NSW Health Emergency Department Workforce Research Project

Final Report

PricewaterhouseCoopers

Acknowledgements

The development of this Final Report, and the Emergency Department Workforce Principles and Guidelines contained in it, has been funded by the New South Wales Department of Health.

The contribution of people who provided direction and assisted with the development of the Final Report and the Workforce Analysis Tool is gratefully acknowledged:

NSW Health Project Team

Robyn Burley, Daniel Comerford, Michael Hannon, Cathy Ellis, Jenny Morris, Alison King.

PwC Project Team

Dr Anne-Marie Feyer, Jonathan Lunn, Mary Mitchelhill, Laura Applebee-Jones, Deanna Pyper, Rachel Linton, Ruth Goodwin.

Emergency Department Workforce Reference Group

Co-Chairs

Robyn Burley	Director, Workforce Development & Innovation Branch, NSW Department of Health
Dr Tim Green	Director, Emergency Royal Prince Alfred Hospital, SSWAHS

Members:

Anne Hawkins	Clinical Nurse Consultant, GSAHS
Antoinette Borg	Senior Nurse Manager, St George ED, SESIAHS
Brett Williams	Area Director Allied Health SWAHS
Catherine Foster-Curry	Service Manager Division of Emergency Medicine, John Hunter Hospital, HNEAHS
Colleen Mullens	A/NUM Blacktown Emergency Department, SWAHS
Daniel Comerford	Area Performance Manager, Project Director State-wide Redesign Program
Deb Thoms	Chief Nursing and Midwifery Officer, NSW Department of Health
Dr Carolyn Hullick	Director, Emergency John Hunter Hospital, HNEAHS
Dr Kate Porges	Emergency Physician Gosford Hospital NSCCAHS
Dr Louis Christie	Director of Medical Services, Orange Hospital, GWAHS
Dr Matt O'Meara	Director Emergency, Sydney Children's Hospital, SESIAHS
Dr Richard Cracknell	Australian Salaried Medical Officers Federation NSW
Elizabeth Koff	Director Clinical Operations, SESIAHS
Glenn Tyrrell/Gerard Hayes/Bob Morgan	Health Services Union
Jenene Bell	Manager, Workplace Relations & Management Branch, NSW Department of Health
Matthew Byrne/Fran McQuade/Rhonda Kassis	NSW Nurses Association
Jenny Carter	Operations Manager, Patient Transport and Flow Unit, JHH, HNEAHS
Paul Gavel	Director of Strategic Workforce Planning and Development, SSWAHS

Special thanks also goes to the Emergency Departments that participated in data collection and testing of the principles and guidelines and workforce analysis tool:

Field Test Emergency Departments

Auburn Hospital
Blacktown Hospital
Coffs Harbour Hospital
Dubbo Base Hospital
Goulburn Base Hospital
Grafton Base Hospital
John Hunter Hospital
Liverpool Hospital
Royal North Shore Hospital
Royal Prince Alfred Hospital
Shoalhaven and District Memorial Hospital
Sydney Children's Hospital
Tamworth Base Hospital
The Tweed Hospital
Wagga Wagga Base Hospital
Wollongong Hospital
Wyong Hospital

Table of contents

Executive summary

Background and aims of the project

The NSW Health Emergency Department Workforce Research Project is a response to emerging emergency department (ED) staffing challenges in NSW. It is focused on the effective deployment of staff skills to an ED. The project aims to develop:

- An evidence base for decisions on skill mix in EDs
- Guidelines and principles for use across EDs in determining ED staffing profiles.

EDs are a core component of the public health system with growing demand for ED services and a concurrent challenge in the provision of a suitable skilled and experienced staff mix. Currently NSW EDs see over two million presentations annually, a number expected to increase. This growth is evident worldwide and similar challenges are experienced around the level and mix of ED staff available.

To address the staffing skill mix challenges in EDs a range of principles and guidelines have been developed by professional bodies in Australia and internationally highlighting the importance of a defined skill mix in the ED. Additionally, evidence in the literature highlights the importance of adequate ED staffing, without which negative impacts of increasing workloads in EDs can occur. Despite literature examining the effects of different roles in an ED in the context of models of care, few studies have examined the impact of different staffing or skill mix on ED performance as a whole.

The study reported here examined the ED workforce as a whole, considering the baseline skill mix for EDs in addition to specific skill mix requirements for models of care. For the purposes of this report skill mix refers to the combination of skills available at a specific time in the ED.

Overview of Final Report

The Final Report describes the Emergency Department Workforce Research Project in detail. The report outlines the background to the project including the key drivers for the project and the current ED environment in Australia and internationally. The report details the overall four-phased approach to the project to determine an evidence base for staffing an ED. This includes the Diagnostic and Solutions Design Phases, a Reporting Phase and finally a Testing Principles and Guidelines Phase.

The Diagnostic and Solutions Design Phases are summarised with key findings presented.

The aim of this report is to:

- Describe the methodology and findings of the Diagnostic Phase
- Identify conditions that apply to specific ED scenarios
- Present the principles and guidelines for skill mix in a Level three to Level six ED in NSW
- Identify conditions that influence the introduction of models of care
- Provide a “how to” guide for NSW EDs to identify the scenario to which they belong
- Provide case examples to demonstrate use of the scenario framework and applications of the principles and guidelines to the ED using a workforce analysis tool.

Diagnostic Phase

The Diagnostic Phase was key to identifying the current ED environment in NSW. Central to this stage were site visits to a representative sample of Level three to Level six EDs in NSW with the aim of:

- Identifying systematic variation between EDs
- Identifying and describing the current NSW ED workforce and their key activities
- Describing the workforce and operational models in EDs in NSW
- Identifying the perceived changes to the ED workforce and challenges in a changing health care landscape, derived from key stakeholder interviews
- Providing contextual information about ED workforce models nationally and internationally.

The site visits comprised a range of activities for data collection:

- Contextual analysis looked at the four contextual dimensions of Throughput and Catchment Characteristics, Access to Services, ED Staff Profiles, Education and Models of Care. The key finding from this analysis was that there is considerable systematic variation between and within Level three to Level six EDs. Further, with the exception of Level six, level of ED was not an indicator of hospital profile.
- Activity mapping sessions were held to identify the range and skill level of staff carrying out patient and non-patient activities and the potential future roles for staff. A comparison of the findings from the activity mapping revealed two broad themes:
  - Few similarities were identified with reference to staff members responsible for patient and non-patient activities, rather various staff groups were responsible for the variety of activities and took on multiple roles within the ED.
  - Highly skilled staff tended to take on tasks that did not utilise the specific skills they possess, with other staff members identified as potentially being able to take on these tasks.
- Structured interviews were conducted with key stakeholders at each site with thematic analysis conducted. Overall, most sites indicated a change in demand within the ED due to: overall increasing presentations; increasing acuity and complexity of patients; increasing volumes of lower acuity patients.
- Other key findings include:
  - Perceived increase in the use of diagnostic testing for decision making
  - Perceived culture of completing all required diagnostics and treatments prior to transfer to the inpatient unit
  - Impact of clinical leadership within EDs
  - Tailored professional development packages more prevalent for nurses than for medical staff
  - Difficulty backfilling nursing and medical shifts for attendance at formal training.
- National and international consultation was carried out via surveys and interviews. Findings revealed similarities in skill mix challenges, increasing demand and the introduction of workforce models and models of care to manage the increasing demand and streamline care.

Solutions Design Phase

The Solutions Design Phase of the project used the data analysed in Phase One to develop a scenario framework for identifying ED profiles to apply operational and workforce models of care. In conjunction with evidence from the literature and existing principles and guidelines from professional bodies, the data also informed the development of principles and guidelines for ED skill mix.

Recognising that there is not a “one size fits all” formula for staffing EDs, the scenario framework was developed to assist NSW EDs to build appropriate staffing profiles. Individual ED data provided by NSW Health was used to map NSW Level three to Level six EDs to a particular scenario (eighteen scenarios in total).

The framework for identifying ED scenarios was built using a four-stage approach.

1 Drivers of ED characteristics were identified. These are remoteness, activity and patient complexity. These three drivers are correlated and interdependent, and as such, all three drivers need to be used to determine staffing skill mix.

2 Each driver was operationalised in terms of observable measures. The Australian Standard Geographic Classification - Remoteness Areas (ASGC-RA) is used to measure remoteness; annual number of presentations to ED is used to measure activity; and a weighted combination of variables (clinical urgency, proportion of aged presentations, admission rate and proportion of ambulance arrivals) is used to measure complexity.

3 A decision tree approach was used to build scenarios, with the identified drivers yielding eighteen potential ED scenarios.

4 These scenarios were then mapped to models of care profiles, which are staffed using multiples of the ED baseline staff skill mix.

Using the scenarios and mapped models of care as a reference point for staff skill mix in EDs, principles and guidelines were then developed for the Level three to Level six EDs in NSW.

Principles and Guidelines

General principles have been developed for the baseline staff skill mix of Level three to Level six EDs in NSW. While no overall single staffing model is considered applicable to every ED, this baseline skill mix is fundamental to every Level three to Level six ED for safe and effective care delivery. It includes a combination of qualified and experienced medical and nursing staff, allied health staff as applicable and staff in support roles also crucial to the delivery of emergency care.

The baseline staffing is categorised into the discrete skill mix groupings which are listed below:

- Complex leadership
- Educational leadership
- Clinical leadership and management
- Clinical decision making
- Clinical skills
- Clinical Assistant skills
- Non-clinical skills.

Importantly there is recognition in the baseline principles and guidelines of the role an ED has in the training of the future workforce and in building the knowledge and skill set of the existing workforce for

medical, nursing and allied health staff. Further there is a need for an adequate supply of and access to educational leaders to support education and workforce development and to provide direct clinical supervision to novice and trainee ED staff. Consideration of the future expected increase in the number of interns and graduate nurses entering the health system is important to deciding the educational support required in each ED.

Principles and guidelines have also been developed for models of care appropriate to the ED setting. Models of care can be applied to an ED to focus the ED on the way that their specific patient profiles are managed. These models of care are not necessarily applicable to every ED, nor necessarily applicable to all times of the day and day of the week. It is also recognised that models of care relevant to an ED may change as new and innovative ways of managing the emergency department presentation are developed. Models of care identified in this report and used to map to ED profiles are listed below:

- Streaming
- Fast Track
- Short Stay Observation Unit
- Care Coordination Team
- Rapid Assessment Team
- Psychiatric Liaison.

The baseline staff skill mix can be deployed to the models of care identified for each ED profile with the exception of where a skill mix cannot be drawn from the baseline, for example mental health skills for psychiatric liaison roles. The skill sets deployed to the models of care are in multiples of the baseline and hence single staff members should not be committed to working in multiple locations within the ED at any one time. The staff skill mix can also be deployed permanently as a feature of each model of care. The deployment of the baseline skill mix to each model of care will need to be determined to meet the capacity of the ED.

Testing the principles and guidelines

The principles and guidelines were tested in series of workshops, utilising a Workforce Analysis Tool, developed by NSW Health in conjunction with PricewaterhouseCoopers. The purpose of the tool is to assist the ED to plan and implement an appropriately skilled ED workforce, using a consistent approach based on the principles and guidelines. PwC and the NSW Department of Health worked collaboratively through a series of workshops to develop this tool.

The development of the tool included key areas for analysis, identifying areas of variation to the principles and guidelines, and subsequent action areas the ED could apply. The tool was then tested and validated in four NSW EDs, across the model of care profiles A-E. This process also allowed testing of the principles and guidelines for relevance to the ED, identification of any additional skill mix groups/data and identification of principles and guidelines that required revision and refinement.

Data collected during the site visits and through completion of an evaluation identified several areas for revision and further consideration. Changes were addressed with reorganisation and refinement of principles and guidelines to provide clarity and to highlight the significance of education and supervision across ED skill mix groups, acknowledge the scope of external ED obligations and the ED trauma response. Through the testing process and with recommended refinements made, it is considered that the principles and guidelines have been effectively tested for relevance and applicability to an individual ED using the purpose built tool.

Implementation considerations

Four key areas that need to be taken into consideration to implement the scenario framework and principles and guidelines are defined in the report and include:

- Data access and integrity
- Governance considerations
- Process and cycle of review
- Operational viability.

Key Result Areas have also been defined for the ongoing monitoring and sustainability of the solutions and these include the areas of:

- Patient measures
- Staff measures
- Efficiency and service provision measures.

Some clinical indicators are reported currently as part of State ED KPI monitoring and other key result areas can be considered to provide a balanced assessment of implemented principles and guidelines. It is recommended that individual EDs incorporate monitoring of any selected/considered KRAs into business as usual following implementation. That is, collect these KRAs alongside routine data.

Development of ED scenarios and mapping to models of care required a measure of complexity to be applied to EDs. The measurement was limited to available data, hence a new measure of patient complexity, categorised in bands along a continuum, was developed as part of this research project.

Strengths of the model include:

- Based on 2008/09 NSW Health ED data, it is current and suitable for use across NSW EDs
- Evidence-based and has strong face validity when tested with NSW EDs.

Limitations of the model include:

- Complexity formula is only as good as the variables which comprise the measure
- Variability in input data across the NSW for admission rate, triaging practices and arrival by ambulance to hospital
- Data was not available for many small rural hospitals hence inclusion of this data may change the complexity measure for other EDs.

In summary, the complexity measure developed in this phase of work reflects the best available option with available data from NSW Health. It is evidence-based and has strong face validity. To maintain currency, this model should be tested and adjusted over time as patient complexity change.

1 Introduction

1.1 Project overview

Emergency Departments (EDs) are central to the public health system. Demand for ED care continues to grow worldwide and pivotal to that care is the level and mix of skills available. The challenge in meeting the growth in demand and providing emergency care appropriate to the current health landscape is access to suitably skilled and experienced staff to perform the work required.

The ED Workforce Research Project is being carried out in response to emerging ED staffing challenges in NSW. The objective of this project is to determine how best to deploy the skills of staff to perform the work required to improve the patient journey, while maximising the safety, quality and efficiency in EDs.

The key drivers for the research into ED Workforce include:

- Shortage of available medical staff with ED skills
- An ageing medical and nursing workforce
- An increasing proportion of novice nursing and medical staff working in EDs
- Changing roles with task substitution and delegation and new workforce models and models of care introduced into ED.

The key outcomes of this project include:

1 An evidence base for decisions on skill mix in EDs

2 Development of guidelines and principles for use across EDs in determining ED staffing profiles.

The project comprised three initial Phases, with a fourth added to test the principles and guidelines in individual EDs:

Phase 1: Diagnostic Phase

Phase 2: Solutions Design

Phase 3: Reporting

Phase 4: Testing Principles and Guidelines.

This Final Report is a core component of the Reporting Phase and includes implementation considerations and key result area (KRA) considerations for ongoing monitoring and evaluation of skill mix requirements. With the addition of Phase 4, the Final Report also includes a description of the development of the workforce analysis tool in collaboration with NSW Health and a summary of the site visits undertaken to test the principles and guidelines.

1.2 Final Report overview

This Final Report describes the ED Workforce research project in detail. It outlines the background to the project including the current ED environment in Australia and internationally and the key drivers for this project. The report details the overall four-phased approach to the project to determine an evidence base for staffing an ED. This includes examination of the literature, key informant interviews, national and international consultation, site visits and site specific data collection, activity mapping and review of state-wide ED data. The Diagnostic and Solutions Design Phases are summarised with key findings presented. The principles and guidelines developed for the project have been described in detail alongside a scenario framework and ED profiles to allow mapping of EDs to specific models of care. A final stage of testing the principles and guidelines using a newly developed workforce analysis tool has been described alongside case studies and findings from the four sample EDs visited. Also included is the considerations for implementation of the principles and guidelines and ongoing management and monitoring of ED staff skill mix assessing Key Result Areas.

This report:

- Identifies conditions that apply to specific ED scenarios
- Identifies conditions that influence the introduction of models of care
- Provides case examples to demonstrate use of the scenario framework and applications of the principles and guidelines to the ED using a workforce analysis tool.
- Provides a “how to” guide for NSW EDs to identify which scenario they belong to
- Recommends Key Result Areas (KRA) for monitoring and management of ED staff skill mix.

This report also comprises information from the Diagnostic and Solutions Design Phases of the project.

1.3 Roadmap to the report

Section	Heading	Description
2	Background to the project	Provides background information to the project including an overview of NSW EDs, health workforce challenges in Australia, and an international comparison.
3	Approach to the ED Workforce Research Project	Describes the approach to the project including selection of NSW ED sample sites, data collection and consultation in the Diagnostic Phase and the Solutions Design Phase.
4	Diagnostic Phase	Overview to the Diagnostic Phase, methodology and key findings.
5	Solutions Design Phase	Overview to the Solutions Design Phase, methodology and development of an ED scenario framework, models of care and principles and guidelines.
6	Principles and guidelines	Presents principles and guidelines for staffing EDs in NSW based on skill mix. Principles and guidelines are presented as a baseline staff skill mix requirements for Level three to Level six EDs, in addition to specific guidelines for models of care.
7	Testing the principles and guidelines	Describes the approach taken to developing and testing a workforce analysis tool in collaboration with NSW health to test the applicability of the principles and guidelines to an individual ED.
8	Analysing the characteristics of EDs and using the principles and guidelines: a practical application	Describes the process for mapping an EDs characteristics to a scenario using current ED data and also demonstrates a practical application of the ED Workforce Analysis Tool and Principles and Guidelines through a series of three ED Case studies.
9	Implementation considerations for NSW	Outlines implementation considerations for NSW Health and the individual EDs, describing the use of the scenario framework and ongoing data monitoring.

2 Background to the project

2.1 Emergency departments

One definition of an ED describes a dedicated area in a hospital that is organised and administered to provide a high standard of emergency care to people in the community who perceive the need for, or are in need of, acute or urgent care including hospital admission[i]. EDs are open 24 hours a day 7 days a week and therefore provide the only around the clock primary and emergency care service. EDs are normally staffed by multidisciplinary teams 24 hours a day; including allied health staff in some EDs. However, some smaller EDs in Australia do not have dedicated medical staff on-site.

In other countries, the ED is sometimes known by other names, such as the emergency room or ER in the US, accident and emergency or A&E in England, and casualty in Scotland. While the terms are varied and used interchangeably, the care provided is similar.

2.2 Overview of NSW emergency departments

In 2008–09, NSW EDs handled more than two million presentations from just over one million individuals. Of that number, 610,000 individuals presented to ED once, and nearly 39,000 individuals presented to ED more than 5 times each. The average ED saw 23,000 presentations in 2008-09, of which nearly 6,000 or 25% were paediatrics[ii].

EDs in NSW are categorised according to the Levels one to six – also known as role delineation[iii]. Each ED provides a different level of service according to its rated level. Level three to Level six EDs are included in this project and Table 1 describes each of these Levels.

Table 1: Summary of the different levels of the Emergency Department[iii]

Level	Description
3	Level three EDs provide emergency services within a small hospital setting. Assessment and treatment areas are staffed by nurses 24 hours a day, with 24 hour access to Medical Officers (either on site or available within 10 minutes). Specialists in general surgery, anaesthetics, paediatrics and medicine are available for consultation. Pathology, radiology and operating suites are available during normal hours and on call after hours. There are formal quality assurance programs and education programs for nursing and medical staff.
4	Level four EDs provide similar services to Level threes, but are able to handle most emergencies, including stabilisation and assisted ventilation. The ED is purpose designed, and is run by a Medical Director trained in emergency medicine. RNs, including a RN with post basic emergency qualification, are on site 24 hours a day. Specialists are on call for intensive care, general surgery, paediatrics, orthopaedics, anaesthetics and medicine, with on-call liaison psychiatry. There is 24 hour access to pathology, radiology and operating suites. Formal in-house education programs are provided for medical and nursing staff. Access to a CNC is available.
5	Level five EDs are designed to manage all emergencies. In addition to Level four capabilities, Level fives have 24 hour on call emergency consultation cover, plus 24 hour psychiatric assessment on call. Both the Medical Director and Registrar are FACEM accredited. The ED may be a Metropolitan/Regional Trauma Service, with links to referral hospitals for tertiary level sub-specialities. Access to a CNC is available.
6	In addition to the services provided by Level five EDs, Level six EDs provide neurosurgery, cardiothoracic surgery, CT and nuclear medicine on site. Subspecialists are available on roster, and there may be ED Staff Specialists rostered 24 hours a day. The ED has capacity to manage major trauma, invasive monitoring and short term ventilation. There is a dedicated Nursing Director, CNC and CNE. There is an active research program, as well as an advice and stabilisation service for complex cases transferred from other hospitals.

NSW currently has 87 Level three to Level six EDs as indicated in Table 2. For the purposes of the report all EDs in the Level three to Level six groupings have been considered, however, data for analysis was available for 64 of these 87 EDs. Despite this it is considered that all Level three to Level six ED profiles are included in the developed Principles and Guidelines and hence these can be applied to all EDs in this group. Data for the 64 EDs reveal that 35 are metropolitan and 29 are rural or remote.

Table 2: Number of Emergency Departments in NSW by ED Level

Level	Number of Hospitals
6	11
5	13
4	20
3	43
Total	**87**

2.3 Health workforce challenges in Australia

Health workforce planning has been a priority in the Health minister's agenda since 1995, when the Australian Health Minister's Advisory Council established three planning committees relating to the national health workforce. The need for effective health workforce planning is being driven by several forces, all of which are generating stress on EDs.

Firstly growing demand for ED services is driven by a growing population that is becoming increasingly aged and, as such, medically complex. Demand for ED services is also driven by changing patient expectations: the population is becoming better informed on healthcare and more discerning when seeking care, leading to an increased preference for the "one stop shop" style of care provided by EDs[iv].

Secondly, a shortage of a medical workforce to handle the demand for primary care services both in the community and in hospitals. The GP population is ageing, there is a smaller ratio of GPs to population in rural and remote locations compared to metropolitan areas, and the number of after-hours services has decreased. The impact of these changes to the medical workforce has been increasing waiting lists for GPs, causing increasing numbers of presentations to EDs[iv].

Thirdly, GPs are increasingly likely to refer complex patients to ED instead of treating them in a community-based setting. This practice is likely to have been driven by increasing legal claims for negligence against GPs in the past 10 years[iv].

Demand for emergency medicine services is growing at a rate that is difficult for governments to sustain financially. Accordingly, the government is actively seeking ways to increase efficiency of the health workforce by making better use of the time of highly skilled emergency clinicians.

2.4 International context

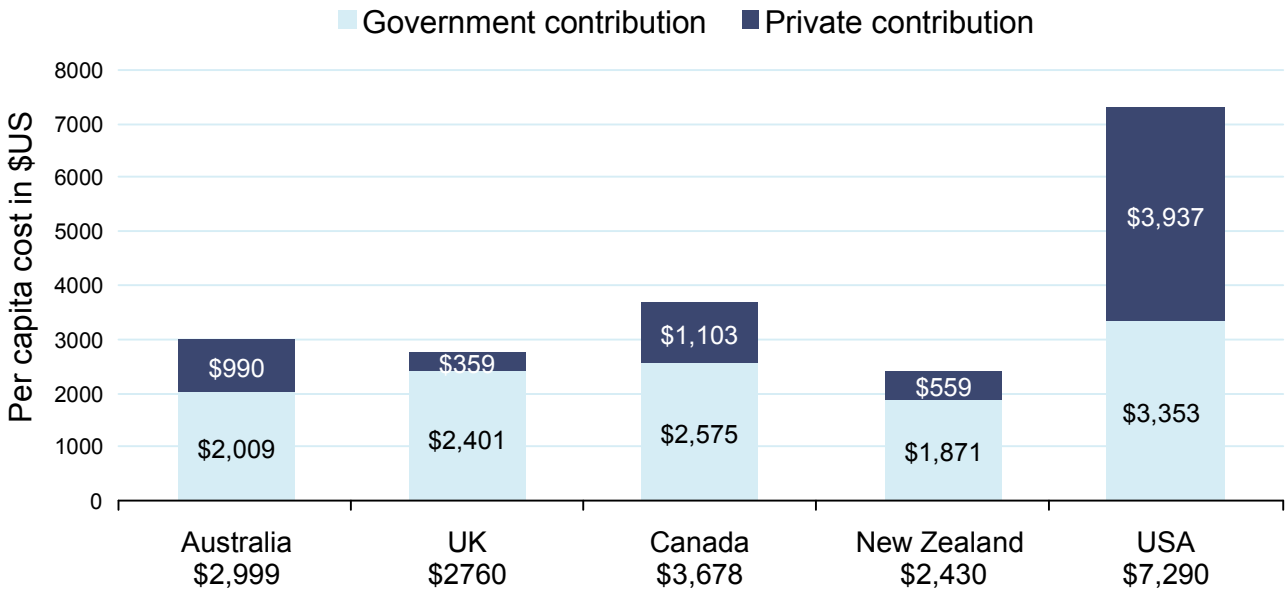
As part of a review of the literature on ED models of care, practices in other countries were investigated as a point of comparison for Australia. Particularly, England, Scotland, Canada, USA and New Zealand, countries with systems of emergency care analogous to Australia's were considered.

Like Australia, the UK, Canada and New Zealand have a universal health insurance system. In fact, the USA is the only industrialised country not to provide some form of universal health insurance[v]. However, the US government provides health cover for eligible aged persons, the very poor, disabled individuals

and children through Medicare, Medicaid and the State Children's Health Insurance Program[vi]. In addition, the Emergency Medical Treatment and Active Labor Act ensures access to emergency care by stipulating that emergency health providers cannot withhold treatment for lack of evidence of the ability to pay[vii].

The annual cost of healthcare in Australia is $2,999 per person, 67% of which is paid for by government[viii]. Similarly, government covers 70% of healthcare costs in Canada[ix]. In the USA, on the other hand, government covers only 46% of healthcare costs[vi], whereas employers provide health insurance for 59% of Americans[vii]. Figure 1 shows the comparative costs of healthcare for Australia, UK, Canada, New Zealand and USA.

Figure 1: Comparative costs of healthcare (per capita) around the world



2.5 Defining staff skill mix

Given that a major aim of this project is to develop "an evidence base for decisions on skill mix in Emergency Departments", it is important to establish a clear definition of what is meant by the term 'skill mix' for the purposes of this project.

According to one commonly cited definition, skill-mix is a broad term that can refer to:

> *"the mix of posts in the establishment; the mix of employees in a post; the combination of skills available at a specific time; or the combinations of activities that comprise each role, rather than the combination of different job titles".* [x]

For this project, the third meaning in this statement is considered most appropriate and will be used: that is, skill mix refers to the combination of skills available at a specific time in the ED. This definition is in line with the approach to this project by NSW Health and the Emergency Department Workforce Reference Group[1] (EDWRG) which acknowledges that some skills can be shared across professional groups. A basic assumption of this project is that the number and type of staff possessing clinical and non-clinical skills can and should vary between departments; however, all the skills should be covered in the staffing profile. Thus, there is not a "one size fits all" formula for ED staffing.

[1] The EDWRG is a reference group, comprising workforce representatives from various stakeholder groups, convened to provide advice to NSW Health on the Emergency Department Workforce Research Project.

3 Approach to the ED Workforce Research Project

3.1 Introduction

This section describes the four phased approach taken to complete the NSW Health ED Workforce Research Project. In particular, this section outlines the:

- High-level approach to completing the project
- Key activities completed for each of the phases
- Sources of evidence in building the scenario framework and developing the principles and guidelines.

3.2 Overview of the approach

The project comprised four phases:

- Phase 1: Diagnostic Phase, which consisted of a project kick off, high level literature scan, national and international consultations and site visits to 13 selected NSW EDs.
- Phase 2: Solutions Design Phase, which consisted of the development of the scenario framework, models of care profiles, and principles and guidelines.
- Phase 3: Reporting, which included the draft final report.
- Phase 4: Final testing of Principles and Guidelines, which consisted of providing input into the development and testing of an ED workforce analysis tool, testing of principles and guidelines for ED applicability, and submission of a final report.

A summary of the approach is illustrated in Figure 2, which includes the key activities undertaken. The key findings from the Diagnostic and Solutions Design Phases are presented in Section 4 and Section 5 respectively.

Figure 2: Overview of the four phase approach

Phase 1 Diagnostic	Phase 2 Solution Design	Phase 3 Reporting	Phase 4 Final P&G testing
8 weeks	4 weeks	4 weeks	10 weeks
Key activities			
• **Activity 1:** Project kick off • **Activity 2:** High level evidence scan, including national/ international comparisons • **Activity 3:** Site visits/ interviews	• **Activity 4:** Development of preliminary framework of principles and guidelines • **Activity 5:** Testing and refining the principles and guidelines • **Activity 6:** Draft framework, principles and guidelines	• **Activity 7:** Preparation of Draft Report • **Activity 8:** Preparation and submission of Final Report for Phases 1-3	• **Activity 9:** Input into development of Workforce analysis tool • **Activity 10:** Test principles and guidelines in sample EDs • **Activity 11:** Preparation and submission of Final report
Deliverables			
• Diagnostic report	• Solution design report	• Draft Final Report	• Final report

3.3 Sources of evidence

A number of sources of evidence were used throughout this research project, to build the scenario framework and develop and test the principles and guidelines, and to develop and test the workforce analysis tool. These sources consisted of:

- Consultation with the EDWRG
- Site visits with a cross section of 13 NSW EDs in Phase 1
- Site visits to four EDs as part of Phase 4
- Analysis of NSW state-level data
- Targeted scan of the literature
- National and international consultation.

3.3.1 Consultation with the EDWRG

Fundamental to this research project was the collaborative relationship with the EDWRG. Consultation with the EDWRG occurred multiple times across the four phases of this research project. Through these consultations, the EDWRG provided input and advice on a number of different aspects of the project, including:

- Determining the location of site visits
- Confirming the jurisdictions of interest for the national and international consultations
- Agreeing the conceptual framework and key areas for data collection
- Planning for the stakeholder consultation process
- Testing the scenario framework and defining the ED scenarios
- Providing feedback and input into development and finalisation of the principles and guidelines
- Providing feedback on the Diagnostic, Solutions Design and Final Reports
- Providing input and feedback into the development of the workforce analysis tool.

3.3.2 Site visits with a cross section of thirteen NSW emergency departments

In consultation with the EDWRG, 13 ED sites in NSW were selected to participate in the research project, to provide an appropriate cross section and gain a clear understanding of the drivers of staffing and skill mix in the current emergency care setting in NSW. Several variables influenced site selection, including geographical location, Area Health Service (AHS), level of the ED, models of care implemented, existing patient load and casemix, and current performance against KPIs. The final sample included three facilities from each of the Level three to Level six EDs and a dedicated paediatric ED.

Consultation with stakeholders at each ED occurred during the two-day site visits, and consisted of numerous coordinated consultation methods, including use of a data collection instrument, a structured activity mapping session and structured interviews. Table 3 describes each of these methods in detail.

Table 3: Coordinated consultation methods with the 13 NSW emergency departments

Consultation method	Description
Data collection instrument	A data collection instrument was developed to capture key information from the sites and gain insight into the: • hospital characteristics • medical, nursing and support services profile • education and training available to support these positions • operational and workforce models in place • access to clinical services within the hospital • alternative services outside of the hospital • quality and safety activities carried out in the ED. The data collection instrument was completed via interview with the key contact at each of the participating sites. Missing and/or additional information was obtained later as required. The information gathered from the site visits formed the basis of the contextual analysis which was used to identify patterns of systematic variation. The contextual analysis is described in more detail in Section 4.3.1 on page 28.
Structured activity mapping session	Structured activity mapping sessions were conducted at each site, taking approximately two and a half hours to complete. On average, 6-10 participants attended covering the range of workforce groups involved in the ED. The variety of ED stakeholders participated to provide information about: • the activities associated with an ED patient journey • who is responsible for performing the activities • other roles or team members who could perform the activity (future alternatives). The activity mapping session focused on both direct patient care activities, as well as other essential activities not directly related to patient care (eg recruitment, research and teaching). For each activity, the following codes were used to identify the staff responsible for carrying out the activities and clarify the staff skills required to do this. These codes were: Primary responsibility for the activity Activity is jointly performed by more than one team member Staff member provides a supporting role Other roles/team members could perform this activity. The information captured by the activity mapping session was used to identify the differences between the staff skill mix in ED, potential changes to workforce models and where potential changes could be made to the way in which existing skill sets can be used to allow the highly-skilled staff to focus on core activities.
Structured interviews	Structured interviews were held with key stakeholders from each site, with a total of 170 interviews completed across the 13 sites. These interviews focused on gaining further input into the key challenges and issues facing each hospital regarding increasing demand, access and delivery of treatment within the ED. The interviews also captured perceptions on the ideal and efficient mix of capabilities and competencies to provide emergency care alongside alternative operational and workforce models that could be adopted in an ED. Qualitative data collected through the interviews were analysed to identify key themes across all sites. The analysis aimed to draw out key differences that might exist between the different professional and support groups, and to identify systematic patterns of variation that might occur across sites.

3.3.3 Site visits to four EDS to test applicability of the principles and guidelines.

To facilitate the application of the principles and guidelines into an existing ED. An ED workforce analysis tool was developed. The purpose of the tool is to assist the ED plan and implement an appropriately skilled ED workforce using a consistent approach and based on the principles and guidelines. In consultation and agreement with the EDWRG, four EDs in NSW were selected to participate in the testing of the principles and guidelines and the testing of the tool. The site selection was based on representation from each model of care profile A-E, spread across rural and metropolitan locations and according to size of ED. The final sample included two metropolitan EDs, Levels four and six, and two rural EDs, levels four and five.
A dedicated paediatric ED was included at later stage; however specific paediatric testing data is not available for this report.

Consultation with stakeholders at each ED occurred during a three hour workshop. The workshops comprised a multidisciplinary approach to using the ED-WAT and to analysis of the current ED workforce against the principles and guidelines. Further this enabled the identification of action areas that can be taken by each ED to address variation to the guidelines. Data collected during the site visits and through completion of an evaluation identified areas for improvement to the principles and guidelines and to the tool. These improvements are considered necessary to effectively assist individual EDs implement the principles and guidelines and plan skill mix decisions based on findings.

3.3.4 National and international consultation

To enhance the qualitative data collected from the 13 NSW EDs and provide an international context for ED workforce models, national and international consultations were conducted.

National consultations

For the national consultations, an expression of interest (EOI) was sent out to all jurisdictions for participation in the consultation via a 30 minute interview. This EOI was sent out via the National Institute of Clinical Studies (NICS) Emergency Care Community of Practice distribution list and from there referred to members of the College of Emergency Nurses (CENA). A sample of participants from each jurisdiction was sought with the aim to include a broad cross section of ED staff from both rural and metropolitan regions.

Responses were received from Victoria, South Australia, Western Australia and a large proportion from NSW, both rural and metropolitan. The majority of responses were from the nursing profession and also included Emergency Specialists and Pharmacists. A total of 10 interviews were conducted with participants Victoria, South Australia, Western Australia. A thematic analysis was conducted on the interview responses to derive similarities and variation between the states, identifying workforce models and models of care in place in other jurisdictions that support the NSW models or that could be adopted as alternative models in NSW. Innovative models were identified where they existed.

International consultations

International consultation was also undertaken to enhance the qualitative data collection from NSW EDs and to provide an international context for ED workforce models. Following selection of countries for consultation, PwC representatives working in the health sector, with close links to health care facilities, were contacted to participate. Data was collected initially via a survey that examined current ED challenges, workforce models and models of care. The survey was completed in consultation with their health care clients and supplemented by their own experiences. The data collected was then used as

the basis for follow on interviews conducted with the research team. Four surveys were completed, three by PwC directly and one by a large facility in the UK.

3.3.5 Analysis of NSW state-level data

In addition to the data collected from the 13 selected sites, available data was obtained for 64 NSW EDs, classified as Level three to Level six. The NSW ED data set included Australasian Triage Scale (ATS), mode of arrival, mode of separation, age, and ICD-9 and ICD-10 codes (international standard diagnostic classification codes).

The NSW Health Data was used to develop the scenario framework, in particular to:

- Identify drivers of access to services, staffing profiles, models of care and education
- Determine measures of drivers, including remoteness, activity and complexity
- Build scenarios
- Map scenarios to models of care.

Due to the reliance on current 08/09 NSW ED data, not all Level three to six EDs were included in the statistical analysis. However the scenario framework, models of care and subsequent principles and guidelines are applicable to all NSW Level three EDs and above.

3.3.6 Literature review and targeted scan of the literature

A review of the literature and targeted literature scan were used to inform the scenario framework, models of care, and principles and guidelines. The review of the literature was conducted for NSW Health by the Northern Rivers University Department of Rural Health (NRUDRH), University of Sydney[xxxvii].

A high level scan of peer-reviewed literature was also conducted by the PwC Research Team. The PwC targeted literature scan fed into the Diagnostic and Solutions Design Phases by:

- Providing an understanding of the nature of innovative ED models of care in a national and international context
- Providing an understanding of the contextual factors that impact on the effectiveness of models of care
- Providing an understanding of existing principles and guidelines relevant to ED staffing and skill mix
- Guiding the development of principles and guidelines regarding ED skill mix
- Guiding recommendations about the time of day particular models of care should operate
- Guiding recommendations about minimum activity thresholds to justify implementing models of care.

The targeted literature scan conducted by PwC is available from the NSW Department of Health upon request.

4 Diagnostic Phase

4.1 Introduction

4.1.1 Aims of the Diagnostic Phase

This section describes the key findings from the Diagnostic Phase of the NSW Health ED Workforce Research Project. The aims of this phase were to:

- Identify systematic variation between EDs of different levels and within different levels, considered against defined contextual information
- Identify and describe the workforce currently employed in NSW EDs
- Identify who carries out key activities along the ED patient journey and where alternative roles exist
- Present the workforce and operational models in EDs in NSW, including their implementation and variation
- Consider the perceived changes to the ED workforce and challenges in a changing health care landscape, derived from key stakeholder interviews
- Provide contextual information about ED workforce models gathered through a scan of current literature, and national and international consultation.

To achieve these aims, the central primary data source for the Diagnostic Phase was systematic consideration of current practice, in NSW EDs, based on a purposeful sample of EDs. In consultation with the EDWRG, 13 EDs in NSW were selected for participation in this research project. These sites were chosen as a representation of EDs in NSW to allow the researchers to gain a clear understanding of the drivers of staffing and skill mix in the current emergency care setting in NSW. Several variables influenced site selection including geographical location, Area Health Service, level of the ED, models of care implemented, existing patient caseload and casemix, and current performance against KPIs. The final sample included three facilities from each of Level three to six and a dedicated paediatric ED.

As indicated above, these primary data were considered against the background of published literature, as well as consultations with other national and international jurisdictions.

4.2 Approach to the primary data collection in the Diagnostic Phase

4.2.1 Data collection methods

A structured approach was planned for consultation with stakeholders at each location. A number of coordinated consultation methods were selected to obtain optimal levels of detail from each site visited. Each method is described in detail below.

Data collection instrument – A data collection instrument was developed to capture key information from sites and gain insights into hospital characteristics, the medical, nursing and support services profile and

education and training available to support these positions. The instrument included questions about use of operational and workforce models and access to health services within and outside the hospital, both of which may impact ED demand and staffing skill mix and levels. The data collection instrument also addressed quality and safety activities carried out in the ED, which are important to maintaining effective and efficient processes in the ED. Data collected using this instrument formed the basis of our contextual analysis, which investigates patterns of systematic variation across sites.

The data collection instrument was completed via interview with the key contact at each of the participating sites. Missing and/ or additional information not available on the day was obtained later as required.

Structured activity mapping session – This activity was conducted at each site and took approximately 2.5 hours to complete. A variety of ED stakeholders were invited to attend to provide key information about activities associated with an ED patient journey and who is responsible for performing these activities. On average, six to ten participants from a range of workforce groups in the ED attended.

The activity mapping exercise included all current ED roles as well as roles that have been implemented in other EDs or which were identified in the literature. The session focused on a comprehensive list of direct patient care activities that were bundled in 'stages' of the patient journey, recognising that care can sometimes commence prior to patient arrival in ED.

The mapping session also included other essential activities not directly related to patient care – for instance recruitment, research and teaching – that are necessary to an ED in providing a contemporary, skilled workforce with appropriate support. These activities were then mapped to the existing ED roles and potential future roles were flagged and activities mapped to these.

In identifying staff carrying out each activity, activities were coded to capture data on the staff roles as follows:

1 Primarily responsible for the activity

2 Activity is jointly performed by more than one team member

3 Staff member provides a supporting role

4 Other roles/team members could perform this activity (future alternative).

Using these codes, the EDs were able to identify the staff carrying out these activities in an ED and clarify the skills required to do this. This information has been used to identify differences between sites in the staff/skill mix in ED, potential changes to workforce models and potential changes to the way in which staff can be best used to focus on core activities of their profession.

Structured interviews – Structured interviews were held with key stakeholders from each of the 13 sites, with a total of 170 interviews undertaken.

These interviews focused on gaining further input into the key challenges and issues facing each hospital, such as increasing demand, access and delivery of treatment within the emergency department. The interviews also captured perceptions on the ideal and efficient mix of capabilities and competencies to provide emergency care along with alternative operational and workforce models that could be adopted in an ED.

Qualitative data collected through the interviews were analysed to identify key themes across all sites. The analysis aimed to draw out key differences that might exist between the different professional and support groups and to identify systematic patterns of variation that might occur across sites.

4.2.2 Contextual analysis

A conceptual framework was developed to focus the collection of data from the 13 NSW EDs around the skill mix and staffing profiles of the EDs. The conceptual framework was developed in consultation with the EDWRG.

The conceptual framework focused the data collection tools and methods on four key contextual dimensions. These dimensions were:

- Throughput and Catchment Characteristics
- Access to Services
- Emergency Staff Profiles
- Education and Models of Care.

Each of the key contextual dimensions was made up of information about various operational domains of the ED. For example, throughput and catchment characteristics were informed by the daily activity of the ED, case mix of presenting patients, and other catchment characteristics of the hospital. The contextual dimensions and operational domains, which make up the dimensions, are provided in Table 4.

Table 4: Dimensions and domains of the contextual framework

Contextual dimensions	Operational domains
Throughput and Catchment Characteristics	Daily Activity
	Casemix
	Catchment Characteristics
Access to Services	Access to Diagnostics
	Access to Specialist Services
	Access to Allied Health
Emergency Staff Profile	Medical Staff Profile
	Nursing Staff Profile
	Support Profile
Education and Innovation	Medical Education
	Nursing Education
	Models of Care

In collaboration with the ED Workforce Reference Group (EDWRG) a data collection instrument was developed to capture key information from sites and gain insights into hospital characteristics, the medical, nursing and support services profile and education and training available to support these positions. The instrument included questions about use of operational and workforce models and access to health services within and outside the hospital, both of which may impact ED demand and staffing skill mix and levels. The data collection instrument also addressed quality and safety activities carried out in the ED, which are important to maintaining effective and efficient processes in the ED. Data collected using this instrument formed the basis of our contextual analysis, which investigates patterns of systematic variation across sites.

The data collection instrument was completed via interview with the key contact at each of the participating sites. Missing and/ or additional information not available on the day was obtained later as required.

Purpose of the analysis

The essential starting point for the Diagnostic Phase was an understanding of systematic patterns of variation across NSW emergency departments. In developing facility profiles, a diverse array of contextual factors that relate to the four broad conceptual dimensions, and their 12 operational domains, as described in Table 4, were aggregated.

The analysis recognised that the contextual dimensions are interrelated and are likely to influence each other. The contextual analysis therefore considered the relationship between each of the key contextual dimensions, as well as skill mix and quality and safety. This was achieved through the use of radar graphs which comprise the twelve domains. The radar graphs allowed a clear visual representation of similarities and differences between sites within levels, and also allowed exploration of similarities and differences between levels.

Explanation of radar graphs

Profiles on each of the 12 operational domains identified in the conceptual framework were distributed along a six-point scale, with scores of 1 or 2 considered ‘low’ and scores of 5 or 6 considered ‘high’. Systematic criteria were developed, such that scores represented discernable combinations of different levels of component factors.

The details of each of the 4 conceptual dimensions and their component domains are presented on the following pages. Specifically, the way the scores were derived for each of the 12 domains is described. It should be noted that the categorisation is an arbitrary but consistent way of locating each facility on the relevant continuum – that, is to obtain a point estimate on the spatial map. It should also be noted that the 1 – 6 point scales are neither necessarily linear, nor are high-end profiles necessarily preferable to low-end profiles. The purpose of the analysis was to graphically represent patterns of similarities and differences amongst emergency departments and allow for comparisons of profiles across domains. These profiles do not represent a qualitative review of processes and practices in emergency departments or a benchmark of emergency departments against one another.

Table 5: Contextual dimensions for throughput and catchment characteristics

Throughput and Catchment Characteristics		
Factors relevant to this grouping include volume of presentations, acuity and complexity, as well as remoteness and socioeconomic factors. These factors provide contextual information that may assist in understanding profiles in other domains.		
	Factors	**Sources of information**
Daily Activity	• Average volume of daily presentations • Number of spaces for patient assessment.	• EDIS data 2007/08, NSW Health • Self reports from EDs • Floor plans
	• Score of 1: (a) Daily presentations ≤ 80 and (b) > 4 patients per assessment space per day • Score of 2: (a) Daily presentations ≤ 80 and (b) < 4 patients per assessment space per day • Score of 3: (a) Daily presentations > 80 but < 130 and (b) > 4 patients per assessment space per day • Score of 4: (a) Daily presentations > 80 but < 130 and (b) < 4 patients per assessment space per day • Score of 5: (a) Daily presentations > 130 and (b) > 4 patients per assessment space per day • Score of 6: (a) Daily presentations > 130 and (b) < 4 patients per assessment space per day	
Casemix	**Factors**	**Sources of information**
	• % triage categories 1 and 2 • % paediatric presentations[2] • % aged presentations[3]	• EDIS data 2007/08, NSW Health.
	• Score of 1: (a) ≤ 9% ATS 1 & 2, (b) < 25% paediatric presentations, and (c) < 20% aged presentations. • Score of 2: (a) ≤ 9% ATS 1 & 2, (b) ≥ 25% paediatric presentations, and (c) < 20% aged presentations. • Score of 3: (a) ≤ 9% ATS 1 & 2, (b) < 25% paediatric presentations, and (c) ≥ 20% aged presentations • Score of 4: (a) > 9% ATS 1 & 2, (b) < 25% paediatric presentations, and (c) < 20% aged presentations. • Score of 5: (a) > 9% ATS 1 & 2, (b) ≥ 25% paediatric presentations, and (c) < 20% aged presentations. • Score of 6: (a) > 9% ATS 1 & 2, (b) < 25% paediatric presentations, and (c) ≥ 20% aged presentations.	
Catchment Characteristics	**Factors**	**Sources of information**
	• Remoteness • Socio-economic status.	• RRMA classification scheme • SEIFA coding scheme
	• Score of 1: (a) Rural location and (b) low socioeconomic status (SEIFA decile 1-4) • Score of 2: (a) Rural location and (b) moderate socioeconomic status (SEFIA category 5-6) • Score of 3: (a) Rural location and (b) high socioeconomic status (SEIFA decile 7-10) • Score of 4: (a) Metropolitan location and (b) low socioeconomic status (SEIFA decile 1-4). • Score of 5: (a) Metropolitan location and (b) moderate socioeconomic status (SEFIA category 5-6) • Score of 6: (a) Metropolitan location and (b) high socioeconomic status (SEIFA decile 7-10)	

2 'Paediatric presentations' includes individuals who are 16 years of age or younger.

3 'Aged presentations' includes non-indigenous individuals who are 70 years of age or older, and Aboriginal and Torres Strait Islander individuals who are 55 years of age or older. This definition was chosen because it reflects the ordinary inclusion criteria for assessment by Aged Services Emergency Teams (ASET) at most sites visited during this project.

Table 6: Contextual dimensions for access to services

Access to Services		
The second conceptual grouping of domains is Access to Services, which considers factors including number of health services available to sites and hours of availability. The range of services included in this analysis covers diagnostics, specialist medical and surgical services and Allied Health services.		
	Factors	**Sources of information**
Access to Diagnostics	• Number of diagnostic services onsite [4] • Hours of onsite availability of diagnostic services.	• Self reports from EDs
	• Score of 1: Access to basic diagnostic services onsite for at least 8 hours per day[5] • Score of 2: Access to a range of diagnostic services onsite for at least 8 hours per day • Score of 3: Access to basic diagnostic services onsite for at least 14 hours per day • Score of 4: Access to a range of diagnostic services onsite for at least 14 hours per day • Score of 5: Access to basic diagnostic services onsite for 24 hours • Score of 6: Access to a range of diagnostic services onsite 24 hours per day.	
Access to Specialist Services	**Factors**	**Sources of information**
	• Number of Specialist Services available onsite. Examples include psychiatric emergency unit, neurosurgery, cardiology, oncology and paediatrics.	• Self reports from EDs
	• Score of 1: Onsite access to surgical and obstetrics only • Score of 2: Onsite access to 1-4 specialist services in addition to surgical & obstetric services • Score of 3: Onsite access to 5-7 specialist services in addition to surgical & obstetric services • Score of 4: Onsite access to 8-10 specialist services in addition to surgical & obstetric services • Score of 5: Onsite access to 11-13 specialist services in addition to surgical & obstetric services • Score of 6: Onsite access to 14 or more specialist services in addition to surgical and obstetrics.	
Access to Allied Health	**Factors**	**Sources of information**
	• Number of Allied Health Services available onsite • Dedicated time in the ED	• Self reports from EDs
	• Score of 1: Access to physiotherapy, social work and pharmacy only on request from other parts of the hospital • Score 2: Access to additional Allied Health services (other than physiotherapy, social work & pharmacy) on-call external to ED • Score of 3: One Allied Health profession with guaranteed time in ED for at least 0.5 FTE (full time equivalent) • Score of 4: Two or more Allied Health profession with guaranteed time in ED for at least 0.5 FTE. • Score of 5: One Allied Health profession based within the ED at least 0.5 FTE. • Score of 6: Two or more Allied Health professions based within the ED at least 0.5 FTE.	

4 'Diagnostics' includes radiology services such as mobile X-ray, fixed X-ray, CT, angiography and MRI, and pathology services such as haematology, biochemistry and microbiology.

5 'Basic' diagnostic services are haematology, biochemistry, mobile X-ray and CT.

Table 7 below shows all diagnostic, specialist and Allied Health services included in the Access to Services contextual analyses.

Table 7: Diagnostic, specialist and Allied Health services included in the contextual analyses

Diagnostic Services	Specialist Services	Allied Health Services
Mobile X-ray	MAU	Physiotherapy
Fixed X-ray	PECC	Pharmacy
CT scanner	Neurosurgery	Social Work
MRI	Orthopaedic surgery	Occupational therapy
Angiography	Cardiology	Play therapy
PET	Surgical services	Care coordination
Haematology	Trauma	ASET
Biochemistry	Neonatal	
Microbiology	Cardiac Catheter Lab	
Cytology	Obstetrics	
Histology	Urology	
	Ear Nose and Throat	
	Paediatrics	
	Mental Health	
	Geriatrics	
	Respiratory	
	Oncology	
	Palliative Care	

Table 8: Contextual dimensions for emergency staff profile

Emergency Staff Profile		
Domains in this grouping examine medical, nursing and support staff profiles within the ED.		
	Factors	**Sources of information**
Medical Profile	• FTE of emergency physicians employed in the ED and frequency of shifts available • Frequency of locum usage to fill rosters.	• Self reports from EDs
	• Score of 1: (a) < 1.0 FTE FACEM employed in the ED (or < 5 shifts per/ week) and (b) daily use of locums • Score of 2: (a) < 1.0 FTE FACEM employed in the ED (or < 5 per/ week) and (b) less than daily use of locums • Score of 3: (a) ≥ to 1.0 but ≤ 2.0 FTE FACEMs employed in the ED (or 5-7 shifts per week) and (b) daily use of locums • Score of 4: (a) ≥1.0 but ≤ 2.0 FTE FACEMs employed in the ED (or 5-7 shifts per week) and (b) less than daily use of locums • Score of 5: (a) > 2.0 FTE FACEMs employed in the ED (or > 7 shifts per week) and (b) daily use of locums • Score of 6: (a) > 2.0 FTE FACEMs employed in the ED (or > 7 shifts per week) and (b) less than daily use of locums.	
Nursing Profile	**Factors**	**Sources of information**
	• % Senior Nurses [6] • Frequency of agency or casual nurse usage to fill rosters	• Self reports from EDs
	• Score of 1: (a) < 50% Senior Nurses, and (b) daily use of agency or casual nurses • Score of 2: (a) < 50% Senior Nurses and (b) less than daily use of agency or casual nurses • Score 3: (a) ≥50% but < 70% Senior Nurses and (b) daily use of agency or casual nurses • Score 4: (a) ≥ 50% but < 70% Senior Nurses and (b) less than daily use of agency or casual nurses • Score of 5: (a) ≥70% Senior Nurses and (b) daily use of agency or casual nurses • Score of 6: (a) ≥ 70% Senior Nurses and (b) less than daily use of agency or casual nurses	
Support Profile	**Factors**	**Sources of information**
	• Clerical staff FTE • Presence of patient support roles in ED [7]	• Self reports from EDs
	• Score of 1: (a) < 6.0 FTE clerical staff dedicated to ED, and (b) patient support available only on request • Score of 2: (a) Less than 6.0 FTE clerical staff dedicated to ED, and (b) patient support based in ED • Score of 3: (a) 6 – 12 FTE clerical support and (b) patient support available only on request • Score of 4: (a) 6 – 12 FTE clerical support and (b) patient support based in ED • Score of 5; (a) > 12.0 FTE clerical staff dedicated to ED, and b) patient support available only on request • Score of 6: (a) > 12.0 FTE clerical staff dedicated to ED, and (b) patient support staff based in ED.	

6 'Senior Nurse' in this context is a grouping that includes senior positions such as nurse manager, nurse educator and clinical nurse specialist as well as RNs (registered nurses) who are more than three years postgraduate. 'Junior Nurse' includes RNs who are less than three years postgraduate, EENs (medication-endorsed enrolled nurses) and ENs (enrolled nurses).

7 Patient support roles are known by different terminology across sites and include job titles such as HASA (health and security assistant), PSA (patient support assistant), EDSO (emergency department support officer), AiN (assistant in nursing) and wards person.

Table 9: Contextual dimensions for Education and Models of Care

Education and Models of Care		
Domains in this conceptual grouping consider medical and nursing education profiles as well as level of use of innovative models of care.		
	Factors	**Sources of information**
Medical Education	• ACEM accreditation status [8] • Regular provision of formal in-service education • Current research activity	• Self reports from EDs
	• Score of 1: (a) Hospital is not ACEM accredited; (b) the ED provides in-service education on an ad hoc or irregular basis only; and (c) no current involvement in health or medical research • Score of 2: (a) Hospital is not ACEM accredited; (b) the ED provides in-service education on an ad hoc or irregular basis only; and (c) current involvement in national and/or internal research projects • Score of 3: (a) Hospital is not ACEM accredited; (b) the ED provides regular formal in-service education; and (c) no current involvement in research projects • Score of 4: (a) Hospital is not ACEM accredited; (b) the ED provides regular formal in-service education; and (c) current involvement in national and/or internal research projects • Score of 5: (a) Hospital is ACEM accredited; (b) the ED provides regular formal in-service education; and (c) no current involvement in research projects • Score of 6 (a) Hospital is ACEM accredited; (b) the ED provides regular formal in-service education; and (c) the ED has current research involvement, whether initiated inside or outside the hospital.	
Nursing Education	**Factors**	**Sources of information**
	• Provision of formal development pathways • FTE of educator roles based in the ED for every 40 FTE of nurses	• Self reports from EDs
	• Score of 1: (a) The ED does not provide formal development pathways for nursing staff, and (b) < 1.0 FTE educator role is based in ED for every 40 FTE of nurses • Score of 2: (a) The ED does not provide formal development pathways for nursing staff, and (b) ≥ 1 but < 2.0 FTE educator based in ED for every 40 FTE of nurses • Score of 3: (a) The ED does not provide formal development pathways for nursing staff, and (b) ≥ 2.0 FTE educator role based in ED for every 40 FTE of nurses • Score of 4: (a) The ED provides formal development pathways for nursing staff, and (b) < 1.0 FTE educator role based in ED for every 40 FTE of nurses • Score of 5: (a) The ED provides formal development pathways for nursing staff, and (b) ≥ 1.0 FTE but < 2.0 FTE educator based in ED for every 40 FTE of nurses • Score of 6: (a) The ED provides formal development pathways for nursing staff, and (b) ≥ 2.0 FTE educator roles are based in ED for every 40 FTE of nurses.	
Models of Care	**Factors**	**Sources of information**
	• Number of contemporary workforce and operational models of care in use [9]	• Self reports from EDs
	• Score of 1: (a) 1 – 3 contemporary models of care currently implemented in ED	

8 ACEM refers to Australasian College for Emergency Medicine, which provides accreditation for hospitals in emergency medicine training.

9 Examples of contemporary workforce models are rapid assessment teams, NPs (Nurse Practitioners), clinical initiatives nurses, EDSOs (emergency department support officers), ASET (aged services emergency team), care navigators and physiotherapist practitioners. Examples of contemporary operational models are fast track or “House Doctor” areas, 3-2-1 model of patient flow, dedicated paediatric zones and emergency management units, also known as short stay units. The description of contemporary models included in this analysis can be found at Section 4.

Education and Models of Care		
Domains in this conceptual grouping consider medical and nursing education profiles as well as level of use of innovative models of care.		
	Factors	**Sources of information**
	• Score of 2: (a) 4–6 contemporary models of care currently implemented in the ED • Score of 3: (a) 7 – 9 contemporary models of care currently implemented in the ED • Score of 4: (a) 10 –12 contemporary models of care currently implemented in the ED • Score of 5: (a) 13 – 15 contemporary models of care currently implemented in the ED • Score of 6: (a) 16 –18 contemporary models of care currently implemented in ED	

4.3 Key findings from the site visits

4.3.1 Contextual analysis - summary of results

This section provides the key findings from the contextual analysis. Overall, there was considerable variation both within and between levels of EDs. Hospital profiles were most homogenous at Level 6 only and varied most at Level 3. Hospitals at Level 6 had similar profiles across five out of twelve contextual domains. In contrast, no single characteristics were identified as typical of a Level 3 sites.

The key findings for each of the contextual dimensions are included in Table 10.

Table 10: Key findings from the contextual analysis

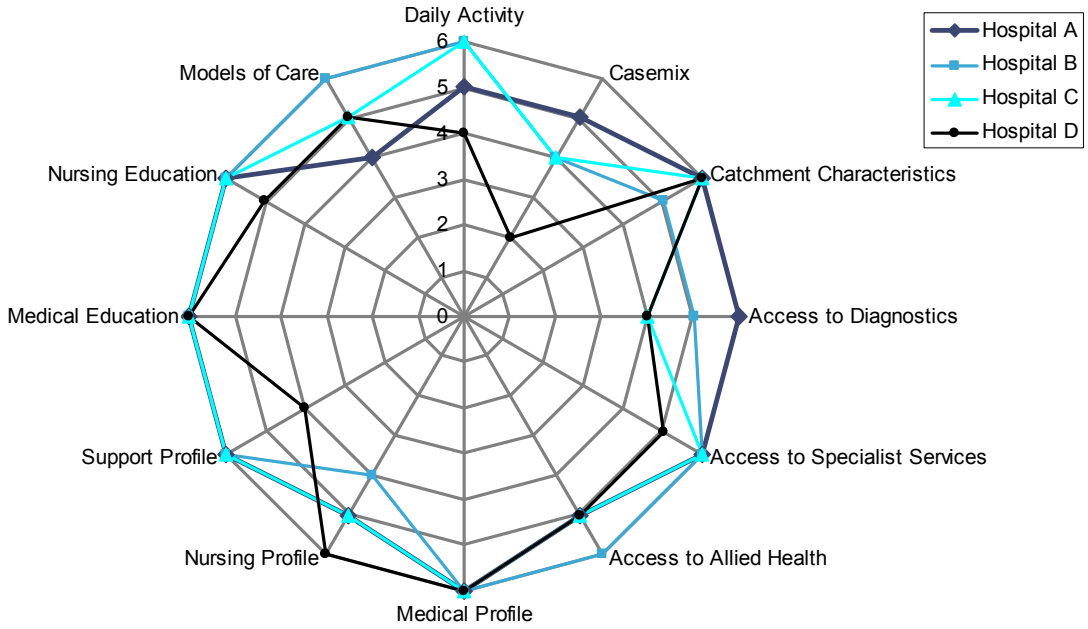
Role	Key findings
Throughput and Catchment Characteristics	• Daily Activity – five EDs (none at Level 4) saw more than 130 patients in the ED each day, on average, and three EDs saw fewer than 80 patients per day. • Casemix – five EDs (none at Level 4) saw more than 9% of presentations in triage categories 1 and 2, the highest level of clinical urgency. • Catchment Characteristics – according to the RRMA classification, eight EDs were classified as metropolitan, five EDs were rural and none were remote[10].
Access to Services	• Access to Diagnostics – all EDs have onsite access to haematology and biochemistry (basic pathology services) and mobile X-ray and CT (basic radiology services) for at least 8 hours per day. • Access to Specialist Services – all EDs have access to onsite surgical and obstetrics specialist services. • Access to Allied Health – all EDs have access to physiotherapy, pharmacy and social work, on request from other parts of the hospital. • Level 3 and Level 4 EDs were more likely to have profiles for access to services (particularly diagnostic and specialist services) at the lower end of the spectrum.
Emergency Staff Profile	• Medical Profile - seven EDs have more than 7 shifts per week covered by emergency physicians employed in the ED. In contrast, two EDs have less than 5 shifts per week covered by an emergency physician. All Level 3 and 4 EDs report daily use of locums, whereas Level 6 sites all report less than daily use of locums. • Nursing Profile - five EDs have Senior Nurses making up more than 70% of nursing staff. Only ED site reports that it has fewer than 50% Senior Nurses. • Support Profile – twelve EDs reported having 24 hour/ 7 day per week access to support staff. At six EDs there were greater than 12.0 FTE clerical support
Education and Models of Care	• Medical Education – nine EDs are accredited training facilities with the Australasian College for Emergency Medicine (ACEM). • Nursing Education – seven EDs have a 1.0 FTE or greater dedicated educator role per 40 nursing FTEs based in ED. • Models of Care – the use of contemporary models of care varied considerably between EDs, with seventeen models implemented at one ED and only one model used by another ED.

10 Whilst remoteness was determined using RRMA in the Diagnostic and Solutions Design Phases of this research project, the new Australian Standard Geographic Classification - Remoteness Areas (ASGC-RA) classification system is used in this report to categorise emergency departments. This classification is considered to be more current.

4.3.2 Key findings by hospital level

Level six facilities

Figure 3: Pattern of profiles for level six contextual analysis.



Throughput and Catchment Characteristics

The profiles of three level six sites are quite consistent across domains, whereas the fourth site Hospital D shows a somewhat different pattern of results.

Daily activity

- Three of the four level six sites have more than 130 presentations to emergency each day, on average.
- At two of these sites, the assessment space to patient ratio is less than one to four. That is, one assessment space is available for fewer than four patients per day, on average.
- At the third site, assessment spaces are available for more than four patients per day, on average.
- The fourth level six site sees between 80 and 129 patients per day, on average, with an assessment space to patient ratio of less than one to four.

Casemix

- Three sites have more than 9% of ATS categories 1 and 2, the highest levels of clinical urgency. 9% was selected as the classification threshold because it reflects the state-wide average proportion of ATS category 1 and 2 patients.
- At one of these three sites, more than 25% of presentations are paediatric presentations, a group of patients known to require specialised care.

- At the fourth level six site, less than 9% of presentations are classified as category 1 and 2 but more than 25% of presentations, are paediatric and as such require specialised care.

Catchment Characteristics

- Sites at this level appear to be similar in terms of Catchment Characteristics.
- All level six sites are classified by RRMA as metropolitan
- Three of the four sites are at the higher end of the socioeconomic status, with SEIFA scores between seven and ten, while the fourth site has a somewhat lower SEIFA score of five to six.

Access to Services

- Overall, access to health services across the level six sites was at the higher end of the spectrum.

Access to Diagnostics

- Two sites are at the higher end of the spectrum, with onsite access to haematology and biochemistry (basic pathology services) and mobile X-ray and CT (basic radiology services) 24 hours per day, seven days per week.
- Two sites are at a somewhat lower end of the spectrum, with basic radiology and pathology services available onsite for at least 14 hours per day.

Access to Specialist Services

- At all four sites, the profile for access to specialist services is at the higher end of the spectrum,
- Level six sites have access to between 16 and 18 specialist services such as oncology, neurosurgery, cardiology and obstetrics, with one site being able to access between 13 and 15.

Access to Allied Health

- Level six sites consistently report having Access to Allied Health Services at the higher end of the spectrum, including access to physiotherapy, pharmacy, occupational therapy and social work on request
- All level six sites report that they have at least one Allied Health profession based in the ED, at least 0.5 FTE.
- Site B report that they have more than one Allied Health profession based in the ED, for at least 0.5 FTE each.

Emergency Staff Profile

- All of the level six hospitals have staffing profiles at the higher end of the spectrum.

Medical Profile

- All level six hospitals have a Medical Profile at the higher end of the spectrum.
- All hospitals have greater than 2.0 FTE emergency physicians employed in ED and specialist coverage of more than seven shifts per week
- All sites report less than daily reliance on locums.

Nursing Profile

- Nursing Profiles varied somewhat across level six sites.
- Three EDs are at the higher end of the spectrum, with at least 70% Senior Nurses; the fourth site has greater than or equal to 50% but less than 70% Senior Nurses.
- Two sites report that they rely on casual or agency nurses to fill the roster less than daily, while the other two sites report reliance on casual or agency nurses at least once each day.

Support Profile

- Support Profiles varied somewhat across the level six sites
- Three level six sites report support staff profiles at the higher end of the spectrum, with clerical staff based in the ED for more than 12.0 FTE, 24hour/7 day coverage, and patient support roles based in ED.
- The fourth site has a somewhat lower support profile, with between 6.0 and 12.0 FTE clerical staff, 24 hour/ 7 day coverage and patient support based in ED.

Education and Models of Care

Education

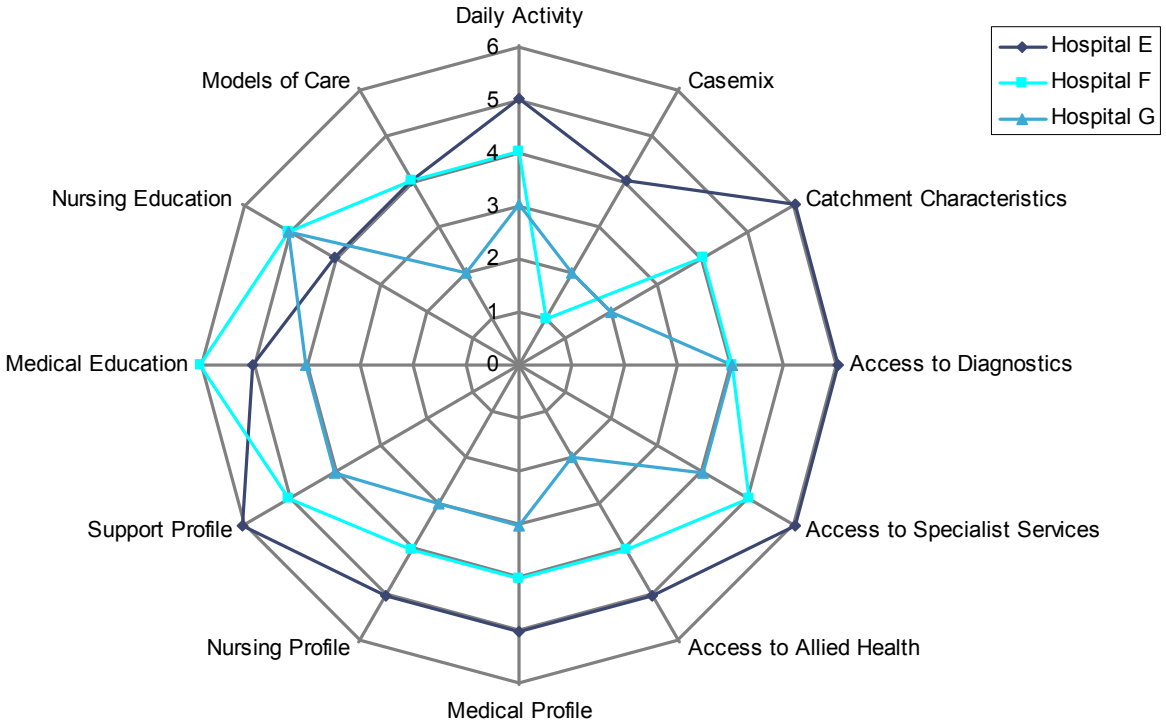
- Level six sites showed consistent Medical Education profiles at the higher end of the spectrum.
  - These sites are ACEM accredited institutions, provide regular formal in-service education for medical staff, and have current involvement in health-related research, both initiated within the hospital or externally.
- Level six sites also showed consistent Nursing Education profiles at the higher end of the spectrum.
  - All sites provide formal developmental pathways for nursing staff, involving a staggered program of learning packages to guide nurses through multiple stages of skill acquisition, ranging from new graduate level programs through to advanced practice level programs.
  - The sites varied somewhat in the level of coverage by a nurse educator or clinical nurse educator in the ED: three sites have a dedicated educator for greater than or equal to 2.0 FTE per 40 FTE nursing staff; the fourth site has slightly less coverage, with greater than or equal to 1.0 FTE but less than 2.0 FTE educators per 40 FTE nursing staff.

Models of Care

- Level six sites varied somewhat in the extent of use of contemporary models of care, but were, for the most part, at the higher end of the spectrum.
- Hospital B reported the most extensive use of contemporary models of care, having implemented between 16 and 18 models in its ED.
- Hospital C and D use 13 to 15 models, and Hospital A uses 10 to 12 models.

Level five facilities

Figure 4: Pattern of profiles for level five contextual analysis



This radar graph illustrates the significant levels of variation between level five hospitals.

The profile of Hospital E is of similar spatial distribution to that of the level six hospitals described above. Hospital G's profile is more like that of lower level hospitals, which will be described later in this section. Hospital F lies between Hospitals E and G across most domains.

Throughput and Catchment Characteristics

- Among the level five facilities, Hospital E's ED is at the higher end of the spectrum for caseload and casemix:
  - More than 130 patients are seen each day
  - More than 9% of presentations are in ATS categories 1 or 2
  - On average, more than four patients are seen in each assessment space per day.
- Hospitals F and G are somewhat lower on this continuum than Hospital E:
  - Between 81 and 130 patients are seen per day in both facilities
  - Fewer than 9% of presentations are in ATS categories 1 or 2
  - At Hospital F, an average assessment space handles more than four patients per day, while at Hospital G an average assessment space handles fewer than four patients per day
- According to the RRMA classification scheme for remoteness, two sites are metropolitan and one site is rural.
- Relative socioeconomic status varies across the spectrum for the level five sites:

  - Site E falls into the higher socioeconomic grouping, with a SEIFA score between seven and ten.
  - Site G falls into the mid-range, with a SEIFA score of five or six.
  - Site F falls into the lower socioeconomic grouping, with a SEIFA score of one to four.

Access to Services

- The radar graph illustrates that level five Hospitals varied in terms of their access to services.
- Overall, Hospital E reported higher access to a wider range of services than Hospitals F and G.

Access to Diagnostics

- Hospital E has a profile at the higher end of the spectrum, with access to most pathology and radiology services 24 hours per day/ 7 days per week.
- Hospitals F and G have access to a range of pathology and radiology services for at least 14 hours per day/ 7 days per week.

Access to Specialist Services

- Level five hospitals varied from being at the mid range to the higher end of the spectrum of access to specialist services
- In addition to surgical and obstetrics services.
  - Hospital E has access to another 14 to 16 specialist services.
  - Hospital F has access to another 11 to 13 specialist services
  - Hospital G has access to another 8 to 10 specialist services.

Access to Allied Health

- Level five facilities varied across the spectrum of access to Allied Health.
- At the higher end of the spectrum, Hospital E has one Allied Health profession based within the ED for at least 0.5 FTE.
- Hospital F has guaranteed time by additional Allied Health services (other than physiotherapy, social work and pharmacy) in ED at least 0.5FTE.
- At the lower end of the spectrum, Hospital G has access to additional Allied Health services (other than physiotherapy, social work and pharmacy) on-call external to the ED.

Emergency Staff Profile

- Level five hospitals vary in terms of Medical, Nursing and Support Staff Profiles.
- Hospital E's profile lies at the higher end of the spectrum across the three staffing domains, compared to hospitals F and G.

Medical Profile

- Level five facilities vary in terms of specialist coverage and in terms of reliance on locums.
- Hospital E has greater than 2.0 FTE emergency physicians employed in its ED with specialist coverage of greater than 7 shifts per week. but relies on locums to fill the roster at least daily

- Hospitals F and G have between 1.0 and 2.0 FTE emergency physicians employed in their EDs with specialist coverage of between 5 and 7 shifts per week. One hospital uses locums on a daily basis, whereas the other uses locums less than daily.

Nursing Profile

- Nursing Profile also varies across the level five facilities, with Hospital E's profile lying at the higher end of the spectrum compared to the other facilities.
- Hospital E has a nursing profile at the higher end of the spectrum with more than 70% of nurses employed in the ED at Hospital E are Senior Nurses, but the ED relies on casual or agency nurses to fill its roster at least daily.
- Hospitals F and G both have greater than or equal to 50% but less than 70% Senior Nurses
- Hospital F relies on casual and agency nurses less than daily, while Hospital G relies on casual or agency nurses at least daily.

Support Profile

Level five Hospital Support Profiles also vary.

- Hospital E's Support Profile was at the higher end of the spectrum (similar to level six facilities)
- All level five facilities have 24 hour/ 7 day per week support staff coverage, but they vary in the extent of support staff available:
  - Hospital E has more than 12.0 FTE clerical support and has patient support staff based in the ED
  - Hospital F has more than 12 FTE clerical support roles, but lacks patient support staff based within the ED, and relies on patient support staff based in other areas of the hospital
  - Hospital G has patient support staff based in the ED, but has lower headcount than hospitals E and F, with between 6.0 and 12.0 FTE.

Education and Models of Care

- In contrast to other domains represented on the level five radar graph, Hospital F has a profile at the higher end of the spectrum for education and models of care, compared to both Hospital E and Hospital G
- Hospital G's profile lies at the lower end of the spectrum for education and models of care, compared to the other level five facilities.

Education

- All level five sites provide their emergency medical officers with formalised in-service education on a regular basis
- Two sites are ACEM accredited and two sites are currently involved in medical research, whether initiated within the hospital or externally
- Two sites have a Nursing Education profile at the higher end of the spectrum, with:
  - A dedicated educator for greater than or equal to 1.0 FTE but less than 2.0 FTE per 40 FTE nursing staff
  - Provision of formal development pathways for professional growth for emergency nursing staff

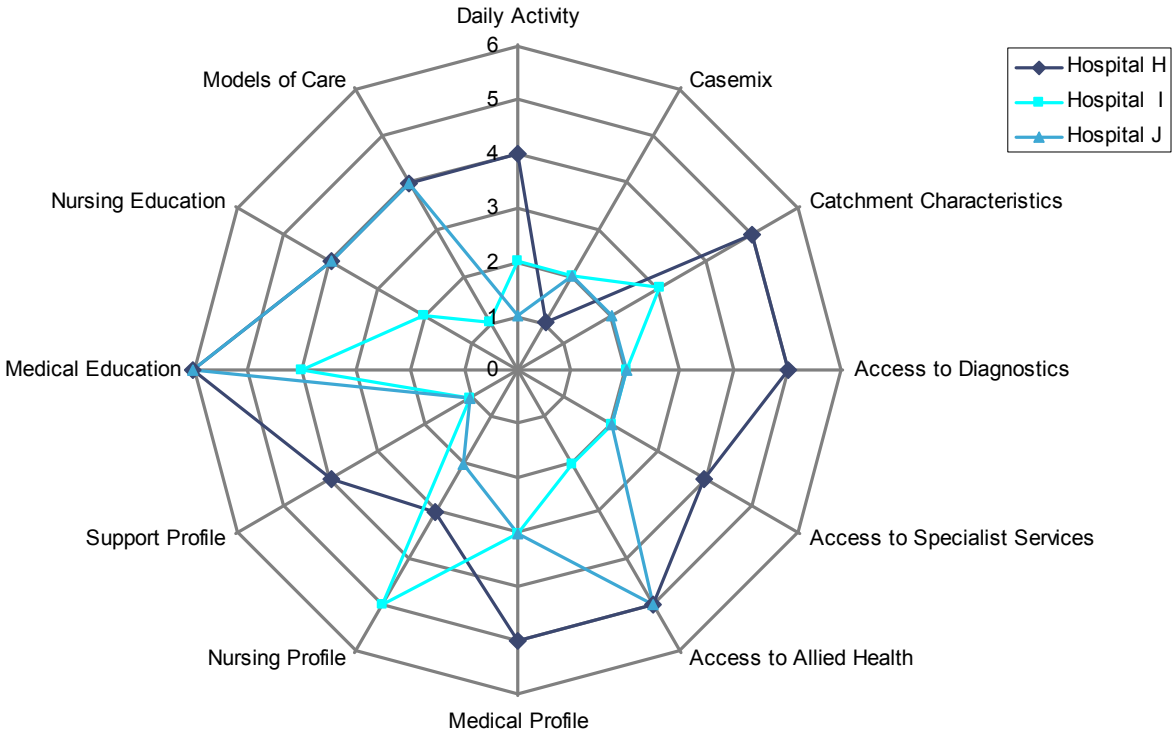
- The third site's profile is in the mid range of the spectrum of nurse education, with:
  - A dedicated educator for less than 1.0 FTE per 40 FTE nursing staff
  - Provision of a formal development pathway program for emergency nursing staff.

Models of Care

- Hospitals E and F profiles for extent of use of contemporary models of care lie in the mid range of the spectrum, with use of between 10 and 12 workforce and operational models in their EDs.
- By contrast, the ED at Hospital G is at the lower end of the spectrum, reporting use of between 4 and 6 innovative models of care.

Level four facilities

Figure 5: Pattern of profiles for level four contextual analysis



The radar graph for level four hospitals illustrates the significant variation of profiles among facilities at this level, and far greater variation than was evident within either level five or level six.

Hospital H's profile is at the mid to high range of the spectrum for most domains, making it more similar to level five facilities. The profiles for Hospitals I and J are more distinctively individual in terms of reflecting higher and lower ends of the contextual spectrums.

Throughput and Catchment Characteristics

- Level four sites varied in terms of throughput and catchment characteristics: Overall:
  - Hospital H shows a profile similar to the level five hospitals

  - Hospital J shows a pattern similar to some level three hospitals (to be discussed below)
  - Hospital I's profile lies between the other two facilities.

Daily Activity

- Hospital H reports Daily Activity in the mid range of the spectrum, with between 80 and 129 presentations, on average, with less than four patients per assessment space
- Hospitals I and J both see fewer than 80 patients per day, but differ with respect to assessment space to patient ratio. For Hospital I the average is less than four patients per assessment space, while Hospital J reports seeing more than four patients per assessment space.

Casemix

- On average, the casemix seen by the level four sites was at the lower end of the spectrum:
  - For all of the facilities fewer than 9% of presentations are in ATS categories 1 and 2, the highest levels of clinical urgency.
  - At two of the level four sites, more than 25% of presentations are paediatric presentations, and as such require specialised care.

Catchment Characteristics

- Two sites are classified as rural and the third site is classified as metropolitan.
- Two sites (one metropolitan and one rural) are in the mid range of the socioeconomic spectrum, based on the SEIFA code. The third site (rural) is at the higher end of the socioeconomic spectrum, with a SEIFA score between 7 and 10.

Access to Services

- Overall, Hospital H appears to be at the higher end of the spectrum for of access to services relative to the other level four hospitals.
- Hospitals I and J fall in the lower range of the spectrum for access to Diagnostics, but in the higher range of Access to Allied Health.

Access to Diagnostics

- Hospital H's profile for access to diagnostics is at the higher end of the spectrum, with onsite access to basic pathology and radiology services 24 hours per day, every day.
- In contrast, the other level four hospital profiles are at the lower end of the spectrum of access to diagnostics, with access to a range of pathology and radiology services for at least 8 hours per day.

Access to Specialist Services

- All level four sites have onsite access to surgical and obstetrics services
- Access to specialist services at the level four sites is at the mid to lower end of the spectrum, but varied considerably among the level four sites:
  - Hospital H has 8 to 10 additional specialist services available onsite
  - Hospital I and J have onsite access to between 1 and 4 additional specialist services available.

Access to Allied Health

- Access to Allied Health services varies substantially among the level four sites:
  - For two level four sites, the profile for Access to Allied Health services is at the higher end of the spectrum, with access to one allied health profession based within the ED for at least 0.5 FTE or guaranteed time by additional Allied Health services (other than physiotherapy, social work and pharmacy) in ED at least 0.5 FTE
  - For the other level four hospital, the profile for access to Allied Health services, was at the lower end of the spectrum, with access to all Allied Health (other than physiotherapy, pharmacy and social work) services on-call external to the ED.

Emergency Staff Profile

Nursing and Medical Profiles vary substantially across the level four sites.

Medical Profile

- All three hospitals rely on locums to fill the medical roster at least once daily.
- The sites vary in terms of the level of coverage provided by emergency physicians in the ED:
  - Hospital H has a Medical Profile at the higher end of the spectrum with employed emergency physicians greater than 2.0 FTE and more than 7 shifts covered per week
  - Hospitals I and J have a profile in the mid range of the medical profile spectrum, with 1.0 FTE to 2.0 FTE emergency physicians employed in the ED, covering 5 to 7 shifts per week.

Nursing Profile

- Substantial variation exists across the level four sites in terms of nursing profile:
  - Hospital I's Nursing Profile is at the higher end of the spectrum with a high proportion of experienced nursing staff (more than 70% of nursing staff are Senior Nurses), but with daily reliance on agency/casual staff to fill the roster
  - Hospital H has a nursing profile in the mid range of the spectrum, with 50 to 70% Senior Nurses, and a daily reliance on agency/casual staff to fill the roster
  - In contrast, fewer than 50% of nurses at Hospital J are Senior Nurses, but site J relies on agency/casual nurses less than daily.

Support Profile

- One of the level four hospitals has a Support Profile at the higher end of the spectrum, comparable with facilities in higher levels, with between 6.0 and 12.0 FTE clerical support 24 hour/ 7 day coverage, as well as patient support staff based in the ED.
- For the other two level four sites, the Support Profile was at the lower range of the spectrum, with less than 6 FTE and patient support on request only. One level four site has 24 hour/ 7 day coverage of clerical staff and the remaining site has no clerical cover overnight.

Education and Models of Care

- All level four hospitals are in the mid range for extent of use of contemporary Models of Care.
- Level four hospitals also are in the mid range of the spectrum for Nursing Education profiles.
- The profile of Medical Education among level four sites is highly varied.

Education

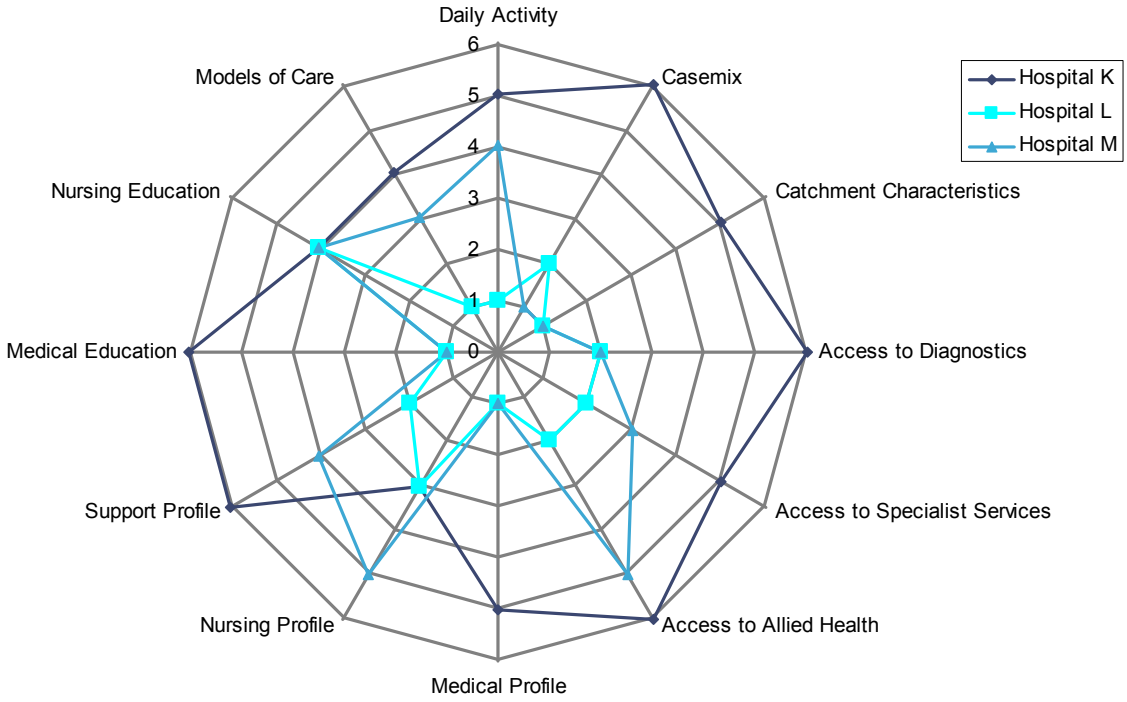
- Hospitals at level four have varied profiles for Medical Education ranging from mid range to the higher end of the spectrum:
- At the higher end of the spectrum, the profile reflects that two of the hospitals:
  - are ACEM accredited
  - provide regular in-service for medical officers
  - currently participate in research.
- At the mid range of the spectrum, the profile reflects that the third hospital:
  - is not ACEM accredited
  - does not provide its emergency medical staff with regular in-service education
  - does not currently participate in any research programs.
- Nursing Education profiles also vary among the level four sites, ranging from the lower end of the spectrum to mid range:
  - The mid range profile (Hospitals H and J) reflects that whilst having less than 1.0 FTE educator based in the ED per 40 FTE nurses, these sites provide formal development pathways for the professional growth of nursing staff in the ED
  - The lower range profile reflects that there is between 1.0 FTE and 2.0 FTE educator based in the ED per 40 FTE nurses, but formal professional development pathways are not in place.

Models of Care

- Hospitals at level four hospitals have varied profiles for use of contemporary models of care.
- One site, at the lower end of the spectrum, uses no more than 3 contemporary models of care.
- At two level four EDs, 10 to 12 models of care are currently implemented.

Level three facilities

Figure 6: Pattern of profiles for level three contextual analysis



This radar graph for level three facilities reflects greater level of variation across the facilities than any other level. No characteristic can be identified as typical of a level three hospital. Hospital K's profile is closer in spatial distribution to that of a level five or 6 profile, rather than to that of other level three facilities.

Throughput and Catchment Characteristics

Daily activity

- The sites varied across the range of the daily activity spectrum.
- One site has a profile at the lower end of the spectrum with fewer than 80 presentations per day.
- At the opposite end of the spectrum, another Level site shows a profile of Daily Activity with greater than 130 presentations per day.
- Both sites see more than 4 patients per assessment space per day.

Casemix

- Level three facilities also varied across the range of the casemix spectrum.
- For one level three facility, more than 9% of presentations are ATS categories 1 and 2, and more than 20% of presentations are classified as aged presentations.
- At the opposite end of the spectrum, another level three site sees fewer than 9% ATS categories 1 and 2 and fewer than 25% paediatric patients.

Catchment Characteristics

- Level three sites show a wide range of Catchment Characteristics.
- One level three site is at the higher end of the spectrum, reflecting its RRMA classification (metropolitan) and its mid-range socioeconomic status (SEIFA category five to six).
- At the opposite end of the spectrum, two level three facilities are classed as rural and low socioeconomic status (SEIFA category one to four).

Access to Services

- Overall, Hospital K reported a very high level of Access to Diagnostic, Specialist and Allied Health Services, similar to a level six profile.
- In sharp contrast, the other level three hospitals have a low level of access to these services.

Access to Diagnostics

- Hospital K's profile reflects access to diagnostics at the higher level of the spectrum, with numerous pathology and radiology services available 24 hours, seven day a week.
- In contrast, the other two level three sites have access to pathology and radiology services on site for between 8 and 14 hours per day.

Access to Specialist Services

- Hospital K's profiles for Access to Specialist Services is at the higher end of the spectrum with access to between 13 and 15 services in addition to obstetric and surgical services.
- The other level three hospitals have lower Access to Specialist Services profiles, accessing no more than seven specialist services, in addition to surgical and obstetrics services.

Access to Allied Health

- Hospital K's profile for Access to Allied Health Services is at the higher end of the spectrum, similar to some level six sites, with two or more Allied Health staff based within the ED for at least 0.5 FTE each.
- Similarly, another level three hospital has access to an Allied Health profile at the higher end of the spectrum, with one Allied Health staff member based with the ED for at least 0.5FTE.
- The third level three presents something of a contrast, with an Allied Health profile at the lower end of the spectrum reflecting access only to Allied Health services external to the ED, on an on-call basis.

Emergency Staff Profile

Emergency Staff Profiles varied considerably across level three sites.

Medical Profile

- All sites at level three rely on locums to fill the roster on a daily basis.
- The medical profile for Hospital K was at the higher end of the spectrum, reflecting greater than 2.0 FTE emergency physicians employed in the ED, and specialist coverage of more than seven shifts per week.

- The other two facilities had medical profiles at the lower end of the spectrum, with less than 1.0 FTE emergency physicians employed in the ED, and specialist coverage of less than 5 shifts per week.

Nursing Profile

- All sites at level three rely on agency/ casual nurses to fill the rosters on a daily basis.
- At Hospital M, greater than 70% of nursing staff are Senior Nurses.
- At hospitals K and L, greater than or equal to 50% but less than 70% of nursing staff are Senior Nurses. However, both these sites also rely daily on casual or agency nurses to fill the roster.

Support Profile

The support profiles of these three sites showed considerable variation.

- All hospitals have support 24 hour/ 7 days per week.
- Hospitals K's support profile is at the higher end of the spectrum, with greater than 12.0 FTE in clerical staff, as well as patient support staff based within the ED.
- The other sites, alternatively, have less than 6.0 FTE clerical support each. One of these sites has patient support staff based within the ED, and the other has access to patient support only on request from other wards.
- At the other end of the spectrum, Hospital L has a support profile at the lower end of the spectrum, with less than 6.0 FTE and patient support based in the ED.
- A mid range profile is seen at Hospital M, with between 6.0 FTE and 12 .0 FTE clerical support, and patient support based in the ED.

Education and Models of Care

Education

Medical education profiles varied across the level three sites, while nursing education profiles were highly consistent across level three Sites.

Hospital K has a Medical Education profile at the higher end of the spectrum. It:

- is ACEM accredited
- provides formal in-service
- has current involvement in research.

- In contrast, Hospitals L and M, have medical education profiles at the lower end of the spectrum. They:
  - are not ACEM accredited
  - provide informal in-service
  - have no current involvement in research.
- The level three facilities have similar nursing education profiles in the mid range of the spectrum, reflecting that these emergency departments:
  - Provide nursing staff with formal development pathways for achieving clinical competencies and professional development

– Have less than 1.0 FTE dedicated nurse educators roles based in the ED for every 40 FTE of nurses.

Models of Care

The extent of use of contemporary Models of Care varied across the Level three sites, ranging from the midrange on the spectrum to the lower end. Hospital K's profile indicated use of 10 to 12 contemporary/ innovative models of care implemented in the ED. In contrast, Hospital L's profile indicated between one and three contemporary/ innovative modes of care in use in the ED.

4.3.3 Summary of emergency department activity

Table 11 below provides a high level summary of the activity of the level three to level six emergency departments visited. The EDs visited were located in both metropolitan and rural areas.

- All level six EDs are metropolitan sites, with a mixture of rural and metropolitan sites at other levels.
- There was wide variation in activity within and between the levels. For example, one level three ED has a similar level of activity to that of level six EDs.
- Level six is the most consistent level across the contextual domains. One exception is casemix: level six EDs have both the highest and lowest proportion of ATS category 1 and 2 presentations.
- A level three ED has the highest number of aged presentations

Table 11 Summary of the range of activity and casemix for NSW ED sample

ED Level	Presentations FY 2009	Metro: Rural	ATS 1 & 2 (%)	ATS 3 (%)	ATS 4 & 5 (%)	Paediatric (< 16 yrs)	Aged (70yrs+ or 55+ for ATSI)
6	36,119 - 61,569	4 : 0	3.4 - 16.1	19.0 - 52.5	34.4 - 77.6	12,149 - 36,065	2 - 9,941
5	32,734 - 50,211	2 : 1	7.0 - 9.1	28.4 - 37.5	55.4 - 62.1	8,420 - 11,061	4,878 - 10,030
4	22,327 - 35,220	1 : 2	5.2 - 6.8	21.5 - 31.7	61.9 - 73.3	4,855 - 7,267	2,405 - 6,156
3	24,728 - 51,168	1 : 2	4.6 - 9.1	21.2 - 39.0	52.9 - 74.2	6,464 - 12,645	3,542 - 10,316

‡ Source: NSW Health EDIS data for 2008/09

4.3.4 Summary of emergency department staff profiles

To understand the different workforce profiles and skills mix in NSW EDs, different roles were identified and examined at the thirteen participating EDs. Individual EDs provided information about existing roles during structured interviews, activity mapping sessions and through completion of a data collection instrument.

Overall, there appears to be little variation in the range of roles offered by EDs between levels three and six. However, some differences were apparent within levels, which is unsurprising given the differences in hospital profiles.

An example of a unique role seen at one facility is the Technical Assistant (TA), which has the responsibility of performing technical tasks such as venepuncture and cannulation and ordering imaging and pathology tests under the direction of a registrar or staff specialist. The Blood Cannulation Nurse (BCN) is a similar role seen at another facility. BCNs are endorsed enrolled nurses with extended skills in cannulation. By taking on responsibility for technical tasks, the BCN can assist clinicians to focus their efforts on their core role of diagnosis and treating patients.

The different roles currently being used in NSW EDs are shown in Table 12 to Table 15.

Table 12: Nursing roles seen in Level 3-6 EDs in NSW

Nursing roles	Level 3	Level 4	Level 5	Level 6
Services Manager				✓
Nurse Manager	✓		✓	✓
Nursing Unit Manager	✓	✓	✓	✓
Clinical Nursing Unit Manager	✓	✓		✓
Nurse Practitioner		✓	✓	✓
Clinical Nurse Consultant (CNC)			✓	✓
Clinical Nurse Specialist	✓		✓	✓
Nurse Educator				✓
Clinical Nurse Educator	✓	✓	✓	✓
Registered Nurse	✓	✓	✓	✓
Clinical Initiatives Nurse	✓	✓	✓	✓
Endorsed Enrolled Nurse	✓	✓	✓	✓
Enrolled Nurse	✓		✓	✓
Triage Support Nurse			✓	
Assistant in Nursing			✓	✓
Aged Care CNC	✓	✓	✓	✓
Mental Health CNC / Nurse	✓	✓	✓	✓
Rapid Assessment Nurse		✓	✓	
Bed Manager / pt flow manager	✓		✓	
Student Nurse			✓	
Chronic Care Nurse			✓	
Care Navigation CNC		✓		
Ambulance Release Team nurse	✓			
ALERT Nurse	✓			
Drug and Alcohol Nurse	✓			

Table 13: Medical roles seen in Level 3-6 EDs in NSW

Medical roles	Level 3	Level 4	Level 5	Level 6
Emergency Department Director	✓	✓	✓	✓
Staff Specialist	✓	✓	✓	✓
FACEM	✓	✓	✓	✓
Career Medical Officer	✓	✓	✓	✓
General Practitioner - Visiting Medical Officer	✓	✓	✓	✓
Locum	✓	✓	✓	✓
Registrar		✓	✓	✓
Resident Medical Officer	✓	✓	✓	✓
Intern.		✓	✓	✓
Medical Student		✓	✓	
Visiting Medical Officer	✓			

Table 14: Allied Health roles seen in Level 3-6 EDs in NSW

Allied Health roles	Level 3	Level 4	Level 5	Level 6
Radiographer	✓	✓	✓	✓
Physiotherapist	✓	✓	✓	✓
Physiotherapist Aid	✓			✓
Occupational Therapist		✓	✓	✓
Social Worker	✓	✓	✓	✓
Speech Pathologist	✓	✓		✓
Aboriginal Liaison Officer	✓	✓		✓
Dietician	✓			✓
Clinical Pharmacist	✓	✓	✓	✓
Hospital Pharmacist	✓	✓		
Mental Health Emergency Clinical Team	✓		✓	
Allied Health Manager	✓			
Respiratory Physiotherapist	✓			

Table 15: Support staff roles seen in Level 3-6 EDs in NSW

Support Staff roles	Level 3	Level 4	Level 5	Level 6
Chaplain				✓
Communications Clerk / Receptionist	✓	✓	✓	✓
Clerical Staff	✓	✓		✓
Secretarial Support Officer / Administrative Assistant	✓	✓	✓	✓
Equipment Coordinator / Stores person	✓	✓		✓
Ward Orderly / PSA	✓		✓	✓
Clinical Support Officer			✓	✓
Cleaners	✓	✓		✓
Volunteers				✓
Security / HSA	✓	✓	✓	✓
Staffing Officer				✓
Technical Assistant				✓
Executive Assistant	✓	✓		✓
Data Manager				✓
Wards person	✓	✓	✓	
Information technology		✓		
Emergency Department Support Officer		✓		
Clerical Manager	✓			
Discharge Planner	✓			

4.3.5 Activity Mapping

Participants

A key method of data collection during each of the thirteen EDs visited, was an activity mapping session. The session, lasting approximately 2.5 hours, was open to all categories of staff with a direct or indirect role in the ED. On average, six to ten people attended each session and included medical, nursing, clerical, Allied Health and support staff. The intention was to include a variety of ED stakeholders to attend and to provide key information, in a structured way, about staff responsible for activities associated with an ED patient journey.

Purpose

The purpose of the sessions was to:

- Identify the range and skill level of staff working in each ED, both directly and indirectly
- Understand the working relationships between staff groups

- Identify the high level activities of the patient journey through the ED including activities that are not direct patient activities but are essential to the running of the ED
- Identify the requisite skill level for particular roles and subsequent skill requirements to carry out specific activities
- Identify activities which are appropriate to be delegated to less skilled staff under supervision
- Identify future roles that have the potential to be developed and implemented in an ED.

The findings of the activity mapping session were then used to inform the development of the principles and guidelines for skill mix in an ED, as well as identifying potential changes that can be made to the way in which existing skill sets are best used in the ED.

Approach to data collection

A matrix was used to collect activity mapping data, with staff allocated along one axis, and a list of activities listed on the other axis. The activity mapping data collection included all current ED roles, as well as roles that have been implemented in other EDs or which were identified in the literature. Activities were then mapped in the matrix to staff roles. The session focused on a comprehensive list of direct patient care activities bundled into 'stages' of the patient journey, and recognising that care can sometimes commence prior to patient arrival in ED. For the purposes of thematic analysis, activities were subsequently bundled into functional categories.

The mapping session also included other essential activities not directly related to patient care – for instance recruitment, research and teaching – that are necessary to an ED in providing a contemporary, skilled workforce with appropriate support. These activities were then mapped to the existing ED roles and potential future roles were flagged with appropriate activities mapped to these.

In identifying the staff carrying out each activity, activities were coded to capture data on the staff roles as follows:

1 Primarily responsible for the activity

2 Activity is jointly performed by more than one team member

3 Staff member provides a supporting role

4 Other roles/team members could perform this activity (future alternative).

Using these codes, the EDs were able to identify the staff carrying out these activities in an ED and clarify the skills required to do this. This information has been used to identify differences between sites in the staff/skill mix in ED, potential changes to workforce models and potential changes to the way in which staff can best be used to allow them to focus on core activities of their profession.

Activity Mapping Summary

This section summarises the key findings from activity mapping sessions. Overall, analysis of the activity maps for the thirteen sites revealed two broad themes:

1. Few similarities between ED sites were identified regarding staff members responsible for patient and non-patient activities. In other words, multiple members of staff (ie medical, nursing, allied health and support) were responsible for a variety of activities and took on multiple roles within the ED.

2. Highly skilled staff tended to take on tasks that did not utilise the specific skills they possess, with alternative staff members identified as potentially being able to take on these tasks. For example, experienced medical staff were found to take on a number of administrative tasks, such as tasks associated with coordinating a patient transfer. After liaison with clinicians at another facility to take/receive a patient history, advise on treatment and accept/refer a patient transfer, medical staff would often complete the transfer arrangements including ambulance transport, necessary paperwork and allocation of a bed. These tasks have the potential to be completed by clerical staff in collaboration with the medical staff member.

The following tables below list both the direct patient and non-direct patient activities that were mapped. This list is not exhaustive of all ED activities, and was used at each site with some slight variations depending on the site.

Table 16 below lists the direct patient activities that were included in the activity mapping session. The aim was to identify high level activities that are representative of a typical patient journey for both an emergency and urgent patient presentation.

Table 16: Direct patient activities identified in activity mapping sessions

Activity mapping – direct patient activities	
Category	**Activity**
Administrative / secretarial	• Collect and bring notes to the ED
Admissions and patient flow	• Handle direct admissions that come through ED (liaising with bed manager and NUM) • Discuss admissions with the sub-specialty team • Liaise with the bed manager to arrange a inpatient bed • Liaise with bed manager at another hospital to arrange an inpatient bed • Arrange transfer to a private hospital • Arrange patient transfer with the patient flow team
Certification death	• Certify life extinct • Register death on arrival • Completion of Death Certificates by ED staff • Contractor certification of life extinct
Clinical info gathering and advice	• Receive bat phone call from ambulance • Clinician consultation via radio / receive treatment call (from ambulance) • Receive call from GP or other facility (for advice, second opinion or pending arrival) • Receive admitting calls (mental health or aged care) from another hospital or specialist rooms • Receive notification of urgent pathology / imaging • Receive handover from ambulance/caregiver • Consult with registrar/consultant to organise outpatient / specialist referral / liaison with GP / liaison with pharmacist regarding medications • Liaison with other caregiver • Notify coroner / police of death • Notify GP of death

Activity mapping – direct patient activities	
Category	**Activity**
Communication with patient/carer	• Communicate discharge decision to residential aged care facility / family / carer • Provide patient with discharge letter and instructions • Notify relatives of death
Coordination of ongoing care	• Contact other services as part of management plan (e.g. Community Nurse, APAC, GP) • Coordinate discharge equipment / dressings
Response activation	• Team activation in response to urgent / trauma presentation • Security activation • Social work / chaplain activation for trauma / resuscitation patient • Arrange retrievals with medical staff or other facilities • Coordinate inter-hospital transfer • Notify donor coordinator / eye bank
Patient information and registration	• Register patient and assign medical record number • Enter triage information into patient management system and note the time patient arrived in ED • Order patient notes • Complete admissions paperwork • Coordinate paperwork for transfers • Collate patient notes for medical records
Patient assessment	• Triage patient and assign to relevant area • Primary assessment • Initial intervention - attach patient to equipment (monitoring). • Invasive monitoring • Interpret diagnostic results • Monitor patient in waiting room • Activation of specialist team
Ordering diagnostics	• Nurse-initiated tests (clinical pathways) • Order diagnostics (x-rays and pathology)
Patient and specimen transfers	• Assist unstable or aggressive patients into the ED • Send ambulance to collect patient from helicopter • Escort patients for diagnostics • Escort patients to critical care areas or ward • Arrange hospital porter transfers • Arrange patient transport • Transfer patients to treatment areas • Arrange retrieval - adult and paediatrics • Transfer patients around ED • Transfer to morgue • Transfer specimens
Decision making	• Initial intervention - order analgesia • Decision making around patient management as a result of diagnostics • Disposition decision • Decision regarding outpatient / speciality review
Procedure - standard / complex	• Conduct intubation • Conduct ultrasound in ED (FAST) • Conduct invasive diagnostic procedures • Conduct eye procedures e.g. foreign body removal • Treat dislocations (realignment etc) • Manage fractures (realignment etc) • Urethral catheterisation • Gynaecological exam and swabs

Activity mapping – direct patient activities	
Category	**Activity**
Procedure - musculoskeletal	• Limb stabilisation (plaster) • Limb stabilisation (crutches) • Limb stabilisation (bandaging, slings, splinting)
Intervention - medications	• Initial intervention (oxygen, analgesia, cannulation) • Initiate treatment in the waiting area prior to medical review • Prescribe and document fluids and/or medications • Prepare, administer and document fluids and/or medications • Review medication / conduct medication reconciliation • Prescribe and arrange discharge medications
Patient documentation	• Documentation in electronic systems • Ongoing documentation in medical record • Collate and track paper based notes • Take and record vital signs • Complete discharge summary and contact GP • Complete checklist / parent information handout • Complete medical certification forms
Social support	• Care for family of resuscitation patients • Accompany family to critical care inpatient area • Support families regarding retrieval • View body with relatives

Table 17 below lists the non-patient activities, typically those activities which are essential to running an ED. These activities were selected as a representative sample of activities that can take place in ED on a daily basis but are not direct clinical care.

Table 17: Non-patient activities identified in activity mapping sessions

Activity mapping – non-patient activities	
Category	**Activity**
Care-taking	• Complete roster (nursing, medical, Allied Health, clerical and other) • Manage timesheets and resourcing, payroll • Restock equipment (medications, stationery, emergency equipment and bed areas) • Manage stock and ordering • Conduct audits of documentation and medication charts • Maintenance / tracking and repairing of equipment • Medication inventories • Secure patient valuables
Cleaning	• Clean spot spills • Clean body products / fluids • Change beds • Clean whole ward (floors, bathrooms, dusting) • Clean bed bay / cubicles at patient turnover
Patient Support	• Move patients on/off beds and chairs • Assist patients with hygiene and toileting • Assist with patient comfort, e.g. by providing blankets and water • Assist with family comfort e.g. by providing meals and drinks • Assist patients with meals • Provide emotional support to patients and families
Administration	• Check formal pathology / radiology results • Prepare for and attend morbidity and mortality meetings • Review and manage IIMS • Prepare and attend hospital administration meetings • Prepare and attend hospital quality meetings • Prepare and attend hospital meetings / committees
Communication	• Prepare and attend hospital grand rounds • Follow up patient complaints • Follow up staff complaints • Page other teams • Page wards person / support staff • In-house communication system responsibilities
Staff Related	• Organise and conduct staff recruitment • Organise and conduct new staff orientation • Organise and conduct on-boarding activities • Provide staff support e.g. debriefing
Additional	• Order new equipment / furniture • Renew equipment contracts • Monitor impact of equipment on occupational health and safety • Troubleshoot IT systems • Make after-hours patient system updates • MET calls • Undertake switchboard duties after hours • Collect medical records after hours • Clean toys • Patient education

Activity mapping – non-patient activities	
Category	**Activity**
	• Restrain aggressive patients • Organise interpreters • Set up assessment and treatment rooms between patients
IT	• Log IT job • Data management • Coordinate with external IT support

The summary of themes which emerged from the activity mapping sessions are described in Table 18.

Table 18: Key findings from the activity mapping session

Role	Key findings
Medical staff	• *Patient activities*: Experienced medical officers in rural sites are reported to take on tasks unrelated to their area of specialty, for example administrative tasks such as ordering stock. Experienced medical officers at smaller sites are reported to take on more responsibility across a variety of roles. In smaller sites with a higher proportion of novice staff, these less experienced medical staff were more likely to have a primary responsibility in a decision making role. • *Non-patient activities*: Medical officers have more involvement in supporting non-patient activities at lower level sites.
Nursing staff	• *Patient activities:* There was a trend for the admission and patient flow responsibilities of Clinical NUMs to increase as the level of ED decreased. Clinical NUMs also appeared to have greater responsibility for coordinating discharge equipment and liaising with other care givers (eg residential aged care facilities) at smaller sites. • *Non-patient activities*: Nurse Managers tend to take on more responsibility for non-patient tasks at rural sites including ordering and restocking equipment. Nurse Managers are also responsible for management of IIMS and staff complaints across all sites.
Allied Health Staff	• *Patient activities:* Few consistent themes emerged for Allied Health across sites due to the diverse nature of the profession. • *Non-patient activities:* Allied Health staff tended to have little to no role in non-patient activities.
Support staff	• *Patient activities*: Clerical staff have primary responsibility for the majority of patient registration tasks. Clerical staff were also identified as playing a supporting role in collating pathology results in some sites, and taking a lead role in communications such as paging other teams. • *Non-patient activities*: Cleaners take a primary role for cleaning duties across all sites, while nurses were identified as playing a joint or supporting role in bed cleaning at patient turnover. Clerical managers at some facilities played a joint role in handling patient complaints.

Table 19 below summarises opportunities for future roles that were identified by more than two sites visited. Due to variation in practices, some of these roles are already being performed in some EDs by the staff identified.

Table 19: Opportunities for future roles that were identified by more than two sites visited

Role	Key findings
Medical staff	• There were no future roles identified for medical staff raised by more than two sites.
Nursing staff	• Smaller sites with no CIN role expressed a desire to expand the nursing role to tasks such as clinical information gathering, decision making, interventions, patient assessment and procedures. • Most sites with no Nurse Practitioner role identified the opportunity for this role to be involved in many aspects of patient care. Assistant in Nursing and Enrolled Nurse roles are more prevalent in large metropolitan sites. • In general the following activities were identified as tasks that could be completed by appropriately trained nursing staff in the future: Arterial blood gas management Point of care testing on samples Limb stabilisation (plastering) Wound management and suturing.
Allied Health Staff	• Sites with a physiotherapist based in the ED identified the opportunity for this role to take on primary care responsibilities for patients with musculoskeletal injuries. In addition, opportunities for physiotherapists to become more actively involved in limb stabilisation and plastering, and wound dressing and management were identified at some facilities. • Sites without a social worker expressed a desire for this role to take on social support responsibilities, which currently fell to clinical staff.
Support staff	• Opportunity to expand the clerical role with additional communication responsibilities was identified by several sites. Some examples include: Support for coordination of retrievals Coordinating outpatient appointments. • A number of potential patient–related roles have been identified by several sites for clerical staff, wards persons and Technical Assistants. Some examples include: Coordination of discharge equipment Cannulation and blood gas management Point of care testing on blood samples Limb plastering. • Wards persons and Clinical Support Officers were also identified as having potential to perform a number of non-patient tasks including re-stocking, ordering non-catalogue stock and securing valuables.

Activity mapping – direct patient activities

The key findings relating to tasks and staff roles for direct patient activities are summarised in the following tables 20 and 21. Table 20 provides a summary of emerging themes around the range and skill level of staff carrying out direct patient activities in addition to potential future alternatives, for instance activities appropriate for delegation to less skilled staff.

Table 20: Emerging themes relating to task/role linkages for direct patient activities

Staff group	Summary
Medical Staff	• Senior medical officers in rural sites are reported to take on tasks unrelated to their area of specialty, for example administrative tasks and coordinating patient transfers. • Senior medical officers at smaller sites are reported to take on more responsibility across a variety of roles. • In smaller sites with a higher proportion of junior staff, junior medical staff were more likely to have a primary responsibility in a decision making role.
Nursing staff	• Smaller sites with no CIN role expressed a desire to expand the nursing role to tasks such as clinical information gathering, decision making, interventions, patient assessment and procedures. • Most sites with no NP role identified the opportunity for this role to be involved in many aspects of patient care. • Assistant in Nursing and Enrolled Nurse roles are more prevalent in large metropolitan sites.
Allied health Staff	• Few consistent themes emerged for Allied Health across sites due to the fragmented nature of the profession. • Sites with a physiotherapist based in the ED identified the opportunity for this role to take on primary care responsibilities for patients with musculoskeletal injuries. • Sites without a social worker expressed a desire for this role to take on social support responsibilities, which currently fell to clinical staff.
Support staff	• Opportunity to expand the clerical role with additional communications responsibilities was identified by several sites. New responsibilities would include: – Coordinating retrievals and putting out response calls, for example for trauma / security. – Liaising with families and community care providers to collect additional information about current patient treatment and to inform them of disposition decisions – Contacting specialty teams to arrange outpatient appointments. • Wards persons are primarily responsible for patient and specimen transfers. Opportunity to expand this role was identified across a number of sites, with tasks including: – Coordinating discharge equipment, for instance crutches and mobility equipment – Collecting patients from cars and transferring patients from waiting room to treatment room – Point-of-care blood tests on samples • A Technical Assistant (TA) role was in place in one facility only. This role was identified as a future alternative for many activities at 9 of the 13 sites. Activities include: – Procedures, such as taking blood and blood gas management, 12 lead ECGs, catheterisation, wound management, cannulation, and removing dressings and IV lines – Preparing a patient for theatre – Transferring patient belongings

Diagnostic Phase

Staff group	Summary
	– Coordinating discharge equipment / dressings – Conducting initial interventions in the waiting area – Transferring patients from waiting room to consultation room – Preparing / relocating the body of a deceased patient in the ED – Ongoing documentation in the medical record – Limb stabilisation – plastering and crutches

Table 21 summarises the evidence about similarities and differences among metropolitan and rural, large and small, high level and low level EDs in terms of which staff groups are carrying out activities. For several activity groupings, potential alternatives to current tasks and staff roles have been identified. Activities have been grouped into functional categories to simplify the way in which this information is presented.

Table 21: Staff group responsibilities for activities along the patient journey

Activity grouping	Staff group	Summary
Administrative		• No clear themes emerged as to who this responsibility falls to.
Admissions and patient flow	Medical	• Medical staff have primary responsibility for admissions and arranging admissions with admitting teams.
	Nursing	• Lower-level EDs had more responsibility in this area than higher-level EDs. • Junior nursing staff are more likely to have a role in patient flow in Level five and six EDs
	Allied health	• At Level three and Level four sites, physiotherapy has a role in liaising with admitting teams
	Support	• Clerical staff provide assistance to clinical staff in liaising with admitting teams and arranging beds. • Wards persons are responsible for patient transfers
Certification death	Medical	• All medical staff have a primary responsibility in certification of death as this is a legal responsibility that cannot be delegated.
	Allied health	• Social workers have a support role in the certification of death tasks at Level three EDs
	Support	• Clerical staff support medical staff in this role in Level three and Level four sites
Clinical information gathering and advice	Medical	• Primary role for senior medical officers with support from junior medical staff
	Nursing	• Primary responsibility for the clinical NUM at a Level six ED
	Allied health	• Physiotherapists have primary role for liaising with specialist teams in Level six facilities and support roles in lower level EDs. • Physiotherapists and social workers were identified as having a potential role in liaising with GPs / caregivers in lower-level EDs.
	Support	• Staff play a supporting role at many sites • At other sites, this was identified as a potential support role for clerical staff.

Diagnostic Phase

Activity grouping	Staff group	Summary
Communication with patient/carer	Medical	• All medical roles consistently take primary or secondary responsibility for these tasks.
	Nursing	• Primary role of the NUM and Nurse Manager at rural sites • In Level six EDs, CNC/NPs take a primary responsibility for communicating discharge instructions. • CIN role was identified as a potential alternative to take on this role.
	Allied health	• Physiotherapists and social workers have a joint role in providing discharge instructions at Level four and five metropolitan sites • Social workers have joint responsibility for notifying relatives of patient death at Level six sites • The Aboriginal Liaison Officer at one site was considered to play a joint role in providing referral letters and discharge instructions to patients. • Two lower-level sites identified an opportunity for occupational therapists to communicate discharge decision, give a referral letter and provide patient instructions. • Two Level five sites identified a potential role for clinical pharmacists in liaising with GPs or other pharmacists
	Support	• One Level four ED identified an opportunity for communications clerks to communicate discharge decisions to the family or residential aged care facility.
Coordination of ongoing care	Medical	• The level of involvement of medical officers in these activities varies across sites • Junior medical officers tend to have greater involvement at Level four and five sites.
	Nursing	• Nurse Managers tend to have a primary responsibility for coordinating discharge and equipment at lower-level sites.
	Allied health	• General trend for physiotherapists to take responsibility for contacting other services in relation to ongoing care plans. • Occupational therapists and social workers have joint responsibility for contacting other services in relation to ongoing care plans. This was a suggested role for occupational therapists at three lower-level sites. • Physiotherapists have a primary or joint responsibility for coordinating discharge equipment / dressings.
Response activation	Medical	• Senior medical officers take primary responsibility for coordinating patient transfers at Level six EDs only. • The extent to which medical staff are involved in arranging retrievals varies by site. Senior medical officers are more likely to perform this activity than junior doctors.
	Nursing	• Senior RNs are more likely to have joint responsibility for team activation at Level six metropolitan sites than at other sites.
	Support	• At one Level six ED, a Health and Safety Assistant (HASA) role supports this activity. • At most sites, security and clerical staff play a joint role in activating trauma or security responses. At sites where this does not occur, security and clerical staff were identified as future alternatives for this task. • One Level six site identified the potential for communications clerks to notify donor organisations regarding patient death • Level three to five EDs identified potential activities for clerical staff, including calling social workers and arranging retrievals.
Patient information and registration	Medical	• Medical staff have a joint responsibility for ordering patient notes or completing admissions paperwork in only two EDs (both Level five). • At two Level six EDs, medical staff have joint responsibility for coordinating paperwork for patient transfers and collating medical notes.
	Support	• Clerical and communications staff have primary responsibility for the majority of tasks in this category at all sites. • One Level six ED identified Clinical Support Officers as a potential future role for coordinating paperwork for transfers.

Diagnostic Phase

Activity grouping	Staff group	Summary
Patient assessment	Medical	• JMOs take more responsibility for primary patient assessment at lower-level sites than at higher level sites. • Interns take a primary role in patient assessment at some lower-level sites.
	Nursing	• Senior nursing staff have primary responsibility for attaching patients to equipment at rural sites. • The clinical NUM at one small rural site has primary responsibility for performing primary patient assessments. • NPs tend to have a primary or joint responsibility for patient assessment.
Ordering diagnostics	Medical	• Medical officers have primary or joint responsibility for activities in this category. • Interns are more likely to be involved in ordering diagnostics at large metropolitan EDs.
	Nursing	• Where the role is used, NPs play a primary role in ordering diagnostics. • Nurses order tests according to clinical pathways
	Allied health	• Physiotherapists take a primary role in ordering x-rays at some lower-level sites
Patient and specimen transfers	Medical	• Senior medical officers have a responsibility for transferring patients from the waiting to treatment rooms across all sites. • At lower levels sites, JMOs have a joint responsibility for specimen transfers. • At Level three to five sites, senior medical officers are jointly responsible for the transfer of patients to resuscitation bays. This role for senior medical officers was uncommon at Level six sites. • Senior medical officers have primary responsibility for arranging retrievals for children at all sites.
	Nursing	• Nurse Managers are more likely to arrange ambulance or transport services at Level six sites than at lower-level sites. • EENs were identified as a potential role to take responsibility for patient transfers from waiting or consultation rooms.
	Allied health	• Social workers, where used, have primary or shared responsibility for accompanying patients and families to wards. • Social workers tend to take on more activities at higher-level sites. • Social workers have primary or joint responsibility for arranging patient transport at a number of sites.
	Support	• EDSOs, where used, have primary responsibility for a number of patient transfer activities. • HASAs, where used, have responsibility for transferring patients and specimens. • Communications clerks have a potential future role in arranging patient transport within and between the hospitals. These tasks are already performed by communication clerks across most other hospitals • Executive Assistants and CSOs were identified as having a potential future role arranging patient transport.
Decision making	Medical	• Medical officers have a primary role in reviewing and prescribing medication. • Residents and interns are more likely to take responsibility in clinical decision making in lower level rural sites.
	Nursing	• Clinical NUMS at smaller rural sites tend to play a supporting role in decisions around patient management and disposition as a result of diagnostics.
	Allied health	• Physiotherapists were identified as having responsibilities in clinical decision making.
Procedure - standard / complex	Medical	• Senior medical officers have primary responsibility for performing complex tasks such as lumbar punctures and intubation. • At all sites, senior medical staff are jointly responsible for taking blood • Senior medical staff are involved in carrying out basic procedures except at one Level six site. • Level four and Level five sites identified the opportunity for senior medical staff to perform point-of-care blood tests and ECGs. • An opportunity for CMOs to perform ECGs and intubation was identified in one Level five ED.

Diagnostic Phase

Activity grouping	Staff group	Summary
	Nursing	• NPs, where used, take primary responsibility for standard procedures • At one Level six ED, nursing staff take primary responsibility for the more basic procedures. • Junior RNs are more likely to provide support for simple procedures in larger metropolitan hospitals than in lower-level sites where they tend not to have a role. • A number of sites suggested an opportunity for senior nurses to undertake wound management procedures. • Some sites suggested an opportunity for RNs and EENs to collect blood gases.
Procedure - musculoskeletal	Medical	• Medical officers play a role in limb stabilisation at a number of lower-level sites.
	Nursing	• In some lower-level sites, Nurse Managers and clinical NUMs have joint responsibility for limb stabilisation. • Two metropolitan sites suggested for a role for CNCs in plastering for limb stabilisation. • NPs took on a primary responsibility for this task.
	Allied health	• Physiotherapists had joint responsibility for musculoskeletal procedures at a number of rural sites. • Physiotherapists were identified as having primary responsibility for this task at two metropolitan sites.
	Support	• HASA role has been identified as having potential future involvement in limb stabilisation (crutches) in a Level four rural site
Intervention - medications	Medical	• Medical officers have a primary role in the review and prescription of medication. • Medical officers take a joint or support role in initial interventions (e.g. analgesia etc.)
	Nursing	• At Level three to Level five EDs, senior nurses tend to have a joint or primary responsibility for initiating medications in the waiting area. • A number of Level six sites suggested a role for a Mental Health CNC in relation to this activity.
	Allied health	• At Level six EDs, clinical pharmacists have primary responsibility in the review and reconciliation of medication, along with managing medications on discharge. • Opportunity for clinical pharmacists to take on these responsibilities was identified at other sites.
Intervention - therapy	Medical	• Medical staff have limited involvement in these activities, at most taking joint responsibility or a supporting role.
	Nursing	• Nurses at all sites have responsibility for therapeutic interventions.
Intervention - other	Medical	• Medical staff have limited involvement in these activities, at most taking joint responsibility or a supporting role. • Residents and interns have primary responsibility for initial interventions (non-medication) in the waiting area at one ED.
	Nursing	• Nurses at all sites initiate interventions in the waiting room.
Patient documentation		• All Medical, nursing and Allied Health staff have joint responsibility for documentation in the patient record
	Medical	• Medical staff have a primary role in completing discharge summaries.
	Allied health	• Physiotherapists were identified as having a role in completing discharge summaries at Level three, four and five EDs.
Social support	Medical	• Medical officers have a varying level of involvement in providing social support across sites.
	Nursing	• Clinical NUMs at rural sites tend to have primary responsibility for supporting families of deceased patients • At Level six EDs, this is likely to be the joint responsibility of medical, nursing and Allied Health staff.

Activity grouping	Staff group	Summary
	Allied health	• Social workers, where used, have primary responsibility for providing social support.

Activity mapping – non-patient activities

Tables 22 – 23 below describe the key findings relating to tasks and staff roles for non-patient activities. Table 22 provides a summary of the typical responsibilities of different roles, in addition to potential future alternatives, for instance activities appropriate for delegation to less skilled staff.

Table 22: Emerging themes relating to task/role linkages for non-patient activities

Staff group	Summary
Medical Staff	• Medical officers have more involvement in supporting non-patient activities at lower level sites. • Locums have no responsibility for non-patient activities.
Nursing staff	• Nurse Managers tend to take on more responsibility for non-patient tasks at rural sites.
Allied health Staff	• Allied health staff tend to have little to no role in non-patient activities
Support staff	• Wards persons were identified as a potential alternative for carrying out: – Restocking equipment – Ordering non-catalogue stock – Checking emergency equipment – securing valuables – Cleaning bed bays and changing beds – Assisting patients with washing / showering and meals – Moving patients in and out of chairs • The CSO role was identified as a potential alternative for: – Rostering – Restocking equipment – Ordering catalogue stock – Timesheet and resource management

Table 23 summarises the evidence about similarities and differences among metropolitan and rural, large and small, high level and low level EDs in terms of which staff groups are carrying out which kinds of activities. For several activity groupings, potential alternatives to current tasks and staff roles have been identified. Activities have been grouped into functional categories to simplify the way in which this information is presented.

Table 23: Role responsibilities related to non-patient activities

Activity grouping	Staff group	Summary
Care-taking	Medical	• Medical officers at Level three and Level four EDs are more likely to support or take a joint role in some caretaking activities than medical officers are higher-level EDs. • At small rural sites, medical staff tend to have joint responsibility for ordering stock and other equipment.
	Nursing	• Nurse Managers are responsible for ordering stock and other equipment across all sites. • Senior nurses at small rural sites also have responsibility for this task. • Clinical NUMs and CNCs tend to be responsible for documentation and drug audits at Level six sites. • CNEs at small rural sites also have primary responsibility for these tasks. • EENs are primarily responsible for re-stocking and caretaking tasks typically in rural areas
	Allied health	• At a number of sites, clinical pharmacists have primary responsibility for restocking and reviewing medication inventories
	Support	• Stores persons (also called equipment officers) are primarily responsible for ordering stock, restocking equipment and checking stock in bed areas in most large sites, • This role was identified as a potential future alternative at Level three and four hospitals
Cleaning	Medical	• Medical staff at lower level sites have some responsibility for cleaning, e.g. bodily spills.
	Nursing	• Senior nurses at low-level rural sites have joint responsibility for cleaning roles such as cleaning bed bays and changing beds. • Junior RNs, ENs and AiNs have joint responsibility for cleaning and changing bed bays across all sites.
	Support	• Cleaners take a primary role in most cleaning duties across all sites. • Some sites identified cleaners or EDSOs for a potential future role in cleaning and changing bed bays and cubicles. • EDSOs have primary responsibility for a number of cleaning tasks.
Patient Support	Medical	• Senior and junior medical staff have greater involvement in patient support at lower level sites.
	Nursing	• All nursing staff have a joint role in this area. • Nurse Managers have a primary or joint responsibility for assisting patients with meals in two low-level rural sites.
	Allied health	• At some rural sites, physiotherapists have joint responsibility for moving patients on and off beds. • At two metropolitan sites, social workers have a primary role in providing emotional support for patients.
Administration	Medical	• No clear trends emerged in relation to the involvement of medical staff in administrative activities. • The ED director typically has a primary role in checking pathology results.
	Nursing	• Nurse Managers typically have responsibility for managing IIMS reports across all sites.

Activity grouping	Staff group	Summary
		• Clinical NUMS have a varying level of responsibility for this task among Level six sites.
	Allied health	• At one metropolitan site, the physiotherapist has primary responsibility for reviewing radiology results
	Support	• Clerical Managers at some sites attend patient registration meetings, revenue meetings and hospital administration meetings.
Communication	Medical	• At larger sites, the ED Director and Nurse Manager are responsible for ED communication tasks. • CMOs and VMOs tend to have responsibility for communication at low-level sites.
	Nursing	• At larger sites, the ED Director and Nurse Manager are responsible for ED communication tasks. • Clinical NUMs also play a role in communication.
	Allied health	• At one Level six site, social workers are responsible for following up patient and staff complaints. • Physiotherapists and clinical pharmacists have responsibility at some small sites for in-house communication.
	Support	• Clerical Managers have some role in handling patient complaints. • Communications clerks have primary responsibility for many tasks including paging other teams and in-house communication at Level five and Level six sites. This is not the case in Level three and Level four sites.
Staff Related	Medical	• ED Directors have a primary role for staff recruitment/orientation and support. • CMOs and VMOs tend to have greater responsibility for staff-related activities at Level three sites.
	Nursing	• Nurse Managers are responsible for most staff-related activities at all sites. • It is common for CNEs to have joint responsibility for these tasks, particularly in rural areas.
	Allied health	• Social workers, where used, take on responsibility for staff support activities.
	Support	• Clerical Managers are responsibility for clerical staff recruitment/orientation tasks in some EDs. • Secretarial support staff consistently have primary responsibility for tasks in this area.
IT	Medical	• Medical staff in lower-level sites have joint responsibility for logging IT jobs.
	Nursing	• Some rural sites identified Nurse Managers and junior RNs as having supporting roles in data management and logging IT calls.
	Support	• Clerical staff have primary responsibilities in data management and other IT-related activities at some sites. • In sites where this is not the case, clerical staff were identified as having a potential future role in data management.

4.3.6 Operational and workforce models of care used within the ED

Operational models of care

EDs are responding to changes in the profile and patterns of patient presentations, changes in technology, and changes in the composition of their workforce. In recent years, more flexible patient-centred operational models of care have been introduced. These models have been introduced in different settings in NSW as a result of their success nationally and internationally in increasing the quality, safety and efficiency of ED care. However, implementation of these models may meet with limited success if the appropriate skill mix and staffing profile is unavailable to staff the models adequately.

A number of key findings emerged from the data collection tool and structured interviews regarding the operational and workforce models of care used within the ED.

Overall, numerous operational models of care were used in the thirteen sites, including fast track, streaming, short stay units (SSU), medical assessment units (MAU), 3-2-1 processes, rapid assessment teams (RAT), separate paediatric area (SPA), psychiatric emergency care centres (PECC) and trauma teams. A summary of the key findings regarding operational models of care are provided in Table 24.

Table 24: Operational models used within the ED

Key findings
• Fast track and streaming models were in use at all metropolitan sites, but in no rural sites. • Most metropolitan sites and all Level 6 sites had an SSU in their departments. Only a minority of rural sites had an SSU and no Level 3 sites use this model. • Approximately half of sites used a 3-2-1 process model, with the majority being Level 5 and 6 sites. • All sites treated paediatric patients, with all Level 6 sites having a separate paediatric area. • A minority of metropolitan and rural EDs had a PECC. One Level 6, one Level 4 and one Level 3 site had a PECC with no Level 5 sites having this facility within the ED. • The majority of metro sites activated a trauma team in the ED versus one rural site.

The following table lists the operational models identified in NSW EDs providing a description of each model and any variation. The table also includes commentary from sites visited regarding the models implemented.

Table 25: Operational ED models of care in place across NSW EDs

Model of care	Description	Sites using the model	Variations and challenges
Fast Track[xi] [xii] [xiii]	• Fast Track is used to streamline the care of low urgency/low complexity patients. • The emphasis for this group of patients is early commencement of care by a clinical team. • Fast Track operates with dedicated staff in a physically separate zone, which may consist of cubicles and/or procedure rooms. • This model of care is designed to reduce waiting times and length of stay for a defined group of patients.	• The Fast Track model was used in all of the metropolitan sites with no rural sites using this model. • This model was used in all of the Level six sites and two Level five sites. • One Level four and Level three site used the Fast Track model.	• The majority of Fast Track models operate with a senior medical staff member. • One Level six site uses a NP and physiotherapist to see and treat Fast Track patients. • Two metropolitan sites used extended role RNs • One rural site disregarded the Fast Track model because they were concerned it would encourage primary care patients to present to ED for treatment rather than seeking care from a community GP. • A view expressed was that Fast Track was overly reliant on senior medical staff to operate it. • Senior medical staff with diagnosis and decision making ability are necessary to make a rapid diagnosis for this model to achieve its goals. Using inexperienced medical staff can be counterproductive.
Streaming [xiv] [xv]	• Streaming involves separating patients into different value streams at triage based on complexity, clinical urgency or likely disposition decision; that is, the clinical needs of the patient.	• Streaming is only used in metropolitan sites • All Level six hospitals use streaming • It is less common at smaller sites	• One Level six site streams patients according to an acuity/complexity matrix, such that patients are separated into four groupings. • Another Level six site streams patients into three groups based on predicted disposition and length of stay. The three streams are acute, sub-acute and direct admission into the SSU.
Short Stay Units (SSU)[xvi] [xvii]	• SSUs provide rapid and frequent assessment and short-term therapy and observation for patients who are likely to be discharged home within 24 hours. • They can be an effective means of improving patient flow through ED, limiting patient LOS in ED to 6 hours and avoiding admission to a ward for patients who are deemed to require monitoring for a limited period of time.	• The majority of metropolitan sites had SSUs • A minority of rural sites have SSUs. • All Level six sites have a SSU within the department. • Most Level five and Level four sites have an SSU • No Level three sites use this model.	• At some sites the term MAU is sometimes used to refer to SSUs. For the purposes of this report, however, SSU refers to a designated area within ED which holds patients for up to 48 hours. MAUs may also hold a patient for up to 48 hours. • EMU is another term for this model of care that may be used interchangeably with SSU. • Although SSUs are not designed as holding areas for the wards, some sites report that they start every day with patients in the SSU who are waiting for an inpatient bed.

Model of care	Description	Sites using the model	Variations and challenges
3-2-1 Process[xvii]	• This process model sets parameters around the length of patient stay in ED. • According to this model, it should take no longer than: – 3 hours to work up, review and make a disposition decision for a patient – 2 hours for the admitting team to review and accept the patient – 1 hour to transfer to ward • This process model targets high complexity patients at the crucial points in the patient journey.	• Approximately half of rural and metropolitan sites use a 3-2-1 process model or similar model. • Most Level five and Level six sites use the 3-2-1 process model. • One Level four site and one Level three site use the model.	• A variation on the 3-2-1 was found in one site. This Level six site employed a 4-2-2 model which had corresponding parameters. This modification was considered to allow for a better allocation of resources in patient care. • Limitations to patient information tracking systems were considered to impede achieving the goals of the 3-2-1 process model. • Sites choosing not to use the model expressed the belief that it does not account for the time taken for diagnostic testing and diagnosis, which occur before patients can be moved to a ward. • The model is reportedly susceptible to breakdown during peak periods. • One site appointed a 3-2-1 nurse during the day to monitor patients' progress against 3-2-1 targets • At one site a clerk was allocated the role of monitoring all 3-2-1 timelines and keeping clinical staff informed.
Rapid Assessment Teams (RAT)[xviii xix]	• RATs aim to provide a quick assessment and initiation of treatment for high acuity patients. • Experienced clinical decision makers conduct a quick assessment of the patient and initiate pain management and pathology/radiology tests.	• This model is less commonly used than other models. • Two metropolitan sites and one rural site used the model.	
Separate paediatric area (SPA)[xx]	• A separate paediatric area should be used only for paediatric patients. • It should be set up with a dedicated medical and nursing team from the usual ED staff pool. • This model provides a rapid stream for treatment and assessment.	• All sites visited treated paediatric patients. • The majority of metropolitan and rural sites had separate paediatric areas in their EDs. • All Level six sites used separate paediatric area whilst the majority of Level five and Level four site had this area. One Level three site had a separate paediatric area.	
Psychiatric Emergency Care Centres PECC)[xvii]	• Aims to provide a separate stream for psychiatric presentations to the emergency department. • Provides a safe service for	• A minority of metropolitan and rural ED sites had a PECC. • One Level six, Level four and Level three site had a PECC with no Level five sites having	• One rural site had a similar operational model in the Mental Health Emergency Care Support Centre in which patients are streamed into once admitted to the ED.

Model of care	Description	Sites using the model	Variations and challenges
	consumers, service providers and the public. • Targets patients suffering from an acute mental health illness or disorder and are at risk of behavioural disturbance.	this facility.	
Trauma Team[xxi]	• A trauma team consists of medical and nursing staff from within the • Team members have clearly defined roles and are lead by a consultant. • The model also uses external surgical and anaesthetic staff as required. • The team is activated when a major trauma presents to the ED.	• Most metropolitan sites have a formal trauma team. • Only one rural site has a trauma team • All Level six sites use a trauma team in the ED.	

Workforce models

The shift in demand for and nature of emergency department presentations has prompted change in workforce models used within the emergency department beyond previous demarcations of nursing and medical staff. The introduction of new workplace models has shifted the manner in which other roles within the emergency departments function and has subsequently created a demand for further new roles. A number of these new workplace models have been introduced following their success in both the national and international context.

Some contemporary workforce models of care were seen in a number of sample sites, including the Clinical Initiatives Nurse (CIN), Mental Health CNC, Communication Clerk, Nurse Practitioner (NP), aged care services emergency team (ASET) and registered nurses with extended roles in ED. A summary of the key findings regarding the workforce models of care is provided in Table 26.

Table 26: Workforce models used within the ED

Key findings
• The CIN role was used in all metropolitan sites, but only a minority of rural sites. • The majority of rural and metropolitan sites used the Mental Health CNC and ASET model. • The majority of metropolitan sites used the Mental Health CNC, Communication Clerks, Nurse Practitioners, registered nurses with extended roles and ASET. • Only a minority of rural sites used the CIN role, Communication Clerks and NPs. • About half of the metropolitan and rural sites had implemented the administrative assistant role. • About half of the rural sites used registered nurses with extended roles. • Other workforce models which were implemented at a minority of the sites included the ED Physiotherapist Practitioner, Play Therapist, Patient Care Navigator, Psychiatric and Cardiac Liaison Nurse, Trauma CNC, ED Support Officer and Technical Assistant.

During the research phase, multiple methods were used to collect information about the use of contemporary workforce models of care. Interviews were conducted with key personnel in a wide range of roles at each site; role descriptions and guidelines for the scope of each role were collected to determine how the model is used at the site; where available, business cases recommending the implementation of these contemporary roles and evaluation studies were collected.

Detailed information about these contemporary workforce models is presented in the Table 27. Some roles that are used in only one ED have been omitted.

Table 27: ED Workforce models in place in NSW EDs

Model	Description	Sites using the model	Variations and challenges
Clinical Initiatives Nurse (CIN)	• The CIN initiates treatment based on advanced clinical assessment and using extended practice skills. The CIN can also reassess and re triage patients as their condition alters during their time in the waiting room. • The purpose of the role is to provide care and communication early in the patient journey, thereby reducing patient anxiety and frustration.	• The CIN role is used in all metropolitan sites. • It is used in a minority of rural sites. • All Level six and Level five sites use the CIN role.	• The CIN role is filled in most cases by a registered nurse with extended skills. • One site uses the role only to provide basic care to patients in the waiting room, rather than initiating treatments. • Some sites report that it is a challenge to guarantee the role shift by shift: it is the first role to be re-deployed in cases of staff shortages. • The CIN role also tends to breakdown in peak periods, with some sites pulling the CIN into triage to act as a second triage nurse.
Mental Health Clinical Nurse Consultant (MH CNC)	• The MH CNC provides assessment, treatment and care coordination for mental health presentations within the ED. • This role targets patients with complex mental health needs whose treatment does not interface well in the busy emergency department environment.	• Most rural and metropolitan sites use the mental health CNC role. • All Level five sites and most Level six, Level four and Level three sites use this role.	
Play Therapist	• The purpose of this role is to normalise a strange and threatening situation for young children through techniques such as distraction and education. • The role targets children who require procedures or invasive treatments • Part of the play therapist role is teaching play therapy techniques to ED staff	• This role is uncommon in NSW EDs • It is used in one Level six metropolitan site and one Level four rural site.	• This is a specialised role that is unique to two of the sample EDs • Play therapists have been involved in training staff at other hospitals in play therapy techniques • As a result, other sites use play therapy concepts such as distraction when treating children
Care Navigator	• This role manages the journey of a specific group of complex patients through the hospital system by coordinating with acute and post-acute care staff. • It also coordinates more appropriate community-based care for these patients by liaising with community providers in order to reduce re-presentations to ED. • An automated flag alerts the Care Navigator when patients meeting specific criteria present to the ED. • The Care Navigator liaises with community care providers to collect all relevant healthcare	• This innovative model of care was developed by a metropolitan ED to address the needs of a particular at-risk group of patients.	• The Care Navigator role provides a complementary service to the traditional ASET model, which targets elderly patients. • The Care Navigator role is intended to provide a similar service for younger ED patients with social problems, mental illnesses or chronic diseases who are at risk of re-presentation to ED.

Model	Description	Sites using the model	Variations and challenges
	information about the patient.		
Communications Clerk	• This role was introduced as a means of reducing time spent on clerical tasks by clinicians • Communications clerks answer incoming calls and direct calls to appropriate staff members. • They coordinate outgoing calls and patient movements between departments such as radiology and wards.	• Most metropolitan sites use this role. • A minority of rural sites have implemented this role.	• Introduction of the communications clerk role is generally seen to be a successful initiative. • Sites without communications clerks identified this as a potential role for their ED.
Administrative Assistant	• This role was introduced to reduce the administrative burden on clinical and managerial staff. • This role performs administrative tasks associated with the running of the ED. These include assisting with rostering, staff recruitment and managing budgets.	• Approximately half the metropolitan and rural sites have an administrative assistant.	
Nurse Practitioner (NP)	• Nurse Practitioner is a protected title in Australia that denotes certain advanced qualifications and clinical competencies. • This role expands the traditional nursing role, allowing practitioners to take on tasks that were traditionally within the medical domain. • NPs are generally used to provide a primary care service to patients with low care needs.	• Most metropolitan sites have the NP role in place. • Only one rural site has implemented this role. • Most Level five and Level six sites use this role. • A minority of Level three and Level four sites use this role.	• Evaluations of the NP role show that it reduces the workload of medical and nursing staff. • Views of emergency medical officers range as to the appropriateness of the NP role in ED. • Some NP roles require a level of medical supervision to operate. Some NPs roles are similar to extended role RNs or CINs.
Extended Role RNs	• These roles have been introduced to enhance the clinical scope of trained nurses and also reduce the workload for medical staff. • The role is performed by experienced nurses who are trained and work according to clinical pathways, such as initiating analgesia, ordering radiology and pathology.	• Extended role RNs operate in most metropolitan sites. • Half the rural sites use extended role RNs.	• Generally, this role is seen as useful for overcoming medical staff shortages. • However, some interviewees stated that these nurses tend to ignore basic patient care tasks.
Aged Care Services Emergency Team (ASET)	• The ASET model of care is used to manage the care of elderly patients so that admissions and re-presentations can be avoided. • ASETs identify elderly patients (patients over 70 or over 55 years for ATSI) at risk of poor outcomes and plan for their safe and effective discharge into the community. • ASETs work closely with community healthcare providers to coordinate ongoing care for their	• The ASET model is used in most metropolitan and rural sites • This model is seen at all levels.	• Other care coordination models similar to ASET are Emergency Department Care Coordinator (EDACC) and the Care Navigator role. • Care coordination models are considered vital to improving the flow of elderly patients through ED and preventing re-presentations. • The outreach ASET model is considered to have a role in assessing potential patients at aged care facilities.

Model	Description	Sites using the model	Variations and challenges
	clientele.		
Psychiatric liaison	• The psychiatric liaison role is used to assess and treat patients who present to ED with mental health needs. • The purpose of the role is to provide appropriate clinical assessment in an environment where staff may not have the time or expertise to provide adequate care. • The role may be filled by various professional groups, including mental health CNC, mental health CNS, psychiatrist, psychiatric registrar or psychologist.	• A minority of metropolitan sites have a psychiatric liaison model of care. • No rural sites use this model. • This role is used only at Level five and Level six sites.	• This role can be dedicated in the ED, or can be based elsewhere in the hospital and available on call to the ED. • The mental health CNC can fill the psychiatric liaison role. • A PECC unit can also fill this role.
Cardiac liaison	• The cardiac liaison role is used to review patients presenting to ED with cardiac-related symptoms. Cardiac liaison personnel may assess patients and consult with medical staff regarding transfers to an SSU. • The purpose is to coordinate the care of cardiac patients through the hospital system and back out into the community.	• A cardiac liaison nurse was found in a minority of metropolitan sites. • It has not been implemented in rural sites. • This role is used only in Level five and Level six sites.	• This role can be dedicated in the ED, or can be based elsewhere in the hospital and available on call to the ED.
Physiotherapist Practitioner	• This role provides a primary care service to patients presenting to ED with musculoskeletal injuries or elderly patients who require mobility assessments. • Physiotherapist practitioners can manage patients independently with minimal input from medical officers. • Aims to reduce waiting times for these injuries.	• The physiotherapist practitioner role is used in a minority of metropolitan and rural sites. • It is used in sites at all levels.	• At one Level six metropolitan site, physiotherapist practitioners had standing orders which enabled them to initiate care, perform assessments, order radiology tests and discharge patients. • Some sites use physiotherapists in the ED only as secondary care providers.
Trauma Clinical Nurse Consultant	• This role coordinates the care of major trauma patients with a focus on preventing deterioration. • Trauma CNCs provide expert clinical advice to patients and other health care professionals.	• One Level six metropolitan ED has a dedicated trauma CNC. • A Level three ED has access to a Trauma CNC as part of its AHS network. • The role was not specifically identified in any other ED.	
Emergency Department Support Officer (EDSO)	• This role is used to provide basic patient care and a range of non-patient-related support tasks. • Tasks include patient transport, couriering items, cleaning and assisting patients with meals and toileting.	• The EDSO role is used in one Level five metropolitan ED and one Level three rural ED. • No other EDs used this role.	• Other EDs have similar roles, e.g. wards person, HASA and AiN. • The distinguishing feature of the EDSO role appears to be the focus on basic patient care, which is absent from traditional wards person roles.

Diagnostic Phase

Model	Description	Sites using the model	Variations and challenges
Technical Assistant (TA)	• Technical Assistants are trained in procedural tasks such as taking blood, venepuncture and cannulation. The purpose of the role is to reduce demands on medical staff. • TAs can also order imaging and pathology services under standing orders or the direction of medical staff.	• This role has been implemented only in one Level six metropolitan ED.	• A similar role is performed in another NSW ED by EENs, who collect can collect blood samples. • The EEN in this role also provides additional clinical support to patients.

Alternative workforce roles

Throughout interviews and activity mapping sessions, the sample EDs identified a number of alternative workforce models with the potential to supplement the existing ED workforce skill mix. Models were identified from those existing in other ED and health care settings and are listed. The views expressed in Table 28 are those of the key informants interviewed.

Table 28: Alternative ED workforce models identified by NSW EDs

Alternative roles	Description and rationale
Scribes	• One interviewee reported that documentation demands on clinical staff have increased in recent years, taking highly skilled clinicians away from their clinical responsibilities. • The US model in which scribes type up the shorthand notes of medical staff was suggested as an alternative role at one Level six metropolitan site. The scribe is responsible for taking down patient notes, retrieving a patient's medical history, compiling imaging and pathology results and recording discharge plans. • Many sites expressed the view that Information Technology (IT) for recording and tracking patient information is cumbersome, counterintuitive and hampers productivity. A scribe familiar with the patient administration system would be more efficient at entering patient information than medical staff and would reduce the administrative burden on highly skilled clinicians.
Assistants in Nursing (AiNs)	• Several sites expressed concern that the increasing prevalence of extended nursing roles has led to gaps in nursing care. They argue that basic patient care is being overlooked in favour of more interesting extended roles and nursing activities. • One suggestion to close this gap is introducing AiNs into EDs. Some interviewees suggest that AiNs are suitable for providing basic patient care such as assisting with hygiene, mobilisation, meals and equipment support. AiNs could also have a role in supervising the increasing numbers of elderly patients in emergency departments. • Those in favour of the AiN role emphasised that it is no replacement for RNs. • Conversely, those against the AiN role argue that it is unsuitable for the busy and complex ED environment, as AiNs have limited clinical knowledge. • Some argue that AiNs are only suitable for large EDs in which they can operate in a supernumerary capacity. • Some suggested that Technical Assistants are preferable to the AiN model, as TAs can perform a wider range of tasks.
Clinical Pharmacist	• Most sites perceived a need for clinical pharmacists in ED, at least during peak times. • Where used, clinical pharmacists take medication histories, conduct medication reconciliations, oversee discharge scripts, advise clinical staff on prescribing procedures, educate clinical staff on the latest and most effective drugs, educate patients on medication use, dispense directly to patients on discharge. • Evaluation studies undertaken in Australian EDs show that clinical pharmacists significantly reduce medication errors compared to medical officers. • Widespread support for the role was expressed; however, one clinical pharmacist at a Level six metropolitan site felt that the role was best placed in the wards.
Executive Assistant/Clinical Support Officer	• ED managers report that they are spending an increasing amount of time on non-clinical activities, such as rostering, managing budgets, resourcing and recruitment, quality and safety activities and other administrative functions. • A widespread view is that most of these tasks do not need to be performed by highly skilled clinicians. • An EA or CSO role was proposed as a potential solution to support managers with these tasks. • Similar secretarial support roles are currently used in several EDs.
Equipment Officers	• Several sites commented that equipment management activities such as monitoring, ordering and maintaining stock and equipment in the ED frequently falls to clinical staff. • Several interviewees commented that a dedicated equipment officer could be used to take this administrative burden from clinical staff.
Physician Assistant (PA)	• The perceived unique skill set which senior medical staff possess is the ability to quickly and accurately make appropriate clinical decisions regarding diagnosis and treatment • Given the widespread shortage of senior medical staff in EDs, the PA role was suggested as an

Alternative roles	Description and rationale
	alternative role to carry out traditional medical tasks under supervision of a medical officer. • Although PAs lack complex decision making skills, one interviewee argued that their ability to assist with medical functions should increase efficiency in the ED. • Additionally, the interviewee commented that scope of practice would depend on each individual's skill level. According to the US model, PAs draw up an agreement with their supervising medical officer explicitly describing their scope of practice and responsibilities.

4.3.7 Structured interviews

As outlined in Section 3, structured interviews were conducted with key stakeholders at each of the sites. A thematic analysis was conducted to identify the key themes which emerged from the interviews, against the backdrop of the contextual analysis, in order to add further depth to the understanding of the contextual drivers of ED workforce models, both present and future.

- The objectives of these interviews were to:
  - Confirm the understanding of the research project with stakeholders
  - Identify roles, capabilities and educational requirements for different staff working in the ED
  - Identify roles and capabilities of staff who provide a service to the ED, and how these roles work alongside the ED staff
  - Identify challenges, gaps in workforce and local strategies to overcome these.

Profile of ED and other staff who participated in structured interviews

A selection of staff at each site were invited to participate in a thirty to forty-five minute interview. The intention was to interview a broad spectrum of staff in the hospital who either worked directly in the ED or who had a direct relationship with ED operations.

Across the thirteen sites, 170 stakeholders were interviewed. The interviews were conducted either individually or in small groups. Each interview was structured using 12 open-ended questions and interviewees also had the opportunity to share contextual and site-specific information

The following representatives were consulted throughout the structured interviews at each site.

Table 29: ED and hospital representatives included in the 170 structured interviews across 13 NSW Hospitals

Structured Interview participants	
Chief Executive Officer	Director Clinical Operations
General Manager	Clinical Nurse Educator
Director of Workforce	Nurse Educator
Director of Nursing	Director Emergency Medicine Training
Director Clinical Services	Administration and Clinical Staff
ED Director	Allied Health Staff
ED Nurse Manager	Mental Health liaison staff
ED Nursing Unit Manager	Aged Care staff
Registered Nurse	Pharmacy staff
ED Staff Specialist	Medical Imaging staff
Clinical Nurse Consultant	Pathology staff

Themes emerging from the site visit interviews

Analysis of the data collected through interviews revealed that overall, most sites indicated a change in demand within the ED. This was due to increasing volumes of presentations, increasing acuity and complexity of patients and an ageing population and lack of access to GPs. Other challenges identified by sites included perceived shortages of an experienced medical and nursing workforce, hospital occupancy, difficulties attracting, recruiting and retaining staff, reliance on overseas trained staff and locums, and constraints due to patient management systems (eg eMR). The geographical design of some EDs was also raised as a challenge for staffing and skill mix due to lack of visibility from the main nursing station and lack of appropriate treating spaces.

Table 30 provides a summary of key themes identified from the structured interviews.

Table 30: Key Themes identified from analysis of structured interviews

Key Themes
• Changing demand – most sites indicated a change in demand within the ED due to one or more of the following: Overall increasing volume of presentations Stable volume of presentations, but increasing acuity and complexity Poor access to community GPs and alternative health services, causing increasing volumes of lower acuity patients An ageing population driving an increase in ATS category 2 and 3 presentations.
• Patient flow – Perceived increase in use of diagnostics for decision making across a number of metropolitan and rural sites; however commentary on this issue was not consistent. Perceived culture within EDs of completing all required diagnostics and commencing treatments and patient management plans before patients are transferred to wards. There were differing views on the drivers behind this behaviour. Hospital occupancy was seen as a limitation to patient flow from the ED. Perceived misalignment at seven sites of medical staff rosters within the hospital to peak times of activity in ED.
• Clinical leadership Broadly all sites made reference to the impact of clinical leadership in ED. The emerging profile of key traits of the ideal clinical leader includes: Full time staff specialist Ownership of the department Ability to direct the department and coordinate patient flow Ability to play a leadership role for other staff Experience and ability to make rapid and reliable clinical decisions Active involvement in staff management.
• Workforce Perceived shortages in the experienced medical and nursing workforce at almost all sites. Impediments to attracting experienced medical staff into leadership and senior positions within departments include: Instability of the medical workforce (specifically the high use of locums to fill positions), Location of the department, and Size of the department – Challenges regarding recruitment and retention of staff include: Reliance on overseas trained staff, Lag time associated with recruitment,

Key Themes
Ability to provide training and education to attract staff and Perceived limitations associated with the location of an ED. – Concern about the use of locums in rural and greater metropolitan sites: Perceived variability in skill level and experience of locums Perceived lack of formalised skills and competency assessments for locums Perceived link between reliance on locums and quality and safety incidents.
• Education Perception at rural sites that skilled professionals and trainees would be attracted to their workplace if they were known to provide quality training and education Tailored development packages for ED staff appear to be more prevalent for nurses than for medical staff. Many sites also mentioned that due to inadequate staff numbers, they have difficulty backfilling nursing and medical shifts when staff attend formal training.
• Patient Management Systems Poor functionality and constraints of patient management systems raised at a number of sites Widespread perception among medical staff that eMR reduces productivity due to onerous data entry requirements and a counterintuitive system design.

4.4 Key findings from national and international consultations

To supplement the qualitative data collected in NSW through ED site visits, consultation with ED clinicians nationally and internationally were sought. The following describes the process for selecting participants in the consultations and key findings from each.

4.4.1 National consultations

The participants in the consultation were selected from a population of ED staff members who responded to an expression of interest (EOI) for consultation. Expression of interest (EOI) was sent out via national ED communities of practice for volunteers to be involved in the consultation process. This EOI was also sent via the College of Emergency Nurses Australasia (CENA) to members.

Profile of ED staff who participated in consultation

An expression of interest was sent out to all jurisdictions for participation in the consultation via a thirty-minute interview. A sample of participants from each jurisdiction was sought with the aim to include a broad cross-section of ED staff from both rural and metropolitan regions. Responses were received from Victoria, South Australia, Western Australia and a large proportion from NSW. The majority of responses were from the nursing profession and also included emergency specialists and pharmacists.

Given the research team was in the process of consulting widely within thirteen NSW EDs, representatives from the other states were consulted as a priority.

The following representatives were consulted from each state.

Table 31: ED representatives included in the National consultation

State	Role	Rural/metro
Victoria	Nursing Unit Manager	Rural
	Nursing Unit Manager	Rural
	Emergency Department Pharmacist	Metropolitan
	Emergency Physician	Metropolitan
	Residential Reach Coordinator	Rural
	Emergency Nurse	Metropolitan
WA	Nurse Manager	Metropolitan
	Emergency Nurse	Metropolitan
SA	Nurse Practitioner	Metropolitan
	Nurse Manager	Metropolitan
	Nurse Practitioner	Metropolitan

A total of eleven interviews were conducted. Attempts to include additional representatives from other jurisdictions and to include a greater medical presence were not achieved within the project timeline.

Key findings

The key findings from the Australian consultations are summarised below in Table 32.

Table 32: Key findings from the National consultation

Key findings
• Operational models such as fast track, short stay units, mental health units, aged care support teams are consistent across Australia and have evolved to manage increasing demand.
• In NSW, the fast track model is implemented in the larger metropolitan facilities where access to senior staff is greatest.
• Aged care support teams (care coordination teams) are spread across all jurisdictions and in most hospitals, regardless of hospital characteristics.
• Alternative workforce models have been suggested. It is recognised that task delegation for clinical/technical tasks can be achieved using non-clinical staff allowing highly-skilled clinicians to focus on their key roles. • No specific recommendation was made as to who could carry out this role: the requirement is that they are trained appropriately and work alongside a clinician under supervision to carry out these tasks.
• Different team-based models have been implemented to manage the skill mismatch in an ED.
• Clinical supervision for medical staff and the presence of a Clinical Nurse Educator for nursing staff is considered essential to support the development of junior staff in an ED.

Overall, operational models of fast track, short stay units, mental health units, aged care support teams and other team based models are consistent across Australia and have evolved to manage increasing demand. Whilst fast track models tend to be implemented in larger metropolitan EDs where access to senior staff is greatest, aged care support teams (care coordination teams) are spread across all jurisdictions.

Alternative workforce models were also suggested; recognising that task delegation for clinical/technical tasks can be achieved by using non-clinical staff. This would allow highly-skilled clinicians to focus on their key roles. Finally, across the board, clinical supervision for medical staff and the presence of a Clinical Nurse Educator (CNE) was considered essential to support the development of novice staff in the ED.

4.4.2 International consultations

Profile of international participants and data collection

International consultation was undertaken to enhance the qualitative data collection from NSW EDs and to provide an international context for ED workforce models. A scan of international literature informed a decision to consult with the USA, United Kingdom and Canada. This decision was made together with the EDWRG. Following selection of countries for consultation, PwC representatives working in the health sector with close links to health care facilities were contacted to participate. Data was collected initially via a survey that examined current ED challenges, workforce models and models of care. The survey was completed in consultation with their health care clients and supplemented by their own experiences. The data collected was then used as the basis for follow-on interviews conducted with the research team. Four surveys were completed, three by PwC directly and one by a large facility in the UK.

Key findings

The key findings from the international consultations are presented in Table 33 below.

Table 33: Key findings from the International consultation.

Key findings
• To manage increasing demand in EDs internationally, new models of care have been introduced alongside an increase in the use of Allied Health in ED. • Models include fast track, see and treat, various short stay observation units and clinical decision centres.
• A focus on primary care has been taken to prevent unnecessary ED presentations and manage demand.
• Workforce redesign in EDs has been a focus for all countries, which have implemented new training programs to increase the skill level and scope of practice of nursing staff.
• All countries consulted have accepted and use non-clinical staff trained to perform procedural tasks under supervision. This approach is seen as beneficial as it allows highly skilled medical staff to focus their attention on highly skilled work.
• The provision of care coordination services for aged patients allows early intervention and management and in some cases prevents admission. These services are provided by experienced geriatric nurses.
• Physiotherapy primary care clinics are in place in some countries for treating minor injuries.
• Geographical location and size of facility can influence the services available in an ED.

The international consultations indicated that, similar to Australia, new models of care have been introduced in EDs internationally to manage increasing demand. These models include increased use of Allied Health, fast track, short stay units and clinical decision centres. As workforce redesign in EDs has been a focus of all countries, a number of workforce models have also been introduced to increase the skill level and scope of practice of nursing staff to successfully manage high-volume low complexity patients.

Other models described also parallel those discussed nationally. They include experienced geriatric nurses to provide services for the aged presentations, physiotherapy primary care clinics to treat minor injuries and non-clinical staff trained to provide some clinical tasks under supervision.

5 Solutions Design Phase

5.1 Introduction

5.1.1 Aims of the Solutions Design Phase

This section describes the approach and key outcomes from the Solutions Design Phase of the NSW Health ED Workforce Research Project. The aims of this phase of the project were to:

- Identify the different ED scenarios in NSW (these include actual and possible NSW ED scenarios) and apply appropriate operational and workforce models of care to each
- Present the baseline principles and guidelines for skill mix in an ED, including all levels of staff working in ED
- Present the guidelines for each identified ED model of care, including the staff skill mix required and profile options according to location and access to different staff
- Provide contextual information about the methodology for developing the scenario framework and its application to future scenario identification

5.1.2 Approach to the Solutions Design Phase

This section describes the process for identifying ED scenarios and applying appropriate models of care to each of the identified scenarios. Scenarios were developed using current NSW Health ED data and include current as well as potential scenario groups based on future ED activity. A baseline set of principles and guidelines was developed and is considered to apply to all Level three to Level six EDs. The baseline principles and guidelines are described in Section 6.

The framework for identifying ED scenarios was built using a four-stage approach:

1 Identifying drivers of access to services, staffing profile, models of care and education.

2 Determining measures of drivers, including remoteness, activity and complexity.

3 Building scenarios based on the identified drivers.

4 Mapping scenarios to models of care.

The outcomes of each of the four stages are summarised below.

5.2 Drivers of access to services, staffing profile, models of care and education

As described in Section 4 several data collection methods were used to gather information from thirteen sample sites on four aspects of hospital profile: Throughput and Catchment Characteristics, Access to Services, Staffing Profile, and Models of Care and Education.

From information collected from the sites, it appeared that Throughput and Catchment Characteristics systematically related to or influenced the other domains. Plotting the results on a radar graph revealed systematic patterns of difference between sites, driven by remoteness (rural versus metropolitan), activity (greater than 130 presentations per day; 80 – 130 presentations per day; and fewer than 80 presentations per day), and clinical urgency (greater than 9% Australasian Triage Scale (ATS) categories 1 and 2 versus less than 9% ATS categories 1 and 2).

5.2.1 Remoteness

Figure 7 and Figure 8 clearly demonstrate the systematic pattern of difference between metropolitan and rural hospitals. The metropolitan sites in Figure 7 consistently show profiles at the higher end of the spectrum overall than the rural sites depicted in Figure 8.

Figure 7 illustrates how Metropolitan sites fall into the mid to high range across all domains, with the exception of casemix, which relates to proportion of presentations in ATS 1 and 2. This pattern indicates that metropolitan sites have moderate to high volumes of daily activity; moderate to high levels of access to diagnostic, specialist and Allied Health services, as well as staffing levels on the moderate to high end of the spectrum, education and models of care profiles. However, metropolitan sites do not necessarily have a high proportion of presentations of ATS 1 and 2.

Figure 7 Pattern of profiles of all participating metropolitan sites

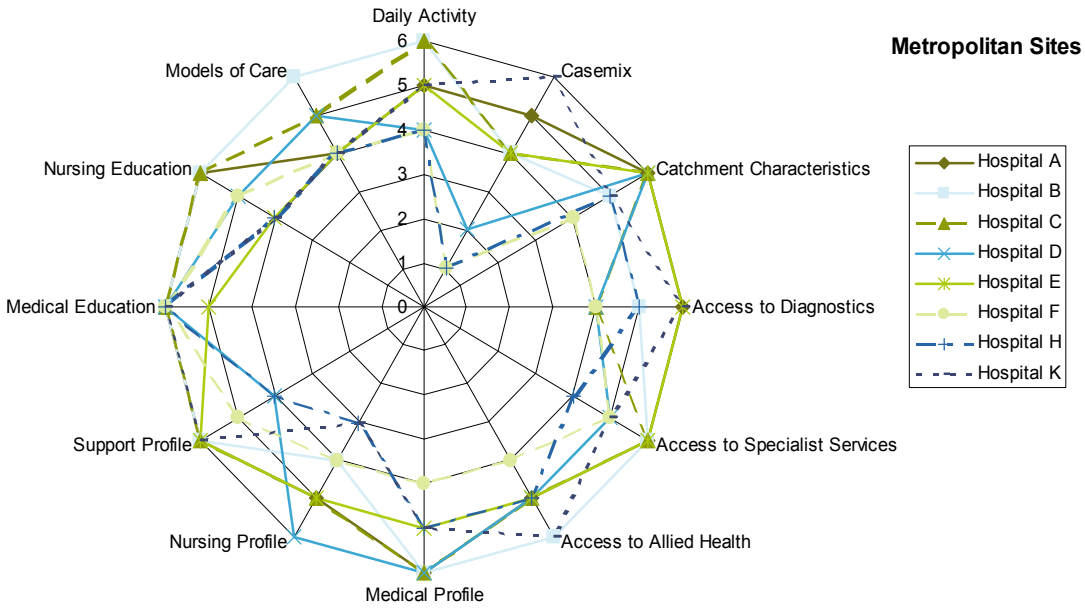
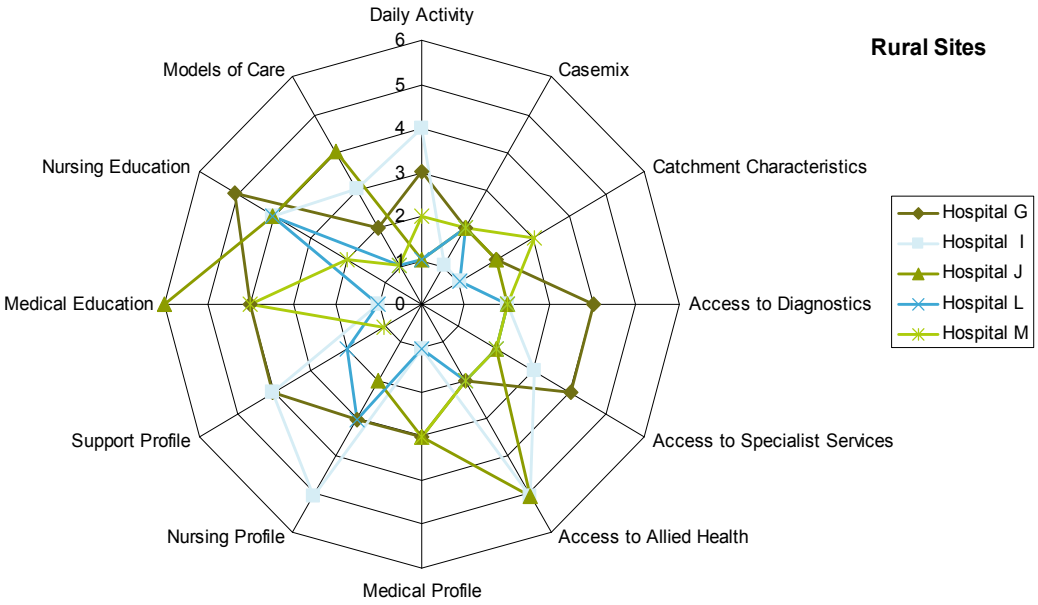


Figure 8 illustrates highly variable profiles for rural sites, with scores ranging from 1 to 6 across domains. Overall, however, rural sites show a closer spatial distribution on the radar graph than metropolitan sites. Rural sites tend to have lower to more moderate levels of daily activity, lower to more moderate access to services, lower to more moderate staffing profiles, and low to moderate use of innovative models of care. Education profiles are more variable among rural sites than other domains.

Figure 8 Pattern of profiles of all participating rural sites



5.2.2 *Daily Activity*

The radar graphs below indicate the systematic differences between sites with large, medium and small volumes of daily presentations. Sites with a high volume of daily activity, shown in Figure 9, consistently show profiles at the high end of the spectrum. Whereas, sites with a low volume of daily activity, depicted in Figure 10 tend to have profiles with a closer spatial distribution. Sites with moderate daily activity, shown in Figure 11, have highly variable profiles without a discernable pattern.

Figure 9 Pattern of profiles of all participating sites with more than 130 presentations per day

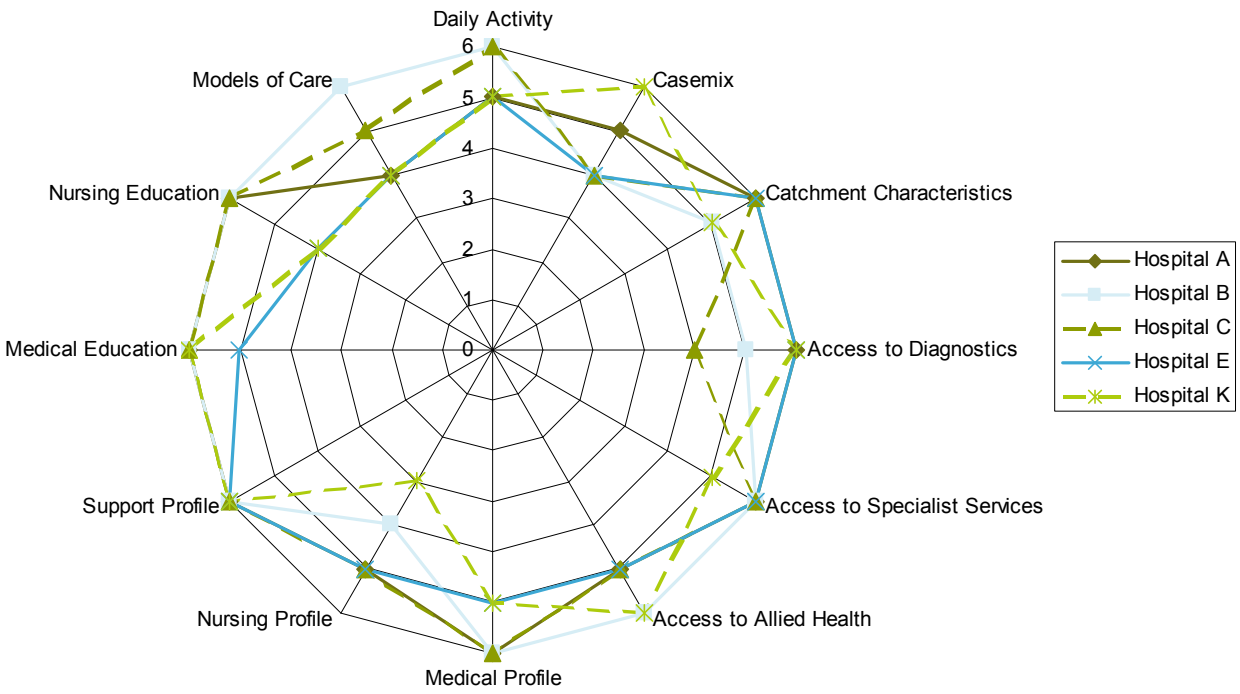


Figure 10 Pattern of profiles of all participating sites with less than 80 presentations per day

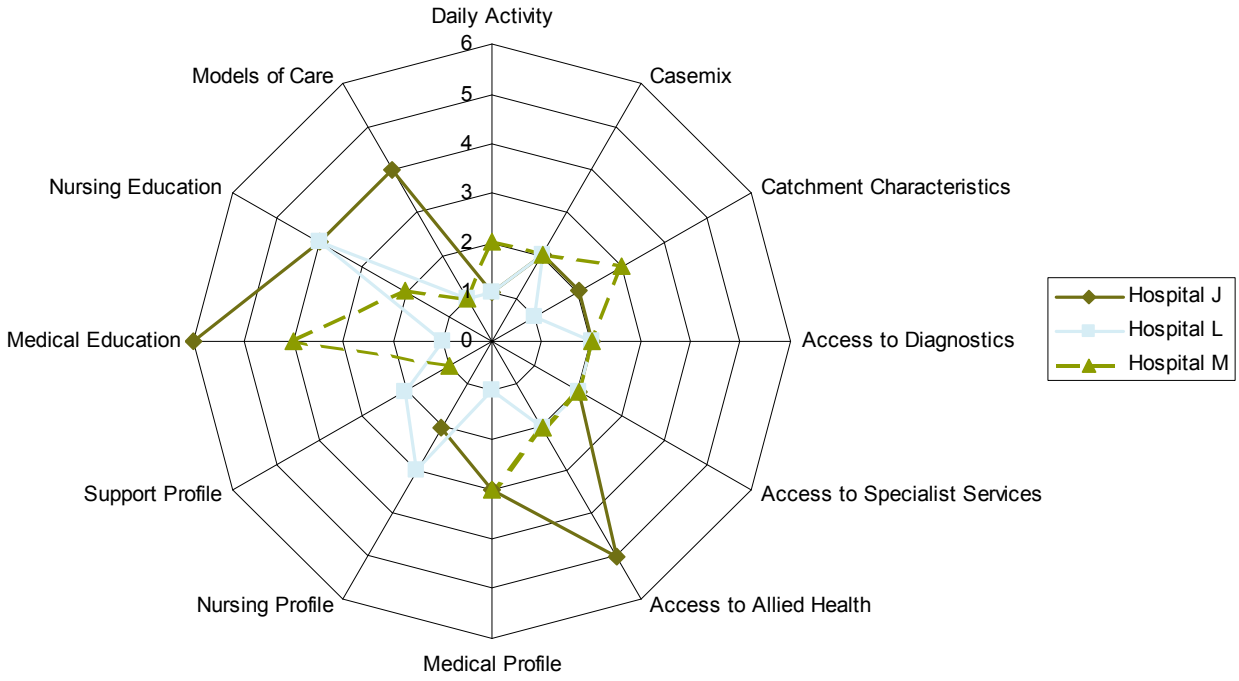
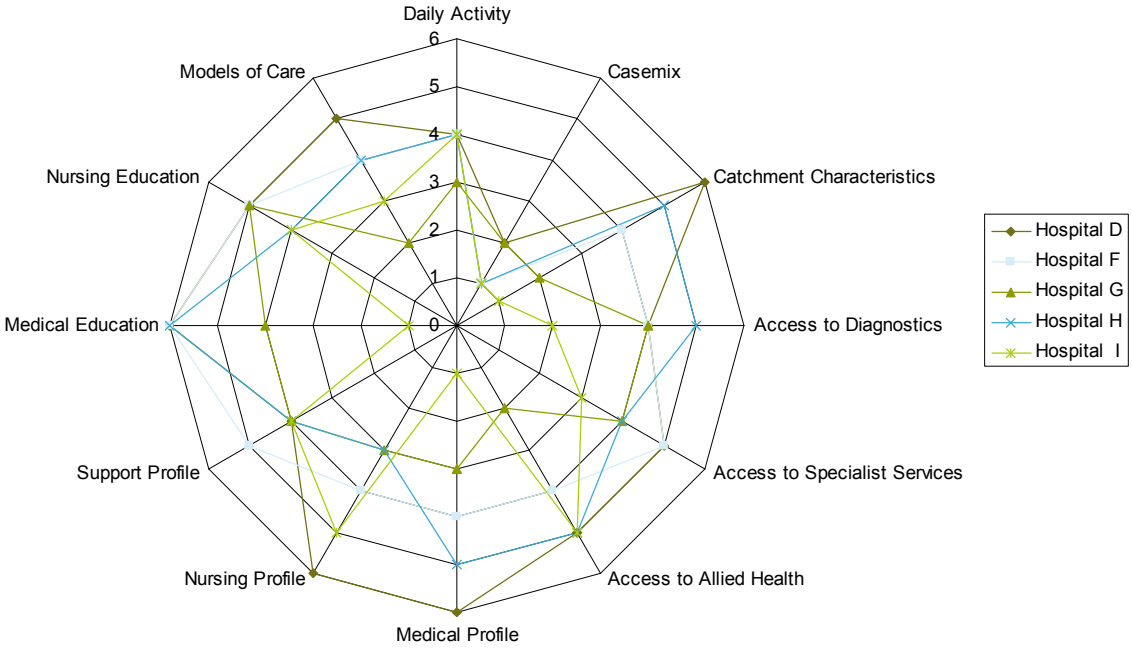


Figure 11 Pattern of profiles of all participating sites with 80 to 130 presentations per day



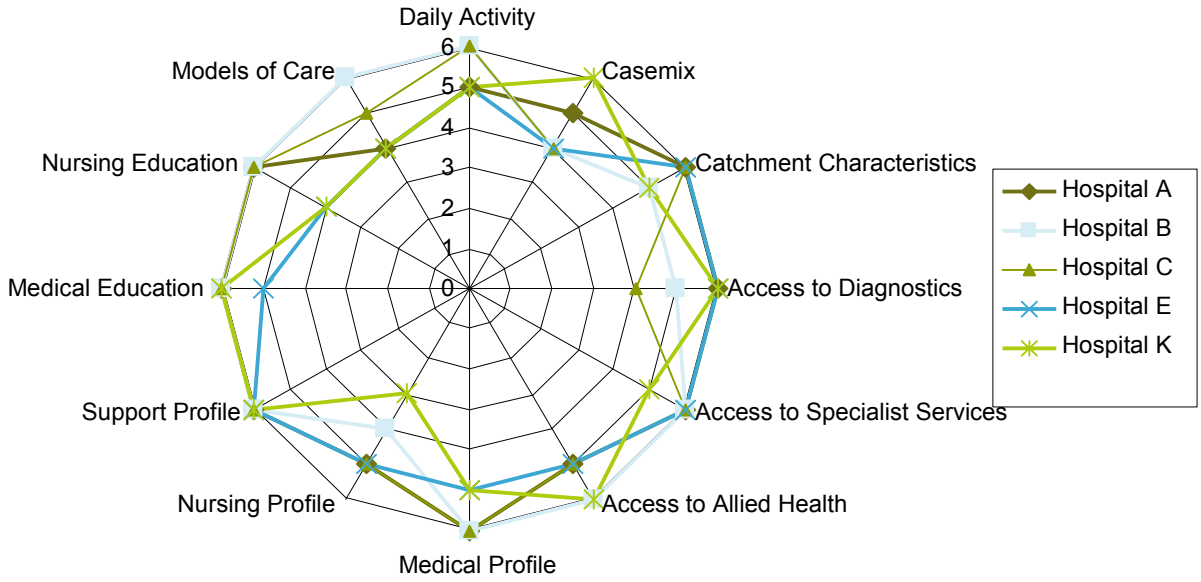
Taking these graphs together, it appears that having high or low levels of activity relates strongly to other domains, such as access to services, staffing profile, and education and models of care.

5.2.3 Clinical urgency

The graphs below illustrate the systematic differences between hospitals with greater than 9% ATS 1 and 2 and hospitals with less than 9% ATS 1 and 2.

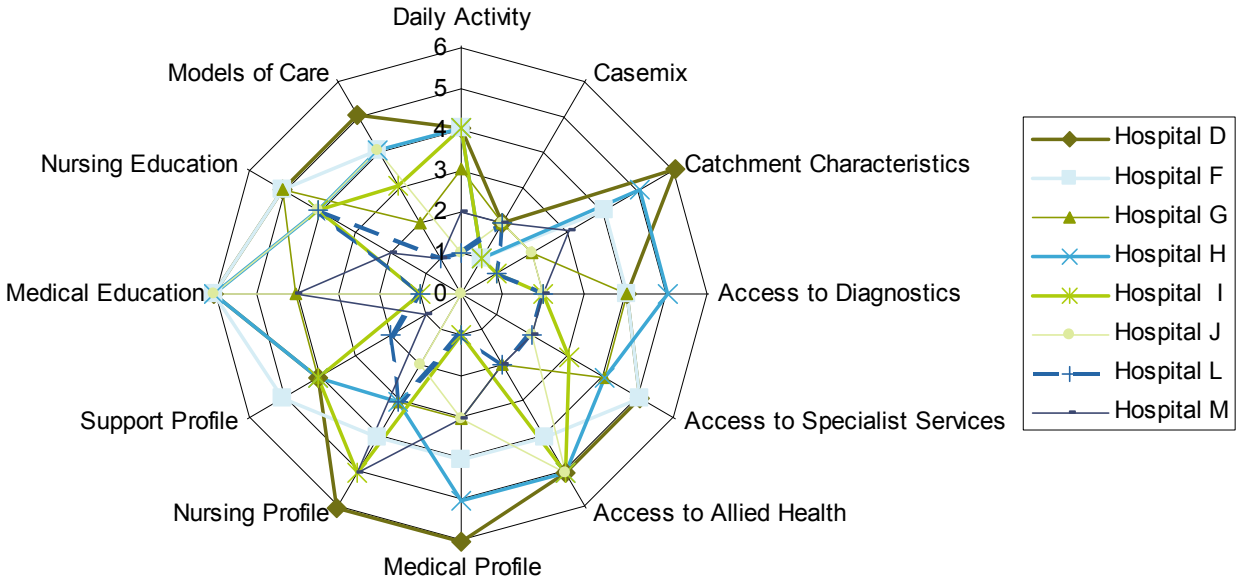
Figure 12 sites have a relatively large proportion of presentations with high levels of clinical urgency; that is, more than 9% of presentations are classed at triage as ATS 1 or 2. These sites appear to be similar across numerous other domains. All are metropolitan, all have high levels of access to specialist services and Allied Health, and all have medical and support staff profiles at the high end of the spectrums.

Figure 12 Pattern of profiles of all participating sites with greater than 9% ATS 1 & 2



Sites depicted in Figure 13 have fewer than 9% ATS 1 and 2 presentations. Figure 13 profiles are highly variable within sites, but also inconsistent between sites. Figure 13 sites are both metropolitan and rural; have high, moderate and low levels of access to services; have high, moderate and low staffing profiles, and high, moderate and low education and models of care profiles.

Figure 13 Pattern of profiles of all participating sites in this project with less than 9% ATS 1 & 2



5.3 Workshop with EDWRG

To develop and test the framework for defining ED scenarios, a half day workshop was held with 20 members of the EDWRG. Results from the Diagnostic Report and statistical analysis were presented, with feedback and new input sought from the reference group.

Based on information presented, three drivers of staffing, services, models of care and education were agreed. These were:

1 Remoteness
2 Activity
3 Patient complexity, which potentially includes factors such as:
   a Clinical urgency (as defined by proportion of ATS 1 and 2)
   b Proportion of aged patients (aged 70+ years or indigenous groups aged 55+ years)
   c Proportion of paediatric patients (aged16 years and under)
   d Patient complexity
   e Socioeconomic status
   f Admission rate.

The group endorsed a decision tree approach to building scenarios.

5.4 Conduct statistical analyses on NSW Health ED data

Statistical methods were used to validate assumptions that emerged from the patterns in the radar graphs and the discussions at the EDWRG workshop. From each assumption, an associated hypothesis was developed and tested.

5.4.1 Assumption 1: Remoteness is a driver of other drivers of hospital demand characteristics

To test this assumption the following hypothesis was examined:

Hypothesis 1: Rural sites are different from metropolitan sites in relation to:

- Average annual activity
- Clinical urgency
- Number of paediatric patients
- Number of aged patients
- Admission rate.

Hypothesis one was tested by comparing patterns of activity and admissions between rural and metropolitan sites across NSW using analysis of variance technique (ANOVA) in SPSS. The results of this analysis are presented in Table 34. The results of the analysis reveal significant differences between rural and metropolitan sites across all measures of activity and clinical urgency, supporting hypothesis one. These results demonstrate that metropolitan sites compared to rural sites, have a significantly higher average volume of activity, greater number of paediatric and aged presentations, and significantly higher proportions of clinical urgency and admission rate.

Table 34: Rural versus Metropolitan: Patterns of activity, urgency and admission in FY 08-09

	Rural [(a)]	Metropolitan [(b)]	F statistic
Average annual activity	13,801	34,326	47.9**
Number of paediatric presentations	3,580	8,509	12.0**
Number of aged presentations	2,083	5,841	37.9**
Clinical urgency	4.8%	8.4%	23.0**
Admission rate	17.7%	25.4%	15.4**

** The difference between scores is significant at the 0.01 level (2 tailed).

(a) Results based on data provided by NSW Health in relation to 46 NSW EDs classified as rural according to the RRMA scheme

(b) Results based on data provided by NSW Health in relation to 40 NSW EDs classified as metropolitan according to the RRMA scheme

While remoteness was determined using the Rural, Remote and Metropolitan Areas (RRMA) classification in the Diagnostic and Solutions Design Phase of this research project, the new Australian Standard Geographic Classification - Remoteness Areas (ASGC-RA) classification system is now used to categorise emergency departments. This will ensure that the scenario framework remains current. The re-classification of EDs to the ASGC-RA had no impact on analysis and reclassification did not change any hospitals in the Diagnostic Phase sample. From the 64 Level three to Level six EDs analysed two of the Level three and one Level four ED changed classification from metropolitan to rural.

5.4.2 Assumption 2: No driver influences hospital characteristics on its own

To test this assumption the following hypothesis was examined:

Hypothesis 2: The hypothesised drivers interrelate, such that there is shared variance amongst the drivers. These drivers include:

- Remoteness
- Activity
- Proportion of aged presentations
- Proportion of paediatric presentations
- Proportion of ATS 1 and 2.

Hypothesis 2 was tested using a two-tailed correlation in SPSS. All correlations (except those with the variable ‘proportion of paediatric presentations’) use Pearson’s correlation coefficient, which assumes a normal distribution. The variable ‘proportion of paediatric presentations’ has a non-normal distribution with skewness = 3.5 and kurtosis = 19.4. Accordingly, correlations with this variable use Spearman’s correlation coefficient, which does not assume a normal distribution.

Table 35 presents the correlations between each of the drivers. According to this table, eleven out of fifteen correlations are significant, with the strongest correlations between:

- Activity and remoteness
- Activity and clinical urgency
- Activity and admission rate
- Remoteness and clinical urgency.

These results support hypothesis two, indicating that the hypothesised drivers interrelate and work together to influence hospital characteristics.

Table 35: Correlations among potential drivers of emergency department characteristics

	Activity				
Remoteness	.60**	Remoteness †			
% paediatrics	-.01	.06	% paediatrics		
% aged	.07	-.07	-.61**	% aged	
% urgent presentations	.70**	-.46**	-.29**	.33**	% urgent presentations
Admission rate	.75**	.39**	-.22*	.29**	.79**

** Correlation is significant at the 0.01 level (2 tailed).

* Correlation is significant at the 0.05 level (2 tailed).

† Remoteness correlations are based on coding of 86 NSW EDs as metropolitan or rural, according to the RRMA scheme

5.4.3 Assumption 3: Socioeconomic status is a driver of hospital characteristics

To test this assumption the following hypothesis was examined:

Hypothesis 3: High socioeconomic status sites are different from low socioeconomic sites in relation to:

- Average annual activity
- Clinical urgency
- Number of paediatric patients
- Number of aged patients
- Admission rate

Socio-economic status was measured using the Australian Bureau of Statistics (ABS) tool, Socio-economic Indexes for Australia (SEIFA), which is based on 2006 ABS data. This tool was first released in May, 2008. The Index of Relative Socio-economic Advantage and Disadvantage was used to classify Level three to Level six NSW EDs. Using this index, 29 EDs sit in the low socio-economic status group, where low socio-economic status is defined as deciles 1 to 4. 11 EDs sit in the medium socio-economic group (SEIFA deciles 5 and 6), and 24 EDs sit in the high socio-economic status group (deciles 7 to 10).

Hypothesis 3 was examined in two stages. It was first examined by plotting radar graphs for thirteen sample sites with a high, medium and low socio-economic status. The graphs, presented in Figure 14, Figure 15 and Figure 16 do not appear to show any clear systematic differences between sites with high, medium and low socio-economic status. Accordingly, the radar graphs do not support hypothesis three.

Figure 14 Pattern of profiles of all participating sites in this project with high SEIFA scores (7-10)

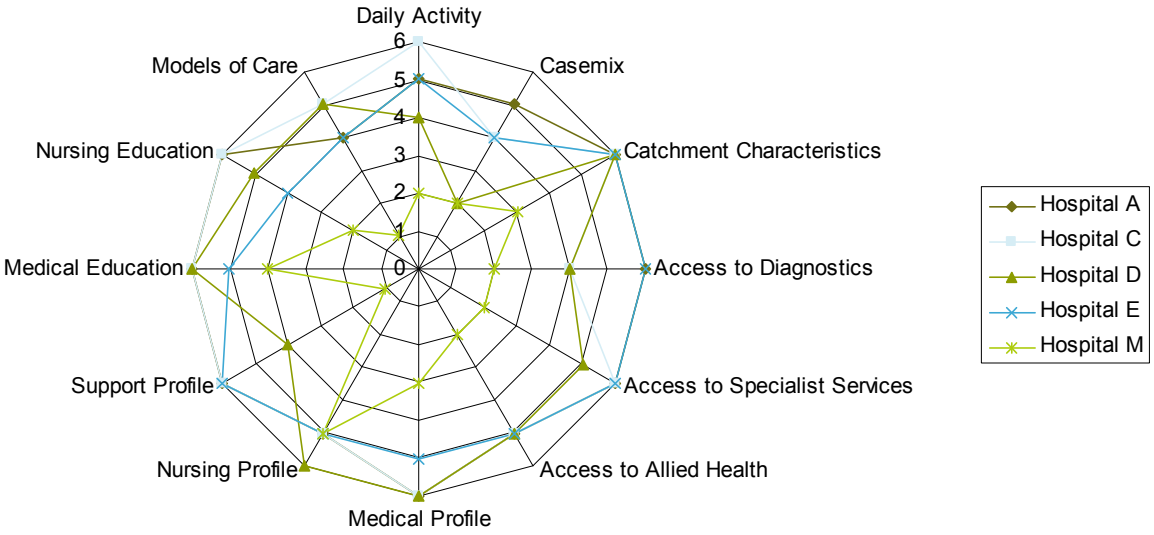


Figure 15 Pattern of profiles of all participating sites in this project with medium SEIFA scores (5-6)

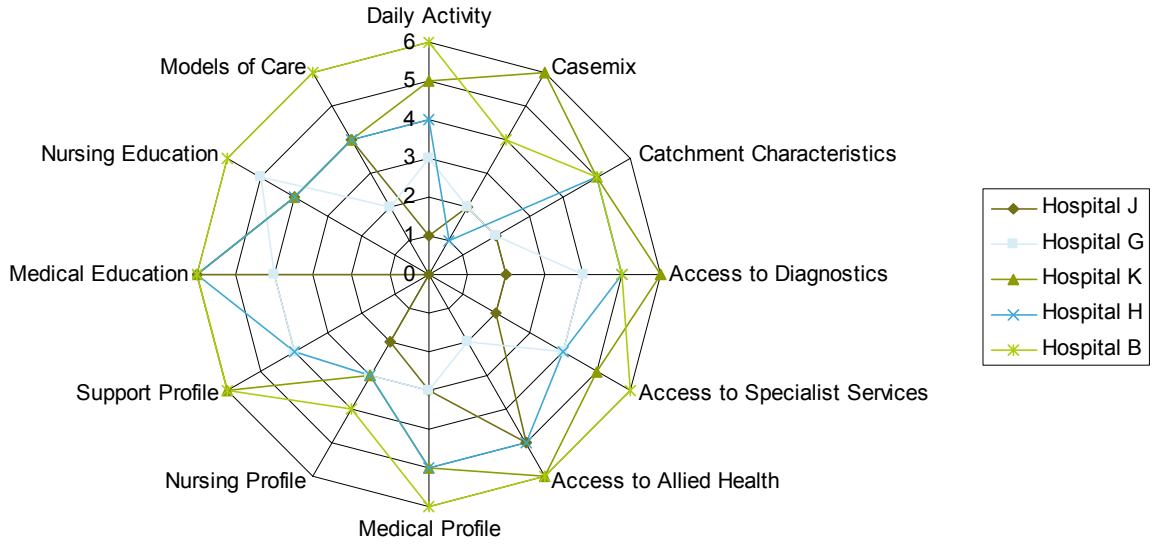
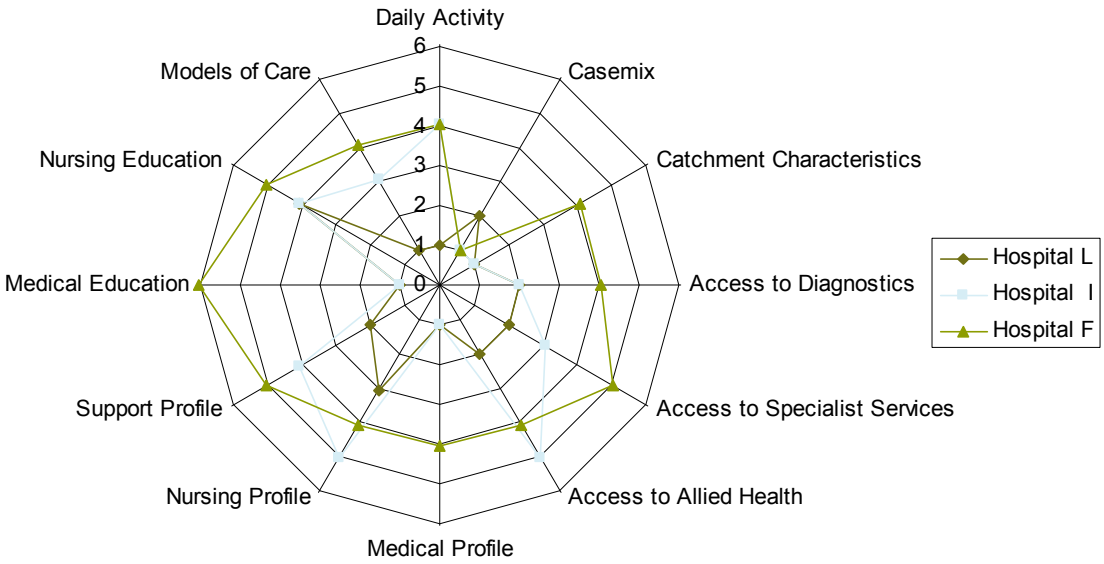


Figure 16 Pattern of profiles of all participating sites in this project with low SEIFA scores (1-4)



Secondly, hypothesis three was tested on state-wide data using two-tailed correlations in SPSS. Table 36 shows the correlations between socio-economic status and other measures of hospital and patient demand characteristics. The results show that the only significant correlation is with remoteness, indicating that metropolitan sites are likely to have a higher socio-economic status than rural sites. Socio-economic status does not appear to relate to activity, clinical urgency, paediatric patients, aged patients or admission rate.

Table 36: Correlations among socio-economic status and potential drivers of ED characteristics

	Activity	Remoteness	% paediatric	% aged	% urgent presentations	Admission rate
Socio-economic status	0.06	-0.38*	-0.07	0.18	0.05	0.24

* Correlation is significant at the 0.05 level (2 tailed).

Taken together, the graphs and correlations indicate that socio-economic status is not a driver of ED demand characteristics. Accordingly, this factor was not included in the scenario framework.

5.4.4 Initial approach to developing scenario framework

The findings from the site visits, literature review and EDWRG workshop revealed three drivers to be included in the scenario framework. These were:

1 Remoteness: Rural versus metropolitan (2 levels)
2 Activity: High, moderate and low (3 levels)
3 Complexity:
  a Aged: High proportion versus low proportion (2 levels)
  b Paediatrics: High proportion versus low proportion (2 levels)
  c Clinical urgency: High proportion versus low proportion (2 levels)
  d Volume of complex patients: High proportion versus low proportion (2 levels)

Using a decision tree approach, the three factors with multiple levels within each factor would yield 96 different outputs or scenarios. Given that there are 64 Level three and above emergency departments in NSW, it was determined that 96 scenarios is too many, and the number of scenarios could be reduced without losing the information that differentiates one site from another.

To reduce the number of scenarios, each of the three drivers were analysed to categorise individual hospital scores and determine thresholds. This analysis was conducted using NSW Health ED data from 64 Level three to Level six emergency departments.

5.4.5 Approach to determining remoteness

Remoteness was determined using the Australian Standard Geographical Classification – Remoteness Areas (ASGC-RA) classification system, which divides NSW into major cities (RA1), inner regional (RA2), outer regional (RA3), remote (RA4) and very remote (RA5). The ASGC-RA was developed in 2001 by the ABS as a statistical geography structure which allows quantitative comparisons between 'city' and 'country' Australia. According to this classification system:

- Thirty-five emergency departments were classified as metropolitan
- Twenty-nine emergency departments were classified as rural

5.5 Approach to determining activity

Based on the contextual analysis, activity was considered a key driver of staff skill mix. Original thresholds presented in the Diagnostic Report were set as <80 presentations per day and >130 presentations per day.

To determine appropriate thresholds, 2008/09 NSW Health ED data were analysed for the 64 emergency departments classified as Level three to Level six. The mean number of presentations state-wide was 30,183, with a standard deviation of 14,827. The first approach to defining thresholds was dividing sites into the following three groups:

- Activity lower than one standard deviation below the mean
- Activity within one standard deviation of the mean
- Activity above one standard deviation of the mean.

Using this approach, 9 sites were below one standard deviation of the mean, 43 sites were within one standard deviation of the mean, and 12 sites were above one standard deviation of the mean. Given that such a large proportion of sites fell into the middle grouping, it was decided that this approach was unsuitable, as it failed to distinguish between most sites.

An alternative approach was to combine the review of NSW Health ED activity data from 2008/09 with a review of national and international literature concerning activity thresholds. According to the British Association of Emergency Medicine, departments with > 70,000 presentations per year are considered large and departments with < 40,000 presentations per year are considered small[xxxvi]. While these thresholds may represent systematic differences between sites in Britain, they do not adequately represent the Australian situation, as no NSW ED has > 70,000 presentations per year, and 47 out of 64 departments (> 70%) have < 40,000 presentations.

The pattern of results for NSW EDs yielded the following segmentation of activity, which is consistent with ACEM thresholds.

Table 37: Activity thresholds identified for NSW EDs

Presentations per annum	Number of sites (08/09)	Category
< 25,000	28	Low
25,000-50,000	25	Medium
> 50,000	11	High

5.6 Approach to determining complexity

5.6.1 Initial approach to determining complexity

Initially, the approach to determining complexity involved classifying information about the clinical diagnosis of emergency department patients. Information about clinical diagnosis is coded using ICD 9 or ICD 10, or ICD 10AM codes. The planned approach was to categorise each ICD9 or ICD10 code as either high or low complexity and either high or low acuity, dividing patient presentations into four categories of complexity. The acuity/complexity matrix below was originally developed as the basis for streaming guidelines in John Hunter Hospital's ED[xxii].

Table 38: Complexity/acuity matrix

High Complexity/High Acuity eg major trauma, cardiac failure	High Acuity/Low complexity eg significant fracture in otherwise healthy person
High Complexity/Low Acuity eg elderly patient with co-morbidities	Low Complexity/Low Acuity eg simple laceration, ENT problems, mild asthma

Detailed examination of the ED data from NSW Health revealed that the data set was incomplete. As summarised in Table 39, nearly 13% of activity in NSW emergency departments was un-coded or appropriate ICD codes could not be mapped for some data items from the SNOMED data set. The volume of missing or un-coded data was considered too high to utilise this approach to determining complexity, as there may be systematic patterns in the missing data that would confound the results. An alternative approach was to review national and international literature for guidance about measures of complexity. As outlined in the next section, these measures were combined in a Principle Component Analysis to yield a single complexity measure.

Table 39: Number of sites missing data - either un-coded or unable to be mapped (Source: NSW Health ED data 2008/09)

	Rural				Metro				All			
Activity level	Low	Mod	High	All	Low	Mod	High	All	Low	Mod	High	All
< 10% of data missing	15	7	0	22	7	6	4	17	22	13	4	39
10-25% of data missing	0	2	0	2	1	2	4	7	1	4	4	9
> 25% of data missing	2	0	0	2	3	8	3	14	5	8	3	16
	3.7% of annual activity for rural sites is un-coded or unable to be mapped to a stream.				18.8% of annual activity for metro sites is un-coded or unable to be mapped to a stream.				12.7% of annual activity for all sites is un-coded or unable to be mapped to a stream.			

5.6.2 Principal Component Analysis

In order to establish a measure of patient complexity, a Principal Component Analysis (PCA) was conducted on state-wide ED data for 2008/09. Principal component analysis is a multivariate data analysis technique that transforms a number of correlated variables into a smaller number of uncorrelated variables called principal components. This analysis has a number of benefits, which include:

- Discovering which variables make up the relevant component
- Reducing the number of variables included in the analysis, while accounting for as much of the variability in the data as possible
- Identifying meaningful underlying variables, in this case 'Complexity'.

This section describes the methodology for conducting the principal component analysis, and the steps taken to arrive at a measure of complexity. These steps are:

1 Identifying variables of complexity
2 Defining the variables
3 Standardising the variables
4 Identifying principal components
5 Calculating complexity scores
6 Categorising complexity scores along a continuum into bands of high, moderate or low.

5.6.3 Step one: identifying variable of complexity

To ascertain a list of variables that best describe patient complexity, a review of national and international literature was conducted. The literature revealed several variables used to measure complexity, for which data was not always available. For example, defining complexity by the number of procedures required in an episode of care. The evidence shown in Table 10 was taken together to arrive at a list of variables for testing as a complexity measure.

Table 40: Supporting evidence for variables of complexity

Reference	Findings	Variables
Schull, M., Kiss, A., Szalai, J. (2007)[xxiii]	Low complexity patients defined as: – Canadian Triage Acuity Score of less urgent (4) or non-urgent (5) – ED arrival not by ambulance – Discharged home High complexity patients defined as: – Admitted to the hospital Medium complexity patients defined as: – All other patients (ie Triage score 1, 2 or 3, not admitted to the hospital)	– Triage – Mode of arrival – Admission/ discharge
Ieraci, S., et al. (2008)[liv]	– Fast track group (considered low complexity) included significantly fewer patients in ATS categories 1-3 and more patients in ATS categories 4 and 5 than the standard ED group – Larger proportion of standard ED patients than Fast track patients were admitted to the hospital as inpatients – Gap between complexity and disposition – most evident in elderly patients with deteriorated mobility.	– Triage – Admission – Age (elderly)
Sprivulis, P. (2004)[xxiv]	– Definition of proxy for low complexity patients was patients having no more than one procedure, one investigation and one consultation – Definition of proxy for high complexity patients was patients requiring at least two procedures or at least two investigations or at least two consultations – In low complexity proxy group there were a higher proportion of self-referred, lower urgency category, non-ambulance transported and discharged patients compared to the high complexity proxy group – The proportion of patients in the high complexity proxy group is higher among more urgent ATS categories, admitted patients and those arriving by ambulance • ATS and Disposition were found to better discriminators of complexity compared with presenting problem and diagnosis (interpretation of data) – Near perfect linear correlation between complexity and patient age in high complexity proxy group. ED workload complexity was found to be sensitive to small shifts in patient age distribution (study excludes patients < 15 years).	– Triage – Disposition (admitted/discharged) – Age (elderly)
Erwich-Nijhout, A., et al. (1997)[xxv]	– Triage category was found to be a potent predictor of staff time, resource use and costs. – Average staff contact time was 2.6 times higher for admitted patients than for discharged patients – Resource use for admitted patients was higher than for discharged patients – Staff time and resource usage for admitted patients were much higher than for discharged patients in the same clinical urgency category – The older the patient the more clinical activities undertaken – mean costs show a linear increase with age.	– Triage category – Admission/discharge – Age (elderly) – Diagnosis

5.6.4 Step two: Defining the variables

The next step of the principal component analysis was to define the selected variables. These variables are defined in Table 41.

Table 41: Variables included in the principal component analysis

Variable	Definition
Aged	Proportion of aged patients presenting to the ED • 70 years and over • 55 years and over for indigenous patients
Paediatric	Proportion of paediatric patients presenting to the ED • 16 years and under
Triage123‡	Proportion of patients presenting to the ED who are triaged as category 1, 2 or 3.
Mode of arrival‡	Proportion of patients arriving to the ED by ambulance, including: • State ambulance service (01) • Helicopter rescue service (04) • Air ambulance service (05) • Internal ambulance (06)
Admission ‡	Proportion of patients who are admitted to the hospital from the ED, including: • Admitted to ward/inpatient unit not a critical care ward (01) • Admitted and discharged as inpatient within ED (02) • Admitted: to critical care ward (10) • Admitted: via operating theatre (11) • Admitted: transferred to another hospital (12)
Injury	Proportion of patients in the ED who are coded using ICD-9 and ICD-10 codes as an injury. Whilst there were gaps in the ICD-9 and ICD-10 data, the state-wide data was used to estimate the proportion of total patients presenting with an injury. Previous Table 39 provides the extent of the data gap.

‡ Definitions based on NSW Health Emergency Department Data Dictionary Version 4.0

5.6.5 Step three: Standardisation of variables

The next step of the principal component analysis was to standardise each of the variables, that is, rescale the variables so that the mean is zero and the standard deviation is 1.0. Standardising the scores ensures that all variables contribute evenly and makes it easier to interpret the results of the analysis.

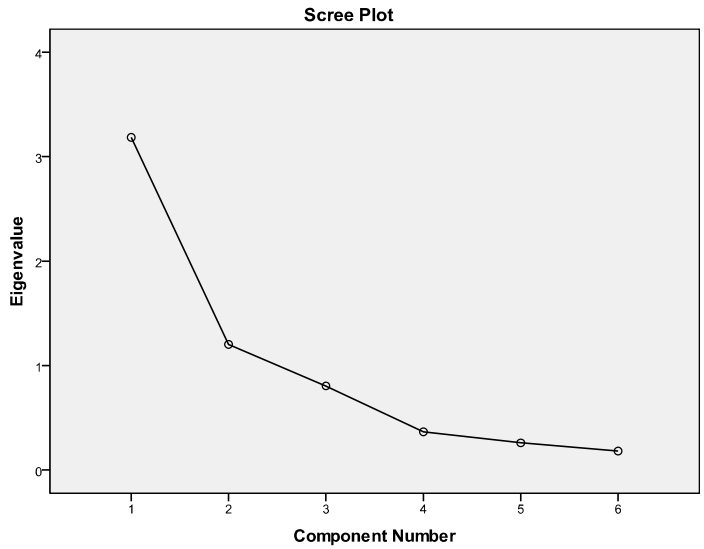
A Z-score is the standard score obtained by subtracting the mean from a score and then dividing by the standard deviation. To calculate the variable's Z-scores for each of the 64 Level three and above emergency departments, PASW Statistics 18 (formerly SPSS Statistics) was used.

5.6.6 Step four: Identifying principal components

Using the standardised variables, a principal component analysis was run using the data reduction command and factor analysis subcommand in PASW Statistics 18. The analysis revealed a Kaiser-Meyer-Olkin (KMA) measure of sampling adequacy (MSA) of 0.763, which is acceptable, indicating that the variables have shared variance and, accordingly, the data is suitable for PCA.

The results of the principal component analysis revealed two components which had an eigenvalue of above one, explaining approximately 73 per cent of the variance. However, examination of the scree plot in Figure 17 demonstrated that only one principal component needs to be retained.

Figure 17 Scree plot used to identify principal components



Another important matrix from the output of the principal component analysis is the rotated component matrix (Table 42). This table shows the loading, or correlations, between each variable and the principal component.

Table 42: Rotated Component Matrix

Rotated Component Matrix[a]		
	Component	
	1	2
Z-score(Admission)	0.926	-0.062
Z-score(Triage 123)	0.859	0.011
Z-score(Mode_of_arrival)	0.844	-0.344
Z-score(Paediatric)	-0.275	0.776
Z-score(Injury)	0.118	0.722
Z-score(Aged)	0.574	-0.645
Extraction Method: Principal Component Analysis.		
Rotation Method: Varimax with Kaiser Normalization.		
[a] Rotation converged in 3 iterations.		

The results indicate that four variables load heavily onto component one, labelled Patient Complexity:

- Admission rate
- ATS categories 1, 2 or 3
- Mode of arrival
- Aged

Paediatrics and Injury, on the other hand, did not heavily load onto component one, and thus were not extracted and used in calculating Patient Complexity. However, given the importance of paediatric patients in selection and consideration of models of care, the impact of paediatrics will be addressed separately.

5.6.7 Step five: Calculating a complexity score

The fourth step is to calculate scores for principal component one, or complexity, for each emergency department in the data set. This can be achieved using the weighted coefficients from the component score coefficient matrix in Table 43.

Table 43: Component score coefficient matrix

Component Score Coefficient Matrix		
	Component	
	1	2
Z-score(Admission)	0.388	0.158
Z-score(Mode_of_arrival)	0.291	-0.060
Z-score(Aged)	0.108	-0.334
Z-score(Injury)	0.209	0.540
Z-score(Paediatric)	0.050	0.492
Z-score(Triage 123)	0.375	0.195
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.		

To calculate the scores for each emergency department the following regression equation was used:

Z1' = 0.388 x Z-score (Admission) + 0.291 x Z-score (Mode_of_arrival) + 0.108 x Z-score (Aged) + 0.375x Z-score (Triage1,2,3)

Component scores of complexity were calculated for each of the 64 emergency departments in the data set using the compute command in PASW Statistics 18.

5.6.8 Step six: Categorising ED complexity score as high, medium or low

The final step in determining the complexity profile for emergency departments is to categorise each emergency department along a continuum into the bands of complexity - high, medium or low - based on their individual complexity score. Using a standard deviation of 0.5, emergency departments were categorised as high, medium or low complexity if their standardised complexity scores were:

- > 0.551 (high complexity)
- -0.551 – 0.551 (moderate complexity)
- < -0.551 (low complexity)

  Please refer to Section 9.2 for further information about strengths and limitations of the complexity measure.

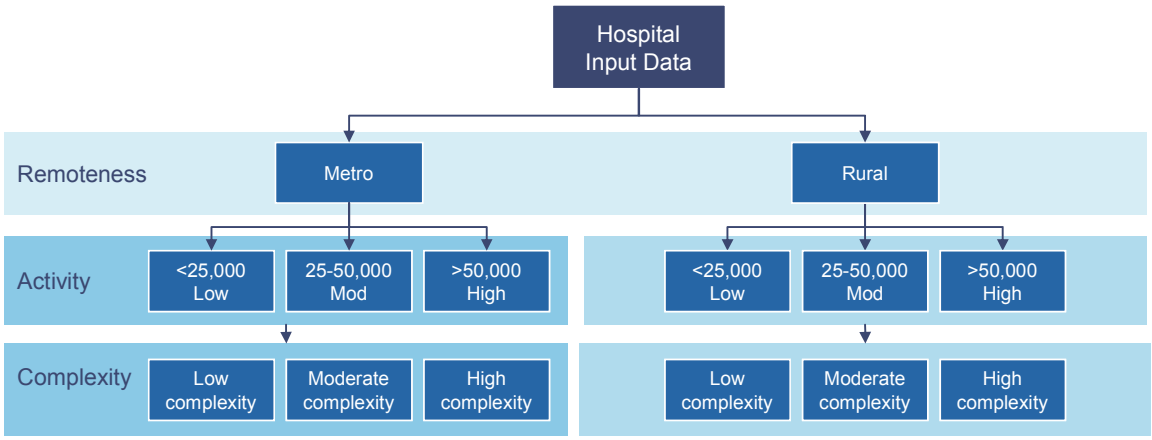
Scenario framework for defining ED profiles

Taken together, the literature review, consultations with sites and the EDWRG and statistical analysis of NSW Health ED data revealed three drivers of skill mix and staffing needs:

- Remoteness of the ED: Rural versus metropolitan (2 levels)
- Previous 12 month activity: High, moderate and low (3 levels)
- Patient complexity: High, moderate and low complexity (3 levels)

Figure 18 illustrates these drivers in the decision tree for determining scenarios.

Figure 18 Decision-tree for scenario framework



Using the decision tree approach, the three drivers, with multiple levels, resulted in 18 potential scenarios of NSW EDs. The 18 scenarios identified are illustrated in Figure 19.

Figure 19: Eighteen evidence-based scenarios

	1	2	3	4	5	6	7	8	9
Remoteness Activity Complexity	Metro Low Low	Metro Low Mod	Metro Low High	Metro Mod Low	Metro Mod Mod	Metro Mod High	Metro High Low	Metro High Mod	Metro High High
	10	11	12	13	14	15	16	17	18
Remoteness Activity Complexity	Rural Low Low	Rural Low Mod	Rural Low High	Rural Mod Low	Rural Mod Mod	Rural Mod High	Rural High Low	Rural High Mod	Rural High High

5.7 Approach to recognition of education profile

When mapping the eighteen scenarios to the evidence-based models of care, it is important that EDs consider the education profile of the site and the skill mix required to maintain the delivery of education and training according to accreditation standards. Education considerations should be addressed for all professional and non-professional groups within the ED.

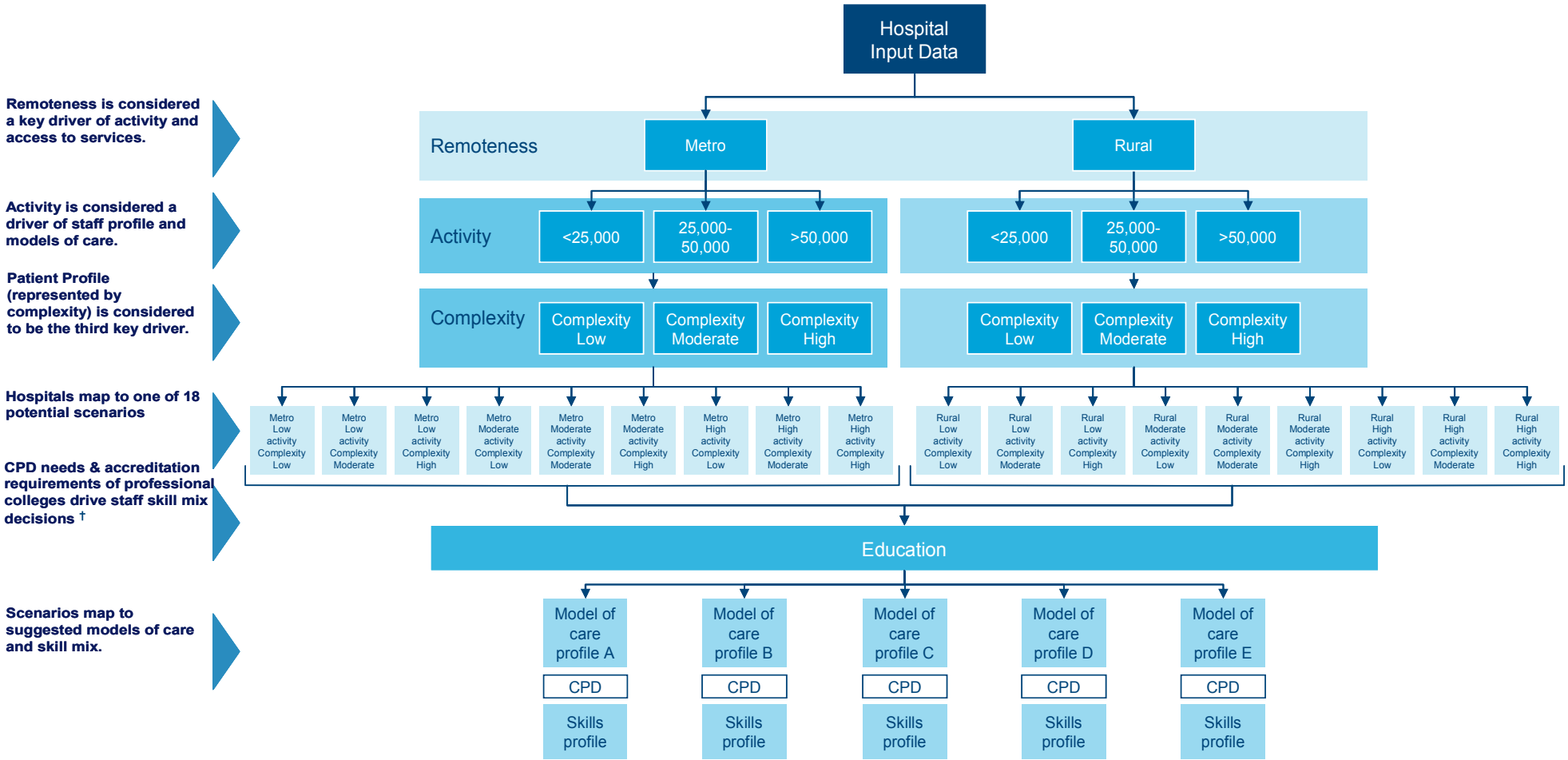
Education considerations include:

- ACEM/IMET accreditation
- University affiliations
- Undergraduate and postgraduate placements.

Figure 20 overleaf illustrates the scenario framework in its entirety.

Scenario Framework

Figure 20: Scenario Framework for defining ED profiles †



† CPD means continuing professional development

5.8 Mapping models of care to evidence-based scenarios

Following the identification of the eighteen scenarios, the next step was to map each of the evidence-based scenarios with models of care.

During site visits, information was gathered about the number and nature of models of care currently being used in NSW emergency departments. Collating this information revealed which models are most commonly used, where they tend to be used, and which are thought to be the most and least useful models in certain contexts[xxxvi]. Using the scenario framework described above, models of care were mapped to the different activities based on the activity of the ED and the complexity profile of presenting patients. This was achieved through a targeted scan of the literature to identify where models of care would be most effective and appropriate. Combining information from sample sites, literature and discussions with the EDWRG, a selection of contemporary models of care has been selected. These models of care are:

- Fast Track
- Short Stay Unit
- Streaming
- Care Coordination
- Rapid Assessment Team
- Psychiatric Liaison.

Models of care were mapped to the different scenarios, based on the volume of activity of the emergency department and the complexity profile of presenting patients. This was achieved through a comprehensive review of the literature, to identify where each model of care would be most effective and appropriate. Consideration of activity levels for all models of care will need to be determined at each ED to assess the feasibility of sustaining the model of care.

Table 44 summarises the process for mapping scenarios to models of care.

Table 44: Mapping models of care to evidence-based scenarios

Model of Care	Summary of methodology	Scenarios
Streaming	Based on the literature, the Streaming model of care was mapped to scenarios with: • High activity or • Moderate activity, with a decision point around adequate staffing levels, as streaming requires separate teams of medical and nursing staff.	4 – 9 and 13-18
Fast Track	Based on the literature, the Fast Track model of care was mapped to scenarios with: • High activity or • Moderate activity and low complexity.	4, 7, 8, 9, 13, 16, 17, 18
Short-Stay Unit	Based on the literature, the Short-Stay Unit model of care was mapped to all eighteen scenarios.	All scenarios
Care Coordination Team/ASET	Based on the literature, the Care-Coordination Team model of care was mapped to all eighteen scenarios.	All scenarios

Model of Care	Summary of methodology	Scenarios
Rapid Assessment Team (RAT)	Based on the literature, the RAT model of care was mapped to scenarios with: • Moderate to high activity • Moderate to high complexity.	5, 6, 8, 9, 14, 15, 17, 18
Psychiatric Liaison	Based on the literature, the Psychiatric Liaison model of care was mapped to all eighteen scenarios.	All scenarios

5.8.1 Fast Track

Fast Track is an operational model of care whereby patients with less urgent medical conditions are 'streamed' into a dedicated space for treatment. Non-urgent conditions are treated in a separate area by a dedicated clinical team with the target of reducing patient discharge time to 2 hours[xvii].

A number of studies have reported that the implementation of Fast Track zones significantly improved quality, safety and efficiency outcomes such as reduced waiting times, length of stay and did not waits. As Table 45 shows, beneficial results are reported for large emergency departments and middle-sized departments with a high volume of low-complexity patients.

Table 45: Background and findings identified from Fast Track literature

	Contextual/Hospital Factors	Reduction in waiting time	Reduction in LOS	Reduction in DNW	Higher discharge rate
Bankstown Hospital, NSW [liv]	• Middle-sized ED with approximately 40,000 presentation to ED in 2006 • Case mix of approximately 25% paediatrics	✓	✓	✓	
Sir Charles Gairdner Hospital, WA[xxvi]	• Middle-sized ED with approximately 43,000 patients annually	✓	✓		
Townsville Hospital, QLD [xxvi]	• Large ED with approximately 53,000 patients in 2006 • 20% paediatric patients.	✓	✓	✗	
Northern Hospital, VIC[xxvii]	• Approximately 70,000 ED patients annually • Casemix of 25% paediatrics • Admission rate of approximately 25%	✗	✓		✓

Based on the literature, the Fast Track model of care was mapped to scenarios with:

- High activity or
- Moderate activity and low complexity

Accordingly, Fast Track was identified as an appropriate model of care for eight out of eighteen scenarios, namely 4, 7, 8, 9, 13, 16, 17 and 18.

5.8.2 Short Stay Unit (SSU)

The term Short Stay Unit refers to units that have been developed for the short-term care of ED patients who require observation and specialist assessment, and whose length of stay is deemed to be limited (eg less than 24hours). The nomenclature for Short Stay Units varies throughout national and international literature, with labels including Emergency Medical Units (EMU) and Clinical Decision Units (CDU).

Research has shown that SSUs are an effective means of improving patient flow through an ED, limiting patient LOS in ED to six hours and avoiding admission to inpatient wards. Further, SSUs can help avoid transfers to other hospitals in cases where a particular specialty ward is not available onsite within the hospital for a short stay admission, eg paediatric ward. Table 46 shows some Australian evidence about the benefits of SSUs.

Table 46: Background and findings identified from Short Stay Unit literature

	Contextual/Hospital Factors	Outcomes
St George Hospital, NSW[xxviii]	• Tertiary referral hospital • 10-bed SSU • Max LOS 24 hours • 2074 admissions to the SSU in the first year	• 85% of patients reported that discharge planning from the SSU was adequate • High reported patient satisfaction • ED access block and ambulance diversions reduced by 20% and 30%, respectively.
Maroondah Hospital, VIC[xxix]	• 291 bed metropolitan hospital • 4 to 8 beds quarantined for children • 9097 paediatric emergency attendances, of which 862 were admitted to the SSU.	• Median length of stay was 20 hours • High reported patient satisfaction
Barwon Health, VIC[xxx]	• Clinical decision making unit (CDMU) located with the ED	• Average LOS less than 24 hours • 92% of patients discharged home

From the literature, it appears that SSU is an appropriate model of care for all types of emergency department. As such, SSU has been identified as suitable for all eighteen scenarios.

5.8.3 Streaming

Streaming in the ED involves separating patients into different value streams based on complexity and/or acuity and disposition. Streaming has been shown to improve quality, safety and efficiency outcomes in emergency departments[xiv]. The following table provides a summary of two emergency departments (metropolitan and regional) implementing a Streaming approach.

Table 47: Background and findings identified from streaming literature

	Contextual/Hospital Factors	Reduction in waiting time	Reduction in LOS	Reduction in DNW	Higher discharge rate	Reduction in representation
Bendigo Health, VIC[xiii]	• Rural ED with approximately 35,397 presentations annually • 47% were allocated to gold stream (complex) and 53% were allocated to blue stream (less complex)		✓	✗	✓	
Flinders Medical Centre, SA[xiv]	• Approximately 50,000 presentations to the ED. • Patients likely to require admission were allocated to the A-side and patients likely to return home from the ED were allocated to the B-side.	✓	✓	✓	✓	

Based on information captured during site visits as part of this project and literature reviewed, streaming is most common in large EDs and also used in mid-sized EDs. Sample sites that use streaming range from 35,000 to in excess of 60,000 presentations.

Based on the literature, the streaming model of care was mapped to scenarios with:

- High activity
- Moderate activity, with a decision point around adequate staffing levels, as streaming requires separate teams of medical and nursing staff.

Accordingly, streaming was identified as an appropriate model of care for twelve out of eighteen scenarios, namely 4-9 and 13-18.

5.8.4 Care Co-ordination Team/Aged Services Emergency Team

The objective of Care Co-ordination Teams (CCT) and Aged-care Services Emergency Teams (ASET) is to reduce admissions, length of stay in ED and re-presentations for complex patients, including: aged people, people living alone, frequent presenters to ED, those requiring assistance with activities of daily living, those not eligible for Hospital in the Home, those requiring complex discharge planning, the homeless, and those with drug and alcohol problems.

Implementation of CCTs has been associated with significantly reduced admissions from ED and high patient and staff satisfaction. A CCT at Royal Melbourne Hospital saw 2,532 patients in a year, which significantly reduced hospital admissions that year.[xxxi] In response to steadily increasing presentations to EDs, particularly among the older population, this model has been introduced into many NSW and Victorian EDs: in 2006, ASETs had been established in 36 NSW EDs.[xvii]

Positive experiences of CCTs across a range of EDs suggest that this model is suitable for all scenarios. However, smaller sites should consider whether their volume of frequent visitors or aged patients is sufficient to warrant such a dedicated team.

5.8.5 Rapid Assessment Team

The purpose of a Rapid Assessment Team (RAT) is to provide an early comprehensive medical assessment, resulting in early initiation of tests and pain management, treatment and, where

appropriate, the opportunity for immediate discharge[29]. A RAT consists of a triage nurse and an independent clinician, who is usually an experienced medical officer. In this model, the triage nurse refers appropriate patients to the RAT clinician for early assessment.

Evidence from the literature indicates that RATs are most beneficial for departments with patient flow and bed access challenges in the ED. An evaluation study found that this approach reduced the number of did not waits, reduced waiting times, increased the number of patients seen within ATS thresholds and improved staff satisfaction. The authors noted that the model may be of less benefit in large, well-designed departments with an adequate number of assessment spaces[xxxii]. Pilot study results also indicate that a RAT is only suitable in departments with enough experienced medical officers to cover the floor in the main department as well as the triage area.[xxxiii] Accordingly, this model of care is likely to be suitable only for well-staffed middle-sized to large departments.

Based on the literature, the RAT model of care was mapped to scenarios with:

- Moderate to high activity
- Moderate to high complexity.

Accordingly, RAT was identified as an appropriate model of care for eight scenarios, namely 5, 6, 8, 9, 14, 15, 17, 18.

5.8.6 Psychiatric liaison

The purpose of psychiatric liaison roles is to provide psychiatric assessment and care for patients identified as potentially having mental health problems. Examples of existing psychiatric liaison roles in the literature are mental health CNC, EMTaCS nurse (emergency department mental health triage and consultancy service nurse), mental health liaison nurse and psychiatric nurse. About 60 mental health clinical nurse consultants (CNC) and mental health nurse practitioners were operating in rural and metropolitan EDs in NSW in 2006.[xvii]

Literature indicates that psychiatric liaison roles are seen as beneficial by ED professionals who may not have expertise in assessing and treating mental health patients. Some studies have also found improvements in efficiency measures such as waiting times, did not waits and length of stay in emergency [lxi, lx, xxxiv.] Given the demonstrated benefits of psychiatric liaison for emergency patients, it was concluded that all Level three to Level six EDs should provide mental health patients access to psychiatric assessment. As such, psychiatric liaison was mapped to all scenarios.

Table 48 provides a summary of how the models of care were mapped to the eighteen evidence-based scenarios.

Table 48 Models of care mapped to evidence-based scenarios

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Streaming				✓	✓	✓	✓	✓	✓				✓	✓	✓	✓	✓	✓
Fast Track				✓			✓	✓	✓				✓			✓	✓	✓
SSU	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Care Coordination/ASET	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Rapid Assessment Team					✓	✓		✓	✓					✓	✓		✓	✓
Psychiatric liaison	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

††† Red ticks indicate potential model of care depending on additional characteristics of the specific ED eg implementation of an ASET team would depend on the number or proportion of aged patients seen by the ED.

†† Blue shading indicates scenarios which currently only apply to children's hospital.

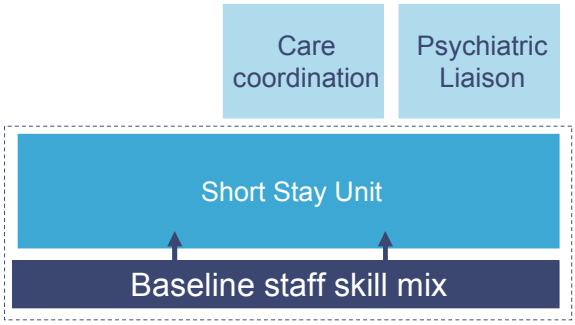
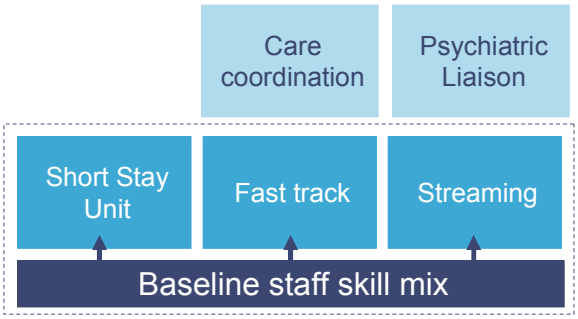
†† Grey shading indicates scenarios in which no existing EDs are currently included.

5.9 Grouping of scenarios based on models of care

Table 48 provides a summary of how the models of care were mapped to the eighteen evidence-based scenarios. From the scenario framework, these eighteen scenarios can be further grouped into five model-of-care profiles, described in Table 49. It should be noted that the scenario is a filter on the way that the model of care is interpreted and/or implemented. This is discussed further in the guidelines for the scenarios and their models of care.

The diagrams in Table 49 illustrate the model of care profiles and include the baseline staffing skill mix requirements. The intention is that the baseline staff skill mix groups are deployed as applicable to the models of care (represented within the dashed line). Additionally, models of care which require specific staffing and skill mix are indicated by the light blue boxes above the dotted line eg for the psychiatric liaison model.

Table 49: Mapping models of care to evidence-based scenarios

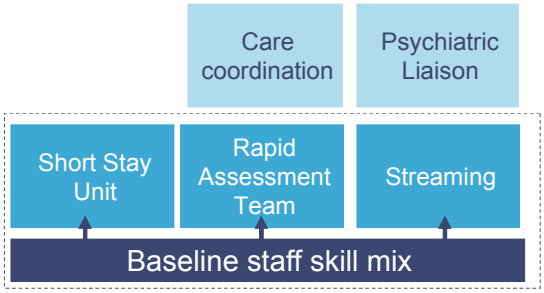
Model of care profiles
Model of care profile A Scenarios 1, 2, 3, 10, 11 and 12 have the same models of care profile. EDs who fall into any of these scenarios would benefit from the following models of care: • Short-stay unit • Care coordination or ASET team • Psychiatric Liaison 
Model of care profile B Scenarios 4, 7, 13 and 16 have the same models of care profile. EDs who fall into any of these scenarios would benefit from the following models of care: • Fast-track • Short-stay unit • Streaming • Care coordination or ASET team • Psychiatric Liaison 

Model of care profiles

Model of care profile C

Scenarios 5, 6, 14 and 15 have the same models of care profile. EDs who fall into any of these scenarios would benefit from the following models of care:

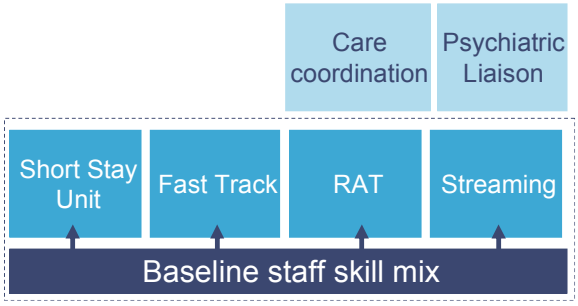
- Short-stay unit
- Streaming
- Care coordination or ASET team
- Rapid Assessment Team
- Psychiatric Liaison



Model of care profile D

Scenarios 8, 9, 17 and 18 have the same models of care profile. EDs who fall into any of these scenarios would benefit from the following models of care:

- Fast track
- Short-stay unit
- Streaming
- Care coordination or ASET team
- Rapid Assessment Team
- Psychiatric Liaison



Model of care profile E

Consultations with the EDWRG about the Solutions Design report caused the group to deliberate on the applicability of the complexity measure to dedicated paediatric EDs. As a result of those discussions and further examination of literature, paediatric EDs were grouped together to form their own models of care profile, known as models of care profile E.

Both dedicated paediatric EDs in NSW emerged in the low complexity band using the measure derived as part of this project. Literature and anecdotal evidence indicate that the usual measures of complexity, including triage category, age and admission rate are not suitable for use with paediatric EDs. An Australian study examining different practices in the triage of paediatric patients found that nurses in dedicated paediatric EDs were four times more likely to triage patients as ATS categories 4 and 5 than nurses in mixed EDs[xxxv]. This finding suggests that the complexity level of paediatric EDs may be artificially reduced in relation to mixed EDs because of differences in triaging practices for paediatric patients.

By their very nature, paediatric EDs have a low proportion of aged presentations. As such, it seems inappropriate to use a measure of complexity that incorporates proportion of aged patients as an indicator. Furthermore, anecdotal evidence suggests that paediatric EDs have a higher level of senior medical coverage, which is known to reduce the likelihood of admissions. Together, these sources of evidence suggest that the measure of complexity derived as part of this study is not appropriate for dedicated paediatric EDs.

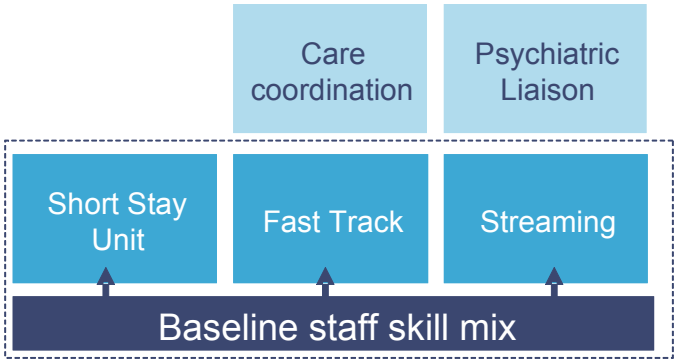
Care Coordination Team models of care may also apply to dedicated paediatric EDs. These teams are likely to be sourced from outside of the ED, attending ED to coordinate care for patients with complex or chronic conditions.

Model of care profiles

According to models of care profile E, paediatric EDs would benefit from the following models of care:

Model of care profile E

- Fast track
- Short-stay unit
- Streaming
- Trauma team
- Care coordination team
- Psychiatric Liaison



Skill mix guidelines for each of the models of care are included in principles and guidelines Section 6.

6 Principles and guidelines

6.1 Overview

The clinical work in an ED can be divided into discrete skill sets, which every department needs in order to care for all the types of patient that present[xxxvi]. A basic assumption of this project is that the number and type of staff possessing these skills can and should vary between departments; however, all the skills should be covered in the staffing profile. Thus, there is not a "one size fits all" formula for ED staffing.

To inform the development of the principles and guidelines, according to different scenarios and hospital profiles, NSW Health ED data were analysed for the 64 of the 87 Level 3 and above EDs with available data. Despite data not being available for the remaining 23 Level 3 EDs, the development of ED scenarios, model of care profiles and principles has considered all Level three to Level six EDs in NSW.

The following principles and guidelines have been developed to determine the skill mix required in the Level three to Level six EDs. The principles apply to all EDs in this category and guidelines are based on ED scenarios (characteristics) and the different models of care that can be applied to each.

The ED scenarios and guidelines have been developed from analysis of the drivers of systematic differences in EDs, namely remoteness, activity, and complexity. These three drivers are interdependent and all three need to be used in conjunction to determine staffing and skill mix requirements. Consideration has also been given to other necessary components of an ED such as clinical supervision, education and training, quality and safety and other non-clinical activities required for effective ED operation and management that can influence staffing requirements.

The principles and guidelines are designed to be applied to an individual ED. They are complementary to the occupational health and safety regulations and industrial agreements such as the Public Health Systems Nurses' and Midwives (State) Award which contains principles, guidelines and tools for reasonable workloads (subclauses (i), (ii), and (iii)). The principles and guidelines in this report do not override any formal industrial agreements.

6.2 Existing evidence for ED staffing models

A review of evidence around ED staffing has revealed a range of principles and guidelines developed by professional bodies in Australia and internationally. Some apply specifically to professional groups in ED, and others apply to the broader aspects including ED design, staff education and training, and the number and workload of staff.

Additionally, the importance of adequate ED staffing is clear from some studies which demonstrate the negative impacts of increasing workloads in EDs. Despite the wealth of literature examining the effects of nursing, medical or allied health roles in ED, few studies have examined the impact of different staffing or skill mix on ED performance as a whole. A literature review completed for this project by Schofield and Callandar[xxxvii] found little literature describing the entire ED workforce: most identified studies looked at a single staffing model in ED.

6.3 Principles and guidelines: approach to development

The principles and guidelines for Level three to Level six NSW EDs in this report were developed drawing from the literature and existing ED principles and guidelines, in addition to qualitative information gathered during the Diagnostic Phase. This qualitative information included essential components of an ED, current staffing models and the availability of staff in different regions. The developed principles and guidelines were then refined and agreed in collaboration with the EDWRG and following testing at a number of sample EDs.

Key findings from the activity mapping sessions, conducted in the Diagnostic Phase of the project, were used to inform the development of the principles and guidelines for skill mix in an ED. Comparisons of the activity maps revealed potential for change in the way that existing skill sets are best used, to allow the highly skilled staff to focus on their core activities. Changes include the use of staff trained in clinical tasks to support clinical roles, and also the use of emerging primary roles for nurses and allied health staff such as the Nurse Practitioner and Primary Physiotherapist role in ED.

Acknowledging that skills can be shared across professional groups it was agreed that these principles and guidelines would describe skill requirements only and professional groups would only be described when the skill sets were not shared and activities could not be carried out by any other profession.

While no single staffing model is considered applicable to every ED, a baseline staffing requirement is necessary in every ED for safe and effective care delivery. This baseline includes a combination of qualified and experienced medical and nursing staff, allied health staff as applicable and staff in support roles, also crucial to the delivery of emergency care. The baseline staffing requirements are based on skill mix only: not numbers of staff, not the ratio of staff to patients, and not the ratio of experienced to novice staff in an ED.

The Principles and guidelines have therefore been developed and presented in two parts:

1 As baseline skill mix recommendations

2 Skill mix according to models of care.

6.4 Principles and guidelines: baseline skill mix recommendations

General principles have been developed for the staff skill mix of Level three to Level six EDs in NSW and these are considered the baseline case for EDs at these levels. The baseline staff skill mix is categorised into the discrete skill mix groupings based on existing ED guidelines[xxxvi] with the inclusion of a clinical assistant skills group to address the emergence of clinical support staff trained to assist and support medical and nursing clinicians. The inclusion of these roles allows the highly skilled clinician to focus their skills and knowledge away from the routine tasks that can be carried out by others.

The baseline staff skills are considered essential to all Level three to six EDs. These staff should have capacity to be involved in provision of direct and indirect patient care of all patient presentations to the ED. The intention is that the baseline staff skill mix can be deployed to the models of care identified for each ED profile. The skill sets deployed to the models of care should be in multiples of the baseline and hence will not be committed to working in multiple locations within the ED at any one time. The staff skill mix can also be deployed permanently as a feature of each model of care. These models of care are not necessarily applicable to every ED, nor necessarily applicable to all times of the day and day of the week. The deployment of the baseline skill mix to each model of care should be determined to meet the capacity of the ED.

The models of care to which staff are deployed include the Short Stay Unit, Fast Track, Rapid Assessment Teams and Streaming models. The exception to this is where staffing alternatives exist and

these staff are not part of the baseline skill mix, or where specialist staff groups are required, eg mental health staff for the psychiatric liaison role.

For the purposes of this report, 'experienced medical' staff are considered to be medical officers who have worked extensively in ED and are independent clinical decision makers in an ED environment. That is, they are able to make clinical decisions around diagnosis, treatment and disposition of undifferentiated patients, without routinely seeking input from other emergency medical practitioners. 'Experienced nursing' staff are considered to be nurses who have worked extensively in ED and/or have completed a post-graduate emergency or critical care nursing course and are able to operate independently in an ED environment. That is, they are able to assess, monitor and treat undifferentiated patients without the need for supervision from other emergency nursing staff.

The following skill mix groupings have been applied to NSW for all professional groups and support staff. It is recognised that some staff skill sets can relate to more than one skills group. The skills groups are:

- Complex leadership tasks
- Clinical leadership and management roles
- Clinical decision makers
- Clinical skills
- Clinical Assistant skills
- Non-clinical skills.

The principles and guidelines for staffing according to these groupings are described in more detail in the following sections. It should also be noted that NSW Health policies exist and should be referred to in conjunction with these principles and guidelines when determining skill mix.

6.4.1 General principles

General principles for staffing all Level three to Level six NSW EDs are listed below:

- 24 hour per day/seven days per week clinical cover is required to operate a safe and accessible ED service to its catchment
- Access to experienced doctors 24 hours a day[xxxviii]. These staff may be Emergency Medicine Specialists, career medical officers and GPs with ED experience and/or post graduate qualifications, and Registrars (it is recognised that registrars are trainees and as such require supervision by experienced medical staff)
- A range of registered nurses with varied skill levels and ED experience are rostered in the ED 24 hours per day
- Staff skill mix should include a range of staff with experience and knowledge of assessing and caring for all levels of patients regardless of urgency/complexity and presenting problem and with a focus on delivery patient centred care
- Selection of staff in ED should be based on matching the appropriate skill level to the tasks required and should consider the importance of highly skilled and experienced staff utilising their skills appropriately
- Staff skill mix should include a range of staff with experience and knowledge of assessing and caring for specific patient groups, such as paediatrics, aged care and mental health and those with chronic disease

- Staffing levels should consider the number of aged and paediatric patients to reflect increasing complexity, and dependency, and increased resource requirements for procedures
- Staff skills should include communication and skills in the management and de-escalation of aggression
- Access to/inclusion of skilled and experienced Allied Health staff in the multidisciplinary team for patients who require management and treatment by specialist allied health services
- Access to pharmacy services/clinical pharmacist for the review of medication regimens, provision of recommendations and advice for drug therapies, education and advice to staff and patients, and the supply of medications to ED
- Mental health specialist staff employed to the role of psychiatric liaison; this member should be an addition to the clinical staff required in other areas of ED
- Staff skill mix should include staff with expertise in providing clinical supervision and education to trainee and staff new to the ED environment, including novice medical and nursing staff such as interns and nurses in graduate programs
- Models of care that can streamline the patient journey through ED and provide early assessment and treatment and that are staffed according to applicable workforce models
- Flexibility in staffing to meet demand and peak times of the day, week and seasonal variation according to local need
- Provision to cover staff required to attend other hospital responsibilities, as locally designated, such as a Medical Emergency Team, Cardiac Arrest Team and Medical coverage in the hospital after hours as well as the coordination of retrieval and transfer to other facilities
- EDs with a role in disaster management should have in place plans to backfill the team(s) of staff required to attend disasters in the field
- Staffing should address award provisions for all staff including annual leave, sick leave, FACS leave, maternity leave, based on an average across the state.

6.4.2 Complex leadership

Complex leadership tasks are those that comprise operational management in an ED and all Level three to Level six EDs have a basic requirement for operational management. These staff include both medical and nursing leaders, and may include clerical managers. These complex leaders should:

- be responsible for the management of the ED budget, recruitment of staff and staff resourcing at a strategic level
- provide cover across a majority of ED business hours five days a week
- provide support to ED staff as required, for example, for staff well-being, debriefing after critical incidents and performance management.

Skills and knowledge include:

- Managerial and leadership expertise
- Advanced interpersonal and communication skills
- Organisational, time management and prioritisation skills
- Budget management and monitoring skills
- Human resource management

- Change management
- Quality and safety management.

6.4.3 Educational leadership

Complex leadership tasks are also those that comprise education in an ED. All Level three to Level six EDs have a basic requirement for education leadership and management.

EDs should have access to educational leaders in ED – these staff should address the needs of all medical and nursing and other staff employed in the ED. Staff in these roles can include a Clinical Nurse Educator, Nurse Educator, Clinical Nurse Consultant and Director of Emergency Medicine Training.

The role encompasses:

- Clinical supervision for trainee clinical staff
- Clinical supervision and support for ED staff new to the ED environment
- Professional development opportunities and progression of skills development for ED staff
- Coordination of mandatory OH&S and other educational requirements
- Support for the introduction of new models of care and policies and procedures.

Educational leaders should be available to provide clinical support and supervision at times when novice and less experienced staff are rostered in ED. Weekend and after-hours shifts should be included as required.

Skills and knowledge include:

- Advanced communication and interpersonal skills
- Computer literacy
- Extensive knowledge of ED practices
- High level knowledge and skills across a range of emergency presentations, and their management, to allow clinical supervision, advice and support to clinical staff caring for patients in ED
- Experience in the delivery of education and assessment of trainees and a working knowledge of adult learning principles, critical and reflective thinking, problem solving and clinical reasoning
- High level knowledge of mandatory OH&S, professional development and other educational needs of the ED.
- EDs should have access to at least a Clinical Nurse Educator (CNE) or equivalent to support education and workforce development programs for ED nursing staff
- EDs should have access to a Clinical Nurse Consultant (CNC) to research best practice delivery of care for ED patients, the development of policies and procedures, involvement in quality activities and ongoing monitoring, and to support the CNE role in developing and maintaining education programs
- The CNE and CNC roles should be supernumerary, dedicated roles within the ED
- EDs accredited for specialist emergency training must comply with College guidelines which currently require access to dedicated Director of Emergency Medicine Training (DEMT) time.

6.4.4 Clinical leadership and management

The staff in these roles should be experienced in ED and have clinical management and leadership skills to facilitate smooth functioning of the ED on a shift by shift basis. Staff in this role includes both nursing and medical staff, eg Clinical NUM, in-charge nurse, Emergency Medicine Specialist, CMO, Senior Registrar. The cover for this skill set is 24 hours per day/seven days per week. It is recognised that staff working in the skills group may also be functioning in the clinical decision making skills group.

Also included in this skills group is the Clinical Nurse Consultant (CNC) who provides leadership and guidance in emergency clinical practice and offers expert clinical support to those delivering emergency patient care.

Clinical leaders and managers should:

- Manage on a shift by shift basis the coordination and flow of patients through the ED
- Identify and coordinate on a shift by shift basis the skill mix required in ED to provide a high level of safe patient care and to manage unexpected leave.

Skills and knowledge include:

- A high level knowledge and skills across a range of emergency presentations to allow clinical supervision, advice and support to clinical staff caring for patients in ED
- Advanced procedural and clinical skills to assess and care for the seriously ill and injured
- Understanding of ethical, legal, managerial, policy and clinical governance issues and the application of these to the clinical setting
- High level communication and interpersonal skills
- Human resource management for allocation of appropriately skilled staff.

6.4.5 Clinical decision making

Clinical decision making is core to ED and should be done by staff experienced in providing emergency care – medical, nursing and allied health staff. The cover required for these staff is 24 hours per day.

Within their scope of practice, clinical decision makers can assess and make independent decisions about initial management, diagnosis, treatment and disposition of undifferentiated patients in ED. Clinical decision makers include Emergency Medicine Specialists, ED Nurse Practitioners and transitional ED Nurse Practitioners. Additionally these clinical decision makers can include Registrars, experienced CMOs and experienced ED registered nurses. Clinical decision makers can also be experienced Allied Health staff in specialist roles such as aged care coordination and minor injury.

Skills and knowledge include:

- Frontline management of patients
- Clinical assessment and diagnosis
- Decision making about appropriate investigations, treatment and disposition
- Interpretation of diagnostic results
- Skills and knowledge to make referrals to other health professionals
- Work autonomously in management of routine presentations

- Work in caring for both low complexity and high complexity presentations
- Knowledge of hospital and community services available
- Ability to assess clinical urgency, complexity and likelihood of discharge
- Ability to identify potential for adverse outcomes and implement strategies to minimise risk
- Triage trained and experienced ED registered nurse designated to the role of triage for every shift, providing ongoing reassessment of patients waiting for treatment, and re-triaging as appropriate
- High level communication and interpersonal skills.

6.4.6 Clinical skills

While clinical skills are inherent in the previous skill mix groups, there is a requirement that a core group of staff is available and trained, within their scope of practice, in a broad range of clinical skills required for emergency care. It is recognised that staff in this clinical skills group may include interns and nursing staff who are new to emergency care, are learning and who have limited skills in emergency care. These staff require direct supervision from experienced staff. This skill mix group is required 24 hours per day/seven days per week.

The core group of staff trained in clinical skills includes:

- Medical staff and registered nursing staff and allied health staff as appropriate
- Endorsed enrolled nurses (EEN) are a valuable addition to staff with clinical skills, and can assess the sick patient and take a history and provide ongoing monitoring of a patient's condition
- EENs can undertake procedures under the supervision of nursing and medical staff
- Assistants in nursing (AINs) can also be a valuable member of the nursing team and can work within their scope of practice to provide basic nursing care and ongoing monitoring of patients.

Staff in the clinical skills group should:

- Be trained in required tasks and can work according to guidelines and clinical pathways, within their scope of practice
- Be provided with direct clinical supervision and other education and training support required, decided and assessed on a case by case basis.

According to scope of practice, skills and knowledge can include:

- Assessment of the sick patient including physical assessment and history taking
- Ordering and interpretation of diagnostic tests
- Monitoring and recording of vital signs
- Ongoing monitoring of patient condition
- Provision of basic patient care
- Diagnostic procedures such as lumbar puncture
- Venepuncture, cannulation and blood collection
- Wound care including suturing and dressing
- Musculoskeletal care – management/relocation of fractures, dislocations and plastering.

6.4.7 Clinical Assistant skills

There is recognition of scope to train staff in clinical tasks. These roles already exist in some areas and have included phlebotomists and allied health assistants. Technical assistants functioning as phlebotomists and the allied health assistants both have the potential to work effectively in an ED environment. The clinical assistant role should be considered in EDs to assist highly skilled clinicians and to focus the clinicians' skills on complex patient care. The technical skills of this group can also include some of the skills listed above in the clinical skills group.

Clinical assistants can be available 24 hours per day/seven days per week, however each ED should identify appropriate coverage of these staff to suit the needs of the ED. Staff working in this role can include technical assistants and allied health assistants.

These staff should:

- Be trained and work according to locally specified clinical guidelines
- Work under supervision of experienced ED doctors, nurses and allied health staff as an extension to the clinical role
- The skills required should depend on the responsibilities assigned to the each created position.

The skills and knowledge can include:

- Ability to work under direction and in a team environment
- Work according to clinical pathways and standing orders
- Venepuncture, blood collection and other procedures as approved through local policy and with educational support.
- Application of plasters and splints
- Fitting and provision of mobility aids such as crutches

6.4.8 Non-clinical skills

The functioning of an ED is reliant on non-clinical staff to carry out other key roles. These roles are crucial to operations in ED and include staff employed directly to the ED and staff who are employed into other services and are accessible by the ED. Non-clinical staff include:

Clerical

Clerical staff should provide cover to ED 24 hours per day. These staff allow those in clinical roles to focus on their core tasks. Clerical roles can include functions such as patient registration, admission and communications and clerical support.

- Skills and knowledge can include:
  - Ability to work as part of a multi-disciplinary team
  - Communication and interpersonal skills
  - Organisation and time management skills
  - Computer literacy and data entry skills
  - Working knowledge and understanding of the ED ICT and patient information systems in use

  - Data collection for patient registration and record keeping
  - Follow-up of diagnostic results
  - Creating admission paperwork and understanding admission processes
  - Collating medical records including creating and printing necessary individual patient paperwork
  - Medical terminology
  - Knowledge and understanding of confidentiality.

Administrative/Executive support

These staff should provide support to Complex Leadership and Clinical Management and Leadership groups. This skills group should be available across weekday business hours.

- Skills and knowledge include:
  - Organisation and time management skills
  - Highly developed communication skills
  - Problem solving skills
  - Computer literacy
  - Knowledge and understanding of confidentiality
  - Medical terminology.

Data Management

Data management is essential for the collection and reporting of data around performance targets. These staff should be available across weekday business hours.

- Skills and knowledge include:
  - Understanding of local ICT and patient information systems
  - Clinical data capture and reporting
  - Advanced computer literacy and database/data entry skills
  - Understanding of health system data, coding and relevant ED key performance indicators
  - Analysis and information management
  - Communication and interpersonal skills.

Equipment and Supplies management

Equipment and supplies skill sets are required to manage and maintain the large volume and range of stores required in ED and to manage, track and maintain ED equipment. This could be a role for a non-clinical staff member working under the guidance and supervision of a clinical staff member. This role does not encompass strategic decision making about the selection of clinical equipment, nor the provision of training in the use of highly technical clinical equipment. The role can, however, include coordination of education sessions in equipment use. Staff with these skill sets should provide cover primarily in business hours five days per week.

- Skills and knowledge include:
  - Organisation and time management skills
  - Interpersonal and communication skills
  - Computer literacy, including stores database management and record keeping
  - Stock management

- Purchasing processing knowledge
- Ability to work in a multidisciplinary team.

6.4.9 Support services

The ED is reliant on a range of support services fundamental to the operations in ED and include staff employed into other services external to and accessible by the ED.

Patient transfer services

Patient transfer may come from a shared pool of staff and should be available 24 hours per day as required.

- Skills and knowledge include:
  - Knowledge of the hospital geography and systems
  - Training and understanding of occupational health and safety issues in relation to manual handling and transfer of patients around the hospital
  - Knowledge and understanding of local policies and procedure relating to patient transfer and escort requirements.

Security services

Security services should be available to the ED and accessible 24 hours per day. There may be a dedicated daily security allocation to ED, or a response either on request or to an activation procedure.

- Skills and knowledge include:
  - Knowledge and understanding of ED and hospital policies and procedures
  - Aggression management and de-escalation skills
  - Interpersonal and communication skills.

Housekeeping services

Housekeeping services, such as cleaning and food services, should be available to the ED and accessible as required.

- Skills and knowledge include:
  - Interpersonal and communication skills
  - Organisational skills
  - Knowledge and understanding of ED and hospital policies and procedures.

6.4.10 Management of trauma – the trauma response

The ‘NSW Trauma Service Plan’ (December 2009) was implemented in NSW in 2010. The Service plan is based on five integrated trauma service networks and EDs should refer to this plan to determine their trauma designation.

It is expected that all EDs will receive trauma patients for emergency care, regardless of size and location, or designation as a trauma service. In some cases trauma patients may present without warning and where pre-hospital notification has been received a trauma response should be activated. To manage trauma presentations the ED trauma response should include the following.

Designated Trauma Services

- For severely injured patients activation of a trauma team according to individual hospital trauma activation criteria and level of trauma service and resources available.
- For less severe trauma a minimum of an ED Staff Specialist/Registrar and ED nursing staff should assess and treat the patient.

No Formal Trauma Designation

- For severe trauma in hospitals without a dedicated trauma team, a trauma response to include an ED Staff Specialist/Registrar or equivalent and ED nursing staff should be in place.
- Small rural sites with no on site Emergency Medical staff should activate an internal emergency response according to local guidelines.

Education and training

- Education and training in the assessment and care of the seriously injured patient for trauma responses and teams to work together effectively – this should be considered in a team simulation setting where possible to promote experiential learning.

6.4.11 Sustainability of the ED workforce

Sustainability is described as the ability of ED staff to maintain a satisfying and rewarding work life span and to continue to develop and maintain a high quality ED workforce[xxxix]. This concept applies across all groups of staff dedicated to providing patient care in an ED.

The following principles are key to the sustainability of the workforce:

- Support for fair rostering practices and the educational development of staff, aligned to industrial awards
- Career development and pathways, available for staff working in ED to provide an opportunity to progress and expand their skill set
- Professional development opportunities available for professional staff groups to maintain their professional standards as required by Colleges, Registration Boards and Associations.

6.5 Other skill mix considerations in ED

6.5.1 Physical layout of emergency departments

The size, capacity and layout of the EDs can have implications for delivery of patient centred care, the patient experience and patient safety, in addition to the safety of ED staff. These factors should be taken into consideration when determining skill mix; in particular:

- Patient visibility and safety – the proximity of the central workstations from treatment spaces and the ability to observe patients within the department should be considered when determining staff skill mix within a department. Staff should also be able to access other skill mix resources for assistance when required in the event of patient deterioration.
- Staff visibility and safety – the ability for experienced medical and nursing staff to support and supervise less experienced staff within the department as well as the safety of staff working in isolated areas of a department should be considered. Immediate access to assistance should be available when required.
- Functional layout of ED – the functional layout of the ED in regard to mobility of the aged care patient and access to equipment for mobilisation and moving patients should be considered. Staff should have ready access to equipment to support delivery of patient care.
- The functional relationships between the ED and other services, such as medical imaging, in the hospital can influence staff skill mix required; in particular if staff are required to leave the ED to escort patients requiring access to other services.

6.5.2 Rural settings with on-call medical staffing

It is noted that in some Level three EDs in NSW, onsite medical staff are not available at all hours. This situation requires specific skill mix considerations to allow equitable access to emergency care by the local community.

Traditional medical and nursing roles should be reviewed and nursing roles negotiated in these situations to be expanded. Guidelines have been developed below and it is recognised that further work and consultation may be required for these EDs without medical cover.

It should also be noted that limitations to available and qualified staff may exist in these rural locations and these limitations should be considered when planning the skill mix. This includes the VMO workforce who may not be available to review and admit patients from ED in a timely manner. Individual EDs should refer to state-wide and local facility policies for guidance in managing these admissions.

- Rural EDs without onsite medical cover should have a minimum of one experienced ED registered nurse on every shift in addition to other required nursing staff and medical staff on-call. This experienced nurse should possess the following skills:
  - ability to work in a team with the VMO/on-call medical staff member
  - extensive experience and advanced skills in Emergency Care
  - ability to work according to pre-determined clinical pathways and standing orders
  - ability to make a clinical decisions about appropriate diagnostic tests, treatment and disposition decisions

  - to prescribe and administer simple medications according to standing orders (it should be noted that prescribing rights of nursing staff may change as part of future skills development).
- Clinical governance structures must be in place to support the advanced role of the nursing staff working in these facilities.
- Nurses working in these facilities should have appropriate support, education and preparation they require to work with limited medical support.

6.5.3 Caring for the paediatric presentation

When considering guidelines for paediatric emergency care it is important to note that emergency presentations differ dependent upon age groups[xl]. NSW Health data (2008/09) revealed that around 17% of all paediatric patients (those ≤16 years old) in NSW attend a dedicated paediatric facility. Framed differently, most paediatric patients, some with life-threatening conditions, attend mixed Level three to Level six EDs. As such, guidelines for paediatric presentations apply to all types of Level three to Level six EDs.

Based on data analysed, both dedicated paediatric EDs in NSW emerged as low complexity using the measure derived as part of this project. The usual measures of complexity, including triage category, age and admission rate may not be suitable for use with paediatric EDs. A discussion around the application of these indicators for paediatric patients can be found in Section 5.8. Complexity in paediatric patients may be better indicated by alternative measures such as number of patient interventions, number of staff required to provide treatment, or clinician time spent with a patient.

In view of the specialty care required for paediatric patients, guidelines for paediatric management have been drawn from recommendations and guidelines made by a number of professional bodies both in Australia and internationally[xlii, xliii, xliii].

These guidelines include the following:

- Medical and nursing staff with experience in the emergency management of children should be rostered at all times
- To optimise skill mix, staff with paediatric experience should be rostered to match peak times for paediatric presentations
- Models of care and workforce models should be implemented according to the proportion of paediatric presentations
- Recognising that diagnosis and management of paediatric patients can require additional time and resources in comparison to similar treatments for adult patients (eg intravenous cannulation), additional resources should be considered.
- Paediatric treatment areas should be kept separate from adult treatment and assessment spaces
- Paediatric treatment spaces should be in close proximity to available ED resources (ie medical, equipment and nursing observation) and EDs should be equipped with space for ongoing observation of paediatric patients
- In non-paediatric specialty facilities, clinical staff with a special interest, knowledge and skill in paediatrics should take on the ED paediatric emergency care portfolio and should:
  - Maintain competency in paediatric emergency care
  - Facilitate paediatric quality improvement and patient safety activities, and policy and procedure development

  - Facilitate the provision of paediatric emergency education for staff working in the ED
  - Work with clinical leadership in ED to make available paediatric equipment, medications, staffing and other resources required.

Skills, knowledge and training required include:

- ED staff caring for paediatric patients should have experience, knowledge, training and skill in ambulatory and emergency paediatric medicine
- ED staff caring for paediatric patients should be trained in paediatric basic and immediate life support and have specific paediatric basic competencies in the recognition of serious illness, pain assessment and identification of vulnerable patients
- Staff working autonomously to assess and treat paediatric patients should be trained in the anatomical, physiological and psychological differences for children
- Staff should have access to and/or be trained in play therapy and distraction techniques to best manage paediatric interventions with the least distress to the patient and family
- Staff treating paediatric patients should have high level communication skills and the ability to educate families and patients regarding treatment decisions.

External support should include:

- A paediatric registrar or specialist external to the ED should be available for immediate consultation for acutely unwell children
- Other consulting specialists skilled in management of acutely unwell children, such as a Paediatrician, Paediatric Surgeons and Anaesthetists, should be available for consultation on a 24 hour basis
- Urgent help must be available for advanced airway management
- If onsite support is not available, the paediatric skills of ED staff should be developed.

6.5.4 Caring for the aged patient

It is recognised that as the population ages, demand on the ED by this patient group will continue to increase. Assessment of an older person can be difficult in ED due to vague histories and presenting symptoms. Aged patients can have a complex combination of medical, general health, and social problems that require additional resources and referral to community providers. Acute confusion and delirium can complicate the ability to take a history and can also be the main sign of a serious underlying condition[xliv]. EDs can present challenges in providing caring for this complex group of patients and hence consideration must be taken for their care in an ED.

Models of care are well established to assist with assessment and management of these patient groups and the coordinating care team/aged care services emergency team is described in more detail in Section 6.8. Alongside the existence of these models, with the exception of dedicated paediatric EDs, all Level three to Level six EDs should:

- Consider care of the older patient as part of the core business of ED
- Care for the older patient should include:
  - Established processes for discharge planning/transfer of care and referral
  - Established processes for communicating with care-givers and community providers
  - Established communication processes and support for Residential Aged Care Facilities, patients who are at risk of negative hospital outcomes and multiple presentations

  - Providing basic care to the aged patient in ED to prevent de-conditioning/functional decline and the incidence of adverse events while in ED. This includes processes to safely manage the confused aged and those with mobility problems.

Skills and knowledge include:

- An interdisciplinary team approach used to provide care, drawing on available resources for referral and assessment
- Clinical staff skilled in comprehensive geriatric assessment including:
  - Functional, psychosocial and cognitive status of patients
  - risk screening for other potential adverse outcomes ie falls, polypharmacy, delirium, pressure ulcers and nutrition status
  - attention to physiological condition and vital signs (considering this group is vulnerable to infection)
  - awareness of atypical presenting symptoms for some conditions
  - attention to the treatment and care of trauma in the aged.

6.5.5 Pharmacy considerations

Pharmacists have a role and skills that are unique to that profession. The role of the clinical pharmacist in an ED is growing and they are seen to add value to the ED setting in intervening early in medication reconciliation and management. Pharmacy plays a key role in the supply of medicines in ED to include imprest stock and specialty medicines required less frequently. Additionally the pharmacist can provide pharmaceutical advice regarding drug therapies and empiric antibiotic selection, acute pain management and drug policies in ED.

The skills and knowledge include:

- Understanding of the risks and issues around polypharmacy and ability to make recommendations for patients on multiple medications
- Knowledge and experience in conducting a thorough medication review
- Ability to recommend optimal drug regimens
- Ability to identify drug-related presentations to ED
- Ability to handover medication information to the in-patient team and community health professionals
- Ability to provide drug information to health professionals particularly related to ED presentations
- Ability to provide drug information to patients and carers.

6.6 Safety and quality of care considerations

A component of safe and quality ED practices is participation in quality and safety activities. To achieve this all Level three to six EDs in NSW should monitor clinical quality and patient safety continuously to allow the opportunity to investigate, review and identify potential improvement areas in relation to patient care. Safety and quality activities can include clinical chart and diagnostic results review, incident and adverse event monitoring, and the development and ongoing review of clinical practice pathways and guidelines, and presentation of cases at Grand Rounds and morbidity and mortality meetings. These activities are presented as examples for EDs to consider and require particular skills and knowledge.

Skills and knowledge include:

- Communication and interpersonal skills
- Computer literacy
- Working knowledge of the incident monitoring system to monitor and feedback incidents as they are reported
- Understanding of the incident monitoring system and principles that underpin its use in identifying improvement opportunities
- Extensive knowledge of sentinel event reporting and the RCA process to facilitate the process of review and feedback of sentinel events that may occur
- Data entry and reporting to facilitate:
  - collection and reporting of NSW Health KPIs as required
  - collection and reporting of other relevant KPIs as defined locally
  - incident monitoring reports
- Audit, analysis and review skills
- Extensive knowledge of operational policies and clinical practice protocols
- Experience in emergency medicine and presentations and comprehensive understanding of anatomy and pathophysiology to review pathology and imaging results.

6.7 Education and workforce development

Provision of education and developing the future workforce, medical, nursing and allied health, is a part of the core business of EDs. The ED provides an excellent training ground for clinical staff who are exposed to a wide selection of disease groups and presentations. To assist with development of guidelines in relation to education and workforce development, current College guidelines and criteria have been reviewed[xlv, xlvi, xlvii, xlviii, xlix].

For EDs to be classified as a training facility, certain criteria and accreditation guidelines from training bodies must be met. It should be noted that these criteria and accreditation requirements change periodically and should be referred to alongside the principles and guidelines presented here.

Clinical education and supervision is the responsibility of the multidisciplinary team involved in the delivery of health care within the ED. Education and supervision encompasses a range of functions: equipping staff for their role in the ED; orientation and transition programs; mandatory training; and continuing professional development.

EDs also provide clinical experience and education in management of the acutely unwell patient for trainees in formal medical specialty, pre-vocational or nursing programs. While teaching and supervision of university students is the primary responsibility of the education providers, this is complemented by a partnership with health services.

A number of requirements should be incorporated into staffing profiles and these are outlined below.

- Education delivery methods for staff in the ED can encompass formal lectures, bedside teaching and supervision, simulation training and e-learning or self-directed learning packages
- Clinical education of nursing and medical staff should be the responsibility of all involved in the delivery of health care within the ED and includes education delivered at the bedside and on a one to one basis

- Multidisciplinary clinical education should take place wherever possible to maximise use of resources and promote team functioning
- The provision of education and training to ED clinical staff should not compromise the safety and quality of the service and care delivered.

Education of trainees

- The ED has a role in providing training in management of the acutely unwell patient, especially in emergency conditions, for trainees in medical prevocational, medical specialty and nursing programs
- Training to interns and medical students should focus on building skills and knowledge to rapidly assess and treat undifferentiated patients, and make decisions in a time critical manner
- Interns and medical students should be provided skills development in problem based learning activities delivered through active participation in patient assessment and care.

Continuing professional development/education

- ED staff should have access to flexible education delivery such as on-line and self-directed learning packages to supplement education sessions, as their flexibility helps overcome challenges of competing workloads
- Education and further qualifications should be available to experienced staff responsible for supervising the less experienced staff
- Staffing should address the need to provide time for ED staff to attend ongoing professional development and the extension of advanced skills in ED care such as attendance at recognised ED and trauma courses
- EDs should support and provide opportunities for career progression programs for nursing staff to pursue advanced skills and roles
- Staffing to address study and conference leave and to relieve staff to attend mandatory education needs to be considered
- Clinical staff should have access to participate in and be trainers in a variety of nationally accredited courses relevant to ED and trauma care.

Supervision

Clinical supervision can be described as a formal process of professional support and learning which enables practitioners to develop knowledge and competence. It allows them to assume responsibility for their own practice and enhance consumer knowledge and competence, and enhance consumer protection and safety of care in complex clinical situations.

- Staffing should address the requirement for experienced staff to provide clinical supervision and support to novice staff in ED who have a varied skill and knowledge level
- Proportions of novice to expert clinician should be reviewed frequently with forward planning to a take into account the variation in skill mix between terms or years and in expecting an increase in graduates and interns and subsequent supervision requirements
- To support interns and medical students in the ED the roster profile should be structured to allow direct supervision on a case-by-case basis by a medical officer at least third post-graduate year

- EDs should provide clinical supervision, so that learning is meaningful, relevant and applicable to the clinical setting
- EDs should support newly qualified staff to transition into the clinical ED setting
- The nurse educator should play a key role in supporting the entry of nursing staff with little or no experience in emergency medicine.

Support staff:

- Support staff should be provided with appropriate education and training in relation to their role in ED and relevant policies and procedures that apply.
- Support staff should be provided with mandatory education and training relevant to their role in ED.
- Clerical, reception, administration and data management staff should be provided support and training in use of current ED ICT systems.

6.8 Models of care

Principles and guidelines have been developed for a variety of contemporary models of care appropriate to the ED setting. Models of care can be applied to each ED using the scenario framework to identify their scenario grouping, and subsequent ED profile, and to focus the ED on the way that patients are managed. The following principles can guide the facilities in implementation of site specific and appropriate models of care. All Level three to Level six EDs should:

- Implement models of care that address demand with the aim of streamlining the ED patient journey, early assessment and early initiation of care
- Use the scenario framework to identify local needs for the implementation of different models of care and the staff skill mix required to operate them safely and effectively
- Review their activity data to identify peak demand and should include data by triage category and patient age to support the need for model of care implementation and sustainability of that model
- Review activity data for seasonal variation to support the need for model of care implementation according to annual variation
- Provide alternative pathways for the less complex patient presentations and the sicker, higher acuity presentations so that the low complexity patients are not delayed by the need for clinicians to see the sickest patient first.

Specific principles and guidelines for individual models of care are provided in this section. The models of care addressed in this project are identified below:

1 Streaming

2 Fast Track

3 Short Stay Unit

4 Care coordination team/ASET

5 Rapid Assessment team

6 Psychiatric Liaison.

This list of models of care does not contain workforce models that are specific to a particular professional group, such as physiotherapist, pharmacist or emergency physician. This approach is

based on the assumption that clinical work in an ED can be divided into discrete skills, which may belong to a variety of professional groups. The models of care in the list above are designed to address well-established emergency patient needs, rather than specifying professional groups that may be useful in an ED. Examples of professional groups who may be best suited to delivering these models of care are given in the following section.

It is also recognised that the models of care presented have evolved from clinical practice as a result of clinical need and innovation in an ED to manage that need. As such, it is expected that models of care will be added and removed as new models emerge and others become redundant.

Models of Care skill mix guidelines

Table 50: Streaming Model of Care skill mix requirements

Streaming

Streaming involves separating patients into different value streams at triage based on complexity, clinical urgency or likely disposition decision; that is, the clinical needs of the patient. Streaming should include streaming to care pathways for most common presentations, for example to a chest pain pathway. Streaming has been shown to improve quality, safety and efficiency outcomes in EDs.

Patient Profile:

- All patients are included in a streaming model.
- Existing models commonly separate patients into two streams at triage based on:

Likelihood of discharge versus admission[xiv] (these decisions are only accurate for patients with injuries and febrile illnesses)[xv]

High complexity versus low complexity[xiii]

- In a mixed ED, a streaming model should separate patients into four streams at triage, as shown in the table below. In a paediatric or adult ED, the Paediatric Emergency stream would be merged together with the Emergency stream.

Stream	Urgency	Complexity	Expected Disposition	Ages	Separate zone	Associated models of care
Resuscitation	High	High	Admission	All	Yes	Trauma team, Psychiatric liaison
Emergency	High/Low	High	SSU or admission	Adult	No	RAT, CCT/ASE, SSU, Psychiatric liaison
	High	Low	SSU or discharge			RAT, SSU
Paediatric Emergency	High/Low	High	SSU or admission	Paed	Yes	RAT, CCT, SSU, Psychiatric liaison
	High	Low	SSU or discharge			RAT, SSU
Fast Track	Low	Low	Discharge	All	Yes	Fast Track

Principle:

- Patient flow can be managed more efficiently by streaming patients into like groups with clear care pathways.

Baseline Skill-Mix Requirements:

Professional groups of staff are not specified but must have the basic skills and knowledge listed below.

- Skill in assessing clinical urgency

Streaming
• Skill in assessing patient complexity • Skill in assessing likelihood of discharge after initial treatment • Ability to make prompt decisions regarding which stream patients are assigned to • Time management and organisational skills • Effective interpersonal skills and ability to work in a multidisciplinary team.
Staffing Options
• Experienced ED Medical staff • Experienced ED Registered Nurses • Registered Nurses with extended roles in ED
Additional Guidelines:
• Separate streams should have dedicated staff each shift • Streaming should only be implemented if there is an adequate supply of staff to provide each stream with acceptable nursing and medical coverage.
Scenarios:
• Streaming is appropriate for large EDs and well-staffed mid-sized EDs.

Table 51: Fast Track Model of Care skill mix requirements

Fast Track
Fast Track is an operational model of care used to streamline the care of low urgency/low complexity patients. The emphasis for this group of patients is early commencement of care by a clinical team. Fast Track operates with dedicated staff in a physically separate zone, which may consist of cubicles and/or procedure rooms. This model of care is designed to reduce waiting times and length of stay in ED for a defined group of patients, with potential benefits flowing on to the rest of ED. Providing that they do not deteriorate while waiting, patients streamed into the Fast Track zone are seen in the order in which they arrived, rather than by triage category[l, xiv,xiii]. Fast track can include 'procedural teams' assigned to manage simple wounds and musculoskeletal injuries and procedures.
Patient profile:
• Ambulatory patients with non-urgent, low complexity conditions that can be assessed and treated in a short period time, eg minor burns, minor wounds and musculoskeletal injuries, children with mild asthma or fever, minor ENT conditions
Principles:
• Patients should be assessed and cared for early in the patient journey by clinicians with the most suitable knowledge, skills and experience to independently manage and discharge patients. • Opening hours should match peak demand times of presentations suitable for Fast Track.
Baseline Skill-Mix Requirements[li]: Professional groups of staff are not specified, but a Fast Track must be staffed by individuals with the basic knowledge and skills listed below.
• Advanced clinical assessment skills. • Skills and recognised training to autonomously initiate and implement care for routine presentations. • Skills and recognised training to order and interpret diagnostic tests. • Skills and recognised training to prescribe medications. • Skills and recognised training to make disposition decisions. • Procedural skills including musculoskeletal procedures, plastering and wound management • Knowledge of and recognised training in relevant treatment protocols for management of patients who meet well-defined criteria. • Skills and recognised training to make direct referrals to other health professionals. • Communication and interpersonal skills for contact with patients, colleagues in ED, radiology and laboratory staff and community GPs. • Ability to identify potential adverse outcomes and implement proactive strategies to minimise risks. • Demonstrated ability to work independently. • Demonstrated time management and organisational skills. • Demonstrated effective interpersonal skills and ability to work in a multidisciplinary team. • Computer literacy. • Knowledge of available hospital and community services available.

Fast Track

Staffing Options:[lii, xvii]

Essential:[liii]

- At least one independent clinical decision maker, who may be an experienced medical officer (eg Emergency Medicine Specialist, Senior CMO, Senior Registrar or GP experienced in emergency medicine) or an experienced Nurse Practitioner. An independent clinical decision maker is able to make decisions about diagnosis, treatment plans and disposition without supervision from another clinician.

Optional:

- Physiotherapist practitioners in conjunction with independent medical or nursing staff
- Nurse practitioners operating according to clinical pathways and standing orders
- Experienced emergency RNs operating according to clinical pathways and standing orders.

Additional Guidelines:

- Dedicated staff resources are to be allocated to Fast Track[xvii].
- Fast Track patients should be discharged within two hours[xvii].
- Use the most experienced staff available, as seniority is essential to the functioning of the model[liv].
- Staff must be experienced in emergency management and have the ability to make independent clinical decisions.
- Fast Track services can be managed by nurses only, a doctor and a nurse, or can use doctors only in busy periods[liii].
- The professional groups responsible for managing and working in Fast Track can vary depending on contextual factors such as remoteness or activity.

Scenarios:

- Fast Track is suitable for sites with a moderate to large volume of low-complexity ATS 3-5.

Table 52: Short Stay Observation Unit Model of Care skill mix requirements

Short Stay Observation Unit (SSU)
SSUs provide rapid and frequent assessment and short-term therapy and observation for patients who are likely to be discharged home within 24 hours. They can be an effective means of improving patient flow through ED, limiting patient LOS in ED to 6 hours and avoiding admission to a ward for patients who require monitoring for a limited period of time. Further, SSUs can help avoid transfers to other hospitals in cases where a particular specialty ward is not available onsite within the hospital eg for paediatric short stay patients.
Patient Profile
• Patients who require short-term therapy and observation who are likely to be discharged home within 24 hours • Typical conditions include: asthma, cellulitis, chest pain, deep vein thrombosis (DVT), headache, pneumonia, self harm, pulmonary embolus, renal colic, minor head injury, anaphylaxis, pneumothorax
Principle:
• Admissions to inpatient wards should be avoided for patients who require observation and monitoring but are likely to be discharged within 24 hours.
Baseline Skill-Mix Requirements:
Professional groups of staff are not specified, but an SSU must be staffed by individuals with the basic skills and knowledge listed below[lv].
• Ability to make disposition decisions autonomously • Ability to develop and document care plans and discharge plans • Clinical skills in assessing and reviewing patients • Management skills in overseeing appropriate and timely use of resources • Communication and interpersonal skills for contact with patients, colleagues in ED, ward staff, radiology and laboratory staff and community GPs • Common sense in applying flexibility to protocols for patients not fitting one select group • Basic patient care skills • Patient observation and monitoring skills.
Staffing Options:
Essential: • Experienced emergency medicine Consultant with admitting rights AND • Experienced medical staff (eg Emergency Medicine Specialists, Senior CMOs, Senior Registrars, GPs with ED experience) AND • Registered nurses with ED experience AND • Access to the multidisciplinary ED team, including care coordination and allied health services eg, ASET, social work, physiotherapy and pharmacy. Optional: • ENs or EENs under supervision from experienced nursing staff • Junior medical officers under supervision from experienced medical staff.
Additional Guidelines:[lvi]
• An SSU should have an appropriate number of monitored beds to match demand • The unit should be located within or close to the ED • Management responsibility for the SSU should lie within the ED • Staff must be experienced in emergency management and have the ability to make independent

Short Stay Observation Unit (SSU)
clinical decisions • Regular medical review is required prior to admission and discharge • Where appropriate, links with hospital in the home (HITH) and other community services should be established so that suitable patients can receive appropriate care without occupying an inpatient bed • Medical staffing should be structured to facilitate frequent medical review of patients.
Scenarios:
• A paediatric SSU is suitable for centres that lack extended senior paediatric cover onsite in the hospital.

Table 53: Care Coordination Teams Model of Care skill mix requirements

Care Coordination Teams, eg ASET, Care Navigator
Implementation of CCTs has been associated with reduced admissions from ED, reduced numbers of re-presentations to ED[xliv] and high patient and staff satisfaction.
Patient Profile:
• Complex patients, including aged people, people living alone, frequent presenters to ED, those requiring assistance with activities of daily living, those not eligible for Hospital in the Home, those requiring complex discharge planning, the homeless, and those with drug and alcohol problems.
Principles:
• Patients should be assessed and cared for early in the patient journey by clinicians with the most suitable knowledge, skills and experience • Patients at risk of re-presentation should be identified early in the ED • For identified patients, steps should be taken to avoid admission to wards • For identified patients, steps should be taken to avoid re-presentations to ED • For identified patients, steps should be taken to improve awareness of and access to a range of community healthcare and social services • Known patients who present to ED should be managed more efficiently than unknown patients.
Baseline Skill-Mix Requirements:
Professional groups of staff are not specified, but a CCT must have the basic skills and knowledge listed below[lvii.]
• Ability to work as part of a multidisciplinary team for the coordinated care of a particular complex group of patients • Advanced skills in the comprehensive assessment of a particular complex group of patients, including skills in cognitive, functional, social and behavioural assessment • Knowledge of and recognised training in treatment protocols for management of patients who meet well-defined criteria • Skills and recognised training to develop, document, commence and co-ordinate specific management plans for a particular complex group • Knowledge of relevant community services and community care processes, including residential care services • Skills and recognised training to make direct referrals to other health professionals • Communication skills to build working relationships with other community service providers, including case managers, community nursing, ACAT and mental health services • Ability to lead and co-ordinate family/case conferences • Ability to prioritise, organise and manage own workload and that of the team in a busy environment • Ability to work independently without direct clinical supervision • Computer literacy.
Staffing Options: [liii]
• Composition may range from a single person to a multidisciplinary team • CCTs comprising three or more people should include an occupational therapist, a social worker and a registered nurse • Additional roles may be GP, physiotherapist, psychologist, dietician or drug and alcohol worker.
Additional Guidelines:
• Procedures for early identification of patients at risk of re-presentation to ED should be implemented

Care Coordination Teams, eg ASET, Care Navigator
and followed in all Level three to six EDs.
Scenarios:
• Care coordination teams have been introduced into most NSW and Victorian EDs, suggesting that they are suitable for metropolitan and rural EDs • ASET is appropriate for EDs with a high proportion of aged presentations • Care Navigator role is appropriate for EDs with a high re-presentation rate.

Table 54: Rapid Assessment Team Model of Care skill mix requirements

Rapid Assessment Team
Rapid Assessment Teams provide a fast comprehensive assessment and early initiation of tests and pain management for urgent patients[lviii, lix].
Patient Profile:
• Complex and/or emergent patients who are unsuitable for Fast Track and are likely to require diagnostic testing.
Principles:
• Patients should be assessed and cared for early in the patient journey by clinicians with the most suitable knowledge, skills and experience • All patients who present to ED should be assessed by an experienced clinician within benchmark time • Operating times should match peak patient presentation times.
Baseline Skill-Mix Requirements:
Professional groups of staff are not specified but must have the basic skills and knowledge listed below.
• Advanced clinical assessment skills, including focused history taking and examination, for rapid differential diagnosis • Ability to make prompt decisions regarding appropriate investigations, treatment and patient disposition • Skills and recognised training to order and interpret diagnostic tests • Skills and recognised training to prescribe medications • Skills and recognised training to initiate pain management • Skills and recognised training to make independent disposition decisions • Ability to develop and document a plan of care for ED nursing and medical staff • Knowledge of and recognised training in treatment protocols for management of patients who meet well-defined criteria • Skills and recognised training to make direct referrals to other health professionals • Demonstrated time management and organisational skills • Demonstrated effective interpersonal skills and ability to work in a multidisciplinary team. • Computer literacy.
Staffing Options: [liii]
Essential: • Experienced medical staff (eg Emergency Medicine Specialist, CMO, Senior Registrar, GP) OR Nurse Practitioner, OR Extended Practice Nurse operating according to standing orders. Optional • Support from junior medical staff (eg resident, registrar or intern).
Additional Guidelines[xxxii, xxxiii].
• The RAT can only run when there is an experienced medical officer working a clinical shift in the main area of the ED • The RAT clinician must be supernumerary • Prior to implementation, an education and information session should occur in the ED. This session should reassure nursing staff that the role of the RAT clinician in this model of care is not to triage a patient, the responsibility of the triage nurse, but rather to provide an early medical assessment

Rapid Assessment Team
• The RAT role should not be implemented if it could potentially decrease the role of senior staff to provide supervision, consultation and teaching.
Scenarios:
• Suitable for departments with patient flow and bed access challenges in the ED • The model may be of less benefit in large, well-designed departments with an adequate number of assessment spaces.

Table 55: Psychiatric Liaison Model of Care skill mix requirements

Psychiatric Liaison
Psychiatric liaison roles are needed to provide psychiatric assessment and care for patients identified as potentially having mental health problems. These roles are seen as beneficial by ED staff without expertise in assessing and treating mental health patients.
Patient Profile:
• Patients who have self harmed • Patients presenting with mental health problems • Patients presenting with physical complaints that may benefit from a psychiatric assessment.
Principles:
• Patients should be assessed and cared for early in the patient journey by clinicians with the most suitable knowledge, skills and experience.
Baseline Skill-Mix Requirements:
Professional groups of staff are not specified but psychiatric liaison personnel must have the basic skills and knowledge listed below[lx.]
• Skills and recognised training to undertake mental health assessments • Skills and recognised training to assess immediate risk to the patient and others • Skills and recognised training to provide brief treatment interventions • Communication and interpersonal skills to build relationships with community and hospital mental health services and to advise other health professionals on the care and treatment of patients • Knowledge of local community mental health resources to refer patients to appropriate services • Ability to work autonomously.
Staffing Options:
• Mental health nurse (CNS) • Psychiatric registrar or psychiatrist • Senior/clinical Psychologist
Additional Guidelines:
• All patients identified at triage as potentially having mental health problems should be offered psychosocial assessment in Level three to six EDs[xxxiv.] • Mental health professionals should be integrated into EDs to improve psychosocial assessment and provide training for non-mental health professionals working in the ED • Psychiatric liaison personnel should be employed in a supernumerary capacity[lxi] • Psychiatric liaison personnel should be available on weekends and after hours • Mental health services should respond to ED consultation requests with equal clinical priority to other emergency requests[lxii] • Clinical priority to other emergency requests. • Where possible, designated mental health staff should be rostered to provide consultation to EDs, in order to foster a team working relationship– NSW Health 1998 Guidelines.

Psychiatric Liaison
Scenarios:
• Given the demonstrated benefits of psychiatric liaison for emergency patients, all Level 3 to 6 EDs should provide patients with access to psychiatric assessment.

7 Testing the principles and Guidelines

7.1 Aim of the Testing Phase

This section describes the approach to developing a Workforce Analysis Tool, and testing it alongside the principles and guidelines as part of the NSW Health ED Workforce Research Project. The aims of this phase were to:

- Provide input to the development of a user guide, known as the 'workforce analysis tool', (the tool) that can be used in an individual ED to plan and implement an appropriately skilled ED workforce - the tool will be a companion document to this report
- Test the tool and its effectiveness for use in an individual ED
- Test the principles and guidelines, alongside the tool, for appropriateness and identify any areas for refinement or addition
- Develop case studies based on the testing identified above for four participating EDs
- Revise principles and guidelines, based on lessons learned from the case studies.

7.2 Approach to testing

PwC and the NSW Department of Health worked collaboratively to develop the tool and plan for testing. The purpose of the tool is to provide a consistent approach to analysis of an EDs current workforce and facilitate the application of the principles and guidelines to reviewing staffing decisions. The tool has been designed as a companion document to this report.

The tool has the following key features:

- Structured sections that allow an ED to work through the principles and guidelines logically and sequentially
- Key questions and a summary table for each section to include action areas
- An overview sheet that allows an ED to summarise all key findings and action areas in the tool - it is intended that this overview sheet will form the basis of future ED skill mix decisions.

Detail of the tool, and its application in the case studies, is provided in Section 8.

7.2.1 Testing the tool and principles and guidelines

Testing of the tool and principles and guidelines was undertaken in four NSW EDs, selected in consultation and agreement with the EDWRG. The ED selection was based on representation from each model of care profile A-E, spread across rural and metropolitan locations and size of ED. The ED selection was also based on maintaining a spread across NSW ED role delineations and Area Health Service. The selected EDs included two metropolitan EDs, Levels four and six, and two rural facilities, Levels four and five.

The tool was developed as a paper based guide that instructs the user in how to apply the principles and guidelines in their ED. In each ED a three-hour workshop was convened with key stakeholders from the ED and other parts of the facility. The workshop design allowed ED stakeholders to work through the tool together to analyse the current ED skill mix, areas of variance and any relevant action areas. This multidisciplinary approach allowed a broader perspective to be applied to the analysis and to the identification of potential action areas

An important component of the tool is the summary section that allows each ED to nominate actions areas to manage identified variation. This ‘action area’ approach is designed to enable the ED stakeholder to think differently about solutions to manage variation to the skill mix guidelines and to inform the decision making process.

Factors to facilitate completion of the tool include stakeholder familiarity with the tool and level of discussion around action areas. To assist with completion in the allotted timeframe, information should be provided to ED stakeholders prior to workshops; and selected sections of the tool completed prior to convening the workshop. This workshop approach demonstrates the ideal circumstances for application of the tool and principles and guidelines and is the one recommended for future implementation of the tool and principles and guidelines.

7.2.2 Evaluation and feedback

An evaluation was completed by participating EDs with the exception of the pilot site. The evaluation was designed to identify the usability and relevance of principles and guidelines alongside the usability of the ED-WAT. A 14 item evaluation survey was created for respondents to rate the tool and the principles and guidelines.

Overall responses to the evaluation were positive with most respondents agreeing to the applicability and ease of use and understanding of the tool and principles and guidelines. The stakeholder group selected for participation in each workshop was considered appropriate and allowed a whole of hospital approach to identifying action areas. Comments were that the workshop allowed a team approach to trouble shooting skill mix issues. The process also allowed forward planning for an ED, identifying and reflecting on strengths and weaknesses of the existing workforce models and approaches to improvement. The ED stakeholder groups were able to identify multiple actions within a single section of the tool and further these actions could be prioritised based on what could be done in the near future.

Evaluations revealed that the skill mix groups in the principles and guidelines were relevant and covered the required ED skill mix. The principles and guidelines provided a consistent approach to the skill mix profile in EDs and provided evidence for building a business case for staffing. Models of care recommended were appropriately allocated to the ED scenario placement and allowed sites to reconsider models of care not in place, or those in place that could be improved.

In summary, through the testing and refinement of the tool, its usability was validated for use in individual EDs in the future. It is considered an effective tool for applying the principles and guidelines and analysing skill mix requirements.

The case studies for each site visit, and the way they were obtained, in essence, provide a *'How To…'* guide for the systematic consideration of EDs: the patients needs that need to be met, the context in which the ED operates and the most appropriate skill mix for safe and high quality care. The case studies and their lessons are presented in Section 8.

7.2.3 Refinement to Principles and Guidelines

The process of testing the principles and guidelines using the tool did not identify additional data requirements or principles and guidelines. The process of testing did however identify the need for some refinement and also areas that required further consideration. Four refinements were undertaken:

Reorganisation of principles and guidelines: The principles and guidelines were reorganised and grouped into specific categories. Wording was amended as necessary to improve clarity and to further categorise specific skill mix groups.

External ED obligations: To reflect the range and impact of external ED obligations in the rural EDs a more extensive selection of items were included in the tool. This allows the ED to assess and consider these obligations and their impact when making skill mix decisions. EDs can also refer to State-wide and local ED admitting policies and procedures to manage admissions processes and workload challenges.

Education and supervision requirements: These are multidisciplinary and apply to all skill mix groups in ED. The ability to provide clinical supervision was identified as a key function in ED and the principles and guidelines were therefore refined to raise the profile of supervision in ED for clinical and non-clinical staff. Similarly the skill mix requirements for education were enhanced to better reflect the educational requirements across all professional groups. The principles and guidelines were further developed and restructured to highlight the specific areas in each, such as formal training requirements, continuing professional development and supervision needs. Additionally, in recognition of both formal and informal delivery of education, this balanced approach to providing education was also included in the guidelines.

The trauma response: In recognition of the need for EDs to plan for a trauma response and to align this response to the recently released state-wide trauma plan, the trauma guidelines were reorganised to better reflect the plan.

Hence the principles and guidelines presented in this report were effectively tested for relevance and applicability to an individual ED using the purpose built tool. With recommended refinements made, the principles and guidelines can now be used more widely across NSW EDs as a basis for decision-making around ED skill mix requirements.

8 Analysing the characteristics of EDs and using the principles and guidelines: a practical application

To effectively test the application of the principles and guidelines to an individual ED a workforce analysis tool (the tool) was developed in collaboration with NSW Health and tested in a number of different EDs (Level four to Level six). This also served to test the appropriateness of the principles and guidelines.

At each site, the tool was applied through a jointly facilitated workshop (PwC and NSW Health) with key stakeholders from the selected EDs. Stakeholders (for example the ED Director, ED Nurse Manager, Director of Workforce Development) were stepped through each section to facilitate completion of the tool and a summary overview sheet.

In this section, the approach to understanding an EDs characteristics and the implications for the skill mix required are described in practical terms. Three case studies are also reported in this section.

8.1 Understanding the characteristics of the ED

The essential starting point for ED workforce analysis in the present approach is understanding the characteristics of the ED. The characteristics of an ED can influence the skill mix required especially in relation to Model of Care requirements. When examining the skill mix requirements of an ED (and completing the workforce analysis tool) an ED needs to examine the following components:

- Mapping to the scenario framework of core characteristics of EDs
- Formal training status and education obligations
- Trauma status
- Specific rural considerations
- ED physical design
- Other external ED obligations.

8.2 Using the scenario framework and ED Data

Recognising that there is not a “one size fits all” formula for staffing EDs, a scenario framework was developed to assist NSW EDs to build appropriate staffing profiles. Individual ED data provided by NSW Health was used to map NSW Level three to Level six EDs to a particular scenario (eighteen scenarios in total).

The principles and guidelines for determining skill mix and staffing EDs are based on the eighteen ED scenarios. A ‘how to” guide for mapping EDs to scenarios was therefore developed, providing step-by-step instructions for identifying which scenario an ED belongs to. This guide takes NSW Health and/or AHS through the mapping process. This includes using the NSW ED data to:

- Identify ASGC-RA status
- Identify activity category
- Identify complexity category
- Map EDs to the eighteen scenarios.

8.3 "How to guide" for mapping EDs to scenarios

Step-by-step instructions for identifying which scenario an ED belongs to, are described below.

Step 1. Identify ASGC-RA status.

Remoteness was determined using the Australian Standard Geographical Classification – Remoteness Areas (ASGC-RA) classification system, which divides NSW into major cities (RA1), inner regional (RA2), outer regional (RA3), remote (RA4) and very remote (RA5). The ASGC-RA was implemented in July, 2009 by the ABS as a statistical geography structure which allows quantitative comparisons between 'city' and 'country' Australia.

According to this classification system 35 EDs are currently classified as ASGC-RA1 (Metro) and 29 EDs are classified as ASGC-RA2 or ASGC-RA3 (Rural). In the future, these classifications will need to be updated as the ASGC-RA is updated by the ABS.

The table below shows the current ASGC-RA status of the 64 Level 3 to 6 NSW EDs for which a complete data set is available.

Table 56: Current ASCG-RA status of Level 3 to 6 EDs in NSW

Metropolitan	Metropolitan	Rural	Rural
Auburn	Mount Druitt	Albury Base	Kempsey
Bankstown/Lidcombe	Penrith-Nepean	Armidale & New England	Lismore
Belmont	Prince Of Wales	Bathurst	Lithgow
Blacktown	Royal North Shore	Bowral	Manning
Calvary Mater Newcastle	Royal Prince Alfred	Blue Mountains	Moree
Camden	Ryde	Broken Hill	Murwillumbah
Campbelltown	Shellharbour	Cessnock	Muswellbrook District
Canterbury	St. George	Coffs Harbour	Narrabri
Children's Hosp Westmead	St. Vincent's	Dubbo	Orange
Concord	Sutherland	Goulburn	Port Macquarie
Fairfield	Sydney	Grafton Base	Shoalhaven
Gosford	Sydney Children's	Griffith Base	Singleton
Hornsby/Ku-ring-gai	Sydney Eye	Gunnedah	Tamworth
John Hunter	Tweed Heads	Hawkesbury	Wagga Wagga
Liverpool	Westmead	Inverell	
Maitland	Wollongong		
Manly	Wyong		
Mona Vale			

Step 2. Identify activity category

NSW Health data should be revisited every year to reclassify EDs into activity categories. The table below shows how annual activity currently divides into low, moderate and high groupings.

Low activity	< 25,000 presentations in the last financial year
Moderate activity	25,000 to 50,000 presentations in the last financial year
High activity	>50,000 presentations in the last financial year

The table below shows current groupings of EDs based on 2008-09 financial year data.

Table 57 Current activity groupings of Level 3 to 6 EDs in NSW

Low activity		Moderate activity		High activity	
Narrabri	6,008	Calvary Mater Newcastle	25,368	Children's Hosp (Westmead)	50,046
Muswellbrook District	7,341	Auburn	25,763	Wollongong	50,211
Gunnedah	8,412	Dubbo	26,402	Gosford	50,706
Inverell	8,643	Orange	27,079	Royal North Shore	50,944
Moree	9,728	Lismore	28,708	Wyong	51,168
Camden	10,947	Mount Druitt	29,934	Penrith-Nepean	51,312
Singleton	12,012	Concord	30,632	Westmead	55,607
Lithgow	14,430	Hornsby/Ku-ring-gai	30,806	St. George	56,708
Armidale & New England	14,658	Port Macquarie	30,870	Liverpool	60,444
Murwillumbah	15,563	Shoalhaven	31,156	RPA	60,636
Blue Mountains	16,065	Albury Base	31,606	John Hunter	61,569
Goulburn	17,607	Fairfield	31,932		
Sydney	18,202	Canterbury	32,442		
Sydney Eye	18,309	Wagga Wagga	32,734		
Broken Hill	18,350	Coffs Harbour	34,371		
Bowral	18,381	Blacktown	35,220		
Cessnock	18,651	Sydney Children's	36,119		
Kempsey	18,676	Sutherland	36,690		
Hawkesbury	18,735	Maitland	39,565		
Griffith Base	20,055	St. Vincent's	41,380		
Manly	20,444	Tweed Heads	41,447		
Ryde	22,160	Bankstown/Lidcombe	42,826		
Belmont	22,287	Tamworth	43,141		
Bathurst	22,327	Prince Of Wales	43,712		
Manning	22,429	Campbelltown	48,853		
Mona Vale	24,168				
Shellharbour	24,281				
Grafton Base	24,728				

Step 3. Identify complexity category

"Complexity" as a measurable construct, was used in this study to represent a relative level of complexity in the population of patients presenting to an ED, based on historical data. It can be calculated from the following indicators: Aged, Urgency, Mode of Arrival and Admission Rate. These indicators are defined in the table below.

Table 58 Definitions of indicator variables

Variable	Definition
Aged	Proportion of patients presenting to the ED that are: 70 years and over 55 years and over for indigenous patients
Urgency	Proportion of patients presenting to the ED who are triaged as category 1, 2 or 3.
Mode of arrival‡	Proportion of patients arriving to the ED by ambulance, including: State ambulance service (01) Helicopter rescue service (04) Air ambulance service (05) Internal ambulance (06)
Admission rate‡	Proportion of patients who are admitted to the hospital from the ED, including: Admitted to ward/inpatient unit not a critical care ward (01) Admitted and discharged as inpatient within ED (02) Admitted: to critical care ward (10) Admitted: via operating theatre (11) Admitted: transferred to another hospital (12)

‡ Definitions based on NSW Health Emergency Department Data Dictionary Version 4.0

Step 3a. Identify complexity indicator scores

Scores on each of the above indicators are then calculated, using NSW Health data. The table below shows scores on the most recent data available at the time of printing, based on 2008-09 data from NSW Health.

Table 59 Current results on indicator variables for Level 3 to 6 EDs in NSW

Hospital	Admission Rate (%)	Urgency (% ATS 1-3)	Mode of arrival (% ambulance)	Aged (% 70+ or 55+ for ATSI)
Albury Base	20.54%	29.39%	22.25%	13.98%
Armidale and New England	18.32%	17.45%	13.92%	11.72%
Auburn	30.06%	36.75%	18.44%	13.77%
Bankstown/Lidcombe	31.61%	52.20%	35.30%	21.74%
Bathurst	19.06%	26.71%	13.78%	10.77%
Belmont	14.88%	25.69%	28.29%	24.74%
Blacktown	22.63%	27.18%	30.90%	17.48%
Blue Mountains	15.66%	34.57%	15.76%	14.45%
Bowral	26.87%	47.66%	18.55%	19.39%
Broken Hill	18.12%	12.03%	15.44%	16.25%
Calvary Mater Newcastle	29.44%	34.06%	39.61%	23.42%
Camden	7.86%	33.21%	0.58%	7.07%
Campbelltown	26.66%	53.11%	26.81%	12.91%
Canterbury	25.49%	34.99%	26.87%	17.34%
Cessnock	9.32%	27.86%	9.43%	11.32%
Children's Hosp (Westmead)	21.75%	28.25%	9.32%	0.00%
Coffs Harbour	30.55%	45.00%	23.12%	15.45%
Concord	36.13%	38.15%	31.40%	30.50%
Dubbo	29.60%	38.10%	25.08%	14.99%
Fairfield	21.79%	39.88%	22.25%	15.72%
Gosford	30.25%	36.02%	34.84%	22.35%
Goulburn	19.22%	31.79%	15.05%	14.23%
Grafton Base	18.87%	47.06%	12.91%	14.32%
Griffith Base	23.12%	39.00%	12.88%	11.83%
Gunnedah	10.27%	11.09%	7.24%	13.67%
Hawkesbury	24.42%	67.72%	20.28%	14.81%
Hornsby/Ku-ring-gai	25.09%	30.41%	21.98%	20.40%
Inverell	13.62%	17.66%	16.15%	12.45%
John Hunter	30.75%	38.38%	31.25%	15.97%
Kempsey	30.45%	43.63%	17.64%	14.53%
Lismore	32.33%	45.40%	26.15%	15.00%
Lithgow	14.37%	31.87%	13.69%	13.87%
Liverpool	34.00%	65.26%	36.09%	16.45%
Maitland	17.38%	31.25%	20.91%	12.09%
Manly	36.84%	50.71%	23.23%	21.98%
Manning	29.90%	39.14%	26.45%	20.19%

Table 59 Current results on indicator variables for Level 3 to 6 EDs in NSW (continued)

Hospital	Admission Rate (%)	Urgency (% ATS 1-3)	Mode of arrival (% ambulance)	Aged (% 70+ or 55+ for ATSI)
Mona Vale	25.86%	41.63%	23.45%	23.20%
Moree	10.79%	13.12%	7.50%	12.16%
Mount Druitt	16.37%	33.84%	25.71%	9.24%
Murwillumbah	19.03%	28.02%	9.12%	12.41%
Muswellbrook District	13.02%	20.45%	12.67%	8.32%
Narrabri	13.65%	11.75%	6.92%	11.32%
Orange	25.34%	25.71%	19.32%	13.82%
Penrith-Nepean	45.03%	52.09%	29.93%	14.11%
Port Macquarie	27.25%	46.16%	24.66%	21.13%
Prince Of Wales	38.47%	48.81%	31.45%	21.98%
Royal North Shore	37.10%	50.67%	28.26%	19.26%
Royal Prince Alfred	31.07%	46.52%	33.71%	16.21%
Ryde	26.54%	39.33%	27.10%	25.33%
Shellharbour	35.55%	29.00%	24.09%	18.38%
Shoalhaven	28.90%	25.82%	26.70%	18.30%
Singleton	9.92%	19.57%	9.29%	8.06%
St. George	35.90%	49.79%	31.80%	23.20%
St. Vincent's	41.76%	59.09%	36.87%	16.51%
Sutherland	29.05%	52.16%	30.03%	22.09%
Sydney	14.47%	20.73%	20.40%	6.25%
Sydney Children's	19.85%	22.39%	7.42%	0.01%
Sydney Eye	4.06%	1.40%	0.33%	15.84%
Tamworth	15.08%	30.42%	12.05%	11.82%
Tweed Heads	34.90%	42.91%	20.81%	18.31%
Wagga Wagga	38.81%	44.55%	24.31%	14.90%
Westmead	50.58%	48.89%	36.15%	20.27%
Wollongong	36.27%	37.53%	34.26%	19.98%
Wyong	21.82%	34.95%	28.31%	20.16%
State-wide Average	**24.90%**	**35.72%**	**21.66%**	**15.78%**

Step 3b. Standardise scores on indicator variables

Once scores have been calculated on the indicator variables, the next step is to standardise the scores so that they are re-scaled into the same metric. Standardising scores ensures that all variables contribute similarly and makes it easier to interpret the results of the analysis.

Standard scores or 'Z-scores' can be obtained for individual sites on each indicator variable using this formula:

$$Z = \frac{X - \mu}{\sigma}$$

where X = the raw score, μ = the population mean and σ = the population standard deviation (SD).

Worked Example: **Wyong ED standardised admission rate**

To calculate the Z-score on the variable Admission Rate for Wyong ED, first obtain values for the unknown variables X, μ and σ.

X (the raw score on the Admission Rate variable for Wyong ED) = 21.82%; μ (the state-wide mean on the Admission Rate variable) = 24.90%; σ (the state-wide SD on the Admission Rate variable) = 9.4%

Using the formula:

Z-score(Admission) = (21.82 – 24.9)/9.4

= -0.31

Alternatively, Z-scores may be automatically calculated using the SPSS program PASW Statistics 18. Instructions on obtaining Z-scores in SPSS are provided at Step 3d.

The Table 60 shows current standard scores on the indicator variables based on 2008-09 data from NSW Health. For the purposes of this report, calculations based on these data are referred to as 'current'.

Table 60: Current Z-scores on indicator variables for Level 3 to 6 EDs in NSW

Hospital	Admission Rate Z score	Urgency Z score	Mode of arrival Z score	Aged Z score
Albury Base	-0.45	-0.47	0.06	-0.32
Armidale and New England	-0.67	-1.36	-0.82	-0.73
Auburn	0.53	0.08	-0.34	-0.36
Bankstown/Lidcombe	0.69	1.23	1.44	1.07
Bathurst	-0.60	-0.67	-0.83	-0.90
Belmont	-1.02	-0.75	0.70	1.61
Blacktown	-0.23	-0.64	0.98	0.31
Blue Mountains	-0.94	-0.09	-0.62	-0.24
Bowral	0.20	0.89	-0.33	0.65
Broken Hill	-0.69	-1.76	-0.66	0.09
Calvary Mater Newcastle	0.46	-0.12	1.90	1.37
Camden	-1.74	-0.19	-2.23	-1.56
Campbelltown	0.18	1.30	0.54	-0.51

Table 60: Current Z-scores on indicator variables for Level 3 to 6 EDs in NSW (continued)

Hospital	Admission Rate Z score	Urgency Z score	Mode of arrival Z score	Aged Z score
Canterbury	0.06	-0.05	0.55	0.28
Cessnock	-1.59	-0.59	-1.29	-0.80
Children's Hosp (Westmead)	-0.32	-0.56	-1.31	-2.83
Coffs Harbour	0.58	0.69	0.15	-0.06
Concord	1.15	0.18	1.03	2.64
Dubbo	0.48	0.18	0.36	-0.14
Fairfield	-0.32	0.31	0.06	-0.01
Gosford	0.55	0.02	1.39	1.18
Goulburn	-0.58	-0.29	-0.70	-0.28
Grafton Base	-0.62	0.85	-0.93	-0.26
Griffith Base	-0.18	0.24	-0.93	-0.71
Gunnedah	-1.49	-1.83	-1.53	-0.38
Hawkesbury	-0.05	2.38	-0.15	-0.17
Hornsby/Ku-ring-gai	0.02	-0.40	0.03	0.83
Inverell	-1.15	-1.35	-0.58	-0.60
John Hunter	0.60	0.20	1.01	0.03
Kempsey	0.57	0.59	-0.43	-0.22
Lismore	0.76	0.72	0.47	-0.14
Lithgow	-1.08	-0.29	-0.84	-0.34
Liverpool	0.93	2.20	1.53	0.12
Maitland	-0.77	-0.33	-0.08	-0.66
Manly	1.22	1.12	0.17	1.11
Manning	0.51	0.26	0.51	0.79
Mona Vale	0.10	0.44	0.19	1.33
Moree	-1.44	-1.68	-1.50	-0.65
Mount Druitt	-0.87	-0.14	0.43	-1.17
Murwillumbah	-0.60	-0.57	-1.33	-0.60
Muswellbrook District	-1.21	-1.14	-0.95	-1.34
Narrabri	-1.15	-1.79	-1.56	-0.80
Orange	0.05	-0.75	-0.25	-0.35
Penrith-Nepean	2.06	1.22	0.87	-0.30
Port Macquarie	0.24	0.78	0.32	0.96
Prince Of Wales	1.39	0.98	1.04	1.11
Royal North Shore	1.25	1.11	0.70	0.62

Table 60: Current Z-scores on indicator variables for Level 3 to 6 EDs in NSW (continued)

Hospital	Admission Rate Z score	Urgency Z score	Mode of arrival Z score	Aged Z score
Royal Prince Alfred	0.63	0.81	1.27	0.08
Ryde	0.17	0.27	0.57	1.72
Shellharbour	1.09	-0.50	0.26	0.47
Shoalhaven	0.41	-0.74	0.53	0.45
Singleton	-1.53	-1.20	-1.31	-1.39
St. George	1.12	1.05	1.07	1.33
St. Vincent's	1.72	1.74	1.61	0.13
Sutherland	0.42	1.23	0.88	1.13
Sydney	-1.07	-1.12	-0.13	-1.71
Sydney Children's	-0.52	-0.99	-1.51	-2.83
Sydney Eye	-2.13	-2.56	-2.26	0.01
Tamworth	-1.00	-0.39	-1.02	-0.71
Tweed Heads	1.02	0.54	-0.09	0.45
Wagga Wagga	1.42	0.66	0.28	-0.16
Westmead	2.62	0.98	1.53	0.81
Wollongong	1.16	0.13	1.33	0.75
Wyong	-0.31	-0.06	0.70	0.79

Step 3c. Calculate complexity score

Standardised indicator scores are used to calculate complexity scores using the following formula:

Complexity score = 0.388 x Z-score (Admission) + 0.375 x Z-score (Urgency) + 0.291 x Z-score (Mode of arrival) + 0.108 x Z-score (Aged)

Worked Example: **Wyong ED complexity score**

Using the formula:
Complexity score for Wyong ED = 0.388 x (-0.31) + 0.375 x (-0.06) + 0.291 x (0.70) + 0.108 x (0.79)

= 0.146

The table below identifies whether scores fall into low, moderate or high complexity groupings. The categorisation was derived from the Principal Components Analysis, using FY 2008/09 data from NSW Health. The formula represents the co-efficients (weightings) obtained in the analysis. Further detail on the derivation of the formula is provided below (section 3d).

Low complexity	**Complexity score < -0.551**
Moderate complexity	**Complexity score between -0.551 to 0.551**
High complexity	**Complexity score > 0.551**

Table 61 shows complexity scores and groupings for NSW Level 3 to 6 EDs, based on 2008- 2009 data.

Table 61 Current complexity scores and groupings for NSW Level 3 to 6 EDs

High Complexity		Moderate Complexity		Low Complexity	
Hospital	**Complexity Score**	**Hospital**	**Complexity Score**	**Hospital**	**Complexity Score**
Westmead	1.92	Manning	0.53	Goulburn	-0.57
St. Vincent's	1.80	Coffs Harbour	0.52	Blue Mountains	-0.61
Liverpool	1.64	Ryde	0.52	Lithgow	-0.81
Penrith-Nepean	1.48	Mona Vale	0.40	Bathurst	-0.82
Prince Of Wales	1.33	Bowral	0.39	Murwillumbah	-0.90
St. George	1.28	Shellharbour	0.36	Tamworth	-0.91
Bankstown/Lidcombe	1.26	Dubbo	0.34	Children's Hosp (Westmead)	-1.02
Royal North Shore	1.17	Kempsey	0.29	Sydney	-1.06
Concord	1.10	Canterbury	0.19	Armidale and New England	-1.09
Manly	1.06	Wyong	0.15	Broken Hill	-1.11
Sutherland	1.00	Auburn	0.10	Inverell	-1.19
Wollongong	0.97	Shoalhaven	0.09	Cessnock	-1.30
Royal Prince Alfred	0.93	Fairfield	0.01	Sydney Children's	-1.32
Wagga Wagga	0.86	Blacktown	-0.01	Muswellbrook District	-1.32
Calvary Mater Newcastle	0.83	Hornsby/Ku-ring-gai	-0.04	Camden	-1.56
Hawkesbury	0.81	Grafton Base	-0.22	Singleton	-1.58
Gosford	0.75	Belmont	-0.30	Narrabri	-1.66
Lismore	0.69	Griffith Base	-0.33	Moree	-1.70
Campbelltown	0.66	Albury Base	-0.37	Gunnedah	-1.75
Tweed Heads	0.62	Orange	-0.37	Sydney Eye	-2.44
John Hunter	0.60	Mount Druitt	-0.39		
Port Macquarie	0.58	Maitland	-0.52		

Step 3d. Update Complexity Score using Principal Component Analysis

The formula for calculating complexity scores was derived using FY 2008/09 data from NSW Health. This formula will need to be updated from time to time to reflect current indicator scores. Updating the complexity formula requires the four indicator variables described above as well as two others: Paediatrics and Injury. The variables included in the Principal Component Analysis are shown in the table below.

Table 62: Variables included in the Principal Component Analysis

Variable	Definition
Aged	Proportion of patients presenting to the ED that are: • 70 years and over • 55 years and over for indigenous patients
Paediatrics	Proportion of paediatric patients presenting to the ED • 16 years and under
Urgency‡	Proportion of patients presenting to the ED who are triaged as category 1, 2 or 3.
Ambulance‡	Proportion of patients arriving to the ED by ambulance, including: • State ambulance service (01) • Helicopter rescue service (04) • Air ambulance service (05) • Internal ambulance (06)
Admission ‡	Proportion of patients who are admitted to the hospital from the ED, including: • Admitted to ward/inpatient unit not a critical care ward (01) • Admitted and discharged as inpatient within ED (02)
Injury	Proportion of patients in the ED who are coded using ICD-9 and ICD-10 codes as an injury.

‡ Definitions based on NSW Health Emergency Department Data Dictionary Version 4.0

In this research study, the Principal Component Analysis was conducted using the statistical software program PASW Statistics 18 (formerly SPSS Statistics). A number of statistical software packages can be used to conduct the necessary statistical analyses for updating the scenario framework and calculating individual scores for scenario profiles. These programs include, but are not limited to, XLSTAT, SAS System and NCSS.

8.4 NSW ED Profiles mapped to Scenarios

The schematic below shows the mapping of NSW EDs (Levels 3 to 6) to Scenarios, based on 2008 – 2009 data.

	1	2	3	4	5	6	7	8	9
Remoteness Activity Complexity	Metro Low Low	Metro Low Med	Metro Low High	Metro Mod Low	Metro Mod Med	Metro Mod High	Metro High Low	Metro High Med	Metro High High
	• Camden • Sydney • Sydney Eye	• Belmont • Mona Vale • Ryde • Shellharbour	• Manly	• Sydney Children's	• Auburn • Blacktown • Canterbury • Fairfield • Hornsby/Ku-ring-gai • Maitland • Mount Druitt	• Bankstown/Lidcombe • Calvary Mater Newcastle • Campbelltown • Concord • Prince of Wales • St. Vincent's • Sutherland • Tweed Heads	• Westmead Children's	• Wyong	• Gosford • John Hunter • Liverpool • Penrith-Nepean • Royal North Shore • Royal Prince Alfred • St. George • Westmead • Wollongong
	10	11	12	13	14	15	16	17	18
Remoteness Activity Complexity	Rural Low Low	Rural Low Med	Rural Low High	Rural Mod Low	Rural Mod Med	Rural Mod High	Rural High Low	Rural High Mod	Rural High High
	• Armidale and New England • Bathurst • Blue Mountains • Broken Hill • Cessnock • Goulburn • Gunnedah • Inverell • Lithgow • Moree • Murwillumbah • Muswellbrook District • Narrabri • Singleton	• Bowral • Grafton Base • Kempsey • Manning • Griffith Base	• Hawkesbury	• Tamworth	• Albury Base • Coffs Harbour • Dubbo • Orange • Shoalhaven	• Lismore • Port Macquarie • Wagga Wagga	• No EDs currently fit this profile	• No EDs currently fit this profile	• No EDs currently fit this profile

8.5 Consolidated Case Studies

Three case studies, including both analysis of historical data and a site visit, were undertaken. Each case study report describes the process of working through the following steps:

1 Mapping the ED to one of eighteen scenarios

2 Analysing baseline skill mix requirements

3 Identifying a models-of-care profile for the ED

4 Education and supervision requirements

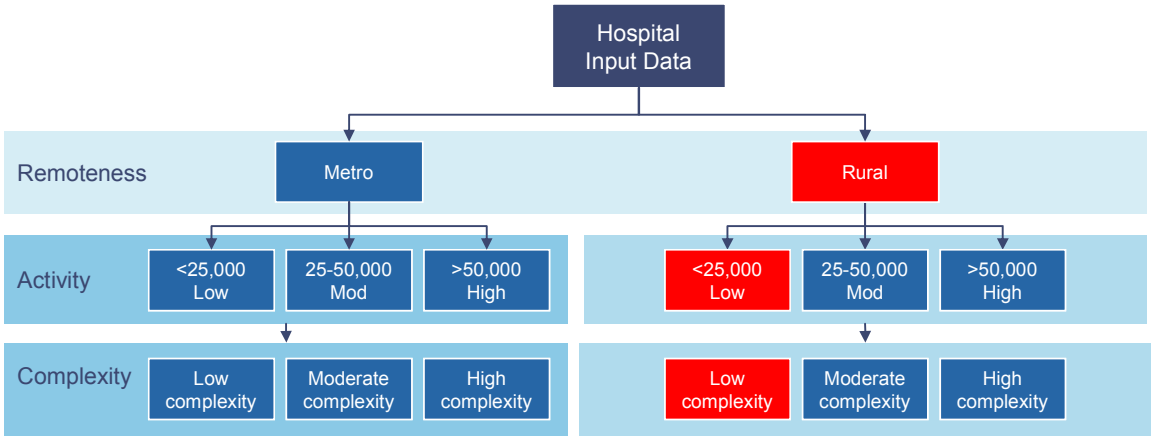
5 Workshop Outcomes

8.5.2 Case study: Model of Care Profile A

A rural Level 4 (four) ED was selected as a site for testing of the principles and guidelines as a representative of Model of Care Profile A. This case study takes the reader through the mapping process and summarises the outcomes from the analysis

Step 1. Map the ED to a scenario

Figure 21 Steps 1.1 to 1.3 for Level 4 ED



Map the Level 4 ED to a scenario

Summarising the steps above, the ED has the following characteristics:

Rural
Low activity
Low complexity

From the figure below, we can see that this ED maps to **scenario 10**.

Figure 22: Eighteen evidence-based scenarios

	1	2	3	4	5	6	7	8	9
Remoteness	Metro	Metro	Metro	Metro	Metro	Metro	Metro	Metro	Metro
Activity	Low	Low	Low	Med	Med	Med	High	High	High
Complexity	Low	Mod	High	Low	Mod	High	Low	Mod	High
	10	11	12	13	14	15	16	17	18
Remoteness	Rural	Rural	Rural	Rural	Rural	Rural	Rural	Rural	Rural
Activity	Low	Low	Low	Med	Med	Med	High	High	High
Complexity	Low	Mod	High	Low	Mod	High	Low	Mod	High

Formal training status

This ED is not currently accredited to provide either Emergency Physician training, or pre-vocational training.

Rural settings guidelines

The rural setting guidelines are not applicable to this ED as they have onsite medical staff.

Trauma Status

Under the 'NSW Trauma Services Plan' (December 2009) this ED is classified as a local hospital with no formal trauma designation. Due to its location, most trauma patients by-pass the ED and are taken to a major tertiary facility within the Area. Patients can however be brought to this ED for stabilisation prior to retrieval.

The ED has a local response in place in line with their designation; including both nursing and medical staff.

Summary: This ED met the trauma guidelines

ED physical design

The physical design of this ED was rated as high impact on staffing due to a high level of overcrowding and close proximity of beds/treatment spaces within the department. Layout consists of an open ward with 5 beds, and 2 single rooms. Within the department there is no designated area for paediatrics or mental health patients; the department also treats a high number of prisoners and special patient populations which need to be accommodated.

Due to the small size and close proximity of treatment spaces within the department visibility is considered good – with the exception of the triage and waiting area external to the department. The triage space is isolated and is not visible from the main department.

Other external ED obligations

Staff in this ED were required to fulfil the following obligations external to the ED more than daily:

Medical Emergency Team – medical staff only

Cardiac Arrest Team – medical and nursing staff

Hospital medical coverage after hours

Providing medical coverage to the hospital after hours was thought to have the biggest impact of these external obligations.

Step 2 Baseline staff skill mix groupings

The baseline skill groupings incorporate combinations of qualified and experienced medical and nursing staff, allied health staff and staff in support roles who are also crucial to the delivery of emergency care. To analyse the baseline staff skill mix skills areas were broken down into four sections, namely:

- *Departmental and clinical management groups* (including Complex Leadership, Clinical Leadership and Management and Clinical Decision Making)
- *Other clinical skills group* (including Clinical skills and Clinical Assistant skills)
- *Non-clinical skills group* (including Clerical, Data Management, Administrative/Executive and Equipment and Supplies Management)
- *Support services group* (including Patient Transfer, House Keeping and Security Personnel).

Variation from the skill mix guideline across the four sections was identified along with action areas to address the variance. Results are summarised in the table below

Skill mix group	Variation from guideline	Action Area
• Complex Leadership • Clinical Leadership & Management • Clinical Decision Making	This site varied from the guideline. Challenges raised included: • There is a tension between complex leadership and clinical leadership management of nursing roles. For example nursing complex leadership roles (eg budget management) are often de-prioritised or completed out-of-hours out of necessity to provide clinical leadership coverage. • There is no medical clinical leadership and management on a shift by shift basis. Medical staff are available however they do not function in these roles. • There is a dedicated triage nurse rostered for 8 hours per day, and only one RN in the department overnight. • In-charge nursing role is shared between ICU and ED and is not a supernumery role. • Lack of allied health access after-hours has an impact	• Re-skill: Re-skill locum medical officers for clinical leadership skills • Realign: Access to allied health after hours • Redesign: Clinical assistants and clinical support officer (with a clerical focus) could free-up clinical staff to see patients (ie blood taking plastering, minor procedural work, and data entry respectively). Relevant for both medical and nursing – currently there are no ward clerks to manage stores. • Recruit: Recruitment drive for nursing and medical to fill roles. Also need to recruit clinical assistants and CSOs.
• Clinical Skills • Clinical Assistant Skills	Partially meets guidelines Challenges raised included: • Competing demands on ED medical staff who also provide medical coverage to wards/ICU overnight. • Poor balance of medical decision makers (ie medical staff from the clinical decision maker or clinical management and leadership group) to clinical skills group that require supervision and support.	• Re-skill: Novice nursing staff being up skilled • Realign: Length of medical shifts in the evening • Redesign: VMO admitting practices overnight • Recruit: JMO cover over night on the wards to relieve pressure on ED staff
• Non-Clinical Skills	Does not meet guideline: Challenges raised included: • There is a lack of after-hours clerical coverage for the ED. • Currently data entry is managed by nursing staff with new implementation of EMR. • Stores, equipment and data are managed by the ED NUM.	• Recruit: CSO/clerical support to fulfil clerical roles and cover data management and stores management.

Skill mix group	Variation from guideline	Action Area
• Support Services	Does not meet guideline: • Currently the ED does not have the required security or housekeeping support overnight. Cleaning is completed by nursing staff after hours.	• Re-skill: Could re-skill ward clerks as HASA • Recruit: Security/HASA staff specifically.

Paediatric and Aged Care considerations

This section of the ED-WAT was not completed at this site.

Step 3 Identify Models of care for the scenario group 10 ED

Recommended Models – for this ED it is recommended that there is:

- Short-stay unit – not in operation
- Care coordination or ASET team – in operation business hours
- Psychiatric Liaison – in operation

Currently only two of the three models listed above are in place in this ED. The short stay unit was not in operation due to a lack of appropriate physical space within or in close proximity to the department. Opportunities for improvement or expansion of the hours of coverage were identified for the ASET team and Psychiatric liaison roles.

Step 4 Review Education and Supervision requirements

The formal education and training programs offered by this ED include:

- Nursing undergraduate rotations
- Nursing staff professional development/up-skilling
- New staff orientation

In addition to the formal training and education activities currently in place discussion indicated that the ED is interested in becoming involved in non-specialist medical professional development (eg Hospital Skills Program) in the future.

Educational Leadership

Educational leadership for medical staff is provided by the FACEM Director who is available on site 1 day per week, thus availability of staff to provide education is a challenge. A further challenge raised was accessing locum medical officers to provide the training; specifically it was considered challenging to get them all in the same place to provide formal training. The Hospital Skills Program is expected to address some of these challenges.

Educational leadership for nursing staff is ad hoc. Currently there is no CNE allocated to ED; mandatory skills training can be provided by the ICU CNC however this role is primarily ICU not ED. Freeing up nursing staff to attend training was also raised as a challenge.

Summary: This ED varied the guidelines for educational leadership as there was no dedicated CNE for nursing staff and minimal medical leadership support for education (only 1 day per week). Action areas identified included recruiting a CNE, and investigating alternative modes for delivering training.

Educational Support and Supervision

Responses indicated that there is “sometimes” access for staff to educational support to equip them for their role in the ED (eg mandatory training, orientation and other professional development programs) however this varies for nursing and medical staff. A multi-disciplinary approach to education is also drawn on “sometimes”.

Summary: This ED varied from the guidelines for educational support and supervision.

Outcomes of the workshop

How principles and guidelines guided staffing decisions

Working through the ED-WAT at this Level 4 rural ED to analyse the current ED skill mix identified some areas of variance from the skill mix principles and guidelines. Overall in this ED variances from the skill mix principles and guidelines were identified in the following areas of the ED-WAT completed:

- Baseline staff skills mix
  - Departmental and clinical management

  - Other clinical skills (partial variance)
  - Non-clinical skills
  - Support services
- Education and supervision
  - Educational leadership
  - Education support and supervision.

In summary some of the action areas identified to address these variances included:

- Re-skilling existing staff, in particular the locum medical workforce and less experienced nursing staff to address variances in the clinical skills groups
- Realigning the hours for allied health staff and for medical staff in the department to increase coverage after hours and on weekends
- Redesigning the workforce to include clinical assistant roles to support clinical staff; and redesigning the methods for delivering training and educational support to capture a larger proportion of the workforce
- Recruit clerical and support staff to support the ED
- Recruit junior medical staff to provide cover over night on the wards to relieve pressure on ED staff.

8.5.3 Case study: Model of Care Profile B

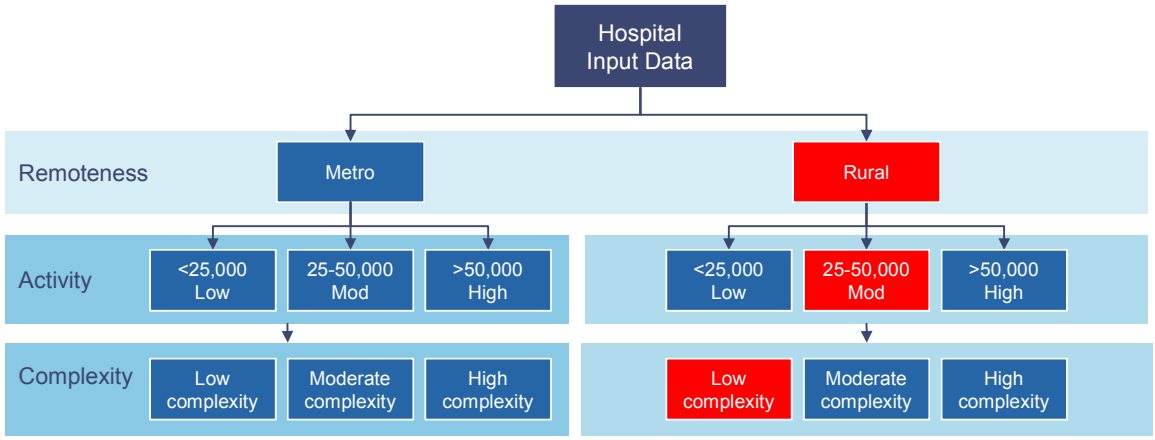
A rural Level 5 (five) ED was selected as a site for testing of the principles and guidelines as a representative of Model of Care Profile B. This case study takes the reader through the mapping process and summarises the outcomes from the analysis.

This case study will lead the reader through:

1 Mapping the ED to one of eighteen scenarios
2 Analysing baseline skill mix requirements
3 Identifying a models-of-care profile for the ED
4 Education and supervision requirements
5 Workshop Outcomes.

Step 1. Map the ED to a scenario

Figure 23 Steps 1.1 to 1.3 for Level 5 ED



Map the Level 5 ED to a scenario

Summarising the steps above, the Level 5 ED has the following characteristics:

Rural
Moderate activity
Low complexity

From the figure below, we can see that this ED maps to **scenario 13**.

Figure 24: Eighteen evidence-based scenarios

	1	2	3	4	5	6	7	8	9
Remoteness	Metro	Metro	Metro	Metro	Metro	Metro	Metro	Metro	Metro
Activity	Low	Low	Low	Med	Med	Med	High	High	High
Complexity	Low	Mod	High	Low	Mod	High	Low	Mod	High
	10	11	12	13	14	15	16	17	18
Remoteness	Rural	Rural	Rural	Rural	Rural	Rural	Rural	Rural	Rural
Activity	Low	Low	Low	Med	Med	Med	High	High	High
Complexity	Low	Mod	High	Low	Mod	High	Low	Mod	High

Formal training status

This ED is currently provides pre-vocational medical training and Emergency Physician training.

Rural settings guidelines

NA – the ED has medical staff overnight.

Trauma Status

Under the 'NSW Trauma Services Plan' (December 2009) this ED is classified as a Regional Trauma Service (RTS). The ED has a local response in place in line with their designation with two major trauma protocols in place – paediatrics and adults. The response includes an ED physician, staff specialist and/or Registrar – anaesthetist/registrar and surgeon/registrar, radiology, paediatrician/registrar, nursing staff from ED. The site also has Trauma CNC in hours.

Summary: Although this ED met the trauma guidelines; some action areas were identified including:

- Re-skilling: providing lesser experience nursing staff with opportunities to complete Critical Care certificates
- Recruit: recruit middle grade medical staff to augment medical coverage.

ED physical design

The physical design of this ED was rated as having a moderate impact on staffing. Overall commentary indicated the design was good. The layout of monitored beds and the paediatrics area is OK; however the cubicles are difficult to see from cubicle 1 to cube 6. When the department becomes crowded it becomes difficult to manage patients, as the number of beds cannot be increased due to limited space.

The paediatric areas are visible from work station and staff are accessible and help can be easily obtained.

Other external ED obligations

Staff in this ED were required to fulfil the following obligations external to the ED:

- Medical Emergency Team – medical staff only
- Cardiac Arrest Team – medical and nursing staff
- Hospital medical coverage after hours
- Retrieval Team – medical and nursing staff
- Phone retrieval/patient transfer support to other facilities – medical and nursing staff
- Other – ED physicians also care for ICU patients after hours.

Providing MET support was reported to occur daily, while the Cardiac Arrest Teams were required less than weekly as this role was shared with ICU. Retrievals were thought to occur approximately 120 times per year – this role is shared with ICU. Medical staff also provide support and advice to other sites for retrievals and play a large role in transfer of care to the Major Trauma Centre in the Area. Consultations and involvement in the critical care networks also occurred more than daily.

Step 2 Baseline staff skill mix groupings

The baseline skill groupings incorporate combinations of qualified and experienced medical and nursing staff, allied health staff and staff in support roles who are also crucial to the delivery of emergency care. To analyse the baseline staff skill mix skills areas were broken down into four sections, namely:

- *Departmental and clinical management groups* (including Complex Leadership, Clinical Leadership and Management and Clinical Decision Making)
- *Other clinical skills group* (including Clinical skills and Clinical Assistant skills)
- *Non-clinical skills group* (including Clerical, Data Management, Administrative/Executive and Equipment and Supplies Management)
- *Support services group* (including Patient Transfer, House Keeping and Security Personnel).

Variation from the skill mix guideline across the four sections was identified along with action areas to address the variance. Results are summarised in the table below:

Skill mix group	Variation from guideline	Action Area
• Complex Leadership • Clinical Leadership & Management • Clinical Decision Making	Partially meets guidelines Challenges and considerations raised include: • Complex leadership functions are performed by the NM and Director who also play a clinical leadership and management role taking on direct clinical care of patients. • Gaps in after hours decision makers and in the middle grade doctors • Gaps in after hours coverage of RN grades 4-6 • When activity is high there are inadequate numbers of clinical decision makers for both nursing and medical. There is a decreasing volume and proportion of decision makers. • Gaps in coverage of triage nurse after hours.	• Re-skill: up-skilling the PG 2 & 3 nurses and building the middle level base of staff. This could be achieved through offering more targeted training, after-hours education opportunities and through conducting training needs analysis. • Realign: realign medical staff on nights to increase the proportion of experienced to less experienced staff. • Realign: link into the medical registrar to realign provision of medical cover in the hospital overnight • Realign: realigning the hours worked by the CNE to provide after hours support to less experienced staff • Recruit: recruit an additional staff member to fill a dedicated triage role.
• Clinical Skills • Clinical Assistant Skills	Meets guideline. • There were no challenges relating to the provision/coverage of clinical skills, this group was identified as adequate.	• No action areas identified.
• Non-Clinical Skills	Partially meets guidelines Challenges and considerations raised include: • Clinical staff currently perform data management and equipment supply management	• Recruit: recruit additional staff to fill clerical and other roles (eg data management/equipment management)
• Support Services	Does not meet guideline Challenges and considerations raised include: • No food services are available overnight • Patient transport service (porters) is not always reliable.	• No action areas identified.

Paediatric and Aged Care considerations

Paediatric Care

This ED indicated they either often or always had the following:

- A range of clinical staff who have the skill set required for paediatric care
- Staff who take on the functions described for the Clinical Leaders and Educators in Paediatric care including CNC and CNS, Emergency Medicine Specialists, Registrars
- Appropriate external staff with specialist paediatric skills available as required
- Paediatric Registrar/anaesthetists in the facility.

Summary: This ED only partially met the paediatric guidelines. Presently there is no identified variance; however an action area identified was a need for ongoing training to maintain staff skills and ability to follow guidelines.

Aged Care

This ED indicated they often had the a range of clinical staff who have the skill set required for aged care; however they rarely have access to appropriate external staff with specialist aged care skills available as required.

To address this, an opportunity to increase the hours of coverage and referrals to ASET and other aged care support external to the ED was identified.

Summary: This ED met the aged care guidelines.

Step 3 Identify Models of care for the scenario group 13 ED

Recommended Models – for the ED it is recommended that there is:

- Fast-track – not in operation
- Short-stay unit – not in operation
- Streaming – not formally in operation
- Care Coordination or ASET team – in operation
- Psychiatric Liaison – in operation

Only two of the five models of care listed above are in place in this ED. Reintroducing a fast-track model was identified, along with an opportunity to formalise streaming models. Opportunities to extend hours of coverage for ASET and to recruit to extend the psychiatric liaison roles were also identified.

The short stay unit was not in operation due a lack of appropriate space.

Step 4 Review Education and Supervision requirements

The formal education and training programs offered by this ED include:

- Specialist Emergency Physician Training
- Pre-vocational training (Interns)
- Medical students
- Nursing undergraduate rotations
- Nursing staff professional development and up-skilling
- New staff orientation

In addition to the formal training and education activities listed above, most nursing staff also rotate through ICU to develop ventilation skills.

Educational Leadership

This section was not completed during the site visit.

Educational Support and Supervision

This section was not completed during the site visit.

Outcomes of the workshop

How principles and guidelines guided staffing decisions

Working through the ED-WAT at this Level 5 rural ED to analyse the current ED skill mix identified some areas of variance from the skill mix principles and guidelines. Overall for this ED, variances from the skill mix principles and guidelines were identified in the following completed areas of the ED-WAT:

- Baseline staff skills mix
  - Departmental and clinical management (partial variance)
  - Non-clinical skills (partial variance)
  - Support services
  - Paediatric care (partial variance)

In summary some of the action areas identified to address these variances include:

- Re-skilling or up-skilling the PG 2 and 3 nurses to build the middle level base of staff and providing training to staff to maintain staff skills and ability to follow paediatric guidelines
- Realigning the medical staff on nights to increase the proportion of experienced to less experienced staff and through realigning the hours worked by the CNE to provide after hours support to less experienced nursing staff.
- Recruiting additional clerical and support staff to support the ED.

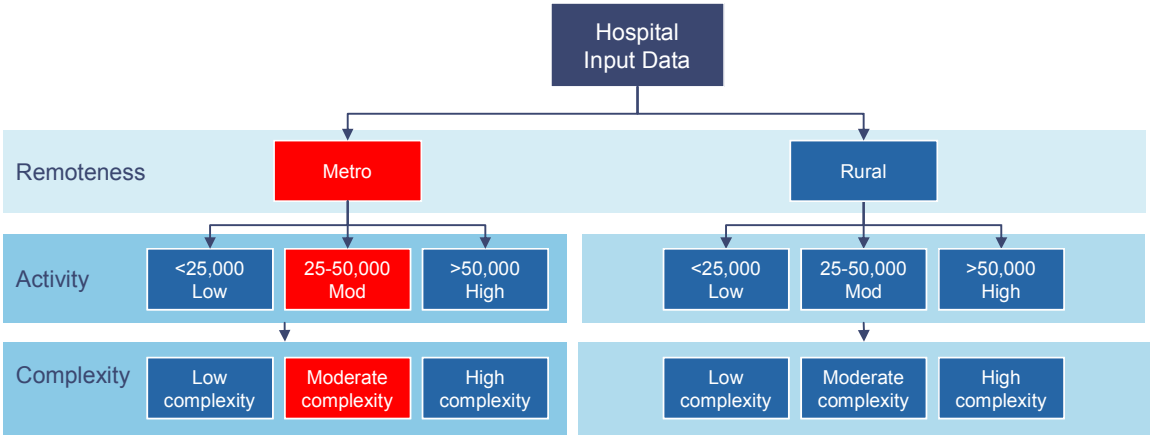
8.5.4 Case study: Model of Care Profile C

A metropolitan Level 4 (four) ED was selected as a site for testing of the principles and guidelines as a representative of Model of Care Profile C. This case study takes the reader through the mapping process and summarises the outcomes from the analysis:

1 Mapping the ED to one of eighteen scenarios
2 Analysing baseline skill mix requirements
3 Identifying a models-of-care profile for the ED
4 Education and supervision requirements
5 Workshop Outcomes.

Step 1. Map the ED to a scenario

Figure 25 Steps 1.1 to 1.3 for Level 4 ED



Map the Level 4 ED to a scenario

Summarising the steps above, the ED has the following characteristics:

1 Metro
2 Moderate activity
3 Moderate complexity

From the figure below, we can see that this ED maps to **scenario 5**.

Figure 26: Eighteen evidence-based scenarios

	1	2	3	4	5	6	7	8	9
Remoteness	Metro	Metro	Metro	Metro	Metro	Metro	Metro	Metro	Metro
Activity	Low	Low	Low	Med	Med	Med	High	High	High
Complexity	Low	Mod	High	Low	Mod	High	Low	Mod	High
	10	11	12	13	14	15	16	17	18
Remoteness	Rural	Rural	Rural	Rural	Rural	Rural	Rural	Rural	Rural
Activity	Low	Low	Low	Med	Med	Med	High	High	High
Complexity	Low	Mod	High	Low	Mod	High	Low	Mod	High

Formal training status

This ED provides prevocational medical training and formal training for medical students. It is not accredited to provide Emergency Physician training, however it is anticipated that this ED will gain accreditation in future.

Rural settings guidelines

NA – metropolitan ED.

Trauma Status

Under the 'NSW Trauma Services Plan' (December 2009) this ED is classified as a local hospital with no formal trauma designation. The ED has a local response in place in line with their designation; including senior nursing and medical staff experienced in resuscitation, intubation and stabilising patients for transfer.

Summary: This ED met the trauma status guidelines.

ED physical design

The physical design of this ED was rated as high impact on staffing; however this was influence more by staffing levels within the department more so than the physical layout. The department has recently been re-developed and has been custom designed; if staffing levels were ideal, the physical design impact would be low.

Triage is a distance from the treatment areas and this is an issue when there are reduced numbers of nurses on a shift and the triage nurse is floating between triage and treatment areas. Visibility across the department was considered good, and the paediatric treatment spaces are in close proximity to the paediatric short stay ward.

Other external ED obligations

Staff in this ED were required to fulfil the following obligations external to the ED:

- Medical Emergency Team – medical and nursing staff
- Cardiac Arrest Team – medical and nursing staff
- Hospital medical coverage after hours
- Phone retrieval/patient transfer support to other facilities – medical and nursing staff

Providing MET and Cardiac Arrest Teams was thought to occur less than weekly; however providing hospital medical coverage after hours and phone retrievals were thought to occur on a daily basis.

Step 2 Baseline staff skill mix groupings

The baseline skill groupings incorporate combinations of qualified and experienced medical and nursing staff, allied health staff and staff in support roles who are also crucial to the delivery of emergency care. To analyse the baseline staff skill mix skills areas were broken down into four sections, namely:

- *Departmental and clinical management groups* (including Complex Leadership, Clinical Leadership and Management and Clinical Decision Making)
- *Other clinical skills group* (including Clinical skills and Clinical Assistant skills)
- *Non-clinical skills group* (including Clerical, Data Management, Administrative/Executive and Equipment and Supplies Management)
- *Support services group* (including Patient Transfer, House Keeping and Security Personnel).

Variation from the skill mix guideline across the four sections was identified along with action areas to address the variance. Results are summarised in the table below

Skill mix group	Variation from guideline	Action Area
• Complex Leadership • Clinical Leadership & Management • Clinical Decision Making	Meets guideline. Some of challenges or considerations raised include: • Complex leadership roles are “spread a bit thin”. Additional clerical/support would enable complex leaders to focus more time on primary responsibilities. • Nursing coverage of clinical leadership and management skills is more stretched on weekends when the team leader is not supernumery taking on a patient load. • The same medical and nursing staff are always performing both clinical leadership and management tasks and complex leadership functions.	• Re-skill: up-skill/implement succession planning for less experienced RNs • Redeploy: redeploy the ASET nurse as an Aged Care Nurse Practitioner • Recruit: recruit a CNE role and RNs to fill current vacancies • Other: gain accreditation for emergency medicine training to secure registrar rotations.

Skill mix group	Variation from guideline	Action Area
• Clinical Skills • Clinical Assistant Skills	Meets guideline. Some of challenges or considerations raised include: • A challenge identified was staying up to speed with succession planning and skills portfolios. • Overall it was considered that there was a good balance of middle and higher skilled medical officers. However there was a need to increase the number of nurses to fill vacancies.	• Re-skill: up-skill/implement succession planning in particular in the education of team leaders.
• Non-Clinical Skills	Does not meet guideline: Some of challenges or considerations raised include: • There is no clerical coverage overnight; at night the clerk on front desk also manages the hospital switchboard. • There is no data management or administrative or executive support staff.	• Re-skill: up-skill newly appointed CSO • Recruit: recruit further clerical support • Redeploy: redeploy a CSO from another part of the hospital to support the ED.
• Support Services	Partially meets guideline: Some of challenges or considerations raised include: • No cleaning or food services are available overnight. Nurses complete cleaning tasks.	• Other: retain multi-skilled and cooperative staff who can cover multiple roles.

Paediatric and Aged Care considerations

Paediatric Care

This ED indicated they always had the following:

- A range of clinical staff who have the skill set required for paediatric care
- Staff who take on the functions described for the Clinical Leaders and Educators in Paediatric care
- Appropriate external staff with specialist paediatric skills available as required
- Paediatric Registrar in facility providing weekly training to staff in the care of paediatric emergency patients.

In addition specialist Children's Hospital consultants provide back up advice.

Summary: This ED met the paediatric care guidelines.

Aged Care

This ED indicated they always had the following:

- A range of clinical staff who have the skill set required for aged care
- Appropriate external staff with specialist aged care skills available as required.

In addition the ED has access to 0.2 FTE of VMO on-call geriatricians. The hospital's general physicians are also experienced in aged care.

Summary: This ED met the aged care guidelines.

Step 3 Identify Models of care for the scenario group 5 ED

Recommended Models – for this ED it is recommended that there is:

- Short-stay unit – not in operation
- Streaming – not in operation
- Care Coordination or ASET team – in operation
- Rapid Assessment Team – not in operation
- Psychiatric Liaison – in operation

Currently only two of the five models of care listed above are in place in this ED however there were numerous opportunities for improvement identified regarding models of care. The short stay unit was not in operation due to challenges staffing the additional spaces although space is available. Opportunities for enhancement of the roles (ie re-align to suit Nurse Practitioner roles) or expansion of the hours of coverage was identified for the ASET nurse and the Mental Health CNC.

The rapid assessment team was previously in operation and worked well in the waiting room of the ED however at present it was thought that there was insufficient staff to operate it.

Step 4 Review Education and Supervision requirements

The formal education and training programs offered by this ED include:

- Pre-vocational training (Interns)
- Non-specialist medical professional development (eg Hospital Skills Program)
- Medical students
- Nursing undergraduate rotations
- Formal RN1/2 programs
- Nursing staff professional development and up-skilling
- New staff orientation

In addition to the formal training and education activities currently in place discussion indicated that the ED is seeking accreditation to deliver Specialist Emergency Physician training.

Educational Leadership

Educational leadership for medical staff is provided by Emergency Medicine Specialists and senior CMOs working within the department. They also have access to a DEMT which is shared across the hospital.

Educational leadership for nursing staff is drawn from external to the ED as there is no CNE within the department. An opportunity to formalise access to CNCs at other facilities within the area was identified.

Summary: This ED partially met the Educational Leadership guideline; the guideline was met from a medical perspective, however the variance was reported in nursing education leadership.

Educational Support and Supervision

Responses indicated that access to staff for educational support to equip them for their role in the ED (eg mandatory training, orientation and other professional development programs) is “always” available for medical staff, however for nursing staff and allied health this support is only “sometimes” available. Availability of nursing staff to attend formal training was raised as a key challenge.

Summary: This ED partially met the Educational support and supervision guideline. Action areas identified included redesigning the mode of training delivery, realigning and strengthening the relationship with other larger EDs in the Area and recruiting a CNE for the hospital.

Outcomes of the workshop

How principles and guidelines guided staffing decisions

Working through the ED-WAT at this Level 4 metropolitan ED to analyse the current ED skill mix identified only a small number of areas of variance from the skill mix principles and guidelines; specifically in the following skills groups:

- Baseline staff skills mix
  - Non-clinical skills
  - Support services (partial variance)
- Education and supervision
  - Educational leadership (partial variance)
  - Education support and supervision (partial variance).

Although overall this ED reported few variances or partial variances from the skill mix principles and guidelines; following this analysis opportunities to maintain and improve on the current skill mix in the future were identified. These included:

- Re-skilling or up-skilling existing nursing staff to take on team leader roles, and up-skilling less experienced RNs.
- Redeploy existing ASET nurse into an aged care nurse practitioner role
- Recruit additional clerical and support staff to support the ED and a CNE to provide educational support and leadership.

9 Implementation considerations for NSW

9.1 Implementation of the Scenario Framework

Finally, four key areas need to be taken into consideration to implement the scenario framework and principles and guidelines. These key areas include:

- Data access and integrity
- Governance considerations
- Process and cycle of review
- Operational viability

9.1.1 Data access and integrity

- Access to activity data to apply the scenario framework – access to reliable and informative activity data is central to the application of the scenario frameworks. It is integral that this data be available, accessible and accurate and collected in such a way that allows analysis of presentations by time of day and seasonal variation.
- Understanding of patient profile – to facilitate implementation, a key activity is for sites to build an ongoing understanding of their patient profile. Specifically sites need to understand the volume of presentations by ATS profile, age of patients, admission rate and patient mode of arrival which all contribute to complexity.
- Data management and capture - another factor that should be taken into consideration is the management and capture of data. As EDs transition between patient management systems (eg EDIS and FirstNet) strategies should be implemented to facilitate compatibility and backwards mapping of data between systems.
- Support for analysis - hospitals will also be required to identify staff who are familiar with the data and are able to provide support in analysis of thresholds and time of day/day of week presentations to support mobilisation of models of care.
- Data comparability – variations have been highlighted with regard to data definitions and capture as well as local variations in practice (eg Triage processes). These variations are thought to impact on the capture and subsequent comparability of EDs and may limit the appropriateness of greater reliance on this data. In recognition of this, the comparability of data across sites should be taken into consideration; and approaches to improve consistency in data collection should be investigated prior to implementation.

9.1.2 Governance considerations

- Governance – A model of governance should be embedded to support implementation of the principles and guidelines and workforce analysis tool and to oversee ongoing monitoring. Issues to consider in making decisions on appropriate governance are as follows:
  - Management of communications and change management processes
  - Management of data collection and integrity at a state and hospital level
  - Application of the scenario framework, models of care and principles and guidelines within ED
  - Application and process for using the tool within an individual ED

  - Updating and maintaining the framework and baseline data calculations for the NSW EDs
  - Updating and maintaining relevance and integrity of principles and guidelines in line with the development of changes to practice, changes to policy or introduction of new operational or workforce models
  - Identification and management of skill mix gaps within the workforce
  - Manage the escalation of requirements for out of cycle review of staff skill mix profiles
  - Provide feedback and input into any subsequent changes to industrial requirements.
- Financial considerations – there is the potential for changes in ED skill mix profiles to subsequently lead to requirements for changes to financial resources and management. These changes need to be taken into consideration with the implementation of principles and guidelines and new models of care. While an important consideration, for the purpose of this report, the financial implications are outside the scope of this project and have not been examined.

9.1.3 Process and cycle of review

The process for, regularity and timing of the review of ED activity and profiles against the scenario framework needs to be determined prior to implementation. Specifically the following should be addressed:

- *Process:* Agreement should be reached with stakeholders regarding the process for applying the framework, specifically if scenario outputs are analysed at a Hospital, Area or State level. The mechanisms for applying this process should also be determined; for example if it is agreed that application of scenarios should occur at a site level, an online web portal could be established to provide sites with State level means and data required for analysis along with the relevant data scripts and formulas to determine scenario outputs.
- *Cycle of review:* Agreement should be reached regarding the timing and regularity of reviews of skill mix profiles. These can either be based around the calendar or financial year or on a more regular basis (eg quarterly).
- *Out of cycle reviews:* The process sites should undertake for requesting or escalating a skill mix review out of the agreed cycle (as a result of changes to their profile of presentations or activity) should also be discussed and agreed prior to implementation.
- *Demand forecasts and projections*: Where available projections for future demand for ED services should be considered as an input into the cycle of review of skill mix profiles.

9.1.4 Operational viability

There are two components to operational viability which can broadly be considered under the headings of acceptability and availability.

- Acceptability:
  - Stakeholder acceptability – a key consideration for implementation is to gain buy-in from all stakeholders. Buy-in should be sought around the following:
    - Scenario framework, principles and guidelines and models of care
    - Changes to skill mix requirements within the ED, in particular the acceptance of the potential introduction of new models of care, roles and the inclusion of non-traditional staff within the ED.

    - Funding considerations to support introduction of new models of care and changes to skill mix profiles
    - Process for implementation, monitoring and ongoing review.

- Availability
  - Existing workforce skills profile – EDs need to build an understanding of skills and experience within the current ED workforce. This profile will form the foundation for the application of the principles and guidelines and can provide a baseline to identify variation from the skill mix guidelines and workforce numbers to resource models of care
  - Workforce availability – The process for and roles and responsibilities involved in the management of potential workforce gaps and shortages need to be considered prior to implementation. Some of the responsibilities could include management of recruitment to the NSW Health workforce as well as development of strategies to attract staff to facilities.

9.2 Strengths and limitations of the complexity measure

To facilitate identification of ED scenarios and mapping to models of care a measure of complexity was necessary to identify the patient profile in ED. The available NSW ED data did not allow identified evidence-based measures to be used; hence a new measure of patient complexity was developed as part of this research project.

This measure is based on 2008/09 NSW Health ED data, hence is current and suitable for use across NSW EDs. It is evidence-based and has strong face validity when tested with NSW EDs. To maintain currency, the model should be tested and adjusted over time because patient profiles and complexity change over time.

In this research project, measurement of complexity was limited to available data. For example, complexity has been measured more precisely by other researchers in terms of the number of procedures required in a course of care. However, this data is unavailable currently in NSW. Were this data to become available in future, the measure of complexity should be refined.

The complexity formula derived in this project is only as good as the variables which comprise the measure. Anecdotal reports suggest some weaknesses are associated with the variability in input data across the state. In relation to admission rate, there may be variability between sites regarding how disposition decisions are coded in the patient management system. For instance, there may be disagreement around what constitutes “admission and discharge as inpatient within ED”. Further, anecdotal evidence suggests that level of experience of clinical decision makers in an ED can influence the percentage rate of admissions to an inpatient ward.

Second, anecdotal evidence indicates that triaging practices (and hence triage category data) vary not only between hospitals but within hospitals. However, the high correlation ($r = 0.79$) between proportion of ATS category 1 and 2 patients and admission rate suggests that triage practices reflect genuine patient needs. Accordingly, differing triaging practice is unlikely to be a major limitation.

In relation to mode of arrival, differences in use of the ambulance service are likely to exist between rural and metropolitan sites that reflect availability of services rather than patient complexity. The impact of differences in level of access to ambulance services on mode of arrival data is unknown and may be a limitation. More granular accuracy should be obtained for rural sites in future.

The complexity formula will need to be refined from time to time. In the future, data may be available for the many small rural hospitals which are currently missing data. Future calculations of the complexity formula may yield different results with the inclusion of data from these smaller sites. It is foreseeable

that inclusion of these data may re-classify some sites from low complexity to moderate complexity and other sites from moderate complexity to high complexity.

In summary, the complexity measure developed in this phase of work reflects the best option given the available data from NSW Health. It is evidence-based and has strong face validity. To maintain currency, this model should be tested and adjusted over time, last but not least because patient profiles change over time.

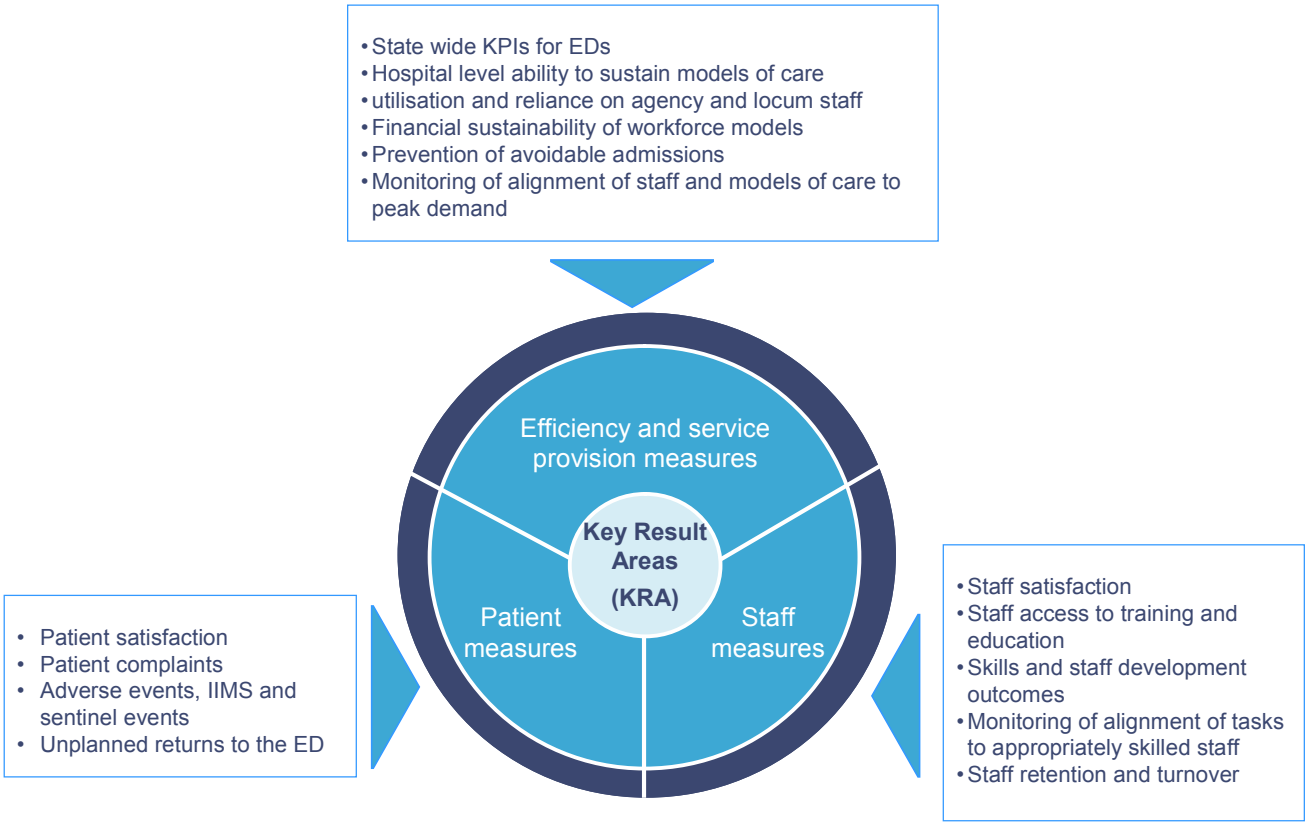
9.3 Key result areas

In order to assess the impact and sustainability of the principles and guidelines, regular monitoring of the operational key result areas (KRA) should be considered. As with monitoring of State required KPIs for EDs, it is recommended that when monitoring KRAs, if data is readily available, the KRAs should be incorporated into business as usual for the EDs following the implementation.

Process indicators to measure outcomes in an ED traditionally include such things as LOS, waiting times to be seen and patient satisfaction. Monitoring the implementation of principles and guidelines and subsequent models of care is dependent on access to reliable and informative data. For some of the KRAs outlined below data is already captured and reported to NSW Health on a monthly basis. In the future, the collection of additional data should also be considered to monitor patient/carer satisfaction and staff satisfaction. The ability to collect this data is an important consideration that should be discussed prior to the commencement of implementation.

Some of the key result areas that are suggested to provide a balanced assessment of the effectiveness of the solution are shown in the figure below. This is not an exhaustive list, and there may be overlap between the areas. Additional measures may be identified by NSW Health and at a local hospital level.

Figure 27 Key Result Areas



List of Acronyms

ACEM	Australasian College for Emergency Medicine
AiN	Assistant in Nursing
ASET	Aged care Services Emergency Team
ASGC-RA	Australian Standard Geographical Classification – Remoteness Areas
ATS	Australasian Triage Scale
CCT	Care Co-ordination Team
CDU	Clinical Decision Unit
CIN	Clinical Initiatives Nurse
CMO	Career Medical Officer
CNC	Clinical Nurse Consultant
CNE	Clinical Nurse Educator
CNS	Clinical Nurse Specialist
CSO	Clinical Support Officer
DEMT	Director of Emergency Medicine Training
EAP	Emergency Access Performance
ED	Emergency Department
EDSO	Emergency Department Support Officer
EDWRG	Emergency Department Workforce Reference Group
EEN	Endorsed Enrolled Nurse
EMU	Emergency Medicine Unit
EN	Enrolled nurse
ENP	Emergency Nurse Practitioner
EOI	Expression of interest
FACEM	Fellow of the Australasian College for Emergency Medicine
FACS	Family and Community Service
FTE	Full Time Equivalent
GP	General Practitioner
HASA	Health and Safety Assistant
IIMS	Incident Information Management System
JMO	Junior Medical Officer
KRA	Key Result Area
LOS	Length of Stay
MAPU	Medical Admission Planning Unit
MAU	Medical Assessment Unit
NM	Nurse Manager
NP	Nurse Practitioner
NSW	New South Wales

NUM	Nursing Unit Manager
PECC	Psychiatric Emergency Care Centre
PwC	PricewaterhouseCoopers
RAT	Rapid Assessment Team
RCA	Root cause analysis
RMO	Resident Medical Officer
RN	Registered Nurse
RRMA	Rural Remote Metropolitan Area
SEIFA	Socio-Economic Index For Australia
SSU	Short Stay Unit
TNP	Transitional Nurse Practitioner
VMO	Visiting Medical Officer

References

[i] Australasian College for Emergency Medicine. (1993). *ACEM Policy on Standard Terminology.* ACEM: West Melbourne.

[ii] NSW Health Emergency Department Information System data for FY 2009.

[iii] NSW Health (2002), Guide to the role delineation of health services, Third Edition, SSDB, North Sydney.

[iv] Booz Allen Hamilton. (2007). *Key drivers of demand in the emergency department: A hypothesis driven approach to analyse demand and supply.* NSW Department of Health: North Sydney.

[v] Davis, K., Schoen, C., Schoenbaum, S. C., Doty, M. M., Holmgren, A. L., Kriss, J. L., & Shea, K. K. (2007). *Mirror, mirror on the wall: An international update on the comparative performance of American health care.* The Commonwealth Fund.

[vi] Peterson, C. L., & Burton, R. (2007). U.S. Health Care Spending: Comparison with Other OECD Countries, September 17, 2007. Congressional Research Service Report for Congress.

[vii] Flowers, L., Gross, L., Kuo, P., & Sinclair, S-A. (2006). State Profiles: Reforming the Health Care System 2005, 13th Edition. AARP Public Policy Institute.

[viii] OECD Health Data 2009. Available at: http://www.oecd.org/document/16/0,3343,en_2649_34631_2085200_1_1_1_1,00.html

[ix] OECD Health Data 2006: How does Canada compare?

[x] Buchan, J., Ball, J., & O'May, F. (2001). If changing skill-mix in the answer, what is the question? *Journal of Health Service Research Policy*, *6* (4) 233-238

[xi] Considine, J., Kropman, M., Kelly, E., & Winter, C. (2008). Effect of emergency department fast track on emergency department length of stay: a case control study. *Emergency Medicine Journal, 25*, 815-819.

[xii] Kwa, P., & Blake, D. (2008). Fast Track: Has it changed patient care in the emergency department? *Emergency Medicine Australasia, 20*, 10-15.

[xiii] Kinsman, L. et. al. (2008). Assessing the impact of streaming in a regional emergency department. Emergency Medicine Australasia, 20, 221-227.

[xiv] King, D. L., Ben-Tovim, D. I., & Bassham, J. (2006). Redesigning emergency department patient flows: Application of Lean Thinking to healthcare. *Emergency Medicine Australasia, 18*, 391-397.

[xv] Holdgate A, Morris J, Fry M, Zecevic M 2007, Accuracy of triage nurses in predicting patient disposition *Emergency Medicine Australasia, 19*, pp. 343–344.

[xvi] Clinical Epidemiology and Health Service Evaluation Unit. (2004). Models of care to optimise acute length of stay: SOU, MAPU, EMU. The Royal Melbourne Hospital: Parkville, Victoria.

[xvii] NSW Health. (2006). Clinical Services Redesign Program: Models of emergency care. North Sydney: NSW Health.

[xviii] NSW Health Hunter New England. (2005). The Maggie Program: System Redesign produced sustainable improvements in emergency department performance. North Sydney: NSW Health.

[xix] Leaman, A. M. (2003). See and treat: A management driven method of achieving targets or a tool for better patient care? One size does not fit all. *Emergency Medicine Journal, 20,* 118.

[xx] The Scottish Government Health Delivery Directorate Improvement and Support Team. (2007). Unscheduled Care Collaborative Programme. The Scottish Government: Edinborough. Available at: http://www.scotland.gov.uk/Resource/Doc/200790/0053681.pdf

[xxi] Review of Trauma and Emergency Services Victoria 1999: Final Report. Report of the ministerial taskforce on trauma and emergency services and the department of Human Services working party on emergency and trauma services. Acute Health Division, Department of Human Services, Victoria.

[xxii] Holding, D., Holbert, J., Hullick, C., & Guimont, C. (n.d.). Division of emergency medicine: Guidelines for Streaming into Team A and B. John Hunter Hospital.

[xxiii] Schull, M., Kiss, A., Szalai, J. (2007). The effect of low-complexity patients on emergency department waiting times. *Annals of Emergency Medicine,49*, 3.

[xxiv] Sprivulis, P. (2004). Pilot study of metropolitan emergency department workload complexity. *Emergency Medicine Australasia. 16*, 59.

[xxv] Erwich-Nijhout, A., Bond, M., Phillips, D., Baggoley, C. (1997). The identification of costs associated with emergency department attendances. *Emergency Medicine, 9*, 181.

[xxvi] O'Brien, D., Williams, A., Blondell, K., & Jelinek. (2006). Impact of streaming "fast track" emergency department patients. *Australian Health Review, 30*, 525-532.

[xxvii] Flowers, L., Gross, L., Kuo, P., & Sinclair, S-A. (2006). State Profiles: Reforming the Health Care System 2005, 13th Edition. AARP Public Policy Institute

[xxviii] Arendts, G., MacKenzie, J., & Lee, J. (2006). Discharge planning and patient satisfaction in an emergency short-stay unit. *Emergency Medicine Australasia, 18*, 7-14.

[xxix] Hopper, S., Archer, P., Breene, R., Bolt, P., & Sammartino, L. (2008). Paediatric short stay unit in a community hospital: Effective, efficient and popular. *Emergency Medicine Australasia, 20*, 431-436.

[xxx] Victorian Department of Human Services. (2007). *Better faster emergency care: Improving emergency care and access in Victoria's public hospitals.* Melbourne: Department of Human Services.

[xxxi] Moss, J. E., et al. (2002). A multidisciplinary Care Co-ordination Team improves emergency department discharge planning practice. *Medical Journal of Australia, 177*, 427-431.

[xxxii] Richardson, J. R., Braitberg, G., & Yeoh, M, J. (2004). Multidisciplinary assessment at triage: A new way forward. Emergency Medicine Australasia, 16, 41-46.

[xxxiii] Grant, S., Spain, D., and Green, D (1999). Rapid assessment team reduces waiting time. *Emergency Medicine, 11, 72-77.*

[xxxiv] National Institute for Clinical Excellence (NICE). (2004). *Self harm. The short-term physical and psychological management and secondary prevention of self harm in primary and secondary care*. Clinical Guideline 16, 2004. Available at: www.nice.org.uk/CG016NICEguideline. (Last accessed 23/11/09)

[xxxv] Durojaiye, L., & O'Meara, M. (2002). A study of triage of paediatric patients in Australia. *Emergency Medicine Australasia, 14,* 67-76.

[xxxvi] British Association for Emergency Medicine and The College of Emergency Medicine (2005). Way Ahead 2005. BAEM: London.

[xxxvii] Schofield, D and Callandar, E. (2009) *Literature review of Emergency Department staffing redesign frameworks.* (Unpublished manuscript.)

[xxxviii] Australasian College for Emergency Medicine (2004). *Statement on emergency department role delineation.*

[xxxix] Australasian College of Emergency Medicine. *Guidelines for adult and mixed emergency departments seeking training and accreditation: minimum requirements.*

[xl] NSW Health Emergency Department Information System data for FY 2009

[xli] Royal College of Paediatrics and Child Health (2007). Services for Children in Emergency Departments. Report of the Intercollegiate Committee for Services for Children in emergency Departments.

[xlii] American College of Emergency Physicians (2009). Joint policy statement – Guidelines for care of children in emergency departments. *Annals of Emergency Medicine,* Volume 54, No 4.

[xliii] Australasian College of Emergency Medicine and Australian College of Paediatrics. Policy on hospital Emergency Department Services for Children.

[xliv] Shanley, C., Sutherland, S., Tumeth, R., Stott, K., & Whitmore, E. (2009). Caring for the older person in the emergency department: The ASET program and role of the ASET Clinical Nurse Consultant in South Western Sydney, Australia. *Journal of Emergency Nursing, 35(2), 129-133.*

[xlv] NSW Nurses Association (2007) Principles and guidelines to manage workload emergency departments. Available at: http://www.nswnurses.asn.au/infopages/9236.html (last accessed 20 November 2009).

[xlvi] NSW Institute of Medical Education and Training. (2008). Emergency Medicine Training in NSW. Revised recommendations to NSW Health from the NSW Institute of Medical Education and Training, Australasian College for Emergency Medicine and the Emergency Care Taskforce regarding the need to formalise training networks in Emergency Medicine in NSW.

[xlvii] Australasian College for Emergency Medicine, (2004). *Guidelines on the role of interns in emergency departments.*

[xlviii] Australasian College for Emergency Medicine. *Policy on the emergency medicine component of the undergraduate medical curriculum.*

[xlix] Australasian College of Emergency Medicine. *Guidelines for adult and mixed emergency departments seeking training and accreditation: Minimum requirements.*

[l] Department of Human Services. (2008). Discussion Paper – *Streaming care: Fast track services in hospital emergency departments*. Metropolitan Health and Aged Care Services Division, Victorian Government.: Melbourne, Victoria.

[li] Information on skills required for fast track comes from relevant position descriptions and model of care documents from participating NSW EDs.

[lii] O'Connell, T. et al. (2008). Clinical process redesign for unplanned arrivals in hospital. *Medical Journal of Australia, 188, S18-S22*.

[liii] Taylor, D., Bennett, D. M., & Cameron, P. A. (2004). A paradigm shift in the nature of care provision in emergency departments. *Emergency Medicine Journal, 21*, 681-684.

[liv] Ieraci, S., Digiusto, E., Sonntag, P., Dann, L., & Fox, D. (2008). Streaming by case complexity: Evaluation of a model for emergency department Fast Track. *Emergency Medicine Australasia, 20*, 241-249.

[lv] Smith, M. (2001). Roles and responsibilities of a Clinical Decision Unit (CDU) Fellow. *Unpublished article from St James University Hospital.*

[lvi] Clinical Epidemiology and Health Service Evaluation Unit. (2004). Models of care to optimise acute length of stay: SOU, MAPU, EMU. The Royal Melbourne Hospital: Parkville, Victoria.

[lvii] Information on skills required for CCTs comes from relevant position descriptions and model-of-care documents from participating NSW EDs.

[lviii] Leaman, A. M. (2003). See and treat: A management driven method of achieving targets or a tool for better patient care? One size does not fit all. *Emergency Medicine Journal, 20,* 118.

[lix] NSW Health Hunter New England. (2005). The Maggie Program: System Redesign produced sustainable improvements in emergency department performance. North Sydney: NSW Health.

[lx] Sinclair, L., Hunter, R., Hagen, S., Nelson, D., Hunt, J., & on behalf of the A&E Mental Health Study Group. (2006). How effective are mental health nurses in A&E departments*? Emergency Medicine Journal, 23*, 687-692.

[lxi] Wand, T., & Happell, B. (2001). The mental health nurse: Contributing to improved outcomes for patients in the emergency department. *Accident and Emergency Nursing, 9,* 166-176.

[lxii] New South Wales Health Centre for Mental Health. 1998. Working group for mental health care in emergency departments, final report and recommendations. State Health Publications: Sydney.

pwc.com.au