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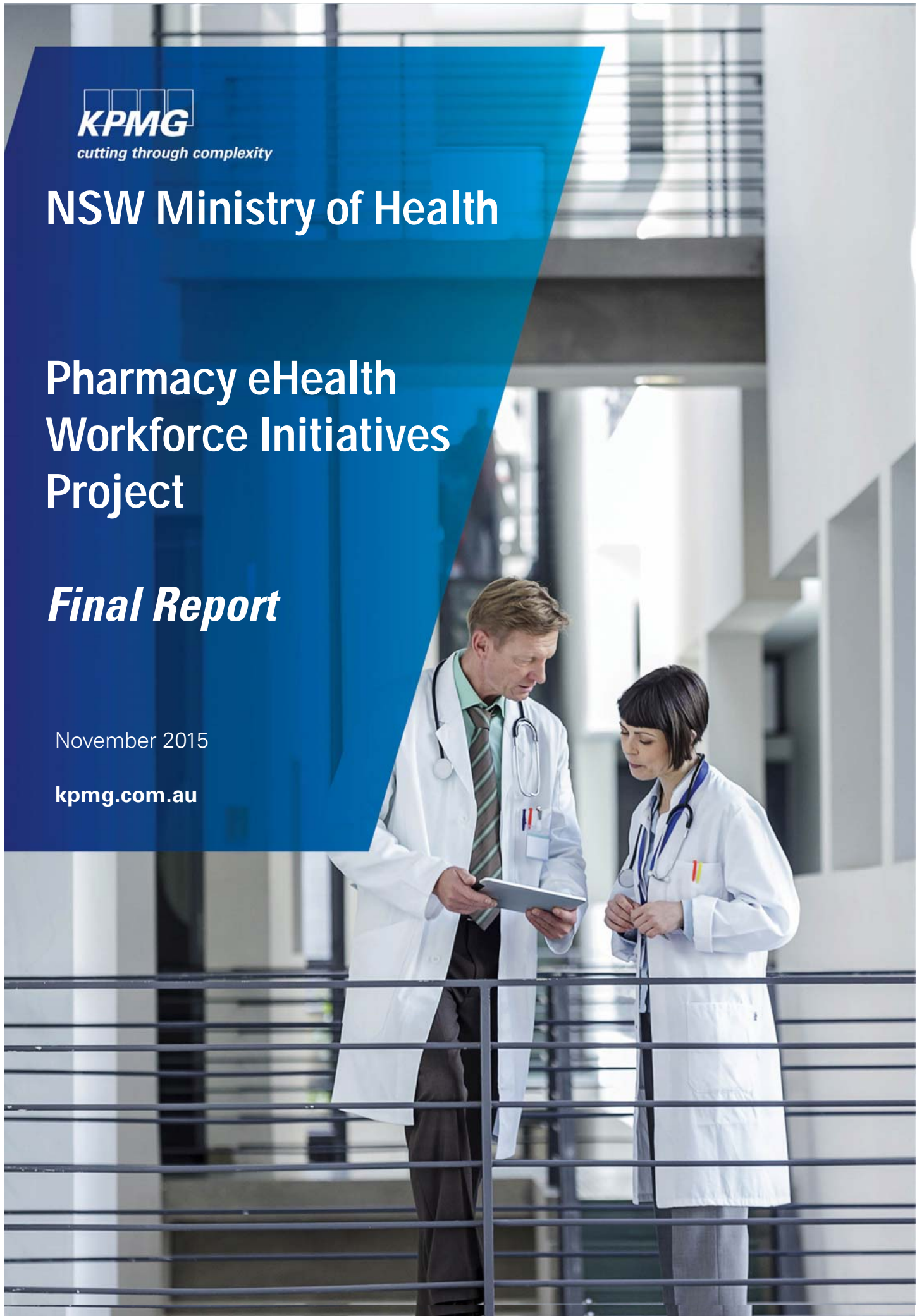
NSW Ministry of Health

Pharmacy eHealth Workforce Initiatives Project

Final Report

November 2015

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Contents

Executive Summary <i>(addressing the critical questions)</i>	4
Section One	Introduction 17
	Project Impetus, Background and Objectives 18
	Project Approach 19
Section Two	Context and Background 21
	The EMM Program 22
	The NSW Health Clinical Pharmacy Workforce 25
	Pharmacy Workforce Context 26
Section Three	Horizons Scanning 31
	Introduction, Approach and Limitations 32
	Key Insights- General Findings 33
	Key Insights- Workforce, Workflow and Work Task Findings 36
Section Four	Stakeholder Consultations 38
	Introduction, Approach and Limitations 39
	Key Insights- General Findings 40
	Key Insights- Workforce, Workflow and Work Task Findings 43
Section Five	Scenario Modelling 48
	Introduction, Approach and Limitations 49
	Scenario Framework 50
	Location 51
	Resourcing and Skill-mix 53
	Specialisation 55
	System Decisions 58
	Implementation Approach 60
	Contextual/ Baseline Factors 62
Section Six	Impact Analysis 64
	Introduction and Approach 65
	Defining the Broader Context (limitations) 66
	Impact Analysis Framework 68
	Impact Analysis Findings 71
Section Seven	Workforce Principles 72
	Introduction and Approach 73
	Workforce Principles 74
Section Eight	Developing a pharmacy workforce plan for EMM 81
	Introduction and Tools 82
	Workforce Plan on a Page 83
	Risk Assessment of Contextual Factors 84
	Impact Analysis Findings 85
Conclusion and Opportunities	86
	Acronyms 93
	Reference List 94
Appendices	96

Executive Summary

Executive Summary

In recognition of the importance of its clinical pharmacy workforce, the NSW Ministry of Health sought the analysis of the impact of EMM (Electronic Medication Management) on the clinical pharmacy workforce based on the available evidence. This project, titled the Pharmacy eHealth Workforce Initiative (PeWI), has been conducted by KPMG. This project seeks to assist Local Health Districts (LHDs) to understand the pharmacy workforce impacts of EMM and provide tools and workforce principles to support the success of EMM and the sustainability of the pharmacy workforce locally. This reflects NSW Health's commitment to ensuring an appropriately skilled, competent, efficient and sustainable pharmacy workforce that can meet the expectations required to support the successful implementation of EMM.

This project was undertaken in a number of phases (which form the structure of this report). This includes horizons scanning, stakeholder engagement, scenario modelling, impact analysis and workforce principles and tools.

Background

The PeWI engagement was driven by an identified need to undertake research into workforce planning models pertaining to the EMM reform program. It was designed to assist LHDs consider the workforce, workflow and work task impacts that are likely to result from the transition; from a paper based to an EMM system.

The EMM reform program represents a significant investment from the NSW Government to support Information, Communication and Technology (ICT) programs over the next decade in health and refers to a collection of systems that support the medication management cycle. It includes a commitment to implement EMM systems in 28 hospitals over the next 3 years, and provides the opportunity to realise a number of benefits, key among them being the minimisation of medication errors.

The EMM reform program occurs in a wider context of workforce and health system reforms that impact on the clinical pharmacy workforce. These include:

- increasing service demands from population growth, the increasing burden of chronic disease, the ageing population and increasing co-morbidities;
- changing practice requirements driven by: technological innovations and the increased focus nationally on improving medication safety;
- clinical pharmacy workforce changes including: current levels of resourcing, the ageing profile and distribution of the workforce, exploration of expanded practice roles, and registration and continuing professional development requirements; and
- a constrained funding environment coupled with increasing consumer expectations.

These factors have an impact on the future clinical pharmacy workforce and need to be considered alongside the impacts of EMM on the clinical pharmacy workforce.

Horizons Scanning

The literature scanning of the Australian and international context identified that analysis of the impact of EMM on the pharmacy workforce is a developing area, with the majority of research to date undertaken in the United States where there are a number of practice differences compared to the Australian context. Despite this, a number of

key findings were identified to ensure the success of EMM, including a need for effective project management, change management, governance, and education and training. A number of findings were also identified in relation to expected pharmacy work task and workflow impacts of EMM which helped inform the stakeholder discussions.

Stakeholder Consultations

The stakeholder consultations with the NSW clinical pharmacy workforce were useful in identifying the experience to date in the NSW context, and in highlighting concerns from stakeholders regarding pharmacy workforce issues they expect when they implement EMM. The interviews and workshops were particularly useful in understanding the contextual factors that result in different experiences regarding the impact of EMM on the clinical pharmacy workforce. These discussions resulted in a number of key insights, provided validation of the findings from the literature, and importantly provided the details required for the Scenario Modelling.

Scenario Modelling

The Scenario Modelling identified six key variables that may alter the impact of EMM on the clinical pharmacy workforce. These factors are:

1. the remoteness of the facility;
2. the current resourcing and skill-mix of the pharmacy workforce;
3. the specialisation of the ward or facility where EMM will be implemented;
4. the EMM system functionality and design decisions;
5. the implementation approach; and
6. the contextual and baseline 'readiness' factors.

The interplay between these variables is complex, and therefore each site should understand how their particular context and planning decisions might impact on workforce, work tasks and workflows for the clinical pharmacy workforce.

Impact Analysis

The Impact Analysis draws on the experience to date of the impact of the EMM reforms on the clinical pharmacy workforce across the three areas of

1. workforce,
2. work task; and
3. workflows.

This analysis also identifies differences across the planning, implementation and embedding phases of EMM reform, noting that there are different capabilities and tasks needed across each of these phases. The Impact Analysis was based on the general framework of evaluation for health interventions developed by Drummond et. al (2005). This section includes an evaluation framework to guide the analysis, noting the scope limitations of this project in providing analysis on only one aspect of examining whether EMM is advisable given the relative worth it provides against a paper system.

Workforce Principles

The workforce principles have been developed as a reference tool to support the LHDs in making decisions that will optimise the use of their current clinical pharmacy workforce. This also seeks to ensure that future decisions about new roles and changed scope of practice are based on the available research and evidence. These workforce principles form the basis of the Approach to Workforce Impact Analysis which has been developed as a user friendly tool to help guide the LHDs through the workforce and impact analysis process.

Addressing the critical questions

Overall this engagement sought to answer a number of critical questions in relation to the impact of the EMM reforms on the clinical pharmacy workforce. These key questions (and others raised during the course of this engagement) are addressed below.

Has research been undertaken (nationally or internationally) that could provide valuable insight for the NSW EMM reforms?

It is important to note that the implementation of EMM is an emerging area of reform. There was limitations in regards to documented experiences and research to draw from for this report (and the Literature Review), particularly in the Australian context.

Most critical to the development of insights and knowledge are the experiences of the following Australian hospitals: Concord Hospital (NSW); St Vincent's Hospital (NSW); Austin Hospital (VIC); Frankston Hospital (VIC); Royal Darwin Hospital (NT); Macquarie University Hospital (NSW); Epworth Private Hospital (VIC); St Stephen's Hospital (Qld); and the planning for EMM implementation occurring at Children's Westmead (NSW) and Prince of Wales (NSW). These hospitals have all been pioneers in implementing EMM in Australia, with some of these sites first implementing EMM ten years ago. The majority of these hospitals were interviewed during this project and their insights strengthen the evidence base for many of the findings outlined throughout this report.

Particular insights into the risks and concerns for EMM implementation in an Australian context, were able to be gleaned from the 2013 Victorian Auditor General's Report into the rollout of clinical ICT systems in the Victorian Public sector. Key findings of this report included: the significant cost of the reforms; an underestimation of the required project scope, timelines, workflow redesign and change management; the need for interoperability with existing ICT systems used within the facilities; potential clinical risks if unforeseen issues have not been resolved during system user design and testing; and a need to expedite the mandatory and ongoing training, particularly in supporting the prescribing and administration of medicines. It is understood these implementation and clinical application findings have been considered by the NSW eHealth Program in the design, implementation and delivery of EMM in NSW.

While academic research has been undertaken on the pharmacy workforce impacts of EMM, much of this is international research, particularly in the United States context. These findings are not necessarily transferrable in an Australian context due to the different hospital pharmacy practices in the United States. While literature in the Australian context was limited, the literature available provided some useful information regarding:

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- A qualitative study of pharmacy workforce concerns regarding EMM;
 - An evaluation of changes in clinical pharmacist time spent on tasks pre and post EMM; and
 - Workforce analysis of the distribution of Pharmacists across Australia.

This provided valuable insight regarding workforce numbers, workforce perceptions and work task impacts. This was then explored further in stakeholder consultations.

What are the views regarding the EMM reforms from the clinical pharmacy workforce?

During the course of this engagement the views of approximately fifty people from the clinical pharmacy workforce across NSW were sought. Overall there were two key groups identified during the workshop and interview process. The first was those who had experience in an EMM environment and had been involved in some aspect of planning, implementing or embedding the reforms at their current facility. The second was those who had little exposure to EMM and were curious about the potential impact it might have on them and the broader clinical workforce.

The views of those who had been involved with EMM were largely positive. Most stakeholders who had experienced EMM systems felt that although there were issues to be addressed in an EMM environment (particularly around interoperability with other systems, and functionality), it resulted in a better quality outcome for patients; was able to enforce completeness of orders; provided greater accountability and transparency of orders; allowed for improved functionality in areas including auditing and research; and was seen as 'the way of the future'.

Stakeholders who had not yet been involved in the planning, implementation or embedding of EMM systems acknowledged that they did not have a good understanding of what this would involve or how it would work in practice. These stakeholders felt that the workshops were highly beneficial in improving their understanding of the reforms relevance to them. It was noted throughout this project that the EMM reforms are a significant and emerging area and that the pharmacy workforce will initially be unaware of the requirements, scope, benefits and expected impacts of the EMM reforms.

Mentoring of these stakeholders as their facilities plan for EMM will be important. Sites currently planning EMM reforms in NSW noted that they gained significant benefit from mentoring support provided to them from the Concord and St Vincent's pharmacy workforce (as well as the experience in Victoria) during the planning and design phases of EMM.

What will the workforce implications be for the LHDs implementing the EMM reforms for the clinical pharmacy workforce?

The two key workforce implications as a result of the EMM reforms (particularly the inpatient ordering system) are:

1. the implications for the clinical pharmacy workforce; and
2. the implications for the pharmacy workforce for EMM project support roles including project management, change management, continuous quality improvement and systems support.

Clinical Pharmacy Workforce

Overall the stakeholder experience to date did not identify that the implementation of EMM resulted in an ongoing need for any additional clinical pharmacy workforce, nor any changes to skill-mix. This was despite the consistent finding that the EMM reforms resulted in an improvement in the volume and quality of services.

Some stakeholders felt that the majority of the impact and changes that occurred as a result of the EMM reforms were felt by Pharmacists (and not Pharmacy Assistants and Technicians) which then resulted in a need to rebalance the workload to ensure the current workforce and skill-mix was optimised (consistent with the workforce principles).

There are some contextual factors which may impact on the need for resourcing (for example implementation across a whole hospital within a 6-8 week timeframe, compared with an extended 10 year implementation approach). It should also be noted that in most cases those sites who have implemented EMM had an appetite for EMM and had well resourced pharmacy departments prior to EMM. This will not always be the case as the EMM program is implemented across NSW Health facilities due to significant variations of resourcing of the pharmacy workforce.

Pharmacy Workforce- EMM project support roles

The second consideration is the impact on the pharmacy workforce for project management, change management, governance (including Drug Committees), system design, maintenance, continuous quality improvement roles to support EMM. It should be noted that these roles should be comprised of a multidisciplinary team from across the facility, including nursing, medical and allied health staff. Across all sites interviewed in this engagement, experienced clinical pharmacists were reported to have played a key role in the planning, implementation and embedding of the EMM systems because of their knowledge of medications management and understanding of other electronic systems in the hospital. It should also be noted that some of these roles are ongoing business as usual functions and that there is a permanent need for EMM support once it has been implemented.

The degree to which the pharmacy workforce is impacted by EMM project support roles will depend on:

- how many Pharmacists, Pharmacy Technicians and Pharmacy Assistants are brought into the EMM team (compared with staff from other disciplines);
- the role they will undertake in driving the EMM reforms; and
- the role or position they were undertaking in the clinical care team (and consideration of backfill of their role).

The impact will also depend on the degree to which other clinical areas (i.e. nursing) are involved in the EMM team. The impact of these roles is also expected to change during the shift from planning to implementation and embedding phases, which is discussed further below.

How will work tasks be affected for the clinical pharmacy workforce as a result of EMM?

There are a number of new, changed and obsolete tasks as a result of the EMM reforms. Overall, the types of tasks remain relatively stable, with some areas requiring less work

time and effort and others more. Broadly, the quality and volume of services has been found to dramatically improve in an EMM environment and should be noted when comparing the impact on the pharmacy workforce when transitioning from a paper based environment.

The tasks that become obsolete in a paper based environment include: finding (and waiting for) paper charts on the ward; and checking for the completeness and legibility of records. There are also a number of changed tasks including the types of errors and incorrect records in an electronic system, and time taken for some tasks (such as monitoring imprest stock).

The new tasks that occur as part of the EMM reform either support the planning, implementation and embedding of the system itself; support clinicians in the successful adoption of the system; or occur because of new functionality the EMM system provides. Examples of this include:

- tasks that support the decision support capability of the system;
- audit and reporting functionality;
- addressing new orders (including blood products and nutritional supplements);
- tasks to support the interaction and interoperability with other electronic systems;
- removing unverified orders for discharged patients;
- transitional tasks while both paper and EMM wards co-exist; and
- enabling functions that can be used to assist with Medications Reconciliation and Anti-Microbial Stewardship.

How will workflow processes be affected for the clinical pharmacy workforce as a result of EMM?

The workflow and process impacts of EMM on the pharmacy workforce are variable based on the system decisions, methods of electronic delivery, implementation and timing decisions, and interface and interoperability with other systems. A key concern raised by the workforce was the impact of EMM on Pharmacist ward and patient interaction in an EMM environment. This concern reflects the experience of some sites who reported that in an EMM environment Pharmacists were spending more time in the Pharmacy Department and less time on the ward. This may prevent opportunistic ward conversations and troubleshooting for other clinicians that Pharmacists provide in a paper environment.

A key factor impacting on workflow findings is the use (or not) of electronic hand-held devices and wireless network access throughout the hospital. One hospital reported that by enabling this, they were able to minimise any workflow or user interaction impacts of EMM, as Pharmacists could do the work they did as before and update information through their hand-held device at any place throughout the hospital. It should be noted that this will not always be possible due to cost, infrastructure and physical building design and layout. It was also understood that some EMM systems currently offer better hand-held compatibility than others.

What are the contextual factors that may alter the impact of workforce, workflow and work task impacts of the EMM reforms?

The evidence gathered during this project suggests there are several contextual factors that will alter the impact of EMM on the pharmacy workforce. This report therefore seeks to identify all of these factors so that any LHD can consider which of these apply and are relevant to them. Due to the range of contextual factors that may apply and interact, it is difficult to identify that a particular outcome of impact of the EMM reforms on the pharmacy workforce will occur, and even more difficult to identify the degree of the impact.

Location (remoteness)

The first scenario consideration identified was in relation to the remoteness of the facility implementing EMM. This is because levels of pharmacy workforce resourcing are often worse the more remote the facility. Regional and remote facilities are more likely to use hub and spoke models of pharmacy workforce service delivery, and have poorer ICT infrastructure, connectivity and speed. It was also noted that the medical model in rural and remote sites often utilised General Practitioners (GP) rather than Visiting medical Officer, and the GP familiarity with their own electronic systems may be a further barrier to the successful adoption of EMM. Those facilities included in the Rural eHealth Strategy may also need to consider collaborative arrangements for EMM across Local Health Districts; leveraging central resources; and the sequencing of activities outlined in the Rural eHealth Strategy.

Resourcing and Skill-mix

The second contextual factor is the level of resourcing of the clinical pharmacy workforce prior to the implementation of EMM. The level of resourcing and skill-mix of the pharmacy workforce at each site will have a significant impact on the workload, workflow and user interactions that result from the EMM reforms. It is important that each site understand their current levels of resourcing and skill-mix, and consider compliance with current legislative and policy requirements including required practice standards. The workforce should be monitored and reviewed before and during the course of the EMM reforms with consideration of scope of practice and task redistribution within the workforce; monitoring of safety and quality and workload pressure; and consideration of required education and training and levels of computer literacy ensure the workforce has the required competencies to support the EMM reforms.

Specialisation

The third contextual factor is the level of specialisation of the facility or ward that the EMM system is being applied to. There are significant reported impacts on the system build and configuration, and these changes are also expected to have some impact on the workflow, workload and workforce requirements of the pharmacy workforce. Considerations outlined in this section include the impact of complex infusions and fluid balance, interface and interoperability with existing systems, high dependency units (Emergency Departments and Intensive Care Units), Paediatric settings, mental health settings, the Justice and Forensic Mental Health Network, and the impact on specialist units (including renal dialysis, oncology, transplants, haematology and immunology).

System Decisions

The EMM reforms by their nature rely on the build of the system and functionality of

the selected EMM provider. While Cerner is being used in the majority of EMM sites across NSW, there are some sites that will be or are using other systems. It has been reported that some of the decisions made in the building and design phase will impact on the required workload, workflows and worktasks for the pharmacy workforce. Key considerations flagged are system functionality (including system flags), interface and interoperability with existing hospital systems, and adoption of wider EMM functionality (for example AMS, Medications Reconciliation, updates to iPharmacy, and barcode scanning). To support the system design and planning there will also be a requirement to establish governance where key design and functionality decisions will be made and recorded.

Implementation Approach

The implementation approach is the fifth contextual factor considering the number of elements in the implementation approach selected at a site, which are expected to impact on the pharmacy workforce and their workload. Considerations include:

- implementation of a 'ward by ward' approach compared with a whole of hospital approach (considering the impact of high turnover compared with low turnover wards as well as any speciality wards);
- implementation of only certain aspects of the Medications Management Continuum (for example initially excluding discharge functions);
- the duration of implementation;
- the timing of implementation (with the later the implementation the greater the learnings from other facilities);
- whether the site is a hub site in a regional or rural area;
- The ongoing EMM journey including how system revisions will be managed and evolve over time; and
- whether the implementation approach will use handheld devices or a desktop approach.

Contextual and Baseline Factors

The final consideration is the contextual and baseline factors that apply at the facility prior to the introduction of EMM. This includes the levels of resourcing across the clinical workforce, available funding and resourcing for the EMM program, IT infrastructure and physical space; the degree of stakeholder engagement and sponsorship support for the EMM reforms; and the level of clinical engagement. It is understood a readiness assessment is undertaken by the EMM Program for each facility prior to the commencement of the EMM reform.

What differences are there in the workforce, workflow and work task impacts on the pharmacy workforce across the different phases of planning, implementing and embedding EMM?

Feedback from stakeholders who have implemented EMM systems suggest that there are three key phases of implementing an EMM system, which are the planning and design phase, the implementation of the system, and the embedding of the system into business as usual practice. Each of these phases result in differences in the workforce, work task and workflow impacts for the clinical pharmacy workforce.

Planning Phase

The planning phase requires resourcing for the EMM project team for roles such as project management, change management, system design and support, governance and education and training. New tasks will include:

- a need to test and design the new system;
- education and training to understand the new system (including the training of 'Super Users' to support the clinical workforce);
- decision making through the local Drug Committee or other governance arrangements about the system functionality; and
- change management and preparedness for the clinical workforce regarding the EMM reforms.

It is also noted that the workforce selected to undertake these roles would benefit from being mentored by other sites who have already implemented EMM systems to ensure knowledge transfer and to enable improvements based on lessons learned from previous implementation and design approaches.

Implementation Phase

The project implementation phase may require additional resourcing for 'Super User' roles and supporting the wider clinical workforce in understanding and using the EMM system effectively, delivering education and training, and implementation decision making through the Drug Committee or other governance body. At this time, key task impacts include the need to account for transitional arrangements if both paper and EMM wards exist concurrently, and tasks that may result from interface and interoperability limitations with existing systems.

Embedding Phase

The embedding phase involves consideration of how the system can best be utilised and will include consideration of new tasks that draw on the EMM functionality including:

- audit and reporting;
- decision support;
- prioritisation of orders;
- system flags; and
- system enablers for improvements in Medications Reconciliation and AMS.

It will also involve consideration of new tasks that are an unintended consequence of the system including removing unverified orders for discharged patients and addressing new orders for blood products and nutritional supplements. The workforce impacts of this phase includes ongoing FTE to support and maintain the system; adjusting scope of practice to ensure work balance across the workforce; and consolidating competency of the workforce in using the EMM system.

It is important to note that EMM is an ongoing reform, with stakeholders all reporting that they continue to enhance the functionality provided. It therefore requires an ongoing commitment from the workforce to both sustain and improve the system.

Are there any particular learnings regarding the impact on and use of Pharmacy Assistants and Pharmacy Technicians?

The evidence gathered throughout this project resulted in three key findings regarding the use of Pharmacy Technicians and Assistants.

The first was that the use of Pharmacy Assistants and Technicians is highly variable across the state, with no consistency in the skill-mix composition of the clinical pharmacy workforce.

The second was anecdotal feedback from clinical Pharmacists that indicated many didn't clearly understand the scope of practice of the Pharmacy Assistants and Technicians (including the difference between these roles). In practice, it is understood that the Pharmacy Assistant and Technician roles are often used interchangeably. Many Pharmacists felt that the individual competence of Pharmacy Assistants and Technicians was highly varied and it was a key consideration in ensuring safe and appropriate delegation.

The third key finding was that in some hospitals the impact of the inpatient EMM system on the clinical pharmacy workforce had a large impact on the workload, work tasks and workflow of Pharmacists, with a negligible impact in most cases on the role, tasks, workflow and user interaction for the Pharmacy Assistant and Technician workforces, however, it was noted that other EMM reforms, particularly barcode scanning for the safe distribution of medications, would likely heavily impact on the Pharmacy Assistant and Technician roles.

What are the critical principles for LHDs to apply to workforce planning and development in response to the eHealth reforms?

Six key principles have been developed to assist LHDs in planning to support the clinical pharmacy workforce through this significant reform. These are based on best practice workforce planning and support optimising the scope of practice of the workforce and balancing the workload and work tasks impacts across the whole of the clinical pharmacy workforce. These provide reference to a number of useful resources to assist LHDs through this process. These principles are:

1. designing a workforce that meets business needs;
2. ensure staffing levels are sufficient to meet current practice requirements;
3. determine the pharmacy workforce needed for change management, project management and technical EMM support roles;
4. optimise the existing workforce, re-balancing workload as needed;
5. optimise the pharmacy workforce if new roles are required; and
6. adjust the pharmacy workforce during planning, implementation and embedding phases of EMM.

What other key insights were learned during this project?

The EMM system provides transparency of orders which is not available in a paper based environment, This allows for monitoring of orders which results in increased accountability for the workforce. It also provides greater visibility of any backlog of orders, which may increase pressure for the workforce. This visibility of the

orders, combined with the prioritisation and decision support functionality of the system have resulted in an increase in the volume of orders seen by the pharmacy workforce and an improvement in the quality of service delivery than in a paper environment.

The EMM reforms will impact on other workforce groups including medical, nursing, allied health and administrative roles. An understanding of the wider workforce impact of the EMM reforms may be useful in understanding where key benefits can be realised and in addressing key risks and issues faced across the workforce when implementing EMM.

Many sites noted that to realise the benefits from the new functionality provided by EMM they were increasing the workload of the clinical pharmacy workforce. This occurs due to two key reasons:

1. The increased visibility of orders in the system and the prioritising capability provided by the EMM system; and
2. The increased functionality that the EMM system provides (including for example acting as an enabler for AMS and Medication Reconciliation, and providing audit and reporting functionality).

These factors push demand for improved service provision that impacts on the clinical pharmacy workforce. Consideration needs to be given to how and when new functions might be adopted; whether EMM drives a change in the expectation and role of the clinical pharmacy workforce (and how any change should be resourced); and what is desirable functionality and service provision compared with required functionality (in a constrained funding environment). These decisions need to be made at a local level based on the local contextual factors.

Conclusion and Opportunities to Strengthen the Evidence

The summary and recommendations detail the key findings of this project given all of the phases of work, and identifies key recommendations to help strengthen the evidence in this area into the future. These are:

- i. A supplementary review to be undertaken following the implementation of EMM in a further 2-3 sites across NSW to add to the existing evidence base and to further develop decision making supports and tools.
- ii. Undertake a detailed pharmacy workforce impact study of the work task, workflow and workforce impact for the first rural site in NSW to implement EMM.
- iii. Develop a whole workforce study on the impact of EMM on the wider clinical workforce (including nursing, medical, ICT, allied health and pharmacy).
- iv. Build the capacity of LHDs and where possible the clinical pharmacy management, to access available data to use in local workforce planning. Consider developing tools and resources to support LHD workforce planners to ensure consistent approaches to workforce analytics and planning relating to EMM and other ICT reforms.
- v. Undertake a project to investigate the scope of practice and skills and capabilities of the Pharmacy Assistant and Pharmacy Technician roles in hospital pharmacies with a view to improved utilisation of the Pharmacy Assistant and Technician workforces across NSW Health.
- vi. Consider partnering with education and training providers around EMM training for the pharmacy workforce (at both university and VET level).
- vii. Utilise existing work to date on pharmacy workflows to promote a state-wide approach when EMM is implemented (validating as required).
- viii. Monitor and review the impact of the antimicrobial stewardship, Medications Reconciliation and barcode scanning initiatives on the pharmacy workforce.

Section One: Introduction

Introduction

Project Impetus

The impetus for the **Pharmacy eHealth Workforce Initiative (PeWI)** has come from an identified need by eHealth NSW (NSW) to undertake research into workforce planning models pertaining to the upcoming implementation of the Electronic Medication Management (EMM) Reform Program.

This project is designed to assist the Local Health Districts (LHDs) consider the workforce, workflow and work task impacts that are likely to result from the transition from a paper based to electronic medications management system for the pharmacy workforce.

Project Background

NSW Health is committed to the implementation of EMM and began the EMM journey approximately 5 years ago. The EMM program is part of a wider New South Wales (NSW) Government commitment included in the *Blueprint for eHealth in NSW*, which committed \$1.5 billion over the next 10 years to support this reform agenda, including almost \$400 million for ICT programs including EMM.¹

The EMM Program includes a commitment to the implementation of EMM systems in 28 hospitals over the next 3 years. There is recognition within the Ministry of Health that such a reform program requires significant change management support and comprehensive planning to ensure the benefits are realised.

The EMM Program includes a range of eHealth initiatives including updates to iPharmacy Software; the Medicines Reconciliation initiative; barcode scanning for the safe distribution of medicines in hospitals; inpatient EMM including the introduction of electronic approvals and script signatures; discharge and outpatient prescribing; antimicrobial stewardship (AMS); and Medicines Database Management.

This project, to undertake research into workforce models pertaining to EMM and the hospital based pharmacy workforce, is one element of a wider program of work being undertaken to ensure the successful implementation for the EMM Program over the coming years.

Project Objectives

The key objectives of this project are to:

- Identify the key workforce learnings from the implementation of EMM programs around the world;
- Mitigate the significant risks of EMM implementation and adoption by the workforce that have occurred in other jurisdictions and settings due to insufficient design, planning, implementation and resourcing;
- Developing workforce modelling scenarios and workforce principles that can be used by LHDs to support them in the implementation of EMM understanding the differences caused by contexts and settings; and
- Promote the awareness of the EMM reforms with the NSW Health pharmacy workforce.

Project Approach

The project approach was altered during the course of this engagement in response to the needs of the project, gathering best available evidence, and preventing duplication where existing work had been undertaken. The key changes were:

- The EMM Program's existing work on workflow mapping resulted in process mapping on the current state (paper based system) and future state (EMM system) to no longer be required within this project's scope;
- The cost benefit analysis planned in phase 4, was changed to an impact analysis. This is because the quantitative and economic data required to complete a full cost- benefit analysis was not available because of a lack of experience in NSW and the inconsistency of contextual factors;
- Additional inter-jurisdictional interviews were undertaken to strengthen the evidence base of different experiences of facilities who have implemented EMM systems across Australia; and
- A workforce planning framework including three key tools was developed to help guide LHDs through considering the impacts on the pharmacy workforce when they implement EMM.

Phase 1 – Project initiation occurred to confirm scope, timing, team and governance for the project. This included the development of a Project Plan and Stakeholder Communications Plan, requests for information and data and confirming meeting dates and times for workshops and the PeWI Steering Committee.

Phase 2 – A horizons scan (broad literature review) was undertaken of current learnings from the implementation of similar programs within Australia and internationally and to identify emerging issues that may impact on the implementation of EMM in NSW.

Phase 3 – Stakeholder engagement and workshops were undertaken to canvass the views of the NSW Health hospital pharmacy workforce within different contexts and settings. This included twenty interviews prior to the workshops with key participants using the Delphi technique, and three workshops which focused on metropolitan, regional and speciality needs respectively.

In addition five interviews were conducted with **inter-jurisdictional stakeholders** who have successfully implemented EMM systems (closed loop where possible). This was done to strengthen the evidence of findings to date in Australia due to the small number of sites who have implemented EMM in the NSW context.

Following this, a **scenario generation process** developed an outline of the components that influence the workforce impacts of EMM, which aim to assist LHD to respond to the implications of these reforms in day-to-day clinical practice.

Phase 4 – Compiled the qualitative findings of previous phases to provide an assessment of the **impact of EMM on the pharmacy workforce**. This phase also included the development of an evaluation framework to guide the analysis and a one page guide on the expected outcomes given the experience to date.

Phase 5 – Developed **supporting workforce principles** to support the LHDs in the implementation and delivery of the EMM Program. This seeks to step out the process that needs to be followed to ensure optimal utilisation of the pharmacy workforce and thorough consideration of the impacts, noting the contextual differences that apply.

A **workforce planning framework including three key tools** was also developed to help guide LHDs with proactive planning in preparation for the impacts of EMM on the pharmacy workforce.

Phase 6 – Resulted in the development of the **final report** for this project. This was provided to the PeWI Steering Committee for review and comment prior to finalisation.

Scope Limitations

The project has been constrained to considering the impact on the **hospital pharmacy workforce** (Pharmacists, Pharmacy Assistants and Pharmacy Technicians) only, noting that there will be some workflows where other clinical staff play an integral role.

This project has only been able to examine and draw from the EMM experience **as at June 2015**, which is limited to two sites in NSW who have implemented EMM systems, and two sites who are in the planning phase for implementation.

The limited quantitative data available has meant that this research has been **qualitative** in nature, drawing from the feedback from stakeholders at interviews, in workshops and drawing from the literature on the wider Australian and international experience.

The project is also limited to **pharmacy workforce stakeholders who were available** to attend the workshops and interview sessions conducted in April, May and June 2015. Stakeholder invitations were sought from the Chief Executives of each LHD and the Pharmacy Directors in NSW with the aim of gaining a wide range of stakeholder views across clinical settings, sites and LHDs.

Finally, the project was limited by the work already undertaken by the EMM Program, with close collaboration with the Program Director across all stages of the project to ensure there wasn't overlap with work that has or is already being undertaken by EMM team. This meant that the PeWI project has leveraged work undertaken by the EMM Program and EMM sites where appropriate.

Section Two: Context and Background

The EMM Program

NSW Health is committed to the implementation of EMM systems, as a component of a wider NSW Government reform agenda for Information Communication Technology (ICT) programs over the next decade as outlined in the *Blueprint for eHealth*.¹ Hospital EMM systems enable prescribing, supply and administration of medicines to be completed electronically (wholly or in part), potentially covering the entire hospital medication cycle including prescribing by doctors, review and dispensing of medication orders by Pharmacists, and administration of medications by nurses.² At the centre of this commitment is patient safety – a reduction of likelihood of patient harm through medication errors and adverse events, which will ultimately improve the patient experience.

EMM refers to the use of ICT to support and enable the processes involved in the medication management cycle. While there are a range of EMM solutions available in the market, the collection of systems typically spans:

- medications history recording;
- medications review and reconciliation;
- allergies and adverse drug reaction history and alerts;
- ePrescribing;
- medications formulary, standardised medications catalogue, order-sets and clinical decision support;
- electronic medication ordering;
- dispensing;
- electronic administration records;
- access to shared medication lists from local and national eHealth records
- electronic claiming; and
- eDischarge summaries.^{3,4}

The implementation of EMM has strong endorsement both in Australia and internationally. This includes support from the Australian Medical Association, the Pharmacy Society of Australia, the Pharmacy Guild of Australia and the National Health Hospitals Reform Commission.⁵

Current Progress

To date, Electronic Medical Record (EMR) systems have been implemented in many sites across NSW Health and are now used in a range of clinical settings, including:

- Emergency Departments and Operating Theatres, to track and monitor the clinical status of patients;
- busy hospital wards, where clinicians use the EMRs to order blood tests and x-rays, and to review the test results on-line (as well as having the ability to view digital images from anywhere in a metropolitan or rural hospital); and
- electronic discharge summaries of a patient's hospital visit to their general practitioner.⁴

Continual enhancements to the EMR system have enabled enhanced functionality such as clinical documentation, customised speciality views of patient information and improved system performance. Over time, the EMR system will contain complete

records of a patient's medical information including hospital admissions, attendances at outpatient clinics, and in some cases, community health records, and will be accessible in one shareable electronic record to all authorised people caring for the patient.

Recognising that the use of medicines is "the most common and complex therapeutic intervention in hospitals, and has the greatest potential to cause harm";⁵ the introduction of EMM is the next phase of technology enablement of the health system in NSW. NSW Health intends to introduce EMM across the entire medication management process, also known as a 'closed-loop' EMM system.

Implementation of EMM in NSW hospitals is gaining momentum with significant progress made in the NSW pharmacy supply chain with systems and data standardisation. The NSW Health EMM Program includes a commitment to implementing EMM systems in 28 hospitals over the next 3 years. It is understood that detailed planning or full implementation has already occurred at four sites.

The introduction of EMM (including the wider eHealth initiatives) in the NSW public health system provides the opportunity to realise a number of benefits to clinical outcomes, the key benefit being the minimisation of medication errors. If implemented successfully, other key benefits are expected to include improved clinical information sharing; minimised transcription errors; reduced duplication, waste and system wide inefficiency; prevention of the misalignment of records; and standardised, legible and complete orders. This is not only desirable, but essential in an environment of increased complexity with respect to prescribing and administering medication as well as in an increasingly financially-constrained reform environment.

NSW EMM program components

The NSW Health EMM Program includes a range of eHealth initiatives including updates to iPharmacy Software; the Medicines Reconciliation initiative; barcode scanning for the safe distribution of medicines in hospitals; inpatient EMM including the introduction of electronic approvals and script signatures; discharge and outpatient prescribing; antimicrobial stewardship; and Medicines Database Management. Each of these is discussed further below.^{3,4}

- **Inpatient EMM including the introduction of electronic approvals and script signature, discharge and outpatient prescribing** – This is understood as the 'core' of EMM – and refers to the implementation of a system (e.g. Cerner or MedChart) to replace a paper based prescribing system. It should be noted that there are significant differences in what each electronic system offers, making comparison difficult. Additionally, there are different versions and components of these systems that can be purchased, meaning that the functionality of one Cerner system may not be the same as another (however much of this will be consistent across NSW following the state-wide tender process that was undertaken earlier this year).

The pharmacy workforce impact of the change to these prescribing systems from a paper based system is the key focus of this report.

-
- **iPharmacy Software** – iPharmacy is software that provides the administrative aspects of the Pharmacy Information Systems around drug dispensing and inventory control.⁶ It already exists across most LHDs in NSW. Therefore the focus of the impact discussed throughout this Report, is the impact of software, system and medication updates that need to occur, and the interoperability and interface with the EMM system (Cerner or MedChart). The initial workforce impacts of implementing iPharmacy are not within scope.
 - **Medications Reconciliation** – This refers to the formal process of ensuring a current and accurate list of each patient’s medications, matching the medicines that should be prescribed to those that are prescribed. Particular care needs to be taken at certain points of the patient journey, including admission to hospital, transfer to wards (including from the Emergency Department and/or Intensive Care Unit), and at discharge (including from hospital to home, hospital to hospital and hospital to other care facility).⁷

Medications Reconciliation isn’t necessarily an electronic process, however some of the electronic systems (such as Cerner) have enabling functions to assist with Medications Reconciliation. A key consideration in terms of the pharmacy workforce impact of this, is the amount of Medications Reconciliation occurring at sites prior to EMM. It is understood this is an area that tends to be under-resourced at present in NSW. Therefore when sites implement EMM, they may increase the rate of Medications Reconciliation, requiring additional FTE simply because it was not easily undertaken in the paper based environment.

- **Barcode scanning for the safe distribution of medicines in hospitals⁸** – This refers to the use of electronic barcode scanning devices and use of iPharmacy to assist with the reduction of pharmacy dispensing errors. This is now a mandatory requirement under accreditation.⁸ In regards to consideration, planning and implementation of barcode scanning processes, it is understood that hospitals across NSW are at varying stages. It should be noted that there are multiple aspects to the implementation of barcode scanning systems.

While anecdotally it is understood that barcode scanning is expected to have considerable workflow and workforce impacts (particularly on the Pharmacy Technician workforce), the limited experience of implementing barcode scanning to date has made this difficult to quantify for this project. It should also be noted that the implementation of an EMM system for inpatient prescribing (e.g. Cerner) is not required as a precursor to implementing barcode scanning.

- **Antimicrobial Stewardship (AMS)** – AMS has been an area of increased focus globally for the clinical pharmacy workforce of the last few years. It refers to the review and optimisation of clinical outcomes of antimicrobial use while minimising unintended consequences including toxicity, under and over dosing, inappropriate microbial selection and the emergence of resistant organisms.

Antimicrobial Stewardship in Australian Hospitals 2011⁹ was produced to assist hospitals in the development of AMS programs. This discusses electronic decision support systems as a key enabler, but it is noted that AMS can be integrated into EMM decision support systems. It is expected that in the short term many sites will introduce computerised decision support systems that do not rely on EMM systems.

Furthermore, computerised decision support systems are only one aspect of an effective AMS program. It is understood that increased policy focus on AMS will or has already enunciated impact on the clinical pharmacy workforce, and that it is difficult to separate the electronic workforce impact of this from the wider AMS program.

Medicines Database Management² – This refers to the system upgrades and updates in drug databases and decision support that need to occur to the Electronic Medications Management systems. This includes updates required for all electronic systems including iPharmacy, Cerner, MedChart, Mosaic, ICCIS and any other system that is being used.¹⁰

Stakeholder feedback across NSW Health suggests that this is most likely to impact on the clinical Pharmacists, information technology and informatics workforces, with at least 1 FTE (full-time equivalent) becoming a dedicated offline resource to process these changes. The impact on the pharmacy workforce is dependant on the number of systems in use, the interoperability of the systems and the decision to use clinical Pharmacists over other possible workforces (such as information technology personnel). These factors are therefore key considerations in the scenario modelling and workforce principles components of this project.

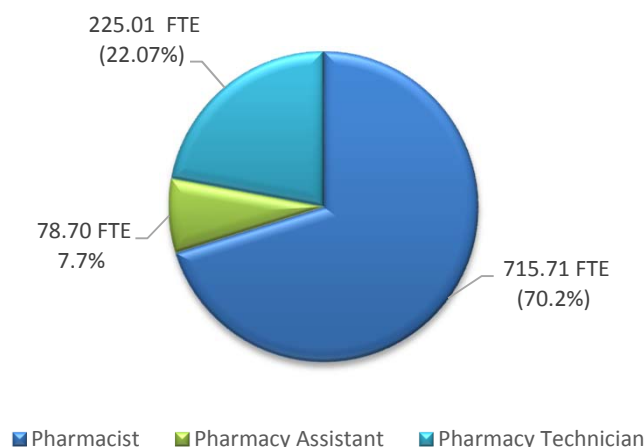
The NSW Health Clinical Pharmacy Workforce¹¹

The scope of the Clinical Pharmacy Workforce for this report considers three key occupations- Pharmacists, Pharmacy Technicians and Pharmacy Assistants.

The skill-mix and composition of this workforce is significantly varied across each hospital and LHD, with local decision-making around how the pharmacy workforce can best meet the needs of the specific hospital or facility. **It is important to note there is no specified or 'correct' pharmacy workforce composition or size, and comparison should not occur without consideration of complexity, specialties, volume and size of service delivery.**

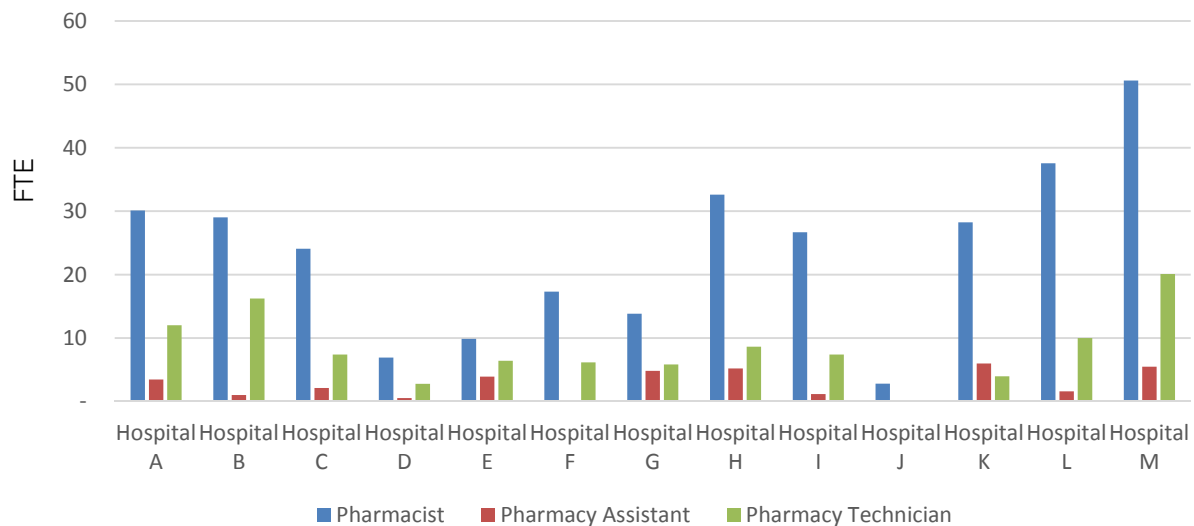
The pie chart in Figure 1 shows the composition of the pharmacy workforce across the State as at June 2014.¹¹ Pharmacists comprise the majority of FTE for the pharmacy workforce (just over 70%), with overall skill-mix equivalent to 3.2 Pharmacists for every Pharmacy Technician, and 9.1 Pharmacists for every Pharmacy Assistant. The total pharmacy workforce across NSW Health at June 2014 was just under 1,200 FTE.

Figure 1: NSW Health Pharmacy Workforce



There is also significant variation on overall pharmacy workforce FTE used in the hospitals and facilities within NSW Health (as at June 2014). This data shows that 93 facilities employ less than 10 FTE for their pharmacy workforce, while 30 facilities employ the majority (77%) of this workforce.

It is understood that EMM implementation will focus the lead or 'hub' hospital within the LHD,. Examination of these facilities (Figure 2) also shows significant variation in the baseline workforce and skill-mix for the pharmacy workforce.



Overall analysis of the pharmacy workforce data shows that there is significant variance across facilities in the pharmacy workforce and the use of Pharmacy Assistants and Technicians. Further work could be undertaken following this project to explore this variance by examining the total pharmacy workforce at each facility against NWAU information.

Pharmacy Workforce Context

The health system in NSW has undergone wide-ranging change in recent years in response to the growing demand for health services and constrained funding environment. This section outlines the environment currently influencing the clinical pharmacy workforce within NSW public healthcare system.

Increasing Service Demands

Population growth^{12,13}

NSW is predicted to have significant overall growth in its population over the next 15 years. The NSW Department of Planning reports the highest areas of growth will be in South Western Sydney, North Western Sydney, parts of Central Sydney, the South Coast, the Sydney-Canberra Corridor and Illawarra. Growth is also projected for a number of regional centres, including Albury, Bathurst, Coffs Harbour, Dubbo, Griffith, Port Macquarie, Tamworth and Wagga Wagga. However, some remote areas are predicted to experience a fall in population over the coming years. This overall increase in population growth, especially within Sydney, is expected to drive an increase in health service demands for public hospital service delivery, and therefore increase the demand for the clinical pharmacy workforce.

Burden of chronic disease¹⁴

The demand for healthcare services is projected to increase for a variety of reasons, including the increasing incidence of chronic disease, as well as greater consumer awareness and expectations around healthcare services. The growing rate of chronic disease including heart disease, stroke, cancer, depression and diabetes are associated with earlier identification and improved treatments for conditions which may have previously resulted in early mortality.

Chronic diseases are characterised by their long development period with multiple factors leading to their onset, and a prolonged course of illness, often leading to other health complications and comorbidities. Poor lifestyle behaviours such as poor diet, tobacco smoking, and excessive sedentariness are also identified as contributing factors to suboptimal health outcomes and therefore greater demand for healthcare services, impacting the pharmacy workforce.

Ageing population and co-morbidities¹⁵

The ageing population is expected to produce a noticeable increase in the demand for healthcare services, with current trends highlighting the potential for suboptimal and costly consequences for the healthcare system. The significant burden is primarily due to increasing demand for all health services (including pharmacy), at a time when workforce capacity is also declining in line with the ageing population.

It is anticipated that the ageing population will increase the demand for health services, including management of co-morbidities. Hospital admissions almost triple among older populations with length of hospital stays increasing with age, rising to eight days for patients aged 85 years and older. Demand for pharmacy services also increase with age, with research showing that approximately 25% of people aged over 65 years use four or more medications concurrently, increasing the possibility of drug interaction and adverse events, and requiring management by clinical Pharmacists.

Changing Practice Requirements

Complexity in the public system⁴⁰

Public hospitals provide most emergency department (94%) and outpatient services (97%) while private hospitals provide the majority of elective surgery (around 66%) Public tertiary referral hospitals provide specialist service units for areas such as cardiac care, spinal injury, burns and infectious disease. This means there is often greater complexity of services provided in the public setting, impacting on demands of the hospital pharmacy workforce. In addition the complexity of medical care, and its reliance on pharmacy as the most common form of intervention, has resulted in significant increases to the complexity of care provided and additional workload pressures on the clinical pharmacy workforce.

Increased focus on medication safety¹⁶

Over the last few years there has been an increased focus on medication safety and reduction of errors. This has been driven nationally by the Australian Commission on Safety and Quality in Healthcare's Medication Safety Program. This program has included recommendations around medication charts, Medication Reconciliation, medication administration, medication safety and quality, education and training, high risk medicines, and safer naming, labelling and packing of medications. This drive to improve

medication safety has resulted in the National Safety and Quality Health Service (NSQHS) Standard 4 on Medication Safety, which forms part of the national accreditation against the National Safety and Quality Health Service Standards which commenced on 1 January 2013.

As discussed earlier in this section there are a number of medication safety reform areas which are expected to, or are already, impacting on the work task, workflow and workforce requirements for the clinical pharmacy workforce. These reform areas include:

- barcode scanning;
- AMS;
- Medication Reconciliation; and
- Medicines Database Management.

Clinical Pharmacy Workforce changes

Levels of resourcing¹⁸

In March 2014 Health Workforce Australia released a report which provided a current snapshot of Pharmacists in Australia. Key findings include (based on 2012 data)⁴²:

- There were 21,331 registered Pharmacists;
- Of these, 26% worked in the public sector, and 18% worked in hospital settings; and
- The majority (31%) worked in NSW, however with the exception of the Northern Territory, NSW had the lowest number of Pharmacists per 100,000 in the population.

This last finding is consistent with stakeholder feedback that NSW Health has a lower resourcing base for its clinical pharmacy workforce in public hospitals than in other jurisdictions. It is believed this is partially due to other states increasing the number of Pharmacists to improve Medication Reconciliation in order to meet Pharmaceutical Benefits Scheme commitments with the Commonwealth Government.

Analysis of the pharmacy workforce across each of the facilities within the NSW Health context shows significant variation in the baseline workforce (prior to the implementation of EMM). This variation occurs both in terms of total workforce numbers (headcount and FTE) and the skill-mix of the workforce and the use of Pharmacy Assistants and Pharmacy Technicians. While workforce variation is expected due to complexities, specialisation, volume and size of service delivery changing for each facility, the difference in baseline resourcing makes assessing the impact of a reform such as EMM on the pharmacy workforce difficult. As was shown by the current data, 93 facilities employ less than 10 FTE in their pharmacy workforce, while 30 facilities employ 77% of the total clinical pharmacy workforce across NSW Health facilities.¹¹

Ageing profile¹⁸

The average age of the pharmacy workforce across Australia is 39.7 years, suggesting this is not a health profession where there is a significant ageing workforce risk. This is also consistent with data showing that the percentage of the workforce aged 55 years and older decreased between 2011 to 2012 from 17.2% to 16.7%. While this may be

less of a risk than some other health professional groups, ageing workforce strategies may still need to be enhanced including succession planning, transition to retirement through flexible working arrangements, and knowledge transfer and mentoring.

Distribution of the workforce¹⁸

The resourcing, and therefore availability of the pharmacy workforce to support regional and remote locations within NSW is particularly significant, due to the wide disparity in pharmacy workforce numbers between metropolitan and non-metropolitan locations. In 2014, Health Workforce Australia reported that metropolitan cities have approximately 101.6 Pharmacists per 100,000 in the population, while inner and outer regional locations have 73.6-79.3 Pharmacists per 100,000 in the population respectively. Those in remote or very remote locations have 61.8 to 39.8 Pharmacists per 100,000 in the population respectively.¹⁸ This suggests an under-resourcing of the clinical pharmacy workforce in regional and remote locations which may be due to workforce shortages in attracting and retaining the required workforce.

Expanded scope¹⁸

As with many other health professions, particularly allied health, there is a shift towards expanded scope of practice roles for Pharmacists, to address the changes in capabilities required to meet the current and future needs of the population. Potential expanded scopes of practice, such as those raised in the recent Grattan Institute report, include Pharmacists as immunisers and Pharmacists being used for repeat prescribing.

National Registration and Accreditation Scheme¹⁹

The National Registration and Accreditation Scheme (NRAS) became operational on 1 July 2010 and initially included requirements for the registration of ten health professions (later expanded to fourteen), which included Pharmacists. Each of the professions under NRAS have their own Board and are supported by the Australian Health Practitioner Regulation Agency (AHPRA). The NRAS's primary focus is to establish requirements for the registration of each of the registered professions including handling of complaints, decisions on the restriction of licences, establishing continuing professional development requirements, and determining education accreditation standards and approved education and training courses for each profession. All registered Pharmacists need to be aware of registration requirements for their practice.

Other key changes

Constrained funding environment²⁰

In the last five years there has been increasing pressure to improve the productivity and efficiency of the workforce. For example the 2010 Intergenerational Report recognises that rising health costs are unsustainable and that health reform is required so that every health dollar will provide more and better quality health services. This occurs in an environment where labour costs comprise approximately 60-70% of health expenditure. The recent national changes to performance reporting, the introduction of activity base funding and the introduction of the National Efficient Price

are already having a significant impact on workforce funding and therefore workforce models of care and resourcing.

Consumer and community expectations¹⁷

The expectations of health consumer is expected to be a key challenges faced by the health workforce into the future. This challenge has a number of components including expectations in terms of the quality of service provision and adoption of the latest technologies and services, expectations of consumer focused service delivery as consumers become more proactive in the management of their own health care and the availability of services in smaller centres when considered against the viability, quality and sustainability of service delivery.

Section Three: Horizons Scanning

Horizons Scanning

Introduction

This section describes the approach and key findings of the horizons scanning (literature review) undertaken to provide an evidence based foundation to the Pharmacy eHealth Workforce Project.

A separate Pharmacy eHealth Workforce Initiative Literature Review has been provided to the Ministry of Health during the course of this project, which provides further details on the pertinent literature found both in Australia and internationally.

Approach

KPMG's approach to undertaking this literature review involved three key steps:

- 1) Defining the scope – in this case, the scope of the literature review was first defined with NSW Health based on their needs for this project. It was agreed that the scope would be limited to hospital pharmacy workforce development, trends in eHealth (specifically EMM) and the impacts to workforce and workflow that result from EMM implementation. The review also examined any available evaluations and workforce initiatives relevant to hospital pharmacy workforce planning.
- 2) Searching academic literature – the search focused on specific search terms including 'electronic medication management'; 'EMM'; 'EMR'; 'pharmacy + eHealth'; 'pharmacy + workforce'; 'eHealth + workforce'; 'EMM + workflow'; 'electronic medication management + workflow'; 'computerized provider order entry' and 'CPOE'(US terminology).
- 3) Reviewing grey literature – KPMG reviewed relevant government reports and reports from accredited professional bodies both within Australia and overseas, primarily in the United States and the United Kingdom, with some exploration more broadly across Europe.

This health workforce literature scanning used the EBSCO, Proquest Health, Informit, and Medical Complete databases. Additionally, the Social Sciences Citation Index (SSCI) database¹ was used to locate where quality articles have been referenced in other literature.

The scanning included Australian health workforce key industry research (such as that undertaken by the Australian Commission on Safety and Quality in Healthcare), state and territory research (such as the Gartner Report from Victoria) and research undertaken internationally (such as the National Health Service). Evaluations, critiques, inquiries and reports from reputable sources including health professional associations (such as the Australian Pharmaceutical Advisory Council) were also included.

Limitations

Over sixty articles were analysed, and approximately fifty were included in the literature review. However the literature search revealed that there is a greater breadth and depth of published literature in some areas, and very little in others.

For example, a large number of articles focused upon the experience of nursing staff and clinicians during the implementation of EMM (either end-to-end or components thereof), and a number of sources were identified addressing the impact of EMM on medication errors. However, there was a dearth of literature on workforce impacts of EMM implementation, and even less when the search was limited to hospital pharmacy staff.

In some cases literature was excluded due to limitations on its availability (if purchase of the information was required or if it was protected by membership to a professional pharmacy association). Unpublished literature was also excluded except where provided to KPMG through consultations and engagement with the NSW clinical pharmacy workforce.

This literature lead to a number of general findings regarding EMM implementation that are relevant to LHDs as they implement EMM, which have been summarised below. There were also a number of key pharmacy workforce findings from the literature which are summarised in this section.

Key Insights – general findings

i. The implementation of EMM programs is increasing both in Australia and internationally. It has significant support from governments, professional associations and the private sector.

EMM (and/ or its components) has already been, or is being, implemented in various forms and to varying degrees across the western world, including in the United States, the United Kingdom, Canada, Germany, France, Italy, Spain, Sweden, the United Arab Emirates, and New Zealand.

The implementation of EMM has strong endorsement both in Australia and internationally including support from the Australian Medical Association, the Pharmaceutical Society of Australia, the Pharmacy Guild of Australia and the National Health Hospitals Reform Commission.

ii. A number of potential benefits are driving the impetus for EMM. One of the primary drivers is an expected reduction in medication errors.

Other benefits identified from the literature include a reduction in variance in prescribing practice; improved legibility, completeness and availability of medicine orders; improved communication with patients about their medication; improved decision-making facilitated by information resources; more efficient and effective interactions among the clinical care team; cost effectiveness; improved clinical information sharing; minimised transcription errors; reduced duplication; reduction of waste and system wide inefficiency; prevention of the misalignment of records; and standardised, legible and complete orders.

iii. Many of these benefits are not realised initially, and are only expected once the EMM program is successfully embedded.

Some benefits of EMM are realised immediately (such as legibility of ordering, standardisation and completeness of orders, visibility of orders, no longer having to search for the medications paper chart and no longer waiting while a paper based chart is being reviewed by another clinician). However, many of the key benefits and drivers for the

implementation of EMM are realised over time. Such medium and longer term benefits include improved prescribing practice, reduced errors and created efficiencies within the health system. EMM programs therefore require comprehensive implementation to succeed and fully realise the benefits they can provide.

iv. There are a number of cases where EMM has not succeeded or had limited success, including in the Victorian context. Key shortcomings include insufficient funding, inadequate planning, insufficient change management and implementation supports.

In October 2013, the Victorian Auditor General released an audit report outlining key risks and issues found following the planned roll-out of clinical ICT systems to nineteen public health services in Victoria. The Department of Health significantly exceeded the initial budget and ultimately only delivered the HealthSMART clinical ICT system to four health services²¹.

This report highlights many of the risks and issues noted both internationally and in the Australian context that need to be considered for EMM. It is important to note that the findings from this project and other literature suggests the benefits of EMM are not guaranteed and these reforms require strong governance, funding, planning, change management and implementation in order to realise the benefits. This is a significant risk, given the cost of EMM programs.

v. There are a number of key learnings/ recommendations for the implementation of EMM identified in the literature. Strong governance is particularly critical.

These implementation learnings include:

- Clinical engagement for buy-in is critical - including strong management support and change champions.
- Substantial engagement with the workforce is needed throughout the project to address issues prior to, and during implementation. There should also be ongoing support provided once EMM is implemented.
- Strong governance and benefits realisation is needed to support the reforms - including support from executive leadership and sponsorship.
- Comprehensive staff training is critical for optimised efficiency and a safer patient care journey.
- A consumer focused approach results in higher clinical quality and efficiency, a safer patient environment, greater employee engagement and improved financial results.
- Workflow analysis is critical to understanding how EMM implementation will impact on the users and their roles, communication pathways and processes.
- The scope of the EMM program needs to be clearly defined, understood and communicated.

vi. Large scale EMM programs, such as the one in NSW, have benefited from 'lead' sites and a prolonged implementation period.

Implementation has consistently been more successful with lead implementation (or pilot sites) prior to roll-out to other sites rather than a 'big bang' rollout. The Gartner Report (2014) found that the 'big bang' approach has been associated with the greatest losses in productivity.²²

EMM systems are complex in nature. Setting realistic timeframes has been found to be imperative to build confidence in the system and allow for the ongoing identification and resolution of problems. The literature shows a trade-off between the speed and efficiency of implementation and the level of acceptance by staff – the more progressive the implementation, the more likely staff are to accept and use the new technology.

vii. A number of change management practices have been found to be successful in assisting to embed EMM.

These recommendations include:

- Clinical champions and change agents to help 'sell' the benefits of EMM. These need to include both senior stakeholders and ward-level change champions;
- Initial and early engagement with stakeholders is beneficial - it provides the opportunity for the workforce and their concerns to be heard; and
- Stakeholder issues and concerns need to be addressed quickly, and where needed, escalated through the relevant governance structure.

viii. Education and training is critical to user adoption of the EMM system/s in use. It should not be considered a one-off, but instead an ongoing requirement to support and sustain EMM.

It is recommended in the literature that education and training should include initial awareness and education and training at implementation, targeted training for specific issues and or users, periodic refresher training and ongoing vendor support.

Key Insights - workforce, workflow or work task findings

As well as understanding EMM and its impacts on the pharmacy workforce, including through the planning, implementation and embedding phases, the horizons scanning included analysis of existing pharmacy workforce models, particularly those that apply in an Australian context that could be applied and relevant. In addition analysis of the research sought to identify any existing evidence on the work flow, workforce and work task impacts of EMM on the pharmacy workforce. The following summarises these key findings.

- i. Australian Pharmacist workforce data from 2012 indicates that New South Wales has the lowest number of Pharmacists per population than any other state, with the exception of the Northern Territory. ¹⁸**

While the largest cohort of Pharmacists are based on New South Wales (31%), this is the lowest number of Pharmacists per 100,000 in the population than any other state or territory, with the exception of the Northern Territory. This workforce data includes both Pharmacists employed in retail and hospital environments. This suggests there may be lower levels of resourcing of clinical hospital Pharmacists in New South Wales than other states, which was explored in stakeholder consultations.

- ii. The Pharmacist workforce remains concentrated in major cities in Australia, with higher proportions in metropolitan areas compared with regional, remote and very remote areas. ¹⁸**

Australian Pharmacy workforce data from 2012 found that major cities have 101.6 Pharmacists per 100,000 in the population compared with very remote locations who have 39.8 Pharmacists per 100,000 in the population. This analysis was not provided for each State so information on ratios for New South Wales were not available. It is also noted that these ratios include all Pharmacists, including those in retail and hospital clinical settings. This finding suggests that the workforce skill-mix, and scope of practice may be quite different when comparing metropolitan to regional and remote facilities which was explored as a contextual difference in consultations with stakeholders.

- iii. There is no currently approved or endorsed pharmacy workforce modelling used by NSW Health to determine total FTE, skill-mix and levels of the pharmacy workforce (although guideline have been produced by the Society of Hospital Pharmacists in Australia). Instead, hospital pharmacy workforce staffing is a decision to be made at the local facility or Local Health District level, based on local contextual factors.**

In Australia the Society of Hospital Pharmacists in Australia has released suggested hospital clinical pharmacy staffing levels based on service type, It is anecdotally understood these are a guide only, and are not used in NSW Health to determine staffing levels. There is limited further literature available on pharmacy workforce models outside of the United States, and it is understood that their pharmacy practices and context are very different to those in Australia. This finding suggests that assessment of the suitability of the resourcing and skill-mix of the pharmacy workforce at each facility in New South Wales would be difficult in the absence of evidence based benchmarks.

iv. While limited research currently exists on the impact of EMM on the clinical pharmacy workforce, there were some key findings on the work task impacts. This includes the following key findings:

- The time it took to complete a series of tasks in a paper based compared with an EMM ward were markedly different, with EMM wards demonstrating faster and more frequent review activities, lower proportions of in-transit tasks occurring and a greater proportion of work occurring independently.³⁵
- Pharmacists on EMM wards had lower rates of multi-tasking and interruptions than those on non-EMM wards.³⁵
- The introduction of an electronic prescribing tool increased medical and pharmacy staff time, but decreased nursing staff time in a 28 bed general surgery ward in a London teaching hospital 6-12 months after the introduction of electronic prescribing.³⁶
- A time and motion study conducted in the United States found a significant decrease in medication turnaround time, particularly in the communication of the order to the Pharmacists (a reduction of approximately 3.5 hours) and in the administration of the dispensed medication to the patient (a reduction of just over 2 hours).³⁷
- A work sampling study was undertaken at a hospital based outpatient pharmacy in the United States which examined the impacts based on analysis pre and post implementation of computer based prescribing. Overall this study found that total staff hours and number of prescriptions for Pharmacists and Pharmacy Technicians were similar before and after computer based prescribing. However under electronic prescribing Pharmacists spent 12.9% more time checking prescriptions; 3.9% less time waiting for work; 2.2 less time in meetings; 45.8% more time problem solving physician orders; 34% less time filling prescriptions; 3.3.% less time advising patients and/ or advising physicians about patient's treatments; and 4% more time working alone.³⁸

v. A qualitative study undertaken in Australia in 2009 identified key concerns faced by health professional staff with the introduction of EMM systems. This included pharmacists concerns about:

- Changing roles and scope- specifically that they may have a reduced physical presence in wards, or be confined to the dispensary rather than in the wards;
- The EMM system potentially being seen as a means of reducing pharmacy staffing levels;
- A reduction in personal communication and face to face interaction with other professionals, and fewer opportunities for informal discussions around medication issues (interviewees noted that face to face contact resulted in 'friendlier exchanges' and less defensiveness on part of the clinicians);
- The functionality of the system, including pharmacy information systems not being able to integrate with the proposed new system, and the impact of different speciality settings;
- Education and training for the new system, while important, would come at the expense of their own clinical work; and
- An undermining of the importance of pharmacists seeing the patient to know what is best for them, and what medications are intended for them.³⁹

Section Four: Stakeholder Consultations

Stakeholder Consultations

Introduction

This section describes the approach and key findings of the stakeholder engagement process which included stakeholder interviews and workshops for the Pharmacy eHealth Workforce Project.

Approach

KPMG's approach to undertaking the stakeholder engagement included three key steps:

1. **Delphi method–stakeholder interviews** – this involved targeted interviews with twenty key stakeholders to understand issues and concerns and expected workforce impacts prior to the workshop sessions. Participants were selected from the workshop participant pool, and focused on stakeholders where EMM systems were already planned or in place.
2. **Pharmacy Workforce Metropolitan, Regional and Speciality Workshops** – These three workshops clustered participants according to a metropolitan, regional or specialist focus to identify any contextual differences. Participants were sought through nominations from both the Local Health District Chief Executive Officers and the Directors of Pharmacy across the state. While all workshops were held in Sydney, participants were provided with teleconferencing options.
3. **Case Study Interviews** – Further interviews were conducted following the scenario modelling with stakeholders who have implemented EMM both within NSW and across Australia. The inter-jurisdictional interviews were sought due to the small number of sites (four) in NSW who have started on the EMM planning and implementation journey. These stakeholders were selected by focusing on sites who have implemented EMM systems in Australia. They were identified in consultation with the EMM project team and the PeWI Steering Committee. These interviews, and interviews with NSW stakeholders formed the de-identified case studies that are provided at Appendix A which helped refine the scenario modelling, impact analysis and key insights from stakeholder consultations.

Limitations

The limitations of the stakeholder consultations were that they required stakeholders to be available for one of three workshop dates or for a one hour telephone interview between April and May 2015. Some sites were in a critical period of implementing EMM and were unable to participate in the workshops due to timing.

The consultations were open for any pharmacy workforce stakeholders to attend, but to limit numbers, nominations were sought through the LHD Chief Executive Officer and Pharmacy Directors. Overall, the number of participants for the workshops was less than anticipated, and the PeWI Steering Committee assisted with some additional nominations to boost participation and stakeholder input.

The case study interviews were limited by the small number of sites across Australia who have implemented EMM, with some of these sites unavailable to participate for varying reasons.

Key Insights - general findings

- i. There was widespread support for EMM from the pharmacy stakeholders contacted during the course of this engagement.**

The views of those who had been involved with EMM were largely positive. Most stakeholders who had experienced EMM systems felt that although there were issues to be worked through in an EMM environment (particularly around interoperability with other systems, and functionality), it resulted in a better quality outcome for patients; was able to enforce completeness of orders; provided greater accountability and transparency of orders; allowed for improved functionality in areas including auditing and research; and was seen as the way of the future.

- ii. While it was noted that issues need to be resolved when implementing EMM, stakeholders were positive about EMM and its benefits. Benefits reported by stakeholders include:**

Safety and Risk Management

- Improved legibility of documentation;
- Standardisation of abbreviations;
- Compliance to prescribing formulae;
- Ability to add protocols to support prescribing;
- Improved decision support – reminders;
- Improved capacity to identify unverified/incomplete orders and errors;
- Greater accessibility, with the patient history and medication chart accessible from remote locations;
- Improved capacity for Medication Reconciliation;
- Enhanced ability to audit; and
- Greater accountability and ability to review processes.

Information Management

- Ability to access and update medications chart remotely;
- Improved capability to capture and report data;
- More complete data and patient information available to support decision making and research endeavours;
- Improved capacity to focus on budget integrity through data and use patterns; and
- Improved availability of information to support accreditation requirements – ability to demonstrate best practice in Antimicrobial Stewardship and Medication Reconciliation.

Workflows

- Improved access for the workforce – able to access records anywhere;
- Improved ability to prioritise workload- including ability to focus on new and changed medications; and
- Historical record of workload and work patterns to support long-term workforce planning, education and staffing requirements.

iii. Stakeholders noted that EMM results in a number of new risks and issues which may impact on the workforce. These include:

- The interoperability and interface between the EMM system and other clinical systems;
- Greater difficulty in identifying inaccurate records;
- Initial over-reliance on the EMM system for clinical decision making;
- System flags being set at the right level to balance the clinical safety with alert fatigue;
- New orders that exist on the electronic system (for example nutritional supplements and blood products) that require approval;
- Visibility of the significant backlog (especially on Monday mornings) and increased accountability is causing stress and anxiety for the pharmacy workforce;
- Electronic sign-off requirements may cause delays;
- Opportunistic ward conversations may disappear- as there is a greater tendency to work in the office and reduce ward time; and
- Significant time taken for system upgrades.

iv. Education and training for EMM needs to be targeted to the user group and reflect the computer literacy and understanding of the group.

Stakeholders highlighted a need to target EMM education and training to those at low, medium or high capability levels to ensure that training is appropriate and makes most effective use of the training time. If this education and training does not effectively occur, there will be significant workload impacts on the workforce as they transition to the EMM system and some of the benefits may not be fully realised.

It was also noted that some of the clinical workforce will need targeted training to improve their general computer literacy and competency.

v. It was noted that the EMM reform is an ongoing journey (with continual system upgrades and improved functionality), and should not be seen as a project that is implemented and is then completed.

Stakeholders who have implemented EMM noted that the EMM reform does need to be seen as an ongoing reform rather than a one-off project. The experience of sites that have implemented EMM in Australia have noted that over a period of 5- 10 years they have improved the system functionality that was initially adopted, and addressed key issues. Importantly they still see further opportunity for the EMM system to assist them with further improvements in functionality- which may for example include better auditing and reporting capability, enabling improved Medications Reconciliation and AMS, improved research in medications and their administration and management, improved interoperability with other systems and hand-held devices. This is important when considering the embedding phase of EMM at each facility.

iv. There was some concern about the workforce impacts and implementation issues that would occur in high turnover wards, with most early implementation focusing on low turnover wards.

EMM is often initially implemented in low turnover wards. As implementation is then introduced in high turnover wards there may be additional workload and workflow pressures to prescribe, dispense, administer and monitor medications to meet the high turnover needs- however many of the issues in transitioning from a paper based to electronic system will have been resolved.

Key Insights – workforce, workflow and work task findings

- i. Stakeholders observed that under EMM, some work tasks increased while others decreased (to a relatively neutral net result) for the clinical pharmacy workforce. However, additional workforce was required because of the project management, technical support and system support roles needed to sustain EMM.**
 - Stakeholders reported that while the overall clinical pharmacy workforce resourcing is not expected to change as a result of EMM, there are expected to be senior clinical Pharmacists who will be taken from the clinical pharmacy workforce to help with the planning, implementation or embedding phases of EMM in a project, change management or systems support capacity.
 - The clinical, and specifically medications knowledge, needed to embed EMM systems means that the technical support roles are often performed by highly skilled clinical Pharmacists. While the FTE needed for these new roles created by EMM will be multidisciplinary, most will include senior Pharmacists as they have the knowledge of the medications requirements, regulatory framework and Drug Committee governance structure needed for the system.
 - The additional FTE recommended to support EMM in the Australian Quality and Safety Commission in Healthcare’s report was 5 FTE per hospital.² Some stakeholders felt this under-estimated the additional work effort and that this was likely due to this finding being based on sites who initially rolled out EMM in Australia, but may not have introduced it in all wards or across the whole medications management continuum.

- ii. Stakeholders felt that at many sites, the hospital pharmacy workforce was already under-resourced compared with national benchmarks and other jurisdictions, observing that EMM is expected to place additional workload pressure on the pharmacy workforce (at least during transition).**

Stakeholder feedback from Pharmacists across Australia all indicated that NSW Health has a lower resourcing base for its clinical pharmacy workforce in public hospitals than other jurisdictions. It is believed this is partially due to other states increasing the number of Pharmacists to improve Medication Reconciliation in order to meet Pharmaceutical Benefits Scheme commitments with the Commonwealth Government. It is understood that to date, NSW Health has not signed up to these commitments.

- iii. There is agreed approach for determining the overall FTE and skill-mix (including Pharmacist, Pharmacy Technician and Pharmacy Assistant ratios) for the hospital pharmacy workforce nationally or within NSW.**

- It is understood that the pharmacy workforce in NSW have established skill-mix and FTE largely based on historical resourcing, and that under the constrained funding environment it is difficult to secure additional positions should the facility be currently under-resourced.
- Workforce data shows that the majority of facilities employ less than 10 FTE in their pharmacy workforce, however lead sites in each LHD typically have over 10 FTE. There is a variation across hospital pharmacy workforce numbers of between 1 FTE to 76 FTE, and skill-mix of the workforce varies at each facility.

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- Stakeholders noted there was a need to validate current workforce data for the pharmacy workforce, with some FTE not counted in pharmacy roles as they are employed in administrative or technical streams of the workforce. In addition it was noted that any assessment of the workforce should consider those employed in technical roles to support EMM, as often senior and very skilled clinical Pharmacists are moved into these roles to support the program.
 - It was also noted that it is often easier to gain approval for a Pharmacist (which is seen as a front-line clinical role) than it is for a Pharmacy Assistant Technician.
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iv. Use of barcode scanning devices is an electronic reform that is expected to have significant workforce impacts, particularly on the Pharmacy Technician workforce. However, It is understood that at present, there is low maturity in implementing this across NSW, making the impact difficult to quantify.

While currently the impact of this is not well understood, all sites across NSW are expected to introduce barcode scanning as this is now a mandatory requirement under national accreditation standards. Workflow impacts may also occur as many sites have reported the pharmacy department was not designed with sufficient physical space to accommodate barcode scanning.

v. It was noted that for some sites, the initial workload impacts of EMM placed additional demands on Pharmacist's time, but not on Pharmacy Technician and Assistants time. Therefore a re-balancing of workload and work tasks using a safe delegation model to Pharmacy Technicians and Assistants was successfully used, and is advised in other settings when EMM is introduced to make best use of the workforce.

It was noted that this re-balancing of the workforce needs to be carefully considered to ensure that safety and quality are not compromised; legislation, medications guidelines and scope of practice are adhered to; and delegation frameworks are used which make clear accountability and responsibility. In addition, as the skill-mix (ratio of Pharmacists to the Pharmacy Technician and Assistant workforce) varies greatly across the state, this re-balancing will need to occur more significantly in some sites than others. The types of tasks given to Pharmacy Technicians was varied in stakeholders consulted, with many suggesting that they do not interact significantly with the EMM systems, and instead focus on dispensing of medications.

vi. Stakeholders felt that the EMM environment provided greater visibility and transparency around the management of orders. This provided the benefit of greater accountability and monitoring, but it was felt that it also can lead to increased stress for some of the workforce.

The paper environment provides no way of readily monitoring the volume of orders that are managed by the pharmacy workforce. However the electronic environment provides the ability to monitor all of the incoming orders. The electronic system therefore assists with accountability, monitoring and visibility, but workforce stress was felt to also increase in an EMM environment, particularly given visibility of the significant backlog on Monday morning (assuming no weekend pharmacy services).

vii. A number of key workflow impacts have been identified in the trial sites and highlight the need for workflow mapping and the refinement of the system to support the Australian context.

These key findings from stakeholders include:

- A significant backlog of activities after hours and on weekends, resulting from hospitals providing 24/7 care, and the pharmacy workforce typically working between 8am - 6pm on week days. While this backlog always existed, the electronic system makes this backlog more visible than a paper-based system.
- Increased reliance on technology and requirement for hardware. It was also noted that this reliance also lends itself to a need for greater physical space, with pharmacy offices not having initially been designed for an electronic environment. This may lead to some workflow disruptions, and require consideration of workplace health and safety.
- An undesirable but potential impact is that EMM results in clinical Pharmacists spending less time on the ward. This may lead to a reduced focus on consumer led care and impact on multidisciplinary care on the ward. There may therefore need to be an increased emphasis on the expectation for ward/patient facing presence.
- System flags are noted as a key change under EMM, and it was noted that if these alerts are set too high, it places additional workload on the clinical Pharmacist who will be required to do an extra number of clicks and or to enter information about why a decision has been made in the system. This would not need to occur in a paper based context. System flags therefore need to be set at a level that balances clinical safety with workforce efficiency and convenience.
- The workflow and workload impacts of the transition of patients between EMM and non-EMM wards and or hospitals was noted as a key impact. In many cases it is expected this will result in a duplication of records, however it was noted that there may be some read only visibility of the EMM system in paper based wards.
- While not a significant issue at this stage, workflow impacts of patients who transfer between EMM systems operating in one system to those in another is also expected to result in some duplication of work effort. As is noted below, this may be a more significant issue for some areas/ facilities (such as Justice and Forensic Mental Health) than others.

viii. Stakeholders felt that EMM functions (such as prioritisation of orders) enabled many tasks to be done more efficiently, however, with this came an increased expectation of quality, volume and compliance of services in an EMM environment.

Stakeholders noted that the EMM system allowed for more effective prioritisation and a focus on the new and changed medications (allowing the focus on the areas most subject to medication errors). However it was also noted that there was a change in expectations once the EMM system was implemented to provide certain tasks that were not previously undertaken (such as reporting on compliance and auditing), and to see an increased volume of orders (up to 100% compared with previously about 40-50%). This means that a post EMM environment is not directly comparable with the former paper based environment, and this in itself causes additional workload and workforce pressures.

ix. A number of workforce considerations were noted for the regional and remote facilities for the implementation of EMM.

- Stakeholder consultation with the regional and remote Pharmacy workforce in NSW Health supports the general finding that regional and remote locations are comparatively less well resourced across their pharmacy workforce, and are not able to leverage economies of scale in the same way as many of the metropolitan sites. This means any workflow and workload pressures as a result of EMM may be more acutely felt in regional and rural sites.
- Many of the smaller sites operate in a 'hub and spoke' model that means they are reliant on support from the 'hub' site. This has implications for the EMM rollout, as if implemented across these smaller sites, they would continue to require significant support from the hub site as they have little or no Pharmacist positions at the smaller sites, and may need access to an AMS Pharmacist.
- The IT infrastructure in some of the regional and remote sites was flagged as a potential issue for workforce and workload impacts, particularly where there is limitations to the connectivity and speed of applications, leading to additional time for those in rural sites to undertake the same task.
- Stakeholders reflected that the medical model in rural and remote sites often utilises General Practitioners rather than Visiting Medical Officers. It was noted that General Practitioners have their own GP-oriented systems for recording information and that this may be a barrier to the successful adoption and implementation of EMM at some sites.

X. Specific workforce and workflow issues were highlighted for the Justice and Forensic Mental Health Network in the implementation of EMM.

Stakeholders from the Justice and Forensic Mental Health Network (JFMHN) highlighted unique issues around EMM system interface with other systems and patient transfer between multiple sites, with varying IT infrastructure and capacity to support EMM.

JFMHN operates in 90 sites across metropolitan, regional and rural NSW and therefore face many of the same issues applicable to regional and rural settings. This environment presents significant potential workflow issues due to the high volume of patient transfers that occurs between facilities.

JFMHN primarily use a nurse-led model, and EMM implementation may therefore result a significant impact for the nursing workforce, particularly if they are required to take on the role traditionally allocated to Pharmacists in other services.

xi. Stakeholders noted that the EMM system may offer decision support functionality that assists with Medications Reconciliation and AMS, leading to sites improving these areas after implementing EMM (leading to additional workload and possible workforce requirements).

It was noted that EMM itself doesn't require additional workforce to support Medications Reconciliation or AMS, but because of the increased functionality, sites were improving these areas of service following the implementation of the EMM system. It was noted from wider jurisdictional interviews that NSW has not had the same investment in pharmacy workforce to support Medications Reconciliation that has occurred in other states. This may result in EMM acting as a trigger to improve Medications Reconciliation and AMS requiring additional pharmacy workforce.

Section Five: Scenario Modelling

Scenario Modelling

Introduction

Qualitative analysis has identified that there are a number of factors expected to impact on the workflow, number and types of tasks and work effort changes when implementing an EMM system (from a paper based system). The following outlines the expected impact of each of these characteristics on the implementation of EMM for the pharmacy workforce.

While scenario generation usually involves the development of a number of scenario options, in this case these were not created due to the number of factors and the complexity of their possible inter-relationships. Due to these complexities, a tailored approach needs to be considered for each facility and LHD in which EMM is implemented, drawing on current capabilities, and addressing identified problem areas to enable productive and efficient use of the pharmacy workforce.

Approach

The approach to the development of the scenario framework included three key steps:

- 1) Identification of **key factors that were driving the different experiences** relating to contexts and settings. This involved identification of key factors that were driving differences in the experiences of those who had implemented a EMM system. This was gathered largely through detailed stakeholder interviews but also through workshop feedback and the experience from the literature. The remoteness of the site was added, despite there not being a regional or remote site whose experience would be drawn from. The pharmacy workforce stakeholders at the regional workshop outlined a number of key factors they felt should be considered for this context.
- 2) Once each of these six key factors had been identified (location, workforce resourcing and skill-mix, specialisation, system decisions, implementation approach and contextual/ baseline factors) the **specific areas of variance were identified**. This was done so that in the future LHDs can understand the complexity of these contextual factors and identify if and where these may change the impacts on the clinical pharmacy workforce for them.
- 3) The final step was the **development of the scenario framework** (Figure 3). This has been designed to be a reference framework that should be read in conjunction with the more detailed discussion in this section.

Limitations

The scenario modelling is limited by the experiences of stakeholders and feedback received to date from the small number of sites that have implemented EMM systems within NSW Health and across Australia. It is understood that as more sites implement EMM, this framework may need revision to account for other mitigation and or contextual factors.

In addition it is noted that the EMM Program area (eHealth) undertakes a maturity assessment of readiness for EMM at the hospital sites flagged for implementation. This assessment should be linked with the baseline and contextual factors part of the scenario framework.

Figure 3 : Scenario Framework

SCENARIO CONSIDERATIONS						
1	Location	Metropolitan	Regional		Rural	
2	Resourcing and Skill-mix	Pharmacist	Pharmacy Technician	Pharmacy Assistant	EMM Project/ Support role	
3	Specialisation	General Medicinal and Surgical	High Dependency (ED, ICU)	Paediatrics	Mental Health (including Justice and Forensic Mental Health)	Specialist Units (Renal Dialysis, Oncology, Transplant, Haematology, Immunology)
4	System Decisions	System Functionality	Interface and Interoperability	Governance Approach	Wider EMM Functionality	
5	Implementation Approach	Ward by ward v whole hospital	Implementation Timing	Lead site v non-lead site		
6	Contextual and Baseline Factors	Clinical Workforce (FTE and skill-mix)	Available Funding and Resourcing	IT infrastructure physical space	Governance and stakeholder buy-in	Clinical Engagement and education and training

Location

The level of remoteness is expected to impact on the workforce and workload impacts on the pharmacy workforce because of pharmacy staffing levels, hub and spoke models, ICT infrastructure and GP oriented models and systems and a need for coordination across LHDs as per the Rural eHealth Strategy.

Pharmacy staffing impacts

One of the reasons for this is the existing and historical resourcing and availability of the pharmacy workforce in regional and remote locations. The research by Health Workforce Australia into the pharmacy workforce in 2014 found that metropolitan cities have 101.6 Pharmacists per 100,000 in the population, while inner and outer regional locations have 73.6-79.3 Pharmacists per 100,000 in the population respectively, while those in remote or very remote locations have 61.8 to 39.8 Pharmacists per 100,000 in the population respectively.

Stakeholder consultation with the regional and remote pharmacy workforce in NSW Health supports the general finding that more regional and remote locations are not as well resourced across their pharmacy workforce, and are not able to leverage economies of scale in the same way as many of the metropolitan sites. This means any workflow and workload pressures as a result of EMM may be more acutely felt in regional and rural sites.

Hub and spoke models of service delivery

Discussion of issues facing Pharmacists from regional and remote sites across the pharmacy workforce, identified that many of the smaller sites operate in a 'hub and spoke' model that means they are reliant on support from the 'hub' site. This has implications for the EMM rollout, as if implemented across these smaller sites, they would continue to require significant support from the hub site as they have little or no Pharmacists at the smaller sites, and may need access to an AMS Pharmacist. While these smaller sites are not planned for EMM rollout in the near term, consideration needs to be given to an approach that is sustainable in these locations. This may place additional troubleshooting and technical support workload on the hub site. For smaller remote sites technology potentially enables improved access to pharmacy services.

ICT infrastructure

The ICT infrastructure in some of the regional and remote sites was flagged as a potential issue for workforce and workload impacts, particularly where there is limitations to the connectivity and speed of services, leading to additional time for those in rural sites to undertake the same task. In addition many of the rural LHDs have basic EMR functionality with mixed rates of adoption and clinical engagement. As EMR is sought as the foundation prior to EMM implementation, the same lower levels of maturity are expected initially with the EMM rollout.

GP v VMO models and systems

Stakeholder feedback reflected that the medical model in rural and remote sites often utilises General Practitioners (GPs) rather than Visiting Medical Officers (VMOs). It was noted that General Practitioners have their own GP-oriented systems to recoding information and that this may be a barrier to the successful adoption and implementation

of EMM at some sites. This may require targeted training for those who already understand and use the GP systems, and require Pharmacists who are performing a troubleshooting and technical support role to be aware of this when considering clinical adoption of the EMM system.

Rural eHealth Strategy- Coordination across LHDs

The Rural eHealth Program Roadmap and Action plan is expected to influence some of the regional sites in their approach to EMM. In particular this plan seeks to leverage investment in central resources (such as from the EMM Program) and will seek to work collaboratively across LHDs to minimise the need for re-work and duplicate effort in a constrained environment. This Rural eHealth Strategy is also expected to influence the sequencing of activities in eHealth, including EMM, over the next four years. Therefore those sites included in this plan may have particular planning, resourcing and governance considerations when implementing the EMM system.

Resourcing, skill-mix and capability

The levels of resourcing and skill-mix of the pharmacy workforce will have a significant impact on the workload, workflow and user interactions for the pharmacy workforce. Therefore a clear understanding of the current skill-mix, capabilities and scope of practice of the pharmacy workforce is critical prior to EMM implementation.

Resourcing

The current levels of resourcing are expected to have a significant impact on the capacity of the pharmacy workforce to effectively support and implement the EMM program. Stakeholder consultations with Pharmacists raised concerns that the NSW pharmacy workforce is currently under-resourced in some sites prior to EMM, with EMM then placing additional pressure on an already constrained workforce.

When considering the resourcing of the current workforce, it is important to note that there is no consistent approach to the current staffing models and skill-mix of the pharmacy workforce in NSW. For example, the FTE variation is between 1-76 FTE, with the majority of sites employing less than 10 FTE. The skill-mix variation is also significant between the Pharmacists, Pharmacy Technicians and Pharmacy Assistants. As sites make optimal use of their current workforce going forward, the existing skill-mix will make a significant difference to determining which role undertakes new and changed tasks in an EMM environment.

Legislative and policy environment

EMM is expected to impact on workflows and processes for the workforce – however critical consideration needs to be given to ensuring that quality and safety in clinical practice is supported through any change process and that Australian professional standards are upheld. This includes compliance with state and federal legislation for medications (including schedule 3 medications), consistency with guidelines released by the Pharmacy Board of Australia (including the '*Guidelines for the dispensing of medicines*'), professional practice standards and the Australian Pharmaceutical Advisory Council's guidelines (including the '*Guiding principles to achieve continuity in medication management*').

Scope of practice and task redistribution

The scope of practice of the Pharmacy Technician and Pharmacy Assistant workforces may need to be better understood prior to implementing EMM. It was noted that in stakeholder consultations across NSW, many sites currently utilise Pharmacy Technicians and Pharmacy Assistants interchangeably. However Pharmacy Technicians are more highly qualified than the Assistant workforce. One of the sites consulted reported a clear distinction in the Pharmacy Technician and Assistant roles, and supported a clear career pathway from Pharmacy Assistant to Technician.

Feedback from stakeholders who have already implemented EMM in NSW, suggest that to successfully implement EMM, redistribution of tasks may need to occur to ensure the workload remains evenly distributed across the workforce. It was the experience of one hospital that EMM resulted in an additional workload for their Pharmacists, and initially a decreased workload for their Pharmacy Technicians. This site reported that they had then

examined the roles undertaken by the Pharmacist and through this process, where able to safely delegate other tasks to the Pharmacy Technicians to balance the workload more evenly across their workforce. A safe delegation framework should be used to achieve this.

Key to the consideration of scope of practice and task redistribution will be the number and proportion of Pharmacists to Pharmacy Assistants and Technicians at each site. While not specific to the EMM program, pharmacy workforce models should consider the distribution of tasks between professions and ensuring that highly skilled staff at a higher pay rate are performing tasks that are appropriate to their level and skill.

Computer literacy

A further consideration when designing the workforce models under an EMM program will be the levels of computer literacy across the workforce. Change champions and troubleshooting roles are typically taken on by the pharmacy workforce to support EMM, and therefore the right people need to be selected in the organisation who will be able to drive these reforms and have high levels of computer literacy and problem solving. Those with low levels of computer literacy will need to be targeted in education and training to ensure they are able to effectively use the EMM system.

Education and training

The need for education and training to support EMM is critical and is required to enable the workforce to perform productively and efficiently. Education and training needs to not simply be a one off initial training for the workforce, but instead needs to include initial awareness and education and training and implementation, targeted training for specific issues and or users, periodic refresher training and ongoing vendor support. Stakeholder consultations also flagged that education and training should target those at low, medium or high capability levels to ensure that training is appropriate. If this education and training does not effectively occur, there will be significant workload impacts on the workforce as they transition to the EMM system.

Specialisation

Consideration needs to be given to the context and area of specialisation (if any) that the EMM system is being applied to. There are significant reported impacts on the system build and configuration, and these changes are also expected to have some impact on the workflow, workload and workforce requirements.

The area of specialisation is expected to have some impact on the workflow, workload and workforce requirements. However, the specific capability requirements for the pharmacy workforce working in these speciality areas, and the levels of complexity are unlikely to change in the move from a paper based to an EMM system. This analysis is therefore only intended to capture the *change* as a result of the EMM system.

Complex infusions and fluid balance

The Australian Commission on Safety and Quality in Healthcare's *'Electronic Medication Management Systems- Specialist Functions'*⁵ notes that complex infusions are still managed primarily on paper, even in EMM environments. While the EMM systems are believed to have the technical ability to assist Pharmacists in this regard, it was noted that they do not always align with current work practices, and in some cases introduce additional clinical risks- such as additional orders on a medication chart. From a workforce and workflow perspective, there is unlikely to be a significant impact from a paper based to EMM system.

As with complex infusions, it is noted in *'Electronic Medication Management Systems- Specialist Functions'*⁵ that fluid balance is still managed primarily on paper charts and as a separate clinical process to medication management. While some of the EMM systems in Australia are able to record fluid balance, it is not widely used potentially due to the lack of integration with other electronic systems. While this continues to remain a paper based task, the impact on the pharmacy workforce and workflow in moving to an EMM system is expected to be negligible.

Interface with existing systems

It was noted that in some specialist areas, a key workforce impact will be the work effort required, at least initially, to manage the interaction between the EMM systems and the existing electronic systems (for example Mosaik for oncology or Philips ICU system for ICU). The key workforce impact for these interface issues was duplication of records where the systems are not integrated and there is no interoperability. It also creates some concern about the 'single source of truth' and most up to date records for an individual patient.

High dependency (ED and ICU)

It is noted that Emergency Departments and ICU areas are often excluded from the initial rollout of an EMM system, resulting in a requirement to consider workflow and workforce impacts of a patient moving between a paper based to an EMM system, or between a specialist electronic system for ED or ICU, to the EMM system. The interoperability between systems and level of duplication of records required become key in understanding the workload impact of this. In addition the process of dealing with unverified orders and the discontinuation of orders was raised as an additional workload requirement for the pharmacy workforce in an EMM environment.

Paediatrics

The practice of medications management for the paediatric workforce differs from that for adults, particularly given that doses relate to the weight and size of the patient and small errors in doses for paediatrics may have a greater impact than in adult practice. This requires that the EMM system has certain functionality to accommodate these needs, however it is understood that the workforce and workflow impacts are similar to the broader pharmacy workforce- with different 'flags' required, and drug dosing decision support contextual to the paediatric setting.

Justice and Forensic Mental Health Network (JFMHN)

Stakeholder feedback suggests that the interface, availability and patient transfer issues will be more significantly felt in the JFMHN than across other clinical contexts. These include:

- The information technology infrastructure across the multiple corrections sites is vastly different, and at some sites may not be suited to supporting EMM (it is understood that some do not have computer access);
- The JFMHN operates across 90 sites across metropolitan, regional and rural NSW and therefore many of the same issues raised in the regional and rural hospital settings need to be considered in this context;
- It is noted that in NSW, the JFMHN area will not use the Cerner system, and therefore patient transfers between the JFMHN and other hospitals need to consider the workforce impacts of moving between different EMM systems. This is significant for the workflow in this environment because of the volume of patient transfers that occurs;
- Consideration needs to be given to accounting for lockdown environments which are not suited to hand held electronic devices or laptops on the wards; and
- Stakeholder feedback about this workforce was that it uses a nursing led model, and this may result in the nursing workforce needing to take a very active role in EMM systems and support, rather than the pharmacy workforce taking on these roles (as is often the case in hospital settings).

Mental health

While many of the workforce, workflow and work task impacts are expected to be the similar in mental health, some contextual differences need to be considered. These include:

- Hand held electronic devices may not be practical in this environment due to lockdowns (as with JFMHN);
- While complex medications may be administered (due to drug to drug interactions and dosage), these may remain stable for long period of time- this means the focus of decision support should be on new and changed medications and that system flags may need to be altered to prevent alert fatigue; and
- Dosage rules and decision support may also need to be modified for the mental health context.

Specialist Units (Renal Dialysis, Oncology, Transplant, Haematology, Immunology)

These units have been highlighted because of their reliance on medications including complex infusions, fluid balance, and repeat courses of medications. As is noted above complex infusions and fluid balance are still typically done in a paper based environment, however there may be adoption of EMM systems in time- in which case careful consideration would need to be given to workflow and workforce impacts. Much of the literature on these areas in EMM focuses on what the EMM system functionality should enable, rather than any differences in the clinical workforce impacts. This is an area that requires further consideration.

System Decisions

While Cerner is being used in the majority of EMM sites across NSW, there are some sites that will or are using other systems. It has been reported that some of the decisions made during the build phase of these systems will impact on the workflows, workforce and workload of the pharmacy workforce.

While this analysis aims to be solution agnostic, stakeholders noted that the way in which the system is designed for the specific hospital and the functionality of the system will result in some workforce impacts. While not all of the system and interface decisions or differences are listed here, those that have been reported to have a workforce impact are detailed below.

System functionality

There are a number of system functionality decisions that will impact on the processes, tasks and decision making that is required of the wider clinical workforce, including for the pharmacy workforce. The Australian Commission on Safety and Quality in Healthcare outline approximately fifty of these system functionality decisions.²

Stakeholder feedback suggests that one of these decisions - the level of system flags or alerts - is a key issue impacting on work tasks and flows once the EMM system is implemented. There can be a number of flags implemented in the system for medications management as alerts, these can be set at different levels depending on both the system that has been selected, and the needs of the facility. In NSW, the experience to date has been that the alert level has been set to high, leading to alert fatigue amongst the workforce and also requiring 'clicks' or entries to explain why a certain decision has been made. This is requiring more work effort than a paper based system, and alert fatigue resulting in some of the alerts being ignored, is impacting on some of the quality and safety benefits of having the system flags.

Interface with existing systems

To best support decision-making and reduce medication errors, the system chosen should have a high degree of interoperability or integration with existing electronic and decision support systems including those for diagnostic and pathology orders and results; adverse drug reactions and allergies; medication histories on admission; discharge prescriptions and summaries and pharmacy dispensing systems. The system decisions will impact on the capacity of the EMM chosen for a particular site to either include these functions, interact with existing systems that have these functions or have no interoperability, resulting in potential duplication of workload and effort which may increase the likelihood of errors.

Adoption of wider EMM functionality

It is noted that the EMM system doesn't just refer to the inpatient EMM system (including the introduction of electronic approvals and script signature, discharge and outpatient prescribing) but also may refer to electronic decision making systems that help to support AMS, Medications Reconciliation and other areas of medications management (such as upgrades to iPharmacy and barcode scanning). The impact of each of these electronic systems needs to be considered, including how these are phased into service delivery.

Governance

The system decisions need to be supported through strong governance and decision making structures at a local level to ensure quality and safety. This may include a Drug Committee or other forms of decision making governance to help guide the design and planning process for the EMM system that is being implemented. This will take considerable time and the approach to governance will impact on the work tasks during planning, as well as the future work tasks and workflows when the system is implemented.

Implementation Approach

There are a number of elements in the implementation approach selected at a site, which are expected to impact on the pharmacy workforce and their workload.

Ward by ward

Hospitals that are choosing to implement EMM in some wards prior to others (a phased approach) will need to consider workload impacts resulting from the transfer of patients from a paper based ward to an EMM ward (or vice-versa). This is expected to result in a level of duplication of records, and will require the EMM system to note that a patient is currently in a paper based ward (i.e. inactive in the EMM system).

In addition it was noted that EMM is often initially implemented in low turnover wards. As implementation is then introduced in high turnover wards there may be additional workload and workflow pressures to prescribe, dispense, administer and monitor medications to meet the high turnover needs - however many of the issues in transitioning from a paper based to electronic system will have been resolved from the low turnover wards. Workflow and process impacts of this need to be worked through prior to implementation.

Aspects of the Medications Management Continuum

Similarly to the above, sites may make a decision to phase the implementation of EMM across key aspects of the medications management continuum (for example initially excluding discharge functions). This means consideration needs to be given to the workflow and workforce impacts of moving between EMM and other paper based or non EMM systems as the patient progresses through the medications management continuum.

Duration of implementation

The duration of the implementation phase may make a significant difference to the workforce, workflow and work task changes experience by the clinical pharmacy workforce. For example, in consultation, one site implemented EMM over a number of years, while another site implemented within a 2-3 month period across the hospital. A shorter implementation timing may require additional workforce to assist the workforce during the implementation period, including Super Users, while a longer phased implementation may not require any additional workforce support. Transitional issues such as a need to duplicate records as patients move between paper and electronic wards will be more acutely felt in hospitals with a long implementation approach, whereas this will not be the case with a shorter roll-out. The merits of each approach should be considered locally to ensure the EMM implementation is successful and has buy-in and support from clinicians.

Timing

It is expected that the later the implementation of EMM implementation at a site, the greater the maturity of the supports, systems, processes and knowledge within NSW Health. The experience from implementing EMM in other sites will provide lessons learned, including workforce and workflow considerations, and will provide clarity on the role and functions provided by the EMM and eHealth Program. Therefore, the later the implementation timing for EMM the more likely that the workload and workflow design

and planning for transition and implementation will be comprehensive and efficiently managed. In addition it is expected that any additional workforce requirements needed for the ongoing support of the EMM system, including ongoing technical support, will be better understood as the rollout of EMM progress across sites in NSW.

Lead site

It is expected that the lead site of an LHD will, by definition, lead the way in the implementation of the EMM program within the LHD. This means these sites will be required to work through a number of issues particular to the context, system build and governance within the LHD, that other later sites will benefit from. While some of these impacts may not be felt by the pharmacy workforce, the impacts of this need to be considered. If the lead site will later provide a 'hub' service to smaller sites, this may lead to an additional workload requirement to assist that site or sites.

System Revisions- EMM Journey

It should also be noted that the EMM system and functionality will evolve over time and this means some issues, work tasks and workflow impacts that are experienced now may change over the coming years. Technological innovations will drive improvements to some of the current issues (such as interface and interoperability), education and training of the workforce will increasingly rely on electronic systems, and scope of practice for the pharmacy workforce will shift over time to adapt to an electronic environment. These factors and others will mean that the EMM systems and the workforce required will be an evolving and ongoing journey.

Handheld devices v desktop approach

A key difference in approach in other states has been the use of hand held devices and hospital wide WiFi, compared with a desktop or ward laptop approach. The hand held devices were found to make no difference to the amount of ward time the clinical Pharmacist (and wider pharmacy workforce) had, whereas if hand held devices were not being used, it was found that ward time and the amount of consumer interaction decreased. This decision is therefore expected to have significant workflow impacts, in terms of when and how tasks are undertaken.

State-wide role v local role

It was noted that many aspects of implementation could be determined at a number of different levels- either the local facility level, the Local Health District level or at a state-wide level. Such decisions may include the scope of system functionality that is adopted, governance around the design and planning of the EMM system, the timing and duration of implementation, the level of existing materials and resources (such as process mapping EMM position descriptions, change management, benefits realisation) and education and training required to support the implementation of the EMM system. It may be possible that while a local decision making approach is adopted for most things, there may be some things that are decided at a state-wide level (such as the decision to use Cerner as the NSW Health EMM provider). The degree to which EMM planning and implementation decisions are managed locally compared with state-wide will impact on the level of local workforce resourcing required to support EMM, particularly during the implementation phase.

Contextual and Baseline Factors

A maturity assessment needs to be undertaken to understand the contextual or baseline factors that exist at each site prior to the implementation of EMM. If any of these factors need greater maturity, there may be impacts on the workforce and workload effort required at that site to ensure that the EMM system is embedded and sustainable.

Clinical workforce

The resourcing and skill-mix across the broader clinical workforce will impact on the EMM readiness of the organisation and its capacity to effectively support and embed EMM. The resourcing of the current workforce across all disciplines will impact on the facility's capacity to take offline skilled individuals for EMM support roles including Super Users, system user design and testing roles, drug committee members and project support roles- (including for project planning, change management and education and training). If some of these roles are to be adopted by the clinical pharmacy workforce, the impacts on the clinical pharmacy workload may need to be considered (such as backfill, maintaining clinical competence, duration of the role, and whether the position can be split across more than one person to ensure both clinical and EMM skills and capabilities are developed and maintained).

Available funding and resourcing

The level of available funding and resourcing is expected to have an impact on the quality, supports and sustainability of the EMM system. It is noted that the NSW EMM program will be providing support for sites in their rollout of EMM, but consideration may need to be given to how the available funds will be allocated in planning phases. This allocation, and the amount of funds available may have an impact on the workforce able to assist with implementing and supporting the EMM program.

IT infrastructure and physical space

EMM implementation requires a level of maturity in IT infrastructure, which as outlined above may not be available (particularly in rural and remote sites). Therefore an assessment should be made as to whether the site planned for implementation requires further investment in IT infrastructure or physical space to effectively support and sustain EMM. If there is insufficient internet access, out of date infrastructure and desktop computers, insufficient access to electronic devices (including computers) and no physical space, there will be workload, workflow and workforce pressures as a result of EMM.

Stakeholder buy-in and sponsorship

As is noted in the literature, stakeholder buy-in and sponsorship and governance supports are critical to the success of EMM. This is critical with any significant transformation project, however the cost, scope and sustainability required to support EMM makes this imperative. This therefore requires involvement from the clinical pharmacy workforce.

Clinical engagement

Clinical engagement is critical to the success of EMM, including of medical, nursing, and allied health staff. It is noted by the pharmacy workforce that they often drive EMM

changes and therefore the engagement of this workforce is key to support other workforces in the adoption and successful implementation of EMM. This is because electronic medications management requires a clinical understanding of the available medications and their interactions; hospital processes in ensuring they are prescribed, dispensed, administered and monitored correctly; and clinical decision-making around medications histories, adverse drug reactions and pathology orders and results; Pharmacists are often the change champions, trouble-shooters and clinical and technical support for these systems.

Section Six: Impact Analysis

Impact Analysis

Introduction

For the purposes of this report, an Impact Analysis was identified as the preferred approach, because the quantitative and economic data required to complete a Cost Benefit Analysis wasn't available in the NSW context. The issues outlined in this Impact Analysis would be considered in a Cost Benefit Analysis if quantitative data were available. Broadly speaking, an Impact Analysis examines the influence of the reform on the current operating environment. This project is specifically interested in the workforce implications as a result of the EMM reforms.

This Impact Analysis collates the information gathered in previous phases and provides an assessment of the impact of EMM on the pharmacy workforce. There are a number of limitations to this Impact Analysis due to the scope of this project and the available information at this time which is qualitative in nature. The final conclusions therefore need to be interpreted with limitations in mind, understanding that further work in this area (as highlighted in the Opportunities section) would strengthen the evidence base and provide a holistic view of the impact of EMM given the wider workforce impacts and the benefits of this reform.

Approach

This Impact Analysis draws its methodology from the work of Drummond et. al. (2005) who developed an economic evaluation framework with specific application to health interventions.³⁴ Based on this framework the following approach was undertaken:

1. Defining and **understanding the broader context**, and therefore limitations of this Impact Analysis. Through understanding the intervention being proposed, and the key question under review, it can be seen that the impacts and benefits of EMM are much broader than the workforce, work task and workflow impacts on the pharmacy workforce. This is important as most cost benefit and impact analysis techniques seek to draw a conclusion about whether the intervention being proposed is advisable given the relative worth it provides against the current state. In this case, the Impact Analysis looks at only one part of a much bigger reform.
2. Developing the **Impact Analysis framework specific to this project**. According to Drummond et.al. (2005), this includes understanding the reform under review, defining the key question under evaluation, identifying contextual factors and providing the framework for measuring these impacts (taking into account the methods used in this report including the literature review, stakeholder interviews, workshops, case studies and scenario modelling).
3. Drawing together the evidence to develop the **Impact Analysis findings**. This defines the key focus areas and measures (based on the Impact Analysis framework), outlines the key changes of EMM (based on the wider context), and then outlines the impacts in the planning, implementation and embedding phases of EMM. Finally, this Impact Analysis outlines the overall finding of the analysis to date across workforce, work task and workflow areas.

Defining the Broader Context

As is noted in this Report, the key driver for the implementation of EMM is to achieve a number of improved outcomes and benefits compared with a paper based environment (including benefits around quality and safety, information sharing and availability and decision making support). The impetus of EMM is not workforce driven, that is the impact on the clinical workforce is a consequence, not the goal, of EMM reforms.

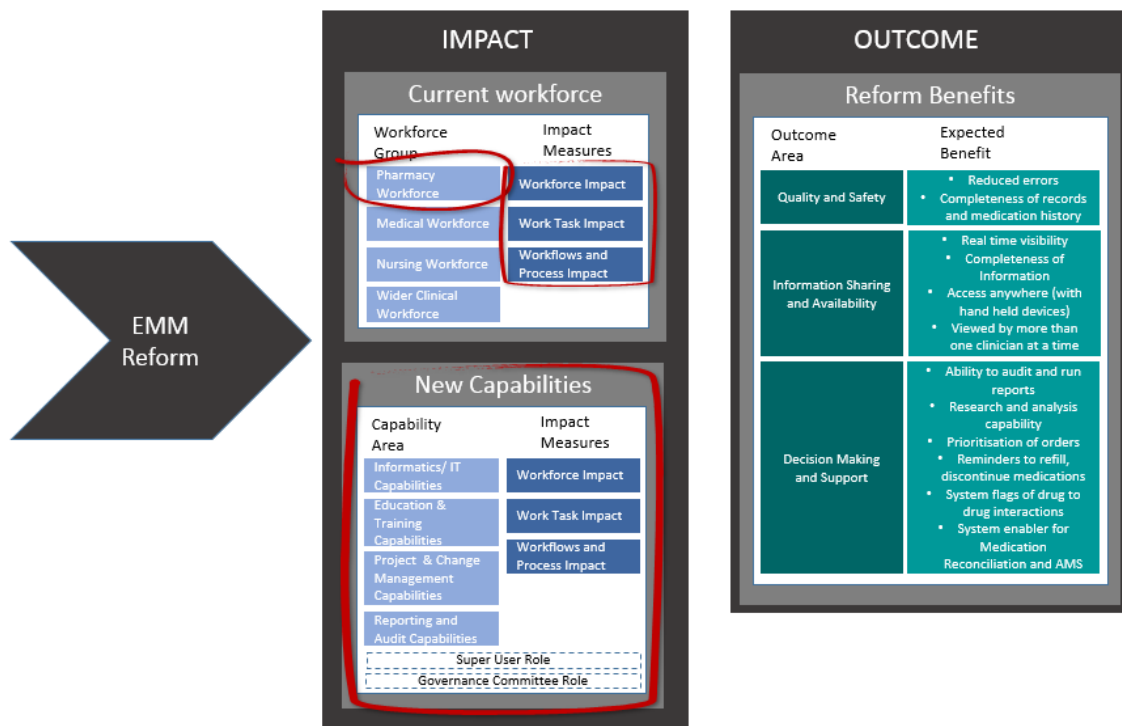
There are many impacts of the EMM reforms, however Figure 4 shows only those relating to the clinical workforce. There will be impacts of the EMM reform program across a variety of clinical workforces including nursing and medical staff. However this project has only examined the pharmacy workforce impacts.

EMM creates a need for new capabilities to support the planning, implementation and embedding of the reform. These include:

- informatics and IT capabilities;
- education and training capabilities (with specific understanding of the system (e.g. Cerner) and its functionality); and
- project and change management capabilities.

It also requires portions of the workforce (whether existing or new) to be trained as Super Users and to attend meetings that support the governance and decision making for the project. The scope of this project only examines these new workforce roles to the extent that they require the pharmacy workforce to undertake these tasks, noting that the number of Pharmacists in the multidisciplinary team delivering these new functions will vary from site to site.

Figure 4: Scope of this Impact Analysis



Caution should be taken to consider the outcomes of this impact analysis within a broader evaluation context. Conclusions in terms of the workforce impact also need to be understood in the wider context, with consideration given to the workforce, work task and workflow impact EMM has on the medical, nursing, wider clinical and 'new' workforces.

Impact Analysis Framework

The Impact Analysis Framework in Figure 5 is based on consideration of Drummond et al.'s (2005) 10 key questions in their general framework for economic evaluation. Each aspect is described further below:

Reform – It is important to understand what the key reform is that is being analysed, as well as the alternative option(s). In this case the reform is EMM, with the alternative being the current paper based environment. The Impact Analysis is designed in relative terms, comparing workforce, work task and workflows based on the current paper environment. It is not within the scope of this project to examine the different EMM systems (e.g. Cerner and MedChart), and instead analysis is system agnostic.

Key question –The Impact Analysis must answer a clear and specific question. This project is limited to in scope the workforce, work task and workflow impacts of the pharmacy workforce (pharmacists, Pharmacy Technicians and Pharmacy Assistants).

Contextual factors – This part of the framework has been developed to explain the uncertainty in the application of these findings to all hospital contexts in NSW Health. Key differences include location, current resourcing and skill-mix, differences in baseline readiness for EMM, selection of the EMM system, functionality and components, contexts (including specialities), and the implementation approach including timing of implementation. As these factors were outlined in the scenario modelling for this project, the Scenario Framework (page 37) forms the basis of this piece.

Impact measurement – This specifies the measures to be considered in examining the three key workforce areas under review. It should be noted that the limitations of these measures are those that have been possible through qualitative information gathered through the literature, stakeholder interviews, workshops and scenario modelling. They are also limited by the small number of sites within NSW who have planned, implemented and embedded EMM systems to date.

Impact Analysis Findings

The findings from the Impact Analysis are shown in Figure 6, and are based on the methods undertaken in previous phases of this project. Each aspect is described further below.

PeWI key focus areas and measures - This outlines the three key impact areas - workforce, work tasks and workflow - that are in the evaluation framework. For each of these there are a number of key measures as outlined in the Impact Analysis Framework.

The key measures for **workforce impacts** are FTE and skill-mix of the pharmacy workforce, however scope of practice may also be impacted as a result of these changes.

Figure 5: Impact Analysis Framework

Reform

Implementation of Electronic Medication Management (EMM) from paper based system

Key Question

What are the pharmacy workforce, work task and workflow impacts of EMM Implementation?

Contextual factors

SCENARIO CONSIDERATIONS

1 Location	Metropolitan	Regional	Rural		
2 Resourcing and Skill-mix	Pharmacist	Pharmacy Technician	Pharmacy Assistant	EMM Project/ Support role	
3 Specialisation	General Medicinal and Surgical	High Dependency (ED, ICU)	Paediatrics	Mental Health (including Justice and Forensic Mental Health)	Specialist Units (Renal Dialysis, Oncology, Transplant, Haematology, Immunology)
4 System Decisions	System Functionality	Interface and Interoperability	Governance Approach	Wider EMM Functionality	
5 Implementation Approach	Ward by ward v whole hospital	Implementation Timing	Lead site v non-lead site		
6 Contextual and Baseline Factors	Clinical Workforce (FTE and skill-mix)	Available Funding and Resourcing	IT infrastructure physical space	Governance and stakeholder buy-in	Clinical Engagement and education and training

How will these impacts be measured?

Workforce Impact	<ul style="list-style-type: none"> Quantify changes to FTE of clinical pharmacy department (3 phases -planning, implementation and embedding EMM reform); Quantify changes to skillmix of clinical pharmacy department (3 phases -planning, implementation and embedding EMM reform); Quantify additional pharmacy workforce required in project, technical, supporting and governance roles for EMM ((3 phases- planning, implementation and embedding EMM)
Work task Impact	<ul style="list-style-type: none"> What new work tasks are created by EMM (type and duration) (3 phases -planning, implementation and embedding EMM reform); What current work tasks are increased or decreased by EMM (type and duration) (3 phases -planning, implementation and embedding EMM reform); What current work tasks change or cease as a result of EMM (type, change and duration) (3 phases -planning, implementation and embedding EMM reform);
Workflow Impact	<ul style="list-style-type: none"> How does the process (order of tasks, number of steps, role of the system) change with EMM (pre and post EMM reform?) How does the interaction with other clinicians change (process, duration, user interaction method); How does the interaction with clients and their families change (process, duration, user interaction, method)

Work task changes seek to identify the new, changed and obsolete tasks that occur as a result of EMM, but with each of these comes a time (duration) change. It is the accumulation of these time and task changes that may result in a workforce change (through the FTE, skill-mix or scope of practice).

The **workflow and process impacts** seek to measure how tasks may change and when they might change (the ordering of tasks) as a result of the reforms. These changes also impact on the user interactions with the pharmacy workforce, other clinicians and health consumers. This aligns with workflow mapping undertaken as part of the EMM program.

EMM key changes – This outlines the key changes that are expected as a result of the EMM reforms, providing context to the Impact Analysis.

Specific impacts – planning, implementation and embedding phases - This part of the Impact Analysis seeks to clearly articulate the key changes that are expected across each of the workforce, work tasks and workflow impacts during each phase of implementation.

Overall impact- Workforce: The overall workforce impact of the reforms suggests ***that if the current workforce is sufficient prior to EMM, there is no anticipated change to the clinical pharmacy FTE and skill-mix as a result of implementing EMM.*** However, significant variance in the baseline pharmacy workforce across NSW facilities suggest that some facilities may be under-resourcing their hospital clinical pharmacy workforce. The new roles created by EMM drive the need for an additional multidisciplinary workforce, however in all case studies reviewed, senior clinical Pharmacists have formed a key part of these project, change management and/or clinical and system support roles for EMM and resourcing allowances have been made accordingly.

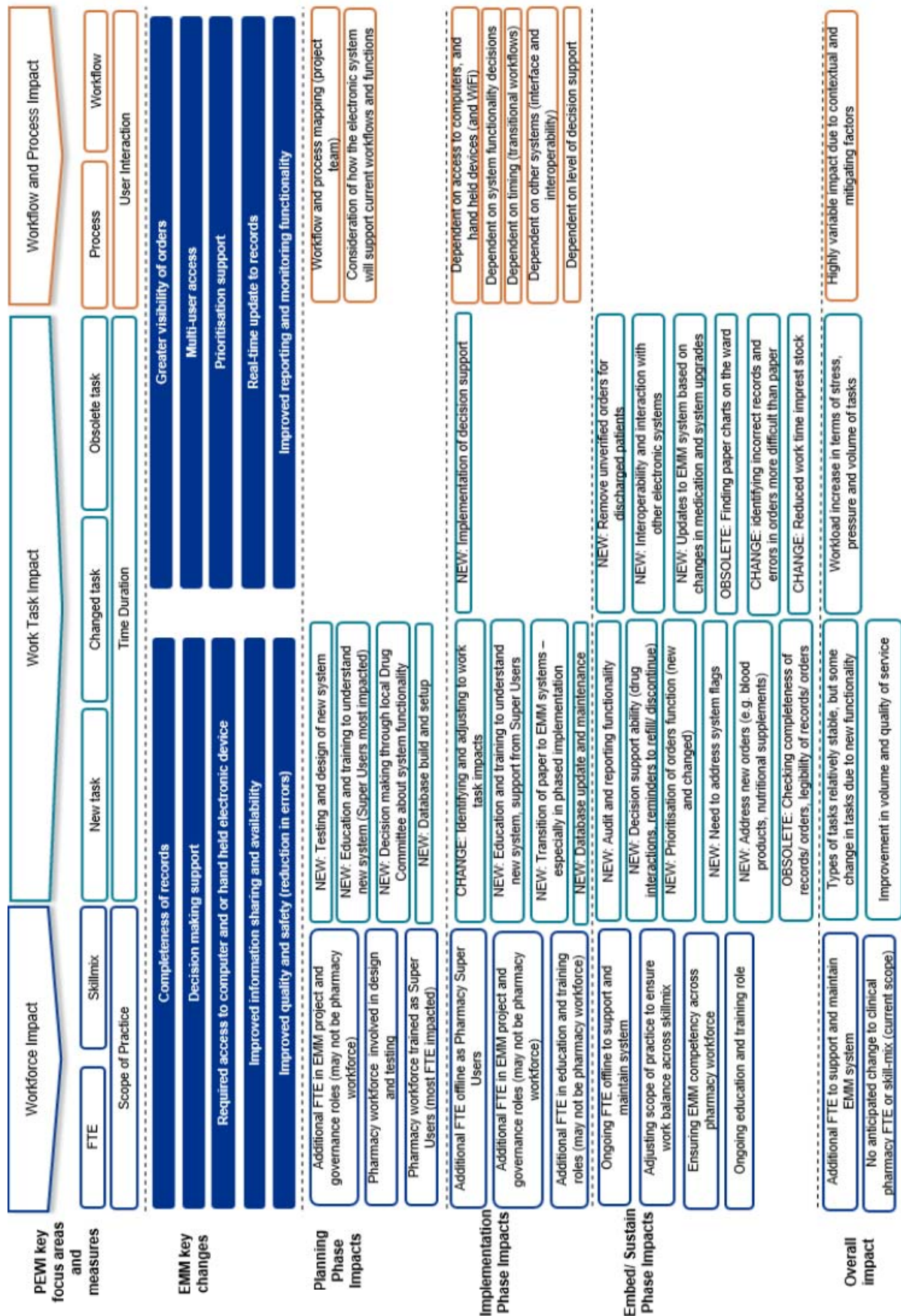
Overall impact- Work tasks: The work task impacts of EMM show that there are a number of new, changed and obsolete tasks as a result of the EMM reforms. Overall the types of tasks remain relatively stable with the key changes occurring as a result of the EMM system functionality.

Most sites who have implemented EMM report that overall workload (measured in time) is the same in a paper based environment compared with an EMM environment. This is because while some new tasks are created, this is offset by a saving in time for other tasks. Some stakeholders felt that that workload, measured in terms of workplace stress, pressure and volume of tasks, increase in the EMM environment. This is because under EMM there is a greater volume of orders that are seen and an improvement in the quality of services due to the ability to prioritise and have greater visibility of all orders, which is not possible in a paper environment.

Overall impact- Workflow: The workflow and process impacts are very variable based on the system decisions, methods of electronic delivery, implementation and timing decisions, interface and interoperability with other systems and the EMM components being implemented. For example, one hospital that implemented an EMM system chose to provide all Pharmacists with hand-held electronic devices and ensure WiFi access throughout the hospital. This has meant that there has been no positive or negative impact on the ward time and consumer interactions compared with the previous paper

system. This contrasts with the experience of another hospital which is reliant on desktops and laptops on each ward and did not use handheld devices. Their anecdotal experience has been that clinical Pharmacist's ward and consumer interaction time has lessened as a result of EMM. Therefore the overall impact in this areas is noted as being highly variable due to contextual factors.

Figure 6: PeWI Workforce Impact Analysis Findings



Section Seven: Workforce Principles

Workforce Principles

Introduction

This section outlines workforce principles to assist LHDs with the implementation of EMM. As the scenario modelling notes, there are a range of contextual factors which may vary the workforce impacts. This approach seeks to promote optimal use of the existing pharmacy workforce wherever possible and draw on current resources to guide best practice workforce skill-mix and design for the changes expected as a result of shifting from a paper to an electronic system.

Approach

To inform the development of these workforce principles three key areas of input were analysed:

1. Existing guidelines on the implementation of **Electronic Medication Management Systems** in Australia. This included *Electronic Medication Management Systems- A guide to Safe Implementation (2012-ACSQH)*; *Document Review on the EMMS A Guide to Safe Implementation (UnitingCare)*; and the *Document Review on the EMMS A Guide to Safe Implementation (Mater Pharmacy Services)*.
2. Pharmacy specific documents relating to the **scope of practice and role of clinical hospital Pharmacists** in Australia. Of particular relevance are the Society of Hospital Pharmacists of Australia Practice Standards as published in the *Journal of Pharmacy Practice and Research* or *The Australian Journal of Hospital Pharmacy*, especially Chapter 9 - Staffing levels and structure for the provision of services, and Chapter 12 - Pharmacy Assistants and technicians supporting clinical pharmacy services.
3. Best practice **health workforce considerations** around education and training, delegation, workforce models and skill-mix and an understanding of the applicable legislation (particularly around medications) and health practitioner registration (with Pharmacists registered under the National Registration and Accreditation Scheme). This included the NSW Health *Allied Health Assistant Framework* Guideline, *Guidelines for the Dispensing of Medicines*, *The Guiding Principles to Achieve Continuity in Medications Management*, and the Pharmacy Assistant and Technician qualifications in the Health Training package.

Workforce Principles and Guidance

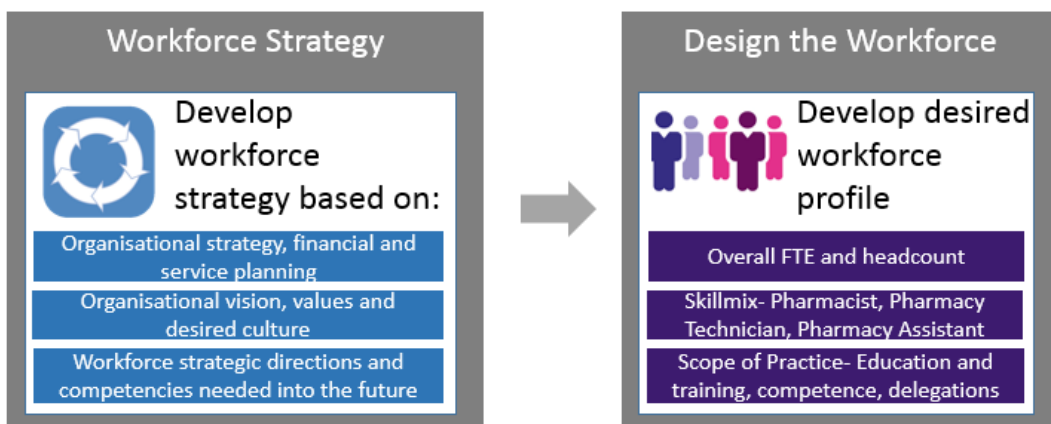
Six key principles have been developed to support optimal use of the clinical pharmacy workforce while implementing EMM. Each of these principles is discussed further in this section, including supporting resources and tools.

Figure 1: Workforce Principles

1. *Designing a workforce that meets business needs*
2. *Ensure staffing levels are sufficient to meet current practice requirements*
3. *Determine pharmacy workforce needed for change management, project management and clinical and technical EMM support roles*
4. *Optimise the existing workforce, re-balancing workload as needed*
5. *Optimise pharmacy workforce if new roles are required*
6. *Adjust workforce during planning, implementation and embedding phases of EMM*

1. Designing a workforce that meets business needs

Figure 7: Designing a workforce that meets business needs



In many cases, the workforce resourcing and skill-mix at a hospital is based on the historical funding allocation. This workforce principle ensures that the workforce is designed in a way that enables the best opportunity to deliver and drive the strategic and organisational objectives. Consideration of the workforce is critical to the business architecture as a key piece of transforming the strategy into practice. Resourcing decisions need to be made on the workforce the business requires, instead of resourcing based on the historical model of care.

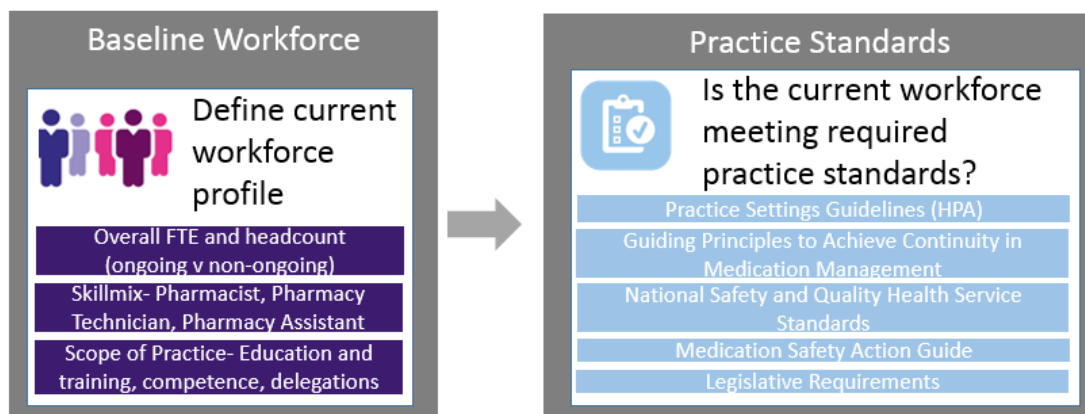
The first step, once the strategic and business goals of the organisation are clear, is to define a sustainable workforce strategy over the medium to longer term that captures the capabilities needed for the organisation now and into the future. This will require an understanding of the contextual factors that are expected to apply to the workforce in

the medium to long term horizon (such as those discussed in Section 2). Importantly any workforce planning needs to be integrated and aligned with strategic, financial and service planning. Other key elements are alignment to vision and values of the organisation, setting strategic directions for the workforce (around areas such as capability development, sustainability, efficiency and productivity).

Once the workforce strategy and capabilities for the future have been identified, the design of the pharmacy workforce can be achieved by matching the needed capabilities with roles (Pharmacist, Pharmacy Technician and Pharmacy Assistant) and levels. If this differs from the current workforce profile, there may need to be a transitional plan to achieve the desired workforce design as people retire or resign from the workforce.

2. Ensure staffing levels are sufficient to meet current practice requirements

Figure 8: Evaluating current pharmacy workforce with current practice requirements



Prior to implementing EMM, it is recommended that baseline staffing levels are adjusted where needed to meet current hospital pharmacy (or equivalent) practice standards. This requires an understanding of the current pharmacy workforce including:

- Overall FTE and headcount, including consideration of ongoing and non-ongoing positions;
- Understanding the skill-mix of the workforce (including number of Pharmacists, Pharmacy Technicians and Pharmacy Assistants; and
- Assessment of the current scope of practice of the workforce, including levels of education and training, competence, use of delegation frameworks and available supervision.

Consideration may also be given to rostering where the hospital pharmacy hours of service require a roster to cover extended hours or weekend hours.

Once this is understood, an assessment needs to be made as to whether the current workforce is able to meet required pharmacy practice standards. This includes consideration of:

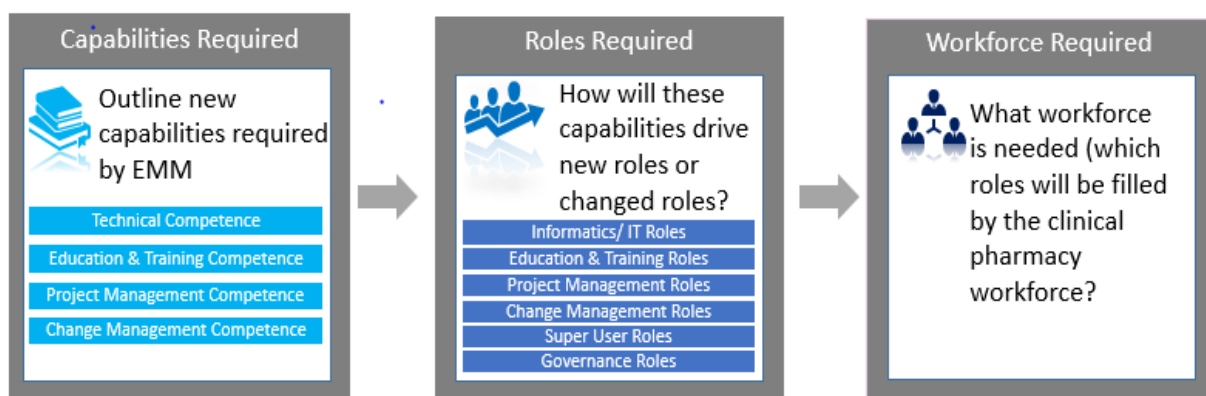
- Clinical pharmacy service delivery that is able to support the *Guiding Principles to Achieve Continuity in Medication Management*; *National Safety and Quality Health Service Standards (particularly Standard 4 on medication safety)* and *The Australian Safety and Quality Goals for HealthCare: Medication Safety Action Guide*;

- Additional resources that can be dedicated to clinical pharmacy management, drug protocol management, AMS and Medications Reconciliation with consideration given to the size and scope of the clinical pharmacy service;
- Legislative requirements and guides for the handling of medications, including the supply of drugs of addiction and restricted substances. This includes *Approved Systems for Recording the Supply of Substances on Prescription generally or in an Emergency to Health Professionals*; *Criteria for Issuing Non-Handwritten (Computer-Generated) Prescriptions*; *Drugs of Addiction (Schedule 8)*; *Guide to Poisons and Therapeutic Goods Legislation for Pharmacists*; *Guide to requirements of Poisons and Therapeutic Goods Legislation for the Supply of Schedule 3 Substances*; *Schedule 4 Appendix D Drugs ("Prescribed Restricted Substances")*.

Key resources that may assist in understanding whether the current needs are being met effectively are summarised in Appendix B outlined below. The latest versions of these resources should be sourced when determining whether baseline needs are being met.

3. Determine pharmacy workforce needed for change management, project management and clinical and technical EMM support roles

Figure 9: Evaluating current pharmacy workforce with current practice requirements



Principle 3 involves evaluation of the need for clinical Pharmacists to take on EMM responsibilities, which may include change management, project management and clinical and technical support roles. To be able to assess this, there should be an initial understanding of the capabilities that will be required, and how these are expected to change during the planning, implementation and embedding phases of EMM.

Some of the roles required will be new roles and some undertaken by the clinical pharmacy workforce within their current workload. A model that has been used in the Australian context is to job share one of the new roles created by EMM with a clinical workload (e.g. 2 Pharmacists each working 0.5 on the project and 0.5 on their clinical workload for a 1 FTE project position).

Clinical pharmacy role

The Australian Commission on Quality and Safety in Healthcare's *EMM Implementation Guide in 2011* (2nd edition) discusses the role of Pharmacists in EMM implementation, noting that they should at a minimum²:

- be involved in the specification, selection, user acceptance testing and evaluation of the EMM system, and provide feedback on the required functionality and usability;

- be involved in selecting clinical decision support tools to be used in the EMM system, the alert activation level and configuration of alerts; a balance is required between too many alerts (resulting in alert fatigue) and the need for essential alerts to ensure safe use of medicines;
- be involved in developing the baseline indicators for evaluating the effectiveness and safety of the EMM system;
- record clinical and supply information when reviewing medication orders to ensure other clinical users have the information they need to manage the medication orders; and
- be responsible for updating and maintaining the public hospital formulary, standard order sets and order lists, and managing clinical decision support-related databases in the EMM system.

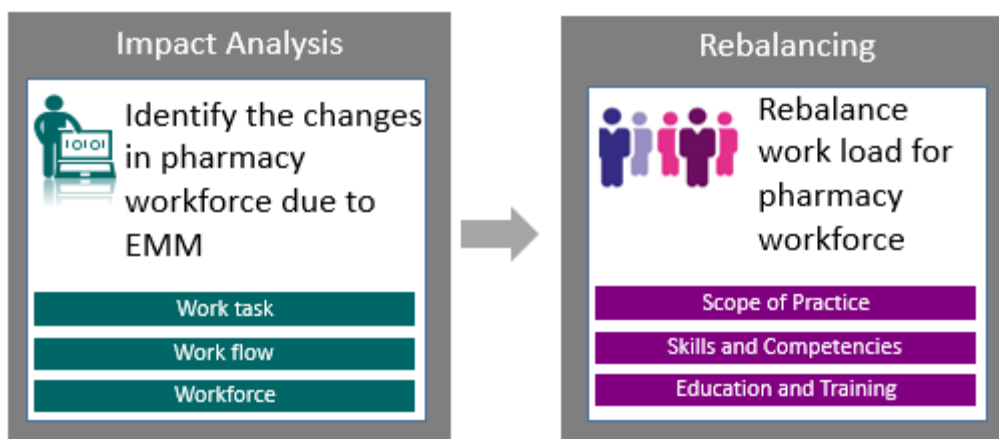
New roles undertaken by clinical pharmacy workforce

The EMM Implementation Guide² may assist LHDs in understanding the governance arrangements that may need to be established to help support the EMM reforms. This includes consideration of Pharmacists for a variety of support roles (project sponsor, project board, project team, champions and change agents, education and training and ongoing resourcing to maintain the system). This Implementation Guide recommends that at least 1 FTE clinical Pharmacist should be dedicated to maintain EMM content to ensure sustainability.

It is important that for each of these roles consideration is given to the specific skillsets and knowledge required and other alternative workforce groups that may be able to deliver these roles. This may include nursing, ICT, medical, allied health and administrative roles. If clinical Pharmacists are required, consideration needs to be given to the impact this will have on the current pharmacy staffing levels (and whether backfilling or recruitment is required). It is noted that best practice EMM suggests a multidisciplinary approach to EMM, and therefore these roles should be undertaken by a range of clinical professions to promote clinical buy-in and support.

4. Optimise the existing workforce, re-balancing workload as needed

Figure 10: Re-balancing workload following Impact Analysis



Principle 4 aims to make best use of the existing clinical pharmacy workforce. A key part of this is monitoring and quantifying changes to workload, work tasks and workflow that are likely to occur or have occurred as a result of EMM. The Workforce Impact Analysis should assist with this analysis and planning.

Re-balancing of tasks or roles may be required to ensure that the work effort is shared across the pharmacy workforce and that the workforce is working to its full scope of practice. For example, in one setting the impact of EMM was most acutely felt by the Pharmacy workforce, with the Pharmacy Assistants and Technicians having more available time as a result of the reform. Therefore a re-balancing was undertaken to safely delegate some tasks (as appropriate to their scope of practice) from the Pharmacists to the Pharmacy Technicians. It is critical to only delegate those tasks where it is safe and appropriate to do so. The *Allied Health Assistant Framework* provides guidance on this and is discussed further in this section.

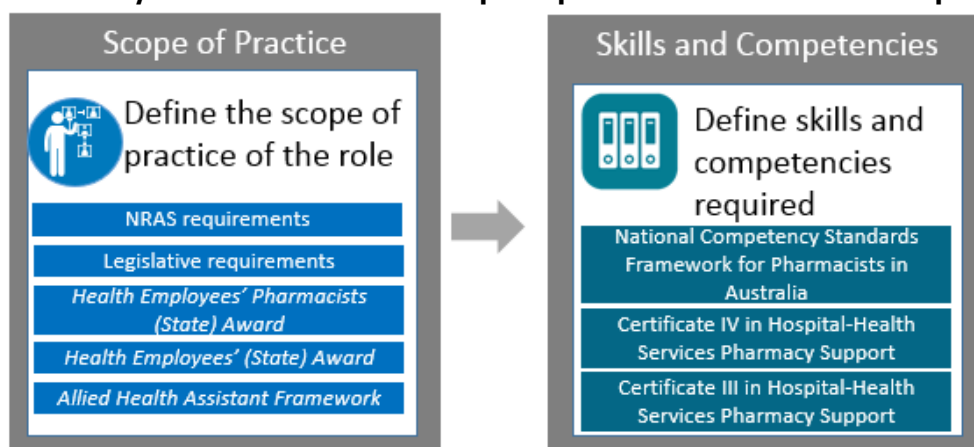
5. Optimise pharmacy workforce if new roles are required

In accordance with the recommendations of the *Special Commission of Inquiry into Acute Care Services in NSW Public Hospitals* (The Garling Report) (2008)²⁷, the NSW Health workforce needs to be realigned to ensure patient centred care, service delivery by a multidisciplinary team with components of care performed by a health care provider utilising the best mix of skills, qualifications and experience to deliver quality healthcare. A key aspect of this is enabling the assistant workforce to take on tasks that allow health professionals to focus on more complex service delivery tasks and develop extended scope of practice roles to further support increasing health care demands.

This means that if additional workforce is required to support EMM implementation, consideration needs to be given to the workforce that best meets the capabilities required, including the appropriate level of decision making, clinical knowledge, supervision and guidance required.

To be able to best assess this, there needs to be an understanding of the scope of practice and skills and competencies (based on the education and training requirements) for the Pharmacist, Pharmacy Technician and Pharmacy Assistant roles.

Figure 11: Pharmacy resources to define scope of practice and skills and competencies



Scope of Practice

The scope of practice of Pharmacists is not explicitly defined in Australia, although all Pharmacists are required to meet the national registration requirements (and have up to date registration) under the National Registration and Accreditation Scheme. This includes meeting the continuing professional development and education and training requirements specified by the Pharmacy Board of Australia. The *Health Employees' Pharmacists (State) Award* also sets out some competency criteria²⁸.

For the supplementary workforce, discussion of how scope of practice integrates with skills and competencies, position descriptors, supervision and delegation, and responsibilities and accountabilities is set out in the Allied Health Assistant Framework.

While the specific scope of practice of Pharmacy Technicians and Assistants is not set out in the Allied Health Assistant Framework, typical duties and associated grades are set out in the *Health Employees' (State) Award (NSW)*.²⁹

Skills and Competencies

The skills and competencies of the pharmacy workforce are defined by the education and training they receive as well as professional practice standards. In the case of Pharmacists, education and training requirements, including continuing professional development requirements, are defined by the Pharmacy Board of Australia. In addition Pharmacists have national competency standards that have been created. Pharmacy Technicians and Assistants are unregistered health professions, and therefore their skills and competencies are best defined through their education and training (as with other allied health assistant roles).

Pharmacist

The competencies required of Pharmacists in Australia are set out in the *National Competency Standards Framework for Pharmacists in Australia (2010)*, for which the Pharmaceutical Society of Australia is the custodian. This sets out eight key domains required of Pharmacists which include³⁰:

1. Professional and ethical practice;
2. Communication, collaboration and self-management;
3. Leadership and management;
4. Review and supply prescribed medicines;
5. Prepare pharmaceutical products;
6. Prepare pharmaceutical products;
7. Promote and contribute to optimal use of medicines; and
8. Critical analysis research and education.

Pharmacy Technician and Assistant

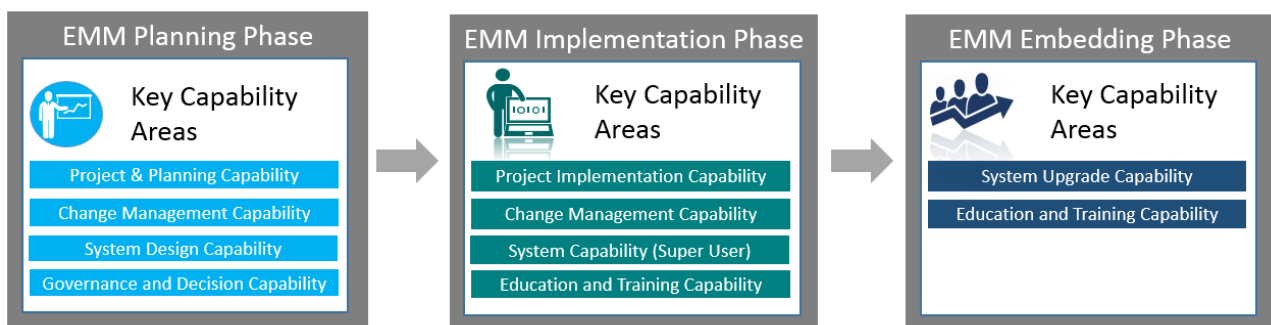
The Allied Health Assistant Framework³¹ provides guidance on the skills and competencies of the professions in this workforce, including support for Pharmacists. The nationally recognised education and training qualification guides the scope of practice suitable for these professions.

However the *Allied Health Assistant Framework* does not currently include the Pharmacy Technician or Pharmacy Assistant qualification in the skills and competencies section. Appendix C provides guidance on the core units of competency for the Pharmacy Assistant and Pharmacy Technician (elective units are also available for these qualifications).

Once the scope of practice and skills and competencies are understood for any required roles these can be matched against the scope of practice and skills and competencies for the pharmacy workforce to ensure optimal use of the workforce.

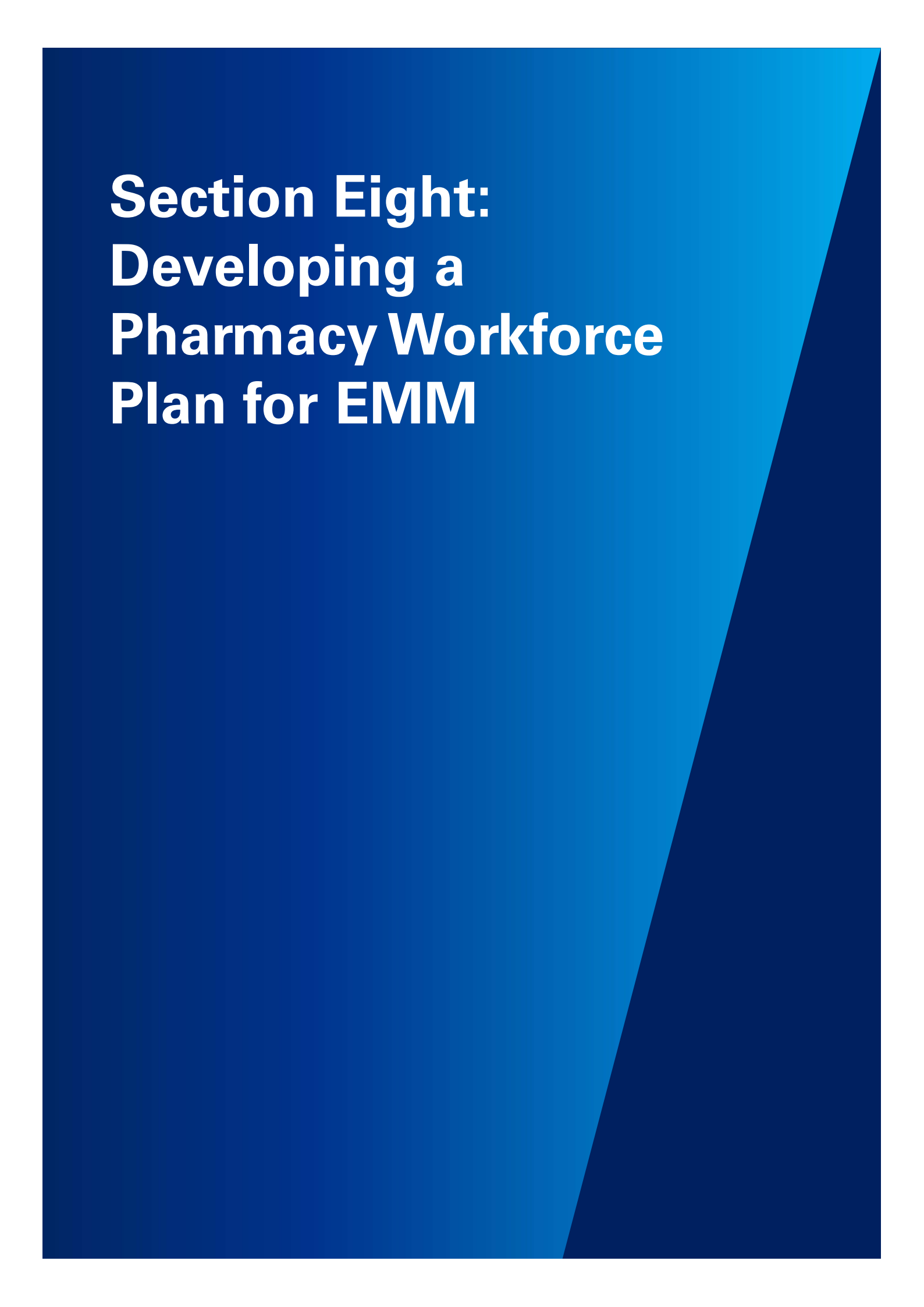
6. Adjust workforce during planning, implementation and embedding phases of EMM

Figure 12: Key capability areas required for planning, implementation and embedding EMM



As is noted in the Impact Analysis, the roles and tasks required by the pharmacy workforce to support EMM are expected to change over time as the EMM reform moves through the planning, implementation and embedding phases. It is important to consider this when planning for workforce impacts to ensure that short term project oriented positions are planned, funded and advertised as such, while ongoing permanent positions to embed EMM are also planned, funded and recruited appropriately. This will assist in providing the needed capabilities at the time when they are needed to support EMM.

This may be strengthened during implementation through a local capability survey. From this tailored learning and development programs can be implemented to address key capability gaps.



Section Eight: Developing a Pharmacy Workforce Plan for EMM

Developing a Pharmacy Workforce Plan for EMM

Introduction

This section seeks to provide the LHDs with some user-friendly reference resources to assist them in managing the pharmacy workforce impacts during the implementation of EMM. These have been developed based on the previous phases.

Tools

Three key tools have been developed to assist the LHDs. These are:

1. Approach to Workforce Impact Analysis– Impact of EMM reform on the Pharmacy Workforce.

This outlines the key steps and considerations each facility's EMM project team needs to consider when planning for the impacts of EMM on the pharmacy workforce. It sets out the key considerations and monitoring that needs to occur during the planning, implementation and embedding phases. More detail on each of these steps is provided throughout this report, but particularly in the Workforce Principles section.

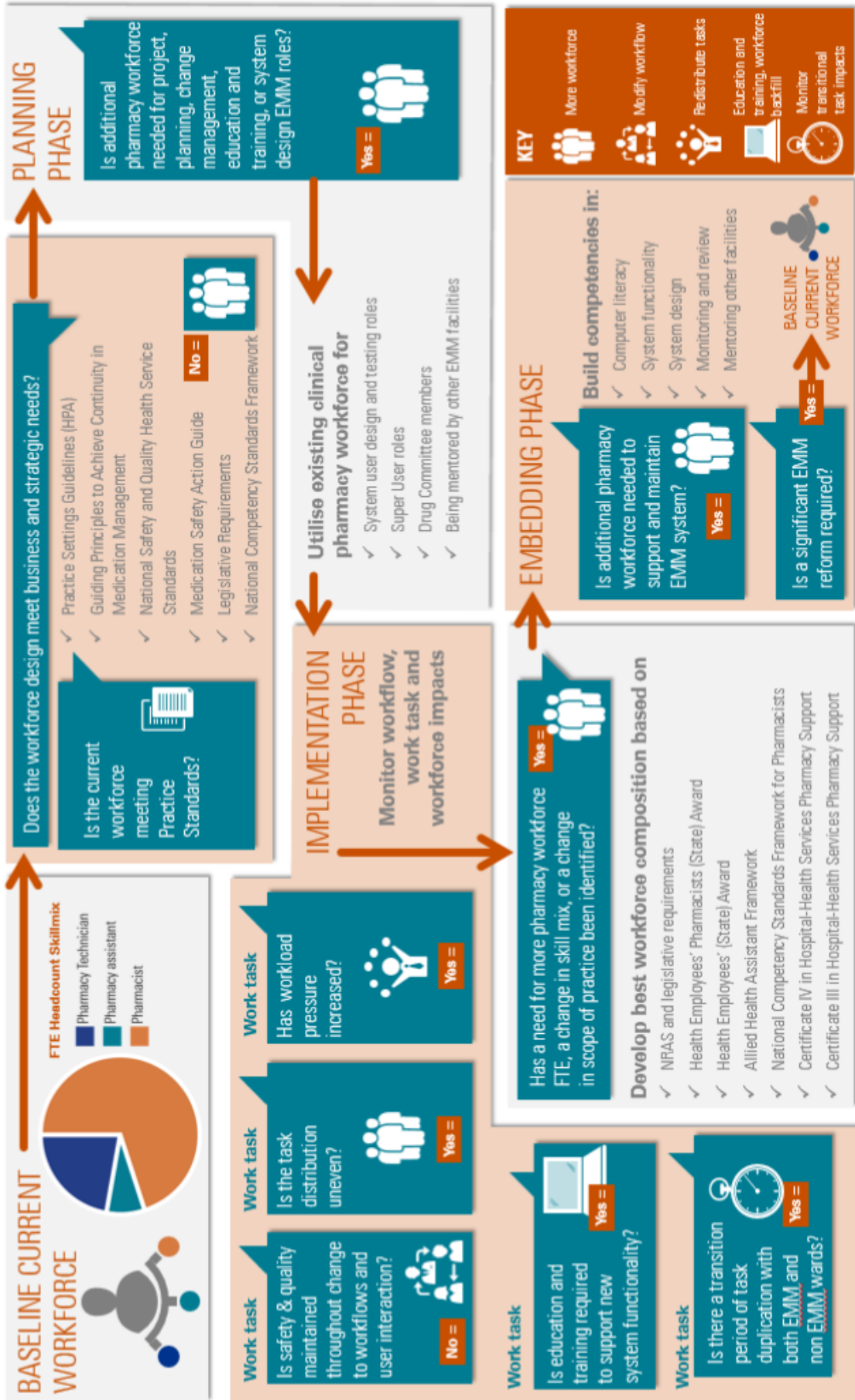
2. Scenario and Risk Assessment- Contextual Factors

This provides a high level overview of the contextual factors that may put sites at a higher risk of requiring additional pharmacy workforce FTE to support the EMM initiative. LHDs need to consider which of these factors apply to them and the interplay between these factors as they impact on resourcing and workforce needs. More detail on each of these factors is provided throughout this report, but particularly in the Scenario Modelling section.

3. Impact Analysis to date- What to expect

This provides the Impact Analysis based on findings to date and may help LHDs to plan for and understand likely workforce, work tasks and workflow impacts throughout EMM planning, implementation and embedding phases. More detail on these factors is provided throughout the report.

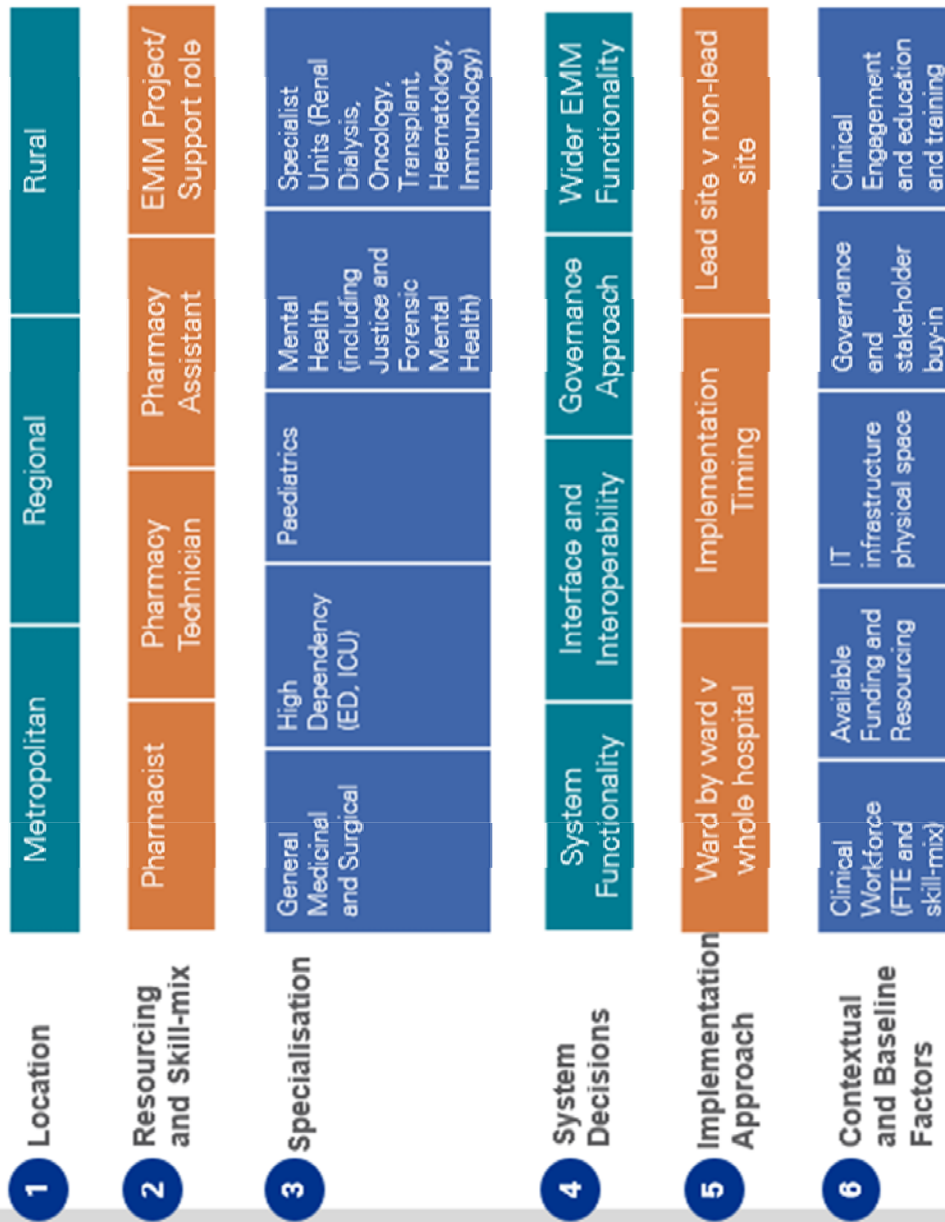
Approach to Workforce Impact Analysis: Impacts of EMM on the Pharmacy Workforce



This is designed to assist facilities in addressing workforce, work task and work-flow issues that need to be considered in the planning, implementation and embedding phases of EMM reforms. Further details on each of these steps is provided in the workforce principles that have been developed in the PEWI Report.

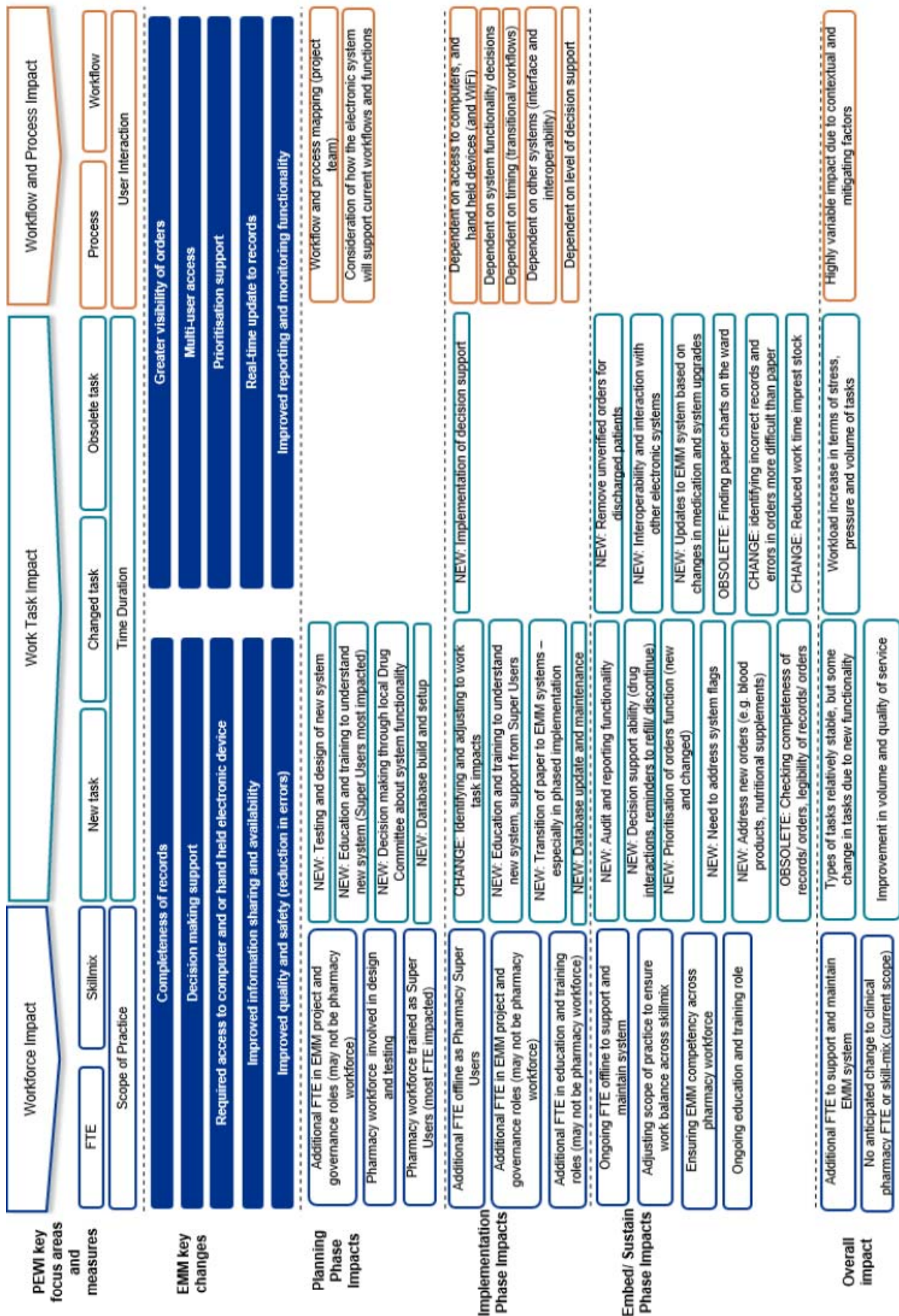
SCENARIO AND RISK ASSESSMENT Contextual Factors

SCENARIO CONSIDERATIONS



INCREASED RISK IF:

- Regional or Rural;
- Pharmacy workforce FTE is less than 10;
- FTE/ skill-mix is not able to meet current requirements;
- Clinical pharmacists are used in EMM project and support roles;
- EMM is implemented in a speciality setting or if significant interface requirements are needed for the speciality setting;
- A high level of system flags are set;
- Interoperability with EMR, iPharmacy poor;
- Transition between EMM and paper wards;
- Lead site, especially if 'hub and spoke' model;
- Implemented in short term, fewer lessons learned;
- Low 'readiness' for EMM.





Conclusion and Opportunities to Strengthen the Evidence

Conclusion

Overall this Pharmacy eHealth Workforce Initiative has highlighted the importance of the clinical pharmacy workforce in helping to embed EMM reforms in LHDs, and identified a number of learnings from the experience to date that can be applied to new facilities as they implement EMM in the coming years. Evidence has been collated through the literature and stakeholder consultation, and tools have been developed to assist LHDs to consider these impacts when they implement EMM into the future. The investment in this project reflects the Ministry of Health's commitment to ensuring an appropriately skilled, competent, efficient and sustainable pharmacy workforce that can meet the expectations required to support the successful implementation of EMM.

Through significant stakeholder consultation, this project identified that there is currently strong support for implementing EMM programs (including barcode scanning and functions that enable AMS and Medication Reconciliation) from within the clinical pharmacy workforce in NSW. It is also supported more broadly in Australia, including from governments and key professional associations, as well as considerable interest and support internationally.

Experience of implementing EMM in NSW to date has identified a number of benefits, of which the key driver is an increase in medication safety, efficiency in medication management and a reduction in medication errors. Other reported benefits include a reduction in variance in prescribing practice; improved legibility, completeness and availability of medicine orders; improved communication with patients about their medication; improved decision-making facilitated by information resources; more efficient and effective interactions among the clinical care team, cost effectiveness, improved clinical information sharing; minimised transcription errors; reduced duplication, reduction of waste and system wide inefficiency; prevention of the misalignment of records; and standardised, legible and complete orders. While quantifying these broader benefits of implementing EMM were not a key focus of this project, the NSW eHealth Program are committed to ensuring these benefits are realised for the LHDs across NSW.

However, EMM programs are complex and a range of risks and issues need to be effectively addressed and considered in order to achieve the expected benefits. These risks include insufficient funding and baseline resourcing, inadequate planning, poor governance, insufficient change management, inadequate education and training, and poor implementation support. There are a number of examples where expected benefits have not been realised, with the Victorian Audit Report on HealthSMART flagging a range of key issues that are pertinent to the NSW context.

Academic research and evidence regarding the impact of the implementation of EMM on the clinical pharmacy workforce is currently limited, however NSW have led this research area within Australia, with literature published based on the experience of the two sites that have implemented EMM in NSW. Despite limited literature, the experience to date strongly suggests that pharmacy workforce engagement is crucial to ensuring the EMM program is a success and that unintended consequences are easily and quickly addressed.

During this project, stakeholder interviews from sites that have successfully implemented EMM systems in the Australian context suggest that there are a range of contextual factors which will change the local experiences and workforce impacts on the clinical pharmacy workforce. Two of these factors are based on the 'readiness' and workforce baseline prior to EMM, and relate to current levels of workforce resourcing, available funding, IT infrastructure, governance and buy-in and clinical engagement. Other key factors include the setting where EMM is to be implemented, with the regionality of the location and specialisation(s) of the wards in which EMM is to be implemented playing a key role. Further key factors impacting on the pharmacy workforce are based on design and planning decisions made for the EMM system, and include the system decisions and implementation approach adopted by the individual site. The interplay of these factors needs to be understood for each site in order to plan for the likely impacts on the clinical pharmacy workforce. These are summarised on the Scenario Modelling Framework which is a single page reference tool developed to assist LHDs understand how these factors might relate to their context.

It is important to note that despite these contextual factors, it was found that while work tasks and workflow changes are expected as a result of the EMM reforms, the overall workload and workforce (FTE) requirements are expected to remain the same for the clinical pharmacy workforce if the current functionality is maintained with improvement in the quality and volume of service. However if EMM results in additional functionality being adopted, consideration must be given to the implications of these on workforce, work task, workflow and workload. Additional pharmacy workforce is likely to be required for project, change management and system roles for EMM as a part of a multidisciplinary team. It is also critical to note that the EMM environment is expected to result in improvements in the overall quality, functionality and volume of services that can be provided. The PeWI Impact Analysis Findings (summarised in a single page reference tool) has been designed to assist LHDs to identify and consider the workforce, workflow and work task impacts on the pharmacy workforce..

Six key workforce planning principles have been developed to assist LHDs in planning to support the clinical pharmacy workforce through this significant reform. These are:

1. Designing a business architecture;
2. Ensure staffing levels are sufficient to meet current practice requirements;
3. Determine the pharmacy workforce needed for change management, project management and technical EMM support roles;
4. Optimise the existing workforce, re-balancing workload as needed;
5. Optimise the pharmacy workforce if new roles are required; and
6. Adjust the pharmacy workforce during planning, implementation and embedding phases of EMM.

These are based on best practice workforce planning and support optimising the scope of practice of the workforce and balancing the workload and work tasks impacts across the whole of the clinical pharmacy workforce. These provide reference to a number of useful resources to assist LHDs through this process, and this is summarised in the Approach to Workforce Impact Analysis tool.

The research undertaken throughout this project has helped to identify a number of future opportunities that may be useful to strengthen the evidence base. This would assist in improving workforce practices to support the NSW EMM program of work, and importantly to support the clinical pharmacy workforce into the future. These opportunities provide the recommended next steps in understanding the impact of EMM on the clinical pharmacy workforce.

In conclusion, as a result of a multi-component stakeholder engagement strategy, this project has identified that the implementation of EMM for LHDs will result in varied impacts on the pharmacy workforce based on a range of contextual factors. It should also be noted that the implementation of EMM will be an ongoing journey, with continual system upgrades, technology enhancements and functionality improvements as well as needed changes over time to keep pace with contemporary practice, medications and other IT systems that are used within the hospital environment. A final observation is that LHDs considering implementing EMM must consider the key purpose of the reforms, which is improved medication safety and quality of care, and is not workforce driven. With appropriate levels of resourcing, planning, change management and governance, these benefits to patient safety and quality of care are realised in the EMM environment and improvements in the quality, functionality and volume of services can be achieved.

Opportunities to strengthen the evidence

The research undertaken throughout this project, and its limitations, have helped to identify a number of future opportunities that may be useful to strengthen the evidence base of the impacts of EMM on the pharmacy workforce. The following opportunities would assist in improving workforce practices to support the NSW EMM program of work, and importantly to support the clinical pharmacy workforce into the future.

i. Following the implementation of EMM in a further 2-3 sites across NSW, a supplementary review is recommended to add to the existing evidence base and to further develop decision making supports and tools.

This will add to the experiences and learnings from the two NSW sites who have implemented EMM to date, and importantly provide greater evidence on the impact of different scenarios as EMM continues to roll-out across hospitals across New South Wales. It is also expected that some of the contextual impacts of the implementation of EMM at speciality hospitals (such as paediatrics) would also be further strengthened with this information.

ii. Undertake a detailed pharmacy workforce impact study of the work task, workflow and workforce impact for the first rural site in NSW to implement EMM.

It is expected that the experience of a rural site in implementing EMM will be different from a metropolitan context, however this has not been tested. Factors that may need to be considered are pharmacy staffing levels (and workforce shortages) in regional locations, hub and spoke models of service delivery, ICT infrastructure, GP models and systems and coordination across LHDs in accordance with the Rural eHealth Strategy. This study could be done in a similar way to the research already undertaken in NSW by Johanna Westbrook et. al., and may assist in providing an evidence base for any rural differences that need to be considered in the EMM rollout.

iii. Develop a whole of workforce study on the impact of EMM on the wider clinical workforce (including nursing, medical, ICT, allied health and pharmacy).

This would provide a more comprehensive picture of the impact of these EMM on the workforce. International literature suggests that EMM has different impacts on different sections of the workforce and this could be quantified in the Australian context. This research could be done in a regional or metropolitan context (or both).

iv. Build the capacity of LHDs and where possible the clinical pharmacy management, to access available data to use in local workforce planning. Consider developing tools and resources to support LHD workforce planners to ensure consistent approaches to workforce analytics and planning relating to EMM and other ICT reforms.

In the interests of transparency, validated clinical pharmacy workforce data, tools and resources could be provided as requested to the LHDs to help facilities understand their baseline workforce and skill-mix. These may assist in ensuring that there is consistency in workforce planning and analytics for the clinical pharmacy workforce.

v. Undertake a project to investigate the scope of practice and skills and capabilities of the Pharmacy Assistant and Pharmacy Technician roles in hospital pharmacies with a view to improved utilisation of the Pharmacy Assistant and Technician workforces across NSW Health.

This is suggested in response to stakeholder feedback from Pharmacists during the consultations around a need to better understand and make use of the Pharmacy Assistant and Pharmacy Technician roles. Recommendations include:

- Inclusion of the core competencies required of Pharmacy Assistants and Technicians in the current Hospital-Health Services Pharmacy Support qualifications in the skills and competencies section of the Allied Health Assistant Framework;
- Inclusion of the typical tasks required of Pharmacy Assistants and Technicians in the scope of practice section of the *Allied Health Assistant Framework*;
- Sharing best practice examples of the use of the Pharmacy Assistant and Technician workforce throughout the State (such as through the Directors of Pharmacy);
- Education and training on the role of the Pharmacy Technician and Pharmacy Assistant workforce with Pharmacists;
- Standardised Pharmacy Assistant and Technician position descriptors; and
- Analysis of the variation in clinical pharmacy skill-mix across the State.

vi. Consider partnering with education and training providers around EMM training for the pharmacy workforce (at both university and VET level). Consider partnering options with Cerner (or other providers) to deliver tailored training about the EMM systems used in NSW Health

The aim of this is to ensure that into the future the pharmacy workforce are job ready in terms of technical competence and understanding of the EMM systems once they complete their relevant qualifications, rather than having to learn this on the job. This may include ensuring education and training of the pharmacy workforce is changed by the university and VET sector to ensure the workforce is job ready for EMM. It could also include partnering with Cerner (or another provider) in conjunction with the university and Vocational Education and Training (VET) sector. This initiative could be driven by the Health Education and Training Institute (HETI).

vii. Utilise existing work to date on pharmacy workflows to promote a state-wide approach when EMM is implemented (validating as required).

The aim of this is to draw upon the workflow mapping expertise that has been developed from existing sites that have implemented EMM in NSW. This will allow future sites to draw on this knowledge and experience and will encourage a level of standardisation in approach and process across NSW. As has been noted in the literature, workflows and process planning are critical to the successful implementation of EMM and help to identify unintended consequences that may occur in the shift from a paper to an electronic system.

viii. Monitor and review the impact of the antimicrobial stewardship, Medications Reconciliation and barcode scanning initiatives on the pharmacy workforce.

This is suggested due to the limitations of this project in only examining the EMM impacts of these reforms, noting that these are understood to be at low levels of maturity currently in NSW Health. To ensure the pharmacy workforce impact of these reforms is captured it is recommended that:

- The national and state requirements for AMS, barcode scanning and Medication Reconciliation are captured;
 - A maturity assessment be undertaken on how well these tasks are currently being performed across the State, including benchmarking of these against other jurisdictions;
 - Appropriate state-wide guidance and support is provided for these initiatives;
 - Quantifying the number of project positions created to support these initiatives over the last 2 years;
 - Based on the above, recommendations are developed regarding whether there are sufficient resources within the current clinical pharmacy workforce to meet these requirements (and if not, recommended funding and resourcing to support these).
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Acronyms and Abbreviations

ACSQH	Australian Commission on Safety and Quality in Healthcare
AMS	Anti-microbial Stewardship
ASGC-RA	Australian Standard Geographical Classification – Remoteness Areas
ED	Emergency Department
EMM	Electronic Medications Management
EMR	Electronic Medical Record
FTE	Full time equivalent
GP	General Practitioner
ICT/ IT	Information and Communication technology/ Information Technology
ICU	Intensive Care Unit
JFMHN	Justice and Forensic Mental Health Network
LHD	Local Health District
NRAS	National Registration and Accreditation Scheme
NSQHS Standards	National Safety and Quality Health Service Standards
NSW	New South Wales
PeWI	Pharmacy eHealth Workforce Initiative
VET	Vocational Education and Training
VMO	Visiting Medical Officer

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Appendices

Appendix A: Case Studies

Case studies have been developed as a result of inter-jurisdictional and NSW stakeholder interviews with those sites that have implemented or are in the process of implementing EMM systems, forming the basis of many of the findings in this report. While all facility names and places were removed, due to the small number of sites that have this experience across Australia, these sites are still identifiable. For this reason these case studies have been provided to the Ministry of Health for their consideration, but will not be widely published.

Appendix B: Resource Summary in Meeting Current Practice Requirements

SHPA Standards of Practice for Clinical Pharmacy Services²³

These Practice Standards developed by the Society of Hospital Pharmacists of Australia (SHPA) outline a minimum level of services that most hospital departments should consistently provide. These include:

- Medication Reconciliation;
- Assessment of current medication management;
- Clinical review, therapeutic drug monitoring and adverse drug reaction management;
- Medication management plan;
- Providing medicines information;
- Facilitating continuity of medication management in transition between care settings;
- Participating in interdisciplinary care planning;
- Prioritising clinical pharmacy services;
- Staffing levels and structure for the provision of services;
- Training and education;
- Participating in research;
- Pharmacy assistants and technicians supporting clinical pharmacy services;
- Documenting clinical activities;
- Improving the quality of clinical pharmacy services;
- Clinical Competency Assessment Tool.

Guiding Principles to Achieve Continuity in Medication Management²⁴

These Guiding Principles to Achieve Continuity in Medication Management were developed to address patient harm and sub-optimal use of medicines when consumers move between different healthcare settings and providers. These principles seek to outline a coordinated approach across all healthcare providers (not just the pharmacy workforce) and to clearly articulate responsibilities and accountabilities when implementing appropriate management of medicines.

There are ten guiding principles which include:

- Guiding Principle 1: Leadership for Medication Management.
- Guiding Principle 2: Responsibility for Medication Management.
- Guiding Principle 3: Accountability for Medication Management.
- Guiding Principle 4: Accurate Medication History.
- Guiding Principle 5: Assessment of Current Medication Management.
- Guiding Principle 6: Medication Action Plan.
- Guiding principle 7: Supply of Medicines Information to Consumers.
- Guiding Principle 8: Ongoing Access to Medicines.
- Guiding Principle 9: Communicating Medicines Information.
- Guiding Principle 10: Evaluation of Medication Management.

National Safety and Quality Health Service Standards²⁵

There are ten key standards as part of this framework, with Standard 4 on Medication Safety, being particularly relevant to the pharmacy workforce. The intention of this specific standard is to ensure competent clinicians can safely prescribe, dispense and administer medications to consumers. Standard 4 details the actions that are required across five key areas. These areas are:

- Governance and systems for medication safety – ensuring mechanisms for the safe prescribing dispensing, supplying, administering, storing, manufacturing, compounding and monitoring of the effects of medicines;
- Documentation of patient information – ensuring the clinical workforce accurately records medication history throughout the episode of care;
- Medication management processes – ensuring the clinical workforce is supported in the prescribing, dispensing, administering, storing, manufacturing, compounding and monitoring of medicines;
- Continuity in medication management- At handover the clinician provides a complete list of the consumer’s medicines to the receiving clinician; and
- Communicating with patients and carers- the clinical workforce inform consumers about their options, risks and responsibilities for an agreed medication management plan.

The Australian Safety and Quality Goals for Healthcare: Medication Safety Action Guide²⁶

This Guide seeks to set out actions that should be considered to achieve the goal of people receiving healthcare without experiencing preventable harm within the priority area of medication safety. This guide sets out five key outcome areas, some of which are less relevant to the hospital pharmacy setting. These goals are:

- Older people living in the community experience fewer adverse medications events;
- Older people experience fewer adverse medicines events at admission to and discharge from hospital;
- Adult experience fewer venous thromboembolisms associated with hospitalisation;
- Children experience fewer dose-related adverse medicines events; and
- People taking warfarin in the community experience fewer adverse medicines events.

Appendix C: Pharmacy Technician and Assistant core competencies from qualification

Table 1: Pharmacy Technician qualification (Certificate IV, core competencies only)³²

Course Reference	Course Title
HLTPH408A	Conduct small scale compounding and labelling of pharmaceutical products
HLTPH409A	Conduct small scale compounding and labelling of aseptic pharmaceutical products
HLTPH411A	Provide assistance in dispensary administration
HLTOH418A	Support pharmacists by collecting information for clients and other health professionals
HLTPH419A	Support pharmacists in the collection and presentation of workplace data and information
HLTWS401A	Maintain workplace WHS processes
CHCORG428A	Reflect on and improve own professional practice
HLTHIR402D	Contribute to the organisational effectiveness in the health industry
HLTHIR506C	Implement and monitor compliance with legal and ethical requirements

Table 2: Pharmacy Assistant qualification (Certificate III, core competencies only)³³

Course Reference	Course Title
BSBFLM303C	Contribute to effective workplace relationships
BSBMED301B	Interpret and apply medical terminology appropriately
HLTHIR301C	Communicate and work effectively in health
HLTIN301C	Comply with infection control policies and procedures
HLTPH305A	Maintain pharmaceutical imprest stock
HLTPH307A	Pack pharmaceutical products
HLTPH315A	Procure, store, maintain and distribute pharmaceutical stock
HLTPH316A	Assist with the dispensing of prescriptions and medication orders
HLTWS300A	Contribute to WHS processes



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