

Mapping workforce configuration and operational models in Australian emergency departments: a national survey

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Abstract

Objective. Hospital emergency departments (ED) in Australia and internationally have been experiencing increased demand, resulting in reduced hospital quality, impaired access and adverse health outcomes. Effective evaluation of new ED service models and their effect on outcomes is reliant on baseline measures of the staffing configuration and organisational characteristics of the EDs being studied. The aim of the present study was to comprehensively measure these variables in Australian EDs.

Methods. Australian hospital EDs with 24-h medical and nursing cover were identified and invited to participate in the study. Telephone interviews were conducted with nursing or medical department managers to collect data related to hospital characteristics, ED workforce and training and ED service and operational models.

Results. Surveys were completed in 87% of the population sample ($n = 135$). Metropolitan EDs were significantly more likely to retain higher full-time equivalents (FTEs) in several medical (staff specialist, registrar, resident and intern) and nursing (nurse practitioner (NP), nurse educator, nurse unit manager and registered nurse) positions. NPs were employed by 52% of Australian EDs overall, but this ranged from 40% to 75% depending on jurisdiction. The most commonly used operational models were FastTrack teams (72% of EDs), short-stay/observational unit (59%) and patient liaison models for aged care (84%) and mental health (61%). EDs that employed NPs were significantly more likely to use FastTrack

($P=0.002$). Allied health services most frequently available within these EDs were radiology (60%), social work (69%), physiotherapy (70%) and pharmacy (65%).

Conclusions. The present study has established a baseline measure of the staffing configuration and organisational characteristics of Australian EDs.

What is known about the topic? EDs are overcrowded due, in part, to the combined effect of increased service demand and access block. Innovative service and workforce models have been implemented by health departments aiming to improve service and performance. National uptake of these service and workforce innovations is unknown.

What does this paper add? The present study is the most comprehensive to date profiling Australian EDs covering hospital characteristics, workforce configuration, operational models and NP service patterns and practice.

What are the implications for practitioners? Information from the present study will assist health service planners to evaluate workforce and service reform models, and to monitor trends in emergency service development.

Additional keyword: models of care.

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Introduction

Hospital emergency departments (EDs) are a high-profile sector of the health service industry and provide real-time specialist health care for patient presentations that cover the continuum of clinical urgency and severity of illness and injury.¹ The key functions of emergency services are to evaluate, treat and discharge or admit patients according to need.² Emergency clinical staff must accept, treat and manage all patients of all ages presenting for care. They must deal with increasing numbers of patients with psychological presentations and those with symptoms and conditions suited for management in the primary care context, such as respiratory infections and minor injuries.³ In Australia, demand for ED care has increased by an average of 3% per annum over the past decade.¹ Furthermore, EDs around the world are facing congestion pressures from factors such as chronic disease in the community, reduced access to primary community care, growing demand, health workforce shortages and restrictions on public finances.^{2,4-6}

Hospital-wide factors, such as the shortages of in-patient beds, also increase ED congestion;⁷ occupancy rates in most hospitals are greater than the 85% maximum level for efficiency.⁶ The consequences of congestion in the ED have been reported as: (1) reduced quality of hospital service, such as deteriorating performance standards, increased waiting time, access block, transport delays and treatment delays; (2) impaired access, such as ambulance diversion and patient elopement; (3) provider losses; and (4) adverse health outcomes, such as increased mortality and morbidity.^{2,5,8,9}

In response to these increased demands on Australian EDs, the Australian Health Workforce Advisory Committee⁴ investigated and reported on ED models of care and health workforce planning. A key feature of their report was the consistent reference to two specific approaches to addressing the service issues in EDs: (1) the need for workforce reform; and (2) innovative service models. Various innovative models of care have been implemented in EDs in an attempt to improve service and reduce congestion. Examples of these models include FastTrack areas for patients with minor injuries, observation units, rapid assessment teams, allied health models and nurse practitioner (NP) services.²

Although there are reports in the literature of the evaluation of the effectiveness of some of these models,^{10,11} there is scant evidence to inform ongoing service planning. Furthermore, there is no published work on the uptake of these models, nor is there widely available information on current workforce profiles in EDs.

To date, reports examining service profiles of EDs in Australia have included state-wide assessments,¹² committee deliberations,⁴ studies focused on a single clinical discipline^{3,13,14} and a study of hospitals that were accredited for training emergency specialists.¹⁵ There is a gap in the literature of current national-level research that examines the service and workforce characteristics of all Australian EDs.

The aim of the present study was to comprehensively measure the workforce profile and organisational characteristics of Australian EDs across all states. This information will inform health service planning, policy on workforce reform and contribute evidence to improved community service in emergency care. It will also advance our understanding of the relative contribution and structure of health service teams in responding to 21st century healthcare demands.

Methods

A national telephone survey of eligible Australian EDs was conducted from April 2013 to March 2014.

Study population

The study population included all Australian public hospital EDs that provide 24-h medical and nursing staff cover and report ED episode data to the Australian Institute of Health and Welfare (AIHW). Hospital EDs that report data to the AIHW were identified from the MyHospitals website (<http://www.myhospitals.gov.au/>, accessed 18 October 2016). The provision of 24-h clinical staff cover was confirmed through telephone calls to all sites. In all, 155 ED sites were identified across Australia as meeting the inclusion criteria.

Survey tool development

The purpose of the survey was to obtain descriptive information about Australian EDs and their operational characteristics. The

tool was developed from several sources and contained four parts. Part A related to ED and hospital characteristics, Part B related to workforce configuration and training, Part C collected data on ED service and operational models and Part D collected information related to NPs and their service patterns. In Part D, responses to Item 11 (Limitations to Practice) were measured using a Likert scale with options from 1 (not at all limiting) to 5 (extremely limiting). An initial scoping Internet survey was conducted through the Australian College of Nurse Practitioners to establish characteristics of the NP workforce in Australian EDs. Fifty ED nurse practitioners responded (79% response rate) and the findings informed, in part, construction of Part D of the survey tool. The multidisciplinary investigator team made minor adjustments to ensure national relevance of the tool. The final version was pilot tested in three states to ensure its national validity.

Data collection

The instrument was administered through a telephone survey to optimise completion of all fields and to ensure accuracy of information. The ED nurse unit manager was identified as the interviewee for all sites and most interviews were conducted with these managers or the title equivalent. If during the interview the interviewee was uncertain or lacking information, a follow-up call was organised to complete the data collection at that site.

Nurse unit managers were sent a package via email containing an introductory letter explaining the study, participant information documents and the survey tool. The interviewees were contacted by telephone to ascertain their interest in participating in the study and an interview time was mutually agreed. The interviewees were advised to collect information from medical staff regarding medical staffing characteristics and NP staff for parameters of practice information before the telephone survey interview. At most sites the NP participated in, or clarified information for, Part D of the survey. For those sites where multiple NPs were employed, Part D was completed for each NP at that site. It was not possible to obtain this level of information from other clinicians.

Data analysis

Survey data were analysed using SPSS version 22 (IBM Corp., Armonk, NY, USA). More than 90% of questionnaires were complete across all sections. Missing data were primarily related to medical staffing information and for those variables with missing data, proportions and means were calculated over the remaining dataset. Data from the present study are descriptive and thus were analysed using proportions and mean averages where appropriate. Pearson Chi-squared test was used to compare group difference for categorical variables. Student's *t*-test was used to test continuous variables. Differences between groups were considered statistically significant if $P < 0.05$ (two-tailed).

Ethics approval

The present study was approved by human research ethics committees (HRECs) from the participating universities and state health authorities for health facility approval. Overall, ethics approval for the present study was obtained from 20 ethics committees. Furthermore, four data requests, four administrative reviews, 16 low and negligible risk applications and 78 site-specific governance applications were approved from individual

or divisional health facility settings. The participants were informed of the research procedures and agreement to make an appointment for the telephone survey was taken to indicate consent to participate.

Results

Surveys were successfully completed for 135 of the 143 eligible Australian hospital ED where HREC approval was provided, achieving a response rate of 94%. From the population of 155 eligible sites, human research ethics approval could not be obtained for 12 sites within the specific time frame for the project deadline and eight sites declined to be interviewed.

The hospital characteristics of the study sites are summarised in Table 1. Study sites were located in all but one Australian jurisdiction. We were unable to gain HREC approval for Northern Territory sites.

ED workforce configuration and training

Nursing

All surveyed EDs employed registered nurses and most employed nurse unit managers. A high proportion of study sites also employed nurse educators (78%; $n = 105$) and enrolled nurses (77%; $n = 104$). NPs were employed in 52% ($n = 71$) of Australian EDs, with 9% ($n = 12$) of the sample holding unfilled NP positions. Clinical nurse consultants, specialist nurses and assistant, associate or clinical nurse unit managers were employed in one-third of EDs (Table 2). The average full-time equivalents (FTEs) for EDs that employed these positions are also given in Table 2.

Nursing positions and average FTE were affected by state and geographical boundaries and were observed for NPs, clinical nurse consultants, nurse specialists and associate nurse unit managers. The proportion of EDs that employed nurse practitioners varied across the country. Most EDs in Western Australia (75%; $n = 8$) and Queensland (67%; $n = 6$) employed NPs, compared with only 40% ($n = 12$) of Victorian EDs. Clinical nurse consultants were employed in approximately 33% ($n = 45$) of EDs, with low proportions reported in Victoria (3%; $n = 1$) and Western Australia (27%; $n = 3$).

Although regional and rural EDs employed nurses in similar positions compared with metropolitan areas, their FTEs were significantly lower, in particular for NPs (1.62 FTE in rural and regional EDs vs 2.38 FTE in metropolitan EDs; Student's *t*-test, $t = 2.483$, $P = 0.015$), nurse educators (0.93 vs 1.41; $t = 3.92$, $P < 0.001$), nurse unit managers (0.99 vs 1.08; $t = 2.47$, $P = 0.015$) and registered nurses (36.49 vs 61.30; $t = 5.42$, $P < 0.001$).

Medical

Information on medical positions in Australian EDs is given in Table 2. Most EDs (93%; $n = 126$) employed a medical director, whereas 80% of EDs ($n = 108$) employed Australian College of Emergency Medicine (ACEM)-trained staff specialists with an average of 8 FTEs. Other medical staff were employed in over 40% of sites ($n = 56$) at an FTE of 3.7. These included visiting medical officers and general practitioner consultants. Over three-quarters of EDs employed registrars with an average FTE of 8.6 for ACEM-trainee registrars. Metropolitan

Table 1. Hospital emergency department (ED) characteristics (n = 135)

Data are presented as n (%)

State	
Australian Capital Territory	2 (1.5)
New South Wales	52 (38.5)
Queensland	24 (17.8)
South Australia	11 (8.1)
Tasmania	4 (3.0)
Victoria	30 (22.2)
Western Australia	12 (8.9)
Hospital type	
Colocated public private	5 (4.4)
Public hospital	130 (95.6)
ED size (for the 2013–14 year)	
>60 000 episodes per year	22 (16.3)
30 000–60 000 episodes per year	58 (43.0)
<30 000 episodes per year	49 (36.3)
Unknown	3 (2.2)
Consumer population	
Adults and children	119 (88.1)
Adults only	9 (6.7)
Children only	5 (3.7)
Women	1 (0.7)
Women and neonates	1 (0.7)
Australian College of Emergency Medicine Classification	
Major referral	30 (22.2)
Urban district	36 (26.7)
Major regional/rural	64 (47.4)
Subregional	2 (1.5)
Not classified	3 (2.2)
Nearest ED	
<30 min by car	68 (50.4)
0.5–1 h by car	31 (23.0)
1–2 h by car	15 (11.1)
2–3 h by car	12 (8.9)
>3 h by car	9 (6.7)
Adverse event system	
Incident Information Management System	51 (37.8)
PRIME	24 (17.8)
RiskMan ^A	20 (14.8)
Victorian Health Incident Management System	16 (11.9)
Safety Learning System	11 (8.1)
Clinical Incidence Forms (paper)	9 (6.7)
Electronic Incident Monitoring System	3 (2.2)
Other/unknown	3 (2.2)
Data reporting system	
Emergency Department Information Systems	57 (42.2)
FirstNet (North Sydney, NSW, Australia) ^A	37 (27.4)
iSOFT Patient Management (Macquarie Park, NSW, Australia) ^A	4 (3.0)
Symphony (Mulgrave, Vic, Australia) ^A	4 (3.0)
Victorian Emergency Minimum Dataset	4 (3.0)
Other	25 (18.5)
Unknown	4 (3.0)

^AProprietary system.

EDs were more likely to employ registrars than regional or rural EDs ($\chi^2 = 23.4$, $P < 0.001$).

Allied health professions

Allied health services are available in many Australian EDs, and allied health professionals were either directly employed,

Table 2. Workforce Configuration and Training

ACEM, Australian College of Emergency Medicine (specialist medical training college); FTE, full-time equivalent

	n (%)	Average FTE
Nursing		
Nurse practitioners	71 (52.6)	2.03
Nurse practitioners – vacant positions	12 (8.9)	1.23
Nurse educators	105 (77.8)	1.18
Clinical nurse consultants	45 (33.3)	2.57
Nurse specialists	46 (34.1)	7.26
Nurse unit managers	129 (95.6)	1.03
Assistant, associate or clinical nurse unit managers	36 (26.7)	4.12
Registered nurses	135 (100.0)	48.1
Enrolled nurses	104 (77.0)	4.08
Medical		
Director	126 (93.3)	0.90
Assistant director	46 (34.1)	0.89
Staff specialists	108 (80.0)	8.00
Other staff specialists	56 (41.5)	3.68
Registrars	103 (76.3)	
ACEM registrars	48 (35.6)	8.55
Other registrars	73 (54.1)	9.64
Residents or interns	113 (83.7)	14.53
Allied health professions available		
Radiology	80 (59.3)	
Social work	93 (68.9)	
Physiotherapy	95 (70.4)	
Occupational therapy	67 (49.6)	
Dietetics	57 (42.2)	
Speech pathology	55 (40.7)	
Pharmacy	89 (65.9)	
Training		
ACEM registrars	55 (40.7)	
Emergency nurse practitioners	40 (29.6)	
Other postgraduate nursing students	106 (78.5)	
Preservice students		
Medical	128 (94.8)	
Allied health	47 (34.8)	
Nursing	135 (100.0)	

shared between other departments within the hospital or requested by on-call services. In this survey allied health services were considered not to be available when patients were referred to external providers. The most common services available were radiology, social work, physiotherapy and pharmacy. EDs often also had access to occupational therapy, dietetics and speech pathology, as summarised in Table 2.

Availability of allied health services varied by state, with better access to services in Tasmanian, Victorian and Western Australian EDs, where more than 50% of hospitals ($n = 23/45$) had access to all seven listed allied health professions. Allied health service availability was similar for EDs across metropolitan and regional or rural locations.

Training

All participating EDs provided professional training and clinical placements. Thirty per cent of EDs ($n = 40$) had NP students and 78% of EDs ($n = 106$) had other postgraduate nursing students. Fellows of the Australian College of Emergency

Medicine (FACEM) registrars were trained in 40.7% of EDs ($n = 55$) surveyed (Table 2). Clinical placements for undergraduate or preservice students were provided for nursing (100% of EDs; $n = 135$), medicine (95% of EDs; $n = 128$) and allied health (35% of EDs; $n = 47$).

ED service and operational models

Data were obtained on ED service and operational models across all participating sites (Fig. 1). FastTrack (72%; $n = 97$) and rapid assessment teams (44%; $n = 59$) were the most commonly

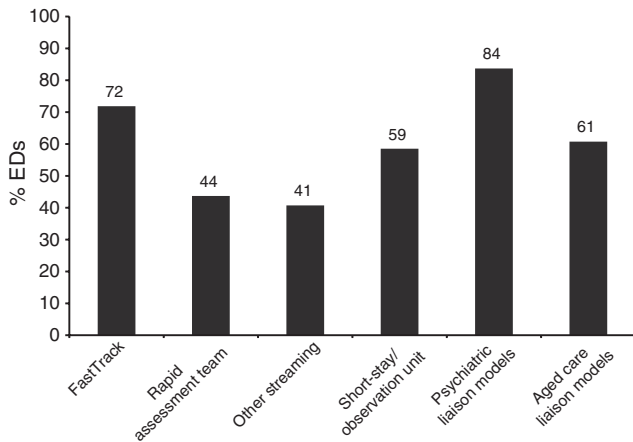


Fig. 1. Emergency department (ED) service models.

used patient streaming models. Hospitals that employed NPs were also more likely to adopt the FastTrack service model ($\chi^2 = 10.34, P = 0.002$). Short-stay and observation units were available in 59% ($n = 79$) of Australian EDs.

Aged care and psychiatric liaison models were found in 61% ($n = 82$) and 84% ($n = 113$) of EDs respectively. Other ED liaison models reported include drug and alcohol, indigenous, Hospital in the Home, paediatrics, refugee, Hospital Admission Risk Program and Community Hospital Interface programs.

Emergency NP service patterns and parameters of practice

Information on the work patterns of 159 NPs who were employed in 71 hospital EDs was collected. One-third (37%) of these NPs managed patients from all Australasian Triage Scale (ATS; http://www.cena.org.au/wp-content/uploads/2014/10/2012_06_14_CENA_-_Position_Statement_Triage.pdf, accessed April 2017) Categories 1–5. Conversely, 33% of ED NPs were limited to managing patients in ATS Categories 3–5, with a further 6% ($n = 9$) restricted to managing ATS Categories 4–5. Western Australia, South Australia and Victoria emergency NPs were more likely to be working with patients from all ATS categories, whereas those from Queensland and New South Wales were more likely to be restricted to ATS Categories 3–5.

Almost 90% ($n = 141$) of emergency NPs reported spending most of or all their time in FastTrack (Fig. 2).

In addition to their clinical activities, emergency NPs were involved in other roles, including education, training, mentoring, research and audit. Surveyed NPs spent, on average, 11% of their work week on these other roles.

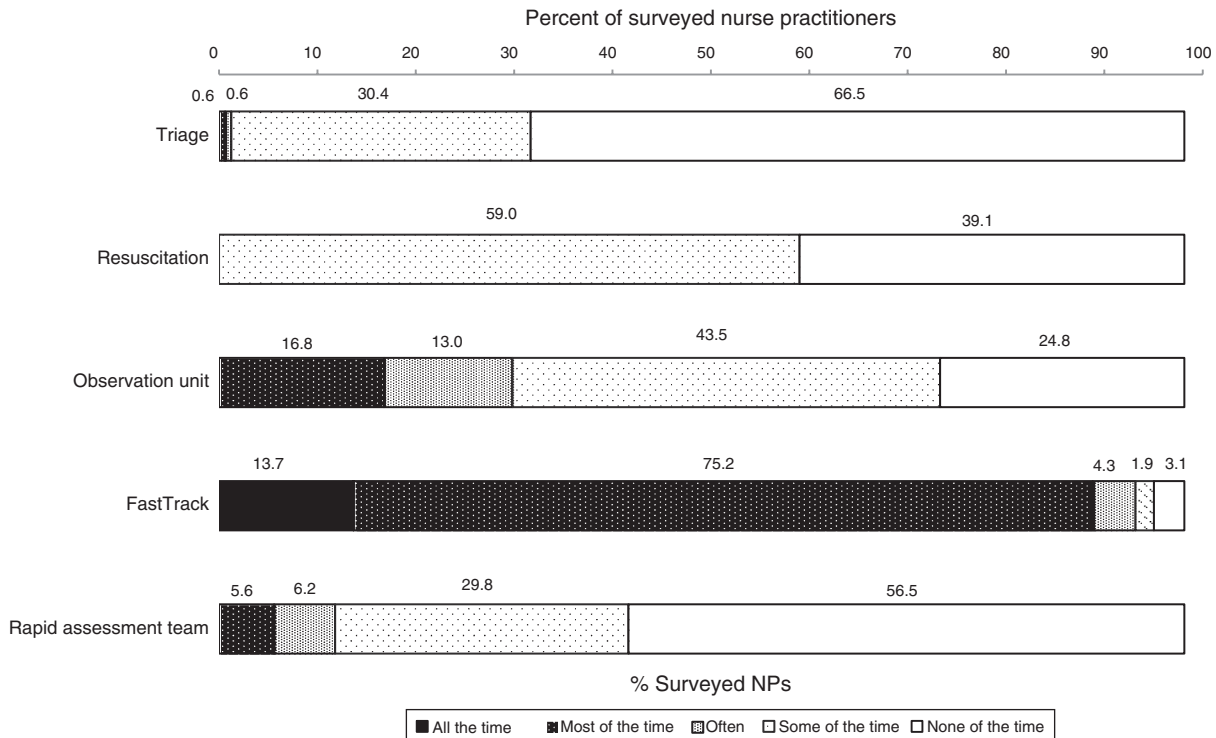


Fig. 2. Proportion of emergency nurse practitioners' (NPs) working week distributed across service areas and care models.

NP parameters of practice were measured by the extent to which the NPs had access to specific practice activities. Seventy per cent of emergency NPs ($n=113$) had a Pharmaceutical Benefits Scheme (PBS) number, with 11% ($n=18$) also holding a Medicare provider number (Medicare Benefit Schedule (MBS)). Those without these privileges found this moderately to severely limiting (Limitations to Practice (Item 11) mean scores 3.2 for both MBS and PBS).

NPs have no authority to issue WorkCover certificates and this group found the restriction to be moderately to severely limiting in their work (mean score 3.4). NPs also reported that it was somewhat limiting (mean score 2.4) when their referrals to other healthcare professionals were refused. When asked to what extent they are limited by their current scope of practice, NPs believed they were somewhat limited (mean score 2.5).

Discussion

The present study is the first reporting Australian ED characteristics to include all discipline workforce and service and operational models, and thus provides previously unknown baseline information to inform ongoing research into ED staffing. Previous studies reporting on surveys of Australian EDs have been limited either to state-based reports,¹² industry subsets, such as ACEM training hospitals,¹⁵ or single workforce disciplines, such as nursing.³ In addition, there is scant evidence that similar work has been conducted internationally, with available literature reporting research focused on service capability and capacity.^{16–18} The response rate to the present survey was exceptionally high, covering 87% of the sample population. Recruitment success was due, in part, to the method of survey delivery and a modest survey designed to be completed within a 15-min telephone interview.

More than 30% of the Australian population visited EDs for the financial year 2011–12, with more than 6.5 million emergency presentations.¹⁹ Australian EDs have adapted new operational and workforce models to improve service performance in the face of these challenges and increased demand, and the present study has revealed the variation in these models nationally.

Nursing staffing profiles in Australian EDs are affected by jurisdiction because nursing position classifications are determined industrially at the state or territory level, with the exception of the NP role, which is nationally regulated.^{20,21} Numbers of senior nursing roles, such as NPs and clinical nurse consultants, varied across jurisdictions. For example, Victorian EDs were notable for low adoption of both NPs and clinical nurse consultants. Of note, nomenclature for describing nursing positions varied by state, but equivalence was able to be determined through our pilot work described in the Methods. Despite this, because Australia now has one national registration body, the time is right to address consistency in role titles and role descriptors.

Medical positions in EDs in terms of residents, trainees and specialist staff did not differ between states; medical position classifications are nationally consistent and not subject to the jurisdiction-based variations found in the nursing workforce.

Traditionally, ED staff profiles nationally have been primarily dominated by medical and nursing staff. However, with the

changing profile of ED presentations, service planners have moved to a more extended multidisciplinary approach incorporating allied health professionals²² to improve support for patients with complex conditions and those needing social care. There is some evidence of improved outcome from this initiative, with recommendations in the literature for further research.^{22,23} The results of the present study show that Australian EDs have access to a variety of allied health professions through direct employment, shared employment with other hospital departments and on-call arrangements. These arrangements made it difficult to measure exact FTE for these professionals. State variance in types and FTE of allied health professionals was evident and may reflect differences in state health department-established standards and guidelines.^{4,24}

Different service and operational models of care have been adopted by EDs with the goal to provide the flexibility to streamline patient flow and provide timely care according to local need. One approach to improving patient flow, FastTrack, had widespread adoption with 72% of EDs reporting implementation of this service model. The acceptance of this model is due to reports of significant improvements in key national indicators where it is used,²⁵ as well as reported positive experiences by both patients and staff.²⁶ FastTrack, with both medical and senior nursing (NP) staff as treating clinicians, enables non-complex patients to be streamed, treated and discharged in under 2 h, particularly in high-traffic periods. This is particularly relevant in the context of government imperatives for EDs to meet National Emergency Access Targets. Hospital EDs with FastTrack were significantly more likely to employ NPs, and 90% of surveyed NPs reported that they spent most of or all their time in FastTrack. This suggests that the NP is seen as key to the success of the FastTrack service model.

Other common operational modes were liaison models. The use of liaison models varied between states and locations and specialist liaison models were adopted in EDs that serviced populations with high percentages of people with unique needs, such as refugees and young adults. Overall psychiatric and aged care liaison models were common throughout Australian EDs. Psychiatric liaison nurses and services are known to promote mental health awareness within the ED and focus on therapeutic intervention and coordination of care, and reducing waiting times for individuals presenting to the ED in psychological distress.²⁷

In the present survey, more information was collected from NPs than other emergency workforce positions because this provider is relatively new and there is scant information on this new service in Australian EDs. The present report provides the first comprehensive profile of emergency NPs in Australia. In terms of clinical practice activities, these NPs spent most of or all their work time in FastTrack areas. Most had a PBS number, whereas just 11% held an MBS number. Following landmark changes in legislation (Health Insurance Act 1973) in November 2010, NPs were eligible to apply for and hold an MBS number subject to certain conditions. One of these conditions was that access was limited to NPs working in private practice; NPs in public hospitals are not eligible for an MBS provider number, with some exemptions for rural and remote areas. Lack of an MBS provider number has previously been identified as limiting NPs ability to work within their legal scope of practice.^{28,29} This

causes disadvantage to patients in the ED in terms of timely referral to specialist medical or in-home care and may affect problems of increased service demand and access block. The findings from the present study show that further research is indicated on the potential effects of these policy limitations to NP practice and ED service.

Study limitations

The limitations of this study relate to completeness of data collection. Lack of data from the Northern Territory limits inclusion of this jurisdiction in the national profile of ED staffing and service models. Less than 10% of surveys contained missing data; however, this missing information was often medical workforce FTE items. The present study was restricted to public EDs and the exclusion of private EDs, which represent almost 10% of all Australia EDs, limits the generalisability of the findings of the present study. In addition, and common to all survey studies, self-reported data are subject to threats of validity.

Conclusions

The present study is the first to measure the staffing configuration and organisational characteristics of Australian EDs. Previous research showed that the largest cohort of NPs in Australia is employed in EDs²⁹ and now, through the present study, we know the service patterns and distribution of this cohort.

The findings of the present study reveal that Australian EDs are well staffed in terms of medical specialists and employ NPs. However, state differences were found when examining the prevalence of certain nursing positions and allied health professionals. When examining operational models, state differences were found regarding the availability of aged care and psychiatric liaison models. It was revealed that FastTrack and short-stay and observation units were the most commonly used patient streaming models. Notably, the present study is part of a larger body of work investigating the practice and profile of NP services in EDs nationally. The present study will enable us to examine associations between these service characteristics and patient outcomes of NP service in EDs.

Australian health service providers, clinical leaders and government departments now have access to reliable, up-to-date information on the workforce configuration and organisational characteristics of EDs. This information is useful in informing service planning and innovation, ongoing staff education and distribution and a baseline for measuring trends in ED service development.

Competing interests

None declared.

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