

GPs' perceived competence and comfort in managing medical emergencies in southeast Queensland

Marie-Louise Dick, Philip Schluter, Catherine Johnston, Mark Coulthard

Marie-Louise Dick, MBBS, FRACGP, MPH, is Senior Lecturer in General Practice, Centre for General Practice, School of Population Health, University of Queensland.

Philip Schluter, MSc, PhD, is Associate Professor in Biostatistics, Division of Public Health, School of Population Health, University of Queensland.

Catherine Johnston, MBBS (Hons), FRACGP, is a general practitioner, Gold Coast Queensland, and former RACGP Training Program Academic General Practice Registrar, University of Queensland.

Mark Coulthard, MBBS, FRACP, is Staff Specialist in Intensive Care, Royal Children's Hospital, Brisbane, Queensland.

INTRODUCTION Little is known about general practitioners' confidence and competence in managing medical emergencies, yet these qualities are vital to maximise patients' chances of survival.

AIM To document the distribution and determinants of GPs' self reported levels of comfort and competence in managing medical emergencies, and GPs' interest in attending an emergency skills update course.

METHODS We conducted a random sample survey of 900 GPs in current clinical practice in southeast Queensland.

RESULTS Five hundred and twelve (57%) GPs responded to the questionnaire. An association between perceived levels of competence and the amount of training GPs received was demonstrated ($P < 0.05$ for 14 of 16 listed emergency skills), as was an association between level of comfort in managing emergencies and the frequency with which such emergency types are encountered in practice ($P < 0.05$ for 8 of 18 listed emergencies). Sixty-nine percent of GPs expressed interest in attending a specifically designed emergency medicine update course.

CONCLUSION Postgraduate training in and experience with medical emergencies is important for GPs' confidence and competence in dealing with such emergencies. A proposed update course designed specifically for GPs was strongly supported.

General practitioners in Australia are the first point of medical contact for the majority of people in the community. Given that appropriate timely response to medical emergencies has been shown to improve patients' probability of survival,¹ it is vital that GPs satisfactorily respond to emergency presentations. Grantham reports that satisfactory patient care in emergency situations requires that GPs demonstrate both competence and confidence.² These measures have been the subject of a small but important series of studies that focussed on rural practitioners, and reported that some deficiencies exist in GPs' capacity to adequately respond to emergencies, and that GPs have identified a need for further training.^{3,5} Similar literature for metropolitan GPs

however, does not currently exist.

This paper reports further data from an Australian population based survey of GPs.⁶ It describes GPs' self reported levels of comfort and perceived competence in managing medical emergencies, and how these vary according to GPs' demographics, the availability of emergency drugs and equipment in their medical practices, and their past training in the management of emergencies. It also reports GPs' interest in attending an emergency skills update course, their recommendations for the content of such a course, and their perceived barriers to attendance.

Methods

Design

Details of the project's methodology have been reported elsewhere.⁶ In brief, a

random sample of 1000 GPs in southeast Queensland was obtained. A questionnaire was posted between October 1999 and March 2000 to all 900 eligible GPs, where eligibility included having a valid mailing address, being currently in practice, and that only one GP be included from each practice location. Reminder calls were made to nonresponding doctors two and four weeks after questionnaire mailing.⁷

Variables

Demographic variables of GPs and their practices were included.⁶ Lists of essential emergency drugs, emergency equipment, medical emergencies likely to be encountered in the general practice setting, and emergency skills most likely to be employed, were compiled with reference to the published literature.⁸⁻¹³ General practitioners

Table 1. Number (%) of GPs reporting prior training in emergency skills as occurring both during medical school and post medical school (both), during medical school only (MS), and post medical school only (post-MS), or none at all (none)^a

Emergency skill	Past training			
	Both n (%)	MS n (%)	Post-MS n (%)	None n (%)
ECG rhythm recognition	357 (76.1)	52 (11.1)	53 (11.3)	7 (1.5)
Recognition and diagnosis of emergencies	323 (70.1)	64 (14.9)	68 (14.8)	6 (1.3)
External cardiac compression	324 (69.2)	39 (8.3)	100 (21.4)	5 (1.1)
Mouth to mouth resuscitation	293 (63.8)	52 (11.3)	105 (22.9)	9 (2.0)
Bag and mask resuscitation	245 (52.5)	46 (9.9)	159 (34.0)	17 (3.6)
Cannulation	232 (49.6)	72 (15.4)	136 (29.1)	28 (6.0)
Venesection	230 (49.1)	105 (22.4)	112 (23.9)	21 (4.5)
Administering emergency drugs	223 (47.8)	37 (7.9)	178 (38.1)	29 (6.2)
Mouth to mask resuscitation	218 (47.1)	42 (9.1)	156 (33.7)	47 (10.2)
Defibrillation	201 (43.8)	30 (6.5)	185 (40.3)	43 (9.4)
IV infusion	201 (42.9)	72 (15.4)	162 (34.6)	33 (7.1)
Intubation	197 (42.3)	48 (10.3)	201 (43.1)	20 (4.3)
Emergency needle tracheostomy	83 (17.8)	54 (11.6)	159 (34.0)	171 (36.6)
Emergency needle thoracocentesis	82 (17.7)	38 (8.2)	171 (36.9)	173 (37.3)
Establishing intraosseous access	26 (5.7)	10 (2.2)	133 (29.0)	290 (63.2)
Intraosseous infusion	21 (4.6)	5 (1.1)	93 (20.2)	341 (74.1)

^a Totals less than 512 are due to missing or incomplete data.

were asked to recall their past training in emergency skills, and the amount of time spent working in hospital terms likely to facilitate the acquisition of emergency skills.

Four-point scales were used to ascertain GPs' level of comfort in dealing with each of 18 medical emergencies (1=very uncomfortable, 2=mildly uncomfortable, 3=moderately comfortable, 4=very comfortable), and GPs' perceived competence in performing each of the 16 defined emergency skills (1=wouldn't know where to start and wouldn't attempt it, 2=would do one if no-one else was available, 3=would attempt it in most cases (perceived competence reasonable), 4=would attempt it in most/all cases (perceived competence good/high).

Finally, interest in attending an emergency medicine skills workshop in Brisbane was sought, as well as possible attendance barriers.

Data analysis

Skewed data were reported using medians and inter-quartile ranges (IQR), otherwise means and standard deviations (SD) were used. A mean competence level for each emergency skill was derived by aver-

aging all the GPs' responses to each of the 16 skills items. Additionally, a mean skills competence level for each GP was derived by averaging his/her responses to all 16 skills items, with an overall mean competence level for all GPs being derived by averaging all the doctors' mean skills competence levels. Similar measures were also derived for GPs' reported level of comfort in dealing with the 18 listed emergencies. Generalised linear models (GLM) were employed to investigate differences between group means, using PROC GLM in SAS.¹⁴ When numbers within a group under comparison were small (less than 5), this group was combined with a neighbouring group for the GLM analyses. An α -level of 5% was considered statistically significant for all comparisons.

Ethical approval

The Research and Evaluation Ethics Committee of the Royal Australian College of General Practitioners (RACGP) and the University of Queensland's Behavioural and Social Sciences Ethical Review Committee approved the study.

Results

Of the 900 eligible GPs, 512 (57%) returned a completed questionnaire, the male to female ratio was approximately 2:1 (as was the ratio of doctors working in group versus solo practices), approximately 30% of GPs practised in a nonmetropolitan locality, and 25% worked part time.⁶

Past training in emergency skills

General practitioners reported having worked for a median of 11 months (IQR: 6, 18) in either anaesthetic, intensive care and/or emergency departments. While 131 (25.7%) doctors indicated they had attended any emergency skills training session(s) since graduation, only 32 (6.5%) had undertaken a formal emergency medicine course.

Of the 16 listed emergency skills, the median number for which GPs recalled receiving training was 14 (IQR: 12, 15). Over 20% of GPs reported training in all skills. Table 1 gives the number and percentage of doctors who received training in the listed emergency skills, and

Table 2. Mean (\bar{x}) and standard deviation (SD) of GPs' perceived emergency skills competencies,^a grouped by their recall of past training, both during medical school and post medical school (both), during medical school only (MS), post medical school only (post-MS), or none at all (none)

Emergency skill	Past training					P
	Overall \bar{x} (SD)	Both \bar{x} (SD)	MS \bar{x} (SD)	Post-MS \bar{x} (SD)	None \bar{x} (SD)	
ECG rhythm recognition	3.2 (0.7)	3.3 (0.7)	3.0 (0.8)	3.2 (0.7)	2.4 (0.8)	<0.001
Recognition and diagnosis	3.2 (0.7)	3.3 (0.6)	3.0 (0.6)	3.3 (0.6)	2.2 (0.4)	<0.001
External cardiac compression	3.5 (0.7)	3.5 (0.7)	3.5 (0.6)	3.4 (0.7)	2.8 (0.8)	0.10
Mouth to mouth resuscitation	3.4 (0.8)	3.4 (0.8)	3.2 (0.9)	3.4 (0.8)	3.0 (0.9)	0.28
Bag and mask resuscitation	3.4 (0.7)	3.5 (0.7)	3.4 (0.7)	3.5 (0.7)	2.1 (1.1)	<0.001
Cannulation	3.5 (0.8)	3.6 (0.7)	3.4 (0.8)	3.5 (0.7)	2.6 (1.1)	<0.001
Venesection	3.6 (0.7)	3.7 (0.6)	3.6 (0.7)	3.6 (0.6)	3.1 (0.9)	0.002
Administering emergency drugs	3.3 (0.7)	3.3 (0.7)	2.9 (0.8)	3.3 (0.7)	2.6 (0.8)	<0.001
Mouth to mask resuscitation	3.4 (0.8)	3.5 (0.7)	3.5 (0.7)	3.5 (0.6)	2.6 (1.0)	<0.001
Defibrillation	2.7 (1.0)	2.9 (0.9)	2.7 (1.1)	2.7 (0.9)	1.4 (0.5)	<0.001
IV infusion	3.5 (0.7)	3.5 (0.7)	3.5 (0.7)	3.5 (0.7)	3.0 (0.8)	<0.001
Intubation	2.8 (0.9)	3.0 (0.9)	2.2 (0.9)	2.8 (0.9)	1.8 (1.0)	<0.001
Emergency needle tracheostomy	2.3 (0.9)	2.7 (0.9)	2.3 (0.9)	2.7 (0.9)	1.8 (0.7)	<0.001
Emergency needle thoracocentesis	2.2 (0.9)	2.6 (0.9)	2.1 (0.8)	2.7 (0.9)	1.7 (0.7)	<0.001
Establishing intraosseous access	1.8 (1.0)	2.4 (1.0)	1.7 (1.1)	2.6 (1.0)	1.3 (0.6)	<0.001
Intraosseous infusion	1.7 (1.0)	2.7 (1.0)	1.6 (0.9)	2.8 (0.9)	1.4 (0.6)	<0.001

^a Perceived competence scores:

1 = wouldn't know where to start

3 = would attempt in most cases (perceived competence=reasonable)

2 = would do one only if no-one else was available

4 = would attempt in most/all cases (perceived competence=good/high)

whether they received this training during or after medical school. Considerable variation in training experience is demonstrated. Less than 40% of GPs recalled past training in intraosseous procedures, approximately 60% recalled emergency needle thoracocentesis and tracheostomy training, while at least 90% recalled receiving training in each of the remaining skills. While many respondents reported receiving their training both during and after medical school, a considerable proportion acquired skills only in their postgraduate years.

Perceived competence in emergency skills

Mean perceived competence levels for each of the 16 listed emergency skills are shown in Table 2. General practitioners perceived the greatest overall degree of competence for venesection, external cardiac compression, cannulation and intravenous infusion, while the weakest competencies were intraosseous procedures, and emergency

needle thoracocentesis and tracheostomy. The overall mean perceived skills competence for all GPs was 3.0 (reasonable), with 90% of values ranging between 2.1-3.9.

Perceived competence in each of the emergency skills (except for external cardiac compression and mouth-to-mouth resuscitation) was strongly associated with having past training in these skills (Table 2). Generally, the mean perceived competence for each of the emergency skills was greatest when the training had occurred both during and following medical school and least for those GPs who recalled having no previous training (Table 2).

After adjusting for past training, a higher level of perceived competence was significantly associated with male gender ($P<0.001$), nonmetropolitan practice ($P<0.001$), and full time work status ($P=0.001$). It was also significantly associated with measures determined by Johnston et al,⁶ having all of the eight items of basic equipment considered essential ($P=0.04$), and having all eight emergency

drugs to treat the 10 most frequently seen emergencies ($P=0.03$) (Table 3).

Level of comfort in dealing with emergencies

The question eliciting level of comfort in dealing with emergencies was poorly answered, with only 179 (35%) participants furnishing complete responses. However, GPs who did respond were no more likely to have seen more emergencies ($P=0.30$) or to have received more emergency training ($P=0.09$) than those who did not respond.

General practitioners' mean reported levels of comfort were greatest for acute asthma, hypoglycaemia and convulsion and least for thyroid crisis and immersion (Table 4). The overall mean comfort level for all GPs over the 18 listed emergencies was 2.5 (midway between mildly and moderately comfortable), with 90% of values ranging between 1.4-3.8. General practitioners' mean comfort levels in dealing with an emergency were generally higher

Table 3. Number (n), mean (x) and standard deviation (SD) of GPs' self reported emergency skills competencies and self reported comfort levels in dealing with emergencies, by sociodemographics and the availability of emergency equipment and drugs^a

		Perceived skills competence ^b			Comfort in dealing with emergencies ^c		
		n	x (SD)	P	n	x (SD)	P
Gender	Females	145	2.9 (0.4)	<0.001	51	2.3 (0.6)	0.005
	Males	322	3.0 (0.4)		125	2.6 (0.6)	
Age (years)	25-34	48	3.0 (0.5)	0.57	22	2.3 (0.7)	0.16
	35-44	156	3.0 (0.5)		72	2.5 (0.7)	
	45-54	153	2.9 (0.5)		50	2.5 (0.7)	
	55-64	90	3.0 (0.5)		29	2.7 (0.7)	
	65+	21	2.8 (0.5)		4	2.9 (0.7)	
Practice location^d	Metropolitan	330	2.9 (0.4)	<0.001	127	2.5 (0.7)	0.76
	Nonmetropolitan	132	3.1 (0.4)		49	2.6 (0.7)	
	Rural Remote	8	3.5 (0.4)		3	2.4 (0.7)	
Practice size	Group	307	2.9 (0.5)	0.12	123	2.5 (0.6)	0.22
	Solo	158	3.0 (0.5)		55	2.6 (0.6)	
Work status^e	Full time	345	3.0 (0.5)	0.001	131	2.6 (0.6)	0.01
	Part time	120	2.9 (0.5)		45	2.3 (0.6)	
Having all 8 items of basic equipment considered essential^f							
Yes	318	3.0 (0.5)	0.04	123	2.6 (0.7)	0.40	
No	152	2.9 (0.5)		56	2.5 (0.7)		
Having all 8 emergency drugs considered necessary to treat the 10 most frequently seen emergencies^g							
Yes	301	3.0 (0.5)	0.03	114	2.6 (0.7)	0.17	
No	160	2.9 (0.5)		62	2.4 (0.7)		

^aTotals less than 512 are due to missing or incomplete data

^bAdjusted for the number of emergency skills (from the 16 listed) for which GPs recalled receiving training

^cAdjusted for the number of different types of emergencies (from the 18 listed) that GPs recalled seeing within the past 12 months

^dAccording to the Rural, Remote and Metropolitan Area (RRaMA) classification²⁰

^eAccording to the RACGP definition where full time is >36 hours²¹

^fOropharyngeal airway, bag and mask, oxygen, nebuliser, sphygmomanometer, tourniquet, Glucometer,TM IV cannulae^g

^gAdrenaline, benzotropine, diazepam, glucagon, haloperidol, hydrocortisone, naloxone, salbutamol^g

when they had encountered that emergency within the past 12 months (Table 4).

After adjusting for the number of different types of emergencies seen within the previous 12 months, males ($P=0.05$) and full time GPs ($P=0.01$) had significantly higher overall levels of reported comfort than females and part time GPs respectively (Table 3).

Needs assessment for update course

Overall, 337 GPs (69%) expressed interest in attending a specifically designed GP workshop on emergency skills in Brisbane. Skills rated by more than 70% of GPs as being essential or very important for inclusion in such a workshop included the recognition and diagnosis of emergencies (93%), administration of emergency drugs (88%), ECG rhythm

recognition (87%), defibrillator use and safety (83%), emergency tracheostomy (82%), basic airway skills (81%), intubation (78%) and needle thoracocentesis (74%). Less relevant skills included cannulation (54%), establishing intraosseous access (52%) and venesection (47%).

For those GPs who expressed interest in attending such a course, the most common factors identified as potential barriers to their attendance were insufficient time (51%), inability to obtain locum cover for their practice (36%), and distance from the course location (25%). Those who reported distance as a barrier were more likely to be from a nonmetropolitan area ($P<0.001$).

Discussion

Australian GPs make a substantial contribution to the national response to medical emergencies.⁶ This study provides

valuable new information regarding GPs' reported levels of comfort and perceived competence in dealing with medical emergencies, and insight into factors influencing these findings.

General practitioners' mean perceived emergency skills competencies were reported as being at least reasonable for the more basic 10 of the 16 listed emergency skills. In general, higher perceived skills competencies were strongly associated with past training in emergency skills (particularly in the postgraduate years), practising in a nonmetropolitan location, male gender, and being well equipped with essential items of emergency equipment and drugs.

General practitioners' mean levels of comfort in dealing with emergencies were reported as at least moderate for acute asthma and hypoglycaemia, but less for the remaining emergencies. Higher

Table 4. Mean (\bar{x}) and standard deviation (SD) of GPs' levels of comfort^a in dealing with 18 medical emergencies, subgrouped by the frequency of seeing these emergencies over the previous 12 months

Medical emergency	Overall	Frequency			P
	\bar{x} (SD)	0 \bar{x} (SD)	1-2 \bar{x} (SD)	3+ \bar{x} (SD)	
Acute asthma	3.1 (0.9)	2.7 (1.0)	3.1 (0.7)	3.4 (0.8)	<0.001
Hypoglycaemia	3.1 (0.8)	3.0 (0.9)	3.2 (0.8)	3.8 (0.5)	0.03
Convulsion	2.9 (0.8)	2.8 (0.9)	3.0 (0.7)	3.3 (0.7)	0.12
Anaphylaxis	2.7 (0.9)	2.6 (0.9)	3.1 (0.6)	2.5 (0.5)	0.003
Overdose	2.7 (0.9)	2.6 (0.9)	2.7 (0.7)	2.9 (0.9)	0.51
Diabetic ketoacidosis	2.7 (0.9)	2.6 (0.9)	2.9 (0.6)	4.0 (n/a)	0.13
Poisoning/ingestion	2.6 (0.8)	2.6 (0.9)	2.6 (0.7)	3.2 (1.0)	0.23
Shock	2.6 (0.9)	2.4 (0.9)	3.0 (0.7)	3.2 (0.8)	<0.001
Impaired consciousness	2.5 (0.8)	2.4 (0.9)	2.6 (0.7)	2.6 (0.9)	0.24
Psychiatric emergencies	2.5 (0.9)	2.4 (1.0)	2.4 (0.8)	2.7 (0.8)	0.28
Cardiac arrest	2.5 (1.0)	2.4 (1.0)	3.0 (0.7)	3.7 (0.6)	0.003
Coma 2.5	(0.9) 2.3	(0.9) 3.1	(0.7) 2.8	(0.8)	<0.001
Respiratory arrest	2.4 (1.0)	2.3 (1.0)	2.8 (1.0)	3.0 (n/a)	0.21
Major/multiple trauma	2.2 (1.0)	2.2 (1.0)	2.6 (0.9)	2.6 (0.5)	0.25
Inhaled foreign body	2.2 (0.9)	2.2 (0.9)	3.3 (0.7)	<0.001	
Asphyxia	2.2 (1.0)	2.2 (1.0)	3.3 (1.0)		0.03
Immersion	2.1 (0.9)	2.1 (0.9)	2.5 (0.6)		0.41
Thyroid crisis	2.1 (0.9)	2.1 (0.9)	2.8 (0.7)	3.0 (n/a)	0.09

^aLevel of comfort scores:

1 = very uncomfortable

2 = mildly comfortable

3 = moderately comfortable

4 = very comfortable

n/a indicates that no standard deviation could be calculated, as there was only one observation

reported levels of comfort were related to the frequency of having seen that emergency in the preceding 12 months, male gender and full time work status.

In Australia, minimum emergency medicine competence standards are not clearly defined for all levels of general practice. The Australian General Practice Training Program Handbook outlines mandatory accident and emergency hospital experience for trainees, and their certification of competency in advanced life support training, while the Royal Australian College of General Practitioners' Quality Assurance and Continuing Professional Development Program currently has no formal requirement for certification of proficiency in emergency medicine skills.^{15, 16} Despite this, GPs themselves perceive such skills to be important with 69% responding positively to our proposal to develop a course aimed directly at their needs.

The ranking of skills important for

inclusion in a refresher course did not always correlate directly with past training and perceived skills competence. Most of the skills considered highly important or essential for inclusion were those in which the majority of GPs had already reported some training since medical school, while some skills, eg. intraosseous procedures which more than 60% of GPs had never had any training and more than 80% reported a low competence level, were considered of low importance for inclusion in an update. A possible explanation is that GPs prioritise their training needs not only on the basis of their perceived competence and previous training but also on their perceived likelihood of requiring a particular skill in clinical practice.

The generalisability of the study's results is potentially limited by response and measurement errors. While our response rate of 57% is consistent with other GP based research,¹⁷ the 43% non-

response rate could introduce biases. Participants' demographic characteristics were comparable with Australian Institute of Health and Welfare (Queensland) data¹⁸ for gender, hours worked per week and geographic data, however, differences emerged for practice size and age, with our sample having more GPs working in solo practice and more middle aged GPs.⁶ Although possibly a result of response bias, this difference was most likely due to our sampling strategy which systematically included only one GP from any given practice address.

The question eliciting level of comfort in dealing with emergencies was poorly answered. We suspect that the high non-response rate was due to questionnaire formatting issues rather than to the sensitivity of the question. General practitioners who responded were no more likely to have seen more emergencies or received more emergency training than nonresponders.

Measurement error may have arisen from GPs having to recall the frequencies and types of emergencies, and past emergency training. However, as life threatening emergencies in general practice require immediate and special attention, it is likely that most would be recalled, although some reported recollections may fall outside the 12 month period. Difficulty in recalling emergency types may result in misclassification, and lapses in recall of past emergency training could underestimate the actual training undertaken by GPs. These measurement errors are symptomatic of questionnaire based retrospective studies and are likely to be nonsystematic.

Self reported competence was used as an outcome measure in this study in an effort to determine those skills in which GPs felt their competence was poor, and in which they therefore might consider the need for upskilling. It is acknowledged that this measure does not necessarily correlate highly with objectively measured clinical skills competence,¹⁹ however, it was beyond the scope of this study to objectively assess skills with performance based tests. We believe that self reported competence likely reflects both performance based competence, and confidence.

Previous studies of rural practitioners have found that deficiencies exist in GPs' capabilities to adequately respond to emergencies.^{3,5} This study's findings are consistent, and demonstrate that these issues are also relevant for metropolitan practitioners. Given the clear associations between increased competence and postgraduate training, and increased level of comfort in dealing with emergencies and having recent experience in managing those emergencies, a strong case can be made for providing GPs with opportunities to upskill in emergency medicine. The results of the study suggest that emergency medicine courses designed specifically for GPs would be widely supported by the profession. Organisations responsible for the education and training of GPs are encour-

aged to provide increased opportunities for enhancing GPs' experience in this area. Consideration of potential barriers to attendance at such courses is essential.

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AFP

Correspondence

Dr Marie-Louise Dick
 Senior Lecturer in General Practice
 Centre for General Practice
 School of Population Health
 University of Queensland
 Herston Road, Herston, Qld 4006
 Email: marie-louise.dick@sph.uq.edu.au