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Examination of undergraduate paramedic clinical placement within a traditional and novel setting

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Research

Examination of undergraduate paramedic clinical placement within a traditional and novel setting

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Abstract

Background

Increasing student enrolments and limited capacity within traditional placements have resulted in a need to reassess the format of clinical placement programs. This study aimed to compare traditional and novel clinical placement experience of third year paramedic science students at Victoria University in order to identify elements that may contribute to identifying an optimum model for future clinical placement programs.

Design

A descriptive study of clinical placement case exposure with comparative analysis of local and international student cohorts.

Setting

A paramedic student clinical placement program in two ambulance services: Ambulance Victoria (Australia) and Magen David Adom (Israel).

Method

Descriptive statistics were used to report patient and student experience factors. Specific case exposure, demonstration of skills and use of pharmacological agents are reported as proportions.

Results

A total of 441 cases were analysed: 206 and 235 in the local and international study groups respectively. Mean caseload per paramedic student was not significantly different between the study groups at 1.2 cases (95% CI: -2.8–0.4, $p=0.1$). The international group engaged in a greater range of shifts, including more afternoon shifts and the opportunity to experience night shifts.

Conclusion

This study provided the first descriptive analysis of a traditional and international clinical placement experience for paramedic undergraduate students, identifying benefit in both programs. Future studies incorporating a mixed methods design measuring practical exposure will add important depth and understanding to clinical placement optimisation.

Keywords:

paramedic student, clinical placement, case exposure

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Background

Clinical placement is an important facet of learning for undergraduate paramedic students, with a small number of studies identifying the importance of students applying their learning to the clinical environment, complemented by theoretical and simulation learning achieved in the classroom setting (1-4). These placements have traditionally been sought within the ambulance service of the state where the paramedic undergraduate program is offered. Recently the ability of Australian universities to provide clinical placements for their undergraduate paramedic students has been challenged by the limited capacity of Australia's eight state and territory service providers in accommodating an increasing demand. These service challenges include the availability of suitably qualified supervisory staff, rostering vacancies, number of operational vehicles and the competitive nature of accommodating such large numbers within a functional emergency health system.

The Council of Ambulance Authorities reported that in 2015 there were some 7484 students enrolled in undergraduate paramedic science degree courses across Australia, an increase of 10% over the previous year (5). In 2015, Victoria University (VU) alone had approximately 750 students enrolled in its paramedic science degree program, with each student required to complete a minimum of 380 hours of clinical placement to satisfactorily complete their degree. This has resulted in an urgent need for universities to revisit the quality and composition of clinical placement programs in order to optimise student learning, clinical competency and subsequent employability on completion.

Ambulance Victoria (AV) has a long history of supporting the development of paramedic students through the provision of clinical placement opportunities for VU, alongside the four universities providing paramedic science degree courses in Victoria. As the organisation responsible for primary emergency health response state wide, in 2014 AV responded to 851,427 cases across an area of 227,600 square kilometres (6).

Ambulance Victoria operates a two-tiered system of clinical care: an Advanced Life Support paramedic model (degree-qualified paramedics) and a Mobile Intensive Care Ambulance (MICA) paramedic model (graduate diploma qualified paramedics with an advanced skillset and pharmacological availability).

In 2014, VU embarked on a novel opportunity to develop a relationship with the Israeli national pre-hospital emergency health provider, Magen David Adom (MDA). A key facet of this new relationship was the opportunity to conduct a study tour of that country, incorporating a mass-casualty incident course and a period of clinical placement for each student on the MDA ambulances. Similarly to AV, MDA provides a primarily two-tiered system (basic life support and intensive care), however, in addition there is a volunteer service and blood bank service. There are also several other private services that respond to and provide emergency health care to the population in a

collaborative relationship with MDA. In 2012, MDA attended 637,004 cases across an area of 21,640 square kilometres (7). This initial clinical placement experience proved beneficial to the 15 students who participated, with high levels of satisfaction reported in a post-tour survey and 100% of students gaining employment in an ambulance service within 6 months of degree completion. A subsequent placement was conducted in 2015, however, to date, neither the value of these international learning experiences (nor that of the traditional model) have not been quantified.

With this in mind, this study aimed to compare the traditional (local placement with AV) and novel (international placement with MDA) clinical placement experiences of third year paramedic science students at VU, in order to report specific elements that may contribute to identifying an optimum learning model for future development of clinical placement programs within the undergraduate degree program.

Method

A descriptive study of clinical placement case exposure with comparative analysis of local and international student cohorts was conducted. Final-year students from the VU Bachelor of Paramedic Science program were recruited to identify clinical exposure to case type, overall and individual case load, and experiential learning through active participation in clinical tasks, to provide a comparative analysis of current local and international clinical placement experience. As the international cohort was limited to 10 positions (through a competitive selection process based on a validated behavioural tool rather than academic achievement), a convenience sample of 10 local students was sought from the remaining 196 students engaging in the local experience program. The international program provided nine shifts of approximately 8 hours over a period of 3 weeks (21 days), whereas the local program utilised a consecutive sample of nine shifts of the students' clinical placements from the 2015 schedule. Incomplete student logbook cases were excluded from the analysis. The student logbook is a hardcopy document that must be completed by all paramedic students to satisfy the requirements of their clinical experience phase of the undergraduate degree. This document contains no identifying information about patients other than routinely collected clinical data: patient age, gender, case type, treatment or therapy given, and whether the student observed or actively participated in the specific procedure or assessment.

Descriptive statistics were used to report patient and student experience factors. Specific case type exposure, demonstration of an element of paramedic practice, use of pharmacological agents and routes of administration of such agents are reported as proportions. A two-tailed independent samples z-test was used to report any statistical significance (p values) for differences between groups. Statistical analysis was conducted using SPSS (Statistical Package for the Social Sciences Version 20.0, SPSS Inc., 20.0.0.2, IBM Corporation, Armonk, New York, U.S.A.).

Table 1. Patient and shift characteristics by group

Patient and shift characteristics		Local N=206	International N=235
Patient age, mean (sd)		54.6 (26.1)	52.9 (25.7)
Patient gender (male), n (%)		102 (49.5)	138 (58.7)
Shift type:	Day, n (%)	198 (96.1)	108 (46.0)
	Afternoon, n (%)	8 (3.9)	70 (29.8)
	Night, n (%)	0 (0)	57 (24.3)
Mean caseload per paramedic student, n (sd)		13.2 (8.5)	14.4 (8.7)

Table 2. Clinical placement case type attended by local and international participant groups

	Case type	Local N=206	International N=235	p value
Cardiac	Chest pain, n (%)*	18 (8.7)	32 (13.6)	0.107
	Arrhythmia, n (%)*	5 (2.4)	19 (8.1)	0.031
	Angina, n (%)	2 (1.0)	2 (0.9)	0.895
	AMI/STEMI, n (%)*	4 (1.9)	3 (1.3)	0.557
	Arrest, n (%)*	2 (1.0)	11 (4.7)	0.022
Respiratory	Short of breath, n (%)*	10 (4.9)	14 (6.0)	0.750
	Asthma, n (%)*	1 (0.5)	4 (1.7)	0.382
	Acute pulmonary oedema, n (%)*	3 (1.5)	6 (2.6)	0.416
	Chest infection, n (%)	8 (3.9)	4 (1.7)	0.160
Gastrointestinal	Abdominal pain, n (%)	7 (3.4)	5 (2.1)	0.255
	Other, n (%)	0 (0)	5 (2.1)	0.060
Trauma	Penetrating, n (%)*	1 (0.5)	3 (1.3)	0.229
	Blunt, n (%)*	6 (2.9)	4 (1.7)	0.667
	Vehicle, n (%)*	7 (3.4)	7 (3.0)	0.802
	Pedestrian, n (%)*	0 (0)	4 (1.7)	0.184
Unconscious, n (%)		3 (1.5)	2 (0.9)	0.895
Stroke or TIA, n (%)*		10 (4.9)	4 (1.7)	0.027
Diabetic problems, n (%)		3 (1.5)	7 (3.0)	0.137
Fall, n (%)		23 (11.2)	16 (6.8)	0.349
Fracture, n (%)		4 (1.9)	2 (0.9)	0.070
Drug or alcohol problem, n (%)		11 (5.3)	12 (5.1)	0.780
Mental health problem, n (%)		17 (8.3)	4 (1.7)	0.318
Pain, n (%)		9 (4.4)	2 (0.9)	0.080
Bleeding, n (%)		4 (1.9)	4 (1.7)	0.851
Sepsis, n (%)*		3 (1.5)	1 (0.4)	0.641
Other medical, n (%)		31 (15.0)	14 (6.0)	0.119
Other surgical, n (%)		0 (0)	1 (0.4)	0.349
Other case type, n (%)		12 (5.8)	33 (14)	0.002
Hospital transfer, n (%)		1 (0.5)	3 (1.3)	0.382
Certification of death, n (%)		0 (0)	6 (2.6)	0.035
* High acuity cases				

Ethics

This study was approved by the Victoria University Human Research Ethics Committee.

Results

Following completion of the required shifts and submission of logbooks by the paramedic students, a total of 441 cases were analysed: 206 and 235 in the local and international study groups respectively. Two paramedic students did not submit their data, and subsequently withdrew from the study without explanation (one local and one international), and 26 cases were excluded (four local and 22 international) due to incomplete data. Clinical placement group characteristics are listed in Table 1. Patients attended were predominantly male in the international group. There was no significant difference in mean case-patient age between groups at 1.8 years (95% CI: -3.1–6.6, $p=0.5$). The mean caseload per paramedic student was also not significantly different between study groups at 1.2 cases (95% CI: -2.8–0.4, $p=0.1$). The international paramedic student group was able to engage in a greater range of shift work options, including more afternoon shifts and the opportunity to experience night shifts.

The international cohort reported a larger caseload during the study period, as well as predominantly greater proportions of exposure to the range of case types, particularly those rated as high acuity patients (including patients with chest pain,

arrhythmia, cardiac arrest, shortness of breath, asthma and acute pulmonary oedema). The international group reported statistically significant exposure to arrhythmia ($p=0.01$) and cardiac arrest ($p=0.022$) cases, while the local group reported a statistically significant attendance at stroke (0.027) cases (see Table 2).

Comparison of elements of paramedic practice applied on clinical placement revealed that the international group were more likely to perform supervised essential advanced life support skills (cardiac monitor, intravenous [IV] access, oxygen therapy, ventilation, cardiopulmonary resuscitation [CPR], and defibrillation), whereas the local group were more likely to perform supervised patient assessment (also a key advanced life support skill). These are reported in Table 3.

Where pharmacological agents common to both services were administered to patients, students in the local group generally performed more administrations ($n=83$) than the international students ($n=58$). However, international clinical placement students utilised a greater proportion of all of the pharmacological agents reported within this study, with 17/20 (85%) compared to 12/20 (60%) in the local group. These results are detailed in Table 4.

Where pharmacological agents were administered by paramedic students during clinical placement, the local group experienced a greater proportion of variety across the range of administration routes, except for the noted predisposition to utilise the IV route in the international setting (see Table 5).

Table 3. Elements of practice by group

Element of practice	Local N=206		International N=235		p value
	Observed	Performed	Observed	Performed	
Assessment*, n (%)	29 (14.1)	160 (77.7)	112 (47.7)	121 (51.5)	<0.001
Cardiac monitor*, n (%)	17 (8.3)	117 (56.8)	39 (16.6)	155 (66.0)	<0.001
Pulse oximeter, n (%)	19 (9.2)	143 (69.4)	38 (16.2)	145 (61.7)	0.077
IV access*, n (%)	17 (8.3)	26 (12.6)	33 (14.0)	81 (34.5)	<0.001
IV fluid, n (%)	7 (3.4)	6 (2.9)	13 (5.5)	20 (8.5)	0.022
Oxygen*, n (%)	4 (1.9)	30 (14.6)	19 (8.1)	49 (20.9)	0.002
Ventilation*, n (%)	2 (1.0)	2 (1.0)	1 (0.4)	25 (10.6)	<0.001
CPR*, n (%)	0 (0)	1 (0.5)	1 (0.4)	11 (4.7)	0.016
Defibrillation*, n (%)	0 (0)	0 (0)	2 (0.9)	8 (3.4)	0.011
Splinting, n (%)	1 (0.5)	9 (4.4)	1 (0.4)	7 (3.0)	0.734
Bandaging, n (%)	2 (1.0)	10 (4.9)	2 (0.9)	9 (3.8)	0.861
Infusion, n (%)	1 (0.5)	0 (0)	2 (0.9)	0 (0)	0.641
* Essential advanced life support skills					

Table 4. Pharmacological agent administered by group

Pharmacological agent	Local N=206	International N=235	p value
Adrenaline, n (%)	2 (1.0)	11 (4.7)	0.022
Aspirin, n (%)	6 (2.9)	3 (1.3)	0.225
Morphine, n (%)	21 (10.2)	12 (5.1)	0.043
Fentanyl, n (%)	14 (6.8)	2 (0.9)	0.002
Glyceryl tri-nitrate, n (%)	6 (2.9)	9 (3.8)	0.596
Glucose or dextrose, n (%)	4 (2.0)	3 (1.3)	0.577
Etomidate, n (%)	0 (0)	2 (0.9)	0.184
Verapamil, n (%)	0 (0)	3 (1.3)	0.104
Adenosine, n (%)	0 (0)	6 (2.6)	0.021
Prochlorperazine, n (%)	2 (1.0)	0 (0)	0.130
Midazolam, n (%)	4 (2.0)	0 (0)	0.032
Salbutamol, n (%)	7 (3.4)	4 (1.7)	0.255
Magnesium sulphate, n (%)	0 (0)	1 (0.4)	0.349
Methoxyfluorane, n (%)	11 (5.4)	1 (0.4)	0.002
Normal saline, n (%)	3 (1.5)	3 (1.3)	0.871
Metoclopramide, n (%)	3 (1.5)	0 (0)	0.130
Frusemide, n (%)	0 (0)	2 (0.9)	0.184
Dexamethasone, n (%)	0 (0)	1 (0.4)	0.349
Heparin, n (%)	0 (0)	1 (0.4)	0.349
Ketamine, n (%)	0 (0)	1 (0.4)	0.349
Total administrations, n	83	65	

Table 5. Pharmacological agent route of administration by group

Route of administration	Local N=206	International N=235
Intramuscular, n (%)	3 (1.5)	2 (0.9)
Intranasal, n (%)	8 (3.9)	1 (0.4)
Intravenous, n (%)	38 (18.5)	50 (21.3)
Nebulised, n (%)	7 (3.4)	5 (2.1)
Inhaled, n (%)	11 (5.4)	1 (0.4)
Oral, n (%)	7 (3.4)	4 (1.7)
Buccal, n (%)	6 (2.9)	5 (2.1)

Discussion

A number of qualitative studies have described the perceptions and experiences of health care students engaging in clinical placement, however there is a paucity of research to quantify the practical exposure attained during these programs (8-14). Paramedic clinical placements are often considered to be somewhat chance encounters, with no means of predicting caseload, case type, or skillset utilisation (4,11). Any provision

of clinical placement experience that enables an optimum learning opportunity for paramedic students should include a means of reducing the gap between theory and practice, particularly in the areas of: (8)

- clinical and technical skills
- pharmacological agent administration
- theoretical clinical knowledge demonstration during assessment and management of patients
- immersion in the practical life of a paramedic.

Measuring paramedic students' practical and technical skills was accomplished through documentation of case type, caseload and skills utilisation within this study. Performance rates for each skill were higher than observation rates amongst both groups, and this is an important reflection on the provider organisations in delivering a high quality practical experience for paramedic undergraduate students. Of particular note was that the international cohort gained greater exposure to the management of high acuity patients generally, and cardiac arrest patients in particular. This of course may be reflective of the specific health demographics within the region of practice, but certainly adds weight to an argument for diversification of the clinical placement experience beyond the international experience (4,14).

The administration of pharmacological agents by students, including route of administration, was achieved by transcribing the data recorded in the students' logbooks and is represented in Tables 4 and 5. There were noted differences in the diversity of pharmacological agents used by each organisation, and this inherently provided students placed internationally with an ability to develop a greater understanding of the types of agents used in different settings or regions, and to develop greater awareness of pharmacological agents generally during the placement experience. In order to assist in providing greater employability of paramedic students on completion of their studies, it is important that a degree program should provide learning opportunities beyond the limited capacity of the classroom and local environment (4,14). In recent years VU has moved toward provision of paramedic education that is more generic rather than focussing on individual state service provider clinical guidelines. This is an important facet of providing diversification of a student's capability from a national and international perspective, and should also be reflected in a experiential learning phase to provide diversity of clinical placements that include ambulance services, hospital departments and specialist medical services (such as dialysis and aged care) (4). Value adding to a degree course in this manner, and consequently to overall student learning, should therefore be considered an essential component of these programs.

Measuring understanding and appropriate use of clinical knowledge is difficult within the confines of this study (as the investigator was not present at each case), however, using a proxy of case type attendance and participation in the process of patient care was used to indicate opportunity to practice. Of course, the random aspect of the shift experience again dictates the student's ability to practise their skills, and yet an optimum clinical placement experience should provide diversity of case type, high caseload and particular emphasis on high acuity cases in order to optimise the experience for the student. While it is not always possible to provide such diversity or to guarantee quality of exposure, the use of a range of settings in which to gain this experience may prove beneficial.

The final important aspect of clinical experience for the student is the nature of immersion in the role of a paramedic. In addition to the opportunity to practise clinical skills, clinical placement should include other features such as engaging in shift work, the challenges associated with taking a meal break and emotional and physical fatigue (4,12). Culturally diverse populations should also be a feature of the student paramedic clinical experience, as the challenges in providing emergency health care where language, religion and culture affect its delivery are featured both globally and within Australia's multicultural society. The inability of student paramedics to work night shifts in Victoria was not evident in the international experience, where 54.1% of cases were safely attended by students engaging in both afternoon and night shift work. It was interesting to note that the focus of the two organisations involved in clinical placement appeared to differ with regard to the type of experience offered to the student, with the local group able to develop a greater exposure to patient assessment while the international group were more focussed on clinical skill application. Both of these elements of practice are important in developing the capability of a paramedic student, and it is therefore expected that an optimum model would provide a balanced opportunity to develop both elements equally (4,12,14). This may be achieved through discussions with the provider organisation to encourage such balance during these placements.

Limitations

This study is limited by the small sample size available within the international group for comparison. The unpredictability of cases attended on a particular shift or series of shifts by any single student or group of students provides a confounder for students having an equal opportunity to attend each case type. However, it is the somewhat random nature of this experience affecting both local and international groups equally that assists in providing an objective measure of the overall student clinical experience. Further, the student logbook provides a limited window through which to view the clinical experience that in future studies could be refined to improve the quality of data available for analysis.

Conclusion

This study provided a first descriptive analysis of a traditional and international clinical placement experience for paramedic undergraduate students, identifying benefit in both programs. Future studies that incorporate a mixed methods approach through inclusion of a qualitative assessment of the student experience while measuring practical exposure, will add important depth to the understanding of how clinical placement may be optimised for paramedic students. It is likely that variety and diversity will be a feature of such programs, both in value-adding the learning experience and alleviating the burden on traditional ambulance service placements.

Conflict of interest

The author has completed the ICMJE conflict of interest statement. Gavin Smith is an Associate Editor of the *Australasian Journal of Paramedicine*.

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