used by the US based National Association of Medical Examiners (NAME) to develop performance standards for forensic autopsies (Clark & Peterson 2006). Here an initial committee of 20 used 5 rounds of communication and feedback to develop a master code of procedures which were then distributed to the NAME membership for comment. It is not clear in the report how the comments (over 2,000) of the general membership were used, if at all, to refine the protocols.

5.5 Summary
The Australian Society of Forensic Odontology required guidelines and standard operating procedures for application in disaster victim identification. Recommendations exist to ensure best practice in the compilation of clinical practice guidelines which were seen to be applicable to this project. These included being evidence based, unbiased, clearly documented and developed by a group of relevantly qualified persons (Lohr 1995, Shekelle et al. 1999,
Use of a formalised and explicit consensus generating method is recommended to create the guidelines (Hutchings et al. 2006).

Of the consensus methods available a modified nominal group technique or the Delphi technique appeared the most suitable for this project. The modified nominal group technique had the advantages of a single meeting with face to face contact which allows for discussion of issues. The formalized nature, via facilitation, of the process reportedly reduces the inhibition of participants often seen in open meetings. A face to face meeting also has the potential to generate a wider range of ideas. Negatives for its use in this project would be the cost of gathering as many members of the AuSFO who wished to participate and the potential that a long meeting would be required which may not achieve the desired outcomes. Also of concern for the society would be the lack of anonymity which could inhibit participation. The society has many members with strong opinions, and these people may not be willing to compromise in public.

The ability of the Delphi technique to provide a high measure of anonymity and being able to be distributed to as many people as wished to participate was seen as a major advantage. The ability of all participants to have an equal say combined with time for reflection was also seen as advantageous. The lack of face to face contact to discuss contentious issues is a potential disadvantage.

It was apparent that the Delphi technique is useful and appropriate in the establishment of agreement but poor and inappropriate for use in the discovery of scientific fact. As this fits well with the development of guidelines and standard operating procedures it was deemed a suitable tool for use in this project.

As with any project some limitations were anticipated including the potential for a low participation rate, a high drop out rate and a failure for any agreement to be reached. These limits are not necessarily specific to the use of the Delphi
technique. It was unknown how the membership of the Australian Society of Forensic Odontology would react to a paper based discussion as opposed to a face to face interaction. The time and personal input required for each round of the process was expected to be considerable and could put many off. All these considerations led to the generation of the research question for this project ‘Is the Delphi technique an appropriate tool to assist the Australian Society of Forensic Odontology to develop a set of guidelines and Standard Operating Procedures for Disaster Victim Identification practices?’.
CHAPTER 6

DEVELOPMENT OF THE DISASTER VICTIM IDENTIFICATION PRACTICE GUIDE FOR THE AUSTRALIAN SOCIETY OF FORENSIC ODONTOLOGY: MATERIALS, METHODS AND RESULTS

This chapter will present the processes used to achieve the final ‘Disaster Victim Identification Forensic Odontology Guide’ and present the results of the research project.

6.1 Materials and Methods

This research was conducted in a manner consistent with the University of Newcastle ethics approval process (Number H-091-0805) (Appendix 1).

All members of the Australian Society of Forensic Odontology (AuSFO) who were resident in Australia were invited to participate in the project. As the final document will only apply to forensic odontologists deployed within or from Australia it was considered inappropriate to invite members not resident in Australia to contribute to the development, as application and implementation of the document would not apply to them. At the commencement of the project (September 2005) the study group comprised 41 members. Members not resident in Australia (3 in number) and 2 forensic odontologists known to the researcher and not members of the AuSFO were invited to participate in validating the first round questionnaire prior to the initial mail out to Australian members.

In addition, DVI Police Commanders from each state and territory in Australia, the Australian Federal Police and an individual from the private disaster management sector (11 in total) were invited to participate in Round 1 only. The rationale behind the inclusion of this group was that as members of the AuSFO essentially work under the command of police jurisdictions during DVI incidents, often being sworn in as special police constables, any obvious shortcomings, inconsistencies or discrepancies evident to these stakeholders needed to be identified. Disaster Victim Identification work also requires considerable collaboration and cooperation between members of the various
specialist disciplines, including the police, and an appreciation by them of the
goal and principles of forensic odontology in a DVI incident could only be of
benefit. It was stressed to both first round groups of participants that the
opinions of this second group may not necessarily lead to change in the
opinions of AuSFO members or the content of the document.

A letter of invitation, under the name of the then President of the AuSFO,
explaining the project, its aims and participant rights and responsibilities, was
sent together with an information sheet, consent form, pre-participation survey
and personal details form (see Appendix 4). The information sheet advised
that participation was voluntary; that the name of all participants would only be
known to the researcher, and that all responses would remain anonymous but
contents would be provided for all participants to review in the subsequent
round. The only caveat was that any comments that were personally critical of
other members of the society or would serve to identify the author would be
edited by the researcher prior to on forwarding. The personal details form
elicited information about age, gender, years of experience as a forensic
odontologist, graduate training in forensic odontology, and DVI experience.

The pre-participation survey included the following questions:

1. I believe I have enough experience as a forensic odontologist to make a
   valuable contribution to the development of this document
2. I think my opinions will equate quite closely to other members of the
   AuSFO
3. I know most members of the AuSFO quite well
4. I have some definite ideas about the contents of this document
5. I have a lot of experience in developing policy documents
6. I anticipate that this process will work well for the final development of
   this document.

Participants were asked to respond on a 5 grade Likert scale, ranging from (1)
strongly disagree, through disagree, neutral or undecided, agree to (5) strongly
agree.
The first round of the Delphi differed from the classic form in that it was not composed of open-ended questions. A draft Disaster Victim Identification Practice Guide for the Australian Society of Forensic Odontology was prepared by the researcher prior to the commencement of the project (see Chapter 4). This draft was edited once by a group of senior Australian forensic odontologists, each with considerable experience in DVI. These people were also members of the study group for the project. A questionnaire relating to the contents of this draft was prepared as Round 1. The contents of the draft guide were grouped into sections and questions relating to the sections within the document. Again a 5 grade Likert scale was used, and comments for each section invited. Round 1 also invited the participants to select, and thus set, the consensus level, and comment on the name of the final document. Additionally, respondents were asked to list in order of priority their 5 principal concerns with any deployment of forensic odontologists.

The range of responses, and comments provided by participants were summarised by the researcher. Areas of the draft practice guide that failed to achieve consensus were reviewed and edited according to the comments made. The summary of responses and comments and the revised draft practice guide were distributed with the Round 2 questionnaire. Subsequent rounds (4 rounds in total) followed a similar format (Figure 1).
At the completion of the four rounds of the Delphi survey, a final version of the document was prepared and forwarded to the executive of the AuSFO for ratification as required by the constitution of the AuSFO. All members of the AuSFO, including those who had participated in the project and those who had not, were eligible to vote. Ratification was conducted by electronic voting in accordance with the rules of the constitution of the AuSFO.

*Figure 1: Research Plan Flow Diagram.*
A post-participation survey was sent to participants after ratification of the final guide by the AuSFO. Included was a letter of personal thanks from the researcher.

6.2 Results
6.2.1 The Participants
6.2.1.1 Australian Society of Forensic Odontology Members
Thirty seven members of the AuSFO responded to the invitation to participate, which was 90 percent of the eligible membership and 84 percent of the total membership of the AuSFO. Four members did not reply to the invitation. Of those who responded 6 members declined to be involved. This resulted in 31 participants at the beginning of the project. Two members withdrew from the project during the course of the research. Including members who participated in the validation of the first round questionnaire, and the researcher who did not answer questionnaires but was nonetheless an active participant, 79 percent of the membership of the AuSFO contributed to the final document.

Sixteen participants selected to participate by paper format and 15 by electronic communication. This is summarized in Figure 2.

Figure 2: Responses to invitation to participate: AuSFO members.
31 (100% of participants) participants returned the personal details and pre-participation surveys. The personal details survey revealed that 24 (77%) respondents were male and 7 (23%) female. The age range of respondents is presented in Figure 3.

![Figure 3: Age range of respondents.](image)

Twenty six (84%) of the respondents indicated their experience in forensic odontology. The range of years of experience working as a forensic odontologist was from 1 to 50 years, and is presented in Figure 4.

![Figure 4: Distribution of years of experience in Forensic Odontology.](image)
Eighteen (58%) of the respondents had graduate qualifications in forensic odontology, and 13 (42%) did not. Five (16%) respondents had received these qualifications in the last 5 years, 3 (10%) in the last 10 years and 10 (32%) more than 10 years ago. The least time since graduate qualification was 1 year and the greatest 29 years.

Twenty-nine (94%) of the respondents had DVI experience, while 2 (6%) did not. Twenty-five people (81%) had previously been deployed internationally and 6 (19%) had not.

Thirty-one participants (100%) completed the pre-participation survey. These results are presented in Table 2.

<table>
<thead>
<tr>
<th></th>
<th>SD</th>
<th>D</th>
<th>N or U</th>
<th>A</th>
<th>SA</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>I believe I have enough experience as</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a forensic odontologist to make a</td>
<td>0</td>
<td>1</td>
<td>5</td>
<td>16</td>
<td>9</td>
<td>31</td>
</tr>
<tr>
<td>valuable contribution to the</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>development of this document</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I think my opinions will equate</td>
<td>0</td>
<td>1</td>
<td>11</td>
<td>18</td>
<td>1</td>
<td>31</td>
</tr>
<tr>
<td>quite closely to other members of</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>the ASFD</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I know most members of the ASFD</td>
<td>3</td>
<td>6</td>
<td>8</td>
<td>11</td>
<td>3</td>
<td>31</td>
</tr>
<tr>
<td>quite well</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I have some definite ideas about</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>the contents of this document</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I have a lot of experience in</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>developing policy documents</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I anticipate that this process will</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>work well for the final development</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>of this document</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

N= number of respondents, SD = Strongly Disagree, D = Disagree, N/U = Neutral or undecided, A = Agree, SA = Strongly Agree. Con = Consensus.

Table 2: Results of pre-participation survey: AuSFO members.

6.2.1.2 Police Respondents
Eight members of various Police Services and the private disaster management sector accepted the invitation to participate in Round 1. This is summarized in Figure 5.

![Figure 5: Responses to invitation to participate: Police personnel.](image)

Six of these 8 participants (75%) returned the pre-participation survey. These results are presented in Table 3.

<table>
<thead>
<tr>
<th>Statement</th>
<th>SD</th>
<th>D</th>
<th>N or U</th>
<th>A</th>
<th>SA</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>I believe I have enough experience in DVI to make a valuable contribution to the development of this document</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>I think my opinions will equate quite closely to those of members of the ASFD</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>I know most members of the ASFD quite well</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>I have some definite ideas about the contents of this document</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>I have a lot of experience in developing policy documents</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>I anticipate that this process will work well for the final development of this document</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>4</td>
<td>1</td>
<td>6</td>
</tr>
</tbody>
</table>

N= number of respondents, SD = Strongly Disagree, D = Disagree, N/U = Neutral or undecided, A = Agree, SA = Strongly Agree. Con = Consensus.

Table 3: Police responses to Pre-participation Survey

6.2.2 Validation of Round 1 Questionnaire
Four forensic odontologists agreed to participate in validation of the Round 1 questionnaire prior to it being distributed. For personal reasons one of these people was unable to complete the process in the required time frame, leaving 3 respondents. These participants were provided with a copy of the draft practice guide and the Round 1 questionnaire and asked to provide comment about the clarity of the questions or lack thereof. As all members of this group selected to receive the document electronically they were also invited to complete the questionnaire if they wished to; to review the success of the electronic version.

Two respondents completed the questionnaire only, the other commented that the questionnaire “made sense” and that he thought it would be easy to complete, and then completed the questionnaire.

6.2.3 Response Rates over Subsequent Rounds

The project commenced with 31 participants. Varying response rates were observed over the four rounds, and are presented in Table 4. Two participants withdrew during Round 3, citing personal reasons. They did not return the Round 3 questionnaire.

<table>
<thead>
<tr>
<th></th>
<th>Questionnaires distributed</th>
<th>Questionnaires returned</th>
<th>Response rate (percentage)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Round 1</td>
<td>31</td>
<td>29</td>
<td>93.5%</td>
</tr>
<tr>
<td>Round 1 (Police)</td>
<td>8</td>
<td>4</td>
<td>50.0%</td>
</tr>
<tr>
<td>Round 2</td>
<td>31</td>
<td>25</td>
<td>80.6%</td>
</tr>
<tr>
<td>Round 3</td>
<td>31</td>
<td>27</td>
<td>87.0%</td>
</tr>
<tr>
<td>Round 4</td>
<td>29</td>
<td>19</td>
<td>65.5%</td>
</tr>
</tbody>
</table>

Table 4: Response rates to the four rounds of the Delphi survey.

Figure 6 presents the responses of AuSFO members only, as a percentage of questionnaires distributed.
6.2.4 Presentation of Results to Delphi Rounds

The draft practice guide was constructed in fifteen sections with 6 appendices. The questionnaire grouped some of these sections for ease of reference. The results will be presented according to these section groupings or by heading name (as section numbers changed during evolution of the final document) to make management of data and related discussion easier, and reference for the reader more straightforward. The results for the ‘strongly disagree’ and ‘disagree’, and ‘agree’ and ‘strongly agree’ responses will be combined for ease of recognition in tables. Response rates will be presented as well as a selection of comments relating to each section. The contents of the first draft of the practice guide will be included in this section and the final presentation of the document as an appendix (Appendix 5), enabling readers to appreciate the difference. Note that at the time of the first draft and commencement of the project the society was known as the Australian Society of Forensic Dentistry (ASFD). The name change to the Australian Society of Forensic Odontology (AuSFO) occurred in 2007. As such the draft document and Delphi questionnaire refers to the ASFD and will not be changed for this presentation as this was what was considered by the participants but all references to the group in the discussion will refer to the AuSFO. The Police responses and comments from Round 1 will be included where they serve to reinforce the views of AuSFO members or are radically different from them.
6.2.5 Comments

In total 955 comments were made over the 4 rounds. This was divided into 30 comments by police respondents and 925 by AuSFO members. The distribution of these comments over the rounds is presented in Figure 7.

![Figure 7: Number of comments per round for the four rounds of the Delphi survey.](image)

Table 5 shows the distribution of comments per section for each round.
<table>
<thead>
<tr>
<th>Section</th>
<th>Round 1 AuSFO Members</th>
<th>Round 1 Police</th>
<th>Round 2</th>
<th>Round 3</th>
<th>Round 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sections 1-6 Preamble</td>
<td>61</td>
<td>3</td>
<td>20</td>
<td>26</td>
<td>12</td>
</tr>
<tr>
<td>Section 7 Role, Organisation and Management</td>
<td>27</td>
<td>1</td>
<td>16</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>Section 8 Personnel</td>
<td>53</td>
<td>10</td>
<td>30</td>
<td>13</td>
<td>5</td>
</tr>
<tr>
<td>Section 9 Documentation, Deployment Register in Final Document</td>
<td>19</td>
<td>0</td>
<td>15</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Section 10 Responsibilities (in Rounds 1-3), Section 12 in Final Document</td>
<td>134</td>
<td>3</td>
<td>46</td>
<td>31</td>
<td>18</td>
</tr>
<tr>
<td>Section 11 (13 in final) Recommended Standard Operating Procedures</td>
<td>41</td>
<td>4</td>
<td>8</td>
<td>22</td>
<td>16</td>
</tr>
<tr>
<td>Section 12 (14 in final) Equipment</td>
<td>11</td>
<td>1</td>
<td>8</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>Section 13 (15 in final) Training</td>
<td>18</td>
<td>2</td>
<td>0</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>Section 14 (16 in final) Complaints</td>
<td>11</td>
<td>0</td>
<td>8</td>
<td>8</td>
<td>1</td>
</tr>
<tr>
<td>Section 15 (17 in final) Review</td>
<td>17</td>
<td>0</td>
<td>4</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Section 16 (18 in final) Remuneration</td>
<td>39</td>
<td>3</td>
<td>26</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>General Comments</td>
<td>18</td>
<td>3</td>
<td>11</td>
<td>16</td>
<td>21</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>471</td>
<td>30</td>
<td>206</td>
<td>161</td>
<td>87</td>
</tr>
</tbody>
</table>

Table 5: Comments per section per round for four rounds: Delphi survey.

Figure 8 presents these results graphically.
6.2.6 Consensus

In Round 1 the participants were asked to comment on an appropriate level for consensus to be considered to have been achieved. The results are presented in Table 6.

<table>
<thead>
<tr>
<th>Consensus regarding the percentage of opinions in agreement should be defined as:</th>
<th>N</th>
<th>&gt;50%</th>
<th>80%</th>
<th>100%</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>29</td>
<td>3</td>
<td>22</td>
<td>0</td>
<td>4</td>
</tr>
</tbody>
</table>

N= number of respondents.

Table 6: Responses to determine appropriate levels of consensus in questionnaire: Round 1.

Selected comments relating to the determination of consensus are presented below.

- “Definition of consensus (Collins dictionary) = majority agreement – would not a specific % be an arbitrary figure? Note – the society definition of consensus should take into account the degree of importance of a particular issue. A simple majority of 50+% may be sufficient in some circumstances, but in critical matters a much higher % might be wiser. Some flexibility may be necessary”.

- “According to the Concise OED, Consensus of the majority view. We must aim for greater than 50%, so 80% could be a good goal (but a hard one to reach). You are really ‘herding cats’!!”
Twenty two respondents (76%) voted for 80 percent of members to be in agreement to approve any given question or issue. The consensus rate was, therefore, set at 80 percent. The responses in both the ‘Agree’ and ‘Strongly Agree’ categories were to be combined for this determination.

Two months after the completion of Round 2 the AuSFO held a biennial meeting as part of the Australian and New Zealand Forensic Science Society Symposium. Considerable discussion relating to the project occurred at this meeting and as a result the membership of the AuSFO requested that the consensus level be dropped to 66 percent. The researcher was happy to accede to this request.

6.2.7 Need for a Disaster Victim Identification Practice Guide

The participants were first asked to consider the need for the AuSFO to have a DVI practice guide. The results are presented in Table 7.

<table>
<thead>
<tr>
<th>N</th>
<th>Disagree</th>
<th>N / U</th>
<th>Agree</th>
<th>Con</th>
</tr>
</thead>
<tbody>
<tr>
<td>29</td>
<td>1</td>
<td>1</td>
<td>27</td>
<td>Yes (86%)</td>
</tr>
</tbody>
</table>

It is important for the ASFD to have a document like this Consensus = 80%

N= number of respondents, N/U = Neutral or undecided, Con = Consensus, value in parenthesis = actual level of agreement.

Table 7: Responses to ‘need for ASFD to have a DVI practice guide’ question in questionnaire: Round 1.

6.2.8 Name of the Document

Originally the draft document was titled ‘Disaster Victim Identification Practice Guide for the Australian Society of Forensic Odontology’. Round 1 feedback as to the acceptance of this title is presented in Table 8.
Table 8: Responses relating to the title of the document in questionnaire: Round 1.

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Disagree</th>
<th>N / U</th>
<th>Agree</th>
<th>Con</th>
</tr>
</thead>
<tbody>
<tr>
<td>I am comfortable with the name ‘Disaster Victim Identification Practice Guide for the Australian Society of Forensic Dentistry’ Consensus = 80%</td>
<td>29</td>
<td>4</td>
<td>5</td>
<td>20</td>
<td>No (69%)</td>
</tr>
</tbody>
</table>

N= number of respondents, N/U = Neutral or undecided, Con = Consensus, value in parenthesis = actual level of agreement.

Table 8: Responses relating to the title of the document in questionnaire: Round 1.

Nine alternative titles were suggested and Rounds 2 and 3 presented these options and invited participants to vote on a preferential scale. By the end of Round 4 there was 100 percent agreement to the document being titled ‘Disaster Victim Identification Forensic Odontology Guide’.

6.2.9 Principal Concerns with Deployment for Forensic Odontologists

Twenty seven (93%) of AuSFO first round respondents completed the section which asked them to list their 5 principal concerns with any deployment of forensic odontologists. The responses were divided into 7 categories. ‘Deployment and employment’ issues included anything to do with the organisation of the deployment, communication, pay, flights, accommodation, and length of deployment. ‘Odontology’ issues related to the experience and competence of the odontologists on deployment and ‘Teamwork’ to the ability of odontologists to work as a team, and the ability and expertise of team leaders. The OH&S category included personal safety, security, and mental and physical health of odontologists. ‘Organisation’ related to both the odontology team and the lead agency and included issues such as clear instructions and protocols and an obvious chain of command. ‘Support and Supplies’ included adequate provision of supplies and appropriate facilities to work in. Category 7 was titled ‘other’ and included those comments that could not be allocated to any other group.

Table 9 presents the number of responses in each category by priority
Table 9: Responses for 5 principal concerns in deployment of forensic odontologists: AuSFO members.

<table>
<thead>
<tr>
<th></th>
<th>Priority 1</th>
<th>Priority 2</th>
<th>Priority 3</th>
<th>Priority 4</th>
<th>Priority 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dep &amp; Emp</td>
<td>3</td>
<td>8</td>
<td>7</td>
<td>6</td>
<td>9</td>
</tr>
<tr>
<td>Odontology</td>
<td>8</td>
<td>3</td>
<td>6</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Teamwork</td>
<td>0</td>
<td>3</td>
<td>5</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>OH&amp;S</td>
<td>8</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Organisation</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>S&amp;Supplies</td>
<td>3</td>
<td>5</td>
<td>3</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Other</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Responses</td>
<td>27</td>
<td>27</td>
<td>27</td>
<td>27</td>
<td>25</td>
</tr>
</tbody>
</table>

Figure 9 presents these results graphically.

Selected comments relating to the principle concerns in deployment of forensic odontologists made by the AuSFO members are presented below.

- “Doing a good job”
- “Structured clear plan of dental operations available prior to deployment”
- “Not embarrassing ourselves as part of the DVI operation”
- “Individual members personal qualities – team participant, work ethic and attention to detail, willing to accept any role allocated within their ability, work well within defined guidelines, diplomatic”
- “Being appreciated”
Four (100%) of the police participants provided answers to the question. These responses were divided into 6 categories. In these responses, ‘Deployment and Employment’ included cost and availability of odontologists. ‘Odontology’, ‘Teamwork’ and ‘Organisation’ responses were recorded, but no responses for ‘OH&S’ and ‘Support and Supplies’ were made. The category for ‘other’ responses was also required. Table 10 presents the number of responses in each category by priority provided by the police respondents.

<table>
<thead>
<tr>
<th></th>
<th>Priority 1</th>
<th>Priority 2</th>
<th>Priority 3</th>
<th>Priority 4</th>
<th>Priority 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dep &amp; Emp</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Odontology</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Team Work</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Organisation</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Other</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Responses</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>

*Table 10: Responses for 5 principal concerns in deployment of forensic odontologists: police respondents.*

Figure 10 presents these results graphically.

![Figure 10: Principal concerns in deployment of forensic odontologists: Police respondents.](image)

Selected comments relating to the principle concerns in deployment of forensic odontologists made by the police respondents are presented below.
6.2.10 Preamble to the Document
Sections 1 – 6 of the draft document were grouped together for the purposes of the questionnaire as they related largely to the preamble for the document. Section 1 comprised the Introduction; Section 2 described the Australian Society of Forensic Odontology; Section 3 was the mission statement; Section 4 addressed the scope of the document; Section 5 included terms and definitions and Section 6 looked at AuSFO representation on stakeholder committees.

The contents of Sections 1-6 section of the draft of practice guide used in the Round 1 questionnaire are presented below.

1. INTRODUCTION
Disaster Victim Identification (DVI) is the given to procedures used to positively identify deceased victims of a multiple fatality event.

Forensic Odontology is one of the specialist disciplines used to facilitate positive identification. It uses the comparison of post-mortem and ante-mortem dental information to provide an opinion regarding identity. Informing this opinion is the scientifically accepted research that human dentitions are unique to a level enabling individualisation.

2. THE AUSTRALIAN SOCIETY OF FORENSIC DENTISTRY
The Australian Society of Forensic Dentistry (ASFD) was established in 1983 and has objectives which include:
- To foster and advance forensic dentistry;
- To pursue and advance the recognition and acceptance of the practice of forensic dentistry within the fields of forensic science and dentistry to establish high professional and clinical standards for the practice of forensic dentistry;
- To do all such things as are incidental to any of these objects and such as are necessary or desirable to attain the encouragement thereof.

The ASFD is a group open to any dental professional, of good standing, with an interest in Forensic Odontology. It has no legislative or administrative function, but aims to represent Forensic Odontologists in their interactions with stakeholders. In this context it seeks to be the overarching body facilitating the involvement of Australian Forensic Odontologists in DVI, either nationally or internationally. It does not seek to have a role at jurisdictional level, but supports the implementation of the standards in this Guide at this level.
3. MISSION STATEMENT

Australian Forensic Odontologists are committed to providing a timely and high quality service to the Australian community in the event of a state, national or international multiple fatality incident, to the satisfaction of the justice system. The practices used by Australian Forensic Odontologists are based on Interpol Guidelines and internationally accepted practice.

4. SCOPE

Forensic Odontology can play a role in each of the phases of DVI. The level of involvement and responsibility in each of these phases will vary.

Although a discipline in its own right, forensic odontology at jurisdictional levels is generally practiced by a small group of individuals operating under differing administrative arrangements. It must, therefore, be remembered that members if a large Forensic Odontology team will necessarily be convened from varying backgrounds and experiences.

This document relates to Australian Forensic Odontologists and aims to define the modes of involvement of forensic odontologists in a major DVI incident, procedures to be followed during that involvement, and protocols for national and international deployment.

This document is to be read in conjunction with:
- The Interpol Disaster Victim Identification Guide;
- The Australasian DVI Standards Manual;
- The Interpol Quality Management Guidelines for Disaster Victim Identification – (ISO/IEC 17205 Application);
- The EMA OMSAS CASPLAN;
- The (draft) Australian DVI Activation and Response Plan;
- The Australian National Emergency Forensic Pathology Activation Program (ANEFPAP).

5. TERMS AND DEFINITIONS

Forensic Odontology: Forensic Odontology is the application of dental science to the administration of the law and the furtherance of justice. In a DVI situation forensic odontology can provide information about assessment of oro-dental trauma, age assessment and identification of victims.

Forensic Odontologist: A qualified dentist with appropriate additional training in forensic odontology.

Jurisdiction: In the Australian context represents the Australian Federal Police of a state or territory Police Force, providing DVI.

Lead Agency: The organisation responsible for the investigation of the DVI incident.

Phase: DVI activities comprise a number of separate but related phases; the scene, AM information collection and family liaison, PM information collection, reconciliation and operational debrief.

6. ASFD REPRESENTATION

6.1 The Australian Society of Forensic Dentistry will be represented on the Australasian DVI Committee. The representative will be the President of the Society, or their nominee. This position will be renewed every two (2) years.

6.2 Australian Forensic Odontologists will participate in the Australian National Emergency Forensic Pathology Activation Program (ANEFPAP), providing a contact person in the event of a national or international incident requiring DVI services. The Odontology representative on this roster must be able to fulfil all duties of the Initial Response Odontologist and Odontology Co-ordinator.
First, participants were asked to reflect on the need for these sections to be included in the document. The results are presented in Table 11.

<table>
<thead>
<tr>
<th>I believe it is important to have Section 1 included in the document</th>
<th>N</th>
<th>Disagree</th>
<th>N / U</th>
<th>Agree</th>
<th>Con</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consensus = 80%</td>
<td>29</td>
<td>1</td>
<td>2</td>
<td>26</td>
<td>Yes (90%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>I believe it is important to have Section 2 included in the document</th>
<th>N</th>
<th>Disagree</th>
<th>N / U</th>
<th>Agree</th>
<th>Con</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consensus = 80%</td>
<td>29</td>
<td>1</td>
<td>3</td>
<td>25</td>
<td>Yes (86%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>I believe it is important to have Section 3 included in the document</th>
<th>N</th>
<th>Disagree</th>
<th>N / U</th>
<th>Agree</th>
<th>Con</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consensus = 80%</td>
<td>29</td>
<td>3</td>
<td>2</td>
<td>24</td>
<td>Yes (83%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>I believe it is important to have Section 4 included in the document</th>
<th>N</th>
<th>Disagree</th>
<th>N / U</th>
<th>Agree</th>
<th>Con</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consensus = 80%</td>
<td>29</td>
<td>0</td>
<td>2</td>
<td>27</td>
<td>Yes (93%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>I believe it is important to have Section 5 included in the document</th>
<th>N</th>
<th>Disagree</th>
<th>N / U</th>
<th>Agree</th>
<th>Con</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consensus = 80%</td>
<td>29</td>
<td>0</td>
<td>1</td>
<td>28</td>
<td>Yes (97%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>I believe it is important to have Section 6 included in the document</th>
<th>N</th>
<th>Disagree</th>
<th>N / U</th>
<th>Agree</th>
<th>Con</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consensus = 80%</td>
<td>29</td>
<td>1</td>
<td>2</td>
<td>26</td>
<td>Yes (90%)</td>
</tr>
</tbody>
</table>

N= number of respondents, N/U = Neutral or undecided, Con = Consensus, value in parenthesis = actual level of agreement.

Table 11: Responses to importance of Sections 1-6 in questionnaire: Round 1.

Second, they were asked to reflect on the content of these sections as presented in the draft. These results are presented in Table 12.
The comments relating to Sections 1 and 4 were mostly concerned with corrections of grammar and terminology. Alterations responding to the feedback were made for Round 2, and the following results (Table 13) obtained. Questions relating to Sections 2, 3, 5 and 6 only were asked, as the contents of Sections 1 and 4 were considered acceptable in the previous round.
Additional alterations for Round 3 resulted in all sections achieving agreement by the end of Round 3. Four of the sections reached 100 percent consensus by the completion of Round 4.

Figure 11 shows the changes in level of support for each of the Sections, 1-6, in the four rounds of questionnaires.

![Figure 11: Trends in support for Sections 1-6.](image)

6.2.11 Role, Organisation and Management

Titled Role, Organisation and Management, this section addressed how forensic odontologists could participate in a DVI incident and the organisational structure that would apply to them.

The contents of the Role, Organisation and Management section in the draft of the practice guide used in Round 1 are presented below.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>7.1</td>
<td>Forensic Odontologists are able to participate in national or international incidents at Initial Response, Coordinator, Team Leader, or Practitioner level. Duties and responsibilities of each of these positions are described in Sections 9 and 10.</td>
</tr>
<tr>
<td>7.2</td>
<td>Established performance criteria and expectations will be documented and understood by all odontology team members.</td>
</tr>
<tr>
<td>7.3</td>
<td>Australian Forensic Odontologists acknowledge the need for management</td>
</tr>
</tbody>
</table>
structures within their own group, and the need to interact with other practitioners according to the Chain of Command indicated in the Australasian DVI standards or by the lead DVI agency.

7.4 Australian Forensic Odontologists recognise that participation in a DVI incident involves considerable teamwork and interaction with other practitioners. This interaction must be professional at all times.

7.5 The Australian Society of Forensic Dentistry will nominate a Quality Manager, and a Health and Safety Officer. A Quality Manager and a Health and Safety Officer will also be appointed for major jurisdictional incidents and each incident requiring national or international deployment of Australian Forensic Odontologists.

7.6 Each member of the Odontology team must be accountable to only one immediate supervisor.

7.7 The Odontology team will operate under the following organisational structure:

The Odontology Coordinator reports directly to, and is answerable to, the DVI Commander.

7.9 All representations for, and on behalf of, the Odontology Team will occur through the Odontology Coordinator only. The Odontology Coordinator will only relay information through the DVI Commander or their delegate, never directly to external agencies.

The results of the question relating to the need for this section to be incorporated in the document are presented in Table 14.

<table>
<thead>
<tr>
<th>Round 1</th>
<th>N</th>
<th>Disagree</th>
<th>N / U</th>
<th>Agree</th>
<th>Con</th>
</tr>
</thead>
<tbody>
<tr>
<td>I believe it is important to have a section addressing Role, Organisation and Management included in the document</td>
<td>29</td>
<td>1</td>
<td>0</td>
<td>28</td>
<td>yes (97%)</td>
</tr>
</tbody>
</table>

N= number of respondents, SD = Strongly disagrees, D = Disagrees, N/U = Neutral or undecided, A = Agrees, SA = Strongly Agrees. Con = Consensus, value in parenthesis = actual level of agreement.

Table 14: Responses to the importance of Role, Organisation and Management section in questionnaire: Round 1.
At the end of Round 1, with 76 percent support, there was not consensus for the contents of this section. Modifications made to the contents from the subsequent rounds led to the ultimate support of 100 percent for this section at the end of Round 4. Table 15 presents the levels of consensus for each of the 4 rounds of questionnaires.

<table>
<thead>
<tr>
<th>The content of this section is appropriate</th>
<th>N</th>
<th>Disagree</th>
<th>N / U</th>
<th>Agree</th>
<th>Con</th>
</tr>
</thead>
<tbody>
<tr>
<td>Round 1</td>
<td>28</td>
<td>4</td>
<td>2</td>
<td>22</td>
<td>No</td>
</tr>
<tr>
<td>Consensus = 80%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(76%)</td>
</tr>
<tr>
<td>Round 2</td>
<td>25</td>
<td>1</td>
<td>6</td>
<td>17</td>
<td>No</td>
</tr>
<tr>
<td>Consensus = 80%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(68%)</td>
</tr>
<tr>
<td>Round 3</td>
<td>27</td>
<td>1</td>
<td>0</td>
<td>26</td>
<td>Yes</td>
</tr>
<tr>
<td>Consensus = 66%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(96%)</td>
</tr>
<tr>
<td>Round 4</td>
<td>18</td>
<td>0</td>
<td>0</td>
<td>10</td>
<td>Yes</td>
</tr>
<tr>
<td>Consensus = 66%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(100%)</td>
</tr>
</tbody>
</table>

N= number of respondents, N/U = Neutral or undecided, Con = Consensus, value in parenthesis = actual level of agreement.

Table 15: Levels of support for the contents of the ‘Role, Organisation and Management’ section over four rounds of the Delphi survey.

The Police responses regarding the contents of this section from Round 1 are presented in Table 16.

<table>
<thead>
<tr>
<th>Round 1</th>
<th>N</th>
<th>Disagree</th>
<th>N / U</th>
<th>Agree</th>
<th>Con</th>
</tr>
</thead>
<tbody>
<tr>
<td>The contents of this section are</td>
<td>4</td>
<td>0</td>
<td>1</td>
<td>3</td>
<td>no</td>
</tr>
<tr>
<td>appropriate</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(75%)</td>
</tr>
<tr>
<td>Consensus = 80%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

N= number of respondents, N/U = Neutral or undecided, Con = Consensus, value in parenthesis = actual level of agreement.

Table 16: Police responses to the contents of ‘Role, Organisation and Management’ section in questionnaire: Round 1.

Selected comments from Round 1 relating to the Role, Organisation and Management section are presented below.

- “Too inflexible – too many structures to follow, roles should be able to be reversed if appropriate in field”
- “This only works if people appointed to positions through ability
and not seniority or the old boy net. This section needs to be tightened significantly, even at the risk of offending people. The operational structure is far too inflexible and excludes the overall dental commander for the away team”

- “I strongly agree with points 7.8 and 7.9”
- “I believe some ‘oomph’ be given to these sections”

Figure 12 shows the changes in level of support for the Role, Organisation and Management section over the four rounds of questionnaires.

![Figure 12: Trends in support for the Role, Organisation and Management Section over four rounds of the Delphi survey.](image)

6.2.12 Personnel

This section included criteria necessary for AuSFO members to be deployed in various circumstances, and a model for regular review of performance and currency of skills.

The contents of the Personnel section in the draft of the practice guide used in Round 1 are presented below.

Many members of the dental team and associated disciplines may work in the area of forensic odontology. It is necessary, however, to make some formal qualification requirements for people wishing to be recognised as forensic odontologists capable of working outside their home jurisdiction. The following are presented as appropriate requirements:
8.1 For working within Australia
- registered as a dentist or dental specialist in their home state, making them eligible for temporary registration in the state of deployment, and
- have or be undertaking graduate training, or have equivalent experience in forensic odontology, which must include training in DVI, and
- evidence of currency in the practice of forensic odontology, including a minimum of 5 fully documented and formally reported cases of identification in the past 12 months, and
- have successfully complete a proficiency review within the last 12 months (see Appendix 5)

8.2 For international deployment
- registered as a dentist or dental specialist in their home state, and
- graduate training or equivalent experience in forensic odontology, which must include training in DVI, and
- evidence of currency in the practice of forensic odontology, including a minimum of 5 fully documented and formally reported cases of identification in the past 12 months, and
- have successfully completed a proficiency review within the last 12 months (see Appendix 5), and
- experience in disaster victim identification (not necessarily international), and
- evidence of currency of required vaccinations (those that are not required to be given immediately prior to departure) and a valid passport, and
- guaranteed availability for a maximum of three weeks, and
- evidence of participation in an accredited DVI training course, workshop or similar in the last 24 months.

8.3 For deployment as an Initial Response Odontologist and/or Coordinator of Forensic Odontology in an international incident;
- all of the above (8.2) plus,
- experience as an Odontology Coordinator in a major incident (not necessarily international), and/or
- participation in a DVI Coordinators workshop run by the Australasian DVI Committee or equivalent.

Participants indicated that they felt this section was a necessary component of the final practice guide, as presented in Table 17.

<table>
<thead>
<tr>
<th>I believe it is important to have a section addressing Personnel included in the document</th>
<th>N</th>
<th>Disagree</th>
<th>N / U</th>
<th>Agree</th>
<th>Con</th>
</tr>
</thead>
<tbody>
<tr>
<td>Round 1 Consensus = 80%</td>
<td>28</td>
<td>2</td>
<td>1</td>
<td>25</td>
<td>yes (89%)</td>
</tr>
</tbody>
</table>

N= number of respondents, N/U = Neutral or undecided, Con = Consensus, value in parenthesis = actual level of agreement.

Table 17: Responses to the importance of Personnel section in questionnaire: Round 1.

The responses to the Round 1 questions relating to the Personnel section are presented in Table 18.
Table 18: Responses to questions relating to the Personnel section in questionnaire: Round 1.

Selected comments from Round 1 relating to the Personnel section are presented below.

- “General concern for role of those in training – there appears to be no way to introduce new professionals – need to address this”
- “We need a criteria to be involved but if you use 8.1 and 8.2 you would lose 25% of your available deployment team.”
- “I feel it is important that an odontologist being deployed should be actively working in the field, however, I feel it would be an administrative burden on the individual and his/her supervisor to provide the necessary documentation as provided in this document.”
- “I consider it important to spread the experience and not to have the same people being the Initial Response Odontologist all the time, as this will eventually lead to a ‘hole’ in the level of experience available”
- “I think the concept of a proficiency review, is, itself, a good thing… I don’t agree with the format as presented in the draft document. I believe a better result would be achieved by reviewing for completeness and appropriateness, a case or two presented in a specified period (12 months? 24 months?). The way the section is written, to me implies a “Viva Voce” approach. It should be a review of practice, and review of results, approach.”
- “Review of proficiency – good concept but needs to be feasible. If
There was considerable discussion about the concept of using a minimum number of cases to indicate currency, and the persistent lack of existing training courses. The concept of an annual review of competency was supported, but the mechanism and content generated a lot of discussion.

Participant feedback provided input for redrafting of all sections for Round 2. Although improved agreement percentages were recorded, none of the reviewed sections managed to gain agreement in Round 2; with criteria for working within Australia reaching 79 percent, criteria for international deployment 71 percent and criteria for initial response and/or Coordinator of Forensic Odontology 75 percent. None of the suggested mechanisms for managing a review of performance was agreed to either. Table 19 shows the responses to the Round 2 questionnaire.
Table 19: Responses to questions relating to the Personnel section in questionnaire: Round 2.

Selected comments from Round 2 relating to the Personnel section are presented below.

- “The initial response co-ordinating role is a crucial one, but the nature of disasters is such that the maximum number of personnel should be able to fill this if necessary. By imposing quite severe restrictions on the qualifications of the person able to be deployed at very short notice may lead to a lack of a suitable person at the time and subsequent delays.”

- “I don’t see this information as excluding practitioners but as a basis for coordinators to put the best balanced team together and for those who want to be involved making a personal commitment to maintain a level of preparedness.”

- “I can see some value in a proficiency review although I am not
completely supportive as I feel it is an unnecessary burden to all involved. Time passes quickly so I would favour 24 months rather than 12 months and keep it simple.”

The modifications presented in Round 3 saw the criteria for working within Australia receiving 100 percent agreement, and the criteria for International deployment and Initial response and/or Coordinator of Forensic Odontology each received 96 percent support. By Round 4 each component in this section had received 100 percent agreement.

Figure 13 shows the changes in level of support for the Personnel section over the four rounds of questionnaires.

![Figure 13: Trends in support for the Personnel section over four rounds of the Delphi survey.](image)

6.2.13 Documentation

The section on documentation addressed the concept of a register of odontologists available for deployment and the use of this register for involvement in an incident.

The contents of the Documentation section in the draft of the practice guide used in Round 1 are presented below.
9.1 Information regarding appropriately qualified odontologists will be kept and managed in a register by the Australian Society of Forensic Dentistry under the direction of the President. It will be updated twice annually, and failure by a registered Odontologist to provide the required information in a timely manner will be taken as indication of a desire to be removed from the register. Involvement in this register is voluntary.

9.2 All persons included in this register agree to abide by the principles of this document.

9.3 Membership of this register does not guarantee deployment in any or every incident. Invitation to participate in any incident will be the prerogative of the Lead DVI Agency.

The questions in Round 1 addressed the appropriateness of the concept of a register, the suitability of the contents of the document and the use of the register. The results are presented in Table 20.

<table>
<thead>
<tr>
<th>Round 1</th>
<th>N</th>
<th>Disagree</th>
<th>N / U</th>
<th>Agree</th>
<th>Con</th>
</tr>
</thead>
<tbody>
<tr>
<td>The principle of a register is appropriate. Consensus = 80%</td>
<td>29</td>
<td>1</td>
<td>1</td>
<td>27</td>
<td>yes (93%)</td>
</tr>
<tr>
<td>Statement 9.2 is an important concept for the document Consensus = 80%</td>
<td>29</td>
<td>1</td>
<td>3</td>
<td>25</td>
<td>yes (86%)</td>
</tr>
<tr>
<td>Statement 9.3 is an important concept for the document Consensus = 80%</td>
<td>29</td>
<td>4</td>
<td>2</td>
<td>22</td>
<td>no (76%)</td>
</tr>
</tbody>
</table>

N= number of respondents, N/U = Neutral or undecided, Con = Consensus, value in parenthesis = actual level of agreement.

Table 20: Levels of support for the contents of the ‘Documentation’ section in questionnaire: Round 1.

Selected comments from Round 1 relating to the Documentation section are presented below.

- “A roster is required, otherwise it is exclusive”
- “Updated annually is quite sufficient (not twice)”
- “9.2 This bit is so important it should be in (say) section 2, not buried in the bowels of the document. It could even be a one line chapter to make it stand out.”
- “I question whether the lead DVI agency should be able to cherry-pick our list”. (6 versions of this comment)
It was agreed that a register is an appropriate mechanism to record availability of odontologists. There was some concern expressed that updating this register twice a year was too onerous, and other feedback resulted in a rewording of section 9.1 for Round 2.

Members were adamant that the Lead DVI Agency should have no say in nominating which odontologists will be deployed and amendments were incorporated into Round 2.

Round 2 questions related to the content of sections 9.1 and 9.3 only, and the results are presented in Table 21.

<table>
<thead>
<tr>
<th>Round 2</th>
<th>N</th>
<th>Disagree</th>
<th>N / U</th>
<th>Agree</th>
<th>Con</th>
</tr>
</thead>
<tbody>
<tr>
<td>The revised content of 9.1 is appropriate Consensus = 80%</td>
<td>25</td>
<td>2</td>
<td>4</td>
<td>19</td>
<td>no (76%)</td>
</tr>
<tr>
<td>The revised content of 9.3 is appropriate Consensus = 80%</td>
<td>22</td>
<td>1</td>
<td>1</td>
<td>20</td>
<td>yes (91%)</td>
</tr>
</tbody>
</table>

N= number of respondents, N/U = Neutral or undecided. Con = Consensus, value in parenthesis = actual level of agreement.

Table 21: Responses to questions relating to the Documentation section in questionnaire: Round 2

Most comments from Round 2 were purely editorial in nature. Further editorial revisions were made for Round 3 and received 89 percent agreement at the completion of this round. By the completion of Round 4 this section had achieved 100 percent agreement.

Figure 14 shows the changes in level of support for the Documentation section over the four rounds of questionnaires.
6.2.14 Procedures

The procedures section aimed to document the roles and duties of the various functions that could be undertaken by odontologists in a DVI incident.

The contents of the Procedures section in the draft of the practice guide used in Round 1 are presented below.

10.1 International Response Odontologist (International Incident only)

On advice of an incident the rostered Odontologist will:
- contact the National DVI Chair for clarification of any role;
- liaise with the Lead DVI agency;
- contact ASFD President/ ASFD Quality Manager for register of odontologists;
- contact the state and territory Odontology Co-ordinators to advise of incident and request state capabilities be determined including persons available for deployment, equipment and capacity to collate AM information;
- if being deployed, nominate Australian based Co-ordinator (next odontologist on roster), and advise this person of their role;
- on arrival at international site, liaise with local odontologist/DVI team and provide support and advice where appropriate;
- in conjunction with local odontologist/DVI Commander assess odontology personnel and equipment resources required;
- if assistance requested, in conjunction with DVI Commander and Australian based Co-ordinator, facilitate deployment of required odontologists and equipment;
- assume responsibilities of Odontology Co-ordinator.

10.2 Odontology Co-ordinator (State and International)

The Odontology Co-ordinator will:
establish odontology plan and procedures;
liase with DVI Commander re specific protocols of relevance to odontology – eg use of teeth for DNA sampling;
ensure agreed practices and procedures are followed;
monitor odontology personnel and equipment requirements;
appoint a Quality Manager and a Health and Safety Officer;
appoint Team Leaders;
if an international incident, maintain daily liaison with Australian Co-ordinator, regarding deployment rotations, AM collation etc;
monitor register of attendance of odontologists;
maintain daily liaison with DVI Commander;
maintain daily (end of day) meeting with Quality Manager, Health and Safety Officer and Team Leaders;
liase with Team Leaders regarding daily rotations of members;
in conjunction with the Quality Manager, and DVI Commander, investigate all complaints;
facilitate transport as required;
ensure quality control procedures are utilised in the odontology identification process;
if required, sit on Identification Board.

10.3 Phase 1 Activities, The Scene

Depending on the nature of the disaster it may be appropriate for an odontologist to attend the scene.

An odontologist working at the scene will:
• work as part of a DVI scene team as requested;
• assess the complexity of dental remains;
• identify dental and facial remains;
• advise on stabilisation and preservation techniques of dental and facial remains.

The Health and Safety Officer will:
• ensure working conditions for odontologists at the scene meet occupational health and safety requirements;
• ensure all odontologists are aware of, and adhere to, occupational health and safety and infection control practices at the scene;
• manage any incidents relating to occupational health and safety, and infection control involving odontologists.

10.4 Phase 2 Activities, The Mortuary

Odontology processes in the mortuary are time consuming and may prove to be a bottle-neck. These activities are also labour intensive, with the recommended team being a team leader, mortuary technician, 3 examination teams, 1 radiography team, a dedicated person to process radiographs, and a quality manager, for an incident involving 50 bodies or more, for timely progress of examinations. Each examination and radiography team will be composed of 2 odontologists and any available assistants e.g. auxiliaries. It must be accepted that it may not always be possible to access this number of suitably qualified odontologists, and as a consequence a slower pace through the dental examination phase must be allowed for.

A progress log (See Appendix 1A) including a check lists of examinations will be retained with each body, and initialled after each procedure is completed. The team leader will ensure all procedures are completed before the body is returned to the holding area.

On receipt of human remains each examination team will:
• document chain of evidence;
• check bag and body unique DVI number;
• ensure any police photographs are taken as required;
• take full face view, and anterior dentition view photographs of remains on initial opening of body bag, unique DVI number to be included in all photographs;
• if determined appropriate, disarticulate mandible (may be completed by mortuary technician);
• clean teeth and jaws as necessary;
• take full arch occlusal view photographs of maxilla and mandible, detail view(s) of any features of special interest, unique DVI number to be included in all photographs;
• conduct detailed dental examination, documented on F2, using Interpol recommended charting;
• initial examination to be checked by recorder;
• complete and sign F2, and progress log.

On completion of dental examination, each radiography team will:
• document chain of evidence;
• check bag and body unique DVI number;
• record full mouth survey in periapical, and bitewing views, (minimum 12 films) for each complete human remains. Special features require additional angled views. If remains incomplete, all teeth present are to be radiographed;
• radiographs may be recorded digitally or by analogue film;
• digital sensors must be appropriately protected;
• digitally recorded images must be appropriately filed and stored, and printed according to predetermined protocol;
• remove analogue radiographs from barrier cover in mortuary and place in separate small bag with DVI number attached;
• place radiographs in appropriate A4 zip lock bag containing all mortuary information for that body, then hand to appropriate person for developing and processing;
• complete and sign F2, and progress log.

If teeth are being used for DNA sample, and only after completion of all other procedures, an examination team will:
• document chain of evidence;
• check bag and body unique DVI number;
• extract appropriate tooth;
• process tooth according to Lead DVI agency instructions;
• record tooth extracted (by FDI number) in progress log;
• complete and sign F2, and progress log.

On completion of wet mortuary activities, the radiography processor will:
• document chain of evidence;
• process radiographs, ensuring no mixing of films;
• mount and label radiographs, one full mouth survey mounting sheet per body irrespective of condition of remains.

The Quality Manager will:
• ensure all documentation complete;
• check charting from mortuary against radiographs and photographs;
• highlight any alterations on F2 and document in running sheet;
• ensure major discrepancies are peer reviewed, with appropriate documentation, and reported to Mortuary Team Leader;
• ensure if necessary, body is re-examined or radiographs retaken;
• if computerised comparison program is being employed, supervise input of data, including digitisation of radiographs.
The Safety Officer will:

- ensure working conditions for odontologists within the mortuary meet occupational health and safety requirements;
- ensure all odontologists are aware of, and adhere to, occupational health and safety and infection control practices within the mortuary;
- manage any incidents relating to occupational health and safety, and infection control involving odontologists.

10.5 Phase 3 Activities, Ante Mortem Record Collation

It is appropriate for odontologists to be part of the missing persons team(s) involved in the collection and collation of antemortem information. It is important that all AM team members are aware of what may constitute dental records (e.g., written records, radiographs, photographs, models, and mouthguards) and all the institutions, specialist practices and facilities where dental records may be located. It is appropriate for odontologists to speak directly with treating dentists regarding the content of dental records, however, odontologists are not trained to interact directly with the families of victims.

A progress log (See Appendix 1B) will be retained with each record, and initialled after each procedure is completed.

Each Odontology Team will:

- be composed of a minimum of 2 odontologists at any given time;
- complete and sign Yellow F2 form according to Interpol guidelines;
- report any missing information known to exist (e.g., original radiographs) to AM Coordinator (or nominated person) for facilitation of collection, report to be documented in AM file;
- identify records obviously inadequate for positive identification via Odontology (e.g., incomplete or containing minimal information) to AM Coordinator (or nominated person), to facilitate further investigation regarding additional identification information, report to be documented in AM file;
- document all access to AM files according to Lead DVI Agency guidelines;
- ensure transfer of AM information to Reconciliation Centre is via Lead Agency guidelines only.

10.6 Phase 4 Activities, Reconciliation

The Odontology team in the Reconciliation Centre is to be composed of a team leader, a minimum of 2 odontologists at any given time, and a quality manager. It is possible that the Team Leader and the Quality Manager may be the same person. It is envisaged that in the majority of incidents the Quality Manager for the incident and the Team Leader, Reconciliation would be the same person.

Only original Interpol forms, radiographs and any other dental reference material will be used in Dental Reconciliation.

Irrespective of use of a computerised matching program, all identifications must be manually verified by named odontologists. All identifications must be peer reviewed.

Once initial comparison (either manual or computerised) has identified a potential identification, one odontologist (the presenter) becomes responsible for that case.

The Odontology Co-ordinator may be a member of the Identification Board. If so, to ensure their independence and objectivity, the final review of dental identifications prior to transfer to the Reconciliation Co-ordinator, should be completed by the Quality Manager. If the Odontology Co-ordinator is not a member of the Identification Board they should review all dental identifications before they are submitted to the Identification Board. The last reviewer (Reconciliation Team Leader/Quality Manager or Odontology Co-ordinator) has the final say as to the identification.
The presenting Odontologist will:

- ensure identification is established according to recommended standards for acceptance of identification (Appendix 2);
- document reasons for identification;
- ensure identification is peer reviewed, and peer review is documented;
- complete standard form for reporting identification (Appendix 3);
- ensure all paperwork is correctly completed, radiographs correctly indexed and labelled;
- present case, with appropriate documentation, to Team Leader/Quality Manager/Odontology Coordinator prior to transfer to Reconciliation Coordinator for presentation to Identification Board;
- present case to the Identification Board.

10.7 Quality Manager

The Quality Manager for the Australian Society of Forensic Dentistry will:

- maintain the quality manual and associated documentation;
- review the quality manual and associated documentation annually;
- ensure validation of any new techniques;
- facilitate unit based annual proficiency testing and ensure evaluation of results;
- facilitate the conduct and evaluation of internal audits;
- co-ordinate quality system audits;
- maintain register of DVI personnel;
- make training recommendations to improve the skills of DVI personnel;
- review any feedback;
- recommend changes and improvements to the DVI quality system;
- maintain any archival material, and facilitate use in training.

The Quality Manager at a DVI incident will:

- maintain the quality manual and associated documentation;
- monitor operations to verify compliance with procedures and practices;
- maintain register of attendance of odontologists;
- investigate problems, and recommend remedial action(s);
- participate in daily liaison with Odontology Co-ordinator;
- in conjunction with Odontology Co-ordinator, investigate all complaints;
- in Mortuary, ensure verification of F2 documentation;
- in AM information section, ensure verification of F2 documentation;
- manage any transfer of data to computerised record management program;
- in Reconciliation, participate in final review of identification documentation;
- ensure 100% peer review of all positive identifications;
- ensure 10% of non-identifications are peer reviewed;
- compile daily Odontology Situation reports for Odontology Co-ordinator.

10.8 Health and Safety Officer

The Health and Safety Officer at a DVI incident will:

- maintain the occupational health and safety and infection control procedures documentation;
- monitor operations to verify compliance with procedures;
- in conjunction with incident Safety Officer, investigate incidents and recommend appropriate actions;
- participate in daily liaison with Odontology Co-ordinator

Appendix 2 Categories for Identification

The following categories and criteria are to be used in the final identification report:
Confirm:
The post-mortem and ante-mortem data correspond in sufficient detail to establish that they are from the same individual. There is radiographic evidence in support of the identification, and there are no irreconcilable discrepancies.

Possible identification:
The post-mortem and ante-mortem data have consistent features, but, due to the condition of either the post-mortem remains or the ante-mortem information, it is not possible to confirm the identification. The information does not exclude the identification.

Insufficient evidence:
The available information, either post-mortem or ante-mortem, is insufficient to be able to reach a conclusion.

Exclude:
The post-mortem and ante-mortem data are inconsistent. The deceased is not the person named in the dental records.

First, respondents were asked to reflect on the need for this section to be included in the document. These results are presented in Table 22.

<table>
<thead>
<tr>
<th>It is important to define the duties and procedures in the document</th>
<th>N</th>
<th>Disagree</th>
<th>N / U</th>
<th>Agree</th>
<th>Con</th>
</tr>
</thead>
<tbody>
<tr>
<td>Round 1 Consensus = 80%</td>
<td>29</td>
<td>1</td>
<td>0</td>
<td>28</td>
<td>yes</td>
</tr>
</tbody>
</table>

Table 22: Responses to the importance of the Procedures section in questionnaire: Round 1.

Second, respondents were asked to comment on the contents of the various components of this section. These results are presented in Table 23.
<table>
<thead>
<tr>
<th>Round 1 Consensus = 80%</th>
<th>N</th>
<th>Disagree</th>
<th>N / U</th>
<th>Agree</th>
<th>Con</th>
</tr>
</thead>
<tbody>
<tr>
<td>The list of Procedures defined in 10.1 Initial Response Odontologist (International Incident only) is appropriate</td>
<td>29</td>
<td>1</td>
<td>5</td>
<td>23</td>
<td>No (79%)</td>
</tr>
<tr>
<td>The list of Procedures defined in 10.2 Odontology Co-ordinator (State and International) is appropriate</td>
<td>29</td>
<td>4</td>
<td>2</td>
<td>23</td>
<td>No (79%)</td>
</tr>
<tr>
<td>The list of Procedures defined in 10.3 ‘Phase 1 Activities, The Scene’ is appropriate</td>
<td>29</td>
<td>6</td>
<td>2</td>
<td>21</td>
<td>No (72%)</td>
</tr>
<tr>
<td>The list of Procedures defined in 10.4 ‘Phase 2 Activities, The Mortuary’ is appropriate</td>
<td>29</td>
<td>7</td>
<td>4</td>
<td>18</td>
<td>No (62%)</td>
</tr>
<tr>
<td>The list of Procedures defined in 10.5 ‘Phase 3 Activities, Ante Mortem record Collation’ is appropriate</td>
<td>29</td>
<td>3</td>
<td>3</td>
<td>23</td>
<td>No (79%)</td>
</tr>
<tr>
<td>The list of Procedures defined in 10.6 ‘Phase 4 Activities, Reconciliation’ is appropriate</td>
<td>27</td>
<td>2</td>
<td>1</td>
<td>24</td>
<td>Yes (89%)</td>
</tr>
<tr>
<td>The list of Procedures defined in 10.7 ‘Quality Manager’ is appropriate</td>
<td>27</td>
<td>3</td>
<td>6</td>
<td>18</td>
<td>No (67%)</td>
</tr>
<tr>
<td>The list of Procedures defined in 10.8 ‘Health and Safety Officer’ is appropriate</td>
<td>29</td>
<td>4</td>
<td>3</td>
<td>22</td>
<td>No (76%)</td>
</tr>
<tr>
<td>The definitions of categories for Identification in Appendix 2 are appropriate</td>
<td>27</td>
<td>3</td>
<td>3</td>
<td>21</td>
<td>No (78%)</td>
</tr>
</tbody>
</table>

N= number of respondents, N/U = Neutral or undecided, Con = Consensus, value in parenthesis = actual level of agreement.

Table 23: Levels of support for the contents of the ‘Procedures’ section in questionnaire: Round 1.

Considerable redrafting occurred for Round 2. At the completion of this round only the procedures for ‘Section 10.3 Phase 1 Activities, The Scene’ were supported. These results are presented in Table 24.
<table>
<thead>
<tr>
<th>Round 2 Consensus = 80%</th>
<th>N</th>
<th>Disagree</th>
<th>N / U</th>
<th>Agree</th>
<th>Con</th>
</tr>
</thead>
<tbody>
<tr>
<td>The 'on-call' odontologist will be the Initial Response Odontologist (irrespective of which model on call we adopt).</td>
<td>23</td>
<td>2</td>
<td>4</td>
<td>17</td>
<td>No (74%)</td>
</tr>
<tr>
<td>Once the Initial Response Odontologist is deployed the responsibilities of Odontology Co-ordinator will be assumed by the second 'on-call' odontologist.</td>
<td>24</td>
<td>6</td>
<td>7</td>
<td>11</td>
<td>No (46%)</td>
</tr>
<tr>
<td>Once the Initial Response odontologist is deployed the responsibilities of Odontology Co-ordinator will be assumed by the ASFD President.</td>
<td>24</td>
<td>5</td>
<td>6</td>
<td>13</td>
<td>No (54%)</td>
</tr>
<tr>
<td>The wording of Section 10.3 Phase 1 Activities, The Scene be altered to read: Depending on the nature of the disaster it may be appropriate for an odontologist to attend the scene. An odontologist working at the scene will: • work as part of a DVI scene team as requested; • assess the complexity of dental remains; • identify dental and facial remains; • advise on stabilisation and preservation techniques of dental and facial remains; • conduct stabilisation and preservation of remains where required; • advise on the removal from the site of remains and the need for any records (E.g. photographs) prior to removal; • comply with OH&amp;S and infection control requirements as defined by the Health and Safety Officer.</td>
<td>24</td>
<td>3</td>
<td>0</td>
<td>21</td>
<td>Yes (87%)</td>
</tr>
<tr>
<td>In Appendix 2: Recommended standards for acceptance of identification, it is important that the criteria for confirm identification contains reference to the presence of radiographic evidence in support of the identification.</td>
<td>24</td>
<td>10</td>
<td>5</td>
<td>6</td>
<td>No (25%)</td>
</tr>
<tr>
<td>In Appendix 2: Recommended standards for acceptance of identification, the criteria for confirm identification should say: 'Ideally there is radiographic evidence in support of the identification.'</td>
<td>24</td>
<td>4</td>
<td>3</td>
<td>17</td>
<td>No (71%)</td>
</tr>
</tbody>
</table>
In Appendix 2: Recommended standards for acceptance of identification, the title of 'Possible Identification' should be replaced with 'Identification consistent with'.

<p>| | | | | |</p>
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</thead>
<tbody>
<tr>
<td>23</td>
<td>6</td>
<td>2</td>
<td>15</td>
<td>No (65%)</td>
</tr>
</tbody>
</table>

The contents of Section 10.7 Quality Manager should be transferred to Section 7 Role, Organisation and Management.

<p>| | | | | |</p>
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</thead>
<tbody>
<tr>
<td>22</td>
<td>4</td>
<td>8</td>
<td>10</td>
<td>No (45%)</td>
</tr>
</tbody>
</table>

The wording of Section 10.7 Quality Manger be altered to read:

The Quality Manager for the Australian Society of Forensic Dentistry will:

• maintain the quality manual and associated documentation;
• review the quality manual and associated documentation annually;
• ensure validation of any new techniques;
• facilitate unit based annual proficiency testing and ensure evaluation of results;
• maintain register of DVI personnel;
• make training recommendations to improve the skills of DVI personnel;
• review any feedback;
• recommend changes and improvements to the DVI quality system;
• maintain any archival material, and facilitate use in training.

The Quality Manager at a DVI incident will:

• maintain the quality manual and associated documentation;
• monitor operations to verify compliance with procedures and practices;
• maintain register of attendance of odontologists;
• investigate problems, and recommend remedial action(s);
• participate in daily liaison with Odontology Co-ordinator;
• in conjunction with Odontology Co-ordinator, investigate all complaints;
• ensure verification of all AM and PM Interpol data documentation and the transfer of this to digital forms
• manage any transfer of data to computerised record.
management program;
• in Reconciliation, participate in final review of identification documentation;
• ensure 100% peer review of all positive identifications;
• ensure 10% of non-identifications are peer reviewed;
compile daily Odontology Situation reports for Odontology Co-ordinator.

The concept of a Quality Manager for the ASFD is appropriate, but the duties outlined for the Quality Manager at a DVI incident can be fulfilled by the Team Leaders.

Section 10.8, Health and Safety Officer be removed, as this person will be a member of the Lead DVI Agency and not provided by the ASFD.

All entries referring to ‘The (Health and) Safety Officer will:’ be removed and replaced with
• ‘comply with OH&S and infection control requirements as defined by the Health and Safety Officer.’

under the section detailing duties of odontologists.

The ASFD should establish a working party to define these procedures before agreement by the membership.

The contents of Sections 10 and 11 should be combined

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</thead>
<tbody>
<tr>
<td></td>
<td>24</td>
<td>1</td>
<td>5</td>
<td>18</td>
<td>No (75%)</td>
</tr>
<tr>
<td>Section 10.8, Health and Safety Officer</td>
<td>25</td>
<td>2</td>
<td>4</td>
<td>19</td>
<td>No (76%)</td>
</tr>
<tr>
<td></td>
<td>25</td>
<td>2</td>
<td>4</td>
<td>19</td>
<td>No (76%)</td>
</tr>
<tr>
<td></td>
<td>24</td>
<td>3</td>
<td>7</td>
<td>14</td>
<td>No (58%)</td>
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<tr>
<td></td>
<td>25</td>
<td>6</td>
<td>8</td>
<td>11</td>
<td>No (44%)</td>
</tr>
</tbody>
</table>

N= number of respondents, N/U = Neutral or undecided, Con = Consensus, value in parenthesis = actual level of agreement.

Table 24: Levels of support for the contents of the ‘Procedures’ section in questionnaire: Round 2.

Discussions at the Perth 2006 meeting saw the formation of a working group who assisted the researcher in considerable redrafting of this and the competencies/responsibilities section.

The activities of the working group saw this section re-titled ‘Recommended Standard Operating Procedures’ and the contents were supported by the end of Round 4.
6.2.15 Competencies/Responsibilities

This section aimed to describe the activities to be undertaken by each odontology member of a DVI team.

The contents of the Competencies/Responsibilities section in the draft of the practice guide used in Round 1 are presented below.

### 11.1 Initial Response Odontologist (International incident only)

<table>
<thead>
<tr>
<th>ELEMENT</th>
<th>PERFORMANCE CRITERIA</th>
</tr>
</thead>
</table>
| Establish Communication Channels (where applicable) | 1. Australasian DVI Chair  
2. Lead DVI Agency Commander  
3. State, Territory and Defence Forces Odontology Coordinators  
4. Odontologist in country of incident |
| Provide Odontology support and advice | 1. Support sovereign odontologist to ensure Interpol procedures are followed |
| Assess Odontology requirements | 1. Personnel requirements to be based on formula of a minimum of 11 odontologists per 50 deceased.  
2. Equipment requirements to be assessed relative to facilities available at site of incident |
| Facilitate Odontology services | 1. Provide list of available personnel to Chair, Australasian DVI Committee/Lead DVI Agency.  
2. Provide equipment list to Lead DVI Agency |
| Maintain records | 1. Complete all documentation in accordance with Lead DVI agency requirements |
| OH&S & Infection control | 1. Identify OH&S and Infection Control risks  
2. Identify Health and Safety Officer  

### 11.2 Odontology Co-ordinator (State and International)

<table>
<thead>
<tr>
<th>ELEMENT</th>
<th>PERFORMANCE CRITERIA</th>
</tr>
</thead>
</table>
| Develop Odontology Plan | In conjunction with lead DVI agency:  
1. Confirm number of Odontologists required  
2. Develop timelines for each deployment, and roster for deployment  
3. Ensure all necessary equipment is available in a timely manner  
4. Confirm protocols and procedures for Odontology  
5. Ensure a minimum of 2 odontologists deployed at any given time  
6. Nominate Quality Manager, Health and Safety Officer and Team Leaders |
| Maintain Liaisons | 1. National DVI Chair  
2. Lead DVI Agency Commander (daily)  
3. Australian Odontology Co-ordinator  
4. Odontologist in country of incident  
5. Quality Manager (daily) |
<table>
<thead>
<tr>
<th>Element</th>
<th>Performance Criteria</th>
</tr>
</thead>
</table>
| OH&S and Infection      | 1. Ensure all OH&S and Infection Control matters are being monitored by Team Leaders.  
                             2. Ensure appropriate management of any OH&S or Infection Control issues raised by Health and Safety Officer.  
                             3. Ensure psychological debriefing is made available for all team members.                                                                                                                                         |
| Control                 |                                                                                                                                                                                                                      |
|                         |                                                                                                                                                                                                                      |
| 11.3 Team Leader, Scene |                                                                                                                                                                                                                      |
| ELEMENT                 |                                                                                                                                                                                                                      |
| Develop and Implement   | In conjunction with Odontology Coordinator  
                             1. Liaise with DVI Scene Coordinator to determine Odontology requirements  
                             2. Identify Odontology Team members  
                             3. Ensure all Odontology Practitioners aware of protocols and procedures being used  
                             4. Facilitate any training/experience for Odontology Practitioners                                                                                                                                             |
| Odontology Scene Plan   |                                                                                                                                                                                                                      |
| Maintain Files          | 1. Ensure appropriate Odontology documentation is maintained  
                             2. Understand documentation requirements of Lead DVI agency  
                             3. Ensure all directives relating to documentation from Lead DVI agency are met.                                                                                                                                   |
| Liaison                 | 1. Liaise with Scene Coordinator.  
                             2. Liaise with Odontology Coordinator as necessary  
                             3. Liaise with Odontology Health and Safety Officer as appropriate  
                             4. Liaise with Odontology Quality Manager as appropriate                                                                                                                                                    |
| OH&S and Infection      | 1. Prioritise identified OH&S and Infection Control risks  
                             2. Determine or develop appropriate OH&S and Infection Control risk management policies in association with Scene Coordinator, and Health and Safety officer.  
                             3. Facilitate implementation of risk management policies by Odontology Practitioners  
                             4. Review, and if necessary, modify risk management policies in association with Scene Coordinator, and Health and Safety officer.  
                             6. Advise Odontology Health and Safety Officer of any OH&S or Infection Control matters requiring higher level intervention.                                                                                   |
| Control                 |                                                                                                                                                                                                                      |
| 11.4 Team Leader, Mortuary |                                                                                                                                                                                                                      |
| ELEMENT                 |                                                                                                                                                                                                                      |
| Develop and Implement   | In conjunction with Odontology Coordinator  
                             1. Identify Mortuary Teams  
                             2. Determine rotations and duties for teams  
                             3. Ensure all Odontology Practitioners aware of protocols and procedures being used  
                             4. Facilitate any training/experience for Odontology Practitioners  
                             5. Participate in Odontology activities in Mortuary                                                                                                                                                    |
<table>
<thead>
<tr>
<th>Maintain Files</th>
<th>6. Supervise Odontology Practitioners in Mortuary</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1. Ensure appropriate Odontology documentation is maintained</td>
</tr>
<tr>
<td></td>
<td>2. Understand documentation requirements of Lead DVI agency</td>
</tr>
<tr>
<td></td>
<td>3. Ensure all directives relating to documentation from Lead DVI agency are met.</td>
</tr>
<tr>
<td>Liaison</td>
<td>1. Liaise with Mortuary Coordinator regarding body flow</td>
</tr>
<tr>
<td></td>
<td>2. Liaise with Odontology Coordinator as necessary, and daily</td>
</tr>
<tr>
<td></td>
<td>3. Liaise with Odontology Health and Safety officer as appropriate</td>
</tr>
<tr>
<td></td>
<td>4. Liaise with Odontology Quality Manager as appropriate</td>
</tr>
<tr>
<td>OH&amp;S and Infection Control</td>
<td>1. Prioritise identified OH&amp;S and Infection Control risks</td>
</tr>
<tr>
<td></td>
<td>2. Determine or develop appropriate OH&amp;S and Infection Control risk management policies in association with Mortuary Coordinator, and Health and Safety officer.</td>
</tr>
<tr>
<td></td>
<td>3. Facilitate implementation of risk management policies by Odontology Practitioners</td>
</tr>
<tr>
<td></td>
<td>4. Review, and if necessary, modify risk management policies in association with Mortuary Coordinator, and Health and Safety officer.</td>
</tr>
<tr>
<td></td>
<td>6. Advise Odontology Health and Safety Officer of any OH&amp;S or Infection Control matters requiring higher level intervention.</td>
</tr>
</tbody>
</table>

**11.5 Team Leader, Reconciliation**

**ELEMENT**

**PERFORMANCE CRITERIA**

In conjunction with Odontology Coordinator:
1. Determine method of initial comparison (e.g., computer, manual)
2. Identify Reconciliation Teams
3. Determine rotations and duties for teams
4. Ensure all Odontology Practitioners aware of protocols and procedures being used
5. Facilitate any training/experience for Odontology Practitioners
6. Participate in Odontology Reconciliation activities
7. Supervise Odontology Reconciliation activities
8. Facilitate the comparison between DVI post mortem and ante mortem information
9. Ensure documentation complete before handed to Reconciliation Coordinator, prior to presentation at Identification Board

Managing reconciliation data
1. Ensure appropriate Odontology documentation is maintained
2. Understand documentation requirements of Lead DVI agency
3. Ensure all directives relating to documentation from Lead DVI agency are met.

Liaison
1. Liaise with Reconciliation Coordinator regarding flow through Identification Board
2. Liaise with Odontology Coordinator as necessary
3. Liaise with Odontology Health and Safety Officer as necessary
<table>
<thead>
<tr>
<th><strong>OH&amp;S and Infection Control</strong></th>
<th><strong>PERFORMANCE CRITERIA</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Prioritise identified OH&amp;S and Infection Control risks</td>
<td>1. Identify dental remains of victims at scene</td>
</tr>
<tr>
<td>2. Determine or develop appropriate OH&amp;S and Infection Control risk management policies in association with Reconciliation Coordinator.</td>
<td>2. Provide advice on appropriate stabilisation and preservation of remains to minimise additional damage during transfer</td>
</tr>
<tr>
<td>3. Facilitate implementation of risk management policies by Odontology Practitioners</td>
<td>3. At all times conform to OH&amp;S and Infection Control risk minimisation principles – wear safety glasses, gloves, face mask and other safety equipment as necessary, or directed</td>
</tr>
<tr>
<td>4. Review, and if necessary, modify risk management policies in association with Reconciliation Coordinator.</td>
<td>4. Monitor own and others’ responses to identified OH&amp;S and Infection Control risks</td>
</tr>
<tr>
<td>6. Advise Odontology Health and Safety Officer of any OH&amp;S or Infection Control matters requiring higher level intervention.</td>
<td>5. Identify to supervisor any response of concern</td>
</tr>
</tbody>
</table>

### 11.6 Practitioner, Scene

**ELEMENT**

**PERFORMANCE CRITERIA**

1. Identify dental remains of victims at scene
2. Provide advice on appropriate stabilisation and preservation of remains to minimise additional damage during transfer

**Maintain records**

1. Complete all documentation in accordance with Odontology and Lead DVI agency requirements

**OH&S & Infection control**

1. Identify OH&S and Infection Control risks
2. At all times conform to OH&S and Infection Control risk minimisation principles – wear safety glasses, gloves, face mask and other safety equipment as necessary, or directed
3. Monitor own and others’ responses to identified OH&S and Infection Control risks
4. Identify to supervisor any response of concern
5. Complete required debriefing procedures

### 11.7 Practitioner, Mortuary

**ELEMENT**

**PERFORMANCE CRITERIA**

1. Examine all human remains according to protocols approved by lead DVI agency

**Maintain Records**

1. Complete all documentation in accordance with Odontology and Lead DVI agency requirements

**OH&S & Infection control**

1. Identify OH&S and Infection Control risks
2. At all times conform to OH&S and Infection Control risk minimisation principles – wear safety glasses, gloves, face mask and other safety equipment as necessary, or directed
3. Monitor own and others’ responses to identified OH&S and Infection Control risks
4. Identify to supervisor any response of concern
5. Complete required debriefing procedures

**Quality Control**

1. All examinations to be peer reviewed at time of examination
2. All documentation to be signed with additional printed surname, date and time
3. Quality Control member to ensure all examinations and
4. After processing of radiographs, charting to be reviewed in conjunction with radiographs.
5. All changes to be highlighted and signed
6. Major differences should be peer reviewed, and if necessary body re-examined

<table>
<thead>
<tr>
<th>11.8 Practitioner, AM collection</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ELEMENT</strong></td>
</tr>
<tr>
<td>Collate Ante Mortem Dental Information</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Maintain Records</td>
</tr>
<tr>
<td>OH&amp;S &amp; Infection control</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Quality Control</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>11.9 Practitioner, Reconciliation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ELEMENT</strong></td>
</tr>
<tr>
<td>Facilitate dental comparisons</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Maintain Records</td>
</tr>
<tr>
<td>OH&amp;S &amp; Infection control</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Quality Control</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
2. All entries to be signed with additional printed surname, date and time

<table>
<thead>
<tr>
<th>11.10 Quality Manager</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ELEMENT</strong></td>
<td><strong>PERFORMANCE CRITERIA</strong></td>
</tr>
<tr>
<td>Procedures</td>
<td>1. Document all procedures to be used by odontologists</td>
</tr>
<tr>
<td>Quality management</td>
<td>1. Ensure all activities are carried out according to agreed protocols and procedures</td>
</tr>
<tr>
<td>Scene Phase activities and documentation</td>
<td>1. Ensure all documentation completed according to Lead agency requirements</td>
</tr>
</tbody>
</table>
| Mortuary Phase activities and documentation | 1. Ensure all examinations and documentation complete before body returned to body holding area  
2. Ensure F2 reviewed against radiographs and photographs and any alterations documented  
3. Facilitate re-examination of body if required  
4. Supervise data entry if computer matching program to be used |
| Reconciliation Phase activities and documentation | 1. Ensure all documentation complete  
2. Ensure identification meets established criteria  
3. Ensure 100% positive identifications peer reviewed  
4. Ensure 10% of non-identifications are peer reviewed |
| Liaison | 1. Odontology Co-ordinator  
2. Team Leaders |

<table>
<thead>
<tr>
<th>11.11 Safety Officer</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ELEMENT</strong></td>
<td><strong>PERFORMANCE CRITERIA</strong></td>
</tr>
</tbody>
</table>
| Procedures | 1. Document all OH&S and Infection Control procedures relating to odontologists  
2. Manage any OH&S or Infection Control issues raised by Team Leaders  
3. Advise Odontology Coordinator of any OH&S or Infection Control matters requiring higher level interaction. |
| Implementation of Procedures | 1. Ensure all odontologists are aware of OH&S and Infection Control procedures to be followed at all times during incident  
2. Ensure all odontologists are able to comply with all procedures  
3. Ensure Team Leaders are monitoring OH&S and Infection Control |
| Scene Phase activities | 1. Identify all risks to odontologists at scene  
2. Ensure Scene Team Leader aware of any risks particular to this scene |
| Mortuary Phase activities | 1. Identify all risks to odontologists in mortuary  
2. Ensure Mortuary Team Leader aware of any risks particular to this incident |
| Reconciliation Phase activities | 1. Identify all risks to odontologists in reconciliation centre  
2. Ensure Reconciliation Team Leader aware of any risks particular to this incident |
Debriefing
1. Ensure debriefing available to all odontologists

Liaison
1. Incident Safety Officer
2. Odontology Co-ordinator
3. Team Leaders

Evaluation
1. Review OH&S and Infection Control process at completion of incident
2. Identify improvements for training and future incidents
3. Update procedures as appropriate

First, respondents were asked to reflect on the need for this section to be included in the document. These results are presented in Table 25.

<table>
<thead>
<tr>
<th>It is important to define the responsibilities and duties of individuals in the document</th>
<th>N</th>
<th>Disagree</th>
<th>N / U</th>
<th>Agree</th>
<th>Con</th>
</tr>
</thead>
<tbody>
<tr>
<td>Round 1 Consensus = 80%</td>
<td>27</td>
<td>0</td>
<td>0</td>
<td>27</td>
<td>yes (100%)</td>
</tr>
</tbody>
</table>

N = number of respondents, N/U = Neutral or undecided, Con = Consensus, value in parenthesis = actual level of agreement.

Table 25: Responses to the importance of the Competencies/Responsibilities section in questionnaire: Round 1.

Second, respondents were asked to comment on the contents of the various components of this section. These results are presented in Table 26.
<table>
<thead>
<tr>
<th>Round 1 Consensus = 80%</th>
<th>N</th>
<th>Disagree</th>
<th>N / U</th>
<th>Agree</th>
<th>Con</th>
</tr>
</thead>
<tbody>
<tr>
<td>The criteria defined in 11.1 Initial Response Odontologist (International Incident only) are appropriate</td>
<td>27</td>
<td>3</td>
<td>5</td>
<td>19</td>
<td>No (70%)</td>
</tr>
<tr>
<td>The criteria defined in 11.2 Odontology Co-ordinator (State and International) are appropriate</td>
<td>29</td>
<td>3</td>
<td>3</td>
<td>23</td>
<td>No (79%)</td>
</tr>
<tr>
<td>The criteria defined in 11.3 'Team Leader, Scene’ are appropriate</td>
<td>29</td>
<td>4</td>
<td>2</td>
<td>23</td>
<td>No (79%)</td>
</tr>
<tr>
<td>The criteria defined in 11.4 'Team Leader, Mortuary’ are appropriate</td>
<td>29</td>
<td>4</td>
<td>2</td>
<td>23</td>
<td>No (79%)</td>
</tr>
<tr>
<td>The criteria defined in 11.5 'Team Leader, Reconciliation’ are appropriate</td>
<td>29</td>
<td>4</td>
<td>2</td>
<td>23</td>
<td>No (79%)</td>
</tr>
<tr>
<td>The criteria defined in 11.6 ‘Phase 1 Practitioner, Scene’ are appropriate</td>
<td>26</td>
<td>2</td>
<td>4</td>
<td>20</td>
<td>No (77%)</td>
</tr>
<tr>
<td>The criteria defined in 11.7 ‘Practitioner, Mortuary’ are appropriate</td>
<td>29</td>
<td>4</td>
<td>3</td>
<td>22</td>
<td>No (76%)</td>
</tr>
<tr>
<td>The criteria defined in 11.8 ‘Practitioner, AM Collection’ are appropriate</td>
<td>29</td>
<td>3</td>
<td>3</td>
<td>23</td>
<td>No (79%)</td>
</tr>
<tr>
<td>The criteria defined in 11.9 ‘Practitioner, Reconciliation’ are appropriate</td>
<td>29</td>
<td>3</td>
<td>3</td>
<td>23</td>
<td>No (79%)</td>
</tr>
<tr>
<td>The criteria defined in 11.10 ‘Quality Manager’ are appropriate</td>
<td>28</td>
<td>3</td>
<td>3</td>
<td>22</td>
<td>No (79%)</td>
</tr>
<tr>
<td>The criteria defined in 11.11 ‘Safety Officer’ are appropriate</td>
<td>28</td>
<td>4</td>
<td>2</td>
<td>22</td>
<td>No (79%)</td>
</tr>
</tbody>
</table>

N= number of respondents, N/U = Neutral or undecided, Con = Consensus, value in parenthesis = actual level of agreement.

Table 26: Levels of support for the contents of the ‘Competencies/Responsibilities’ section in questionnaire: Round 1.

Considerable redrafting occurred for Round 2 where, once again, no consensus was achieved. These results are presented in Table 27.
<table>
<thead>
<tr>
<th>Round 2</th>
<th>Consensus = 80%</th>
<th>N</th>
<th>Disagree</th>
<th>N / U</th>
<th>Agree</th>
<th>Con</th>
</tr>
</thead>
<tbody>
<tr>
<td>The contents of Sections 10 and 11 should be combined.</td>
<td>24</td>
<td>11</td>
<td>5</td>
<td>8</td>
<td>No (33%)</td>
<td></td>
</tr>
<tr>
<td>The contents of Section 11 should be in the body of the document</td>
<td>23</td>
<td>7</td>
<td>4</td>
<td>12</td>
<td>No (52%)</td>
<td></td>
</tr>
<tr>
<td>The contents of Section 11 should be an Appendix to the document</td>
<td>23</td>
<td>11</td>
<td>4</td>
<td>8</td>
<td>No (35%)</td>
<td></td>
</tr>
<tr>
<td>The format of Section 11 should be changed</td>
<td>22</td>
<td>5</td>
<td>8</td>
<td>9</td>
<td>No (41%)</td>
<td></td>
</tr>
<tr>
<td><strong>Section 11.11 Health and Safety Officer</strong> be removed, as this person will be a member of the Lead DVI Agency and not provided by the ASFD.</td>
<td>24</td>
<td>1</td>
<td>6</td>
<td>17</td>
<td>No (71%)</td>
<td></td>
</tr>
<tr>
<td>The ASFD should establish a working party to define these procedures before agreement by the membership.</td>
<td>22</td>
<td>5</td>
<td>4</td>
<td>13</td>
<td>No (59%)</td>
<td></td>
</tr>
</tbody>
</table>

N= number of respondents, N/U = Neutral or undecided, Con = Consensus, value in parenthesis = actual level of agreement.

Table 27: Levels of support for the contents of the ‘Competencies/Responsibilities’ section in questionnaire: Round 2.

Discussions at the Perth 2006 meeting saw the formation of a working group who assisted the researcher in considerable redrafting of this and the procedures section.

The activities of this working group saw this section re-titled ‘Responsibilities’ and it received 100 percent support for all but one component (responsibilities of ASFD President where one responder registered neutral or undecided), at the end of Round 4.

6.2.16 Equipment

The section on equipment addressed equipment necessary for a competent response and who should be responsible for providing it.

The contents of the Equipment section in the draft of the practice guide used in Round 1 are presented below. In addition an appendix detailing specific equipment was included.
12.1 Provision of equipment essential to a DVI service in Forensic Odontology is the responsibility of the Lead DVI agency.

12.2 While it is not possible to prescribe a fully comprehensive equipment list, the attached appendix provides suggested requirements for a DVI incident of 50 victims.

12.3 The President of ASFD will maintain an inventory of the location of large equipment items (e.g. portable x-ray machines) that are available for access in the event of a large mass fatality incident.

The questions in Round 1 addressed the need for an equipment list, who should provide the equipment and the necessary equipment to be provided. The responses are presented in Table 28.

### Table 28: Responses to questions relating to ‘Equipment’ section in questionnaire: Round 1

<table>
<thead>
<tr>
<th>Round 1</th>
<th>N</th>
<th>Disagree</th>
<th>N / U</th>
<th>Agree</th>
<th>Con</th>
</tr>
</thead>
<tbody>
<tr>
<td>I believe it is important to have this section in the document</td>
<td>29</td>
<td>0</td>
<td>2</td>
<td>27</td>
<td>yes (93%)</td>
</tr>
<tr>
<td>Consensus = 80%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The distribution of the responsibilities for provision of equipment is appropriate</td>
<td>29</td>
<td>2</td>
<td>2</td>
<td>25</td>
<td>yes (86%)</td>
</tr>
<tr>
<td>Consensus = 80%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The contents of the equipment appendix are appropriate</td>
<td>29</td>
<td>6</td>
<td>3</td>
<td>20</td>
<td>no (69%)</td>
</tr>
<tr>
<td>Consensus = 80%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

N= number of respondents, N/U = Neutral or undecided, Con = Consensus, value in parenthesis = actual level of agreement.

The majority of comments received dealt with additional equipment requirements.

It was agreed that an equipment list was necessary, and that this equipment is most appropriately provided by the lead DVI agency, and that the ASFD should maintain an inventory of the location of major large items necessary for odontology work at a DVI incident (mainly portable x-ray machines and film processors).
The Police responses to Round 1 questions relating to equipment are presented in Table 29.

**Table 29: Police responses to questions relating to ‘Equipment’ in questionnaire: Round 1.**

<table>
<thead>
<tr>
<th>Round 1</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>I believe it is important to have this section in the document Consensus = 80%</td>
<td>N</td>
<td>Disagree</td>
<td>N / U</td>
<td>Agree</td>
<td>Con</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>yes (100%)</td>
</tr>
<tr>
<td>The distribution of the responsibilities for provision of equipment is appropriate Consensus = 80%</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>yes (100%)</td>
</tr>
<tr>
<td>The contents of the equipment appendix are appropriate Consensus = 80%</td>
<td>4</td>
<td>0</td>
<td>1</td>
<td>3</td>
<td>no (75%)</td>
</tr>
</tbody>
</table>

N= number of respondents, N/U = Neutral or undecided, Con = Consensus, value in parenthesis = actual level of agreement.

Round 2 presented questions that related to the contents of the equipment list only. The responses are presented in Table 30.

**Table 30: Responses to questions relating to the ‘Equipment’ section in questionnaire: Round 2.**

<table>
<thead>
<tr>
<th>Round 2</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>The amended equipment list provides a better starting point Consensus = 80%</td>
<td>N</td>
<td>Disagree</td>
<td>N / U</td>
<td>Agree</td>
<td>Con</td>
</tr>
<tr>
<td></td>
<td>23</td>
<td>0</td>
<td>1</td>
<td>22</td>
<td>yes (96%)</td>
</tr>
<tr>
<td>The ASFD should establish a working party to refine and regularly review the equipment list Consensus = 80%</td>
<td>22</td>
<td>0</td>
<td>1</td>
<td>21</td>
<td>yes (95%)</td>
</tr>
</tbody>
</table>

N= number of respondents, N/U = Neutral or undecided, Con = Consensus, value in parenthesis = actual level of agreement.

Most comments from Round 2 again added additional equipment to the list. The suggested working party was established at the April 2006 meeting of the ASFD. Further editorial revisions to this list were made for Round 3 and received 85 percent agreement at the completion of that round. By the completion of Round 4 this section had achieved 88 percent agreement.
Figure 15 shows the changes in level of support for the Equipment section over the four rounds of questionnaires.

![Figure 15: Trends in support for the Equipment section over four rounds of the Delphi survey.](image)

### 6.2.17 Training

The need for and the form of continuing training and professional development for members of the AuSFO was addressed in the Training section of the draft document.

The contents of the Training section in the draft of the practice guide used in Round 1 are presented below.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>13.1</td>
<td>Australian Forensic odontologists are committed to providing the most relevant and up to date service possible. To achieve this it is recognised that continued training and up grading of skills is important.</td>
</tr>
<tr>
<td>13.2</td>
<td>Training can occur at local, national or international levels.</td>
</tr>
<tr>
<td>13.3</td>
<td>The ASFD recognises the following courses:</td>
</tr>
<tr>
<td><strong>Formal Training in Forensic Odontology:</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Graduate Diploma in Forensic Odontology, University of Melbourne</td>
</tr>
<tr>
<td></td>
<td>• Graduate Diploma in Forensic Odontology, University of Adelaide</td>
</tr>
<tr>
<td></td>
<td>• Bachelor of Science in Dentistry (Honours) in Forensic Odontology, University of Adelaide</td>
</tr>
<tr>
<td></td>
<td>• Master of Science (Forensic Dentistry), University of Sydney</td>
</tr>
<tr>
<td></td>
<td>• Master of Science in Dentistry (Forensic Odontology), University of Adelaide</td>
</tr>
<tr>
<td></td>
<td>• Doctor of Clinical Dentistry (Forensic Odontology), University of Adelaide</td>
</tr>
<tr>
<td><strong>Continuing Education:</strong></td>
<td></td>
</tr>
</tbody>
</table>
The results of questions relating to the Training section over the four rounds of the Delphi survey are presented in Table 31. Round 1 determined that this section was unnecessary in the practice guide, and it was accordingly removed from the draft accompanying Round 2 of the survey. Comments received during Round 2 requested reinstatement. A revised version was included in Round 3 and received 93 percent agreement and 100 percent agreement by the completion of Round 4.

<table>
<thead>
<tr>
<th>I believe it is important to have the Training Section included in the document</th>
<th>N</th>
<th>Disagree</th>
<th>N / U</th>
<th>Agree</th>
<th>Con</th>
</tr>
</thead>
<tbody>
<tr>
<td>Round 1</td>
<td>29</td>
<td>5</td>
<td>1</td>
<td>23</td>
<td>no (79%)</td>
</tr>
<tr>
<td>Consensus = 80%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Round 2 (section removed from Round 2)</td>
<td>25</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Round 3</td>
<td>27</td>
<td>0</td>
<td>2</td>
<td>25</td>
<td>yes (93%)</td>
</tr>
<tr>
<td>Consensus = 66%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Round 4</td>
<td>18</td>
<td>0</td>
<td>1</td>
<td>17</td>
<td>Yes (94%)</td>
</tr>
<tr>
<td>Consensus = 66%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

N= number of respondents, N/U = Neutral or undecided, Con = Consensus, value in parenthesis = actual level of agreement.

Table 31: Levels of support for the contents of the ‘Training’ section over four rounds of the Delphi survey.

Selected comments from participants relating to the Training section are presented below.

**Round 1**
- “CE courses have limited value for training FO’s who are qualified.”
- “Training should imply ongoing currency in the practice of FO i.e. ongoing mortuary attendance.”
- “Postgrad courses are only run in the southern states making access difficult”
for those in other states.”

- “No mention of appropriate overseas qualifications/courses.”
- “The qualifications of some of our senior and most experienced members are not included and they are offended.”
- “There needs to be some recognition of experience in this section.”

Round 2

- “I still believe the training section should be in the manual, to show ‘outsiders’ what the ASFD expects in those practitioners that IT sends on deployment.”
- “A mistake to remove the training section – rework it in light of the comments received.”

Figure 16 shows the changes in level of support for the Training section over the four rounds of questionnaires.

![Figure 16: Trends in support for the Training section over four rounds of the Delphi survey (Note this section was removed from Round 2).](image)

6.2.18 Complaints

The mechanisms for managing any complaints raised by members of the AuSFO or other persons about members of the AuSFO were addressed in this section.
The contents of the Complaints section in the draft of the practice guide used in Round 1 are presented below.

14.1 All Australian Forensic odontologists recognise the confidential nature of DVI work, will respect this confidentiality and undertake that no complaints or grievances will be aired outside this confidential environment.

14.2 All internal complaints will initially be directed through, and handled by, the Odontology Co-ordinator and the Quality Manager.

14.3 All external complaints will initially be directed through the DVI Commander, who will determine appropriate management.

14.4 All complaints and grievances will be dealt with fairly, impartially and without bias.

Table 32 presents the results of the question relating to the level of support for the inclusion of this section in the document.

<table>
<thead>
<tr>
<th>I believe it is important to have a section addressing Complaints included in the document</th>
<th>N</th>
<th>Disagree</th>
<th>N / U</th>
<th>Agree</th>
<th>Con</th>
</tr>
</thead>
<tbody>
<tr>
<td>Round 1 Consensus = 80%</td>
<td>29</td>
<td>3</td>
<td>1</td>
<td>25</td>
<td>yes (86%)</td>
</tr>
</tbody>
</table>

N= number of respondents, N/U = Neutral or undecided, Con = Consensus, value in parenthesis = actual level of agreement.

Table 32: Responses to the importance of the ‘Complaints’ section in questionnaire: Round 1.

The contents of this section failed to meet the necessary level of agreement, with only 55 percent of participants supporting the first draft. The majority of comments indicated that this section was not strong enough. Alternatives presented in Round 2 also failed to be supported (68%) as did the suggestion of a separate working party to work on this section (60%).

An alternative model was drafted for Round 3 and received 89 percent agreement, and 100 percent in Round 4.

Figure 17 shows the changes in level of support for the Complaints section over the four rounds of questionnaires.
6.2.19 Review
Mechanisms by which to conduct formal review of the odontological aspects of a DVI incident were presented in the review section.

The contents of the Review section in the draft of the practice guide used in Round 1 are presented below.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>15.1</td>
<td>Australian Forensic Odontologists acknowledge the importance and value of review processes to the continual improvement of the service they offer.</td>
</tr>
<tr>
<td>15.2</td>
<td>There will be an audit and performance review of the odontological aspects of the incident in a period not before 3 months and not after 6 months of the completion of the incident.</td>
</tr>
<tr>
<td>15.3</td>
<td>The audit will be conducted by an appropriately qualified person external to the Australian Society of Forensic Dentistry.</td>
</tr>
<tr>
<td>15.4</td>
<td>The performance review will be conducted by nominated members of the DVI team and suitable persons who were not members of the DVI team.</td>
</tr>
<tr>
<td>15.5</td>
<td>Outcomes of the audit and performance review will be incorporated into the Quality Manual.</td>
</tr>
</tbody>
</table>

Table 33 presents the results of the questions asked in relation to the Review section in the Round 1 questionnaire.
Selected comments from Round 1 relating to the Review section are presented below.

- “Any outcomes of the audit and performance should not always be incorporated into the quality manual.”

- “There is value in the review process after an incident, but I feel it is not important to be part of this document. The results should be used to update/modify the document where required. The results should be distributed to team members.”

- “Too loose, poorly defined. Open to total abuse and waste of time. Needs to be properly structured. Who pays?”

- “May be unattainable.”

Considerable alterations to this section were made for Round 2. The results from the Round 2 questionnaire are presented in Table 34.
<table>
<thead>
<tr>
<th>Round 2</th>
<th>N</th>
<th>Disagree</th>
<th>N / U</th>
<th>Agree</th>
<th>Con</th>
</tr>
</thead>
<tbody>
<tr>
<td>The wording of 15.1 be altered to read “ASFD members acknowledge the importance and value of review processes to the continual improvement of the service they offer.”</td>
<td>25</td>
<td>0</td>
<td>2</td>
<td>23</td>
<td>yes (92%)</td>
</tr>
<tr>
<td>Consensus = 80%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The wording of 15.2 be altered to read “There will be an audit and review of the odontological aspects at the completion of the incident. This may occur in conjunction with and review process initiated by the lead DVI agency, or separately.”</td>
<td>25</td>
<td>0</td>
<td>0</td>
<td>25</td>
<td>yes (100%)</td>
</tr>
<tr>
<td>Consensus = 80%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The wording of 15.3 be altered to read “the review will be conducted by the Deputy Chair, Scientific of the ADVIC in conjunction with members of the ASFD.”</td>
<td>24</td>
<td>4</td>
<td>6</td>
<td>14</td>
<td>No (58%)</td>
</tr>
<tr>
<td>Consensus = 80%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Section 15.4 be removed from the document.</td>
<td>21</td>
<td>0</td>
<td>5</td>
<td>16</td>
<td>No (76%)</td>
</tr>
<tr>
<td>Consensus = 80%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The wording of 15.5 be altered to read “outcomes of the audit and review will be incorporated into the quality manual as appropriate.”</td>
<td>25</td>
<td>1</td>
<td>3</td>
<td>21</td>
<td>Yes (84%)</td>
</tr>
<tr>
<td>Consensus = 80%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

N= number of respondents, N/U = Neutral or undecided, Con = Consensus, value in parenthesis = actual level of agreement.

Table 34: Responses to questions relating to the ‘Review’ section in questionnaire: Round 2.

Additional amendments were made for Round 3 and these received 96 percent agreement. Further refinements led to 100 percent agreement by the completion of Round 4.

Figure 18 shows the changes in level of support for the Review section over the four rounds of questionnaires.
6.2.20 Remuneration

Issues relating to appropriate payment for odontologists deployed for a DVI incident were addressed in the remuneration section.

The contents of the Remuneration section in the draft of the practice guide used in Round 1 are presented below.

- Many Australian Forensic Odontologists are private dental practitioners or University Academics who undertake these services for little or no remuneration. The time commitment to a major DVI incident would mean considerable loss of income for private practitioners, both in salary and overhead costs of their practice. People employed in Universities may be asked to take leave without pay from their employer, and the University will have to fund replacement staff to cover their responsibilities during this period.
- The Australian Society of Forensic Dentistry recommends the following levels of remuneration for odontologists:
  - Hourly rate: $140 per hour
  - Daily rate: $980 per 7 hour day
  - Weekly rate: $4200 per 5 day week
- This remuneration contains no loading for overtime, holidays, other entitlements, or private practice overheads.
- This remuneration is over and above travel, accommodation and meal costs. It is the responsibility of the Lead DVI agency to ensure that appropriate and adequate indemnity, liability, personal accident and sickness insurance is in place for all odontologists.
- Any additional out of pocket expenses must be logged and justified when claimed.
Table 35 presents the responses to the questions raised in Round 1 with respect to remuneration.

<table>
<thead>
<tr>
<th>Round 1</th>
<th>N</th>
<th>Disagree</th>
<th>N / U</th>
<th>Agree</th>
<th>Con</th>
</tr>
</thead>
<tbody>
<tr>
<td>It is important for odontologists to be remunerated for their services</td>
<td>29</td>
<td>0</td>
<td>0</td>
<td>29</td>
<td>yes (100%)</td>
</tr>
<tr>
<td>Consensus = 80%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>There should be different levels of remuneration for employed and self-employed odontologists</td>
<td>29</td>
<td>11</td>
<td>9</td>
<td>9</td>
<td>no (31%)</td>
</tr>
<tr>
<td>Consensus = 80%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All odontologists should be remunerated equally</td>
<td>29</td>
<td>7</td>
<td>6</td>
<td>13</td>
<td>No (50%)</td>
</tr>
<tr>
<td>Consensus = 80%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference to remuneration should be included in the body of the document</td>
<td>29</td>
<td>3</td>
<td>6</td>
<td>20</td>
<td>No (69%)</td>
</tr>
<tr>
<td>Consensus = 80%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

N= number of respondents, N/U = Neutral or undecided, Con = Consensus, value in parenthesis = actual level of agreement.

Table 35: Responses to questions relating to the ‘Remuneration’ section in questionnaire: Round 1.

A variety of permutations of remuneration options were presented in Round 2, none of which achieved agreement. Comments returned led to another version for Round 3 which received 93 percent agreement. The version presented in Round 4 received 94 percent agreement.

6.2.21 Post Participation Survey

Twenty six participants returned the Past Delphi Survey. This represented 84 percent of the original participants. The responses are presented in Table 36.
<table>
<thead>
<tr>
<th>I believe it is important for the AuSFO to have a Disaster Victim Identification Practice Guide</th>
<th>SD</th>
<th>D</th>
<th>N or U</th>
<th>A</th>
<th>SA</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>23</td>
<td>26</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>I feel satisfied with the completed document.</th>
<th>SD</th>
<th>D</th>
<th>N or U</th>
<th>A</th>
<th>SA</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>2</td>
<td>13</td>
<td>11</td>
<td>26</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>I enjoyed participating in the process.</th>
<th>SD</th>
<th>D</th>
<th>N or U</th>
<th>A</th>
<th>SA</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>3</td>
<td>11</td>
<td>11</td>
<td>26</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>I learned and benefited from the feedback provided during the process.</th>
<th>SD</th>
<th>D</th>
<th>N or U</th>
<th>A</th>
<th>SA</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>1</td>
<td>15</td>
<td>9</td>
<td>26</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>In general, I agreed with the feedback provided during the process.</th>
<th>SD</th>
<th>D</th>
<th>N or U</th>
<th>A</th>
<th>SA</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>2</td>
<td>2</td>
<td>18</td>
<td>4</td>
<td>26</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>I believe that my opinions were considered by other members of the group.</th>
<th>SD</th>
<th>D</th>
<th>N or U</th>
<th>A</th>
<th>SA</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>6</td>
<td>17</td>
<td>2</td>
<td>26</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>I found this process enabled me to express my opinions.</th>
<th>SD</th>
<th>D</th>
<th>N or U</th>
<th>A</th>
<th>SA</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>3</td>
<td>14</td>
<td>9</td>
<td>26</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>I found this process frustrating, as I wanted to discuss some issues with other people.</th>
<th>SD</th>
<th>D</th>
<th>N or U</th>
<th>A</th>
<th>SA</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>19</td>
<td>2</td>
<td>3</td>
<td>0</td>
<td>25</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>I thought this process took too long.</th>
<th>SD</th>
<th>D</th>
<th>N or U</th>
<th>A</th>
<th>SA</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>15</td>
<td>6</td>
<td>3</td>
<td>0</td>
<td>26</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>With hindsight, I would prefer not to have been part of the process.</th>
<th>SD</th>
<th>D</th>
<th>N or U</th>
<th>A</th>
<th>SA</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>18</td>
<td>6</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>26</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>I think the process would have worked just as well in a meeting format.</th>
<th>SD</th>
<th>D</th>
<th>N or U</th>
<th>A</th>
<th>SA</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td>8</td>
<td>3</td>
<td>0</td>
<td>1</td>
<td>26</td>
<td></td>
</tr>
</tbody>
</table>

**Table 36: Results of post-participation survey: AuSFO members.**

### 6.3 Summary

This chapter has presented the Materials and Methods and Results of the Delphi based project used to derive the Australian Society of Forensic Odontology Disaster Victim Identification Forensic Odontology Guide. These results and their implications will be discussed in Chapter 7.
CHAPTER 7

DEVELOPMENT OF THE DISASTER VICTIM IDENTIFICATION PRACTICE GUIDE FOR THE AUSTRALIAN SOCIETY OF FORENSIC ODONTOLOGY: DISCUSSION

This Chapter will discuss the results of the Delphi based project used to derive the Australian Society of Forensic Odontology Disaster Victim Identification Forensic Odontology Guide.

7.1 Need for a Disaster Victim Identification Practice Guide

The generation of the Australasian DVI Standards Manual in 2004 necessitated the development of procedures for the DVI activities in forensic odontology. As the researcher had been part of the executive of the Australasian DVI Committee while the Australasian DVI Standards Manual was being written she agreed to commence this process for the Australian Society of Forensic Odontology. The initial draft document, named 'Disaster Victim Identification Practice Guide for the Australian Society of Forensic Dentistry', was prepared using the Interpol Guide to Disaster Victim Identification (Interpol 1997), various Australian state procedures (Forensic Odontology Unit 2005, NSW Dental Identification Group 2002), the ABFO Body Identification Guidelines (ABFO 1995) the IOFOS guides for single and disaster identification (IOFOS 2004, 2005) and the draft Interpol application for International Standards compliance 'Interpol Quality Management Guidelines for Disaster Victim Identification – ISO/IEC 17025 Application’ as directive documents, combined with personal experience of 20 years as a practicing forensic odontologist. This meant that the document was evidence based as recommended for clinical guidelines (Lohr 1995, Samanta, Samanta & Gunn 2003).

The draft document was edited once by a group of senior Australian forensic odontologists, each with considerable experience in DVI. Discussion with the AuSFO Executive about appropriate mechanisms to advance the development, acceptance and ratification of the document led to the decision that it would be beneficial for all members of the AuSFO to have an opportunity
for input into the generation of the practice guide, as any member deployed in a DVI incident, whether within Australia or internationally, would be expected to abide by the principles expressed in the guide. Participation in its creation was hoped to engender a sense of ownership and willingness to comply with the protocols contained in the guide.

At the beginning of the process 86 percent of respondents felt that it was important for the AuSFO to have a DVI practice guide. By the completion of the project 100 percent of people who completed the post participation survey (84% of participants) felt that the society needed such a document. The executive of the Australian Society of Forensic Odontology selected to use an electronic poll to formalise acceptance of the DVI Practice Guide by the membership. Only 34 percent of the membership responded to the invitation to vote, all being supportive of accepting the document. According to the constitution of AuSFO this represented a quorum and so the document was accepted. Such a low response rate was seen by the author as a disappointing result. As all of the respondents to the post participation survey indicated that they were happy with the final document it could be hoped that the natural progression to completion of the project would be the final ratification of the document to which they had contributed.

7.2 Choice of the Delphi Technique for the Australian Society of Forensic Odontology

The Delphi technique was initially considered by the researcher as an appropriate tool for use in this project due to the geographic dispersal of the members of the AuSFO. The society meets as a group at most once a year, and even then not all members are able to attend. The amount of time required to reach agreement on all aspects of this guide was considered too prohibitive to even contemplate a face-to-face process. A committee or working group output would also require discussion amongst the membership as a whole, thereby almost negating the efforts of the committee. Van de Ven and Delbecq (1974) concluded that Delphi was the technique of choice to generate consensus where it was not possible to readily convene all
participants. The use of the AuSFO membership as the participants also supports the conclusions of Lohr (1995) that professional groups are the appropriate people to generate clinical guidelines.

The non-adversarial nature of the process was also seen as an advantage. As with any group of professionals, strong opinions and personalities exist within the membership, and allowing all to have their say without embarrassment or fear was considered important. The quasi-anonymous nature was also seen as a benefit in allowing people to have input unfettered by the fear of rebuke. The process could not be considered truly anonymous as all members of the society are known to one another, and it was possible for members to speculate about who was participating even though their responses were anonymous. It appears that these two benefits were born out by the process as a number of the comments made, particularly in the first 2 rounds, related to personal experiences of the respondents and may well have served to inflame others if they had been expressed in an open forum.

The Delphi process is useful in areas of research where the aim is to identify opinions and ideological positions, and to reach agreement regarding these views (Linstone & Turoff 1975). The process of establishing guidelines and agreeing on process protocols fit this well. One criticism levelled at Delphi has been that consensus does not equate to correctness (Jones & Hunter 1995). In this context the actual correctness of the outcomes for this project was in a way irrelevant as consistency was the goal. The appropriateness of the decisions at the given point in time when they were generated, for the AuSFO, was the critical issue. That another group of forensic odontologists may determine a different set of outcomes would probably reflect the conditions under which they function in a DVI incident, and not necessarily the greater correctness of a given procedure. As with all guidelines this will be a 'living' document requiring regular review and updating. It is quite feasible that the protocols will change over time; this does not render them incorrect at the time of their generation.
The actions of the AuSFO membership at the Perth meeting to create two working groups to assist the researcher with re-drafting of two of the more contentious sections (standard operating procedures and responsibilities of various positions) could initially be seen as contrary to the principles of the Delphi technique. Delphi uses iteration and feedback to achieve consensus and also permits people to review their opinions in the light of the feedback. It is suggested that the formation of the working groups is actually a reinforcement of these principles and highlights the value of the feedback in encouraging the participants to review their preconceived ideas and be willing to discuss alternatives. It could also be argued that the outcomes from these small groups (4 people per group including the researcher) could be unreliable as they are not the views of the entire cohort. This argument is met by the fact that the results were returned to the entire group for consideration and approval or rejection. The formation of the working groups could be viewed as an offer of assistance in shortening the time frame of the project, and it is obvious that they benefited the process in the long run. Even if one accepted that this action was outside the strict boundaries of the Delphi process, that it reflected the membership of the AuSFO taking some ownership of both the process and the document can only be seen as a positive outcome of the project, and beneficial to the process and to AuSFO.

7.3 Selection of Participants

Considerable discussion in the literature relating to the Delphi technique highlights the critical nature of participant selection. The philosophy of Pill (1971) who observed that an expert is “anyone who can contribute relevant input” was considered appropriate in this project. Most members of the AuSFO have knowledge and considerable experience in forensic odontology. The average experience in forensic odontology was 15 years (range 1-50 years), and 70 percent of the group of participants had more than 10 years experience in the discipline (Figure 4). Fifty eight percent of the group had completed graduate qualifications in forensic odontology, indicating an interest in both improving their own skills and the standards of the profession. The personal details of the participants revealed that only 2 people did not have
DVI experience, and the pre-participation survey indicated that 81 percent felt they had enough experience as a forensic odontologist to make a valuable contribution to the development of the document (Table 2). This provided a considerable amount of knowledge upon which to draw, and for the purposes of this study enabled the participants to be considered expert in this field.

Other questions in the Pre-participation survey were asked in an effort to elucidate the potential for consensus to be easily achieved. Nineteen (61%) of respondents thought their opinions would be similar to those of other members, 11 (35%) were undecided about this and 1 was honest enough to indicate they though this was unlikely to be the case. Similarly, 19 (61%) had definite ideas about what should be included in the document, 2 did not and 10 (32%) were undecided. Given the level of consensus was originally set at 80 percent and these results were lower than this, it was obvious from the beginning that there was the potential for consensus to be difficult to achieve.

All Police respondents indicated experience in preparing policy documents, whereas only 32 percent of AuSFO members did so. Nineteen (61%) of AuSFO members and 3 (50%) of Police respondents had definite ideas about the contents of the document. This result contrasts with the previous result as a lack of definite ideas should indicate a level of flexibility in ideas.

Friendship and experience of other members of the society was asked thinking that high positive responses may indicate a potential for herd mentality agreement. Given that 9 (29%) felt they did not know other members very well and 8 (26%) were undecided this was not considered to be too great a risk. Similarly, only 50 percent of the Police respondents felt they knew members of the AuSFO well, and this should allow honesty in their responses without fear of upsetting colleagues.

The age range of participants is also worthy of comment. Pretty and colleagues surveyed 38 forensic odontologists regarding their experiences in mass casualty incidents. The age distribution of their sample was 67 percent
aged over 50 years, and 33 percent aged below 50 (Pretty, Webb & Sweet 2002). The age distribution of the respondents in this study (Figure 3) was remarkably similar, with 61 percent being over 50 years of age and 39 percent below. Pretty and colleagues commented that major recruiting for younger forensic odontologists is needed to address this skew in age toward older practitioners. Similar conclusions can be drawn for the profession in Australia from the results of this study. A majority of male practitioners was also seen in both studies, with 89 percent of the Pretty, Webb and Sweet sample and 77.5 percent of this cohort being male.

A considerable level of support was shown for this project, with 78 percent of the invited membership agreeing to participate. This was reinforced by only 2 people disagreeing with the need for the AuSFO to have the document under development (Table 7). One was undecided, and the other strongly disagreed that there was a need for the document, without offering a reason.

There was a decline in the response rates over the four rounds of the survey (Table 4 and Figure 6). This was most marked in Round 4 where only 63 percent of surveys were returned. This aligns with published data, which reports a wane in enthusiasm over progressive rounds as a common phenomenon (McKenna 1994, Williams & Webb 1994), although the attrition rate of 34 percent can be considered low. Reid (1988) commented that larger panel sizes tended to exhibit the greatest rates of attrition over time.

This decline in participation may also reflect the time span of the process. Fourteen months elapsed from the distribution of Round 1 until the completion of Round 4 which is long enough for fatigue or boredom to set in. Differences in response rates over the rounds were not investigated but could reflect a number of personal issues including other commitments of respondents at the time of a particular round. In the post participation survey 3 (11.5%) participants thought the process took too long and 5 (19%) were undecided about the length of time taken to complete the project (Table 36).
Two participants withdrew during round 3. These were senior members of the profession and they indicated that as they had not practiced as odontologists for a few years they felt unable to add any more to the process. The potential impact of these withdrawals is mixed. Senior members of any professional group have considerable and valuable corporate knowledge on which to draw. These two participants had not been actively involved in forensic case work for a number of years so it could be argued that the value of this corporate knowledge may have been diluted by lack of contemporary experience.

The discussion at the Perth meeting (April 2006) also served to renew interest in the process, as evidenced by a slightly higher response rate to Round 3 than that seen for Round 2. This outcome reinforces the value of face to face interactions within groups when decisions are required. Although all participants in the project were not present at this meeting and the actual content of the document was not discussed, the ability to readily communicate about the project and rapidly review ideas was beneficial.

Although response rates decreased from Round 3 to Round 4 there was a noticeable increase in the consensus, with many sections receiving 100 percent agreement at the end of Round 4. This could have reflected that either respondents were truly happy with the content of the document, they were accepting that the majority of their peers were happy and were responding to peer group pressure (Woudenberg 1991), or that they were so bored with the process they could see the only way to finish it was to grant consensus. Given the level of involvement in the process in previous rounds, which was reflected by the quantity and detail of the comments received, it could be argued that this last option is unlikely to represent the true picture. An element of peer group pressure may have been operating, but overall the respondents reported being happy with the contents and format of the document in the post participation survey (Table 36). In addition only 1 person indicated they had not enjoyed the process and the majority (92%) felt they had learned and benefited from being part of the project.
The response rates of the Police participants were comparatively low and disappointing. Seventy three percent of those invited accepted the invitation to participate, but only 50 percent of these returned the Round 1 survey. Participation would have required a considerable time commitment to both read the draft document and complete the questionnaire. For something that would have not been considered ‘core’ business, this amount of time may just not have been available.

7.4 Validation of Round 1 Questionnaire

This process was not as successful as hoped. Only one participant made comment about the ease of use of the document. That all participants completed the questionnaire may reflect that they found it easy to use.

Two of these participants were forensic odontologists practicing in New Zealand. As an interesting aside, not long after the validation round a request was received from the New Zealand Society of Forensic Dentistry asking to use the AuSFO document as draft for their society documentation. The request included the following statement “There is very little that needs to be added to your document, barring one addition, which is the best I have ever read”.

7.5 Comments

A total of 955 comments were recorded during the 4 rounds (Figure 7). The reducing number of comments as the rounds progressed would indicate participants were happier with the outcomes as the process continued. The distribution of the comments per section of the document (Table 5 and Figure 8) identifies the sections which created the most interest and also required the most rewriting and took the longest to reach agreement. Of note are the Personnel, Standards Operating Procedures and Remunerations sections. The issues particular to these sections and some of the comments will be reviewed as each of these sections are discussed.
7.6 Principal Concerns with Deployment for Forensic Odontologists

Asking respondents to list their 5 principal concerns with any deployment of forensic odontologists in order of priority was aimed at identifying those areas that would be of most importance to AuSFO members. It was anticipated that these would closely relate to the areas of greatest discussion and disagreement as the development of the document progressed, and this proved to be the case in most instances. Experience of odontologists and Occupational Health and Safety were the most frequently mentioned first priorities. That OH&S figured highly as a priority is interesting given the tortuous path that the Health and Safety Officer had through the progression of the document. This outcome perhaps reflects that many forensic odontologists fully appreciate the need and importance of OH&S, but are unresolved in best how to manage this area of high priority in an incident.

Remuneration and deployment issues were priorities for many members as were the qualifications of odontologists and their ability to work as part of a team. Support and supplies also figured highly, particularly as a second priority. This reflects a need to have adequate facilities and equipment as essential to being able to do a competent job.

For the police respondents the experience of the forensic odontologists and their ability to work competently to agreed procedures were seen as the highest priorities. This would reflect their desire that the identification procedure be completed to high standard.

7.7 Consensus

The original article of Dalkey and Helmer (1963) referred to the Delphi technique as generating "the most reliable opinion consensus of a group of experts". This was seen as the desired outcome for this process. Crisp et al. (1997) warned that ‘consensus is often treated as a given by researchers, with little discussion of what is intended’. For this project the researcher thought it important to let the participants set consensus to a level at which they felt comfortable. If the researcher was seen merely as a facilitator rather than the
director of the process it was hoped to encourage a sense of ownership in the process, and encourage higher levels of participation.

This approach was vindicated by the actions of the membership at the April 2006 meeting in Perth. The original level of consensus was set at 80 percent, which may be considered quite high. A number of respondents commented that consensus was merely ‘the majority view’ and provided dictionary definitions to support this. This ‘majority view’ could be interpreted to mean 50 percent, but a number of other comments including “A simple majority of 50+% may be sufficient in some circumstances, but in critical matters a much higher % might be wiser.” and “We must aim for greater than 50%, so 80% could be a good goal (but a hard one to reach)” and the outcome reflected that a higher level of agreement was seen as important at the beginning of the process.

By the end of Round 2 it became apparent that for a number of issues, particularly the call out activation mechanism; detailed standard operating procedures and responsibilities; training; and continuing professional development, it was going to be extremely difficult to achieve this high level of agreement. Considerable time was spent at the Perth meeting discussing the importance of the document and the best way to advance the project. The researcher took this as a measure of the support from the membership for the project and their desire to see a successful outcome. This may reflect an appreciation of the importance of the document or a desire not to be seen by outsiders as unable to reach agreement amongst themselves, or a combination of both. This could be seen as reinforcing the comment of Woudenberg (1991) that “Delphi is extremely efficient in obtaining consensus but this consensus is not based on genuine agreement but on strong peer group pressure to conform”. At the conclusion of the discussion the membership requested the consensus level be dropped to 66 percent. The researcher was happy to accede to this request.

Upon review, the initial high level of agreement is seen as a distinct asset and advantage. The level of discussion and ideas generated in the first two rounds
led to the generation of a far superior document. If the initial level of consensus was set at 50 percent, or even the final 66 percent, the majority of sections would have been accepted at the end of Round 1. Only two sections, criteria for international deployment and issues relating to remuneration, did not achieve 50 percent agreement at the end of Round 1. An additional five areas: criteria for deployment within Australia; mortuary procedures; criteria relating to training; the annual review of progress; and incident review processes, did not achieve 66 percent agreement after Round 1. This would have resulted in very little development of the document from the original draft, which would have been a disappointing outcome.

The comment “You are really ‘herding cats’!!” was undoubtedly meant in jest but by the end of Round 2 the researcher was beginning to think the analogy was quite prophetic. At the completion of the process this feeling had changed considerably, and the ‘cats’ were considered to be somewhat corralled into a harmonious like-minded group. The change in level of consensus encouraged the respondents to continue participating in the project and a well considered and appropriate document was the result.

This positive outcome also reinforces the value of the operation and mechanisms of the Delphi technique in achieving consensus.

7.8 Preamble to the Document

A preamble sets the document in its desired context. Usually an introductory statement or explanation, the first six sections of the draft guidelines were considered to reflect these preliminary descriptions. Section 1 comprised what could traditionally been seen as the preamble and was titled Introduction; Section 2 related to the Australian Society of Forensic Odontology; Section 3 was the Mission Statement; Section 4 addressed the Scope of the document; Section 5 included Terms and definitions and Section 6 looked at AuSFO representation on stakeholder committees.
The majority of feedback for Sections 1-5 was editorial in nature or aimed at achieving clarification of minor points. These were on the whole not contentious and were largely settled by Round 2, and achieved consensus by the end of Round 3.

The major concern with Section 6 was the mechanism for contact and call-out of AuSFO members in the event of a national or international incident. In the draft document the call-out mechanism was linked to a roster of the Australian National Emergency Forensic Pathology Activation Program (ANEFPAP). This roster saw various pathology centres and institutes in the major cities on call for a period of 2 months each. This presented an uneven distribution of workload across Australia as there are 3 institutes in New South Wales and none in Queensland, the ACT or the Northern Territory. This would exclude a number of capable and experienced members of the AuSFO from being first responders in a DVI incident.

The lack of support for this model was marked with it receiving only 66 percent support in the first round. Many comments reflected the significant level of unease with this proposal and highlighted different structures relating to provision and functions of odontology services, as opposed to forensic pathology services, as rendering this model ineffective. A number of participants were also concerned that this model would exclude a large number of odontologists from being involved in the initial callout, as witnessed by the following section of a detailed response: “…very important to have equal representation throughout Australia…” . Perhaps the most vehement comment summarised these concerns most succinctly: “..is wholly inappropriate given the significant difference in structure and provision of forensic dental services as compared to pathology services. This is merely a grab for power by University based organisations and should be excluded from this document”.

A number of alternate models for call out were presented in Round 2, none of which received support (Table 13). The only idea that achieved consensus
(83%) was the suggestion that “the mechanism for determining the rotation of the AuSFO ‘on-call’ odontologist requires considerable discussion and should be an agenda item at the next meeting of the AuSFO”.

A significant issue for the AuSFO is the distribution of members across the various states and territories of Australia. The smaller states and territories tend to have a low annual demand for odontology services and consequently not many odontologists practice in those areas. Coupled with this is the equally uneven availability of formal training programs which also tends to limit the number of trained dentists in those states and territories. One principle reinforced by this practice guide is the requirement for 2 odontologists to be deployed at any time. Linkage with the ANEFPAP roster would have made this virtually impossible to achieve for more than one state.

The mechanism of call-out was actually removed from Section 6 in Round 3 of the questionnaire, into a section of its own entitled ‘Request for Odontology assistance’. The final model is based on representation from all states and territories on a 2 month roster. Each state agrees to provide 2 forensic odontologists who can be available for immediate deployment if required. Where an individual state or territory is unable to provide this they are paired with another state or territory in a similar situation, for example South Australia is teamed with the Northern Territory and the Australian Capital Territory is teamed with Queensland. This model was accepted as providing a fairer exposure and responsibility for the majority of AuSFO members.

7.9 Role, Organisation and Management

Police services are structured on strict organisational models, the functioning of which may be unfamiliar to unsworn civilians. Odontologists participate in DVI incidents as part of a larger and complex organisational structure. The ultimate responsibility for identification of the deceased rests with the jurisdictional coroner or medical examiner equivalent. Incident management is usually the purview of the relevant police force, who undertakes the duty of identification on behalf of the coroner or equivalent (Clark 1994, Hinchliffe
2007). It is important for the smooth functioning of a DVI incident that all workers are aware that an organisational model will be in place, and how they fit into this structure (Shover 2007).

This section of the document aimed to present an organisational model under which AuSFO members would operate in a DVI incident. The principles of this structure were designed to align with a larger management arrangement for the entire DVI incident.

Support for this section failed to meet the consensus level at the end of Round 1 by a small margin only (76%). The vast majority of comments were editorial in nature although there was an interesting dichotomy in some of the comments, ranging from “Too inflexible – too many structures to follow, roles should be able to be reversed if appropriate in field” through to “This section needs to be tightened significantly, even at the risk of offending people” and “I believe some ‘oomph’ be given to these sections”.

The area which appeared to generate the greatest discussion and concern was that of the appointment of a Health and Safety Officer. The protection of the occupational health, safety and welfare of workers is legislated by law in Australia although it is acknowledged that as these laws are state and territory based there is little uniformity across the country (National Research Centre for OHS Regulation 2007). The overarching tenets of the legislation are to identify potential risks and introduce strategies and mechanisms to minimize risk and injury to workers. All aspects of disaster victim identification have high potential to cause injury or stress to workers. Kneller (1999) indicated that hazards in church archeology can be divided into physical, microbiological, emotional and environmental. These categories are readily transferable to DVI incidents, and obvious concerns include safety and security at the scene; impact of climactic conditions; maintenance of good personal hygiene; potential and unknown infectious status of corpses; radiation safety in the mortuary; appropriate personal protective equipment; disposal of waste and stress mitigation: but all aspects of the work introduce risks to personal health
and safety (Rutty, Byard & Tsokos 2005). The immediate nature of incidents makes provision of safety measures difficult, particularly when communities expect immediate rescue of survivors and recovery of the deceased in a situation where many of the usual services have been interrupted or destroyed.

Many of the state legislations encourage the appointment of a Health and Safety Officer. The draft document indicated that the AuSFO would appoint this person. Many participants commented that this person was necessary, but it may not necessarily need to be a dentist. One comment disagreed with the need for this position, stating “a Health and Safety Officer is a luxury we can rarely afford, and the perceived requirement for one maligns the ‘common sense’ intelligence of the Odontology team members”.

The Round 2 questionnaire redrafted the section taking into account the feedback from Round 1. Respondents were also asked if a Health and Safety Officer was important (64%) and if it was more appropriate for this role to be provided by the lead DVI agency (police force) rather than the AuSFO (52%). These responses contrasted with those from the subsequent Procedures section relating to the duties of the Health and Safety Officer, and Round 2 responses where the removal of the Health and Safety Officer was not supported (Table 24).

The inconsistent nature of these responses led the researcher to make a personal value judgement about who should provide the Health and Safety Officer. Although this was against the spirit and structure of Delphi it was legally and morally necessary for there to be a Health and Safety Officer and the respondents were in danger of ignoring this fact. Round 3 presented the Health and Safety Officer as being provided by the lead DVI agency, and the section received 96 percent support.
One component of this section, relating to teamwork, was removed and relocated in a new section named ‘Code of Conduct’ in Round 4. This new section achieved 100 percent support.

7.10 Personnel
This section presented criteria necessary for AuSFO members to be deployed in various circumstances. Dailey (1995) and Brannon and Kessler (1999) highlighted the importance of experienced odontologists in the smooth and efficient management of a DVI incident. Pretty and Sweet (2001), James (2005) and Nozzolese & Di Vella (2007) have also commented that major mass fatality incidents are inappropriate situations for training junior forensic odontologists.

The model presented in the draft practice guide acknowledged that DVI experience can be difficult to obtain, but that international incidents are the least appropriate place to gain this experience. The section also introduced the concept of an annual review of proficiency for odontologists, to establish currency of practice and procedures. These principles were seen as important in maintaining the professionalism of the discipline.

This section received very low levels of support at the end of Round 1, with support for the sections ‘Working within Australia’ and for ‘International Deployment’ being the lowest of all responses at 57 percent and 48 percent respectively. Most concerns related to the ability to meet the expected annual case load, and the criteria for the annual proficiency review. Many supported the concept of an annual review but were concerned that it would add “an onerous level of bureaucracy”.

One comment related to a perceived omission; “no mention of physical and psychological fitness for deployment – alcoholics and quadriplegics are deployable”. Such considerations are obviously important, particularly in the stressful working environment that characterises a DVI incident, but may be hard to assess and implement. It is also worth remembering that all forensic
odontologists are registered dental practitioners and many of these issues are addressed in existing registration processes.

Interesting comments from the police respondents included; “must include DVI experience seems awfully restrictive” and “minimum 5 cases seems awfully restrictive”. This seems to show a lack of comprehension for the skills associated with the dental identification process, and the documented importance of experience in the DVI process (Vale & Noguchi 1977, Dailey 1995, Warnick 1995, Soomer et al. 2003).

Considerable redrafting was required for this section, and it was not until Round 3 that consensus was reached with all components of this section receiving 100 percent agreement.

7.11 Documentation

In the draft document this section aimed to introduce a mechanism to coordinate availability of odontologists for deployment. The experiences of the AuSFO in locating and scheduling odontologists for both operations in Bali and Thailand highlighted the merit of an ongoing register of availability.

The concept of the register and the need for deployees to abide by the principles of the document were strongly supported at 93 percent and 86 percent respectively in Round 1.

There was vehement disagreement with the principle that the lead DVI agency should have the opportunity to select odontologists. Many comments referred to “cherry picking” and “selection of favourites”; activities which were deemed to be inappropriate. One comment reinforced that with the genesis of the practice guide the lead DVI agency should be confident that any odontologist deployed will be suitably qualified, experienced and professional, and therefore should not need to be part of the selection process.
In contrast, the police responders supported the principle of lead DVI agency selecting deployees. Although the reasons for this preference were not explored, it could be due to a desire to incorporate members into the team who the jurisdiction have worked with before and are known to be experienced and reliable.

Redrafting of the section received consensus in Round 2. This section was re-titled Deployment Register in the final version of the document, and received 100 percent support in Round 4.

One component of this section, relating to adherence to the principles expressed in this guide, was removed and relocated to a new section named “Code of Conduct’ in Round 4. This new section achieved 100 percent support.

7.12 Procedures
The report of James (2005) into the operations of the Thailand Tsunami Disaster Victim Identification efforts highlighted the difficulties that can arise when procedures are not followed. Where procedures were not routinely followed the quality of the post mortem information was found to be reduced. It is accepted that documented procedures to be followed by practitioners are an important part of a professional response to any DVI incident, and are central to the reliability of the whole enterprise (Vale & Noguchi 1977, Stimson & Mertz 1997, Fixott et al. 2001). The American Society of Forensic Odontology published their ‘Body Identification Guidelines’ in 1994 and the International Organisation of Forensic Odonto-Stomatology attempted to prepare an internationally acceptable set in 2004. This somewhat unsuccessful attempt highlighted the need for jurisdictionally based procedures that meet the requirements of local laws and stakeholders.

This section combined the activities on all phases of the DVI process starting from the scene through to reconciliation.
This section and the following Competencies/Responsibilities section proved to be the most contentious of the entire project. It shows that respondents were considered in their thoughts and unwilling to accept a sub-standard document to represent them to the outside world, and to contribute thereby to the worth of the final document.

Unsurprisingly, the respondents accepted that this section was a necessary part of the final document, with 97 percent support; although it was somewhat unexpected that one person thought that documented procedures were not necessary.

Beyond this there was very little agreement on the content of the procedures, although it is fair to say that most sections only fell just short of the 80 percent agreement level at the end of Round 1 (Table 23). Although modelled on existing published procedures (Interpol 1997, ABFO 1995, NSW Dental Identification Group 2002, IOFOS 2004, 2005, Forensic Odontology Unit 2005) rendering them evidence based, the contents provoked considerable discussion. General comments ranged from “overall a nightmare and will be unworkable in the field”, “…too top heavy…” and “…it is important to have all procedures down to the last small detail documented so that everyone knows what they should be doing and what everyone else is doing -…have done this well”.

The major issues of contention were nomination of the initial response odontologist (concern that it was not two people), mortuary activities (mainly detailed procedural comments), and the Quality manager “Quality Manager = big brother”. The issues relating to the Health and Safety Officer have been discussed previously.

Two police comments “Why 2 in each team?”, and “Why do you need so many people in recon?” were truly incomprehensible, and reflected an alarming lack of understanding about the DVI Procedure in total and the role of
forensic odontology in particular. Quite surprisingly no odontology respondents made reference to these comments in Round 2.

Interestingly the results for Round 2 were worse than those for Round 1 (Table 24). This may reflect both slightly different procedures used in different states and territories of Australia and a modicum of inflexibility on the part of respondents in their willingness to accept modifications to their way of functioning, and a desire to create truly best practice procedures. The meeting in Perth formed a working group to assist in re-drafting’ the contents of this section. This produced a section renamed ‘Standard Operating Procedures’ which detailed activities of all members of the DVI team in each phase of the DVI process. This new section received support at the end of Round 4.

The final adopted procedures are a far more comprehensive summary than any currently published procedures or standard operating procedures.

7.13 Competencies/Responsibilities
Many of the comments that pertain to the need for documented procedures are also relevant to the need for documented responsibilities for each of the roles to be filled by forensic odontologists in a DVI incident. James (2005) highlighted the consequences of inadequate understanding of roles and responsibilities.

One hundred percent of respondents thought this section necessary, but again much refinement of the content was necessary before it was accepted. Comments at the end of Round 1 ranged from “I do not understand fully what this section is for”, and “I think this section needs a complete makeover” to “A very detailed breakdown of jobs, duties and tasks” and “This section was structured, readable and informative”.

As for the previous section, all components of this section only just failed to gain consensus at the end of Round 1 (Table 25), scores ranging from 70 – 79 percent.
The majority of comments were aimed at seeking clarification or refinement of topics. Considerable redrafting occurred in Round 2 and this also scored more poorly than Round 1 (Table 26). Again the comments made in the previous section may well be pertinent here.

One interesting comment provided in Round 2; “Initially, I thought all this was overkill, but with a disaster occurring in Australia such protocols should be in place, so that we all know what each of us can/should do” may also reflect the respondents changing perceptions of the value of this section and the document as a whole.

The meeting in Perth formed a working group to assist in re-drafting this section. This produced a section renamed ‘Responsibilities’ which detailed activities of all members of the DVI team in each phase of the DVI process. This new section received 100 percent support in all but one component (responsibilities of AuSFO President where one responder registered neutral or undecided) at the end of Round 4.

The final version of this section is a comprehensive account of responsibilities for each of the roles of forensic odontologists on a DVI incident. Such a representation is not believed to exist in any other published documentation.

7.14 Equipment
Successful practice of forensic odontology requires specific equipment additional to that required by the majority of other DVI practitioners. The lack of appropriate equipment in the early stages of a DVI response can severely diminish a rapid quality response. Of particular importance are portable radiography equipment and dental clinical instruments. This section indicated that the lead DVI agency should be responsible for providing this equipment, and concluded with a list of necessary items.
Round 1 supported the concept of the lead DVI agency providing the equipment. The draft also indicated that the AuSFO would keep an inventory of the location of large equipment such as portable x-ray machines. The contents of the draft equipment list did not achieve consensus (69%) and most of the comments were for additions to the list.

The comments received from the Police respondents can be summarised by the following comment; “Gives a clear requirement to DVI Commanders as to what equipment to organize”. Implicit in this comment is that police accept responsibility for provision of equipment and appreciate the diverse nature of that equipment.

At the Perth meeting of the AuSFO a working group was established to maintain the equipment list. The Round 3 support for this section was reduced from 96 to 85 percent. This may reflect a desire to see as comprehensive a list as possible and the perception that this desire had not yet been fulfilled. By the end of Round 4 the contents of the equipment list received 88 percent agreement.

The final equipment list is more comprehensive than any previously published (Clark 1992, Warnick 1995, Herschaft et al. 2005, Robson 2007) as it covers requirements for all aspects of forensic odontology work over and above that required in the mortuary alone.

7.15 Training

Ongoing training and development forms the core of most professional disciplines. This section aimed to identify acceptable graduate qualifications in forensic odontology.

Graduate programs in forensic odontology are not available in all states of Australia and practitioners frequently need to make a considerable personal commitment and sacrifice to gain this training. Sixty nine percent of the respondents to the pre-participation survey had postgraduate qualifications of
some form in forensic odontology. As the discipline matures it will become more important that practitioners have formal qualifications. Maturity in itself does not presuppose the need for formal qualifications, but increased complexity, standards and quality of service do. As previously mentioned, Hill (1988) indicated that courts expect forensic odontologists to have completed training. Forensic odontology is not currently uniformly recognized as a specialist discipline by Dental Boards across Australia.

At 79 percent this section was the only one not to reach the consensus level for the need to be included in the document after Round 1. A number of comments were made that reflected a feeling that this section was beyond the scope of the document, and courses and activities that could count toward formal training. There was also considerable concern about members who did not have formal training, and some felt that this would exclude them from future involvement. It was anticipated that this document, if accepted by the AuSFO, would be prospective and the experience of these members would be respected. No retrospective activity, other than grandfathering, was indicated.

As a result of the voting from Round 1, this section was removed from Round 2. Feedback from Round 2 indicated that this was felt to be a mistake. A radically modified version which encouraged, rather than prescribed, involvement in ongoing training was presented in Round 3 and received 93 percent support, improving to 100 percent in Round 4. It is probable that this section will need to be updated as continuing professional development is expected to be mandated in most states of Australia in the near future.

7.16 Complaints
Complaints are inevitable in any situation where large numbers of people are required to work together in stressful circumstances. These complaints can be from within the team, from co-workers in other disciplines working on the same incident or from members of the public impacted upon by the incident and the activities of the DVI team. Although perhaps not an obvious or traditional inclusion in a procedures manual or set of procedural guidelines as to how
these complaints are managed and the transparency of the process is important for all members of the team, and the confidence of the community in the professionalism of the service.

The draft version of the document presented a model for management of complaints. The need for this section was supported by AuSFO members (86%) and police respondents (100%) but the contents were not supported by AuSFO members (55%). A number of comments expressed concern that the section was not rigorous enough, including “…this section needs to be far more explicit” and “… Needs to be properly structured”. Comments from Round 2 continued to express concern about how to adequately manage this area. Many saw it as a sensitive issue. No useful references could be found in known published guidelines. Redrafting saw acceptance of the contents by Round 3 (89%) and unanimous support by Round 4. It is likely that this section will be an area that will need continued discussion by the AuSFO in future reviews of the document.

One component of this section, relating to airing of internal grievances within the team, was removed and relocated in a new section named ‘Code of Conduct’ in Round 4. This new section achieved 100 percent support.

7.17 Review

A formal review process is part of the Interpol recommended DVI procedures (Interpol 1995), appearing as Phase 5. Review is an important part of ensuring continual improvement of service to the community in future incidents, but can also assist in refining procedures and practices and personnel management. DVI incidents are known to be potentially dangerous (Centres for Disease Control and Prevention 2005, Byard, Cooke & Ledistsche 2006) and stressful (Jones 1985, Brannon & Kessler 1999, Ursano et al. 1999, Perrin et al. 2007). Review activities should address the processes used, the success of the activity, but also occupational health, safety and welfare issues of the incident.
The need for review was acknowledged by AuSFO members (93%) and police (100%), but the contents of the section were not supported by ASFD members (57%).

Most comments suggested that the section was poorly defined and respondents wanted a change in the structure of who would conduct the review. Round 1 comments included “Any outcomes of the audit and performance process should not always be incorporated into the quality manual” and “may be unattainable”. Redrafting saw agreement by Round 3.

An interesting aspect of the review process was posed by one respondent who commented that “May consider the option of determining the cost/benefit ratio for dental only ID’s and comparing them with fingerprints, DNA”. This is outside the scope of the aims of this document but does present an alternate use of any review and audit process; to assist in the improvement of the DVI process overall and the contribution of forensic odontology within it.

7.18 Remuneration

Unsurprisingly the issue of remuneration generated a lot of discussion. Odontologists who worked as part of Operation Alliance after the Bali Bombings were not paid over and above accommodation and a small per diem allowance (about AU$15 per day). A number of these odontologists were self employed private dental practitioners, and provided forensic odontology services in their home jurisdiction for little or no remuneration. This meant that they had no income for the period of the deployment, about 2 weeks, which impacted severely on their ability to meet practice overheads and pay staff.

Other odontologists were government employees, either in the university or public health sectors. While the vast majority of these were able to be deployed on their usual pay, their employers were disadvantaged by not being recompensed for provision of replacement staff. While most of these employers were happy in this supposedly one-off circumstance it is uncertain that this largesse will be ongoing.
There was unanimous support for the need for odontologists to be recompensed for their services but little other agreement at the end of Round 1. The different employment situations of odontologists generated discussion about the need for similar or scaled rates of pay and what these rates should be. Neither AuSFO members nor police were in agreement about amounts and models for remunerations. This mirrors the comments of Warnick (1995) and Herschaft et al. (2005) who indicated it is difficult to arrive at appropriate levels of remuneration.

Several models for remuneration were presented in Round 2, none of which were supported. By Round 4 there was 96 percent support for the model presented.

7.19 Conclusions

The need for documented procedures and protocols are important in every specialist group to ensure a consistent service to members of the community. They provide guidance to members of the specialist group about responsibilities and appropriate practices, and confidence to the community that the services are of the highest possible standard. In a DVI incident, by enabling the process to be audited, they also serve to ensure that identifications are reliable (Byard, Cooke & Ledistsche 2006). The Australian Society of Forensic Odontology accepted that they needed a practice guide for the management of their members in Disaster Victim Identification situations. This project generated this practice guide via a series of iterative questionnaires modelled on the Delphi method.

The members of the AuSFO who participated (79% of the membership) in the project took ownership of the process and the document. This is a distinct advantage as these members will have confidence in, and a respect for, the
document when they come to work under its direction. Those members who did not participate will also be expected to respect the principles contained in this document and it is hoped the inclusive and rigorous nature of its creation will give them confidence in it.

The high level of initial consensus can be regarded as a benefit as the modifications made in response to not achieving agreement and comments made have resulted in a far superior document.

This initial draft document was prepared using the Interpol Guide to Disaster Victim Identification (Interpol 1997), various Australian state procedures (Forensic Odontology Unit 2005, NSW Dental Identification Group 2002), the ABFO Body Identification Guidelines (ABFO 1995) the IOFOS guides for single and disaster identification (IOFOS 2004, 2005) and the draft Interpol application for International Standards compliance ‘Interpol Quality Management Guidelines for Disaster Victim Identification – ISO/IEC 17025 Application’ and can thus be considered to be evidence based (Lohr 1995, Samanta, Samanta & Gunn. 2003)

The final document used the initial evidence base as well as the considerable experience of the participating members of the AuSFO, amounting to approximately 400 years, and can be considered to be truly best practice. The use of a professional group as the expert panel is supported in the literature (Lohr 1995, Vermylen 2006) and the use of police participants in Round 1 also fulfils the requirement of review by people external to the discipline (Lohr 1995, Shekelle et al. 1999). Creation by a group rather than an individual should make the document more acceptable to stakeholders (Murphy et al. 1998, Black 1999).
The issues generating the most initial disagreement and discussion were the call out activation mechanism; detailed standard operating procedures and responsibilities; training and continuing professional development. The advantage of using the iterative Delphi process is that it encouraged participants to think about the processes used in the forensic odontology aspects of a DVI incident and what they expected from their guiding document.

The guidelines make reference to all aspects which have previously been recommended as needing to be included in forensic odontology guidelines (Stimson & Mertz 199, Fixott et al. 2001), and include all current recommended procedures (see Chapter 4) and in some areas go beyond these. The AuSFO now has a comprehensive and industry leading document to support and guide its activities in Disaster Victim Identification.

Although the process took a considerable period of time the use of the Delphi technique as a tool to achieve consensus among the members of the Australian Society of Forensic odontology would appear to be vindicated.
CHAPTER 8
SUMMARY

The chapter will summarise the previous presentations and discuss the outcomes of the project and the implications to forensic odontology in Australia.

It would be reasonable to say that until recently the principles and practices of disaster victim identification were known only to practitioners and families of victims who had, unfortunately, required these services. Many authors have long commented that the growth in international travel over the past decades has resulted in an increased risk of multiple fatality incidents (Pretty, Webb & Sweet 2002), but the events of September 11 2001, the Bali bombings on October 12, 2002 and October 1, 2005 and the Asian Tsunami of 2005 have highlighted to Australians, and the international community more generally, the vast range of activities that must occur subsequent to these incidents to ensure that victims are repatriated to their families and loved ones.

Disaster victim identification is a series of highly coordinated procedures, the ultimate aim of which is to provide, as succinctly put by De Valck (2006), “accurate, efficient and dignified identification” of the victims.

Identification of individuals is considered a basic human right, but as Morgan et al. (2006) indicated it is also a right of the bereaved. Most nations respect this tenet and routinely strive to identify their deceased.

Forensic odontology is a specialist discipline of dentistry with one of its principal activities being identification of the deceased via comparison of post-mortem and ante-mortem dental information. The use of dental features for identification has been recorded since AD49 when Agrippina used ‘distinctive teeth’ to recognise the head of Lollia Paulina, when it was presented to her on a tray after she had ordered the murder of her rival. The modern era of forensic odontology is said to have commenced with the dental identification of
victims of the Bazar de la Charité fire in Paris in 1897. Publications reveal the spasmodic use of forensic odontology over the first half of the twentieth century, with the discipline becoming more readily used and professional in nature from the 1960s.

This is also the case in Australia where dentists first began providing services in forensic odontology from the early 1960s. Although spasmodically used and generally informal in arrangement this ad hoc beginning did provide the basis for the highly professional service that exists in Australia today. The service is provided in every state and territory of the country; all dental schools have forensic odontology as part of their curriculum and a number offer postgraduate training in the discipline. The service is regularly utilised by police and similar agencies not only for identification but also for age assessment, and examination and analysis of bite mark injuries.

The identification of many people who have lost their lives as the result of a single incident is challenging and usually extremely difficult. Although the principles of the science behind the individual identifications remains constant, the chaos surrounding the incident often makes the delivery of the services complicated. Frequently referred to as disasters, the terminology could refer not only to the incident and the associated loss of life, but on occasion to the response to the incident as well. Disasters, or mass fatality incidents, are defined as any incident where the number of deaths exceeds the capacity of a given jurisdiction to cope with at a given point in time (Nocera & Garner 1999, Jensen 2000, Fixott et al. 2001, de Villiers & Phillips 2002a, Jumbelic 2005).

The principles that guide, and practices that apply to, the investigations surrounding a mass fatality incident, and the repatriation of the deceased to their families; have also undergone massive development since the middle of last century. The earliest consolidation of DVI practices as we appreciate them today appears to have been in Norway in 1945 with the introduction of an Identification Committee (Strom1954, Gustafson 1966). The FBI did have what they referred to as a ‘disaster squad’ formed in 1940, but the emphasis of
this group appears to have been primarily on the use of fingerprints as identifiers (FBI 1961). Individual countries experienced mass fatality incidents and developed skills and practices in isolation until 1978 when the response to a gas tanker explosion in Spain prompted Interpol to establish a working party and then a Standing Committee into disaster victim identification, with the aim of developing guiding principles that could enhance international cooperation and improve the coordination of similar incidents. One of the products of the Standing Committee was the development and publication of the Guide to Disaster Victim Identification, which is now considered to describe international best practice (Griffiths, Hilton & Lane 2003, Payne-James et al. 2005, Vermylen 2006, Sidler et al. 2007).

Sopher commented in his 1976 text that “when faced with seventy or one hundred (or more) bodies, the realm of practicality must prevail, and less reliable methods may have to suffice as modes of identification”. The increased global focus on identification of victims subsequent to events such as September 11, 2001, and the Asian Tsunami make this sentiment outdated and no longer valid. The bereaved and the community expect, irrespective of the nature of the incident, that their deceased will be returned to them; and that mass burial due to lack of formal identification is not acceptable.

Morgan et al. (2006) argued that to have identification of the deceased carried out with dignity and respect requires the establishment of practical guidelines and provision of technical support. These sentiments have been reiterated by many including De Valck (2005, 2006), Lessig, Thiele & Edelmann (2006) and Nuzzolese and Di Vella (2007).

The only truly international guidelines that currently exist for DVI are those published by Interpol (Interpol 1997). These guidelines contain overarching principles for the management of a mass fatality incident, and provide forms for the collation of all relevant ante- and post-mortem data, but do not direct specific operating procedures for each of the activities of the response. The International Organisation of Forensic Odonto-Stomatology (IOFOS) did
attempt, in 2004, to compile and promulgate guidelines for identification practices using forensic odontology, but these are yet to receive international agreement and acceptance (IOFOS 2004, 2005).

The difficulty of both developing and obtaining agreement for international guidelines were discussed by Vermylen (2006). He concluded that any international guidelines can only be broadly descriptive and outline general principles that should apply to the management of the incident response and to the successful and timely identification of the deceased. It is thus imperative for local jurisdictions and disciplines to develop procedures and protocols directly relevant to their own laws and conditions. It would be expected that these would be based on the principles outlined in the international guides.

To this end many police jurisdictions have developed DVI manuals including, but not limited to, the US Department of Justice (NIJ 2005), the Royal Canadian Mounted Police (RCMP 2003), Association of Chief Police Officers of England, Wales and Northern Ireland (Clarke 2001), the Home Office (Home Office 2004), the Metropolitan Police (Clarke 2001), the Australasian Disaster Victim Identification Committee (ADVIC 2004) and the Disaster Mortuary Operational Response Team (DMORT 2006).

In addition, some groups have developed protocols and procedures specific to forensic odontology, including the American Board of Forensic Odontology (ABFO 1994) and the British Association of Forensic Odontology (Robson 2007).

Amongst others, Brannon & Kessler (1999) and Nuzzolese and Di Vella (2007) have reinforced the difficulties that are regularly encountered in the management of multiple fatality incidents. They cited: condition of the human remains mentioning in particular fragmentation, co-mingling and incineration; determination of a potential victim list; collection of reliable ante-mortem information; legal and political issues both of the jurisdiction involved and as part of the overall organisational structure; documentation and communication; experience of workers and the application of universal human forensic identification codes. Stressing the importance of planning and coordination in the successful management of a multiple fatality incident, they commented that well constructed and precise guidelines can contribute to the amelioration of the regularly experienced complications.

The experiences of the overall response and in particular the disaster victim identification activities in Thailand after the Boxing Day tsunami illustrated many of the difficulties discussed previously, and served to highlight the value of agreed and well documented procedures. The early chaos immediately following the tsunami was testament to the lack of disaster plans and preparedness of many of the affected nations (Perera 2005, 2006, Morgan et al. 2006, Tun et al. 2006), and to the extent of destruction wrought. This led to a number of victims being released to relatives in the first few days after the disaster based on visual identification only, and a number being buried in mass graves without having been formally identified (Lau, Tan & Tan 2005, Sribanditmongkol et al. 2005, Morgan et al. 2006, Scanlon 2006, Tsokos et al. 2006, Petju et al. 2007, Szibor et al. 2008).

Standard operating procedures for forensic odontology were developed specifically for the incident (Tan 2005, James 2005, De Valck 2006, Kieser, Laing & Herbison 2006), but many international practitioners refused to follow them (James 2005, Tun et al. 2005, De Valck 2006, Scanlon 2006). This resulted in inconsistent standards of information gathering, many errors and the need to re-examine bodies (Grampp & Huckenbeck 2005, James 2005, Kieser, Laing & Herbison 2006). This added unnecessary additional delay to
an already long and complex identification process. Many of these problems could have been alleviated by a stronger command structure from the beginning of the response (Sribanditmongkol et al. 2005, Tun et al. 2005).

The interviews of senior forensic odontologists undertaken as part of this project revealed that not all states and territories within Australia have documented procedures and practices. To ensure consistency of practices across the nation, and confidence of stakeholders and the community in the services provided, a series of guiding principles for the response to a multiple fatality incident in Australia was required. The evident pressing need for guidelines applicable to the Australian Society of Forensic Odontology was the motivation for this study.

Criteria and recommendations for the compilation of clinical guidelines exist, and the development of these DVI procedures and guidelines was seen as akin to the writing of clinical procedures. It is recommended that clinical guidelines be evidence-based to ensure reliability, reproducibility and validity; unbiased and clearly documented. In addition they need to be flexible enough to be applicable in a variety of situations (Lohr 1995, Samanta, Samanta & Gunn 2003). They should also be regularly reviewed, including review by persons external to the discipline (Lohr 1995, Shekelle et al. 1999). Van der Sanden and colleagues (2004) commented the quality of clinical guidelines was superior when they were developed by experts rather than peer groups.

Vermylen (2006) has defined forensic dental guidelines as “systematically developed statements and protocols to assist forensic odontologists in arriving at final decisions in forensic dental work”. He advised that they must reflect the common opinion of a group of experts and not just a single forensic practitioner.

Consequently, the author prepared a draft guideline document using the Interpol Guide to Disaster Victim Identification (Interpol 1997), various Australian state procedures (Forensic Odontology Unit 2005, NSW Dental
Identification Group 2002), the ABFO Body Identification Guidelines (ABFO 1995) the IOFOS guides for single and disaster identification (IOFOS 2004, 2005) and the draft Interpol application for International Standards compliance ‘Interpol Quality Management Guidelines for Disaster Victim Identification – ISO/IEC 17025 Application’ as directive documents, combined with personal experience of 20 years as a practicing forensic odontologist. This draft guideline was edited once by a group of senior Australian forensic odontologists, each with considerable experience in DVI.

A method to enable the membership of the Australian Society of Forensic Odontology to contribute to the further development of this document was then required.

Members of the Australian Society of Forensic Odontology were invited to participate in the ongoing development of the guideline document using a Delphi based model. The Delphi technique is one of a number of formal methods used for obtaining consensus from groups of individuals or experts, and was selected as the most appropriate tool for use in this project for a number of reasons. The ability to incorporate a large sample size while not requiring the group to meet was a distinct advantage for AuSFO which has members across all states and territories of Australia. All interactions were completed via written questionnaire, and the comments expressed by each respondent were provided as feedback to all in subsequent rounds to encourage further deliberation and consideration. The anonymity of these responses allowed people free reign which may have been removed in face to face setting. The number of rounds required to achieve consensus, or acknowledge that the point beyond which benefits are negligible, is not predetermined, enabling as much discussion about an issue as the group feel appropriate or necessary.

The research question for this project thus became “Is the Delphi technique an appropriate tool to assist the Australian Society of Forensic Odontology to
develop a set of guidelines and Standard Operating Procedures for Disaster Victim Identification practices”

Thirty one members of the Australian Society of Forensic Odontology participated in the project. The participants set the level of consensus against which they wished to work and took 4 rounds to reach agreement on the contents of the document. In addition, discussion regarding the project was held at a meeting of the AuSFO in 2005, approximately 2 months after the completion of Round 2.

Considerable modifications were made to the original document during the progress of the project. The resultant document, titled ‘Disaster Victim Identification Forensic Odontology Guide’ and copyrighted to the Australian Society of Forensic Odontology, includes a preamble addressing the use and scope of the document; personnel appropriate for deployment, including relevant levels of experience; mechanisms for deployments; management structures; a code of conduct; recommended standard operating procedures; an equipment register; structures for ongoing professional development; mechanisms to deal with complaints; a review process; and remuneration (see Appendix 5).

The outcome is a document that meets the criteria established to define quality. It can be considered evidence based (Lohr 1995, Herschaft et al. 2006, Hill 2006, Samanta, Samanta & Gunn 2006, Vermylen 2006) as the procedures were referenced against literature reflecting best practice in forensic odontology and disaster victim identification, including available existing practice guidelines. Having been developed as a result of the Delphi process the guidelines reflect the common opinion of the relevant group of experts (Lohr 1995, Murphy et al. 1998, Vermylen 2006). The document is also clearly documented and has regular review built into the structure (Lohr 1995, Shekelle et al. 1999, Samanta, Samanta & Gunn 2006, Vermylen 2006).
Flexibility is frequently cited as an essential criterion for guidelines (Lohr 1995, Herschaft et al. 2006, Samanta, Samanta & Gunn 2006, Vermylen 2006). This attribute is relevant to DVI as all practitioners have slightly individual ways of executing the same task and delivering the same outcome (Hill 2006, Vermylen 2006). In fact, as Hill (2006) argued, too much rigidity removes the potential for development and innovation, which are essential to the healthy progress of any discipline. On the other hand, too much flexibility allows people to ignore ethical and professional standards which can be detrimental to the overall intention of reliable identification. Flexibility needs to be understood in the process context, but in essence refers both to an individual being flexible enough to work outside their personal preferences and comfort zone when required, and also to the procedural guidelines permitting appropriate variations where necessary. As such, flexibility is not the goal but merely the means by which to achieve the goal. The most appropriate way to deliver flexibility in a DVI context is to draft new procedures for each incident which closely adhere to best practice, but appropriately fit the situation at hand.

Identification of the deceased is not only a legal necessity, but also a human right and dignity that society has a duty to preserve. It is imperative that those tasked with identifying the deceased do so with respect and professionalism. Overarching guiding principles and documented procedures are one mechanism to ensure this humanity is always delivered.

The document developed as a result of this project is comprehensive in coverage and places the Australian Society of Forensic Odontology at the vanguard of professionalism in the forensic odontology community.

The strengths of the Delphi technique proved beneficial for this process. A large number of the members of AuSFO (84%) participated in the project, which is undoubtedly more than would have been able to attend a face to face meeting or meetings. Additionally, it was highly unlikely that all the discussion and consideration generated by the Delphi process would have been possible
in one or even more face to face meetings as evidenced by 955 well considered comments generated over the process. The content of some of these comments also supported that participants felt comfortable with the format and were not intimidated as can occur in face to face meetings. This reinforces that all members of the group were able to make a contribution. That consensus was ultimately achieved supports the use of the Delphi technique as it enables reflection and offers the ability to change an opinion without embarrassment.

The documented limitations of the Delphi technique are important, but many were not applicable to this project. The choice of experts is seen as critical to the success of the process, and criticisms point to a lack of direction in selection and definition of experts. The domain of the project dictated the participants and thus negated this criticism. The levels of experience (combined 400 years) and graduate training (58%) of the participants was seen to define the group as having adequate expertise for the process, and to fulfil the criteria of Vermylen (2006) that forensic dental guidelines should reflect the common opinion of a group of experts and not just a single practitioner.

The pre-determination of the source of the sample (AuSFO members) also dictated the maximum sample size. Response, drop out and fatigue rates are difficult to manage in any survey process that continues over an extended period of time. The small and homogenous sample was hoped to be a positive factor and to contribute to a lower drop out rate, and this was true, with the lowest response rate being 65 percent in Round 4.

By allowing the participants to nominate, and modify the level of consensus another criticism of the Delphi technique, that of not setting the consensus level prior to the project was met.

The criticism of the length of time for a Delphi project to be completed is certainly valid, and applies to this project.
The successful outcome of this project, the development of the AuSFO “Disaster Victim Identification Forensic Odontology Guide” confirms the Delphi technique was an appropriate tool to assist the Australian Society of Forensic Odontology to develop a set of guidelines and Standard Operating Procedures for Disaster Victim Identification practices.

Brown commented in 1988 that true professionalism in forensic odontology required “… financial support by the government of every country to establish within their borders a central identification agency and procedures which are internationally compatible. Well organised protocols will not only expedite the identification process and improve morale of the personnel involved, but more importantly, will project an image of professionalism that will inspire the confidence of relatives of the deceased thus minimising their mental trauma and distress”. Finally, the Australian Society of Forensic Odontology has those guidelines, and consequently the Australian community can be assured that should they require these services they will be delivered to the highest professional, scientific and ethical standards.

CONCLUSIONS
All disciplines that offer services to the community require structured protocols and procedures to ensure their practices are contemporary and reliable and to engender a sense of trust in the stakeholders of these services.

The Australian Society of Forensic Odontology used a Delphi based approach to generate a “Disaster Victim Identification Forensic Odontology Guide” to assist in the response to multiple fatality incidents. This document is evidence based and more comprehensive than any previous international document.

The Delphi technique is an appropriate tool to enable both discussion of issues and achievement of consensus among a group of professionals or experts who are unable to meet regularly in one location. The ability to reflect on the opinions of others and personal decisions is an extremely valuable aspect of
the technique, and may in fact be more beneficial than face-to-face discussions. The use of the Delphi technique can be recommended to other disciplines similar in nature to forensic odontology as a valuable resource to create protocols and procedures.

The Delphi technique can also be recommended to the Australian Society of Forensic Odontology for the development of future protocols for other aspects of its practice, for instance bite mark comparisons and age estimation. This additional research will ensure that forensic odontology in Australia is practiced to the highest standard.
REFERENCES


Acharya, AB (2006) Teaching forensic odontology; an opinion on its content and format. Eur J Dent Educ, 10(3); 137-141.


Amoedo, O (1899). Identification of bodies by the dental expert. *The Dental Cosmos*, 41(5); 444-450.


Brown, KA (2007b) Retired Director of Forensic Odontology Unit, University of Adelaide. Personal communication.


Geneva Convention (I) for the Amelioration of the Condition of the Wounded and Sick in Armed Forces in the Field. 1949.


Green, H (2005) Superintendent, State Disaster Victim Identification Commander, Western Australia Police. Personal communication.


James, H (2005) Thai tsunami victim identification – overview to date. The Journal of Forensic Odontostomatol, 23(1); 1-18.


James, H and Cirillo, GN (2004) Bite mark or bottle top? J Forensic Sci, 49(1); 119-121.


M’Grath, JM (1869) Identification of human remains by the teeth. *The Dental Cosmos, 11*; 77-78.


Pate BL (2008) Identifying and tracking disaster victims. *Fam Community Health*, 31(1); 23-34.


Pedoussaut, A (1952) Identification in air accidents. *Int Criminal Police Rev*, 7(54); 3-9.


Schirnding, H (1934) The teeth and their significance in forensic medicine, with special regard to the identification of corpses. *The Dental Cosmos*, **76**(8); 853-859.


Identification role of the Department of Forensic Medicine Chang Mai University. *CMU Journal*, 5(1); 133-137.


Stimson, PG and Mertz, CA (1997) "Mass Disaster Experiences" in *Forensic Dentistry* (eds Stimson PG & Mertz CA) CRC Press.


van de Ven, AH and Delbecq, AL (1974) The effectiveness of Nominal, Delphi and Interacting Group decision making processes. *Acad Management J*, 17(4); 605-621.


Appendix 1

University of Newcastle Ethics Approval.
HUMAN RESEARCH ETHICS COMMITTEE

Certificate of Approval
for a research project involving humans

| Applicant |
|-----------------|-----------------|
| **Chief Investigator/Project Supervisor:** | Associate Professor Deborah Cockrell |
| **Co-Investigators/Research Students:** | Ms Jane Taylor |
| **Project Title:** | Development of the Disaster Victim Identification Practice Guide for the Australian Society of Forensic Dentistry |

In approving this project, the Human Research Ethics Committee (HREC) is of the opinion that the project complies with the provisions contained in the National Statement on Ethical Conduct in Research Involving Humans, 1999, and the requirements within this University relating to human research.

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NOTE: Approval is granted subject to the requirements set out in the attached document Approval of Conduct Human Research, and any additional comments or conditions noted below:

17 August 2005
Approved subject to a satisfactory response to issues identified by the Committee.

9 September 2005
Response received and accepted.
Approval confirmed.

Signed for the Committee: [Signature]

Ms Susan O’Connor
Human Research Ethics Officer
Appendix 2
Letter of Invitation
Participant Information Sheet
Guided Interview Questions: Forensic Odontologists
Guided Interview Questions: DVI Commanders
Dear Colleague (name to be inserted)

Re: A history of the development of forensic odontology and disaster victim identification services in Australia.

By now you will have received the invitation to participate in the project 'Development of the Disaster Victim Identification Practice Guide for the Australian Society of Forensic Dentistry'. I thank you for your consideration of this invitation.

I would like to prevail upon your generosity a little further in an additional aspect of this project. As I have been searching the literature it has become apparent that there is little published about the history of the development of both forensic odontology and the use of DVI in Australia. As you are respected member of the odontology (police DVI) community, who has been working in these areas for a number of years, I would value your contribution and knowledge in compiling such a history. I would like to invite you to participate by agreeing to be interviewed by me.

I believe that the writing of such a history will not only benefit us as part of the Australian Society of Forensic Dentistry, but it will also be of benefit to future generations of Australian odontologists in understanding the rationale behind the society and the practices of forensic odontology in this country. The history will also be an integral part of understanding and explaining the generation of the DVI Practice Guide.

I propose to tape and transcribe the interviews and will give you the opportunity to review the transcriptions if you would like. You will appreciate that for the history to be documented you need to be happy to have your name, professional details and information you provide included both in my PhD thesis, but also in any publications that arise from this project. I will give you the opportunity to edit any manuscripts before publication.

Please read the attached information sheet and sign the consent form if you would be happy to participate. If you have any additional questions please contact me.

If you agree to participate I will contact you to arrange a mutually convenient time to conduct the interview.

Thank you for taking the time to read this.

Regards

Jane Taylor
Information Statement for the Research Project:
A history of the development of forensic odontology and disaster victim identification services in Australia.

You are invited to take part in the research project identified above which is being conducted by Jane Taylor from the Faculty of Health at the University of Newcastle.

Jane is conducting this research as part of her PhD under the supervision of Professor Mike Capra, Professor Margaret McMillan and Associate Professor Deb Cockrell, all of the Faculty of Health at the University of Newcastle.

The purpose of the project is to document the history of forensic odontology and disaster victim identification in Australia.

The senior forensic odontologist and DVI Commander in each state and territory will be invited to participate. Participation in this project is entirely voluntary. Only people who give their informed consent will be included in the project. If you decide to participate, you may withdraw from the project at any time without giving a reason.

Your involvement in the project will not be disclosed to others, but as the aim of the project is to document the history of these two disciplines it will be necessary to include your name and qualifications in any publications relating to this information.

If you agree to participate you will be required to:
- Participate in an interview with Ms Taylor
- Complete a post-participation survey

The interviews will be tape recorded, and transcribed after the interview. If you would like to review a copy of the transcript this will be possible.

The results of this project will be used as part of Jane’s thesis, and may be published in scientific journals.

All data received as part of this project will be securely stored within the University of Newcastle for seven (7) years after the completion of the project, at which time it will be destroyed. Only the people named on this information sheet will have access to the data.

If you would like to participate please complete the attached consent form and return it in the reply paid envelope, within three weeks of receipt.
Please read this Information Statement and be sure you understand its contents before you consent to participate. If there is anything you do not understand, or you have questions, contact Jane Taylor, Oral Health, University of Newcastle, Box 127, Ourimbah NSW 2258, telephone 02 4349 4545 or 0418 436 113 or email Jane.Taylor@newcastle.edu.au.

Thank you for considering this invitation.

Deborah Cockrell  
Jane Taylor

This project has been approved by the University’s Human Research Ethics Committee, Approval No. H-091-0805.

Should you have concerns about your rights as a participant in this research, or you have a complaint about the manner in which the research is conducted, it may be given to the researcher, or, if an independent person is preferred, to the Human Ethics Officer, Research Office, The Chancellery, The University of Newcastle, University Drive, Callaghan NSW 2308, telephone 02 49216333, email Human-Ethics@newcastle.edu.au
Guided interview for forensic odontologists:

Thank you for agreeing to be interviewed. I would like to ask you some questions about how the use of forensic odontology and DVI was established in your state (or territory).

1. Could you please state your name?
2. How long have you been involved in forensic odontology?
3. How did you become involved in forensic odontology?
4. Do you have any knowledge of how forensic dentistry services were started in your state (or territory)?
5. Do you know if a single person was responsible for the introduction of forensic dentistry services in your state (or territory)?
6. Do you recall any of the early cases where forensic odontology played a significant role?
7. I imagine that those early services were managed on a fairly ad-hoc basis – can you describe that process?
8. How is the use of forensic services managed currently?
9. Was there a specific incident that triggered a change in the use or perception of forensic odontology in your state or territory?
10. Do you think the service is valued by the Police and Coroner in your state (or territory)?
11. Can you describe an early incident that first made you aware of disaster victim identification practices?
12. Do you have any knowledge of how DVI services were started in your state (or territory)?
13. Do you recall any of the early cases where DVI principles were used?
14. Is there a state DVI Committee, and is odontology represented?
15. Have you had any involvement with the Australasian DVI Committee?
16. Do you know how and why this committee was established?
17. Would you like to make any additional comments about the establishment of forensic odontology, and the use of DVI in your state (or territory)?

At a minimum of 5 minutes a question, this is 75 minutes, probably longer.
Guided interview for DVI Commanders:

Thank you for agreeing to be interviewed. I would like to ask you some questions about how DVI and the use of forensic odontology was established in your state (or territory).

18 Could you please state your name
19 How long have you been involved in DVI?
20 How did you become involved in DVI?
21 Do you have any knowledge of how DVI services where started in your state (or territory)?
22 Do you recall any of the early cases where DVI principles were used?
23 How has the use of DVI progressed in your state (or territory)?
24 Do you have a state DVI Committee, and how is this run?
25 Is forensic odontology represented on this committee?
26 Can you describe an early incident that first made you aware of forensic odontology?
27 Do you know if a single person was responsible for the introduction of forensic dentistry services in your state (or territory)?
28 Do you know how the use of forensic odontology was established in your state (or territory)?
29 How is the use of forensic odontology services managed currently?
30 Do you think the Police and Coroner value the current forensic odontology services?
31 Have you had any involvement with the Australasian DVI Committee?
32 Do you know how and why this committee was established?
33 Would you like to make any additional comments about the establishment of forensic odontology, and the use of DVI in your state (or territory)?

At a minimum of 5 minutes a question, this is 70 minutes, probably longer.
Appendix 3
F1 and F2 Interpol forms
Appendix 4
Letter of Invitation, AuSFO Members
Consent Form
Participant Information Sheet
Pre-Delphi Survey
Post-Delphi Survey
Re: Progression of the ASFD Disaster Victim Identification Practice Guide

Following the Bali Bombings many forensic groups recognised the need to improve the documentation of their activities, the ASFD among them. As you are aware a small group (John Clement, Chris Griffiths, Jane Taylor and myself) prepared a draft document entitled ‘Disaster Victim Identification Practice Guide’ during 2004.

This document was at a stage where we felt it was ready for distribution to the wider membership for comment, further development and hopefully ratification, when the attention of many members was redirected to providing service after the Tsunami. Some members have seen this document and made comment, but others have not had this opportunity. Our combined experiences in Thailand will help make this a more professional and complete document.

As part of Jane Taylor’s employment at the University of Newcastle she is undertaking a PhD. Her topic will include the development of quality procedures in forensic odontology in Australia, and this draft document will be part of the material she will consider. Her candidature enables her to be able to co-ordinate the review, development, and approval of this document by the ASFD, using a technique known as ‘Delphi’, which yes is apparently quirkily named after the oracle.

Delphi is variously described, but can perhaps be best summarised as a tool for the systematic collection of opinions from a group of experts. The process involves the use of sequential questionnaires, with new rounds of questionnaires being informed by the feedback from the previous round. All comments received from the previous round are incorporated into a revised document which is then distributed to participants for additional comment and discussion. It is reported that consensus can usually be reached after three to four rounds. Jane is confident that this technique will work well for the further development of our guidelines and protocols.

This is a technique that is widely used in health care, particularly nursing, and in education for development of new curriculum models. If any of you are
interested Jane has indicated that she can provide some references that summarise the process quite well.

I believe this model presents many advantages for the society. It enables all members to make comments as the document is refined, enabling all possible options to be considered. All comments are included as the next round of questions is formulated, but comments of individual responders remain confidential. This should enable people to offer true opinions without the pressure to conform that can often be felt at a meeting. Jane will, however, edit any comments that are personally critical of other members of the society or would serve to identify the author. It also does not require us all to meet formally to advance the document, removing the need to consider funding for such a meeting. This means that people who would not be in a position to attend that meeting are still able to contribute. When we do meet we will, hopefully, be able to more readily confirm our acceptance of the outcomes.

In addition, members are able to consider and review each round at their own pace, albeit within the timeframe provided for each questionnaire, enabling more considered responses.

Naturally, as with all things there are some disadvantages as well. A single person becomes responsible for the progress of the document, and you therefore need to be confident of Jane’s ability to complete the process. Each round of questions would have a timeline (about three weeks), but it is not possible to predict how many rounds it will take for our group to reach a consensus, nor to indicate exactly what time commitment would be involved for each person. Jane has indicated that she will attempt to generate the subsequent rounds within four weeks of receiving all replies.

It is also not possible to guarantee consensus in all areas. It may be that we, as a society, are not able to reach agreement on some issues. This is a discussion that we need to have, and it may be that this process merely serves to highlight issues that require further development by the Society Executive. It is my opinion that this alone would be a worthwhile outcome.

Ownership of the completed document will rest with the ASFD, and not Jane, but she requests the opportunity to document the process as part of her PhD, which I support.

This letter, as well as outlining the project, is an invitation to you to consider being a participant in this project. All members of the ASFD (currently 45) will be invited to participate. Participation is of course voluntary, and as with any project you will be free to withdraw at any time. Your standing within the society will not be affected if you choose not to participate. Jane will undertake not to disclose who is, or is not participating. The Delphi process also requires that all comments returned as part of the feedback process are confidential, so your anonymity as a participant is protected.

I will also invite three members of the AFP, all State and Territory DVI Commanders and one private Disaster Management consultant to participate in Round 1 of the process. Ongoing participants will have access to their
comments. Their input will provide reference comments from stakeholders who use the services of Forensic Odontologists. It is not necessary or appropriate that they have continued involvement in the development of the document, but an appreciation of issues from their point of view may be valuable.

This project has the approval of the Ethics Committee of the University of Newcastle, Approval Number H-091-0805. Jane has indicated that correspondence can be by email, or hard copy via post depending on personal choice.

I would encourage you to support Jane, and the ASFD, in this project by agreeing to participate. The finalisation of this document will be of great benefit to the society. Please respond directly to Jane within three weeks of your receipt of this letter. A return addressed envelope is enclosed.

I hope this will be a process that benefits us all.

Regards and best wishes.

Stephen Knott
Information Statement for the Research Project:
Development of the Disaster Victim Identification Guide for the
Australian Society of Forensic Dentistry.

You are invited to take part in the research project identified above which is
being conducted by Jane Taylor from the Faculty of Health at the University
of Newcastle.

Jane is conducting this research as part of her PhD under the supervision of
Professor Mike Capra, Professor Margaret McMillan and Associate
Professor Deb Cockrell, all of the Faculty of Health at the University of
Newcastle.

The purpose of the project is to finalise the development of the Disaster
Victim Identification Guide, the drafting of which occurred in 2004. This will
involve the use of a multistage questionnaire, based on Delphi
methodology, aimed at gaining consensus from the membership of the
ASFD regarding the content of the document.

All members of the ASFD will be invited to participate. Participation in this
project is entirely voluntary. Only people who give their informed consent
will be included in the project. Personal standing within the ASFD will not be
affected if you choose not to participate. If you decide to participate, you
may withdraw from the project at any time without giving a reason.

Three members of the AFP, all State and Territory DVI Commanders and
one private Disaster Management consultant will also be invited to
participate in Round 1 of the process. Ongoing participants will have
access to their comments. Their input will provide reference comments
from stakeholders who use the services of Forensic Odontologists.

Involvement in the project will not be disclosed. The Delphi process also
requires that all comments returned as part of the feedback process be
confidential, so your anonymity as a participant is protected. Any
comments that are personally critical of or inflammatory to other members
of the society or would serve to identify the author will be edited. All
participants will be given a unique identifier to ensure confidentiality of
responses. All postal and email addresses will be removed before storage
of the data. The data will be securely stored in locked facilities during and
on completion of the PhD.
If you agree to participate you will be required to:

- Complete and sign a consent form
- Complete a pre-participation survey
- Complete a personal details form
- Participate in a minimum of three* rounds of a questionnaire (*if an ASFD member, 1 round if a Police representative). Each round would involve about 1-1.5 hours of your time. You may elect to participate electronically or by surface mail.
- Complete a post-participation survey

The results of this project will be used as part of Jane’s thesis, and may be published in scientific journals. Individual participants will not be identified in any reports arising from the project. Outcomes and the final version of the document will be distributed to the ASFD through the Society executive.

All data received as part of this project will be securely stored within the University of Newcastle for seven (7) years after the completion of the project, at which time it will be destroyed. Only the people named on this information sheet will have access to the data.

If you would like to participate please complete the attached consent form, pre-participation survey and personal details form. A draft of the Disaster Victim Identification Guide and the first round questionnaire will then be forwarded to you.

Please read this Information Statement and be sure you understand its contents before you consent to participate. If there is anything you do not understand, or you have questions, contact Jane Taylor, Oral Health, University of Newcastle, Box 127, Ourimbah NSW 2258, telephone 02 4349 4545 or 0418 436 113 or email Jane.Taylor@newcastle.edu.au.

Thank you for considering this invitation.

Deborah Cockrell  Jane Taylor

This project has been approved by the University’s Human Research Ethics Committee, Approval No. H-091-0805.

Should you have concerns about your rights as a participant in this research, or you have a complaint about the manner in which the research is conducted, it may be given to the researcher, or, if an independent person is preferred, to the Human Ethics Officer, Research Office, The Chancellery, The University of Newcastle, University Drive, Callaghan NSW 2308, telephone 02 49216333, email Human-Ethics@newcastle.edu.au.
Consent Form for the Research Project: Development of the Disaster Victim Identification Practice Guide for the Australian Society of Forensic Dentistry

Researchers: Deborah Cockrell, Jane Taylor, Mike Capra and Margaret McMillan

I agree to participate in the above research project and give my consent freely.

I understand that the project will be conducted as described in the Information Sheet, and letter of approach, copies of which I have retained.

I consent to:
- Completing a pre-participation survey
- Completing a personal details form
- Participating in a minimum of three* rounds (*if an ASFD member, 1 round if a Police representative) of a questionnaire.
- Completing a post-participation survey

I understand my personal information will remain confidential to the researchers.

I have had the opportunity to have my questions answered to my satisfaction.

I understand that I may withdraw from the project at any time.

Print Name: ____________________________
Signature: ____________________________
Date: _______________________________

I wish to project documents to be sent ____________________________
- electronically
  Email address: ____________________________
- by post

Postal address: ____________________________
PARTICIPANT DETAILS SHEET
for the research project:

Please answer the following questions.

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<thead>
<tr>
<th>Gender</th>
<th>Male</th>
<th>Female</th>
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<tr>
<td>Age</td>
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<td>Years working as a forensic odontologist</td>
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<tr>
<td>Do you have graduate qualifications in Forensic odontology (e.g. Grad Diploma)</td>
<td>Yes</td>
<td>No</td>
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<tr>
<td>Year graduate qualifications conferred</td>
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<tr>
<td>Do you have DVI experience?</td>
<td>Yes</td>
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<td>Have you ever been deployed as a forensic Odonotologist nationally?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Have you ever been deployed as a forensic Odonotologist internationally?</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

Contact details and return address:
Oral Health
Box 13, Hunter Building
University of Newcastle
Callaghan NSW 2308
Ph: 02 4921 5514
0418 436 113
Jane.Taylor@newcastle.edu.au
Thank you for agreeing to participate in this project. I would appreciate your thoughts before you commence the process.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral or Undecided</th>
<th>Agree</th>
<th>Strongly Agree</th>
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<tr>
<td>I believe I have enough experience as a forensic odontologist to make a valuable contribution to the development of this document</td>
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<td>I think my opinions will equate quite closely to other members of the ASFD</td>
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<td>I know most members of the ASFD quite well</td>
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<td>I have some definite ideas about the contents of this document</td>
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<td>I have a lot of experience in developing policy documents</td>
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<td>I anticipate that this process will work well for the final development of this document</td>
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</tbody>
</table>

Please make any additional comments:

Contact details and return address:
Oral Health
Box 13, Hunter Building
University of Newcastle
Callaghan NSW 2308
Ph: 02 4921 5514
0418 436 113
Jane.Taylor@newcastle.edu.au
POST DELPHI SURVEY
for the research project:

Thank you very much for participating in the project. I would appreciate your thoughts and perceptions of the process.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral or Undecided</th>
<th>Agree</th>
<th>Strongly Agree</th>
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<tbody>
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<td>I enjoyed participating in the process</td>
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<td>I learned and benefited from the feedback provided during the process</td>
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<td>In general, I agreed with the feedback provided during the process</td>
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<td>I believe that my opinions were considered by other members of the group</td>
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<td>I found this process enabled me to express my opinions</td>
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<td>I found this process frustrating, as I wanted to discuss some issues with other people</td>
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<td>I thought the process took too long</td>
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<td>With hindsight, I would prefer not to have been part of the process</td>
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<td>I think the process would have worked just as well in a meeting format</td>
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</tbody>
</table>

Please make any additional comments:

Jane Taylor
Box 13, Hunter Building
University of Newcastle
Callaghan NSW 2308
Appendix 5
Australian Society of Forensic Dentistry Inc, Disaster Victim Identification
Forensic Odontology Guide
Disaster Victim Identification
Forensic Odontology Guide
# TABLE OF CONTENTS

1. INTRODUCTION 3  
2. THE AUSTRALIAN SOCIETY OF FORENSIC DENTISTRY 3  
3. MISSION STATEMENT 3  
4. SCOPE 3  
5. TERMS AND DEFINITIONS 4  
6. ASFD REPRESENTATION 4  
7. ROLE, ORGANISATION AND MANAGEMENT 4  
8. PERSONNEL 5  
9. DEPLOYMENT REGISTER 6  
10. REQUESTS FOR ODONTOLOGY ASSISTANCE 6  
11. CODE OF CONDUCT 6  
12. RESPONSIBILITIES 6  
13. RECOMMENDED STANDARD OPERATING PROCEDURES 11  
14. EQUIPMENT 14  
15. TRAINING 14  
16. COMPLAINTS 14  
17. REVIEW 14  
18. REMUNERATION 15  
19. APPENDICES 16  
   Appendix 1 – ASFD roster for Initial Response Odontologists 16  
   Appendix 2 – Suggested Progress Logs for Odontology Procedures 17  
   Appendix 3 – Recommended Standards for Acceptance of Identification 20  
   Appendix 4 – Templates for Standard Forms for Reporting Identification 21  
   Appendix 5 – Odontology Equipment 24
1. INTRODUCTION

Disaster Victim Identification (DVI) is the term given to procedures used to identify deceased victims of a multiple fatality event.

Forensic odontology is one of the specialist disciplines used to facilitate identification. Post-mortem data and ante-mortem dental information is compared to provide an opinion regarding identity. This opinion is based on scientifically accepted research that human dentitions are unique, thus enabling individualisation.

2. THE AUSTRALIAN SOCIETY OF FORENSIC DENTISTRY

The Australian Society of Forensic Dentistry (ASFD) was established in 1983. Its objectives include:

- advance the study and application of forensic dentistry;
- to maintain a roster of forensic dentists who are available to deploy to mass disasters as required by relevant authorities;
- act as a conduit for forensic dental deployments in mass disasters.

The ASFD is a society open to any dental professional of good standing with an interest in forensic odontology. It has no legislative or administrative function, but aims to represent forensic odontologists in their interactions with stakeholders. In this context it is the overarching body facilitating the involvement of member forensic odontologists in DVI, both nationally and internationally.

3. MISSION STATEMENT

The ASFD is committed to providing a high quality and timely service to the Australian and international communities in the event of a state, national or international multiple fatality incident.

4. SCOPE

The practices used by ASFD members comply with Interpol Guidelines and internationally accepted practice.

Forensic odontology has a role in each of the phases of DVI. The level of involvement and responsibility in each of these phases will vary according to the nature and locale of the incident.

This document recommends protocol for the deployment of ASFD members both nationally and internationally and provides a comprehensive best practice model of protocols and procedures for the management of the odontology components of DVI. This document may also be used to outline the practices and protocols to be followed by international forensic odontologists should they be deployed in Australia.

This document is to be read and used in conjunction with:

- The Interpol Disaster Victim Identification Guide;
- The Australasian DVI Standards Manual;
- Any existing State or Territory DVI Plan;
- The Interpol Quality Management Guidelines for Disaster Victim Identification – (ISO/IEC 17205 Application);
- The EMA OSMASACASPLAN;
- The Australian DVI Activation and Response Plan.
5. TERMS AND DEFINITIONS

Forensic Odontology: The application of dental science to the administration of the law and the furtherance of justice.

Forensic Odontologist: A qualified dentist with appropriate additional training and experience in forensic odontology.

State/Territory Odontology Commander: The odontologist recognised by the State or Territory DVI lead agency as the responsible DVI Odontology Commander in that State or Territory DVI Plan.

Odontology Commander: Overall Australian manager of forensic odontology in a DVI event. Internationally this position will become the responsibility of the President of the ASFD (or nominee) and nationally the responsibility of the State or Territory Odontology Commander in consultation with the ASFD President, as required by the lead DVI agency.

Odontology Team: A forensic identification group(s) under the leadership of a dental commander.

Jurisdiction: The Australian Federal Police or a state or territory police force, providing DVI.

Lead Agency: The organisation responsible for the investigation of the DVI incident.

Phase: DVI activities comprise a number of separate but related phases; the scene, ante-mortem information collection and family liaison, post-mortem information collection, reconciliation and operational debrief.

6. ASFD REPRESENTATION

The ASFD representative on the Australasian DVI Committee shall be the President or a nominee. Any representative shall not hold this office consecutively for longer than two years.

7. ROLE, ORGANISATION AND MANAGEMENT

7.1 Role

ASFD members will be able to participate in national or international incidents at the Initial Response, Commander, Team Leader, or Practitioner level. Responsibilities of, and standard operating procedures for, each of these positions are described in Sections 12 and 13.

7.2 Organisation

The ASFD acknowledges the need for management structures within their own group, and the need to interact with other practitioners according to the Chain of Command outlined in the Australasian DVI standards or as promulgated by the lead DVI agency.

Management of each odontological phase in the DVI process requires supervision by a suitably qualified forensic odontologist meeting ASFD standards.

The Odontology team will have the following organisational structure:
7.3 Management
The Odontology Commander reports directly to, and is answerable to, the DVI Commander. Each member of the odontology team will be accountable to only one immediate supervisor.

All representations for, and on behalf of, the odontology team will be made only through the Odontology Commander. The Odontology Commander will only relay information through the DVI Commander or their delegate, never directly to external agencies or persons.

Established performance criteria and expectations will be documented and understood by all odontology team members.

8. PERSONNEL
Dentists wishing to be recognised by the ASFD as forensic odontologists capable of working outside their home state or territory must meet the following criteria:

8.1 For working within Australia they must:
- be registered as a dentist or dental specialist in their home state, making them eligible for temporary registration in the state of deployment, and
- have undertaken, or be undertaking graduate training, or have equivalent experience in forensic odontology, which must include training in DVI, and
- demonstrate evidence of relevant recent experience in the practice of forensic odontology.

8.2 For international deployment they must:
- be registered as a dentist or dental specialist in their home state, and
- have undertaken graduate training or equivalent experience in forensic odontology, which must include training in DVI, and
- demonstrate evidence of relevant recent experience in the practice of forensic odontology, and
- provide evidence of experience in disaster victim identification (not necessarily international).

8.3 For deployment as an Initial Response Odontologist and/or Odontology Commander in an overseas DVI incident:
- all of the above (8.2) plus,
- have experience as an Odontology Commander in a major incident (not necessarily international), and/or
- have participated in a DVI Co-ordinators workshop run by the Australasian DVI Committee or equivalent.
9. DEPLOYMENT REGISTER

9.1 A register of appropriately qualified odontologists available for deployment will be kept and managed by the ASFD under the direction of the President. The register will be updated annually, and failure by an odontologist to provide the required information in a timely manner will be taken as indication of a desire to be removed from the register. Listing in this register of those willing to be deployed overseas is voluntary.

9.2 Listing in this register does not guarantee deployment in any or every incident. The register will be used to establish availability and generate a roster of odontologists to be deployed for any given incident.

10. REQUESTS FOR ODONTOLOGY ASSISTANCE

10.1 The ASFD President (or their nominee) will be the contact person for all requests for national or international deployment of ASFD members.

10.2 The ASFD President will manage deployment of Initial Response Odontologists for international incidents via an internal roster system of the states and territories. While on roster (see Appendix 1), each State/Territory agrees to have two odontologists available for immediate deployment.

10.3 Upon receiving advice from the Initial Response Odontologists and a request from the Lead DVI Agency for additional odontology services, the President (or nominee) will assume the responsibilities of Odontology Commander at the international incident. The Vice President (or nominee) will assume the position of Australian based Liaison Odontologist and commence compilation of a deployment roster. The ASFD Executive will nominate a co-ordination group to assist the Vice President.

11. CODE OF CONDUCT

11.1 ASFD members recognise and acknowledge the requirement for adherence to these protocols and the principles of teamwork when interacting with DVI practitioners of this or another discipline and at any level. Such interaction must be professional at all times.

11.2 All persons included in the deployment register agree to abide by the principles embodied in this document.

11.3 All ASFD members recognise the confidential nature of DVI work, and will respect this confidentiality and undertake that no complaints or grievances will be aired outside this confidential environment.

12. RESPONSIBILITIES

12.1 ASFD President

On receiving advice of an incident the ASFD President will:

12.1.1 Contact the National DVI Chair for clarification of any role;
12.1.2 Liaise with the lead DVI agency;
12.1.3 Confirm odontology terms of deployment;
12.1.4 Contact On Call Odontologist and advise if Initial Response Odontologists required;
12.1.5 Contact ASFD Executive and advise what assistance required;
12.1.6 Contact the State and Territory Odontology Co-ordinators to advise that an incident has occurred or that a request for assistance has been received, and to request advice of available assets: the number of
persons available for deployment, the equipment available and capacity to collate ante-mortem information;

12.1.7 Ensure smooth hand over to Vice President and co-ordination group.

12.2 Initial Response Odontologists (International Incident only)

Initial Response Odontologists are provided by the State/Territory on call at the time of the incident, in consultation with the ASFD President. There will always be two initial response odontologists for each and every deployment. On arrival at the international site they will:

12.2.1 Liaise with local odontologist/DVI team and provide support and advice where appropriate;
12.2.2 In conjunction with local odontologist/DVI Commander assess odontology personnel and equipment resources required;
12.2.3 If assistance requested, in conjunction with DVI Commander, lead DVI agency and Australian based Liaison Odontologist, facilitate deployment of required odontologists and equipment;
12.2.4 Ensure smooth hand over to Odontology Commander.

12.3 Odontology Commander (State and International, at site of Incident)

The Odontology Commander will:

12.3.1 Establish an odontology plan and standard operating procedures (SOP);
12.3.2 Liaise with the DVI Commander regarding the specific protocols of relevance to odontology – eg use of teeth for DNA sampling;
12.3.3 Appoint Team Leaders;
12.3.4 Ensure agreed practices and procedures are followed;
12.3.5 Monitor odontology personnel and equipment requirements;
12.3.6 During an overseas incident, maintain daily contact with the Australian-based Liaison Odontologist regarding deployment rotations, ante-mortem collation etc;
12.3.7 Monitor register of attendance of odontologists;
12.3.8 Conduct daily liaison with DVI Commander;
12.3.9 Maintain daily (end of day) meeting with Team Leaders;
12.3.10 Liaise with Team Leaders regarding daily rotations of members and any needed amendments to SOP;
12.3.11 Ensure all incoming odontologists are met on arrival and briefed on accommodation, transport arrangements, DVI situation, phase allocation, SOP and OHS&W issues;
12.3.12 Appoint a review committee to investigate all internal complaints;
12.3.13 Facilitate transport as required;
12.3.14 Ensure quality control procedures are utilised in the odontology identification process;
12.3.15 If requested, sit on Identification Board.

12.4 Australian Based Liaison Odontologist (International Incident Only)

Unless being deployed as an Initial Response Odontologist this person is likely to be the ASFD Vice President in the first instance. The Australian-based Liaison Odontologist for an overseas incident will (For an Australian incident these duties will be assumed by the state or territory Odontology Co-ordinator):

12.4.1 Maintain contact with Incident-based Odontology Commander;
12.4.2 Liaise with Lead DVI agency;
12.4.3 Manage deployment roster, in conjunction with co-ordination group;
12.4.4 Ensure all deploying odontologists are briefed on travel and accommodation, and requirements of deployment;
12.4.5 Ensure regular and detailed information exchange with the membership of the ASFD;
12.4.6 If being deployed, fully brief replacement.
12.5 **Scene Odontology Team Member**

An odontologist working at the scene will:

12.5.1 Work as part of a DVI scene team as requested by the DVI Scene Coordinator and the Odontology Commander;
12.5.2 Assess the condition of the dental remains and the complexity of the required tasks;
12.5.3 Locate dental and facial remains of victims;
12.5.4 Advise the DVI Scene Coordinator on stabilisation and preservation techniques of dental and facial remains;
12.5.5 Conduct stabilisation and preservation of remains where required;
12.5.6 Advise on the removal from the site of remains and the need for any records (e.g., photographs) prior to removal;
12.5.7 Comply with OHS&W and infection control requirements as defined by the Lead DVI Agency Health and Safety Officer.

12.6 **Post-mortem Odontology Team Leader**

The post-mortem odontology team leader will:

12.6.1 Oversee the general running and practice standards of the post-mortem odontology team and consult with the Post-mortem Coordinator on workflow and other operational issues;
12.6.2 Daily, report to the Odontology Commander on progress by the post-mortem odontology team and team management and any other matters that might involve the team;
12.6.3 Supervise the workflow in the post-mortem odontology examination area;
12.6.4 Ensure all the documentation for all procedures is correctly and completely recorded;
12.6.5 Daily, supervise the internal rostering of staff within the post-mortem odontology team;
12.6.6 Ensure post-mortem odontology team members have been briefed on SOP and are familiar with radiographic and any other equipment;
12.6.7 Ensure radiographic and photographic equipment is correctly maintained;
12.6.8 Supervise requests from other DVI sections regarding dental information and reviews;
12.6.9 Ensure all members understand and observe OHS&W protocol within the post-mortem area and notify the Odontology Commander of any lapses or possible concerns. Keep detailed records of any events that are notified and the actions taken;
12.6.10 Supervise quality control and assurance of odontology examinations as required by the DVI agency protocol, ASFD guidelines and internationally accepted practice standards;
12.6.11 Nominate a deputy prior to leaving the post-mortem odontology area during working hours;
12.6.12 Daily, backup data and retain on the post-mortem odontology team leader’s computer hard drive.

12.7 **Post-mortem Odontology Examination Team Member**

A post-mortem odontology examination team member will:

12.7.1 Examine the victim’s dentition and record dental status on pink Interpol F1 and F2 forms using standard Interpol and ASFD recording practices, as directed in SOP and in a format suitable for the reconciliation phase as required by the Lead DVI agency;
12.7.2 Ensure all pages of Interpol form requiring dental information are completed;
12.7.3 Take photographs as required;
12.7.4 Take dental radiographs (unless a dedicated radiography team is being employed);
12.7.5 Take impressions of arches, as required;
12.7.6 Extract teeth for DNA sampling, as required;
12.7.7 Ensure clear separation of clean and contaminated staff, work areas and equipment is maintained;
12.7.8 Maintain sound OHS&W practices and notify the post-mortem odontology team leader of any lapses or possible concerns.

12.8 Post-mortem Odontology Radiography Team Member
A post-mortem odontology radiography team member will:
12.8.1 Take dental radiographs of each body, as directed in SOP;
12.8.2 Ensure digital file is correctly archived according to SOP or analogue films correctly developed, mounted and labelled;
12.8.3 Ensure clear separation of clean and contaminated staff, work areas and equipment is maintained;
12.8.4 Maintain sound OHS&W practices and notify the post-mortem odontology team leader of any lapses or possible concerns.

12.9 Ante-mortem Odontology Team Leader
The ante-mortem odontology team leader will:
12.9.1 Oversee the general running and practice standards of the ante-mortem odontology team and consult with the Odontology Commander daily on team management and any other matters that might involve the team;
12.9.2 Daily, report to the Odontology Commander on progress by the ante-mortem odontology team;
12.9.3 Supervise delivery and release of dental records to and from the ante-mortem area and maintain the AM Dental Records Register of file (and parts thereof) movements to and from the ante-mortem odontology area;
12.9.4 Daily, supervise the internal rostering of staff within the ante-mortem odontology team area;
12.9.5 Brief incoming odontologists on SOP;
12.9.6 Ensure all members understand and maintain OHS&W protocol within the ante-mortem odontology area and notify the Odontology Commander of any lapses or possible concerns. Keep detailed records of any events that are notified and the actions taken;
12.9.7 Supervise quality control and assurance of dental records management as required by the DVI agency protocol, ASFD guidelines and internationally accepted standards of practice;
12.9.8 Liaise with the Ante-mortem Co-ordinator on matters relating to file management procedure and protocol outside the ante-mortem odontology team area. This includes requests for data from ante-mortem interview teams, international data requests and collection of available dental data;
12.9.9 Provide support advice to ante-mortem interview teams and other DVI personnel on dental data requirements;
12.9.10 Supervise requests from other DVI sections regarding dental record information and reviews;
12.9.11 Nominate a deputy prior to leaving the ante-mortem odontology area during working hours or when the area is not secured;
12.9.12 Daily, backup data, retain on the ante-mortem odontology team leader’s computer hard drive.

12.10 Ante-mortem Odontology Phone Team Member
An ante-mortem odontology phone team member will:
12.10.1 Manage phone communications with the providers of dental data;
12.10.2 Manage ante-mortem data collection from those sources;
12.10.3 Keep accurate running sheets of all events, as required by Lead DVI Agency;
12.10.4 Maintain the ante-mortem working register issued to that member, recording all files handled, instruction given and by whom, action taken and current progress status;

12.10.5 Maintain sound OHS&W practices and notify the ante-mortem odontology team leader of any lapses or possible concerns.

12.11 Ante-mortem Odontology Data Input Team Member

The ante-mortem dental data is to be compiled by odontologists working in pairs. An ante-mortem odontology data input team member will:

12.11.1 Receive and transcribe dental records of case files allocated by the ante-mortem odontology team leader into yellow Interpol F1 and F2 forms using standard Interpol and ASFD recording practices as directed in SOP and in a format suitable for the reconciliation phase as required by the Lead DVI agency;

12.11.2 Input data into the computer DVI data base (if one is used) using format as instructed;

12.11.3 Maintain accurate running sheets of each case, as required by Lead DVI Agency;

12.11.4 Notify the ante-mortem odontology team leader of any other dental data that might be available elsewhere for further action;

12.11.5 Maintain sound OHS&W practices and notify the ante-mortem odontology team leader of any lapses or possible concerns.

12.12 Reconciliation Odontology Team Leader

The reconciliation odontology team leader will:

12.12.1 Oversee the general running and practice standards of the reconciliation odontology team and consult with the Odontology Commander daily on team management and any other matters that might involve the team;

12.12.2 Daily, report to the Odontology Commander on the progress of the reconciliation dental team;

12.12.3 Supervise delivery and release of dental records to and from the reconciliation dental area and maintain a Reconciliation Dental Register of file (and parts thereof) movements to and from the reconciliation dental area;

12.12.4 Daily, supervise the internal rostering of staff within the reconciliation odontology team area;

12.12.5 Ensure all members understand and maintain OHS&W protocols within the reconciliation odontology area and notify the Odontology Commander of any lapses or possible concerns. Keep detailed records of any events that are notified and the actions taken;

12.12.7 Supervise quality control and quality assurance of dental records management as required by the DVI agency protocols, ASFD guidelines and internationally accepted standards of practice;

12.12.8 Liaise with the Reconciliation Co-ordinator on matters relating to file management procedure and protocol outside the reconciliation dental team area;

12.12.9 Review all odontology reconciliation recommendations prior to submission to the Reconciliation Coordinator;

12.12.10 Supervise requests from other DVI sections regarding dental reconciliation and reviews;

12.12.11 Nominate a deputy prior to leaving the reconciliation odontology area during working hours or when the area is not secured;

12.12.12 Daily, backup data, and retain on the reconciliation odontology team leader’s computer hard drive.
12.13 Reconciliation Odontology Team Member

A reconciliation odontology team member will:

12.13.1 Review potentially matching ante-mortem and post-mortem files as directed by SOP;
12.13.2 Keep accurate running sheets of all events, as required by lead DVI agency;
12.13.3 Maintain the Dental Reconciliation Working Register issued to that member, recording all files handled, instruction given and by whom, action taken and current progress status;
12.13.4 Maintain sound OHS&W practices and notify the reconciliation odontology team leader of any lapses or possible concerns.

12.14 ASFD Quality Manager

The Quality Manager for the Australian Society of Forensic Dentistry will:

12.14.1 Develop and promulgate quality control systems suitable for use in all phases of a dental DVI operation;
12.14.2 Maintain the quality manual and associated documentation;
12.14.3 Review the quality manual and associated documentation annually;
12.14.4 Ensure validation of any new techniques;
12.14.5 Facilitate the conduct and evaluation of internal audits;
12.14.6 Coordinate quality system audits;
12.14.7 Make training recommendations to improve the skills of DVI personnel;
12.14.8 Review any feedback;
12.14.9 Recommend changes and improvements to the DVI quality system;
12.14.10 Maintain any archival material and facilitate its use in training.

The highest standards of information gathering, data recording and data entry are necessary in a DVI incident. Team Leaders will assume the role of Quality Manager at most incidents and provide quality assurance.

The Quality Manager(s) at a DVI incident will:

12.14.11 Monitor operations to verify compliance with procedures and practices;
12.14.12 Investigate reasons for poor data and information collection and recording, and recommend remedial action(s);
12.14.13 Daily, liaise with Odontology Commander;
12.14.14 In the mortuary, verify pink Interpol F documentation;
12.14.15 In the ante-mortem information section, verify yellow Interpol F documentation;
12.14.16 Manage any transfer of data to computerised records management program;
12.14.17 In reconciliation, participate in final review of identification documentation;
12.14.18 Ensure 100% peer review of all positive identifications;
12.14.19 Ensure 10% of non-identifications are peer reviewed;
12.14.20 Compile daily Odontology situation reports for Odontology Commander.

13. RECOMMENDED STANDARD OPERATING PROCEDURES

13.1 Phase 1 Activities, The Scene

At the request of the DVI Commander, the Odontology Commander may second a forensic odontologist (or odontologists) to advise on the recovery of remains which may have odontological significance, or which may require specific methods of preservation to ensure maximum benefit is gained from the body recovery process.

13.2 Phase 2 Activities, The Mortuary

Odontology processes in the mortuary are time consuming and may prove to be a bottleneck. For timely progress of examinations in an incident involving 50 bodies or more the recommended team is a team leader, mortuary technician, 3 examination teams, 1
radiography team, a dedicated person to process radiographs, and a quality manager. Each examination and radiography team will be composed of 2 odontologists and any available assistants e.g. auxiliaries. It may not always be possible to access this number of suitably qualified odontologists, and as a consequence a slower pace must be allowed for through the dental examination phase.

A progress log (See Appendix 2A) which is a check list of examinations will be retained with each body, and initialed after each procedure is completed. The team leader will ensure all procedures are completed before the body is returned to the holding area.

On receipt of human remains each examination team will:

13.2.1 Document the chain of evidence;
13.2.2 Check that the unique DVI number on the body bag, body tag and documentation are identical;
13.2.3 Ensure that any police photographs required have been taken;
13.2.4 On initial opening of body bag take full face view and anterior dentition view photographs of the remains. The unique DVI number is to be clearly visible in all photographs and must not obscure any dental information;
13.2.5 When appropriate, disarticulate the mandible. This may be completed by mortuary technician;
13.2.6 clean the teeth and jaws as necessary;
13.2.7 Take full arch occlusal view photographs of the maxilla and mandible, and close-up views of any features of special interest. The unique DVI number is to be clearly visible in all photographs and must not obscure any dental information. Photographs may be digital, analogue or Polaroid. All photographs taken are to be documented on pink Interpol F2 form in section 90;
13.2.8 Conduct a detailed dental examination, record on the pink Interpol F2 form, using Interpol recommended charting;
13.2.9 The oral examination is to be checked by recorder;
13.2.10 Take dental impression if required;
13.2.11 Ensure that there is a legible notation in each section of the pink Interpol F1 and F2 forms. This will help to prevent misunderstandings and misinterpretations during the data entry process;
13.2.12 Check that the pink Interpol F1 and F2 forms are completed and then sign the F2 and progress log.

On completion of dental examination, each radiography team will:

13.2.13 Document the chain of evidence;
13.2.14 Check that the unique DVI numbers on the body bag, body tag and documentation are identical;
13.2.15 Record radiographs. Ideally complete a full mouth survey with periapical, and bitewing views, (minimum 12 films) for each set of human remains. Special features require additional angled views. If the dental structures are incomplete, all teeth present are to be radiographed;
13.2.16 Radiographs may be recorded digitally or on analogue film;
13.2.17 Digital sensors must be appropriately protected from contamination;
13.2.18 Digitally recorded images must be appropriately filed and stored and printed according to predetermined protocol;
13.2.19 Remove analogue radiographs from barrier cover in mortuary and place in separate small bag with DVI number attached, carefully avoiding contamination;
13.2.20 Place radiographs in the A4 zip lock bag containing all mortuary information for that body, then hand to appropriate person for developing and processing;
13.2.21 All radiographs taken are to be documented on pink Interpol F2 form in section 89;
13.2.22 Complete and sign the pink Interpol F1 form and the progress log.

If teeth are to be used for DNA sampling, and only after completion of all other procedures, an examination team will:

13.2.23 Document the chain of evidence;
13.2.24 Check that the unique DVI numbers on the body bag, body tag and documentation are identical;
13.2.25 Extract the tooth nominated in the SOP;
13.2.26 Process the tooth according to lead DVI agency instructions;
13.2.27 Record the tooth extracted (by FDI number) in the progress log and on the pink Interpol F1 form in box 84;
13.2.28 Complete and sign the pink Interpol F1 form and the progress log.

As soon as possible after the radiography team have completed each radiographic examination and before the body is returned to the storage area, the processing technician will:
13.2.29 Document the chain of evidence;
13.2.30 Process radiographs, ensuring no mix-up of films between cases has occurred;
13.2.31 Mount and label radiographs with the unique DVI number. Use one full mouth survey mounting sheet per body, except if there are more x-rays than mounting spaces – then use a second mount.

The Quality Manager /Team Leader will:
13.2.32 Ensure all the documentation is complete;
13.2.33 Check charting from mortuary against radiographs and photographs;
13.2.34 Highlight any alterations that were made on pink Interpol F2 and record changes in running sheet;
13.2.35 Ensure major discrepancies are peer reviewed, with appropriate documentation, and reported to Mortuary Team Leader;
13.2.36 If necessary, ensure body is re-examined or radiographs retaken;
13.2.37 Ensure all sections of Interpol form requiring dental information are completed;
13.2.38 If a computerised comparison program is being employed, supervise input of data, including digitisation of radiographs.

13.3 Phase 3 Activities, Ante-mortem Record Collation

It is essential for odontologists to be part of the missing persons team(s) involved in the collection and collation of ante-mortem information. It is important that all ante-mortem team members are aware of what may constitute dental records (eg written records, radiographs, photographs, models, mouthguards and other prostheses) and all the institutions, specialist practices and facilities where dental records may be located. It is appropriate for odontologists to speak directly with treating dentists regarding the content of dental records. Odontologists are not trained to interact directly with the families of victims.

A progress log (See Appendix 2B) will be retained with each record, and initialled after each procedure is completed.

Each ante-mortem odontology team will:
13.3.1 Be composed of a minimum of 2 odontologists at any given time;
13.3.2 Complete and sign the yellow Interpol F1 form according to Interpol guidelines;
13.3.3 Report any uncollected information known to exist (e.g. original radiographs) to ante-mortem odontology team leader (or nominated person) so collection can be arranged. Record the suspected missing information, the date and time of the request for information, and to whom the request was made, in box 79 of yellow Interpol F1 form and in the ante-mortem file running sheet;
13.3.4 Identify records obviously inadequate for positive identification by dental means (e.g. incomplete or containing minimal information) to ante-mortem odontology team leader (or nominated person), to facilitate further investigation regarding additional identification information. This report is to be documented in box 79 of the yellow Interpol F1 form and in ante-mortem file running sheet;
13.3.5 Document all access to ante-mortem files according to lead DVI agency guidelines;
13.3.6 Only access sealed material after authorisation and document such access;
13.3.7 Ensure transfer of ante-mortem information to Reconciliation Centre strictly follows Lead Agency guidelines.
13.4 Phase 4 Activities, Reconciliation

The odontology team in the Reconciliation Centre is to be composed of a team leader and a minimum of 2 odontologists at any given time.

Only original Interpol forms, radiographs and any other dental reference material will be used in odontology reconciliation.

Irrespective of use of a computerised data base program, all identifications must be manually verified by named odontologists appointed to the reconciliation area. All cases regarded as potentially identified and considered suitable for presentation to the Identification Board must be peer reviewed.

Once initial comparison (either manual or computerised) has identified a potential identification, one odontologist (the presenter) becomes responsible for that case. In the event of a change of deployment team prior to presentation to the Identification Board, the newly arrived odontologist taking responsibility for the case, and thus presentation to the Board, should be fully briefed by the original presenter prior to their departure.

The Odontology Commander may be a member of the Identification Board. If so, to ensure their independence and objectivity, the final review of dental identifications prior to transfer to the Reconciliation Coordinator, should be completed by the reconciliation odontology team leader. If the Odontology Commander is not a member of the Identification Board they should review all dental identifications before they are submitted to the Identification Board. The last reviewer (Reconciliation Team Leader/Quality Manager or Odontology Commander) has the final say as to the identification prior to presentation to the Identification Board.

The presenting Odontologist will:

13.4.1 Ensure identification is established according to recommended standards for acceptance of identification (Appendix 3);
13.4.2 Document reasons for identification;
13.4.3 Ensure identification is peer reviewed, and peer review is documented;
13.4.4 Complete standard form for reporting identification (Appendix 4);
13.4.5 Ensure all paperwork is correctly completed, radiographs and any photographs are correctly indexed and labelled;
13.4.6 Present the case, with appropriate documentation, to team leader/Quality Manager/Odontology Commander prior to transfer to Reconciliation Coordinator for presentation to Identification Board;
13.4.7 Present case to the Identification Board.

14. EQUIPMENT

14.1 Provision of equipment essential to a DVI service in forensic odontology is the responsibility of the Lead DVI agency.

14.2 While it is not possible to prescribe a fully comprehensive equipment list, Appendix 5 lists suggested requirements for a DVI incident of 50 fatalities.

14.3 A working group of the ASFD will maintain and update this list and establish an inventory and the location of large equipment items (e.g. portable x-ray machines) that are available for access in the event of a large mass fatality incident.

15. TRAINING

15.1 ASFD members are committed to providing the most relevant and up to date service possible. To achieve this it is recognised that continued training and upgrading of skills is important.
15.2 The ASFD encourages members to participate in regular professional development with a particular emphasis on forensic odontology, including Disaster Victim Identification.

15.3 The ASFD recognises that continuing professional development (CPD) can occur via formal postgraduate training programs, structured group activities and meetings (e.g. study groups and conferences), and personal informal study. CPD can occur at local, national or international levels.

15.4 The ASFD recommends that members engage in a minimum of 10 hours per year continuing professional development, and encourages members to keep a record of this activity.

16. COMPLAINTS

16.1 All internal complaints will initially be directed through the Odontology Commander. The Odontology Commander will appoint a review committee to investigate the complaint.

16.2 All external complaints will initially be directed through the DVI Commander, who will determine appropriate management.

17. REVIEW

17.1 ASFD members acknowledge the importance and value of review processes to the continual improvement of the service they offer.

17.2 There will be an audit and review of the odontological aspects at the completion of the incident. This may occur in conjunction with any review process initiated by the Lead Agency, or separately.

17.3 The performance review will be conducted by nominated members of the DVI team and suitable persons who were not members of the DVI team, convened by the ASFD President.

17.4 Outcomes of the audit and performance review will be made available to members of the ASFD and incorporated into the Disaster Victim Identification Forensic Odontology Guide as appropriate.

18. REMUNERATION

Many Australian forensic odontologists are private dental practitioners or University academics who undertake forensic services for little or no remuneration. The time commitment to a major DVI incident will cause considerable loss of income for private practitioners, both in salary and overhead costs of their practice. Members employed by Universities may be asked to take leave without pay by their employer and the University will have to fund replacement staff to cover their responsibilities during this period.

It is appropriate that ASFD members be remunerated by the lead DVI agency when deployed to work at a DVI incident. The ASFD President will establish an appropriate remuneration level, which will be reviewed annually. This level needs to be discussed with stakeholders regularly and prior to any deployment.

This remuneration is over and above travel, accommodation and meal costs. It is the responsibility of the lead DVI agency to ensure that appropriate and adequate indemnity, liability, personal accident and sickness insurance is in place for all odontologists. The lead DVI agency is also responsible for provision of post deployment care, debriefing and counselling.

Any additional out of pocket expenses must be logged and justified when claimed.
19. **APPENDICES**

Appendix 1

ASFD Roster for provision of Initial Response Odontologists.

<table>
<thead>
<tr>
<th>MONTH</th>
<th>DUTY STATES</th>
<th>Contact person</th>
</tr>
</thead>
<tbody>
<tr>
<td>March 2006</td>
<td>WA</td>
<td>Stephen Knott</td>
</tr>
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<td></td>
</tr>
<tr>
<td>May 2006</td>
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<td>Alex Forrest, David Griffiths</td>
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<td>NSW</td>
<td>Chris Griffiths</td>
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<td></td>
</tr>
<tr>
<td>September 2006</td>
<td>Vic/Tas</td>
<td>Tony Hill</td>
</tr>
<tr>
<td>October 2006</td>
<td></td>
<td></td>
</tr>
<tr>
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<td>SA/NT</td>
<td>Helen James, Mark Leedham</td>
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Appendix 2

Suggested Progress Logs for Odontology Procedures
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<tr>
<td>Name of Photographer</td>
<td>.........................................................................</td>
</tr>
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<td><strong>ODONTOLOGY PHOTOGRAPHS</strong></td>
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<tr>
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</tr>
<tr>
<td>Odontologist 2</td>
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</tr>
<tr>
<td><strong>RADIOGRAPHS</strong></td>
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<tr>
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<td>.........................................................................</td>
</tr>
<tr>
<td><strong>OTHER (e.g. IMPRESSIONS)</strong></td>
<td>[ ]</td>
</tr>
<tr>
<td>Describe</td>
<td>.........................................................................</td>
</tr>
<tr>
<td><strong>VERIFIED COMPLETE BY TEAM LEADER</strong></td>
<td>[ ]</td>
</tr>
<tr>
<td>Signed</td>
<td>.........................................................................</td>
</tr>
<tr>
<td>Date</td>
<td>.........................................................................</td>
</tr>
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</table>
ODONTOLOGY AM PROGRESS LOG

NAME OF MISSING PERSON

DENTAL RECORDS OBTAINED
Originals ………………………  □  Number of pages  ___
Copies …………………………  □  Number of radiographs  ___

RECORDS COLLECTED BY
Name ………………………………………………………………………..

DENTIST DETAILS
Name ………………………………………………………………………..
Address …………………………………………………………………….
……………………………………………………………………..
……………………………………………………………………..

DENTAL TRANSCRIPTION COMPLETE
Odontologist 1…(Name)………………………………………
Odontologist 2…(Name)………………………………………………..

ODONTOLOGIST COMMUNICATION WITH DENTIST
Yes  □  No  □

VERIFIED COMPLETE BY TEAM LEADER
Signed……………………..  Date………………………………….
Appendix 3

Recommended Standards for Acceptance of Identification

The principle underlying dental comparison is one of elimination. The comparison process must be methodical, and include each tooth as well as all associated dental structures.

No minimum number of concordant points is required. All apparent discrepancies in evidence (e.g. errors in recording, dental treatment subsequent to the available ante-mortem information) must be resolved. No assumptions must be made about missing information or unresolved discrepancies. In all circumstances it is better to err on the side of caution and be conservative in decisions.

The following categories and criteria are to be used in the final identification report:

Confirm:
The post-mortem and ante-mortem data correspond in sufficient detail to establish that they are from the same individual. There is radiographic evidence in support of the identification, and there are no irreconcilable discrepancies.

Possible identification:
The post-mortem and ante-mortem data have consistent features, but, due to the condition of either the post-mortem remains or the ante-mortem information, it is not possible to confirm the identification. The information does not exclude the identification.

Insufficient evidence:
The available information, either post-mortem or ante-mortem, is insufficient to be able to reach a conclusion.

Exclude:
The post-mortem and ante-mortem data are inconsistent. The deceased is not the person named in the dental records.
Appendix 4

Suggested Templates for Standard Forms for Reporting Identification

Information can be added to this template to meet jurisdictional requirements, but cannot be removed.
REPORT OF ODONTOLOGICAL INVESTIGATION FOR IDENTIFICATION

On……………………………………………………………………………………………………
at ………………………………………………………………………………………………..
an odontological examination was conducted on the human remains,
Body Number………………………………………………………………………………

This examination involved photography, radiography and charting of the teeth and
associated oral structures.

The information recorded in this examination was compared against information
collected from dental and other records in the name of;
……………………………………………………………………………………………………
of……………………………………………………………………………………………..
with a date of birth of………………………………………………………………………

These records were provided by……………………………………………………………
of……………………………………………………………………………………………..

This comparison enables the identification of the deceased to be ……………………
on dental grounds.

This opinion is based on the information contained in the attached comparison chart.

Reporting Odontologist: (print name and sign))

……………………………………………………………………………………………………

Reviewing Odontologist: (print name and sign)

……………………………………………………………………………………………………

Odontology Commander/Quality Manager: (print name and sign)

……………………………………………………………………………………………………

Date:……………………………………………………………………………………………...
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<thead>
<tr>
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<th>ANTEMORTEM</th>
<th>POSTMORTEM</th>
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COMMENTS (e.g. Radiographic comparisons of note):

_____________________________________________________________________________
_____________________________________________________________________________
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_____________________________________________________________________________
_____________________________________________________________________________

SIGNATURE ODONTOLOGIST 1   SIGNATURE ODONTOLOGIST 2

Date:       Date:
### Appendix 5

**Odontology Equipment**

**Odontology specific items**

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
<th>Specifications, if appropriate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Portable Dental X-ray Unit</td>
<td>1 mobile minimum</td>
<td>Must be able to cope with changes in voltage without affecting output</td>
</tr>
<tr>
<td></td>
<td>1 Nomad hand held</td>
<td></td>
</tr>
<tr>
<td>X-ray developing equipment</td>
<td>2</td>
<td>1 x Durr Periomat Pluss 1 x Procomat or Kodak manual processing box, with hangers</td>
</tr>
<tr>
<td>Developer</td>
<td>5 litre minimum</td>
<td>To be specified</td>
</tr>
<tr>
<td>Fixer</td>
<td>5 litre minimum</td>
<td>To be specified</td>
</tr>
<tr>
<td>Measuring container</td>
<td></td>
<td>To be specified</td>
</tr>
<tr>
<td>Photographic equipment</td>
<td></td>
<td>Nikon Koolpics digital camera with intraoral capability and dedicated computer and colour printing facilities and/or Polaroid Macro 5 SLR camera and 12 packs Polaroid Spectra X 20 film</td>
</tr>
<tr>
<td>X-ray film</td>
<td>6 packets (100/pack)</td>
<td>KODAK DF58C#2 (barrier)</td>
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<tr>
<td>X-ray film - Size 2 self developing</td>
<td></td>
<td>To be specified</td>
</tr>
<tr>
<td>X-ray film - Occlusal</td>
<td></td>
<td>To be specified</td>
</tr>
<tr>
<td>Disposable scalpels</td>
<td>1 box</td>
<td>Mortuary grade</td>
</tr>
<tr>
<td>Disposable Dental Mirrors</td>
<td>1 box</td>
<td>To be specified</td>
</tr>
<tr>
<td>Dental mirrors - metal</td>
<td>10</td>
<td>To be specified</td>
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<tr>
<td>Dental explorer</td>
<td>6</td>
<td>To be specified</td>
</tr>
<tr>
<td>Dental tweezers</td>
<td>6</td>
<td>To be specified</td>
</tr>
<tr>
<td>Large tissue tweezers</td>
<td>6</td>
<td>To be specified</td>
</tr>
<tr>
<td>Disposable dental kit</td>
<td>6</td>
<td>Mirror, probe and tweezers</td>
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<td>Toothbrushes</td>
<td>1 box</td>
<td>To be specified</td>
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<tr>
<td>Extraction Forceps - upper</td>
<td>3</td>
<td>AEDG130</td>
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<tr>
<td>Extraction Forceps - lower</td>
<td>3</td>
<td>AEDG522</td>
</tr>
<tr>
<td>Jaw Openers</td>
<td>3</td>
<td>Aesculap OM30</td>
</tr>
<tr>
<td>Gauze</td>
<td>5 packs</td>
<td>To be specified</td>
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<tr>
<td>X-ray film holders</td>
<td>1 box (100)</td>
<td>Trollplast, full mouth survey TR-TR18</td>
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<tr>
<td>X-ray viewers</td>
<td>2 x desk top</td>
<td>To be specified</td>
</tr>
<tr>
<td></td>
<td>2 x large bench top</td>
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<tr>
<td>Pens</td>
<td>40</td>
<td>4 colour BIC</td>
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<td>Zip lock plastic A4 sleeves</td>
<td>100</td>
<td>To be specified</td>
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<td>Impression putty</td>
<td>2 boxes</td>
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**Other (non-dental)**

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<th>Item</th>
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<tr>
<td>Interpol forms</td>
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<td>Interpol Guide Book</td>
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<td>Australasian Standards Manual</td>
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<td>Interpol elimination charts</td>
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<tr>
<td>Disposable Plastic Aprons</td>
<td>50</td>
</tr>
<tr>
<td>Medical Scrubs</td>
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</tr>
<tr>
<td>Rubber Boots</td>
<td>1 pair per operator</td>
</tr>
<tr>
<td>Face Masks – with and without visors</td>
<td></td>
</tr>
<tr>
<td>Safety Glasses</td>
<td>1 pair per operator</td>
</tr>
<tr>
<td>Rubber and vinyl disposable gloves</td>
<td></td>
</tr>
<tr>
<td>Head lamps</td>
<td>1 per operator – not LED</td>
</tr>
<tr>
<td>Portable lighting</td>
<td></td>
</tr>
<tr>
<td>Alcohol (isopropyl)</td>
<td></td>
</tr>
<tr>
<td>Assorted stationary</td>
<td></td>
</tr>
<tr>
<td>Plastic document folders</td>
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### AM Record Collection, Data Entry and Reconciliation

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<tr>
<th>Item</th>
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<th>Specifications, if appropriate</th>
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<tr>
<td><strong>Accommodation</strong></td>
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<tr>
<td>Area</td>
<td>Minimum area 60 m²</td>
<td>Secure, with good lighting</td>
</tr>
<tr>
<td>Workplace tables</td>
<td>13</td>
<td>Minimum 900 mm²</td>
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<tr>
<td><strong>Communication</strong></td>
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<tr>
<td>Telephones</td>
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<td>Facsimile</td>
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<td>Broadband internet access</td>
<td>1</td>
<td>200 GB storage and unlimited access</td>
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<td>Secure postage</td>
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<td><strong>Storage</strong></td>
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<td>Cupboard</td>
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<td>Filing Cabinet</td>
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<td></td>
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<tr>
<td>Stationary Cupboard</td>
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<td><strong>Computing</strong></td>
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<td>Computers</td>
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<td>Networked together, to printers sn to central DVI computer database server. DVD R/W 2 x USB ports</td>
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<td>Software</td>
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<td>• Operating system</td>
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<td>• Network</td>
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<td>• MS Office</td>
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<td>• Adobe acrobat reader</td>
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<td>• Adobe Photoshop V7 or later</td>
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<td>• DVI database computer workstation program(s)</td>
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<td>Additionally installed on AM Team Leader computer hard drive:</td>
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<td></td>
<td></td>
<td>• AM Records register database</td>
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<tr>
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<td>• Broadband software</td>
</tr>
<tr>
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<td></td>
<td>• Individual team member allocated folder, 1 folder per team member, accessible from all AM team computers. For personal storage of information and location of each members Personal Records Register</td>
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<td>USB Memory stick</td>
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<td>X ray scanner</td>
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<td>Printers</td>
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<td><strong>Office equipment</strong></td>
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<td>White - 4 reams</td>
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<td>Glossy photo – 2 pckts</td>
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<td>Ink for printer</td>
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<td>Toner</td>
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<td>Pens</td>
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<td>4 – water soluble narrow black</td>
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<td>Envelopes</td>
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<td>Stapler + staples</td>
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<td>Stanley knife</td>
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<td>Rubbish bins</td>
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<td>State Dental Service contacts</td>
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<td>State DVI Commander contacts</td>
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<td>Hospital (Public and private) contact</td>
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<td>Health Commission contact names and</td>
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<tr>
<td>numbers</td>
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<td>Dental Laboratories contact names and</td>
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<td>numbers</td>
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<td>DHAA Membership list and contact details</td>
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<td>Documentation</td>
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<td>DVI Correspondence paper</td>
<td>with official letterhead</td>
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<td>Standard “request for records”</td>
<td>correspondence template</td>
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<tr>
<td>Standard “receipt of data”</td>
<td>correspondence template</td>
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<tr>
<td>Standard “request for external information”</td>
<td>template</td>
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