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RESEARCH ARTICLE



Early-career general practitioners' perceptions of the utility of vocational training for subsequent independent practice

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ABSTRACT

Purpose: To evaluate Australian early-career general practitioners' perceptions of the utility of their prior vocational training in preparing them for independent specialist practice. We hypothesised that in-practice teaching would be perceived as more useful than formal education delivered by Regional Training Organisations (RTOs).

Methods and materials: A cross-sectional questionnaire-based study of early-career general practitioners (RTO 'alumni'). The outcomes were Likert scale ratings of alumni's perceived impact of RTO education versus in-practice training on their preparedness for independent practice. Ratings were compared using Wilcoxon signed-rank tests. Multivariable linear regression was used to establish alumni characteristics associated with perceptions of utility of in-practice versus RTO-delivered education.

Results: Three hundred and fifty-four alumni responded (response rate 28%). In-practice training was rated statistically significantly higher than RTO education for minor procedural skills, teaching skills, professional responsibilities, tolerating clinical uncertainty, and preparing for managing child and adolescent health, aged care, chronic disease, multi-morbidity and mental health. RTO education rated higher than in-practice training for practising evidence-based medicine and Aboriginal and Torres Strait Islander health. For a number of further areas, there was no statistically significant difference in alumni ratings of utility.

Conclusions: In-practice or RTO-led teaching was perceived as more useful for some components of independent practice, whilst for others there was no significant difference. The findings support recognition of the individual educational components of a blended education/training structure.

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Introduction

Primary care is the health sector with the most evidence for beneficial effects on health outcomes, reducing morbidity and mortality, and providing more equitable healthcare [1]. General practitioners (GPs) manage acute and chronic illness and multi-morbidity and provide preventive and continuing care [2] in the community setting [3] whilst considering the psychosocial and cultural contexts of illness [4].

Training in general practice is challenging, as trainees must acquire competency across a wide spectrum of

medical conditions, presentations, and consultation skills. It requires a holistic approach to diagnosis and management [5]. Trainees experience considerable stress as they learn to make decisions about undifferentiated illnesses and managing uncertainty [6]. It can be difficult for trainees to calibrate and improve their performance within complex and ambiguous circumstances [7].

Internationally, there is an increasing recognition of the need for specific training in general practice [8]. In Australia, as in several international settings, an apprenticeship-like model of training is used. In this model,

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trainees working in general practice settings receive supervision from experienced GP clinicians. Training is predominantly experiential, with relevant clinical experiences, and their availability, being key to registrars' (specialist GPs in training) learning [9]. Learning in practice is complemented with academic sessions, workshops and personal study [10]. The length of training and allocation of time in each activity varies internationally [11]. In Australia, a programme of co-ordinated out-of-practice education is currently undertaken by Regional Training Organisations (RTOs). These are geographically based, not-for-profit organisations that deliver a co-ordinated national curriculum of general practice training [10]. As well as delivering educational sessions, RTOs co-ordinate allocation of registrars to training practices, monitor training practices' adherence to national quality standards, mentor individual registrars, maintain a programme of formative assessment of registrars, and help prepare registrars for summative (Fellowship) examination.

Practices, while being 'authentic', can be 'somewhat chaotic learning environments' [12]. By extension, clinical experiences are bound to be varied. The challenge remains in identifying which skills to teach registrars, how this may best be done, and in which context. There has been limited previous work examining the reflections of specialist GPs regarding which aspects of their training best prepared them for independent practice. Existing studies are varied and include pre- and post-vocational training programme comparisons, analyses of learners' and teachers' accounts, audits of general practice, and analyses of examination pass rates [13]. This demonstrates the variability and difficulty in defining and quantifying the 'utility' of vocational training. A knowledge gap exists regarding whether vocational training programmes adequately prepare GPs for future practice.

In this study, we aimed to explore Australian early-career GPs' perceptions of the effectiveness of their prior vocational training and education in preparing them for independent specialist practice. We hypothesised that in-practice teaching, where trainees spend the majority of their training, would be perceived as more useful than learning received in formal educational sessions which constitute a minor part, by time, of trainee education.

Methods

This analysis was a component of the New alumni EXperiences of Training and independent Unsupervised Practice (NEXT-UP) study.

The detailed study protocol is presented elsewhere [14]. Briefly, NEXT-UP was a questionnaire-based cross-sectional study of early-career GPs, augmented with data contemporaneously recorded as part of the participants' general practice vocational training programme.

Participants and setting

The participants were former registrars ('alumni') of three RTOs that deliver GP training across New South Wales, Tasmania, the Australian Capital Territory, and Eastern Victoria (in total, 43% of all Australian GP registrars) [15].

At the time of the questionnaire survey, participating alumni were within six months to two years post-completion of vocational training (having attained Fellowship of the Australian College of General Practitioners or the Australian College of Rural and Remote Medicine between January 2016 and July 2018, inclusive).

Recruitment and questionnaire

The questionnaire was distributed to alumni of each RTO via an online survey link using Survey Monkey and a concurrent hardcopy mailout (participants choosing either mode for completion). Potential participants were identified using graduation lists of each RTO. Contact details used were those held by the individual RTOs plus publicly available sources (including the Australian Health Practitioner Regulation Agency website, GP search engines, and individual practice websites).

The questionnaire elicited information about participants' current practice location, characteristics of their current practice, personal demographics, and perceptions of their training experience. Permission was sought from participants to access routinely collected training data from their RTO, providing contemporaneously collected training-related information.

Outcome factors

The outcomes of interest for this analysis of NEXT-UP data were self-reported Likert scale ratings of how well the alumni's' RTO versus in-practice vocational education and training prepared them for their current independent practice. Current independent practice was assessed via measures of defined areas of common GP clinical skills and attributes, and in common GP clinical domains. These skills, attributes and domains were determined by an expert panel of GPs as per the NEXT-

UP protocol [14]. Each skill/attribute or clinical domain was assessed separately for RTO-delivered and in-practice education and training.

The nine defined areas of common skills and attributes were as follows: clinical knowledge; consultation skills; minor procedural skills; practising Evidence-Based Medicine (EBM); teaching skills; self-directed learning; reflective practice; professional responsibilities; and tolerating clinical uncertainty.

The six clinical domains were as follows: child and adolescent health; aged care; chronic disease management; patients with multi-morbidity; Aboriginal and Torres Strait Islander health; and mental health.

For the purposes of comparison, scores were assigned a number from 1 to 4 (1 = poorly, 2 = somewhat well, 3 = moderately well, 4 = extremely well) for Likert scale responses for each of the common skills/attributes and clinical domains.

Independent variables

Independent variables in regression analyses were as follows: alumni age; gender; place of primary medical degree (Australian or International Medical Graduate); post-graduate years in Australian hospital practice prior to commencing general practice terms; RTO trained with; any part-time training; leave during training (other than annual); rural location during training; low socioeconomic status practice location during training; failure of any Fellowship examination component; number of different practices worked during GP training; and year of Fellowship.

Statistical analyses

For each of the nine common skills and attributes items, and for each of the six clinical domain items, mean Likert scale response scores (possible scores, 1–4) were calculated separately for RTO-provided vocational education/training ratings and for in-practice vocational education/training ratings. For scores on each of the 15 items, RTO-provided vocational education/training ratings were compared with in-practice vocational education/training using Wilcoxon signed-rank tests. After sensitivity analyses using paired-t tests (which showed similar results in the signed-rank analyses), it was deemed appropriate in a post hoc analysis to calculate effect sizes of the differences with Cohen's *d*.

We also sought to establish associations of alumni rating one training modality over the other (RTO-provided versus in-practice education/training). We did this for overall ratings of skills/attributes (the sum of difference scores on the nine skill/attribute items) and

for clinical domains (the sum of difference scores on the six clinical domain items).

These difference scores were outcome factors in univariate and multivariable linear regression analyses. Univariate analyses were conducted on each covariate (see 'independent variables', above), with the outcome. Covariates with a univariate *p*-value <0.20 were considered for inclusion in the multiple regression model.

In addition to these two overall rating outcomes, we selected difference scores on five of the 15 individual items (minor procedural skills, Aboriginal and Torres Strait Islander health, practising evidence-based medicine, tolerating clinical uncertainty, and managing patients with multi-morbidity) as outcomes for analysis, using the same (linear regression) approach. The five items were selected on the basis of their clinical and educational importance.

Statistical significance was set at the conventional $p < 0.05$. STATA 14.2 and SAS V9.4 were used to prepare and analyse the data.

Ethical approval

The NEXT-UP study has approval from the University of Newcastle Human Research Ethics Committee (approval H-2018-0333). All participants provided informed consent to participate in the research.

Results

There were 354 alumni responses to 1,256 invitations (response rate 28%).

The characteristics of the participating alumni, their current practices, and training experience are presented in [Table 1](#).

Common GP clinical skills and attributes

Alumni's ratings of the utility of their RTO-provided and in-practice components of their vocational training in preparing them for common GP clinical skills and attributes in post-fellowship practice are presented in [Supplementary Table 1](#). [Figure 1](#) presents a comparison of RTO and in-practice vocational training mean scores of 'GP clinical skills and attributes', with values presented in [Table 2](#).

Alumni rated in-practice training significantly higher (than RTO-provided training) in preparing them for minor procedural skills (Wilcoxon signed-rank $p < 0.001$; Cohen's $d = 0.46$); teaching skills ($p = 0.02$; $d = 0.12$); and tolerating clinical uncertainty ($p < 0.001$; $d = 0.33$).

Table 1. Participant characteristics.

Participant characteristics (n = 354) Class		n (%)*
Gender	Male	107 (33)
Initial qualification as doctor in Australia	Yes	256 (77)
Years as a doctor pre-GP Term 1	<3	134 (40)
	3	87 (27)
	4+	110 (33)
Any Part-time practice during training	Yes	101 (31)
Any leave taken during training	Yes	90 (27)
Any training in a rural practice (Modified Monash Model 2–7)	Yes	153 (50)
Training in a low SES practice	Yes	126 (40)
Failure of any fellowship examination component	Yes	65 (21)
Number of different practices during GP training	1	8 (2.5)
	2	99 (30)
	3	127 (39)
	4+	92 (28)
Year of fellowship	2016	110 (34)
	2017	125 (38)
	2018	91 (28)
Age (years)	Mean ± SD	36.4 (6)

*n may not add to 354 for all items due to missing data within each variable.


Figure 1. RTO and In-practice mean scores for common GP clinical skills and attributes (n = 335).

Table 2. Comparison of RTO versus in-practice paired scores for common GP clinical skills and attributes (n = 331).

Variable	Mean RTO	Mean In-Practice	P value*	Cohen's d
Clinical knowledge	3.19	3.19	0.975	
Consultation skills	3.26	3.32	0.171	
Minor procedural skills	2.5	2.91	<0.001	0.46
Practising EBM	3	2.79	<0.001	0.25
Teaching skills	2.52	2.62	0.02	0.12
Self-directed learning	3.13	3.12	0.374	
Reflective practice	3.08	3.04	0.262	
Professional responsibilities	3.17	3.25	0.06	
Tolerating clinical uncertainty	2.97	3.21	<0.001	0.33

*P values calculated by Wilcoxon sign rank test.

Alumni rated RTO-provided training significantly higher (than in-practice training) in preparing them for practising EBM ($p < 0.001$; $d = 0.25$).

There was no statistically significant difference in ratings of utility in the areas of clinical knowledge, consultation skills, self-directed learning, reflective practice, or professional responsibilities.

Common GP clinical domains

Alumni's ratings of the utility of their RTO-provided and in-practice components of their vocational training in preparing them for common GP clinical domains in post-fellowship practice are presented in Supplementary Table 2. Figure 2 presents a comparison of RTO and in-practice vocational training mean scores of 'GP clinical skills and attributes', with values presented in Table 3.

Alumni rated in-practice training higher (than RTO-provided training) in preparing them for child and adolescent health ($p < 0.001$; $d = 0.55$); aged care ($p < 0.001$; $d = 0.38$); chronic disease management ($p < 0.001$; $d = 0.22$); patients with multi-morbidity ($p < 0.001$; $d = 0.39$); mental health ($p < 0.001$; $d = 0.38$) and child and adolescent health ($p < 0.001$; $d = 0.55$).

Alumni rated RTO-provided training higher (than in-practice training) in preparing them for practising Aboriginal and Torres Strait Islander health ($p < 0.001$; $d = 0.41$).

Exploration of factors associated with alumni ratings of utility of in-practice training versus RTO-delivered training

Overall summed ratings

For summed scores of all items in 'Common GP clinical skills and attributes', alumni rated in-practice training as of more utility than RTO-delivered training, with a mean difference of 0.6 points. On multivariable analysis, failing any Fellowship examination component was significantly associated with higher rating of RTO-delivered (compared to in-practice) education (beta coefficient 1.32 [95% CIs 0.11, 2.52], $p = 0.032$). There was also some evidence ($p = 0.075$ and $p = 0.096$, respectively) for similar associations with Fellowship year and RTO trained with.

For summed scores of all items in 'Common GP clinical domains', alumni rated in-practice training as of more utility (compared to RTO-delivered training), with a mean difference of 1.1 points. On multivariable analysis, being an alumnus of one RTO was associated



Figure 2. RTO and In-practice vocational training mean scores for common clinical domains.

Table 3. Comparison of RTO versus in-practice vocational training paired scores for common clinical domains (n = 331).

Variable	Mean RTO	Mean In-Practice	P value*	Cohen's d
Child & adolescent health	2.93	3.35	<0.001	0.55
Aged care	2.74	3.07	<0.001	0.38
Chronic disease	3.01	3.18	<0.001	0.22
Multi-morbidity	2.85	3.17	<0.001	0.39
Aboriginal & Torres Strait Islander health	2.75	2.33	<0.001	0.41
Mental health	3.01	3.29	<0.001	0.38

*P values calculated by Wilcoxon sign rank test.

with higher rating of RTO-delivered (compared to in-practice) education (beta coefficient 0.92 [95% CIs 0.02,1.82], $p = 0.046$).

See the Supplementary materials in [Tables 3](#) and [4](#) for these regression models.

Individual items

In regression modelling for individual items, alumni rated in-practice training as of more utility than RTO-delivered training for minor procedural skills and managing multimorbidity. Multivariable analysis demonstrated year of fellowship and having taken leave during training were significantly associated with higher ratings. Where alumni rated RTO-delivered training as having more utility than in-practice training for Aboriginal and Torres Strait Island health and evidence-based medicine, training with one RTO was noted as a significant association with the former rating.

See supplementary materials in [Tables 5](#) to [9](#) for these regression models.

Discussion

Summary of main findings

This study sought the perceptions of Australian early-career GPs on the utility of their vocational training in preparing them for independent specialist practice. There was generally a positive assessment of the contributions of both in-practice and RTO-delivered training. This sentiment was reflected across a range of common clinical skills and attributes as well as broader clinical domains.

The hypothesis that in-practice training would be rated as more useful in an apprenticeship-like model of training was partially sustained. In-practice training was rated as more useful for skills including minor procedural skills, teaching skills, professional responsibilities and tolerating clinical uncertainty. It was rated as more useful for the clinical domains of child and adolescent health, aged care, chronic disease, multi-morbidity and mental health. There were clinical areas in which no difference was observed. RTO-delivered training was rated more highly for teaching of Aboriginal and Torres Strait Islander healthcare and evidence-based medicine. The effect sizes of the statistically significant differences were small-to-moderate [16].

Comparison with previous studies and implications for educational practice and policy

Previous research has not established which aspects of general practice vocational training programmes were useful in preparing for future practice. There were some

areas where RTO-delivered training has been considered of greater utility including exposure to Aboriginal and Torres Strait Islander health, which is an essential component [17] of registrar training in the broader context of Australian healthcare. Exposure is markedly variable and depends greatly on practice location and demographics. Given the geographical variability of training and practice, it is unsurprising that RTO-delivered care would rate more highly in this domain, highlighting the need for robust ongoing education and training to be provided with respect to Aboriginal and Torres Strait Islander health, irrespective of training location. The role of RTOs in delivering this education is vital.

RTO-delivered training of evidenced-based medicine was rated more highly than in-practice teaching. This is of some concern and potentially exposes a lack of in-practice capacity to deliver this teaching. This finding more broadly reflects the difficulty experienced, in practice, of implementing evidenced-based practice through successful behaviour change interventions [18]. Previous research has found that effective evidenced-based behaviour change relies on a series of intervention functions, including training, education and effective supporting policies [19]. Providing a supportive learning space through environmental restructuring, effective role-modelling from supervisors, and enablement of capability and opportunity would engender a better implementation of evidence-based practice [19]. Trainee understanding of evidenced-based medicine has been shown to be increased significantly when formal out-of-practice education was provided [20]. Some barriers to the practical implementation of evidenced-based practice include the perceived irrelevance of research to practice, difficulty remaining abreast of updates in primary care, and challenges searching for relevant information [21]. Given the uneven understanding of EBM amongst GPs and previously identified barriers to implementation, it will be appropriate for RTOs not only to continue to deliver registrar training in EBM but also to provide upskilling for supervisors and encourage a whole-of-practice approach to EBM implementation.

The relative lack of participant, practice, and training associations for in-practice versus RTO-delivered training utility outcomes (and the lack of any consistent associations across our outcomes) suggests that the current mix of in-practice and RTO-delivered training does not adversely affect any identifiable demographic within Australian GP vocational training.

Implications for medical education

Learning in an apprenticeship-like model involves is necessarily experiential [22] and constructivist, with

incorporation of new information and experiences into an existing knowledge base [23]. The model of cognitive apprenticeship advances these theories further and acknowledges the visibility of expert thinking [24] which allows cognitive and metacognitive processes to be observed and practiced by learners [25]. This model closely aligns with teaching and learning in the general practice context in Australia. It has been evaluated in the context of medical student education [26], and to inform instructional design and instrument development in health sciences education [27]. This model has not been previously reviewed in the context of GP training where the social context of learning becomes more important. The current delivery of the Australian GP curriculum with both in- and out-of-practice learning in an apprenticeship-like model encompasses all the social characteristics of the cognitive apprenticeship model, including situated learning, intrinsic motivation, cooperation, and communities of practice. This blended approach to curriculum delivery similarly encompasses the content (domain knowledge, strategic knowledge and heuristic strategies) and method (modelling, coaching, scaffolding, articulation, exploration, and reflection) components of this model. The findings from our study demonstrate a good fit of the cognitive apprenticeship model with Australian general practice education, strengthening the association of this model with medical education in general. Cognitive apprenticeship theory similarly supports our findings that promote the need for a blended method of curriculum delivery. It will be prudent, in future planning and delivery of the Australian general practice curriculum, to acknowledge the idiosyncrasies of its structure and to use an appropriate and validated model as a framework.

Strengths and limitations

The response rate, whilst reasonable for a survey of GPs, is only modest [28]. This must be considered in assessing the generalisability of the findings. The characteristics of the study sample (including gender, age and Australian primary medical qualification), however, are consistent with those of Australian general practice registrars.

The outcome measures in this study are alumni perceptions of the utility of various training elements rather than objective measures of the effect of training on subsequent practice (for which valid measurement is essentially not practicable). The perceptions of our participants, however, are informed by actual independent practice experience and add another facet to the evaluation of the views of training expressed during, or at the conclusion of, training. Surveying trainees constitutes

a robust form of quality assurance for the training programme [29], but results from the NEXT-UP study (and the considered, reflective perspective this study provides) present a more complete picture of the utility of general practice training in Australia.

The multivariable analyses exploring associations between differences in perceptions of in-practice and RTO delivered utility were post hoc analyses and should be considered exploratory, with further research and replication indicated.

The results of this study are derived from a current system of training in Australia, which utilises regional training organisations. From 2023, co-ordinated out-of-practice education will transition to the Royal Australian College of General Practitioners and the Australian College of Rural and Remote Medicine. The combination of an apprenticeship-like model of training and out-of-practice education will continue and, thus, the findings of this study will be relevant to (and may inform) education/training structures post-transition.

Deviations from protocol

In our protocol document, we anticipated using chi-square analyses for comparisons of ratings of in-practice and RTO-delivered education and training. We subsequently elected to analyse the data using Wilcoxon signed-rank tests as chi-square analyses were inappropriate given the paired nature of the data, and we aimed not to lose information by dichotomising our data.

We had not included multivariable analyses for alumni perceptions of training utility but subsequently elected to perform post hoc multivariable analysis and Cohen's *d* estimation of effect size to further explore the utility outcomes (given the interest produced by the univariate findings).

Conclusions

General practice training aims to equip graduates with competency in managing a wide spectrum of medical conditions and presentations in independent practice. Curriculum delivery in Australia is shared between RTOs and in-practice teaching within an apprenticeship-like model. This study demonstrates a high rating of utility of the current vocational training model, with both in-practice and RTO-led teaching being perceived as more useful for delivering some components of the general practice curriculum than the other. Hence, there remains a case for the maintenance of the current system of curriculum delivery, with shared input, in ensuring that general practice trainees are competent in their future independent practice.

Disclosure statement

There are no competing interests to declare. Susan Wearne is an employee of the Department of Health. The views expressed are her own and not necessarily those of the Department.

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Data availability statement

The data that support this study cannot be shared due to ethical or privacy reasons.

Ethics approval

The research has been completed with ethics approval from the University of Newcastle Human Research Ethics Committee (H-2018-0333).

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