Procedural skills in general practice vocational training

What should be taught?

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Background

A list of procedural skills is an important component of a curriculum for general practice vocational training. This study aimed to establish an up-to-date list of core procedural skills that doctors undergoing general practice vocational training should be taught.

Method

A Delphi process was used to rank the importance of 185 general practice procedures. In 2009, 31 general practitioners took part in a two round Delphi process. A 4-point Likert scale was used to rate the importance of each procedure in vocational training.

Results

Mean rating scores for all the procedural items listed were determined, and a core list of 112 procedures was agreed on the basis of the relative importance of procedures determined by the Delphi participants.

Discussion

The ranked list of clinical procedures provides a resource to form the basis of a procedures training curriculum which can be adapted to different general practice training contexts.

Keywords: general practice; education, medical, graduate; diagnostic techniques and procedures; therapeutic techniques and procedures; curriculum; clinical competence

Despite the wealth of procedural teaching opportunities in medical and general practice training, medical students qualify with limited experience in basic and emergency procedures[1] and general practitioners can emerge from training programs lacking confidence in a range of procedural skills.[2] The issue of defining core procedural skills within a curriculum for general practice training is a longstanding one, but is considered an important way to address the skills competency gap.[3,4]

There have been different approaches to the development of procedural skills curricula by general practice educational institutions, including The Royal Australian College of General Practitioners (RACGP),[5] The Australian College of Rural and Remote Medicine (ACRRM),[6] the College of Family Physicians of Canada[7] and the Society of Teachers of Family Medicine (United States).[8] These approaches have included consensus, Delphi and questionnaire surveys. The 'essential procedural skills' list[5] of the RACGP was developed from a questionnaire survey conducted in 1990.[9] The delivery of healthcare in general practice has changed since then and the current RACGP list may no longer be relevant to current practice. The procedural skills list of ACRRM was derived from the content of the college's curriculum and published as a logbook for registrars in the ACRRM Fellowship Program.[6] The ACRRM Fellowship Program prepares GPs to work in rural and remote settings, so the scope of the procedural skills in ACRRM curriculum is likely to be much wider than that necessary for urban and many regional settings. Procedural lists developed in other countries and settings may also be of limited relevance to the Australian context.

The authors identified the absence of an up-to-date list of core clinical procedural skills for the Australian context. The aim of our study was to establish a list of core clinical procedural skills which all doctors undergoing vocational training for general practice should be taught.

Method

A Delphi method was chosen to address our research question. Delphi methodologies have previously been used in the investigation of the educational needs of GPs[10] and in establishing core procedural competencies in other areas of medical training.[11]

Ethics approval was received from Newcastle University Human Research Ethics Committee.

Construction of the master list of procedures

The literature review identified that there was no satisfactory or consistent definition of a general practice clinical procedure in the literature. As a result, the research team developed a study definition of a general practice clinical procedure by a consensus process (*Table 1*) and included or excluded items from existing lists according to that definition. 'Procedures' were also excluded if the group agreed that these were really management algorithms, patient education, examination skills, or if the skills were deemed to be minor (eg. measuring oxygen saturation by oximetry and measuring blood glucose using a glucometer). A master list of procedures taught to registrars in general practice was created by combining the lists of procedural skills identified in the RACGP[5] and ACRRM[6] training program curricula. Further procedures were included from locally developed procedure lists (for hospital junior medical officers[12] and an Australian medical indemnity organisation[13]) and from lists from general practice

organisations in other countries: New Zealand,[14] the United Kingdom,[15] the United States[8] and Canada.[7] Additional procedures were added to the list after literature searches performed in the Cochrane Library, PubMed, and Informit databases, and after secondary searches of retrieved articles. The eventual master list included 185 procedures. These were grouped under body systems and types of procedures.

Selection of expert panel members

Accepted criteria for inclusion as experts within a Delphi process – knowledge, experience and policy influence[16] – were employed to select a group of general practice clinicians for invitation to take part in the Delphi panel. In order to produce heterogeneity of the panel,[16] a range of characteristics were sought *(Table 2)*. A 'procedural' GP was one who practised anaesthetics and/ or obstetrics. Using these criteria, the Delphi panel invitees were selected by general practice clinicians in the research team and the canvassed opinions of other general practice key informants. Most invitees were GPs from the Valley to Coast Regional Training Provider (RTP) area (Hunter Valley, Manning Valley and Central Coast, New South Wales), but 10 out of the 63 invitees were from outside the RTP area.

Delphi method

The Delphi method used consisted of two rounds. The lack of a qualitative first round described in the classic Delphi method[10] was catered for by a literature review which generated the master list of procedures – this is an accepted approach.[10]

Questionnaire

The first study questionnaire presented the 185 item list of procedures. Panelists were asked to 'rate each individual procedure's importance as a core attribute of an undifferentiated training program graduate'. Panelists were further advised that 'such an undifferentiated graduate is not expected to be procedurally equipped to deal with all general practice settings in Australia. They will however, have had sufficient training to enable them to undergo, if necessary, further procedural training appropriate to the particular clinical setting they choose to work in'.

Panelists ranked the importance of each procedure on a 4-point Likert scale. The four rating options and their scoring values were: 'not at all important' (1), 'of little importance' (2), 'moderately important' (3) and 'very important' (4).

The questionnaire was pretested on a group of three GPs with similar characteristics to the Delphi panel members.

As well as Likert rating, panelists provided qualitative comments on the importance of individual procedures. Participants were also invited to nominate additional core procedures for inclusion in the second Delphi round and to provide their demographic data.

Invitations to participate, along with the first round questionnaire, were mailed to 63 identified potential panelists in February 2009.

This was followed by up to two reminder letters to nonresponders.

A second round questionnaire was then developed. This incorporated the participant's first round score for each procedure, the group's mean score for each procedure, all comments made in relation to procedures in the first round and any additional skills nominated in the first round that satisfied the study definition of a procedure. The second round questionnaire was mailed to those who responded to the first questionnaire in July 2009, with two reminder letters to nonresponders.

Analysis

Mean rating scores for individual procedures in the second Delphi round (treating Likert scores 1–4 as continuous data) were calculated and the procedures ranked according to mean rating score. This created a ranked list of clinical procedures. The study team then set a cut-point, taking into account both the mean Likert rating score of each procedure and the clinical and educational opinions of the research team.

Results

Sixty-three GPs were invited to participate; 31 agreed to participate and completed first round questionnaires. All 31 (100%) completed the second round. The demographics of the panelists are presented in *Table 2*. A further six procedures were added to the list after first round suggestions by the experts, resulting in a total of 191 procedures in the final list. The mean ranking

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Table 1. Criteria used for defining a general practice clinical procedure

- Discrete activity performed on a patient
- Requires knowledge and psychomotor/ manual skill
- Diagnostic or therapeutic
- May or may not require the use of equipment
- Invasive or noninvasive
- Excludes manual skills which are part of routine clinical examination
- Excludes purely interpretive skills
- Excludes complex surgical procedures that require a general anaesthetic

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Table 2. Characteristics used in the selection of the expert panel and characteristics of the Delphi panel (n=31)

Selection characteristic	Characteristic of panelists	Number of panelists
Gender	Male	20
Practice location	Urban	18
	Rural	11
	Remote	2
Procedural status	Proceduralist	10
Medical educator status	Medical educator	7
General practice supervisor/trainer status	General practice supervisor	17
Age	Age less than 50 years	13
Years in general practice	More than 20 years in general practice	16
Indigenous health expert	Indigenous health expert	2
Trained overseas	Trained overseas	3

scores for each of the procedures and change in scores between round one and two are presented online in the research section of the Document Library of the General Practice Training Valley to Coast website (www.gptvtc.com.au/site/index.cfm ?module=DOCUMENTS&leca=566).

The authors selected a cut-off point at the mean score of 2.66. The resulting list of 112 core clinical procedures for teaching in general practice training program is presented in *Table 3*. They are grouped according to organ system.

Figure 1 illustrates the process and outcome of the study as it relates to the RACGP procedures list.

Discussion

In this study we report the derivation of an up-to-date list of core procedural skills for general practice vocational training. The study was undertaken before the publication of the draft curriculum statement on procedural skills by the RACGP.

Concurrence with current RACGP and ACRRM procedures lists

The procedures list derived in this study appears longer than the current RACGP list (112 vs. 85 procedures), despite the fact that 37 items were removed from the RACGP list. Much of the expansion of the list is due to more detailed itemisation (eg. listing individual fracture types, rather than using the term 'common fractures') and extending the range of musculoskeletal items deemed important (eg. reducing dislocations and joint aspiration/injection). There were also several items added to the 'skin and subcutaneous tissue system'. The procedures list derived in this study is shorter than the ACRRM list (112 vs. 123 procedures), 61 procedures that appear on the ACRRM list were removed. Most of the procedures removed were of a complex nature, likely to be performed in rural and remote hospital settings (ie. procedures associated with advanced cardiorespiratory support, anaesthesia and sedation).

Study strengths and weaknesses

Although only 49.2% of the 63 invitees agreed to take part, the final number of participants (31) was adequate for this method of research.[17] The retention rate of 100% in the second round is also a strength of the study.

It is a challenge to produce a core list of procedural skills for the diversity of contexts in which Australian general practice exists. We have therefore not produced a definitive list, but rather a ranked list, showing the relative importance given to different procedural skills by a group of general practice experts working in, and with experience of, different contexts. We have produced a resource for general practice educators, allowing a choice of different cut-off points for different contexts of vocational training.

By using a range of published international sources (including Australia, Canada, New Zealand, United Kingdom and United States of America), we gave the panelists opportunity to think about the Australian situation from a global perspective. The selection of a cut-off point

mean score in our study was done by consensus among the three active general practice clinicians of the research team rather than by a further Delphi round. The general practice clinicians in the research team were those working in general practice and represented both urban and rural training practices. The cut-off point selected, in the opinion of the research team, included procedures associated with general practice in most contexts, including emergency lifesaving skills, and seemed to exclude procedures more commonly practised by GPs in hospital settings or remote practice settings. This method of cut-off point selection was partly based on available resources, but also recognises that any cut-off point selection is contextual and that the raw data of the rank scored list will be of utility in itself.
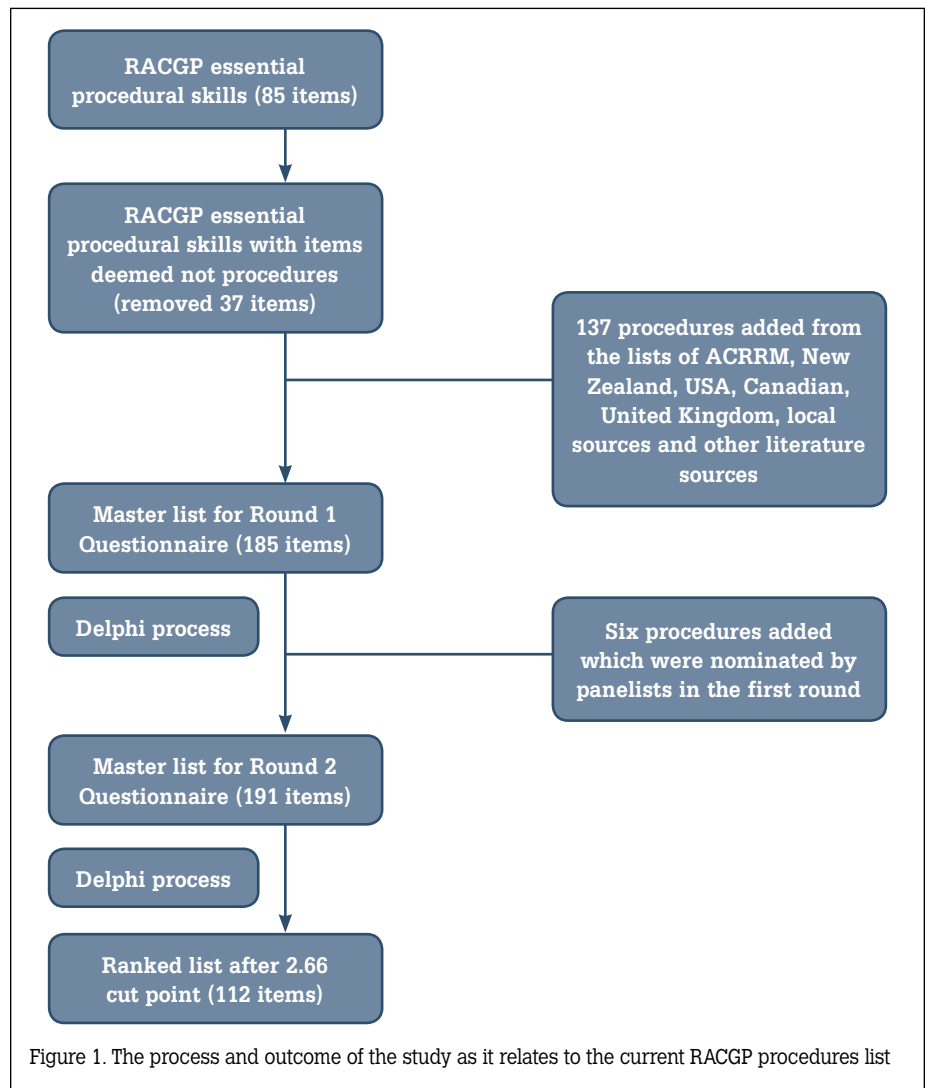

Figure 1. The process and outcome of the study as it relates to the current RACGP procedures list

Table 3. General practice clinical procedural skills (n=112) as rated by Delphi participants

Body system: ear, nose and throat	Mean score	Body system: gastrointestinal tract	Mean score
Syringe external auditory canal	3.71	Drainage of perianal haematoma	3.29
Ear toilet – dry mopping	3.68	Nasogastric tube insertion	3.03
Insertion of wick into external ear canal	3.68	Proctoscopy	3.03
Removal of ear wax	3.65	Orogastric tube insertion	2.97
Removal of foreign body from external auditory canal	3.52	Drainage of perianal abscess	2.71
Removal of foreign body from nose	3.48	**Body system: nervous**	
Anterior nasal packing	3.29	Infiltration of local anaesthetic	4.0
Epley manoeuvre for benign positional vertigo	3.03	Digital nerve block	3.65
Reinsertion of avulsed tooth	2.97	**Body system: ophthalmology**	
Posterior nasal packing	2.71	Application of eye patch	3.84
Body system: musculoskeletal		Removal of corneal foreign body	3.81
Intramuscular injection	3.94	Irrigation of eye	3.74
Subcutaneous injection	3.94	Removal of subtarsal foreign body	3.68
Application of forearm backslab	3.81	Removal of corneal rust ring	3.26
Application of sling – upper extremity	3.81	Use slit lamp	3.23
Injection and/or aspiration of knee joint	3.74	**Body system: respiratory**	
Application of scaphoid cast	3.7	Nebulisation therapy	3.84
Application of below knee backslab	3.68	Perform peak flow measurement	3.84
Application of forearm cast	3.61	Perform spirometry	3.71
Application of aluminium splint to finger	3.58	**Body system: skin and subcutaneous tissue**	
Intradermal injection	3.55	Suture of superficial skin lacerations	4.0
Application of cervical hard collar	3.53	Gluing of superficial lacerations	3.87
Removal of plaster/fibreglass cast	3.5	Cryotherapy	3.84
Application of full arm cast	3.48	Excision of superficial skin lesions	3.84
Reduction of dislocated finger	3.48	Incision and drainage of abscess	3.84
Application of below knee cast	3.47	Punch biopsy of skin lesion	3.84
Injection and/or aspiration of shoulder	3.42	Suture of deep skin lacerations	3.81
Reduction of dislocated shoulder	3.39	Application of wound dressings	3.74
Reduction of dislocated radial head	3.29	Drainage of subungual haematoma	3.74
Injection of subacromial space	3.27	Application of burn dressings	3.71
Soft tissue injury strapping	3.23	Removal of subcutaneous foreign body	3.71
Injection of tennis elbow	3.0	Wound debridement	3.71
Application of full leg cast	2.97	Excision of sebaceous cyst	3.68
Injection of trochanteric bursa	2.94	Shave biopsy of skin lesion	3.65
Injection and/or aspiration of olecranon bursa	2.9	Drainage acute paronychia	3.61
Injection and/or aspiration of prepatellar bursa	2.9	Evacuation of haematoma	3.61
Application of walking heel to a plaster	2.8	Removal of ring (from swollen finger)	3.58
Injection of plantar fasciitis	2.77	Electrocautery of skin lesions	3.35
Reduction of dislocated patella	2.74	Removal of fish hook	3.32
Reduction of dislocated temporomandibular joint	2.68	Curettage of skin lesion	3.26
Body system: urogenital		Pare skin callus	3.23
Urethral catheterisation of a male	3.61	Excision of lipoma	3.19
Urethral catheterisation of a female	3.55	Avulsion of a toenail	3.03
Insertion of preloaded subcutaneous hormone implants	3.32	Partial toenail removal	3.03
Urethral catheterisation (child)	2.74	Wedge excision for ingrown toenail	2.74
Suprapubic aspiration (child)	2.68	**Pathology: collect and prepare**	
Urgent care: cardiac		Wound swab	3.87
Cardiopulmonary resuscitation (child)	4.0	Fungal scraping	3.81
Cardiopulmonary resuscitation (adult)	3.97	Postnasal swab	3.74
Set up and record 12 lead electrocardiogram	3.77	Throat swab	3.68
Defibrillation	3.68	**Reproductive health procedures**	
Urgent care: circulation		**Women**	
Intravenous access	3.94	Pap smear	4.0
Venepuncture	3.94	Taking of high vaginal swab	4.0
Interosseous needle insertion	2.71	Removal of Implanon® rod	3.32
Urgent care: respiratory		Insertion of Implanon® rod	3.26
Mouth to mask ventilation	4.0	Removal of intrauterine device	3.23
Insertion of oral airway	3.93	Insertion of hormone implant by trochar/cannula	3.19
Administer oxygen via face mask	3.9	Diaphragm fitting and insertion	2.81
Mouth to mouth ventilation	3.87	Aspirate breast cyst	2.74
Reduction tension pneumothorax	3.39	**Men**	
Insertion of nasopharyngeal airway	2.84	Taking of urethral swab	3.68
Endotracheal intubation (adult)	2.68		

Implications for general practice

An agreed list of core procedures will allow general practice registrars to focus their learning more effectively, clinical teachers to better focus their teaching and assessment and training providers to be more clear about this aspect of the curriculum. Such a list is also a helpful guide for procedural skills maintenance by qualified GPs.

Our results also have implications for further research. Having agreed on a core list of procedural skills to be taught: How are they best taught in a training program? Which procedures are encountered with sufficient frequency to be taught in general practice office settings? What is the role of other teaching methods in helping registrars acquire these skills? What are appropriate methods for the assessment of competence in relation to these skills?

Conclusion

The authors have applied educational research methodology to establish an up-to-date and contextually relevant list of core procedural skills that the authors feel should be taught in general practice vocational training. The list that has been generated will guide procedural training and assessment in a training program. This study also provides a resource that enables the development of procedural lists in other general practice contexts.

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