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**Competencies Associated with Australian and New Zealand Podiatrists' Perceptions of
Their Preparedness for Graduate Clinical Practice**

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Abstract

Podiatry training institutions are responsible for preparing future podiatrists to be competent and safe practitioners. This follow-up study investigated podiatrists' self-reported preparedness to practice through their ratings of various competencies. An online retrospective survey comprising closed and open-ended questions was distributed to registered and practising podiatrists in Australia and New Zealand. Of the 74 podiatrists who completed the survey, 75.7% felt "prepared" for clinical practice at graduation, with preparedness univariately associated with being female ($p = .042$), overall perception of clinical competence ($p = .004$), preparedness for clinical placement as a student ($p < .001$), theoretical knowledge ($p < .001$), manual skills ($p = .002$), and clinical competence standards ($p < .001$). Multivariable analysis identified preparedness for student clinical placement (OR = 8.95, 95%CI 1.92 – 41.76) and overall theoretical knowledge (OR = 19.29, 95%CI 3.76 – 99.13) being significantly associated with perceived preparedness for practice. Age, qualification, and graduation year were not associated with perceived preparedness. Positive clinical placement experiences enhanced their perceived preparedness, while limited clinical exposure hindered preparedness, potentially resulting in a probable theory-practice gap, and lowered professional self-efficacy. While generally feeling prepared to practice as podiatrists at graduation, they identified the need for additional hands-on learning with early patient exposure in diverse settings during their training, which should improve self-efficacy.

I BACKGROUND

Podiatrists are registered health professionals who practise as primary care providers in the prevention, assessment, diagnosis and treatment of foot, ankle and lower limb conditions. Podiatrists typically work in a range of clinical settings, including in solo or team private practice, public and private hospitals and community facilities. A registered podiatrist in Australia and New Zealand (ANZ) must be appropriately trained by a recognised and accredited podiatry program. This training should provide comprehensive coverage of anatomy, physiology, pathology, pharmacology, biomechanics, and other core biomedical sciences relevant to podiatry, patient assessment, diagnostic and management studies, pre-clinical and clinical studies, professional studies, ethics, evidence-based practice and podiatric therapeutics, to graduate work-ready practitioners who are competent and safe according to past and current minimum registration requirements in ANZ (Australian and New Zealand Podiatry Accreditation Council [ANZPAC], 2015a; Podiatrists Board of New Zealand, 2021; Podiatry Board of Australia, 2022). Shared Podiatry Competency Standards (eight) developed in collaboration with the ANZ podiatry profession, were first published in 2009, and were subsequently revised in 2012 and 2015 (ANZPAC, 2015b).

Although ANZPAC was disestablished in 2019 following national changes to the accreditation process under the Australian Health Practitioner Regulation Agency (AHPRA), education providers were still required to continue using the 2015 Podiatry Competency Standards while the Standards were being reviewed. In 2022, the 2015 Standards were superseded by the Professional Capabilities for Podiatrists (Podiatry Board of Australia, 2022). The Capabilities similarly identify the knowledge, skills and professional attributes needed to practise as safe and competent podiatrists in Australia. The Capabilities also describe the threshold or minimum capability required for registration. Although superficially they may appear different from the previous Standards, the competencies, now known as “capabilities”, reflect contemporary podiatry practice in Australia, and have been reorganised into five integrated domains: Domain 1 – Podiatrist, Domain 2 – Professional and ethical practitioner, Domain 3 – Communicator and collaborator, Domain 4 – Lifelong learner, and Domain 5 – Quality and risk manager (Podiatry Board of Australia, 2022). Table 1 maps the 2022 Professional Capability Domains with the 2015 Podiatry Competency Standards. New Zealand has retained the 2015 Standards but now refers to them as the 2019 Podiatry Competency Standards New Zealand (2019), managed by the Podiatrists Board of New Zealand (Podiatrists Board of New Zealand, 2021).

**Table 1
Mapping Competency Standards to the Professional Capabilities Domains**

Podiatry competency standards for Australia and New Zealand (2015)			Professional capabilities for podiatrists (2022)				
Competency standard	Elements	PC	Domains				
			1	2	3	4	5
1. Practise podiatry in a professional manner	1.1 Operates within relevant legal and regulatory frameworks	1.1.1 – 1.1.3	x	x	x		x
	1.2 Utilises effective strategies for continually improving knowledge and skills	1.2.1 – 1.2.3		x		x	
	1.3 Practises to accepted standards and within the limitations of the individual and of the profession	1.3.1 – 1.3.5	x	x			
	1.4 Displays efficient organisation to complete administrative responsibilities safely and effectively	1.4.1 – 1.4.6	x	x		x	x
	1.5 Conducts self in a professional manner	1.5.1 – 1.5.4	x	x	x		
	1.6 Demonstrates ethical behaviour	1.6.1 – 1.6.2	x	x	x		
	1.7 Practises in a culturally sensitive and inclusive manner	1.7.1 – 1.7.2	x	x	x	x	
2. Continue to acquire and review knowledge for ongoing clinical and professional practice improvement	2.1 Understands and applies relevant podiatry practice principles and theoretical components	2.1.1 – 2.1.3	x	x			
	2.2 Acquires, critiques and applies new knowledge and information and communications technology skills as appropriate to podiatry practice context	2.2.1 – 2.2.4	x			x	
	2.3 Applies an evidence-based approach to practice	2.3.1 – 2.3.5	x			x	
	2.4 Engages in reflective practice, planning and action for ongoing learning	2.4.1 – 2.4.4		x		x	
3. Communicate and interrelate effectively in diverse contexts	3.1 Uses effective interpersonal communication skills and adopts appropriate strategies in working with diverse client groups	3.1.1 – 3.1.5		x	x		
	3.2 Utilises reporting and presentation skills at an appropriate level	3.2.1 – 3.2.4	x		x		x
	3.3 Works in partnership with teams, other professionals, support staff, community and government and demonstrates appropriate communication skills	3.3.1 – 3.3.5	x		x	x	
4. Conduct patient/client interview and physical examination	4.1 Conducts appropriate patient/client interview and collects relevant initial information	4.1.1 – 4.1.5	x				
	4.2 Establishes clinical impression	4.2.1 – 4.2.2	x				
	4.3 Safely conducts appropriate physical examination/tests and refers as appropriate	4.3.1 – 4.3.6	x	x			
5. Analyse, interpret and diagnose	5.1 Interprets and evaluates data	5.1.1 – 5.1.3	x			x	
	5.2 Establishes differential diagnosis	5.2.1 – 5.2.7	x				
	5.3 Communicates information and involves others as appropriate	5.3.1 – 5.3.3	x		x		
6. Develop a patient/client-focused management plan	6.1 Develops rationale for podiatry management plan	6.1.1 – 6.1.4	x				
	6.2 Establishes patient/client-focused short- and long-term goals	6.2.1 – 6.2.6	x				
	6.3 Negotiates appropriate management plan	6.3.1 – 6.3.4	x				
7. Implement and evaluate management plan	7.1 Obtains informed consent through appropriate communication	7.1.1 – 7.1.4	x	x			
	7.2 Implements safe and effective management plan	7.2.1 – 7.2.5	x	x			x
	7.3 Implements infection control and other standards within workplace health and safety legislative requirements	7.3.1 – 7.3.3		x			x
	7.4 Understands and manages adverse events	7.4.1 – 7.4.2	x	x			x
	7.5 Utilises preventative and educative strategies	7.5.1 – 7.5.3	x		x		
	7.6 Monitors and evaluates management plan	7.6.1 – 7.6.5	x		x		
8. Provide education and contribute to an effective health system	8.1 Undertakes podiatry within the broader health care context	8.1.1 – 8.1.3	x	x			x
	8.2 Implements/participates in appropriate supervision linked to the skill and complexity of the task being undertaken	8.2.1 – 8.2.4	x	x		x	
	8.3 Implements health promotion and education activities	8.3.1 – 8.3.4	x	x			x
	8.4 Responds to the health records of the communities in which the podiatrist practises	8.4.1 – 8.4.2		x			x
	8.5 Identifies the determinants of health for relevant populations	8.5.1 – 8.5.2	x	x	x		
	8.6 Delivers and monitors effective and efficient services and resources	8.6.1 – 8.6.5		x	x		x

Note: PC – Performance Criteria, provide further details of the actions and level of performance required to meet each Element; Domain 1- Podiatrist, Domain 2 – Professional and ethical behaviour, Domain 3 – Communicator and collaborator, Domain 4 – Lifelong learner, Domain 5 – Quality and risk manager.

The transition from novice podiatry student to a competent graduate must, however, involve the progressive accumulation of podiatry-specific knowledge and a set of clinical skills that require real-world practical experiences. In nursing education, just as AlMekkawi and El Khalil (2020) identified a range of factors, including theoretical preparation, quality of clinical placement training environments and student support during placements, which may impact preparedness for practice, the same is likely to apply to podiatry. Clinical placement experiences are vital for preparing competent professionals (Levett-Jones et al., 2006), as they should provide opportunities to practise skills and consolidate knowledge in real-world settings, supervised by registered podiatrists who are clinical supervisors (Podiatry Board of Australia, 2021).

There is, however, a lack of research exploring podiatrists' perceptions of their preparedness for practice, specifically their professional competence, i.e. their ability to apply knowledge and skills in a range of clinical contexts irrespective of setting (ANZPAC, 2015b; Podiatrists Board of New Zealand, 2021; Podiatry Board of Australia, 2022). Anecdotal debate on this topic of graduate preparedness began after the transition of podiatry training in the 1990s from vocational education and training (which incorporated early hospital- and community-based practica) to higher educational institutions (more theory-focused, with later practica), and since the formal adoption of eight ANZPAC podiatry competency standards in August 2009. These standards outlined the generic and occupation-specific competencies related to knowledge, skills and professional qualities required of graduates to ensure safe (often independent) and effective podiatry services (ANZPAC, 2015b). To the best of our knowledge, ANZ graduates' competence (perceived or measured) against professional standards has not been documented.

Universities, health services and the podiatry profession should have a vested interest in the education and training of "prepared for practice" graduates, as research in nursing and medicine has shown that unpreparedness can reduce the quality of patient care (Barr et al., 2017; Hezaveh et al., 2014). A gap therefore exists in the literature relating to the preparedness of graduates for podiatry clinical practice. Knowledge of preparedness is therefore required to inform action and to improve the pre- and post-registration educational process of future podiatry students and graduates. To achieve this goal, and informed by a qualitative study of 11 clinical supervisors' perceptions of podiatry students' preparedness for clinical placements and graduates' preparedness for podiatry practice (Reynolds & McLean, 2021), this study further explores ANZ-registered podiatrists' perceptions of their preparedness for clinical placement as students, their theoretical knowledge about core podiatry curriculum areas (e.g. biomechanics), patient/client groups (e.g. paediatrics) and/or specific disorders (e.g. diabetes), manual clinical skills (e.g. scalpel technique), and overall perceived clinical competence at graduation, including how they rated themselves with respect to the eight ANZPAC clinical competence standards (ANZPAC, 2015b), which were the current standards when the research was undertaken.

The following research questions guided this research:

1. How do ANZ-graduated podiatrists view their preparedness for clinical practice on graduation (retrospective), including their preparedness for clinical placement as students and their theoretical knowledge, manual clinical skills and related clinical competence?
2. What sociodemographic characteristics influenced their perceptions (age, gender, qualification type, graduation year) of their preparedness for clinical practice?

II METHODS

A Participant Recruitment

All ANZ-registered and practising podiatrists, including those who are or have been clinical supervisors of podiatry students (in the public/private sector and/or at a university), were invited by email (December 2018-May 2019) to complete an online survey. Bond University Human Research Ethics Committee (15226) granted ethics approval. Podiatrists were searched by location to identify current email addresses. Anybody who received the email was encouraged to

share the email and survey link to increase recruitment. The research study was also promoted via social media and through the Australian Podiatry Association and Podiatry NZ membership platforms. As this was an exploratory study, no power calculations were undertaken. Participation was maximised through two follow-up emails.

B Survey Instrument

A set of questions (closed and open-ended items) informed by the literature and a previous qualitative study (Reynolds & McLean, 2021) (see Appendix) was developed using SurveyMonkey to measure respondents' perceptions of their overall preparedness to practise as a podiatrist at graduation (dependent variable), which included their preparedness for clinical placement as students, and their clinical competence at graduation to practise. The time commitment for this section of the survey was approximately eight minutes. Comment fields were included to allow participants to provide any additional information. The 17 questions comprised two sections:

1. Demographic data, such as age, gender, qualification, year of graduation, etc. (10 questions); and
2. Perceptions about self-preparedness for graduate clinical practice (7 questions, encompassing five dimensions), including:
 - a. Overall preparedness to practise as a podiatrist at graduation, 4-point Likert scale (1 = not at all prepared, 4 = very prepared) (Q12);
 - b. Overall clinical competence at graduation, using one multiple-choice to rate Benner's model of clinical competence, measured on a 5-point Likert scale (0 = novice, 4 = expert) (Q17);
 - c. Preparedness as a student for clinical placement (4-point Likert scale, 1 = not at all prepared; 4 = very prepared) (Q11);
 - d. Theoretical knowledge at graduation of core curriculum areas using two 5-point Likert scales (1 = poor, 5 = excellent), e.g. biomechanics, surgery (five sub-scale items); and core population groups, e.g. paediatrics, and specific disorders, e.g. diabetes (five sub-scale items) (Q14-15);
 - e. Manual clinical skills at graduation (1 = poor, 5 = excellent), 4 sub-scale items, e.g. scalpel technique (Q16);
 - f. Clinical competence at graduation for each of the eight podiatry competency standards (e.g. Standard 1, Practise podiatry in a professional manner) (1 = poor, 5 = excellent) (Q18).

The questionnaire was piloted with two podiatrists from the target population to assess the time taken and acceptability (i.e. face validity). All questions were understood as intended without ambiguity. The responses of these podiatrists were excluded from the analysis. A participant information statement was available prior to commencing the survey which included the purpose of the study, the research team, ethics approval details, that participation was voluntary and anonymous, and that consent was implied by online survey submission.

C Data Analysis

1 Statistical Analysis

Descriptive statistics were reported as frequencies and percentages for categorical variables (e.g. gender) and mean (SD) or median (range) for continuous variables (e.g. graduation year), depending on data distribution. Multi-item preparedness questions (Likert scales) were assessed for internal consistency reliability using Cronbach's alpha on the sample of respondents who completed the survey. A value of .70 or greater is considered acceptable (Taber, 2018). Prior to further exploratory analyses, for ease of interpretation, selected variables with multiple ordinal responses were re-categorised into dichotomous variables, including the main variables of interest: "prepared" - "somewhat prepared" or better (i.e. "very prepared"), vs. "unprepared" - "somewhat unprepared" or worse (i.e. "not at all prepared"); "prepared" - "good" or above (i.e.

“very good”, “excellent”) vs. “unprepared” - “fair” or below (i.e. “poor”); and overall clinical competence at graduation, “prepared” - “Competent” or higher (i.e. “proficient”, “expert”) vs. “unprepared” - “Advanced beginner” or lower (i.e. “novice”), using defined stages of clinical competence based on Benner’s (1982) From Novice to Expert Model, in which a “novice” is considered to have foundational knowledge but no clinical experience thus requiring support, while an “advanced beginner” has marginal experience, uses learned procedures and needs occasional cueing or support. Other sociodemographic variables of interest, such as age, and as a result of the aforementioned changes in training qualifications, and formalisation of podiatry competency standards in ANZ were also re-categorised: age (“44 and younger”, “45+”), qualification type (i.e. “Diploma” or below, “Bachelor” or above), and graduation year (i.e. “pre-2010”, “2010+”). The latter dates were dichotomised in this manner given the standards were initially developed in 2009 (ANZPAC, 2015a). Further, for these reasons, data from respondents who had achieved their initial podiatry qualification elsewhere (e.g. United Kingdom) were excluded from analysis.

Differences in proportions and associations between each dimension and sociodemographic variable of interest (i.e. age, gender, qualification type, graduation year), and against the main outcome of preparedness to practise at graduation were measured using Chi-square test, or Fisher’s exact test. Univariable and multivariable logistic regression analyses were performed to identify factors that might explain preparedness for practice at graduation. Overall means were computed for the following multi-item components: theoretical knowledge, manual skills, and clinical competence standards. A forward selection method was applied to the multivariable regression analyses using the most significant variables identified from the univariate analyses to build a suitable model. SPSS Version 28 was used to analyse quantitative data. Results in this exploratory study were deemed to be statistically significant for p values < .05.

2 Content Analysis

Content analysis was used to analyse the open-ended comments (Hsieh & Shannon, 2005). Comparable comments were coded manually and enabled the researcher (KR) to search and group potential broad categories for each applicable component. The categories were reviewed again by both researchers (KR and MM) where additional coding resulted in a set of main sub-themes. Hermeneutic revisiting of the data set was also undertaken to minimise any researcher bias (Fleck et al., 2011).

III RESULTS

A Participant Demographics

Of the 89 submissions, six were incomplete and nine respondents had graduated elsewhere (e.g. United Kingdom), and so were excluded from the analysis. Seventy-four registered podiatrists, of whom 85% identified as a clinical supervisor, were thus included. Table 2 summarises their demographic data. Women accounted for 64.9% of respondents. Just over half of respondents (52.7%) were aged 44 or younger. The majority (54.1%) had obtained a Bachelor qualification. The median (range) year of graduation as a general podiatrist was 2000 (Range:1969-2018). Of those in the “2010+” graduation group, just over one-third (36.4%, 8/22) were in their first or second year following graduation at the time of survey completion. In their first year as a general podiatrist, overall respondents worked at multiple locations and many also checked multiple categories to describe their initial employment after graduation. Multiple response analysis revealed that of those who had worked initially in solo private practice, the majority (92%, 23/25) were from the “pre-2010” group, as were the majority of independent contractors (88.9%, 16/18). Based on our sample, those who felt supported in their first year of registered practice were highest amongst those working in community centre settings (81.8%, 9/11), compared with the lowest in solo private practice (44.0%, 11/25).

Table 2
Participant Demographics (n = 74)

Characteristics	Categories	n (%)
Gender	Female	48 (64.9)
	Male	26 (35.1)
Age group	18-24	3 (4.1)
	25-34	16 (21.6)
	35-44	20 (27.0)
	45-54	22 (29.7)
	55-64	9 (12.2)
	65-74	4 (5.4)
Qualification	Associate Diploma	6 (8.1)
	Diploma	19 (25.7)
	Bachelor	40 (54.1)
	Bachelor with Honours	7 (9.5)
	Master (graduate-entry)	2 (2.7)
Graduation year	Pre-2010	52 (70.3)
	2010+	22 (29.7)
Qualification location	Australia	63 (85.1)
	New Zealand	11 (14.9)
Other qualifications*	Yes	38 (51.4)
	No	36 (48.6)
Felt supported in first year of employment	Yes	43 (58.1)
	No	31 (41.9)
Health care setting in first year of registered practice#	-	99 (100.0)
	Public hospital	29 (29.3)
	Community centre	11 (11.1)
	Group private practice	34 (34.3)
	Solo private practice	25 (25.3)
Initial employment as a registered podiatrist#	-	79 (100.0)
	Full-time employee	43 (54.4)
	Part-time employee	16 (20.3)
	Casual employee	2 (2.5)
	Independent contractor	18 (22.8)

* Other qualifications, e.g. health services management.

Based on multiple-response items

B Survey Reliability

The Cronbach's alpha for the 74 respondents who answered multi-item preparedness questions, i.e. 25 items overall was .93, and the dimensions of theoretical knowledge, manual clinical skills, and clinical competence had an alpha of .88, .95 and .91 respectively, confirming each of the dimensions (and related items) achieved a satisfactory level and were appropriate for inclusion.

C Perceptions of Overall Preparedness to Practise as a Podiatrist at Graduation

In Figure 1, the evolution of preparedness is visualised from being a student with clinical placement, to at graduation, whereby almost 76% of respondents felt "somewhat prepared" or better, to practise as a podiatrist at graduation. Based on their comments ($n = 42/74$; 56.8%), one

enabler (i.e. *positive clinical placement experiences*) and three barriers (i.e. *limited clinical exposure, theory-practice gap* and *professional self-efficacy issues*) were identified (Table 3).

Figure 1
Registered Podiatrists' Perceptions of Their Preparedness for Clinical Placements as Students and Later, for Clinical Practice at Graduation

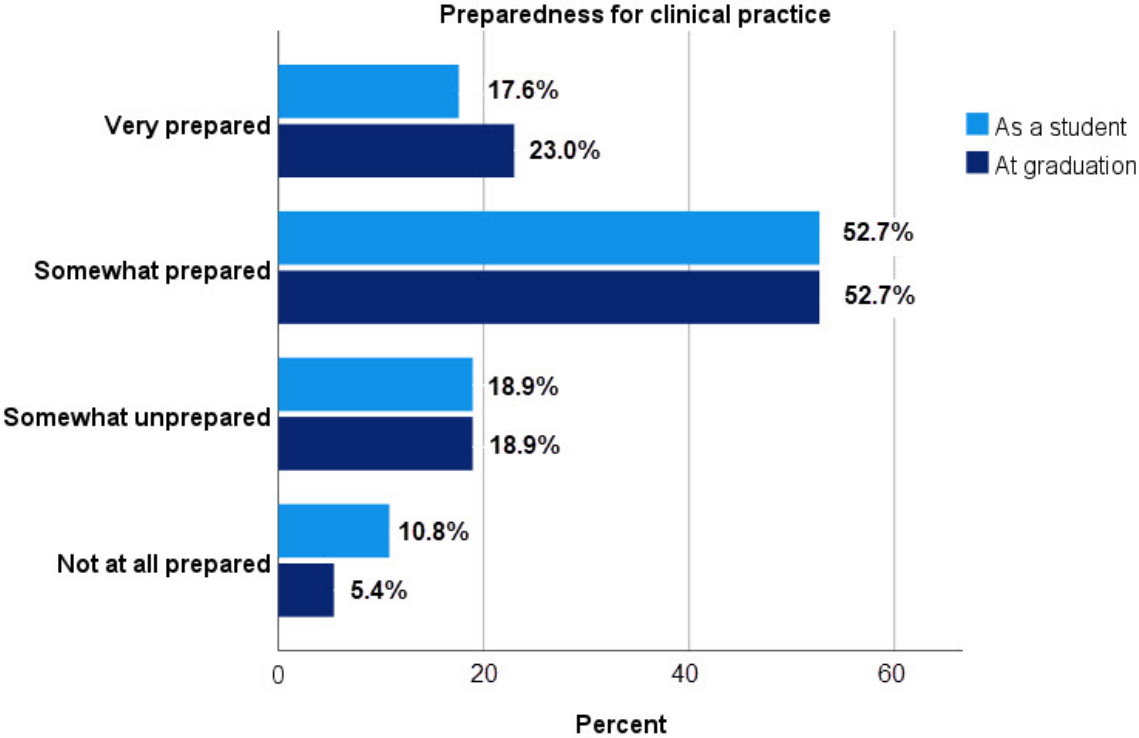


Table 3
Enablers and Barriers to Podiatrists' Perceived Preparedness for Practice at Graduation

Themes	Sub-themes	Associated quotations
Positive clinical placement experiences (n = 10)	Ample hands-on practice	We had vast amounts of clinical hours (R6M – 1984, very prepared).
	Range of settings	Various placements included hospital, private practice and small public clinics for good patient cross-section (R13F – 1982, somewhat prepared).
	Early-on exposure	We started seeing patients in second semester of first year, increasing the number of clinics each 6 months (R4M – 1995, very prepared).
Limited clinical exposure (n = 14)	Little hands-on practice	Due to limited clinical experience during the course, seemed to be underprepared for practice (R9M – 1987, somewhat unprepared). Perhaps still a lack of practical clinical practice skills with patients (R44F – 2002, somewhat prepared).
	Lack of diverse training settings	General treatment privately was fine; however, I had no high-risk clinic placement in my final year despite this being a requirement of the course (R43F – 2003, somewhat unprepared). I felt my university degree was very geared towards public sector work - now that I'm working privately, I feel like the learning curve I've been going through is huge and there wasn't enough preparation for this (R62F – 2015, somewhat prepared).
	Deficit in manual clinical skills for certain conditions	I had not completed a solo nail avulsion or resection of warts. If the opportunity for treating a specific condition didn't come up in clinical practice [placement], we often wouldn't see it until out as graduates (R57F – 2016, somewhat prepared). By graduation I had not enucleated a corn. This made me feel very unprepared for clinical practice. (R74F – 2017, not at all prepared).
Professional self-efficacy issues (n = 11)	Low self-confidence	At times you were out of your depth when having to make important decisions regarding patient care (R12F – 1982, somewhat unprepared). I felt that I had no support once I left university and it was daunting to commence work as a podiatrist in private practice (R47F – 2009, somewhat prepared).
	Impacting independent work	My preference was to work in public sector so that I had that support from a whole department (R25F – 1992, somewhat prepared). I feel I had the theoretical knowledge, however did not have the confidence to apply it clinically, without the supervision (R54M – 2010, somewhat unprepared).
Theory-practice gap (n = 7)	Heavy theory focus	There was a complete lack of sound practical training. I felt I spent three years learning a lot of theory (R32M – 1986, not at all prepared). Good foundation of podiatric knowledge. Little idea how the public health system functioned (R65F – 2012, somewhat prepared).
	Limited clinical experience	All theory and no practice (R7M - 1994, somewhat unprepared). Theoretical knowledge, but limited clinical experience. Knew the basics - had to learn on the job essentially (R1M – 1986, somewhat unprepared).

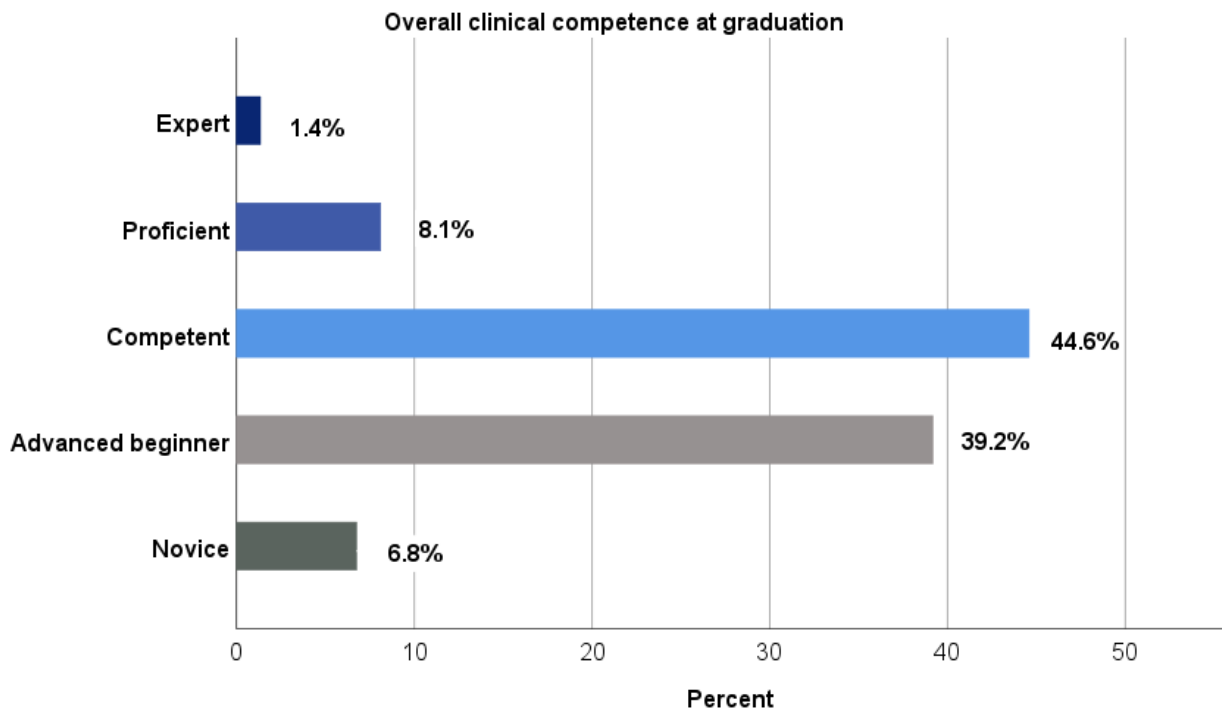
Positive clinical placement experiences as a student (n = 10, 23.8%), to which most rated their response to Q12 as “very prepared”, largely reflected respondents having sufficient hands-on practice across a range of settings with early placement exposure as sound reasoning for feeling prepared for clinical practice at graduation. On the flip side, Figure 1 shows, however, that approximately 24% were “somewhat unprepared” or worse, for clinical practice. As noted, three

barriers were identified which included the “somewhat prepared” respondents (Table 3). Fourteen ($\pm 33\%$) attributed *limited clinical exposure* to a lack of hands-on practice and a deficit in certain manual clinical skills such as performing general treatments. Such limited clinical training also compounded their acknowledged *theory-practice gap* ($n = 7, 16.7\%$), with several explaining that a heavy-theory focus during their studies came at the cost of their ability to apply theoretical knowledge to limited clinical opportunities. *Professional self-efficacy issues* ($n = 11, 26.2\%$) in the form of low self-confidence were also voiced by respondents, for example, when making important patient-based decisions or when working independently in registered clinical practice.

D Perceptions of Overall Clinical Competence Status at Graduation

Less than half (44.6%, 33/74) considered themselves to be “competent” at graduation (i.e. efficient and organised; a feeling of mastery and the ability to cope), followed by those who were “advanced beginners” (39.2%, 29/74) (i.e. marginal experience). The least number of responses was related to “expert” (1.4%, 1/74) (i.e. considerable clinical experience; had an intuitive grasp of each situation; operated from a deep understanding of the complete picture) (Figure 2).

Figure 2
Registered Podiatrists’ Perceptions of Their Overall Clinical Competence at Graduation



E Socio-Demographic Characteristics

In the univariate analyses (Table 4), there was an association between some dimension preparedness items and several sociodemographic variables (i.e. age, gender, qualification type, graduation year). Respondents aged 44 and younger were more “prepared” (i.e. “good” or above) in terms of their knowledge of evidence-based practice (79.5% vs. 40.0%; $p < .001$). Females generally felt more “prepared” in terms of their overall perception of clinical competence at graduation, i.e. “competent” or higher (64.6% vs. 34.6%; $p = .014$), whereas males considered themselves to be “advanced beginners” or lower (65.4%). Females also felt more “prepared” in terms of their knowledge of diabetes (83.3% vs. 53.8%; $p = .006$), pharmacology (72.9% vs. 42.3%; $p = .010$) and rheumatology (68.8% vs. 42.3%; $p = .027$); and across each of the ANZ podiatry competency standards. With qualification type, specifically the “Bachelor or above” group felt more “prepared” in terms of their evidence-based practice knowledge (79.6% vs. 24.0%; $p <$

.001), whereas the “Diploma” or below group, felt more “prepared” in their lower limb anatomy and physiology knowledge (100% vs. 79.6%, $p = .013$). With regard to graduation year, the “2010+” group felt more “prepared” in their knowledge of evidence-based practice (95.5% vs. 46.2%, $p < .001$) and diabetes (95.5% vs. 63.5%, $p = .005$).

Table 4
Statistically Significant Associations Between Selected Socio-Demographic Variables and Dimension Preparedness Items

Socio-demographic dichotomised variables	Dimension	Items dichotomised	p-value	
Age	Theoretical knowledge	Evidence-based practice	< .001 ^a	
Gender	Clinical competence level	-	.014 ^a	
		Theoretical knowledge	Diabetes	.006 ^a
			Rheumatology	.027 ^a
	Pharmacology		.010 ^a	
	Podiatry competency standards		Standard 1 – Practise podiatry in a professional manner	.004 ^a
			Standard 2 – Continue to acquire & review knowledge...	.001 ^a
			Standard 3 – Communicate & interrelate...in diverse contexts	.028 ^a
			Standard 5 – Interpret, diagnose & analyse	.029 ^a
			Standard 6 – Develop a patient/client focused management plan	.006 ^a
	Qualification type	Theoretical knowledge	Standard 7– Implement & evaluate management plan	.016 ^a
Standard 8 – Provide education and contribute to...health...system			.022 ^a	
Graduation year	Theoretical knowledge	Lower limb anatomy	.013 ^b	
		Evidence-based practice	< .001 ^a	
Graduation year	Theoretical knowledge	Diabetes	.005 ^a	
		Evidence-based practice	< .001 ^a	

^a *Chi-squared test performed.*

^b *Fisher’s exact test performed.*

F Associations Between Overall Preparedness to Practise as a Podiatrist at Graduation and Variables of Interest

Table 5 summarises the tests of association between overall preparedness to practise at graduation (“prepared” vs. “unprepared”), sociodemographic variables, and five dimension variables. Preparedness to practise as a podiatrist at graduation was found to be associated with gender ($p = .037$), overall perception of clinical competence ($p = .002$), preparedness for clinical placement as a student ($p < .001$), all core curriculum areas, except for surgery ($p = .217$), all manual skills, except for removing nail spicule(s) ($p = .221$), and all competence standards, except for Standard 3 ($p = .056$). The univariate analyses show that females, those who felt “competent” or higher in their overall perception of clinical competence at graduation, those who felt “somewhat prepared” or better as a student for placement, those with “good” or above levels of theoretical knowledge, manual clinical skills, and competence for each of the standards (bar the

aforementioned items) were more likely to feel prepared. Age, qualification type and graduation year were, however, not found to be associated with graduate preparedness.

Table 5
Results of Tests of Association Between Preparedness to Practise as a Podiatrist at Graduation and Study Variables

Variable	Categories	Practise as a podiatrist at graduation n (%)		Chi-square [#]	p-value
		"Unprepared" 18 (24.3)	"Prepared" 56 (75.7)		
Age	44 and younger	9 (50.0)	30 (53.6)	.07	.792
	45+	9 (50.0)	26 (46.4)		
Gender	Male	10 (55.6)	16 (28.6)	4.35	.037*
	Female	8 (44.4)	40 (71.4)		
Qualification	Diploma or below	6 (33.3)	19 (33.9)	.00	.963
	Bachelor or above	12 (66.7)	37 (66.1)		
Graduation year	Pre-2010	14 (77.8)	38 (67.9)	.64	.423
	2010+	4 (22.2)	18 (32.1)		
Dimension 1: Overall perception of clinical competence level (at graduation)	"Advanced beginner" or lower	14 (77.8)	20 (35.7)	9.70	.002*
	"Competent" or higher	4 (22.2)	36 (64.3)		
Dimension 2: Preparedness for clinical placement (as a student)	"Somewhat unprepared" or worse	12 (66.7)	10 (17.9)	15.53	< .001*
	"Somewhat prepared" or better	6 (33.3)	46 (82.1)		
Dimension 3: Theoretical knowledge of core curriculum areas: Good or above (at graduation)	Biomechanics ¹	6 (33.3)	40 (71.4)	8.40	.004*
	Evidence-based practice ¹	5 (27.8)	40 (71.4)	10.89	< .001*
	Lower limb anatomy and physiology ¹	11 (61.1)	53 (94.6)	-	.001*
	Pharmacology ¹	5 (27.8)	41 (73.2)	11.96	< .001*
	Surgery ¹	6 (33.3)	28 (50.0)	1.52	.217
	Diabetes ²	7 (38.9)	47 (83.9)	-	< .001*
	Gerontology ²	9 (50.0)	44 (78.6)	5.47	.019*
	Paediatrics ²	2 (11.1)	32 (57.1)	11.62	< .001*
	Rheumatology ²	3 (16.7)	41 (73.2)	18.07	< .001*
	Sports medicine ²	5 (27.8)	33 (58.9)	5.29	.021*
Dimension 4: Manual clinical skills: Good or above (at graduation)	Scalpel technique for callus debridement	10 (55.6)	49 (87.5)	-	.007*
	Nail-cutting	14 (77.8)	54 (96.4)	-	.028*
	Removing nail spicules(s)	9 (50.0)	37 (66.1)	1.49	.221
	Enucleating a corn	6 (33.3)	44 (78.6)	12.72	< .001*
Dimension 5: Competence in podiatry standards: Good or above (at graduation)	Standard 1 – Practise podiatry in a professional manner	12 (66.7)	53 (94.6)	-	.005*
	Standard 2 – Continue to acquire and review knowledge...	9 (50.0)	49 (87.5)	-	.002*
	Standard 3 – Communicate and interrelate...in diverse contexts	13 (72.2)	51 (91.1)	-	.056
	Standard 4 – Conduct patient/client interview and physical exam	11 (61.1)	53 (94.6)	-	< .001*
	Standard 5 – Interpret, diagnose and analyse	6 (33.3)	48 (85.7)	-	< .001*
	Standard 6 – Develop a patient/client focused management plan	7 (38.9)	47 (83.9)	-	< .001*
	Standard 7 – Implement and evaluate management plan	4 (22.2)	41 (73.2)	-	< .001*
	Standard 8 – Provide education and contribute to...health...system	5 (27.8)	42 (75.0)	-	< .001*

¹ Core curriculum areas.

² Core client population groups and/or specific disorders.

[#] The Chi-square statistic is reported where Chi-square tests were applied. Other tests used Fisher's exact test.

* Statistically significant $p < .05$.

G Logistic Regression Analysis on Graduation Preparedness

Table 6 reflects the factors significantly associated with preparedness for practice at graduation. The univariable (unadjusted) results show the individual effect of each factor. The odds of being prepared for practice as a podiatrist at graduation (perceived) are three times higher in females than males, six times higher in those prepared in their overall perception of clinical competence at graduation, and nine times higher for those prepared as a student for clinical placement. An increase in mean scores for knowledge, manual skills and clinical competence standards was associated with an increase in the odds of feeling prepared for practice. Multivariable models were attempted to assess the combined effect of factors associated with preparedness for practice at graduation. Due to sample size constraints, only two factors would be statistically significant in the multivariable model. The adjusted model reported contains the two strongest factors that may explain preparedness for practice at graduation. There was a statistically significant association between overall theoretical knowledge and preparedness for practice at graduation ($p < .001$). After accounting for theoretical knowledge, the odds of feeling prepared at graduation were nine times higher in participants who felt prepared as a student for clinical placement, compared with those who did not feel prepared ($p = .005$). The multivariable model was a good fit for the data (Hosmer-Lemeshow $\chi^2 = 8.7$, $p = .28$) and correctly classified 87.8% of the cases.

Table 6
Competencies Associated with Preparedness for Practice and Results of Univariable and Multivariable Logistic Regression on Preparedness for Practice

Factor	Variable	Unadjusted OR (95% CI)	p-value	Adjusted OR (95% CI)	p-value
Gender	Male	1.00 reference			
	Female	3.13 (1.04, 9.35)	.042*		
Overall perception of clinical competence (at graduation)	Unprepared ('advanced beginner' or lower)	1.00 reference			
	Prepared ('competent' or higher)	6.30 (1.83, 21.74)	.004*		
Preparedness for clinical placement (as a student)	Unprepared ('somewhat unprepared' or worse)	1.00 reference		1.00 reference	
	Prepared ('somewhat prepared' or better)	9.20 (2.79, 30.39)	< .001*	8.95 (1.92, 41.76)	.005*
Overall theoretical knowledge (M = 2.81, SD = 0.72)		19.98 (4.38, 91.11)	< .001*	19.29 (3.76, 99.13)	< .001*
Overall manual skills (M = 3.20, SD = 1.01)		3.19 (1.55, 6.58)	.002*		
Combined clinical competence standards (M = 3.22, SD = 0.75)		5.68 (2.09, 15.46)	< .001*		

OR = Odds Ratio; M = Mean; SD = Standard Deviation.

* Statistically significant $p < .05$.

IV DISCUSSION

While this study found that most respondents generally felt prepared for practice as graduating podiatrists, their comments allowed a deeper dive into some of the factors impacting their perceived preparedness. To this end, an enabler was their positive clinical placements as students during which several had ample hands-on practice in a range of clinical settings. For others, however, the opposite was true, with limited clinical experience in only a few clinical settings and limited opportunity for hands-on practice.

Further, despite significant changes in podiatry education over several decades (e.g. vocational training to higher education sector, formalisation of podiatry competency standards), perceptions of overall preparedness were remarkably similar between qualification type (i.e. Diploma or below vs. Bachelor or above) and graduation year (i.e. pre-2010 vs. 2010+). Statistically significant differences were, however, found when comparing the aforementioned sociodemographic variables against self-rated theoretical knowledge items, i.e. *evidence-based practice*, *lower limb anatomy and physiology*, and *diabetes*. Such results are reflective of changes involving the introduction of evidence-based practice as a clinical decision framework by Sackett et al. (1996), and subsequent integration into health professional education degrees (McMenamin et al., 2019); alterations of anatomy education from traditional dissection courses to the rise of plastination over the past 20 years (Papa et al., 2019); and because of an increasing incidence of chronic health conditions, a heightened need was placed on podiatrists surrounding lower limb diabetes management (Health Workforce Australia, 2014), with subsequent upskilling also driving demand for high-risk foot service placements in the public sector.

The findings associated with gender were particularly interesting with respect to the preparedness components. Women generally held higher self-rated perceptions compared with men, and statistically significant associations were noted with regard to their overall perception of clinical competence, theoretical knowledge (in diabetes, rheumatology, pharmacology), and with most of the ANZ podiatry competency standards. Further research is therefore needed to understand the contributing factors for these differences between men and women, and with respect to the use of the 2022 Professional Capabilities framework (Podiatry Board of Australia, 2022).

Our study found that overall perceptions of clinical competence such that being an “advanced beginner” or lower, for fourteen respondents, strongly correlated with being “unprepared” for graduate practice, whereas being “competent” or higher for the majority, strongly correlated with being “prepared” for graduate practice. Such results likely strengthen our previous study findings of an expectancy that “advanced beginners” will advance to “competent” at graduation or soon thereafter, providing that appropriate support mechanisms are in place (Reynolds & McLean, 2021), such as gaining employment in community health within their first year of employment, which is a new finding from this study.

This study has identified that being “prepared” for clinical placements as students translated into to being “prepared” to practise as a podiatrist at graduation for these podiatrists. This significant association reinforces the importance of appropriate practice placements across the pre-registration learning continuum. From their qualitative responses, *positive clinical placement experiences* reinforced this preparedness. Having early and consistent hands-on practice, with a diversity of learning opportunities (e.g. across a range of settings with a cross-section of patients) was arguably the right mix. On the other hand, the findings of *limited clinical exposure* with a resultant *theory-practice gap* during their time spent in clinical placement shaped opinions of either “somewhat prepared” or altogether “unprepared” with respect to their preparedness as graduates, confirming why students in the health professions require adequate preparation before their clinical practice event (O'Brien et al., 2019). Clinical placement preparation has also been reinforced by Cant and colleagues (2021) in nursing education, with regard to universities needing to better inform students and their supervisors about expected schedules, skills, scope of practice, curriculum and learning objectives in order to facilitate a positive experiential learning for their students.

Overall theoretical knowledge of core curriculum areas, population groups and/or specific disorders was also associated with being “prepared” to practise as a podiatrist at graduation. The results suggest that a high level of (perceived) theoretical knowledge can individually and collectively influence preparedness to practise as a podiatrist at graduation. Our study also identified why podiatrists may not be prepared for practice, by identifying areas of knowledge deficits, e.g. in *paediatrics*, an area recently explored by Williams et al. (2019), whose findings highlighted some disparity in the delivery of training and need for baseline knowledge consistency in the paediatric curricula. It was interesting to find that respondents also rated their knowledge of *surgery* low (despite specialist registration required for a podiatrist to later practise as a podiatric surgeon), considering that surgical therapy (e.g. performing partial nail avulsions) remains an important module in pre-registration curricula, and, based on comments particularly by recent graduates, that some students have had limited exposure (if at all) to develop their foundational clinical skills and to consolidate knowledge in this area prior to graduation.

Despite overall manual clinical skills being associated with perceived preparedness to practise as a podiatrist at graduation, the apparent low preparedness rating for the item *removing a nail spicule* was further highlighted by respondents in the many comments relating to this (and of corn enucleation) as a resultant deficit due to *limited clinical exposure*. The evaluation of manual clinical skills teaching (scalpel and other small instrument use) by Causby and colleagues (2017) also identified issues in students’ clinical exposure and its important significance in the development of scalpel skills. Those authors recommended the need for greater attention to manual clinical skills, as was found in this study.

Additionally, this study has shown that perceived preparedness in the overall clinical competence standards (which encompasses the full set of knowledge, skills and professional qualities, e.g. professional behaviour) correlates with being prepared to practise at graduation. Our study therefore contributes to reinforcing the importance of the standards for supporting one’s professional development and as an acceptable measure for assessing competence along the learning continuum. Some work, however, is evidently required in terms of Standard 7 – *Implement and evaluate a management plan* (now mostly represented in Domain 1 – *Podiatrist*, followed by Domain 2 – *Professional and ethical behaviour*), and to a lesser extent, Standard 8 – *Provide education, contribute to an effective health care system* (now mostly represented in Domain 2 – *Professional and ethical behaviour*, followed equally by Domains: 1 – *Podiatrist*, and 5 – *Quality and risk manager*), likely by-products of the perceived *limited clinical exposure* and related *professional self-efficacy* and *theory-practice gap* issues.

Structuring longer and/or longitudinal placement allocations (rather than short-term rotations of 1-2 weeks), as Thistlethwaite and colleagues (2013) did for medical students, should be strongly encouraged in podiatry education so that students can follow patients longitudinally so that there is continuity of care, and to further understand treatment effectiveness and patient conformance. Such engagement will likely further serve to increase student confidence, build their self-reported competence, and allow them to take on greater responsibility over time compared to students on block placements having to “start over” for each new rotation (Thistlethwaite et al., 2013). Allowing medical student continuity with patients supports professional identity formation and being more effective within the health care system, and can improve preparedness in higher-order clinical and cognitive skills (Poncelet & Hudson, 2015), the latter capabilities needed to practise safely and effectively as a podiatrist (Podiatry Board AHPRA, 2023).

A Limitations

Limitations of this study include the small sample size, yet a strength is the diverse range of perspectives from registered podiatrists in the analysis. As this involved a self-reported questionnaire, there is the possibility of response bias (Rosenman et al., 2011). This study was primarily conducted in the first half of 2019 thus the data might not reflect graduates who have completed programs since then, particularly considering the impact of COVID-19 on student placements.

Recall bias may have impacted results considering that graduation for some took place many years ago. Notwithstanding, however, no significant differences were noted other than specific theoretical knowledge: *evidence-based practice*, *lower limb anatomy and physiology*, and *diabetes*, which accounted for known curriculum changes over the period. While the purpose of this research was to inform ANZ curriculum (because of the shared competency standards at the time of data collection), the additional insights gained (e.g. related to clinical placement enablers and barriers) are likely to be applicable globally and still relevant locally despite the recently reworked standards in Australia.

V CONCLUSIONS

This study has revealed important results regarding the perceived preparedness of registered podiatrists. Most respondents believed, irrespective of when they graduated, that they were “prepared” and “competent” for graduate clinical practice. The quality of clinical placements as a student was largely central to establishing preparedness, although there were areas where preparedness could be improved, with barriers identified, namely related to limited clinical exposure having resultant impact as new graduates (e.g. manual clinical skills for certain conditions). Thus, in conclusion, to ensure that current university curricula adequately support graduates who are prepared, preferably “very prepared”, efforts to improve preparedness should at the very least include expanding students’ hands-on clinical exposure, enhancing knowledge connection between the classroom and the placement environment, and building self-efficacy across all areas of learning to strengthen their preparedness for eventual independent clinical practice. This would provide added confidence to all stakeholders that newly qualified podiatrists are meeting the safety needs of the public and are able to deliver high standards of care.

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Appendix

Demographics

1. What is your gender?
2. What is your age group?
3. List the postcode where you practice as a podiatrist.
4. What was your initial qualification to obtain podiatry registration?
5. Where did you complete your initial podiatry qualification?
6. Have you gained any other formal qualifications?
7. In what year did you graduate as a general podiatrist?
8. In your first year as a general podiatrist, in what type of health care environment did you work?
9. Which categories best described your initial employment as a general podiatrist?
10. Within your first year of employment as a general podiatrist, did you feel supported in your clinical learning and related professional development? Explain your choice.

Preparedness for practice

11. Reflect on when you were a student, how prepared were you for your clinical placements?
(Not at all prepared, Somewhat unprepared, Somewhat prepared, Very prepared)
Explain your choice.
12. When you graduated, how prepared were you to practice as a podiatrist?
(Not at all prepared, Somewhat unprepared, Somewhat prepared, Very prepared)
Explain your choice.
13. *In your opinion, how prepared are today's podiatry graduates to practice as podiatrists?#*
14. Please rate your theoretical knowledge (at graduation) in relation to some of the following core pre-registration podiatry curriculum areas:
(Poor, Fair, Good, Very good, Excellent)
 - Biomechanics
 - Evidence-based practice
 - Lower limb anatomy & physiology
 - Pharmacology
 - Surgery
15. Please rate your theoretical knowledge (at graduation) in relation to some of the core population groups and/or specific disorders:
(Poor, Fair, Good, Very good, Excellent)
 - Diabetes
 - Gerontology
 - Paediatrics
 - Rheumatology
 - Sports medicine
16. As per the categories below, how would you have rated your manual clinical skills at graduation?
(Poor, Fair, Good, Very good, Excellent)
 - Scalpel technique for callus debridement

Data not used in this article.

- Nail cutting
- Removing nail spicule(s)
- Enucleating a corn

17. At graduation, how would you have rated your overall clinical competence?

(Multiple choice)

- Novice (no experience, “tell me what to do and I will do it”)
- Advanced beginner (marginal experience)
- Competent (efficient and organised; a feeling of mastery and the ability to cope)
- Proficient (understood situations as a whole; had deep and holistic understanding of complete clinical picture)
- Expert (large background of experience; had an intuitive grasp of each situation; operated from a deep understanding of the complete picture)

18. At graduation, how would you have rated your clinical competence for each of the eight podiatry standards:

(Poor, Fair, Good, Very good, Excellent)

- Practice podiatry in a professional manner (e.g. practices ethically and to accepted standards)
- Continue to acquire and review knowledge for ongoing clinical and professional practice improvement (e.g. applies an evidence-based approach to practice)
- Communicate and interrelate effectively in diverse contexts (e.g. uses effective interpersonal communication skills)
- Conduct patient/client interview and physical examination (e.g. collects relevant initial information)
- Interpret, diagnose and analyse (e.g. communicates information and involves others as appropriate)
- Develop a patient/client focused management plan (e.g. short and long-term goals)
- Implement and evaluate a management plan (e.g. monitors and evaluates care provided)
- Provide education and contribute to an effective health care system (e.g. implements health promotion activities)