PAXTON PARTNERS

Western NSW Local Health District

Review of Pharmacy Services

Final Solution Options Report

June 2016

Table of Contents

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Acknowledgements
Paxton Partners would like to thank the WNSWLHD Executive and pharmacy staff, and all other stakeholders for the generous contribution of their time, feedback and data/information to the review activities.

List of acronyms

Term	Definition	Term	Definition
AACP	Australian Association of Consultant Pharmacy	**IHPA**	Independent Hospital Pricing Authority
ABF	Activity Based Funding	**IIMS**	Incident Information Management System
ACSQHC	Australian Commission on Safety and Quality in Health Care	**LHD**	Local Health District
ADE	Adverse Drug Event	**LOS**	Length of Stay
BPMH	Best Possible Medication History	**MBS**	Medicare Benefits Schedule
CATAG	Council of Australian Therapeutic Advisory Groups	**MPS**	Multi-Purpose Service
DAA	Dose Administration Aids	**NSQHS**	National Safety and Quality Health Service Standards
DD	Dangerous Drugs	**PBA**	Pharmacy Board of Australia
DRG	Disease Related Group	**PBS**	Pharmaceutical Benefits Scheme
DTC	Drug and Therapeutic Committees	**PSA**	Pharmaceutical Society of Australia
DVA	Department of Veterans' Affairs	**QUM**	Quality Use of Medicines
ED	Emergency Department	**RMMR**	Residential Medications Management Review
EFC	Efficient Funding of Chemotherapy Drugs	**SHPA**	Society of Hospital Pharmacists Australia
ELT	Executive Leadership Team	**TGA**	Therapeutic Goods Administration
EMM	Electronic Medications Management	**WHO**	World Health Organization
FTE	Full Time Equivalent	**WIES**	Weighted Inlier Equivalent Separation
GP	General Practitioner	**WNSWLHD**	Western NSW Local Health District
HCD	High Cost Drugs		
HMR	Home Medicines Review		
ICD	International Classification of Disease		

List of tables

List of figures

Executive summary

Project Context

Western NSW LHD (the District) operates 41 facilities across an approximately 250,000 km^2 area, the second most sparsely-populated Local Health District (LHD) in NSW.

The geographical spread creates challenges with providing high quality and equitable pharmacy services across all sites and, in recent years, there has been growth in the number of medical specialties offered by the LHD (including oncology, haematology and nephrology), leading to a corresponding increase in the usage of high cost drugs. The introduction of the National Safety and Quality Health Service (NSQHS) standards has increased the focus on medication reconciliation and the role of pharmacy in supporting best practice antimicrobial stewardship.

The District has experienced challenges with meeting the NSQHS around medication reconciliation and more generally the provision of consistent, appropriate and responsive pharmacy services across it's communities, particularly in those not support by dedicated pharmacy resources.

The District Executive Leadership Team has expressed a desire to shift towards a future state of pharmacy service provision that the District can 'be proud of', supports good medication management across the region and supports the District's aspiration to be a leader in rural/regional pharmacy service provision.

Paxton Partners were engaged to undertake a comprehensive review of pharmacy services across the District and identify and recommend changes to the delivery and governance of pharmacy services to support the District to progress toward this aspiration.

Project Approach

The Pharmacy Services Review was structured into two phases as depicted below. This report constitutes the culmination of Stage 3 – Options Analysis and of Phase 1 overall, the Diagnostic Phase.

	Phase 1 – Diagnostic Phase			Phase 2 – Implementation Phase	
Western NSW LHD Pharmacy Services Review	**Stage 1 Project initiation**	**Stage 2 Current State Analysis**	**Stage 3 Options Analysis**	**Stage 4 Implementation Planning**	**Stage 5 Ongoing Implementation Assistance**
Key Activities	• Develop draft Project Plan • Project initiation meeting with WNSWLHD Project Team • Receive key background documentation from WNSWLHD • Refine and finalise Project Plan	• Stakeholder consultations and site visits • Current State analysis: o Financial analysis (e.g. revenue sources, cost drivers, identification of waste) o Activity data analysis o Workforce analysis o Review of governance arrangements (e.g. organisational, clinical, financial) o Review of infrastructure and enablers (e.g. ICT, physical space, geographical locations) • Development of Draft Diagnostic Report • Review and finalisation of Diagnostic Report	• Review of leading practice pharmacy service delivery models • Development of solution options to improve pharmacy business model • Development of solution option evaluation matrix • Solutions prioritisation and validation workshop • Presentation of key findings to ELT • Development of Solutions Report	• Development of detailed implementation plans for shortlisted options including: o Timing and sequencing of activities o Dependencies and risks o Cost and resource estimates o Strategic considerations and impacts o Governance, roles and responsibilities o Development of Master Implementation Plan and budget estimate	• Ongoing ad hoc and targeted advice and support to WNSWLHD in implementing proposed Implementation Plan (to be defined at end of Stage 4)
Deliverables	1. Project Plan	2. Diagnostic Report	3. Solutions prioritisation and workshop 4. ELT presentation 5. Solutions Report (this report)	6. Option-specific implementation plans 7. Master Implementation Plan and budget estimate	• Ongoing advice and support to implement options • Deliverables to be determined

The activities for Phase 2 will be identified and scoped following the finalisation of this report and Phase 1 of the project.

Key Recommendations

The table below highlights the 38 recommendations identified through the analysis undertaken both during the development of the Diagnostic Report in Phase 2 and the Options Analysis in Phase 3 of the project, for consideration by the District.

Recommendation
Medications Management Strategy
Recommendation 1: WNSWLHD should use the findings of the Pharmacy Services Review to develop a Medications Management Strategy for the District.
Governance
Recommendation 2: Pharmacy should be transitioned to its own business unit, reporting either to the Director of Operations or the Director of Medical Services.
Recommendation 3: All pharmacy staff should report to the Director of Pharmacy at their local site and Directors of Pharmacy at each site should report to the WNSWLHD Chief Pharmacist.
Recommendation 4: The Chief Pharmacist should work with sites across the District to determine and assign functional leads for specific District-wide pharmacy functions.
Recommendation 5: WNSWLHD should review and update the existing Chief Pharmacist position description to better align with the requirements of the District into the future.
Recommendation 6: WNSWLHD should increase its resourcing of the Chief Pharmacist position to a 1.0 FTE.
Recommendation 7: The local DTCs and the District DTC should strengthen their decision-making processes by jointly reviewing their terms of reference and the processes and protocols underpinning their operations, beginning with the priorities identified in this Solution Options Report.
Service Model Options
Recommendation 8: WNSWLHD should transition pharmacy services to a revised hub and spoke configuration that better supports smaller sites, using a staged approach.
Recommendation 9: WNSWLHD should develop minimum service requirements for supporting small sites from Base and District sites, including frequency of visits, definition of the audit process and follow up procedures, governance, and standard reporting templates.
Recommendation 10: WNSWLHD should develop and implement a telepharmacy strategy to support the provision of clinical pharmacy services to sites across the District with no on-site pharmacist support.
Recommendation 11: The District should, as a matter of priority, follow the guidance in the Clinical Excellence Committee Medication Reconciliation Toolkit to: 1. establish the overarching governance and form a multi-disciplinary Medication Reconciliation project team 2. map the current medication reconciliation process at each Base and District site in the initial instance and then all other sites thereafter 3. perform a baseline audit of medication reconciliation performance 4. develop a plan for the District-wide implementation of medication reconciliation processes.

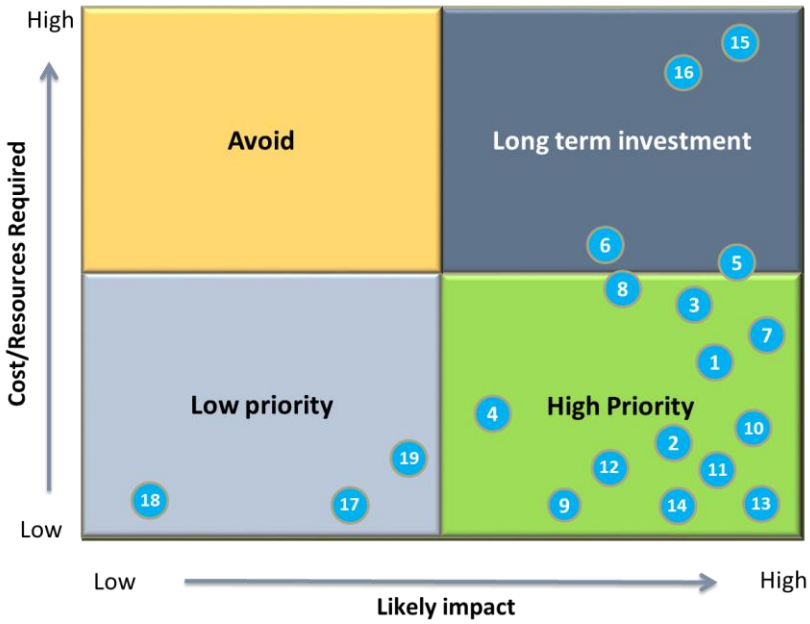
Workforce
Recommendation 12: The District should resource the immediate pharmacy workforce needs (Stage 0) and increase overall workforce resources in a staged approach to support the proposed transition to a revised hub-and-spoke configuration.
Recommendation 13: The District should develop an overall pharmacy workforce strategy that aligns with the Medications Management Strategy (Recommendation 1) and takes into account the impact of adopting the various solution options set out in this report.
Financial Management
Recommendation 14: Pharmacy should review and refine the quality of its drug usage and expenditure data and periodically monitor and report to DTCs on material variations in: • Overall drug expenditure • Drug expenditure by site/ward/unit • HCD expenditure (both S100 and non-PBS funded) • Hospital-funded outpatient expenditure • Stock holding • Stock wastage.
Recommendation 15: The Chief Pharmacist, or delegate, should work with CSC to optimise i.Pharmacy reporting to ensure the District has ready access to the drug usage and expenditure data it needs to monitor performance and trends per Recommendation 14.
Recommendation 16: Further analysis and investigation should be undertaken to identify the optimal configuration and focus for pharmacist-led Tier 2 clinics to generate revenue for the District.
Recommendation 17: The District should establish pharmacy-led smoking cessation interventions clinics to increase the proportion of its population that receives assessment and treatment for nicotine dependence.
Recommendation 18: The District should not offer RMMRs/HMRs directly, but may investigate options to facilitate the delivery of RMMRs/HMRs by community pharmacy providers, on a site-by-site basis.
Recommendation 19: The District should continue to outsource the compounding and supply of its chemotherapy needs, but reassess the costs and benefits of in-house compounding in the event that it adopts inpatient chemotherapy in the future.
Recommendation 20: If NSW adopts the Commonwealth PBS reforms, the District should undertake a detailed site by site viability analysis including working with sites to determine the likely additional resourcing, stock holding and physical space requirements to provide PBS medications to patients on discharge and outpatient/non-admitted patients.
Procurement
Recommendation 21: WNSWLHD should work with its drug suppliers to implement a direct distribution model for drugs across the District that eliminates the need for double-handling of drug orders and increases the efficiency of the procurement process overall.
Recommendation 22: The District should develop a District-wide drug procurement policy to be mandated at all individual sites.
Recommendation 23: The District should consider the appointment of a District pharmacy procurement officer to support improved procurement practices.

Performance management
Recommendation 24: WNSWLHD should develop, implement and maintain, a robust set of performance indicators of pharmacy services, validated by a multi-disciplinary advisory committee.
Recommendation 25: WNSWLHD should identify the data sources required to support the measurement of the indicators developed as part of Recommendation 24. Where required, the District should invest in process/system changes required to capture the required data to a high quality so that the indicators can be used to inform strategic decision making.
Recommendation 26: WNSWLHD should implement the Clinical Excellence Commission's Medication Safety Self-Assessment at all Base and District sites to establish a baseline of comparison against which to measure the impact that improved pharmacy processes has on medication safety.
Enabling Technologies
Recommendation 27: The District should provide mobile tablet devices (configured to access relevant pharmacy software across sites) to pharmacists who are required to undertake significant non-value-added travel, either within or between sites.
Recommendation 28: The District should evaluate, select and implement barcode readers for use at all dispensing terminals across the District as a matter of priority.
Recommendation 29: In advance of the commencement of EMMS implementation planning with eHealth NSW, all District Executives are encouraged to review the ACSQHC's guide to safe implementation of EMMS, starting with Section B *EMM Organisational Considerations*.
Recommendation 30: The District should resource a dedicated EMMS project team for the duration of the EMMS implementation process at the lead site, and retain at least part of the team on a permanent basis as a resource for the District in rolling EMMS out to further sites. This EMMS project team is encouraged to read in full the ACSQHC's guide to safe implementation of EMMS, starting with Section B *EMM Organisational Considerations.*
Recommendation 31: The EMMS project team should work closely with eHealth NSW to determine reasonable estimates of other clinical resources required to effectively support the lead-site implementation. This should include consideration for the development and implementation of a robust evaluation of EMMS impacts, including measuring a baseline of key metrics before EMMS implementation.
Recommendation 32: The District should develop a broader EMMS roll-out strategy to continue to support EMMS roll-out across the District following the lead-site implementation (e.g. post eHealth NSW involvement and support).
Recommendation 33: The District should not implement ADSs at this point in time, but reassess the costs and benefits in the event that NSW adopts PBS reforms, informed by the estimated increase in dispensing volumes.
Recommendation 34: The District should develop a detailed business case, including working with potential vendors to estimate the ROI period based on site-specific data, and estimating resource costs for project team and ongoing maintenance resources for initial piloting of ADCs across one Base hospital site.
Recommendation 35: The impact of the ADC implementation at the pilot site should be evaluated, measuring a baseline of key indicators pre-implementation compared with post-implementation, to inform the decision to implement more ADCs across the District.
Recommendation 36: The District should incorporate an electronic DTC approvals functionality into its development of SharePoint and implement it for use across all local DTCs and the District DTC.
Recommendation 37: The District should consider procuring a DAA management software package and implementing at the sites that generate the most Webster Packs.

Recommendation 38: The District should work with John Hunter Hospital to source and implement the prescription tracking solution in operation at that site, across all WNSWLHD sites with dedicated pharmacy departments.

Recommended Work Programs

To provide further context to the recommendations, and assist in planning implementation, a series of work programs have been profiled in section 4. These are plotted below against the dimensions of cost/resource requirements and likely impact to assist in prioritising implementation of the recommendations. Note that in some cases the work programs incorporate multiple recommendations that fit logically together or are dependent on one another.



1. Develop Medication Management Strategy
2. Revise overall Pharmacy governance
3. Increase resourcing of Chief Pharmacist role
4. Strengthen DTC processes
5. Revise hub and spoke configuration to better support small sites
6. Develop and implement telepharmacy strategy
7. Increase support for medication reconciliation
8. Address immediate workforce requirements and develop workforce strategy
9. Improve access to and quality of pharmacy financial data
10. Implement pharmacist-led Tier-2 non-admitted clinics
11. Establish direct distribution of drugs to smaller sites
12. Review and strengthen procurement processes
13. Strengthen pharmacy performance management
14. Implement barcode scanners at all dispensing terminals
15. Support implementation of EMM across District
16. Pilot and roll-out implementation of ADCs
17. Configure SharePoint to manage approvals of out of session DTC decisions
18. Source and implement Dose Administration Aid management software
19. Source and implement prescription tracking software

The implementation of the proposed work programs will require adequate resourcing and likely require support from a dedicated project management office to develop consistent project management tools and co-ordinate the multiple overlapping activities.

Next Steps

The following activities constitute the immediate next steps for the project:

- Validation of the proposed work programs with the Project Advisory Committee and Project Steering Committee
- Refinement and finalisation of Solution Options Report
- Endorsement of solutions for further analysis/implementation support in Phase 2 of the project
- Scoping and planning of Phase 2 activities
- Further implementation support for identified work programs.

1. Background

1.1 Project background and objectives

Western NSW LHD (hereafter referred to interchangeably as WNSWLHD or 'the District') operates 41 facilities across an approximately 250,000 km^2 area, the second most sparsely-populated Local Health District (LHD) in NSW. The District has the highest proportion of population identifying as Aboriginal or Torres Strait Islander of all NSW LHDs (close to 10%), and like most other regions, is experiencing growth in its population over the age of 65.

In recent years, most notably as a result of the recent Dubbo Base Hospital expansion redevelopment, there has been growth in the number of medical specialties offered by the LHD (including oncology, haematology and nephrology), also leading to a corresponding growth in clinical trials activities.

With the LHD facing budgetary pressures in the past few years, management has been focused on identifying financial improvement opportunities and making more efficient use of its available workforce and other resources to ensure longer term financial sustainability.

Through this process, the LHD Executive Leadership Team (ELT) and Pharmacy management team identified potential areas for improvement in the delivery of pharmacy services across the region.

The specific drivers for the proposed review included:

- Limited pharmacy workforce (number, mix and distribution) serving a large geographical region, creating potential issues related to:
    - equitable and optimal access to pharmacy services across the District
    - quality and safety and Quality Use of Medicines (QUM) (including alignment to, and support of, national safety and quality standards).
- High variability in the delivery of pharmacy services across the region - need for improved consistency and a single responsive District-wide approach.
- Current governance structures that could be strengthened around medication use (especially with the increase in high-cost drugs).
- Potential to improve transparency and understanding of financial management and value for money of pharmacy services – there is currently limited business support to sites for pharmacy.
- Opportunities to better leverage existing revenue streams and investigate potential new revenue streams and procurement models.
- Need to understand future demand for pharmacy services and 'future proof' these across the District.

The ELT has articulated that there is a desire to shift towards a future state of pharmacy service provision that the District can 'be proud of', supports good medication management across the region and supports the District's aspiration to be a leader in rural/regional pharmacy service provision. The review provides an opportunity to consider how pharmacy services may be delivered across the District in new and innovative ways that support the District in meeting this aspiration.

1.2 Project scope

WNSWLHD contracted Paxton Partners to undertake the Review of Pharmacy Services, being implemented in two phases, as shown in Figure 1.

Figure 1: Overview of project approach

Western NSW LHD Pharmacy Services Review	Phase 1 – Diagnostic Phase			Phase 2 – Implementation Phase	
	Stage 1 Project initiation	Stage 2 Current State Analysis	Stage 3 Options Analysis	Stage 4 Implementation Planning	Stage 5 Ongoing Implementation Assistance
Key Activities	• Develop draft Project Plan • Project initiation meeting with WNSWLHD Project Team • Receive key background documentation from WNSWLHD • Refine and finalise Project Plan	• Stakeholder consultations and site visits • Current State analysis: o Financial analysis (e.g. revenue sources, cost drivers, identification of waste) o Activity data analysis o Workforce analysis o Review of governance arrangements (e.g. organisational, clinical, financial) o Review of infrastructure and enablers (e.g. ICT, physical space, geographical locations) • Development of Draft Diagnostic Report • Review and finalisation of Diagnostic Report	• Review of leading practice pharmacy service delivery models • Development of solution options to improve pharmacy business model • Development of solution option evaluation matrix • Solutions prioritisation and validation workshop • Presentation of key findings to ELT • Development of Solutions Report	• Development of detailed implementation plans for shortlisted options including: o Timing and sequencing of activities o Dependencies and risks o Cost and resource estimates o Strategic considerations and impacts o Governance, roles and responsibilities o Development of Master Implementation Plan and budget estimate	• Ongoing ad hoc and targeted advice and support to WNSWLHD in implementing proposed Implementation Plan (to be defined at end of Stage 4)
Deliverables	1. Project Plan	2. Diagnostic Report	3. Solutions prioritisation and workshop 4. ELT presentation 5. Solutions Report (this report)	6. Option-specific implementation plans 7. Master Implementation Plan and budget estimate	• Ongoing advice and support to implement options • Deliverables to be determined

The primary goal of the project was to identify and implement practical initiatives to drive sustainability, innovation and equity of access to pharmacy services across the District. The key objectives of each phase were:

Phase 1 – Diagnostic Phase

- Undertake a detailed review of current pharmacy services being delivered across the District to identify and characterise areas for improvement
- Identify and describe opportunities to address the key drivers for the review, and areas for improvement identified during the review
- Develop practical and innovative solutions for implementation by the District to assist it to move towards its future aspiration for pharmacy services

Phase 2 – Implementation Phase

- Provide an ongoing support role in the implementation of the proposed solutions by WNSWLHD

1.3 Project approach

The following activities provided the key inputs for the Solution Options Report (this report):

Diagnostic Report

The Solution Options Report has been developed to primarily address the key issues identified in the Diagnostic Report.

Published literature and other documentation review

While a formal literature review was not performed, research and analysis of available literature was conducted to inform the development of potential solution options, considerations and practice examples. A review of background documents and current business cases provided by WNSWLHD was also conducted to support the development of solution options and understand their applicability to the District's pharmacy service operations.

Data analysis

A variety of analyses were undertaken to support the evaluation of solution options. These were specific to each solution option but typically included: cost-benefit analysis, break-even analysis and/or scenario analysis.

These analyses, in most cases, were high-level and designed to provide only an estimate to facilitate the assessment of the solution options. As a result, they will typically not be accurate enough to base definitive budget allocation decisions on. Where this is the case the corresponding recommendations note the need for further detailed analysis. Additional analysis of some solution options may be required through Phase 2 to provide more detailed costing analyses.

Consultations

A series of consultations were undertaken with stakeholders in other LHDs and state jurisdictions to identify, validate and refine some of the proposed solution options. A full list of the stakeholders consulted to inform the development of the Solution Options Report is provided in Appendix A.

1.4 Purpose and structure of the Solution Options Report

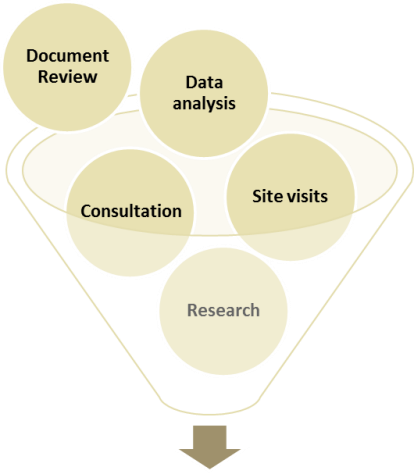
The purpose of this report is to present strategic solution options to address the key findings presented in the Diagnostic Report. High level guidance on prioritisation and implementation considerations is also presented.

The report is structured as follows:

- **Section 1 (this section):** Provides an overview of the overall project background, objectives, approach and methodology of the project.
- **Section 2**: Provides an overview of the results of the Diagnostic Report as context to the development of the solution options presented in this report**.**
- **Section 3:** Presents the analyses undertaken to support the evaluation of the various solution options identified to address the key issues identified through the Diagnostic Report. This section also includes a series of specific recommendations for consideration by the District Executive Leadership Team. Some of the recommendations may be addressed through Phase 2 of this project, while others will require a longer time period and/or their own dedicated project.
- **Section 4:** Provides a profile for each recommended work package, designed to provide high-level implementation guidance on how to effect the recommendations.
- **Section 5:** Provides on overview of the overarching considerations associated with implementing the recommendations.
- **Section 6:** Outlines the high-level next-steps for the project.

2. Overview of key findings from the Diagnostic Report

The Diagnostic Report highlighted the current state of pharmacy service provision across the District and incorporated documentation review, data analysis, consultations and site visits.



The key findings from the Stage 2 of the Diagnostic Phase (Current State Analysis) were grouped under the following four domains:

Domain	Description
High Quality Pharmacy Services	Describes the key issues impacting the District's ability to deliver high quality contemporary and innovative pharmacy services
Governance and Administration of Pharmacy Services	Collates the findings related to clinical and operational governance of pharmacy
Financial Sustainability	Provides a high-level overview of financial performance and control of pharmacy services
Technology and Enablers	Highlights how technology and other enablers may support the District in achieving leading practice rural/regional pharmacy services

The tables below summarise the key findings of the Diagnostic Report under each domain.

2.1 High Quality Pharmacy Services

Key findings	Potential solutions
Best Possible Medication Histories (BPMH) and medication reconciliation at transfers of care are not being completed for each patient (as required by NSQHS Standard 4 – Medication Safety)	• Reconfigure pharmacy workforce models to resource medication reconciliation and discharge planning • Employ additional clinical pharmacists
Lack of clinical pharmacy time limits capacity to support contemporary pharmacy practices	• Balance pharmacist: technician/assistant mix • Upskill and improve utilisation of technicians/assistants • Automation/software solutions • Workflow reconfiguration to improve efficiency

Key findings	Potential solutions
	• Direct from wholesaler distribution to reduce stock handling activities • Employ additional pharmacists
Pharmacy services at smaller sites are limited to a supply function primarily – no clinical services, which limits patient/clinician education on medications use	• Adopt telepharmacy services to provide additional pharmacy advice to more remote sites • Adopt more frequent site visits/audits • Establish resource sharing with community pharmacies
Barcode readers are not employed in the District for dispensing of medications, despite research evidence that they reduce dispensing errors	• Implement barcode scanning at all dispensing terminals and monitor rate of scanning compliance to ensure routine scanning of all dispensed items

2.2 Governance and Administration of Pharmacy Services

Key findings	Potential solutions
There is a perceived lack of transparency with respect to District-wide strategic decision making	• Develop Strategic Plan for Pharmacy in conjunction with pharmacy representatives
Decision-making on High Cost Drugs (HCD) and off-label use of medicines appears to lack consistency	• Review protocols for decision making on medication use and, where required, develop and implement structured control procedures across the District
In some cases, urgent decisions on drug usage were reported as being made via email - may present an issue for documentation	• Develop/purchase auditable electronic system to manage and process requests and approvals for medications management requests
There is need for a strong pharmacy champion to drive improvements in pharmacy services across the district	• Consider increasing Chief Pharmacy position to a 0.8 FTE or full-time • Strengthen overall governance of pharmacy services across District
There is no structured approach to prioritisation of projects for implementation	• Develop project assessment matrix to guide project selection • Develop structured approach to governance and management of projects
There is a need to standardise key District pharmacy processes and protocols to reduce variation and duplication of effort that may lead to unnecessary costs for the District	• Develop, test and implement protocols to standardise decision-making on all pharmacy procurement decisions
Lack of knowledge sharing was seen as a barrier to wider adoption of solutions developed at individual sites, and a contributor to the lack of consistency in certain processes	• Development of a knowledge sharing strategy • Development and maintenance of Pharmacy SharePoint site for information sharing
There are gaps in the quality and availability of data to support an understanding of pharmacy services performance and strategic decision making	• Refine data collection and reporting processes as needed to improve timeliness and quality of data available to support improved understanding of pharmacy services • Upskill pharmacists in performance management and evaluation

2.3 Financial Sustainability

Key findings	Potential solutions
Variation exists in drug procurement practices across the District and the cheapest option may not always be ordered	• Standardise procurement processes • Identification of most efficient drug/treatment options (particularly for high-cost treatments)
Drug orders to smaller sites are effectively double-handled and may be avoided by adopting direct delivery of orders	• Initiate direct delivery to smaller sites from wholesalers
Visibility into pharmacy cost drivers and efficient use of drugs is low, partly due to lack of data availability	• Develop suite of metrics for performance monitoring and new reporting capabilities to better understand underlying pharmacy cost drivers and performance
Limited clinical pharmacist capacity may be impeding capture of revenue through some available sources	• Improved coding of existing activities • Expanded clinical pharmacy services to capture revenue through new funding sources

2.4 Technology and enablers

Key findings	Potential solutions
Various technology solutions are available to address many of the workflow efficiency and safety and quality issues identified	• Employ telepharmacy between smaller sites and base/district sites • Employ use of barcode readers for dispensing • Employ software solutions to aid workflow (e.g. Webster Packs, script tracking etc.) • Automated dispensing/dosing • Implement electronic medicine cabinets for wards • Implement Electronic Medication Management (EMM)
At some sites there appears to be an opportunity improve efficiency of workflow processes	• Undertake LEAN process reviews of pharmacy department workflow processes to identify and eliminate waste

3. Analysis of Solution Options

This section presents analysis of the solution options and a series of associated recommendations for consideration by the District to implement the solution options, designed to address the key findings from the Diagnostic Report. In some cases, the analysis has been included to justify the exclusion or variation of specific solution options identified by stakeholder throughout the development of the Diagnostic Report.

3.1 Medications Management Strategy

The District is lacking a robust overall plan for the quality use of medicines, and many of the issues identified through the Diagnostic Report could be improved through the development and implementation of an overarching Medications Management Strategy for the District. Such a strategy would assist in providing a common reference point for both strategic and operational decision-making on medicines use, drive consistency in the development and application of medications processes across sites and assist in promoting better medicines use as 'everyone's business', rather than the focus of accountability resting primarily with pharmacy.

The Strategy should articulate:

- Common goals for medications management for the district from a multi-disciplinary perspective (including those of medical, nursing, pharmacy, finance, operations, IT)
- Approximate timelines for achievement of goals
- Common principles for quality medicines usage
- Required enablers such as governance, technology and workforce
- Indicators of success, as well as a measurement and reporting strategy.

The development of the Medications Management Strategy should be informed by this report, centred on QUM principles[1], and be developed as a priority to further refine the prioritisation and implementation of the suite of solution options presented in this report. The project to develop the Medications Management Strategy must be governed by a multi-disciplinary advisory group and ideally sponsored by the Chief Pharmacist (see Section 3.2.1 for further discussion on governance for WNSWLHD pharmacy services).

Recommendation 1: WNSWLHD should use the findings of the Pharmacy Services Review to develop a Medications Management Strategy for the District.

3.2 Governance

Through the Diagnostic Report, it was identified that the overall governance of pharmacy services across the District requires strengthening to support a base level of service provision consistent with the needs of the District, with the ultimate goal of supporting the District to become leaders in rural and remote pharmacy provision into the future.

The sections below describe the details underpinning strategic options for improved governance.

3.2.1 Overall pharmacy governance

One of the key issues raised by pharmacy staff was the lack of transparency and consistency in strategic decision-making processes around pharmacy such as project work, business case outcomes and related developments/initiatives being undertaken by other clinical areas.

Currently a specialist pharmacist is employed for Mental Health at each of Dubbo, Orange and Bathurst. In addition, Orange has recently employed a specialist oncology pharmacist, with Dubbo and Bathurst also recruiting similar positions at the time of writing this report. These positions do not currently report through to the Chief

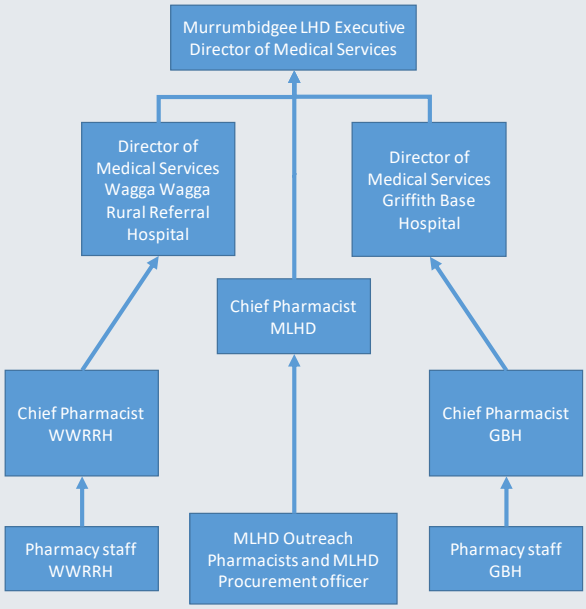
[1] http://www.health.gov.au/internet/main/publishing.nsf/Content/8ECD6705203E01BFCA257BF0001F5172/$File/natstrateng.pdf, Accessed 5 April 2016

Pharmacist and it was reported that this has the effect of isolating these pharmacists from the 'main' pharmacy workforce.

Ideally, all pharmacists at a given site should be considered as one workforce and report through the Director of Pharmacy at that site. This would assist in improving visibility into all pharmacy services across a given site and, by extension, the District. It would also assist in streamlining backfill of pharmacy resources and potentially provide opportunities for general pharmacists to gain exposure to, and upskill in, specialist pharmacy disciplines.

Focus on: Murrumbidgee LHD

In Murrumbidgee LHD, pharmacy staff and Chief Pharmacists report to the Director of Medical Services in an arrangement similar to the one shown below:



This arrangement was seen as effective in creating strong relationships between pharmacy and medical services at both the site and District levels. However, it was suggested that governance and professional support to pharmacy staff at sites could be further strengthened by having pharmacy staff report directly to the Murrumbidgee LHD Chief Pharmacist.

In order to strengthen accountability for, and governance of, pharmacy services in WNSWLHD, the following revised governance structure is proposed for consideration:

Figure 2: Proposed revised WNSWLHD Pharmacy Governance Structure

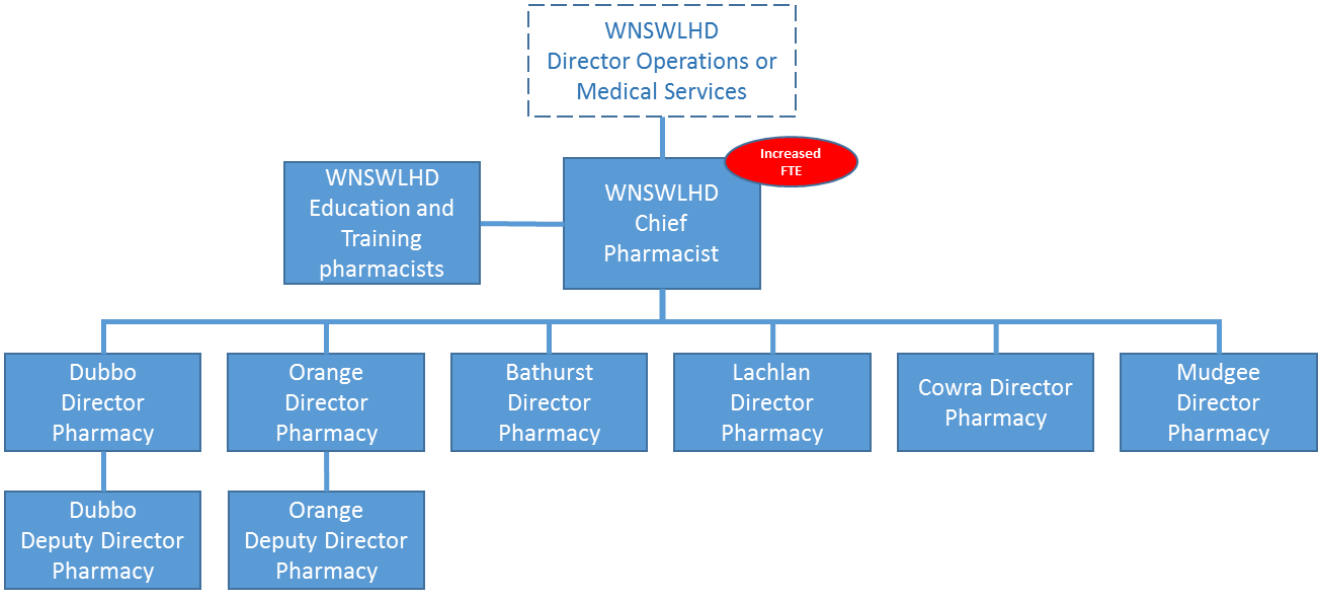


Table 1 highlights the key considerations associated with each of the proposed revisions to the current WNSWLHD governance structure.

Table 1: List of considerations for new governance features

Revised feature	Key Considerations
Reporting line options	**Director of Operations** • Pharmacy staff currently report through to Health Service Managers (HSMs) at individual sites who report through the Director Operations – having the Chief Pharmacist report through to the Director Operations should streamline transition to a stand-alone business unit and transition of pharmacy staff accountabilities from HSMs to Directors of Pharmacy at each site. • During the period of transforming pharmacy services based on this report, it may be beneficial for Pharmacy to report to the same Director responsible for IT, Organisational Performance Improvement and Planning and many of the proposed work packages will require collaboration with these areas. • The effectiveness of this reporting arrangement should be carefully considered in the context of the Director Operations being responsible for 12 existing portfolios. **Director of Medical Services** • Should strengthen relationships and integration between pharmacy and medical services at site level, these will be critical particularly where changes to pharmacy business/operational models may impact of medical services (e.g. the roll-out of EMM (see section 3.8.3)). • Should support multi-disciplinary planning and strategy around quality medicines use and management.
WNSWLHD Chief Pharmacist becomes separate from operational	• Eliminating direct pharmacy delivery duties for the Chief Pharmacist role should assist in providing the time required to develop and drive the strategic changes needed in Pharmacy across the District.

Revised feature	Key Considerations
leads (Directors of Pharmacy)	• Having this position as separate from any single site should assist in the development of a single coherent District-wide approach to the processes and protocols governing medicines use.
Deputy Directors	• Deputy Directors Pharmacy at Orange and Dubbo should be retained to provide a formalised progression path for pharmacists with aspirations to be future pharmacy leaders and provide additional support for the current Directors of Pharmacy at those sites.
All pharmacy staff should report through to the local Deputy Director of Pharmacy	• Would assist in breaking down 'micro-silos' at specific sites where specialist pharmacists do not currently report through the pharmacy department. • Would streamline backfill of pharmacy positions across a given site • Potentially provides the opportunity for professional growth of generalist pharmacists into specialist areas.

Recommendation 2: Pharmacy should be transitioned to its own business unit, reporting either to the Director of Operations or the Director of Medical Services.

Recommendation 3: All pharmacy staff should report to the Director of Pharmacy at their local site and Directors of Pharmacy at each site should report to the WNSWLHD Chief Pharmacist.

3.2.1.1 Assignment of District-wide Functional Leads

WNSWLHD should consider assigning particular sites as functional leads responsible for leading the coordination and provision of specific pharmacy services across the District. The Chief Pharmacist for South Australia reported that this model is employed to good effect for pharmacy services within South Australia.

Lead sites would be responsible for:

- remaining up to date with best practices and standards in pharmacy provision in the assigned functional area
- communicating relevant practice or research developments to other clinicians across the District
- providing ad-hoc advice as required to other clinicians across the District
- identifying improvements to existing District practices and processes and communicating to other sites and, where appropriate, the District Executive.

While not exhaustive, Table 2 provides a preliminary list of possible functional areas and suggested corresponding lead sites.

Table 2: Suggested lead sites by specialist functional area

Functional area	Suggested lead site
Oncology	Orange Base Hospital
Antimicrobial stewardship	Dubbo Base Hospital
Mental Health	Orange Base Hospital
Procurement	Dubbo Base Hospital

Formulary maintenance	Bathurst Hospital
Pharmacy Technology	Whichever site is District lead for the implementation of the Electronic Medications Management System

This approach should:

- improve and clarify accountability for ensuring the District delivers contemporary, evidence-based, pharmacy services
- foster the creation of 'centres of excellence' across the District and reduce the need for all sites to be experts in every specialty area
- provide a single 'go to' site for all sites in the District for advice on specific pharmacy areas and increase and improve communication between sites more broadly
- drive consistency in processes and approach.

Recommendation 4: The Chief Pharmacist should work with sites across the District to determine and assign functional leads for specific District-wide pharmacy functions.

3.2.2 Chief Pharmacist role

A review of the current Chief Pharmacist position description (PD)[2] revealed that:

- The PD does not appear to have been revised since 1 April 2008 (carried over from Greater Western Area Health Service)
- The duties outlined in the PD are consistent with the expectations for the role, but could be broadened and in some areas made more explicit (see recent Chief Pharmacist PD posted by Murrumbidgee LHD[3] as an example)
- The Chief Pharmacist was initially to report to the Executive Director of Medical Services (an option proposed for consideration in Table 1).

Current resourcing of the District Chief Pharmacist position (0.2 FTE) appears to be insufficient to perform the duties outlined in the existing Chief Pharmacist PD, or for the role to effectively support the strategic design and management of pharmacy delivery.

Limited Chief Pharmacist resource time is also a barrier to District-wide governance and delivery of consistent pharmacy services, improvements, and innovation.

For context, Table 3 outlines the level of Chief Pharmacist resourcing across a sample of Local Health Districts.

Table 3: Comparison of Chief Pharmacist resourcing across a sample of LHDs

District	Equivalent Chief Pharmacist resourcing
Western NSW	0.19 FTE
Murrumbidgee	0.84 FTE
Far West	1.0 FTE
Southern NSW	1.0 FTE

[2] Greater Western Area Health Service Position Description – GWAHS Chief Pharmacist

[3] http://nswhealth.erecruit.com.au/ViewPosition.aspx?id=220407, accessed 10 April 2016

Increased resourcing of the Chief Pharmacist role by 0.81 FTE to a total capacity of 1.0 FTE would incur an additional $128k cost in S&Ws to a total annual cost of $158k. While the position will not inherently generate offsetting revenue or cost savings, realisation of the broader benefits from improved coordination and consistency across the District will require strong leadership and sufficient investment in this key position.

Table 4 below outlines a costing analysis for Chief Pharmacist resourcing at 0.5 FTE, 0.8 FTE and 1.0 FTE.

Table 4: Additional FTE costs for Chief Pharmacist role

	0.5 FTE	0.8 FTE	1.0 FTE
Current FTE	0.19	0.19	0.19
Additional FTE	0.31	0.61	0.81
Total FTE	**0.50**	**0.80**	**1.00**
Current S&W cost	$ 29,850	$ 29,850	$ 29,850
Additional S&W cost	$ 49,344	$ 96,860	$ 128,537
Total S&W cost	**$ 79,194**	**$ 126,710**	**$ 158,387**

Recommendation 5: WNSWLHD should review and update the existing Chief Pharmacist PD to better align with the requirements of the District into the future.

Recommendation 6: WNSWLHD should increase its resourcing of the Chief Pharmacist position to a 1.0 FTE.

3.2.3 Local Drug and Therapeutics Committees

Local Drug and Therapeutics Committees (DTCs) were perceived by some staff as too procedural and lacking strategic focus, with accountability for action items reported as weak. Optimising the function of DTCs will support consistent, evidence-based decision making to promote patient safety, equity of access and cost effectiveness of pharmacy services.

A number of resources exist to support the establishment and benchmarking of DTC processes:

- NSW Therapeutic Advisory Group – 'Resources for evaluation of new medicines'
- NSW Health Policy Directive - PD2008_037 'Evaluation of Medicines for Use in Public Hospitals'
- NSW Health Procedure – 'Medication Handling in NSW Public Health Facilities' S3.2
- Council of Australian Therapeutic Advisory Groups (CATAG) – 'Guiding Principles for the roles and responsibilities of Drug and Therapeutics Committees in Australian public hospitals'
- World Health Organisation (WHO) – 'Drug and Therapeutics Committees – A Practical Guide'

While a detailed audit of DTC documentation and process was not conducted, Table 5 below provides a high level review of processes and sample minutes against CATAG guiding principles.

Table 5: WNSWLHD alignment to CATAG principles

#	Principle	✗/✓	Commentary
1	DTCs should have oversight of the medicines management system within a hospital, local health district/network or State/Territory	✓	DTCs have remit over medicine management
2	DTCs should have clear terms of reference that articulate its position within a hospital, local health district/network or State/Territory clinical and corporate governance structure	✓	DTCs operate with explicit Terms of Reference (TORs).
3	DTCs should consider the local environment when defining their functions	✓	DTCs consider local requirements in their functions

#	Principle	✗/✓	Commentary
4	DTCs should have formalised reporting structures to the organisation's executive or clinical governance lead	✓	There are strong formalised links between DTCs to clinical governance and executive. While accountability for decision making is clearly defined in DTC minutes and fully communicated, staff report there follow up/accountability for action items at local DTCs is sometimes ad hoc.
5	Membership of the DTC should be multidisciplinary, with a range of expertise and skills to reflect the functions of the DTC	✓	While the composition of DTCs has strong multidisciplinary clinical representation there is limited evidence to suggest the DTC has the resources available to support routine economic evaluations of drugs.
6	DTCs may establish subcommittees to manage specific tasks and processes	✓	Working groups are established to complete specific tasks when required
7	Standardised procedures for decision-making regarding formulary management need to be defined and applied	✗	Standardised procedures for formulary additions appear to be in place, but feedback suggests these procedures are not always applied and improvements should be made to educate all clinicians around these governance requirements. In addition, based on feedback, there does not appear to be a structured process for formulary management more broadly (e.g. removal, substitution etc. of drugs).
8	Standardised procedures for decision-making regarding individual patient requests need to be defined and applied	✓	Existing processes are based on CATAG templates to support decision-making for individual patient requests.
9	Standardised processes and documentation should be implemented by the DTC	✗	Documentation around DTC processes and decisions is generally standardised. However, it was reported that, in some cases, decisions may need to be made via email in between formal meetings. This creates an issue for the transparency, and auditability of decision making.
10	DTCs should be both proactive and responsive to issues arising and develop an annual work plan	✗	There is limited evidence of DTCs developing and following a formalised annual work plan informed by local issues and horizon scanning, nationally and internationally.
11	DTCs should undertake risk assessments within the health service organisation with respect to medicines use and recommend strategies to mitigate that risk	✓	DTCs review Incident Intervention Management System (IIMS) records for emerging trends. However, there is potential for improvement - with IIMS data often reviewed in the absence of understanding the volume of medication used as context. This limits the utility of the IIMS to derive strategic insights.

#	Principle	✗/✓	Commentary
12	DTCs should identify and prioritise a systems improvement plan and assign responsibilities and timeframes for completion	✗	While staff have noted DTCs identify and implement quality improvement activities, there is limited evidence that a formalised framework exists to ensure consistent decision making criteria is being applied across the District.
13	DTCs should have monitoring systems in place to evaluate their effectiveness	✗	There is limited evidence of a formalised process to review the effectiveness of DTC decisions.
14	DTCs should develop a communication strategy that ensures timely, effective and appropriate information for the intended audience	✗	Regional and rural sites report often having to make decisions in the absence of timely support from Base facility DTCs.
15	DTCs should promote the safe and quality use of medicines throughout the medication management pathway by engaging with internal and external stakeholder	✓	The DTC engages with internal and external stakeholders through the diverse committee representation.
16	DTCs should be adequately resourced by the hospital, local health district/network or State/Territory that they service to undertake their functions and responsibilities	✗	While the composition of DTCs has strong multidisciplinary clinical representation there is limited evidence to suggest the DTC has resources available to support economic evaluations.

DTC processes and foundations appear well established. However, DTCs could be strengthened through improvements in areas such as:

- Evaluation of DTC effectiveness and auditability of approvals made outside formal meeting schedules
- Application of standard medication procurement principles across the District
- Application of standardised processes for medication approvals
- Improved communication of DTC approval requirements and processes to all staff
- Post-approval evaluation of formulary listings and ongoing formulary maintenance
- Incorporation of District-level economic evaluations of drugs[4].

Recommendation 7: The local DTCs and the District DTC should strengthen their decision-making processes by jointly reviewing their TORs and the processes and protocols underpinning their operations, beginning with the priorities identified in this Solutions Report.

[4] http://www.shpa.org.au/lib/pdf/practice_standards/drug_use_ro.pdf, accessed 18 April 2016

3.3 Service Model Options

Current levels, mix and distribution of pharmacy resources only support basic drug distribution services at most sites and there appears to be limited capacity to adopt additional work within the existing pharmacy workforce and service model. Limited pharmacy resourcing and clinical pharmacy service provision is a barrier to meeting National Safety and Quality Health Service Standards (NSQHS) accreditation (particular, Standard 4 Medication Safety and 3.14 – Antimicrobial Stewardship).

Delivery of consistent and cost-efficient pharmacy services across the District's sparse geography is a significant challenge for service model development. Each facility type (Base, District and MPS/smaller facilities) have unique clinical service profiles and operational requirements which demand tailored solutions. That is, there is no 'one-size-fits-all' approach.

Table 6 below outlines the pharmacy role delineation level[5] for each WNSWLHD site and the corresponding recommended service scope, requirements and workforce according to the *NSW Health Guide to Role Delineation of Clinical Services (2016).*

[5] Based on *Western NSW Local Health District – Role Delineation of Services by Facilities (2014)*

Table 6: Pharmacy role delineation by site

Level	Service Scope	Service Requirements	Workforce	WNSWLHD Sites
1	Service provided by LHD/SHN network or external pharmacy. Drugs supplied to patients/clients on individual prescription and/or through an imprest system in accordance with NSW Health PD2013_043 Medication Handling in NSW Public Health Facilities.	• Access to medicines procurement and distribution service. • Access to patient and staff medicines education. • Access to therapeutic guidelines. • Access to drug and therapeutics committee or equivalent. • Referral pathways to relevant Aboriginal programs and services. • Quality and risk management programs in line with current NSQHS standards as appropriate.	• Pharmacist available for consultation, advice and support (may include telehealth; outreach). • Aboriginal hospital liaison roles available, preferably both male and female.	• All other WNSWLHD sites
2	As for level 1. In addition, provide on-site clinical pharmacy service (e.g. patient medicines information, medication chart review, staff education)	• As for level 1. In addition, access to information technology to support integrated pharmacy management system. • May have dedicated pharmacy space.	• Allocated pharmacist resource (may be via LHD/SHN network).	• Grenfell Multi-Purpose Health Service
3	As for level 2. In addition, provide administration and pharmacy management support. May provide medicines procurement, dispensing and distribution services.	• As for level 2. In addition, dedicated pharmacy space. • May have processes to provide medications that require compounding (may be networked or external arrangement).	• Pharmacist on-site. • May have pharmacy support staff (e.g. pharmacy technician, stores person).	• Lachlan Health Service • Cowra Health Service • Mudgee Health Service

Level	Service Scope	Service Requirements	Workforce	WNSWLHD Sites
4	As for level 3. In addition, provide medicines procurement, dispensing and distribution services. Contribute to drug and therapeutics committee or equivalent. May support specialised services (e.g. renal dialysis).	• As for level 3. In addition, department of pharmacy. • Processes to provide medications that require compounding (may be networked or external arrangement). • Access to clinical trial and research support. • May provide administration and pharmacy management support to other health facilities or services. • May supply to other health facilities or services not on-site.	• As for level 3. In addition, service director. • Pharmacists appointed to provide clinical pharmacy service during business hours, with access out of hours. • Pharmacy support staff (e.g. pharmacy technician, pharmacy assistant, stores person).	• Bathurst Health Service
5	As for level 4. In addition, provide support for clinical specialty services (e.g. oncology, haematology). Provide clinical trial and research support.	• As for level 4. In addition, processes for sterile manufacturing and cytotoxic drugs where clinically necessary (may be networked or external arrangement). • May provide networked support to lower level pharmacy services within the LHD/SHN (e.g. advice, purchasing assistance).	• As for level 4. In addition, may have clinical specialist pharmacist roles (e.g. oncology, haematology). • May have pharmacist/s with management role (e.g. distribution service, mental health, cytotoxic production unit, aseptic production unit). • May have senior pharmacy technician/s.	• Dubbo Health Service • Orange Health Service

Level	Service Scope	Service Requirements	Workforce	WNSWLHD Sites
6	As for level 5. In addition, provide support for highly specialised services (e.g. transplantation, neonatology). Active involvement in clinical trials and research activities (e.g. contribute to Human Research Ethics Committee, extensive numbers of clinical trials).	• As for Level 5. In addition, 24 hour on call access to pharmacy service. • Provide networked support to lower level pharmacy services within the LHD/SHN.	• As for Level 5. In addition, clinical specialist pharmacist roles. • Senior pharmacists	• None

The current profile (Table 7) of each facility type appears to be broadly consistent with its respective role-delineation. However, with a single pharmacist currently servicing both Parkes and Forbes, Lachlan Health service may not fully meet the Level 3 requirement to have a 'Pharmacist on-site'. In addition, the Base hospitals would only partially meet the Level 4 requirement to have 'Pharmacists appointed to provide clinical service during business hours, with access out of hours.'.

Table 7: High-level profile of each facility type

Facility type	Profile
Base hospital	• High patient volumes • Trend towards increased clinical specialisations and specialist pharmacists • Moderate clinical pharmacy services • Currently operate as hubs for some services such as drug distribution and site visits to smaller sites • Moderate workforce levels
District hospital	• Moderate patient volumes • Limited clinical pharmacy services with some sites performing primarily distribution functions • Operate as outer hubs for some services such as distribution and site visits • Require clinical support from Base facilities for some specialised scenarios • Limited pharmacy resources
MPS/smaller facilities	• Low level of admitted patients as these facilities do not often have the support required to treat higher acuity patients and typically refer to other facilities • Multi-Purpose Services (MPSs) provide health, aged care and community services in rural and remote communities • On-site pharmacy support is limited to annual site visits in many cases • No dedicated clinical pharmacy services • Limited stock requirements with sites holding modest imprest stock • Some sites provide a distribution service to smaller Community Health Centres

The principles in Table 8 have been developed to guide development and evaluation of potential service and workforce model designs that take into account the differing needs of facilities across the District and seek to address the key issues identified in the Diagnostic Report.

Table 8: Guiding principles for service model re-design

Guiding Principles
All sites receive pharmacy services aligned to local needs
All sites are supported to meet accreditation standards to a level appropriate for the site profile
Clinical pharmacists spend a majority of their time on clinical tasks
All distributive functions that do not require clinical input should be assigned to pharmacy technicians
Pharmacy technicians should assume a greater scope of practice to support pharmacy service overall

In moving to a future state of pharmacy services that supports contemporary medicines management, a number of changes to key pharmacy service model elements are proposed. Table 9 provides a description of these key service model elements and the sections that follow provide an analysis of the alterations that may be made to improve District-wide pharmacy services.

Table 9: Overview of service model elements

Service model elements	Description
On-site pharmacists	Pharmacists are stationed on-site to provide medicines supply and clinical pharmacy support.
Hub-and-spoke configuration	Pharmacy staff at hub sites provide clinical services via periodic visits to surrounding sites.
Telepharmacy support	Telepharmacy services are provided to augment or replace traditional clinical pharmacy resource requirements at some (mainly smaller) sites.

3.3.1 On-site pharmacists

The current volume of activity at individual MPSs and smaller sites is unlikely to support permanent pharmacy resourcing and this would exceed the requirements for sites at a Level 1 role delineation for pharmacy. However, clinical pharmacy support to these sites must be improved as the current level of support is variable and in most cases inadequate to ensure quality use of medicines.

Service to these sites is anticipated to be improved through the adjustments proposed to the current hub and spoke model described in Section 3.3.2 and the proposed telepharmacy approach described in Section 3.3.4.

The volume and complexity of services across Base and District facilities is expected to grow and may require additional pharmacy resources on site to not only increase the overall amount of time allocated to clinical activities at those sites, but also better address the needs of particular clinical specialties (e.g. oncology, renal etc.) and support for MPS and smaller sites (either via telehealth or increased frequency of on-site visits). Further discussion on workforce requirements is presented in Section 3.3.5.

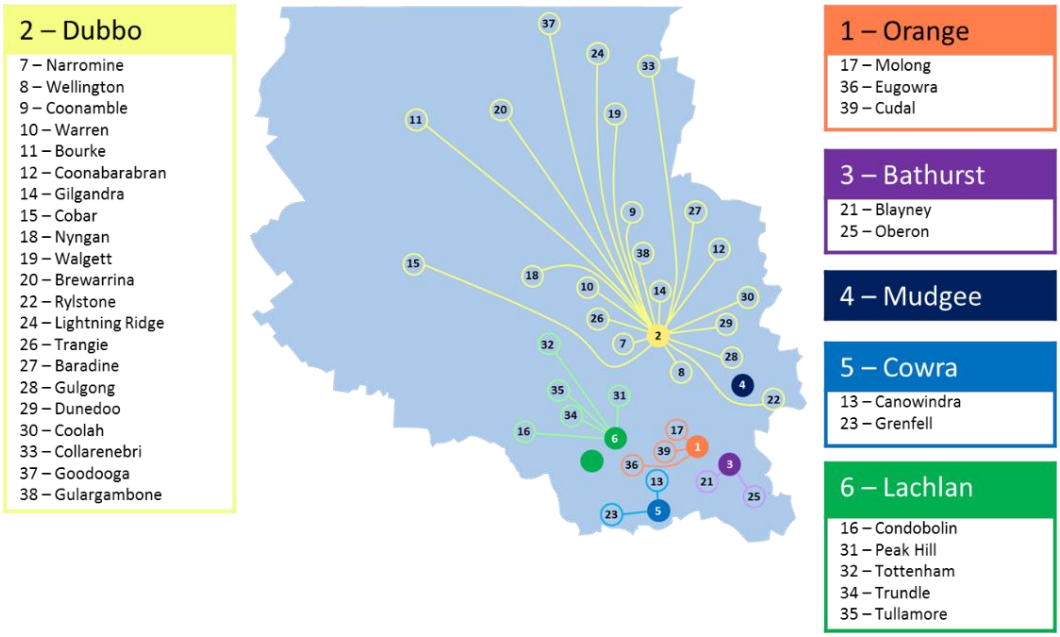
3.3.2 Hub-and-spoke configuration

The current hub-and-spoke model (Figure 3), aligns to the District's drug distribution model. In this model the majority of the Northern Sector is being serviced by Dubbo Base Hospital, which supplies drugs to 24 satellite sites. The Southern Sector currently has four hub sites servicing a total 10 additional satellite sites.

While not all smaller sites/MPSs were visited or consulted during the development of the Diagnostic Report, broader feedback indicated that pharmacy services to these sites is very limited across the entire District and typically consists of a supply function only. The frequency of physical visits to smaller sites was reported to be variable and, in most cases, inadequate to support QUM on an ongoing basis. A review of the site audit reports for some smaller sites suggested the need for more frequent visits to embed behaviour change and ensure remediation plans that address medication management risks are implemented.

In alignment with the guiding principles proposed above and the workforce requirements for sites with Level 1 role delineation of pharmacy, clinical pharmacy support for all smaller site/MPSs must be improved to provide more equitable service across the District and support the local needs of all communities.

Figure 3: Current hub and spoke configuration



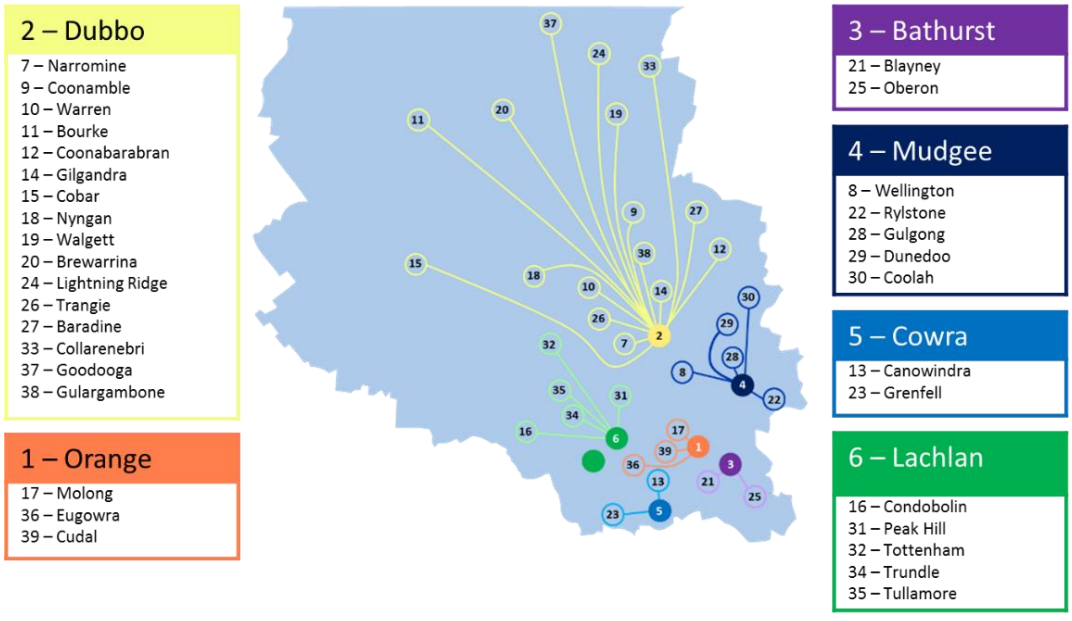
*The site number ranking represents total G&S Drug expenditure 2014/15 excluding HCDs. Dubbo also services Binnaway, Lourdes and Wanaaring, not identified above.

To strengthen the support to smaller sites and reduce the current workload on Dubbo in servicing the majority of the Northern Sector, the current hub and spoke configuration should be adjusted in a staged manner per below:

Stage 1 – Normalisation of hub-and-spoke model

Stage 1 aims to better balance the service workloads for spoke sites across hub sites. The re-distribution of workload will need to be accompanied by additional resourcing and any liberated resources at Dubbo should be re-allocated to support additional clinical service provision. Figure 4 represents a potential reconfiguration of the hub-and-spoke service model in Stage 1.

Figure 4: Stage 1 transition to new hub and spoke configuration



*The site number ranking represents total G&S Drug expenditure 2014/15 excluding HCDs. Dubbo also services Binnaway, Lourdes and Wanaaring not identified above.

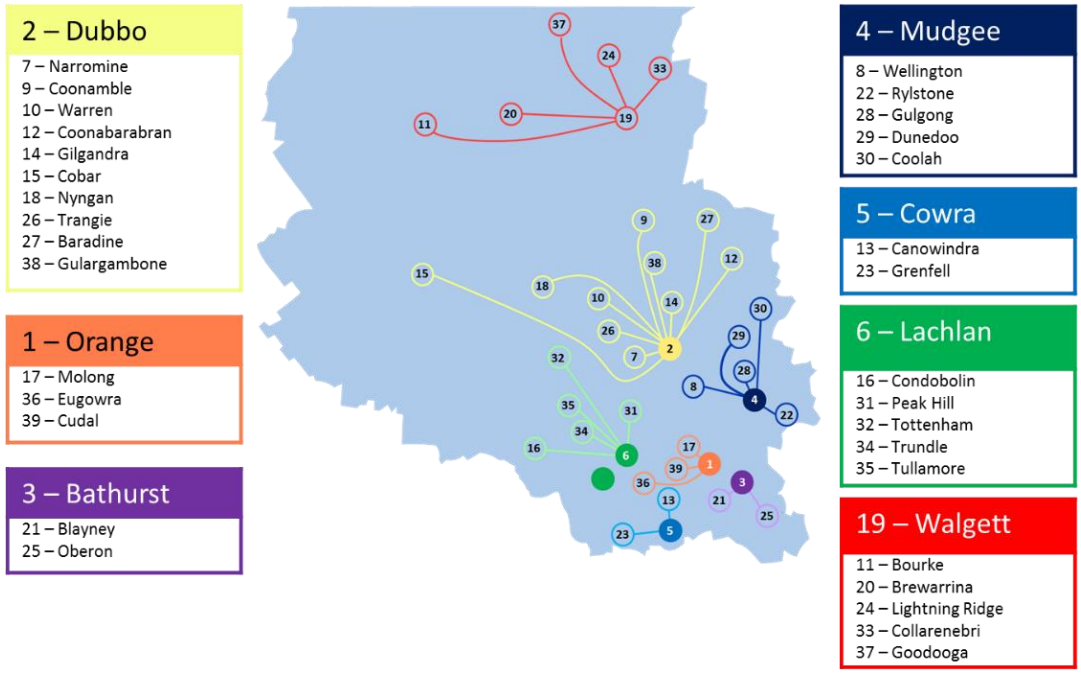
Under the above model Mudgee would adopt clinical service responsibility for Wellington, Rylstone, Gulgong, Dunedoo and Coolah. The new model would shift responsibility for approximately 1.6k separations annually from

Dubbo to Mudgee. This should provide efficiencies with travel requirements and potentially improve equity of pharmacy service access to the grouped sites. At time of writing of this report, early planning had commenced between Dubbo and Mudgee to trial the adoption of clinical service responsibility for Gulgong. This may inform the feasibility of the model proposed above.

Stage 2 – Optimisation of hub-and-spoke model

The second and final stage of the proposed hub-and-spoke configuration aims to improve the delivery of pharmacy services in the far Northern Sector. This stage would involve the formation of an additional new hub centered at Walgett. A potential configuration for the final phase hub-and-spoke service model is depicted in Figure 5.

Figure 5: Stage 2 transition to new hub and spoke configuration



*The ranking represents total G&S Drug expenditure 2014/15 excluding HCDs. Dubbo also services Binnaway, Lourdes and Wanaaring not identified above

In the above model a new hub-and-spoke system would be created in the Northern Sector with Walgett servicing Bourke, Brewarrina, Lightning Ridge, Collarenebri and Goodooga. This model would shift responsibility for approximately 2.4k separations annually from Dubbo to Walgett. Walgett was initially identified as the ideal additional hub in this model due to the location's centrality to the other proposed satellite sites. The creation of this additional hub site would eliminate the need to dispatch resources from Dubbo, and improve service equity in the remote northern regions.

As no clinical pharmacy services are currently delivered at Walgett, a new pharmacy department would need to be created. This will require additional physical space for drug storage and desk space for dispensing of medicines. In addition, supporting IT infrastructure would be required (e.g. laptop or desktop PC, WiFi infrastructure, access to i.Pharmacy and other necessary pharmacy software). Providing dedicated pharmacy resources to the far north area of the District, and at a site with a role delineation of only 1 for Pharmacy, would be a novel service model and align with the District's aspiration to be a leader in rural/remote pharmacy service provision. However, further validation would be required to determine the feasibility of Walgett to support the model proposed above.

Recommendation 8: WNSWLHD should transition pharmacy services to a revised hub and spoke configuration that better supports smaller sites, using a staged approach.

3.3.3 Outreach support to smaller sites

As described above, clinical pharmacy support to sites that do not have their own pharmacy department was reported as variable and limited primarily to a supply function, with infrequent pharmacist review of medication processes and stock levels on-site. Areas for improvement at each site and advice on improvement strategies is provided in the form of detailed regional site visit reports and specific action plans. However, the responsiveness of sites in making changes that address the suggested recommendations was reported as variable, with some sites continuing to display the same issues across multiple review visits. This includes, in some cases, failing to address significant clinical safety risks despite the provision of detailed action plans by the pharmacist on how to address the medication management shortfalls.

More frequent pharmacist visits, and the development of a set of minimum service requirements/expectations for pharmacy service provision, would improve equity and consistency of support to smaller sites across the District. In addition, more formalised governance processes may assist in critical actions being addressed following the pharmacist reporting on the site visit. For example, consistent failure to address issues identified during the pharmacist sites visits should be escalated to the executive level for discussion and remediation.

Recommendation 9: WNSWLHD should develop minimum service requirements for supporting small sites from Base and District sites, including frequency of visits, definition of the audit process and follow up procedures, governance, and standard reporting templates.

3.3.4 Telepharmacy support for service model

Telepharmacy is the use of telecommunications (typically video-conferencing) to deliver pharmaceutical care to patients where a pharmacist is not physically present on-site. In an example relevant to WNSWLHD, telepharmacy implementations have been used to restore or introduce pharmacy services to over 38 rural and remote communities across North Dakota, USA.

Focus on: North Dakota, USA

The North Dakota Telepharmacy Project was established in 2002 for the purpose of restoring, retaining, or establishing pharmacy services in medically underserved rural communities through the use of telepharmacy technology.

In the hospital model under this initiative, clinical pharmacy services are provided remotely to rural sites from a pharmacist-staffed central order entry (COE) site.

The COE site provides supervisory pharmacist oversight to remote rural hospital pharmacies via telepharmacy technology, including audio, video, and computer links and scanned electronic images. Using this telepharmacy technology, a pharmacist supervises a pharmacy technician at the remote telepharmacy site in processing medication orders for patients.

The pharmacy technician obtains the medication order from the nursing station or doctor, enters the order into the computer, prepares the product for dispensing by the pharmacist (product selection, labelling, billing), and then the pharmacist performs a final check of the product and releases the medication to the nursing station and provides professional consultation to the patient, nurse, or doctor, if needed.

Through use of a wireless telepharmacy cart, access to a pharmacist and pharmacy services can be potentially available to any rural hospital 24 hours a day, 7 days per week, at any location within the hospital, ER, nursing station, patient bedside, pharmacy. Real-time pharmacy oversight to the medication order entry and use process in hospitalised patients is recognised as a key component of high quality medication safety practices.

The project also provides quality assurance monitoring to ensure optimum patient safety through medication error tracking and other quality assurance measures.

Extract from: https://www.ndsu.edu/telepharmacy/for_hospitals/

Given that it would not be viable to provide dedicated pharmacy resources at all sites across WNSWLHD, telepharmacy may be used to replace the requirement for on-site clinical pharmacists to perform tasks such as medication reconciliation, patient counselling or patient/clinician education.

District, MPS and smaller facilities would benefit most from telepharmacy support as these sites currently receive limited clinical services and may require the support of specialised pharmacists (e.g. oncology, mental health, cardiology etc.) not available on-site. The supporting role of telepharmacy is categorised broadly in Table 10.

Table 10: Description of telepharmacy service categories

Service category	Description
Routine clinical support	Support for routine clinical tasks such as medication reconciliation, patient/clinician education and counselling.
Specialist clinical support	Support for specialist clinical needs such as oncology, mental health, surgical etc. This support is likely to be provided by Base facility pharmacists.

Three alternate configurations for telepharmacy services have been developed to support WNSWLHD. These are outlined in Table 11.

Table 11: Alternate telepharmacy service model configurations

Telepharmacy configuration	Description
Centralised	District-wide telepharmacy services are provided from a single designated location.
Semi-centralised	Services are provided to District 'zones' out of local hub locations that mirror the hub-and-spoke configurations outlined in Section 3.3.2.
Decentralised	Pharmacist services are provided from any location within the District based on pharmacist availability and the support required. The model would require sites to 'request' a service, which is then 'accepted' by a pharmacist anywhere within the District. The implementation of such a decentralised model is likely to require tailored software development.

The selection of telepharmacy configuration requires consideration of the service category provided. Table 12 describes the potential configurations for each service category.

Table 12: Telepharmacy service sites

Model	Routine clinical support	Specialist clinical support
Centralised	Likely to be provided by Orange or Dubbo	Under all the proposed telepharmacy models, specialist pharmacy services would be provided remotely by hospitals according to lead function (see Section 3.2.1 for further discussion on lead functions).
Semi-centralised	Services provided by local hub sites across the District	
Decentralised	Services provide by 'first-available' on-call pharmacists	

Each configuration can be arranged to deliver the service as Point-to-Point or Point-to-Pharmacist (Table 13). The selection of these technology options are not mutually exclusive as each option has separate situation-dependant advantages and considerations.

Table 13: Telepharmacy device configuration

	Point-to-Point	Point-to-Pharmacist
Description	• Service is provided by connections between fixed terminals at each site	• Service is provided by connection between a fixed terminal and a mobile pharmacist
Considerations	• Some sites may not have the required equipment and infrastructure • Base sites have existing telehealth services • Provides easy scheduling of equipment usage • Communication with nurses on wards may be possible provided that ward Computer On Wheels (COWs) are equipped with the necessary software and hardware	• Service may be provided through smart phone, tablet or other devices that provide roaming capacity within the site (e.g. when the pharmacist may be between the main pharmacy and one or more wards) or potentially external to sites (e.g. while a pharmacist may be travelling between sites) • Provides flexibility to provide services across hospital environments

Recommendation 10: WNSWLHD should develop and implement a telepharmacy strategy to support the provision of clinical pharmacy services to sites across the District with no on-site pharmacist support.

3.3.5 Improving medication reconciliation

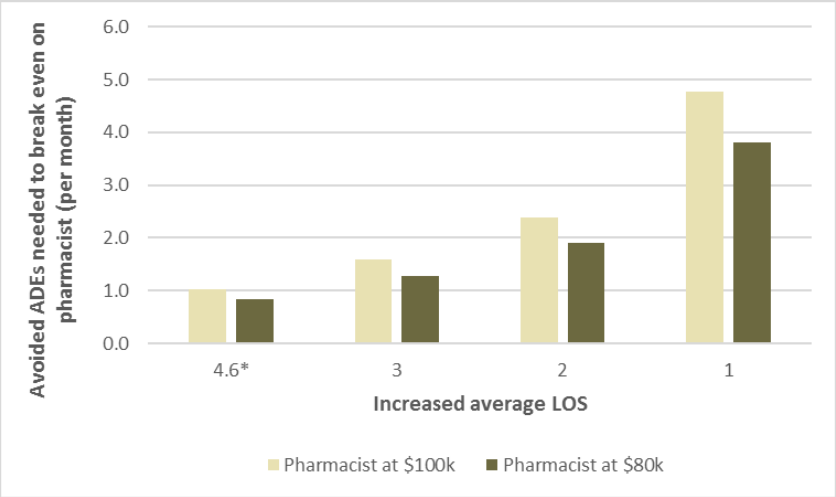
Medication errors are the second most common incident reported in hospitals, after falls. Studies have shown that roughly half of all adverse events remain preventable[6] and that patients who experience an ADE typically stay in hospital 4.6 days longer than those not experiencing ADEs[7]. At an estimated $1,748 - $2,021 per overnight admission[8], this equates to an estimated average increased cost to the health service of approximately $8,042 - $9,299 per ADE.

Consistent feedback from pharmacy staff during the Current State Analysis identified a concern that the District's health services are not meeting the NQSHS Standard around medication reconciliation, primarily due to limited pharmacist time to spend on clinical tasks.

Figure 6 shows that even taking the lower estimate of overnight admission cost ($1,748) and reducing the estimated increased LOS as a result of the ADE down to one day, the pharmacist would need to prevent at most five ADEs per month (at $100k pa salary) or four ADEs per month (at $80k pa salary) to cover their salary costs.

[6] Roughhead, E. Semple, S. 2009, *Medication safety in acute care in Australia: where are we now? Part 1: a review of the extent and causes of medication problems 2002-2008,* Australia and New Zealand Health Policy 6:18
[7] Bates, D.W., et al. (1997) "The costs of adverse drug events in hospitalized patients" Adverse Drug Events Prevention Study Group. Jama, 1997; 277:307-11
[8] Based on 2012-13 cost per bed day for overnight admissions (escalated to 2015-15 levels by CPI, compounded at 3%), published in: http://www.audit.nsw.gov.au/ArticleDocuments/358/10_Managing_Length_of_Stay_Hospital_Readmission_Appendix_Three.pdf.aspx?Embed=Y, accessed 21 April 2016

Figure 6: Sensitivity analysis of avoided ADEs required to break even on pharmacist salary



*Based on published results by Bates et al. (1997)

In a 16-week pilot study, placing an intern pharmacist in a surgical ward in Orange for 10hrs/week reportedly identified at least 60 interventions (average of 15/month). This suggest that preventing sufficient ADEs to fund a pharmacist salary would not be difficult.

A pilot project at Orange with a pharmacist focused on improving the accuracy of discharge summaries in the Critical Care Unit (CCU) showed an improvement from 25% accuracy pre-intervention to 90% post intervention. Subsequent analysis estimated this improvement to have saved approximately $128k in reduced readmissions. The cost of the pharmacist time required to provide the service was estimated at $40k, equating to an approximate return on investment of 3:1.

We understand that WNSWLHD is participating in the NSW Clinical Excellence Commission's Continuity of Medication Management Program[9] which includes the state-wide roll-out of a comprehensive Medication Reconciliation Toolkit[10] and Implementation Workbook to support LHDs in implementing medication reconciliation across health services. In light of the benefits of effective medication reconciliation, the District should look to dedicate a project team to expedite the roll-out of this work.

Recommendation 11: The District should, as a matter of priority, follow the guidance in the CEC Medication Reconciliation Toolkit to:

1. establish the overarching governance and form a multi-disciplinary Medication Reconciliation project team
2. map the current medication reconciliation process at each Base and District site in the initial instance and then all other sites thereafter
3. perform a baseline audit of medication reconciliation performance
4. develop a plan for the District-wide implementation of medication reconciliation processes.

3.4 Workforce requirements

One of the key themes throughout the development of the Diagnostic Report was the gap in pharmacy resourcing across the District and the limitations this places on delivery of high quality and equitable pharmacy services.

The development of an overall future pharmacy workforce model to service the District is complex and requires consideration of the District's sparse geography, the individual needs of each facility and the overlapping

[9] http://www.cec.health.nsw.gov.au/programs/continuity-of-medication-management, accessed 21 April 2016
[10] Clinical Excellence Commission, 2014. Continuity of Medication Management: Medication Reconciliation Toolkit, December 2014. Sydney: Clinical Excellence Commission.

implications of adopting other strategic options proposed in this report that may have net workforce requirements or may liberate existing resources through improved efficiency.

In many cases it is not possible to accurately estimate the impacts on pharmacy workforce from the adoption of the proposed solutions without further analysis and solution development. Such development is anticipated as the focus of Phase 2 of this project.

This section provides a high-level estimate of the identifiable pharmacy workforce requirements to augment current pharmacy provision and relieve immediate resource pressures, with a longer term view to:

- Improving equity of service across the District
- Increasing the net amount of pharmacist time spent on clinical tasks
- Better utilising pharmacy technicians to reduce the need for additional pharmacists where possible
- Supporting transition to the proposed hub-and-spoke configuration.

Stage 0 in Table 14 below outlines the estimated immediate pharmacy workforce needs of the District, while Stages 1 and 2 estimate only the pharmacy resources needed to support the proposed transition from the current hub-and-spoke configuration to the proposed configuration over the respective stages.

It is also noted that, at present, three specialist oncology pharmacists (one each at Orange, Dubbo and Bathurst) are funded through the grant provided as part of the Slade chemotherapy outsourcing arrangement. With growth in oncology activity, the permanent funding and long term sustainability of these existing positions needs to be considered in the context of future changes to the chemotherapy outsourcing arrangements. In addition, the potential requirement for additional oncology pharmacy support, either through upskilling of the existing pharmacy workforce, or new specialist resources requires consideration in overall pharmacy workforce planning.

Table 14: Estimated pharmacy workforce impacts by stage

	Stage 0	Stage 1	Stage 2
Site/Stage Description	**This Stage focuses on addressing the immediately-apparent pharmacy workforce needs to better support the District**	**This Stage estimates the workforce impacts associated with Stage 1 of the proposed hub-and-spoke re-configuration**	**This Stage estimates the workforce impacts associated with Stage 2 of the proposed hub-and-spoke re-configuration**
Dubbo	+ 1.0 FTE Oncology specialist pharmacist[1]	Should release approximately 0.4 FTE Pharmacy Technician	Should release approximately 0.5 FTE Pharmacy Technician
Orange	+ 1.0 FTE AMS Pharmacist for Southern Sector[2]	No change	No change
Bathurst	+1.0 FTE Pharmacy Technician[3] + 1.0 FTE Oncology specialist pharmacist[4]	No change	No change
Lachlan	+1.0 FTE Pharmacist[5] +0.8 FTE Pharmacy Technician[5]	No change	No change
Mudgee	No change	+ 0.5 FTE Pharmacist[6] + 0.5 FTE Technician[6]	No change
Cowra	+0.5 FTE Pharmacy Technician[7]	No change	No change
Walgett	No change	No change	+ 1.0 FTE Pharmacist[8] + 0.5 FTE Technician

	Stage 0	Stage 1	Stage 2
WNSWLHD	+0.8 FTE Chief Pharmacist[9]		

Notes:

[1] At time of writing Dubbo is currently recruiting to this position, funded through the grant provided as part of the Slade chemotherapy outsourcing arrangement.

[2] This resource is the subject of an active business case being considered by the Executive.

[3] This resource is the subject of an active business case being considered by the Executive.

[4] At time of writing Bathurst is currently recruiting to this position, funded through the grant provided as part of the Slade chemotherapy outsourcing arrangement.

[5] These resources are the subject of an active business case being considered by the Executive.

[6] This resource would be net new and would require a business case for funding to be considered by the Executive. This resource would be required to enable Mudgee to support the sites proposed as part of Stage 1 of the transition to a new hub and spoke model and provide additional pharmacist time to spend on clinical activities.

[7] This resource would be net new and would require a business case for funding to be considered by the Executive. This resource would bring the total Pharmacy Technician time at Cowra to just over 1.0 FTE and would be expected to free up additional pharmacist time to spend on clinical activities.

[8] While a full-time pharmacist may not be required to service the sites proposed for the new Walgett hub, it may be difficult to recruit to this position unless it is full-time. In addition, to adequately support the satellite sites for this location, a significant amount of travel would be required which will reduce the efficiency of this role. To service the populations in the most remote areas of the Northern Sector from this hub it may be beneficial to have this position as a designated Aboriginal Pharmacist.

[9] This increase assumes adoption of Recommendation 6 to increase resourcing of the Chief Pharmacist role to 1.0 FTE from 0.2 FTE.

Table 15 provides an estimate of the impact these changes would have on overall pharmacy FTE across the District, based on changes from FY14/15 FTE levels.

Table 15: Estimated impact on FY14/15 Pharmacy FTE

Role	Dubbo^	Orange	Bathurst	Mudgee	Cowra	Lachlan	Walgett	WNSWLHD	Total
Pharmacist	7.05	8.75	2.28	1.11	0.92	1.14		0.19	21.45
Intern Pharmacist	2.23	0.94	-	-	-	-		-	3.17
Pharmacy Technician	2.98	3.00	2.13	-	0.66	0.92		-	9.69
Pharmacy Assistant	1.98	-	-	0.71	-	-		-	2.69
Total clinical FTE	**14.24**	**12.69**	**4.41**	**1.82**	**1.58**	**2.07**		**0.19**	**37.00**
Administration	0.33	1.01	-	-	0.05	0.38		-	1.76
Total 2014/15 FTE	**14.57**	**13.70**	**4.41**	**1.82**	**1.64**	**2.44**		**0.19**	**38.76**
Additional resources proposed for consideration									
Pharmacist	1	1	1			1		0.81	4.81
Pharmacy Technician			1		0.5	0.8			2.3
Total at Stage 0	**15.57**	**14.70**	**6.41**	**1.82**	**2.14**	**4.24**	**0.00**	**1.00**	**45.87**
Pharmacist				0.5					0.5
Pharmacy Technician				0.5					0.5
Total at Stage 1	**15.57**	**14.70**	**6.41**	**2.82**	**2.14**	**4.24**	**0.00**	**1.00**	**46.87**
Pharmacist							1		1
Pharmacy Technician							0.5		0.5
Total at Stage 2	**15.57**	**14.70**	**6.41**	**2.82**	**2.14**	**4.24**	**1.50**	**1.00**	**48.37**

^Dubbo FTE numbers do not reflect potential FTE saved through shifting of responsibility for smaller site support to other hubs as it is assumed this capacity will be absorbed in supporting additional clinical pharmacy activities.

Table 16 provides a high-level estimate of the salary impacts associated with the proposed additional resources presented in Table 15.

Table 16: Estimated salary impacts of proposed additional resources

Role	Dubbo	Orange	Bathurst	Mudgee	Cowra	Lachlan	Walgett	WNSWLHD	Total
Additional resources proposed for consideration									
Pharmacist	$120,000	$120,000	$ 120,000			$ 96,000		$ 129,000	$ 585,000
Pharmacy Technician			$ 58,200		$ 33,000	$ 46,080			$ 137,280
Total at Stage 0	**$120,000**	**$120,000**	**$ 178,200**	**$ -**	**$ 33,000**	**$ 142,080**	**$ -**	**$ 129,000**	**$ 722,280**
Pharmacist				$ 48,000					$ 48,000
Pharmacy Technician				$ 33,000					$ 33,000
Total at Stage 1	**$120,000**	**$120,000**	**$ 178,200**	**$ 81,000**	**$ 33,000**	**$ 142,080**	**$ -**	**$ 129,000**	**$ 803,280**
Pharmacist							$ 96,000		$ 96,000
Pharmacy Technician							$ 33,000		$ 33,000
Total at Stage 2	**$120,000**	**$120,000**	**$ 178,200**	**$ 81,000**	**$ 33,000**	**$ 142,080**	**$ 129,000**	**$ 129,000**	**$ 932,280**

Key to cell colouring: Yellow = estimated cost for Grade 3 Pharmacist (Inclusive of 20% on costs) NB: These positions are funded through oncology grant; Violet: estimated cost for Grade 3 Pharmacist (Inclusive of 20% on costs); Green = salary costs as estimated in submitted business cases (inclusive of 20% on costs); Blue = based on estimate for Grade 2 Pharmacist per 2014 Lachlan business case (inclusive of 20% on-costs); Orange = based on estimated cost for Pharmacy Technician of $55,000 (plus 20% on-costs); Grey = additional Chief Pharmacist resourcing - cost extrapolated from current 0.2 FTE expenditure.

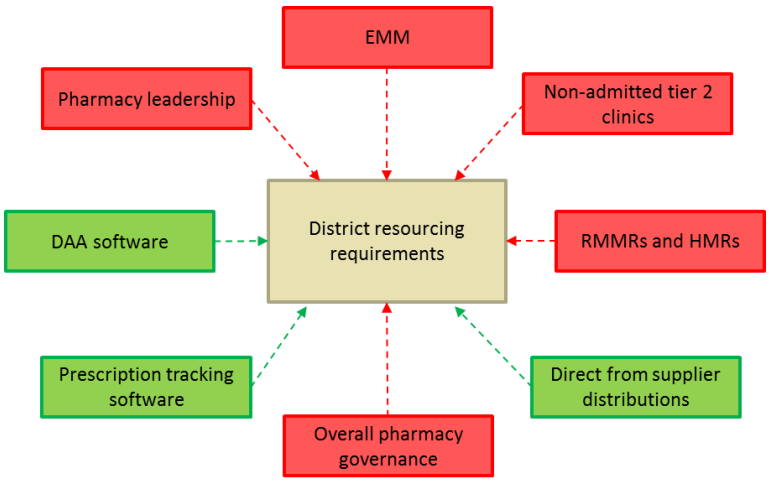
Recommendation 12: The District should resource the immediate pharmacy workforce needs (Stage 0) and increase overall workforce resources in a staged approach to support the proposed transition to a revised hub-and-spoke configuration.

Overarching workforce strategy

Many of the solutions proposed throughout the rest of this report will have impacts on the District's pharmacy workforce requirements, which makes an overall estimate of required pharmacy resources difficult at this time. Therefore, other than the proposed changes in Table 14, any additional changes to the District's pharmacy workforce resourcing should be considered in the context of all of the solution options outlined in this report that are identified for implementation.

While not quantified here, Figure 7 provides an indication, where possible, of the anticipated net impact of other solution options on District workforce requirements. Red boxes indicate a net requirement for pharmacy resources and green boxes depict an anticipated freeing of pharmacy resources through improved operational efficiency.

Figure 7: Indicative impacts on pharmacy resource requirements from implementation of other proposed solution options



Recommendation 13: The District should develop an overall pharmacy workforce strategy that aligns with the Medications Management Strategy (Recommendation 1) and takes into account the impact of adopting the various solution options set out in this report.

3.5 Financial management

The sections below describe the details underpinning strategic options to support improved pharmacy financial management.

3.5.1 Access to quality financial data

Poor visibility and timely access to quality financial data is a barrier to strong financial governance and strategic decision making. The District has limited capacity to understand pharmacy cost drivers and monitor efficient use of drugs, which is a key barrier to the development and implementation of a strong performance management framework for the service (see section 3.7).

Table 17 outlines the major cost categories for pharmacy services across the District and provides a high-level assessment of each as High (H), Medium (M) or Low (L) against the following domains: future growth in the cost category, capacity to identify the costs in current data sets, accuracy of budget and overall ability to understand appropriateness and efficiency of expenditure on each cost.

Table 17: Assessment of information quality for major pharmacy cost categories

Cost category (expenditure in 2014/15)	Future growth	Capacity to identify in data	Budget accuracy	Understanding of appropriateness and efficiency	Comments
General drugs ($10.32m)	M	H	H	M	There is limited reconciliation of general drug expenditure as the process requires the Finance team to rely on i.Pharmacy reports which may not provide the required level of detail.
PBS funded HCDs ($7.67m)	H	H	M	H	PBS funded HCDs expenditure is captured within designated cost centres and is therefore identifiable.
Unfunded inpatient drugs ($?)	M	L	L	L	Expenditure on these drugs is unclear as it is captured under 'general drug' cost centres. There is limited potential to improve the transparency of these costs. The introduction of EMM may help by linking drug use to an individual patient level.
S&Ws + Employee Benefits ($3.40m)	(?)	H	H	(?)	S&W and employee benefit expenditure is captured in designated cost centres and therefore identifiable.
Compassionate drugs ($0.31m)	M	M	M	M	Compassionate drug expenditure is captured in designated cost centres and therefore identifiable.
Expired/destroyed stock ($0.15m)	L	M	M	L	While expired stock cost is captured in designed cost centres the cost is not routinely recorded at all sites. Additionally, wastage of satellite sites is often recorded at the Base facility,

Cost category (expenditure in 2014/15)	Future growth	Capacity to identify in data	Budget accuracy	Understanding of appropriateness and efficiency	Comments
					which limits the capacity to understand cost and trends at site level.
Other ($0.29m)	L	H	H	-	The remaining costs account for 1.3% of total expenditure and are visible.

Improvements in the accessibility, quality and use of financial data will be required to not only increase transparency of drug costs, but also to support measurement of some of the key indicators to be defined in the proposed Pharmacy Performance Management Framework (PMF) described in section 3.7.

Recommendation 14: Pharmacy should review and refine the quality of its drug usage and expenditure data and periodically monitor and report to DTCs on material variations in:

- Overall drug expenditure
- Drug expenditure by site/ward/unit
- HCD expenditure (both S100 and non-PBS funded)
- Hospital-funded outpatient expenditure
- Stock holding
- Stock wastage.

Recommendation 15: The Chief Pharmacist, or delegate, should work with CSC to optimise i.Pharmacy reporting to ensure the District has ready access to the drug usage and expenditure data it needs to monitor performance and trends per Recommendation 14.

3.5.2 Potential revenue sources

The sections below outline the analysis underpinning strategic options that may generate additional revenue for the District through pharmacy services.

3.5.2.1 Non-admitted Tier 2 clinics

Pharmacy-led Tier 2 Non-admitted care clinics (Group 40.01 to 40.60) have the potential to generate revenue for the District. The services within scope for Activity Based Funding (ABF) purposes are wide ranging but must meet one of the following general criteria to attract funding:

- Directly relate to an inpatient admission or emergency department attendance
- Intend to substitute directly for an inpatient admission[11]
- Expected to improve the health or better manage the symptoms of people with physical or mental health conditions who have a history of frequent hospital attendance or admission

Funding under ABF is contingent on services meeting general counting rules which need to be considered during service design. Below are examples of key general counting rules:

[11] Hospital In The Home (HITH) patients that are categorised as 'intermittent' are considered non-admitted (service type 225) and therefore may also be eligible for Tier 2 clinics.

- A Tier 2 Non-admitted service event must be counted once regardless of the number of health care providers involved
- Only one service event may be counted for a patient at a clinic on a given calendar day
- Service events delivered via telehealth where two public hospital service clinics are involved are counted twice. One service event is counted at the clinic where the patient physically attends **and** one is counted at the site where the clinic is provided (classified to code 40.61). This is of relevance to WNSWLHD, particularly if implementing the telepharmacy model proposed in Section 3.3.4.

The following tables outline some potential pharmacy services that may attract funding under Tier 2 Non-admitted care clinics. The indicative funding estimate is based on clinic Price Weights outlined by the Independent Hospital Pricing Authority (IHPA) and the National Efficient Price of $4,971 2015/16[12]. The cost of performing each activity is calculated based on the time requirements of a Grade 2 Second year pharmacist ($52.90/hr). Table 18 includes high level financial modelling of each selected clinic and identifies the estimated net surplus per clinic (taking into account only incremental pharmacist salary costs), and also the minimum number of clinics per week required to fund a Grade 2 Second Year pharmacist to deliver the clinics.

Table 18: Indicative surplus for pharmacy-led Tier 2 non-admitted clinics

Tier 2 Clinic	Description	Indicative funding	Pharmacist time requirements (hrs)	Indicative S&W cost ($52.90/hr)	Indicative surplus/clinic	Clinics per week required to fund Pharmacist ($104k p.a)
40.04	Clinical pharmacy	$ 833.14	1.0	$ 52.90	$ 780.24	2.6
40.30	Alcohol and other drugs	$ 169.51	0.5	$ 26.45	$ 143.06	14.0
40.56	Falls prevention	$ 81.52	1.0	$ 52.90	$ 28.63	70.2
40.58	Hospital avoidance programs	$ 264.95	1.0	$ 52.90	$ 212.06	9.5

The tables below provide summary overviews of the considerations for each identified pharmacy-led clinic that may potentially attract new revenue for the District. Further consultations with the District's clinical coding team may be required to verify the eligibility of the scenarios proposed, or potentially identify additional scenarios that may be viable, particularly for Tier 2 Clinic 40.56 and 40.58.

Table 19: Overview of Tier 2 Clinic - Clinical Pharmacy 40.04

Clinical Pharmacy (40.04)			
Usual provider:	Clinical Pharmacist	**Indicative surplus/clinic:**	**$780**
IHPA definition of the service: Review and advice on medicine usage. **Activity:** Consultations on the following: • review of medicine orders, new and repeat for clinical appropriateness • identify and resolve medicine related problems with the prescriber before processing the medication order • counsel patients or carers to ensure that the patient understands all information required for safe and proper use of the medicine • provide consumer medicines information required for the safe and proper use of the medicine			
Potential scenario:			

12 The WNSWLHD price will be lower than the published NEP which will marginally reduce the estimated surplus per clinic and consequently increase the number of clinics required to be performed per week to fund a pharmacist position.

Clinical Pharmacy (40.04)			
Usual provider:	Clinical Pharmacist	**Indicative surplus/clinic:**	**$780**

- A pharmacist stationed in a pre-admission environment taking Best Possible Medication Histories (BPMH) for each planned admission. (Pre-admission BPMH reported to be already included in coding at Dubbo)
- Medication reconciliation for HITH patients.

Table 20: Overview of Tier 2 Clinic – Alcohol and Other Drugs 40.30

Alcohol and Other drugs (40.30)			
Usual provider:	Allied Health/Clinical nurse specialist	**Indicative surplus/clinic:**	**$143**

IHPA definition of the service:

Diagnosis, treatment and management of patients who overuse and or are dependent on substances that are harmful to the body.

Activity:

Consultations for:

- treatment for substance overuse/dependence and associated behaviours

Potential scenario:

- A pharmacist stationed in a pre-admission environment identifies patients with a positive smoker status and administers an internationally standardised questionnaire tool (e.g. Fagerstrom Test or Heaviness of Smoking Test) determine the patients' level of nicotine dependence. The pharmacist then provides counselling and recommends smoking cessation support.

Table 21: Overview of Tier 2 Clinic – Falls prevention 40.56

Falls prevention (40.56)			
Usual provider:	Allied Health/Clinical nurse specialist	**Indicative surplus/clinic:**	**$28**

IHPA definition of the service:

Support for people who have had a fall, or are at high risk of falling, can be home or centre based and focuses on aiding independent living and reducing falls and fracture/admissions.

Activity:

Patients that have recently been admitted to hospital following a fall or presented to an emergency department following a fall or having been identified at risk of falling. Interventions may include:

- assessment of requirements and risk factors
- development of a management plan
- provision of individual advice, equipment and information
- interventions to address falls risk such as balance training, strengthening, flexibility, skills, teaching to recover from a fall and environment modifications and adaption

- follow-up and support

The services included in this clinic will be predominantly, but not exclusively, provided to aged persons.

Potential scenario:

- A pharmacist identifies discharged patients at risk of falls or who were admitted based on fall related events and administers a standardised falls risk questionnaire to evaluate the likelihood of future falls. The pharmacist then makes recommendations and referrals to community practitioners.

Table 22: Overview of Tier 2 Clinic – Hospital Avoidance Programs 40.58

Hospital Avoidance Programs (40.58)			
Usual provider:	Allied Health/Clinical nurse specialist	**Indicative surplus/clinic:**	**$212**

IHPA Definition of the service:

Comprehensive clinical assessment, risk screening and review of care generally targeted at people with chronic health and/or mental health conditions at risk of unplanned hospital presentations.

Provision of time limited goal orientated care planning in an ambulatory setting to reduce unplanned admissions or re-admissions to hospital and would usually include timely referral to specialist services and care coordination

Activity:

Consultations for people with chronic and often complex health and/or mental health conditions who require comprehensive needs assessment, care planning and review to prevent unplanned hospital admissions.

These activities can be home or centre based including:

- comprehensive client needs assessment
- development of multidisciplinary care plan with client
- client self-management training and support to apply recommendations of specialist assessments, advice and care planning to manage and monitor their condition
- review and follow-up of the effectiveness of the ongoing care plan and strategies implemented.

Potential scenario:

- A pharmacist connects with patients recently discharged from hospital via telephone or videoconference to follow up, support and review the success of ongoing care plans and other strategies recommended for implementation.

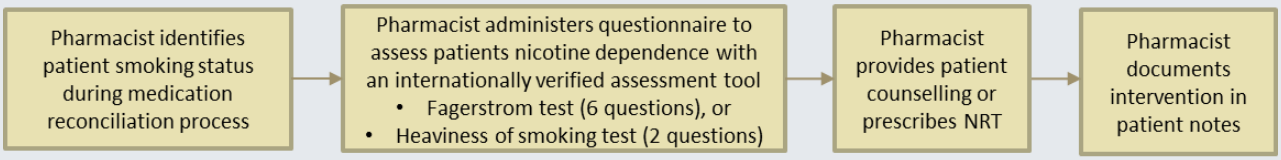
Recommendation 16: Further analysis and investigation should be undertaken to identify the optimal configuration and focus for pharmacist-led Tier 2 clinics to generate revenue for the District.

3.5.2.2 Smoking cessation intervention clinics

During the consultations for the Diagnostic Report, it was identified that at least one hospital in Victoria had attracted additional health service revenue through pharmacist-led smoking cessation clinics. As such we sought to understand whether WNSWLHD may be able to implement similar clinics to attract new revenue to the District.

Focus on: Pharmacist-led smoking cessation clinics at Alfred Health, Victoria.

A study published by the Alfred Hospital Pharmacy Department in 2014 conducted a 6-month review of a pharmacist-led smoking cessation intervention. The review included testing the potential for the interventions to generate WIES revenue. During the study the smoking cessation process (depicted below) was implemented with >70% of inpatients with LOS >2 days.



The study suggested that improving documentation of nicotine-dependence assessment led to increased coding of patients for the nicotine dependant code (ICD-10 F17.2). This had the effect of increasing the DRG classification of these patients, compared to those coded only as positive for tobacco use (ICD-10 Z72.0). This had the effect of attracting increased WIES funding.

The number of cases coded as nicotine dependant (ICD-10 F17.2) in the year pre-intervention was 17 compared to 2240 post-intervention (12-month figure extrapolated from 6-month study results). The analysis suggested that this intervention resulted in an estimated increased WIES revenue of $560/case (extrapolated to total $1.2m annually).

However, in a recent consultation (March 2016) The Alfred Hospital reported that, as of 1 July 2015, the inclusion of ICD-10 code F17.2 no longer influences DRG assignments and therefore no longer generates additional WIES funding for the health service. Despite no longer attracting WIES revenue, the smoking cessation clinics have been retained at The Alfred Hospital for their positive impacts on patients and The Alfred is about to implement Pre-admission NRT clinics (a subsequent evaluation is planned to measure the effectiveness of this model).

Table 23 below shows the proportion of total district separations flagged as positive for tobacco use (Z72.0) and the comparative proportion of separations flagged as nicotine dependant (F17.2).

Table 23: Proportion of WNSWLHD separations identified as tobacco users or assessed as nicotine dependent

Separations	2012/13	2013/14	2014/15
Tobacco user (Z72.0)	24,804	24,372	24,579
Nicotine dependant (F17.2)	87	159	153
District total	61,663	60,881	63,383
Smoker status (Z72.0) as % of District	**40.23%**	**40.03%**	**38.78%**
Nicotine dependant (F17.2) as % of District	**0.14%**	**0.26%**	**0.24%**

Source: Raw data from WNSWLHD Organisational Performance Unit

This data indicates that despite approximately 40% of total District separations for the last three financial years being flagged as tobacco users, only approximately half a percent of these were recorded as having been assessed for nicotine dependence and provided counselling and/or nicotine replacement therapy (NRT). While it is possible that a greater proportion of smoking interventions are being undertaken than are recorded and coded in the data, this still suggests a significant lost opportunity for the District to impact the health of its communities.

Notably, smoking prevention and cessation was one of the key areas identified where actions from health services are likely to give the greatest health benefits to the District's communities[13]. Similarly, at a national community level, the Assessing Cost Effectiveness (ACE) of Prevention Study[14] found that smoking cessation aids were cost effective and have a moderate impact on population health (<10,000 to 100,000 DALYS prevented per intervention).

While the potential for inpatient smoking cessation intervention programs to directly attract additional WIES revenue for the specific coding of smoking cessation interventions may have expired, the broader clinical benefits of such interventions for patients who use tobacco appears clear.

Furthermore, documentation of smoking cessation interventions by a pharmacist for non-admitted patients may attract funding as a Tier 2 non-admitted patient clinic under Alcohol and Other Drugs management (40.30). This scenario is explored in section 3.5.2.1.

Recommendation 17: The District should establish pharmacy-led smoking cessation interventions for inpatients and outpatients to increase the proportion of its population that receives assessment and treatment for nicotine dependence.

3.5.2.3 Residential Medications Management Reviews and Home Medicines Reviews

Residential Medications Management Reviews (RMMRs) and Home Medicine Reviews (HMRs) are a pharmacist-led comprehensive clinical review of a patients' medications aimed at supporting QUM. The clinical process for both RMMRs and HMRs is the same, however, RMMRs are performed on eligible patients residing in aged care (including MPS facilities) while HMRs are performed on community patients and must be conducted at the patients' home. The service is performed by a consultant pharmacist accredited through the Australian Association of Consultant Pharmacy (AACP) upon referral from the patients' GP.

To be eligible to receive a funded RMMR or HMR, patients must meet the related eligibility criteria outlined in Table 24.

Table 24: Eligibility criteria for RMMRs and HMRs

RMMR eligibility criteria	HMR eligibility criteria
• Current Medicare or Department of Veterans' Affairs (DVA) cardholder	• Current Medicare or Department of Veterans' Affairs (DVA) cardholder
• Permanent resident of an Australian Government funded aged care facility as defined by the Aged Care Act 1997 or a MPS facility	• Living in a community setting
• At risk of or experiencing medication misadventure	• At risk of or experiencing medication misadventure
• Resident of an Australian Government funded aged care facility for more than 14 consecutive days	• The GP confirms that there is an identifiable clinical need and the patient will benefit from a HMR service
• The GP confirms that there is an identifiable clinical need and the patient will benefit from a RMMR service	• Patient is not currently an in-patient of a public or private hospital, day hospital facility, transition care or aged care facility

[13] http://www.wnswlhd.health.nsw.gov.au/UserFiles/files/About%20Us%20(Western%20NSW%20LHD)/WNSW_HNA_final_draft_17May13.pdf, Accessed 8 April 2016
[14] https://public-health.uq.edu.au/filething/get/1836/ACE-Prevention_final_report.pdf, Accessed 8 April 2016

RMMR eligibility criteria	HMR eligibility criteria
• Not received an RMMR within the past 12 months unless there has been a significant change in the patient's condition or medication regimen requiring review	• Not received a HMR within the past 12 months unless there has been a significant change in the patient's condition or medication regimen requiring review

The programs are currently funded through the 6th Community Pharmacy agreement (6CPA) with Registered Service Providers (consultant pharmacists or community pharmacies) and GPs each receiving remuneration for services performed. Table 25 outlines the remuneration for both RMMR and HMR services:

Table 25: Provider remuneration rates and claiming considerations for HMRs and RMMRs

Service provider	RMMR	HMR
Accredited pharmacist	• $106.66 per RMMR • Service providers are only able to claim 20 services per month • Before RMMR services can be provided the Service Provider must be engaged with the facility through an RMMR Service Agreement. Only 1 Service Provider may be contracted for a single facility. • The RMMR service must be provided to a facility at no charge	• $210.93 per HMR • Service providers are only able to claim 20 services per month • Rural loading allowance of $125 can be applied to round trips of >200km where patients reside in Pharmacy Accessibility Remoteness Index of Australia (PhARIA) categories 2 to 6. Only 1 allowance can be claimed per day regardless of how many HMRs are performed.
General Practitioner	• $106.00 (MBS item 903) per RMMR	• $154.80 (MBS item 900) per HMR

Access to HMR and RMMR services across the District are likely to vary significantly. A review of the AACP database revealed that Base facilities have the highest number of accredited pharmacists residing within a 50km radius compared to more remote regions where there is often no record of an accredited pharmacist located within 100km. However, this database does not represent the number of travelling accredited pharmacists servicing larger regions under contractual arrangements. For example, stakeholders noted that accredited pharmacists from Sydney regularly fly in to undertake HMRs for residents of WNSWLHD.

Table 26: Number of AACP accredited pharmacists within 50km radius of each Base or District site

		Headcount willing to provide services	
Site	Headcount within 50km	HMR	RMMR
Dubbo	10	10	7
Orange	3	3	3
Bathurst	7	7	7
Parkes/Forbes	5	5	5
Mudgee	1	1	1
Cowra	0	0	0

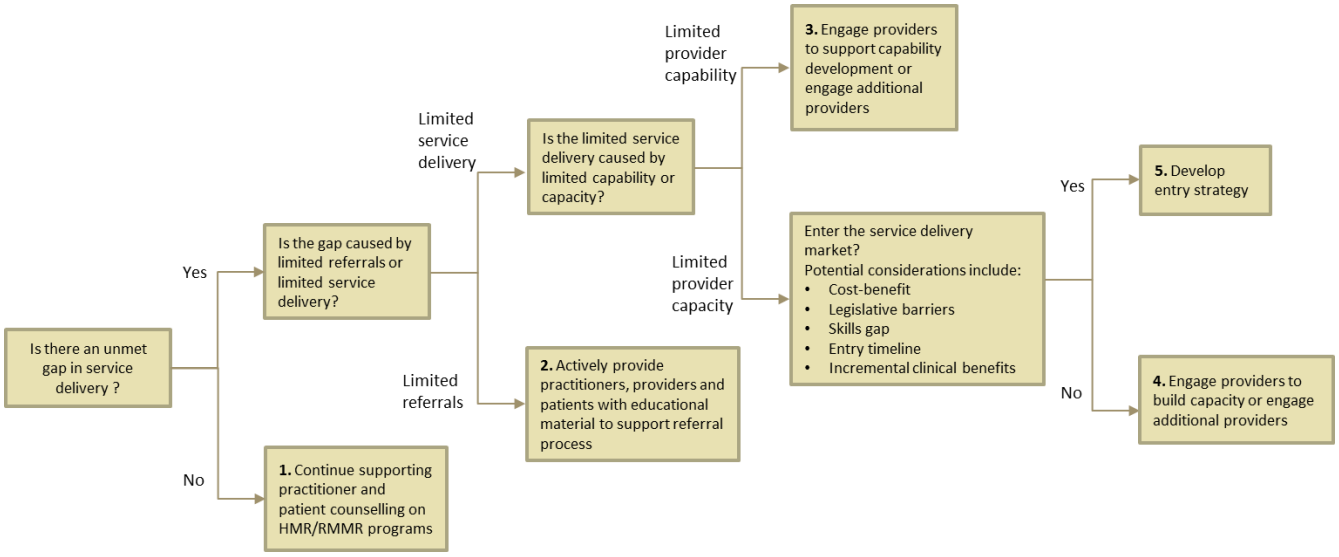
Strategies to actively engage and improve the delivery of RMMR and HMR services across WNSWLHD will need to consider the barriers to delivery at each facility. The below list represents potential engagement strategies which may support improved service delivery and high level considerations of each strategy:

Table 27: Strategies for WNSWLHD to improve HMR and RMMR service delivery

Strategy	High level considerations	Level of direct involvement in clinical pathway
1. Support increased awareness of RMMR/HMR programs amongst practitioners and patients	• Standardised patient and practitioner engagement brochures are available • Limited resourcing requirements	Passive
2. Actively supply practitioners, providers and patients with educational material to support referral process	• Supports stronger relationships with referral process • Periodic resourcing requirements	Low
3 – 4. Engage providers to build capacity/capability or engage additional providers	• Providers may be travelling and have limited presence in the region • Funding the net cost of service delivery may yield higher return than market entry • Higher resourcing requirements	Medium
5. Enter RMMR and HMR service market	• Legislative barriers to District pharmacists capturing revenue directly from 6CPA • Dedicated resourcing requirements • Current skill gap with pharmacist accreditation training likely to take 1.5 to 2 years at a cost of $2.5k. Accreditation also attracts an annual registration cost of $590	High

The decision tree in Figure 8 outlines the logic path leading to each strategy:

Figure 8: Decision tree for selecting HMR or RMMR support strategy by local region



The below analysis suggests the indicative net surplus for each RMMR is $2.18 and each HMR is $80. The model is based on the following assumptions, that significantly influence the estimated surplus margin:

- Services are provided within current travel rosters and do not incur incremental travel costs (e.g. accommodation)
- No additional administrative requirements are incurred
- Total time allocation for each service is limited to 2 hours
- Total incremental travel time is limited to 30 minutes for each HMR

The financial impact of the clinical benefits derived from RMMRs and HMRs is not considered in the model.

Table 28: Estimated surplus from each RMMR or HMR

	RMMR	HMR
Total revenue claim	**$106.66**	**$210.93**
Expenses		
S&W - Pharmacist Grade 2 Second Year ($52.90/hr for 2 hours)	$104.48	$104.48
S&W - Travel time ($52.90/hr for 30 minutes)	-	$26.45
Total expenses	**$104.48**	**$130.93**
Net surplus/(cost)	**$2.18**	**$80.00**

A rate limiting component of entry into the RMMR/HMR service market is the need to employ or develop an AACP accredited pharmacist. The need to employ a pharmacist with AACP accreditation significantly reduces the potential labour pool while internal development through the accreditation process takes an average of 1.5 to 2 years. The direct costs of the accreditation process are summarised in the table below with total initial costs for each accredited pharmacist of $2.5k and annual registration fees of $590.

Table 29: AACPA accreditation costs

	Cost
Training cost - Stage 1	$671.00
Training cost - Stage 2	$1,819.95
Total initial internal development cost	**$2,490.95**
Direct annual registration costs	**$591.25**

Recommendation 18: The District should not offer RMMRs/HMRs directly, but may investigate options to facilitate the delivery of RMMR/HMR by community pharmacy providers on a site-by-site basis.

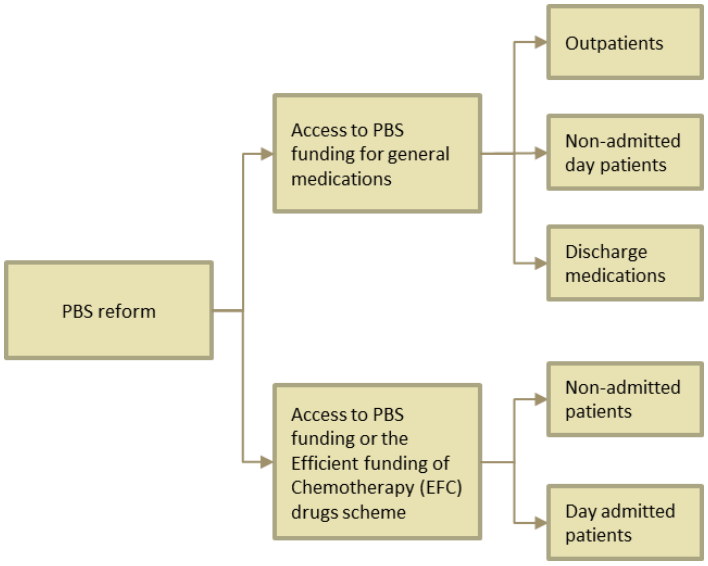
3.5.2.4 PBS reforms

NSW and ACT are currently the only State and Territory, respectively, not participating in the Commonwealth PBS reforms that allow public hospitals to access the PBS for non-admitted patients, patients on discharge from hospital, and day-admitted or non-admitted patients receiving chemotherapy. At time of writing this report, the Commonwealth has once again offered NSW the opportunity to participate in the reforms and NSW Health has commenced a process to reassess the costs and benefits of participating.

If NSW agrees to participate, the reforms will have significant impacts on continuity of patient care, prescribing requirements, workflows and net medication costs. The reforms (Figure 9) include two key funding alterations:

- **PBS medications:** All PBS eligible prescription dispensing of general medications will be reimbursed at ex-manufacturer price + 11.1% mark-up
- **Efficient Funding of Chemotherapy (EFC) scheme:** All eligible chemotherapy preparations will be reimbursed as ex-manufacturer price + $82.67 per preparation

Figure 9: Remuneration model for PBS reforms



Chemotherapy medications

Preparation and supply of chemotherapy infusions is a complex aspect of pharmacy practice and the market is highly concentrated with fewer than 60 pharmacies in Australia (approximately 1% of total) providing over 80% of chemotherapy infusions funded under the PBS. Due to the nature of chemotherapy medications, compounding is a necessary step for the provision of these medications in a ready-to-administer form. Each dose is often compounded from multiple medication vials and almost always involves a level of wastage, which adds to the unit dose cost of already expensive medications. The EFC scheme was introduced in 2011 to calculate the PBS reimbursement on the basis of the most cost-efficient combination of vials to support the sustainability of chemotherapy medication costs.

There are three typical models of compounding facilities:

- In-house Public/Private hospital compounders
- Compounding community pharmacies
- Third-party compounders.

The list below outlines compliance standards for consideration by pharmacy departments involved with chemotherapy compounding:

- TGA Good Manufacturing Practice Standards
- Australian standards for cleanrooms, pharmaceutical isolators and methods of tests
- Clinical Oncology Society of Australia Guidelines for the Safe Prescribing, Dispensing and Administration of Cancer Chemotherapy
- International standards for medical devices and cleanrooms
- Pharmaceutical Inspection Convention and Co-operation scheme
- Society of Hospital Pharmacists Australia (SHPA) Standards of Practice for Clinical Pharmacy Services.

The District currently offers outpatient chemotherapy only and contracts Slade Health Pty Ltd to provide third-party compounding services for all chemotherapy medications. Central pharmacy departments have limited or no operational, governance or financial involvement in chemotherapy medication provision as chemotherapy orders are managed by oncology ward nurses or dedicated specialist oncology pharmacists. Slade Health is able to process prescriptions under PBS rules and therefore there is no cost to the District for PBS drugs. Non-PBS drugs that are supplied are charged to the respective health service at which they are ordered.

The outsourcing arrangement means the uptake of PBS reform by NSW is unlikely to significantly alter the cost of chemotherapy provisions for the District as Slade Health is already able to access PBS remuneration. The remuneration received by community pharmacy providers is also higher than public hospital pharmacy departments due to additional entitlements available under the 6CPA.

Table 30 outlines the potential advantages and disadvantages of developing an in-house compounding services and maintaining outsourcing arrangements with Slade Health, in the event that NSW adopts PBS reforms.

Table 30: Analysis of pros and cons of each chemotherapy compounding model

Model	Pros	Cons
In-house compounding	• Receive EFC funding • Increased control over compounding process, governance and supply • Internal development of compounding expertise and introduction of an advanced career progression pathway for pharmacists • Would allow for supply of inpatient chemotherapy if adopted by the District in the future (albeit not eligible for PBS under current arrangement) • Less reliance on third party logistics chain • Potential increased capacity to support clinical trials and attract associated funding	• Significant capital investment with need to construct and fit compounding clean rooms • Permanency of constructed clean rooms significantly increases change costs • Ongoing maintenance and compliance costs • Lack of compounding experience within current workforce • Physical space requirements mean potentially redesignating space currently utilised • Lack of scale economies compared to outsourced compounder means variable outsourcing costs may be lower than in-house production
Outsource compounding	• Flexibility afforded through contract negotiations and competitive tender of service • Leverage benefits of specialist oncology medication compounding expertise • In-kind benefits (e.g. grant provision to fund specialist oncology pharmacists) • Avoidance of incremental risk, capital investment and ongoing costs	• Not possible to attract funding through the EFC scheme of PBS • Limited control over compounding process, governance and supply • Does not provide for upskilling of existing District pharmacy workforce

Development of an in-house compounding service is unlikely to be preferred to outsourcing, at this stage, considering the incremental operating risk, significant capital investment requirements and ongoing maintenance and compliance costs. Maintaining outsourcing arrangements provides flexibility afforded through contract negotiations and avoids incremental risk, capital investment and ongoing costs.[15]

Recommendation 19: The District should continue to outsource the compounding and supply of its chemotherapy needs, but reassess the costs and benefits of in-house compounding in the event that it adopts inpatient chemotherapy in the future.

[15] WNSWLHD does not currently provide inpatient chemotherapy services. If it were to consider this in the future, the cost-benefit analysis for establishing in-house compounding may differ significantly as inpatient medications (except S100) are not eligible for PBS funding and in particular chemotherapy is typically high cost.

General drugs PBS remuneration – Discharge Medications

High level modelling of PBS funding for discharge medications suggests there is potential to generate a net surplus at Base and District sites before consideration of capital investment, increased stock holding costs, or incremental maintenance costs (Table 31). The combined net surplus potential across Base facilities approximates $660k annually after consideration of an additional requirement for notional 2.63 FTE pharmacist and notional 2.63 FTE pharmacy technicians across the sites. However, the lower volume of separations at District facilities may limit the potential revenue and is estimated to generate only marginal net surplus.

Table 31: Estimated net surplus from PBS funding of discharge medications[16]

Site	Separations 2014/15	Indicative No. of separations receiving discharge medications	Indicative No. of discharge medications dispensed	Indicative PBS funding surplus	Indicative FTE requirements		Indicative S&W cost			Net surplus
					Pharmacist	Technician	Pharmacist	Technician	Total	
Orange	16,614	13,790	41,369	$ 405,173	0.83	0.83	$ 86,478	$ 52,189	$ 138,667	$ 266,505
Dubbo	15,509	12,872	38,617	$ 378,225	0.77	0.77	$ 80,726	$ 48,718	$ 129,444	$ 248,780
Bathurst	8,998	7,468	22,405	$ 219,438	0.45	0.45	$ 46,836	$ 28,265	$ 75,101	$ 144,337
Lachlan	4,535	3,764	11,292	$ 110,597	0.23	0.23	$ 23,605	$ 14,246	$ 37,851	$ 72,746
Cowra	3,126	2,595	7,784	$ 76,235	0.16	0.16	$ 16,271	$ 9,820	$ 26,091	$ 50,144
Mudgee	2,972	2,467	7,400	$ 72,479	0.15	0.15	$ 15,470	$ 9,336	$ 24,806	$ 47,674
Cobar	1,077	894	2,682	$ 26,265	0.05	0.05	$ 5,606	$ 3,383	$ 8,989	$ 17,276
Total	**52,831**	**43,850**	**131,549**	**$ 1,288,412**	**2.63**	**2.63**	**$ 274,992**	**$ 165,957**	**$ 440,949**	**$ 847,463**

Assumptions underpinning the high level model include:

- Proportion of separations receiving discharge medications = 83%
- Average number of medications dispensed per discharge summary = 3
- Average net PBS funding surplus per medication = $9.79
    - Based on indicative average margin of 25% and an average cost per medication (excluding HCDs) of $39.18 from 2014/15 order data
- Assumed Pharmacist and Technician FTE ratio of = 1:1
- Assumed Pharmacist FTE requirements per 200 medications = 1
- S&W cost for Pharmacist Grade 2 Second Year = $104,521 annually
- S&W cost for Technician Grade 2 First Year = $63,078 annually

General drugs PBS remuneration – Outpatient/Non-admitted day patients

High level analysis of non-admitted patient activity suggests only Base hospitals are likely to support the employment of 1 FTE Pharmacist and 1 FTE Pharmacy Technician ('dispensing team') with PBS remuneration for outpatient and non-admitted day patient activity. While it is difficult to estimate the dispensing activity generated from Non-Admitted Patient (NAP) clinic activity, a high level analysis suggests that Orange, Dubbo and Bathurst may be able to support the employment of a dispensing team with only 10%, 11% and 20% respectively of NAP activity generating 1 prescription each event. While Cowra, Mudgee, Forbes and Parkes may also able to support a dispensing team, the proportion of NAP required to generate the threshold prescription activity is unlikely to be realistically achievable. Similarly, all other sites would require NAP activity to generate more than 1 prescription per event to support a dispensing team, which again is unlikely to be realistic.

16 Excluding capital, increased stock or maintenance costs

Table 32: Proportion of NAP occasions of service attracting PBS medications required to support funding of 1 FTE Pharmacist and 1 FTE Pharmacy Technician

Site	Non-Admitted Patients 2014/15	% of total NAPs required to fund 1 FTE Pharmacist and Technician
Orange	174,943	10%
Dubbo	158,698	11%
Bathurst	84,328	20%
Cowra	24,156	71%
Mudgee	21,421	80%
Forbes	19,014	90%
Parkes	26,757	64%
Cobar	3,675	466%

Assumptions underpinning the high level model include:

- Average number of medications dispensed per patient = 1
- Average net PBS funding surplus per medication = $9.79
    - Based on indicative average margin of 25% and an average cost per medication (excluding HCDs) of $39.18 from 2014/15 order data
- Assumed Pharmacist and FTE ratio of = 1:1
- Assumed Pharmacist FTE requirements per 200 medications = 1
- S&W cost for Pharmacist Grade 2 Second Year = $104,521 annually
- S&W cost for Technician Grade 2 First Year = $63,078 annually

Additional considerations for supplying PBS medications for discharge or outpatient/non-admitted patient medications includes, but is not limited to:

- Physical space for management and dispensing of PBS medications
- Requirement for changes to existing pharmacy workflows, procurement and financial management processes
- Requirement for holding of additional stock and implications for management, distribution and rotation of stock between District sites
- Maintenance of existing relationships with local community pharmacies.

Recommendation 20: If NSW adopts the Commonwealth PBS reforms, the District should undertake a detailed site by site viability analysis including working with sites to determine the likely additional resourcing, stock holding and physical space requirements to provide PBS medications to patients on discharge and outpatient/non-admitted patients.

3.6 Procurement

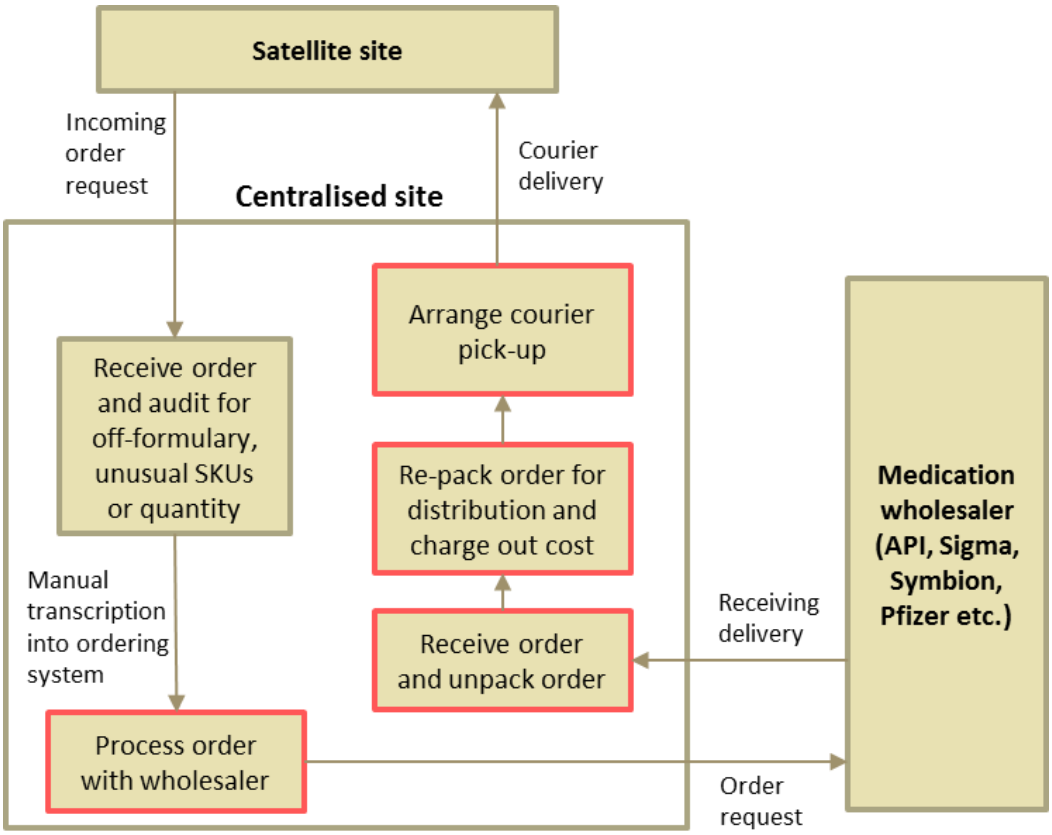
The sections below describe the details underpinning strategic options to improve procurement processes.

3.6.1 Direct from supplier distributions

Stock control and distribution across a geographically disperse network of hospital facilities is a significant challenge. The current distribution process resembles a hub-and-spoke model with pharmacy resources at centralised hospitals being responsible for auditing and managing drug orders, and physically receiving and re-distributing stock, for satellite sites. Pharmacists across the District have reported that distribution services involves a significant administrative workload which limits capacity to undertake clinical pharmacy services. A

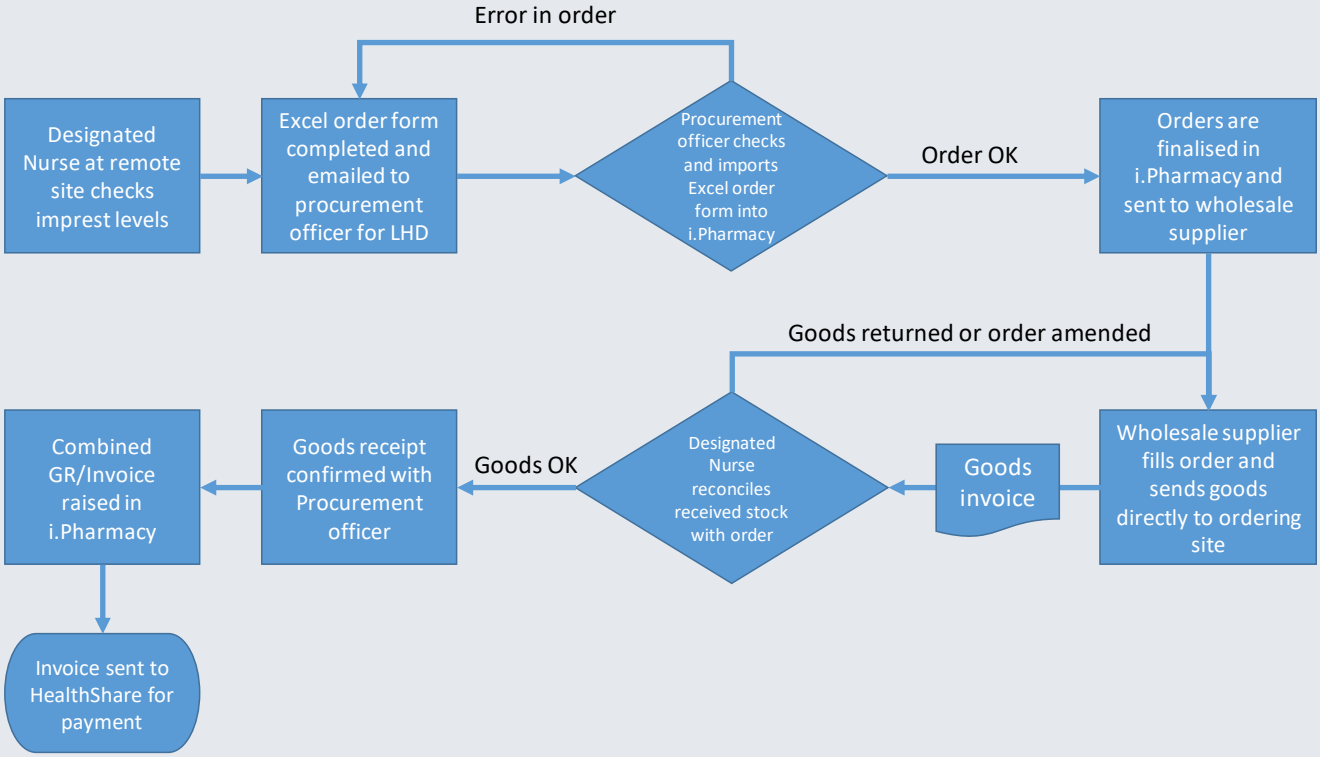
high level overview of the current process is depicted below with areas marked in red representing processes which carry significant administrative requirements for pharmacy staff and do not generate value.

Figure 10: Current WNSWLHD drug procurement and distribution model



Focus on: Centralised drug ordering and direct order distribution in Murrumbidgee LHD

Murrumbidgee LHD (MLHD) faces similar challenges to WNSWLHD with regard to the servicing of a large number of geographically dispersed sites. Pharmacy services in MLHD are currently focused at Wagga Wagga Rural Referral Hospital (WWRRH) and Griffith Base Hospital (GBH), with the 28 smaller sites across the district receiving limited clinical support from these two sites and drug supply directly from WWRRH through a centralised ordering function with delivery directly from the wholesaler to the ordering site. The process, depicted below, is managed by a procurement officer at WWRRH.



LHD	Number of sites by pharmacy role delineation^						
	0	1	2	3	4	5	6
Western NSW	None	30	1	3	1	2	None
Murrumbidgee	18	4	4	2	1	1	None

^ As at 2014

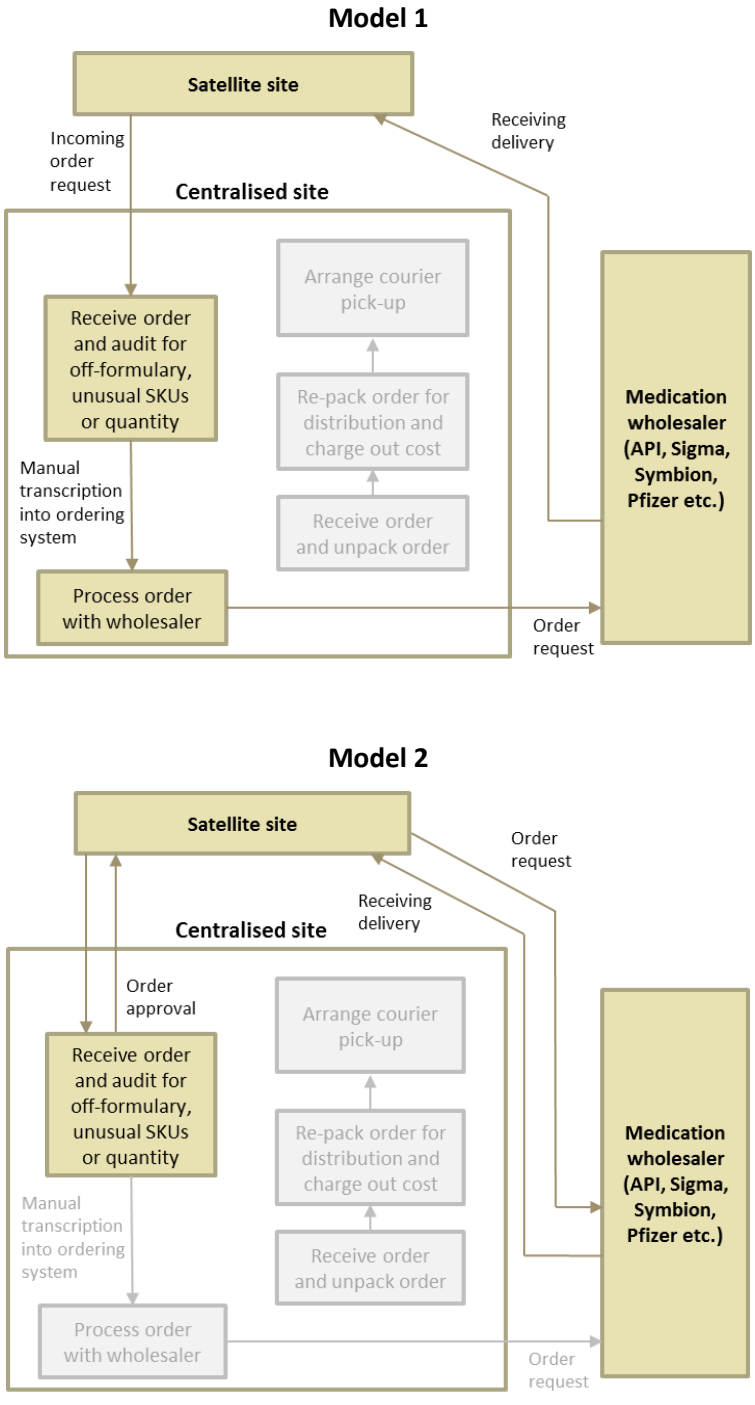
The implementation of a direct delivery arrangement across WNSWLHD may support a range of benefits including:

- Improved workflow efficiencies as unnecessary physical handling is reduced
- Re-alignment of pharmacy technician resources to better support more value-added pharmacy activities
- Improved integrity of cold chain and Dangerous Drug handling processes as there is limited current capacity to govern these standards
- Reduced courier network risk and contract maintenance requirements as the number of courier companies employed to maintain the network is likely to significantly reduce.

A high level overview of two potential direct delivery process is depicted in Figure 11.

- **Model 1** - Processes for receiving and repacking stock performed by the central site are negated by the introduction of direct delivery to the satellite site. The centralised site maintains approval governance over satellite site orders.
- **Model 2** – Building upon Model 1 the process of manually transcribing at the centralised site is avoided while processing the order is shifted to the satellite site. The centralised site maintains approval governance over satellite site orders.

Figure 11: Potential models for direct delivery of drugs across WNSWLHD



Key implementation considerations of direct delivery may include:

- Site level requirements with service provision, workforce, physical space and delivery schedules. A universal model may not be applicable or feasible.
- Impact of workforce redesigns and the employment of administration clerks to support purchasing and stock control
- Impact of procurement standardisation processes
- Risk of current and potential wholesaler courier networks across the District
- Delivery times of wholesaler courier service and resourcing availability to manage orders such as cold-chain and Schedule 8 medicine orders
- Model 2 – Infrastructure and resourcing requirements at satellite sites to allow order entry into i.Pharmacy. Implementation of barcode readers in imprest cabinets may support the automation of the order entry process

The analysis in Table 33 suggests that adopting a direct delivery model may liberate approximately 17 hours of pharmacist and 102 hours of technician time weekly across the District by reducing the need for unpacking and re-packing orders for distribution to satellite sites.

Table 33: Estimated existing workforce requirement to support drug supply to satellite sites

	Dubbo	Orange	Bathurst	Parkes	Total (hrs/wk)
Satellite sites serviced	24	3	2	5	
Indicative weekly workflow efficiencies (hrs)					
Pharmacist (0.5 hours per site)	12	1.5	1	2.5	**17.0**
Technician (3 hours* per site)	72.0	9.0	6.0	15.0	**102.0**
Total (hrs)	**84.0**	**10.5**	**7.0**	**17.5**	**119.0**

*Estimated by Chief Pharmacist

Recommendation 21: WNSWLHD should work with its drug suppliers to implement a direct distribution model for drugs across the District that eliminates the need for double-handling of drug orders and increases the efficiency of the procurement process overall.

3.6.2 District-wide procurement processes

Analysis undertaken for the Diagnostic Report showed that in general, there was a high degree of consistency in prices paid for the same or equivalent drugs. However, in a small number of cases there was material variation in the amount paid between sites. In at least one case, this was due to independent local negotiation with suppliers, as opposed to a co-ordinated District-wide approach. While the issue does not appear significant at the moment, there does appear to be an opportunity to strengthen procurement policies to ensure the District as a whole is accessing the most favourable pricing for drugs across all sites.

As a starting point for the development of a District-wide policy around drug procurement, the following may be considered:

- Where a product is on the NSW Statewide contract, this must be the default purchasing option
- For products (including HCDs) that are not on the NSW Statewide contract, an analysis of likely usage across the District should be estimated and District-wide pricing should be negotiated with suppliers and made available to all sites across the District
- Usage and pricing of all high volume drugs should be reviewed annually and, where off-contract, re-negotiated if possible

- Where the variation in purchase cost of any single product at an individual site is more than $5,000 higher than an available clinically-equivalent alternative, this must be considered and approved by the local DTC, and the District DTC where the impact is likely to extend across multiple sites.

In addition, a dedicated District pharmacy procurement officer (e.g. pharmacy technician level) could be considered to assist in:

- monitoring and governing District-wide drug procurement
- providing key drug procurement data to pharmacists and executives to inform budget processes and other performance monitoring (see Section 3.7)
- negotiating and managing key contracts with drug suppliers
- maintaining up-to-date knowledge of all procurement-related regulations and NSW Health directives
- sourcing once-off or difficult to find products
- educating pharmacists and medical staff on product alternatives
- freeing up pharmacist and pharmacy technician time at local sites.

Recommendation 22: The District should develop a District-wide drug procurement policy to be mandated at all individual sites.

Recommendation 23: The District should consider the appointment of a District pharmacy procurement officer to support improved procurement practices.

3.7 Performance management

The District currently lacks a robust suite of performance indicators for the monitoring and management of Pharmacy services and efficient medicines usage. Table 34, while not exhaustive, provides some potential indicators that may be used to measure different aspects of pharmacy service quality and efficiency, along with an indication of the District's current capacity to measure them.

Table 34: Potential indicators of pharmacy service performance

Measurement domain	Potential indicators	Current capacity to measure
Pharmacy workload/activity	Prescriptions dispensed	High
	Medication reconciliations performed (total # and proportion of total separations)	Low
	Discharge medications lists reviewed (total # and proportion of total discharges)	Low
	Number of clinics performed	N/A
Service quality	Medicine order turnaround time	Moderate
	Number of patients counselled on their medicines before discharge	Low
	Proportion of patients with a medication reconciliation within 24 hours recorded in clinical notes	Low
Patient outcomes	Reduced ADEs	Moderate

Measurement domain	Potential indicators	Current capacity to measure
	Reduced re-admissions for medication reasons	Moderate
	Patient experience of service	Low
Stock Control	Stock turn	High
	Dead stock	Moderate
	Wastage	Moderate
Financial	Overall budget variation	High
	Surplus from HCDs	High
	Price variation across District for same product	Moderate
Overall Efficiency	Pharmacy FTE per 1,000 separations	High

One of the key barriers to measurement of pharmacy service performance, identified through the Diagnostic Report, is the limited availability of high-quality underpinning data.

The implementation of a performance management framework (PMF) for pharmacy services will likely take 6-12 months to establish and for data quality to improve following the introduction of any process/system changes required.

In the interim, the District should implement the Clinical Excellence Commission's Medication Safety Self-Assessment (MSSA), at a minimum across Base and District sites, which will assist to establish a robust baseline for many of the indicators anticipated to be impacted by the implementation of the solutions identified in this report.

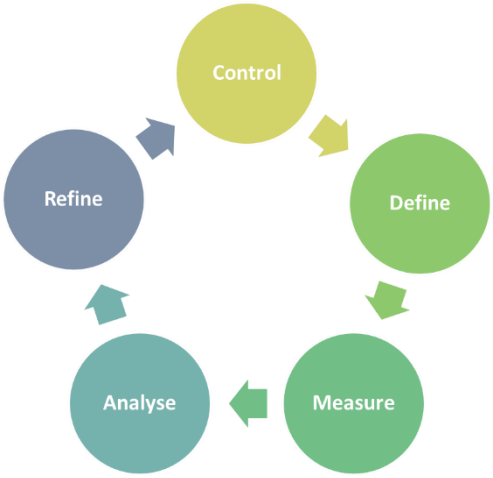
Once robust routine data is available, the pharmacy PMF should support:

- An improved understanding of pharmacy operations
- The development of evidence-based business cases
- The identification of areas for improved efficiency or effectiveness
- Ongoing monitoring of pharmacy service performance and, by extension, the impact of targeted improvement strategies (such as those proposed through this report).

As with all performance measurement frameworks, the Pharmacy PMF should promote continuous improvement at both the organisational and service levels. Through improved understanding and ongoing development of the Pharmacy PMF, a culture of continuous improvement will ensure that the Pharmacy PMF continues to remain contemporary and relevant to supporting the District in achieving its strategic medicines management goals. For this reason, developing an outcomes measurement framework is not a 'set and forget' exercise. Rather, it requires constant monitoring and refinement to ensure it appropriately reflects what is important to the District at any given time.

The five common stages for supporting the continuous improvement cycle are depicted in the figure to the right and relate to:

- **Define** – define the objective or outcome desired of the service or program offering
- **Measure** – measure the outcome of the service offering or progress toward meeting the defined objective
- **Analyse** – analyse the results of the measurement activity
- **Refine** – refine the service or program offering in response to the analysis
- **Control** – control the variables which influence the achievement of the objective or outcomes.



The Pharmacy PMF and the associated indicators and measures will need to be reviewed and refined periodically, based on input from relevant stakeholders and following the cycle above to ensure it remains aligned to the District's strategic directions.

Recommendation 24: WNSWLHD should develop, implement and maintain, a robust set of performance indicators of pharmacy services, validated by a multi-disciplinary advisory committee.

Recommendation 25: WNSWLHD should identify the data sources required to support the measurement of the indicators developed as part of Recommendation 24. Where required, the District should invest in process/system changes required to capture the required data to a high quality so that the indicators can be used to inform strategic decision making.

Recommendation 26: WNSWLHD should implement the Clinical Excellence Commission's Medication Safety Self-Assessment at all Base and District sites to establish a baseline of comparison against which to measure the impact that improved pharmacy processes has on medication safety.

3.8 Enabling technologies

As the District moves towards its aspiration to be a leader in rural/remote pharmacy service provision, it should consider the implementation of contemporary technologies to support more efficient pharmacy workflow and practices and improvements in medications safety and QUM. The adoption of such technologies must be carefully planned and considered in the context of the broader practice and business model changes proposed elsewhere in this report.

The sections below describe the analysis underpinning a series of strategic options for adoption of technologies that will support and augment pharmacy work processes.

3.8.1 Pharmacist mobility options

At some sites, such as Cowra and Forbes, it was reported that pharmacists spend significant time during their day just in moving between the pharmacy department and the wards due to the physical distance between them. As examples, a pharmacist may need to return to the pharmacy department from the wards to access medicines information or drug availability while on the wards or to initiate dispensing in the i.Pharmacy system.

To alleviate the inefficiency associated with this non-value-added time (NVAT), the District may consider mobile technology options that provide pharmacists access to medicines information resources, i.Pharmacy and email on the wards. In addition, such technology may allow pharmacists servicing multiple remote sites to access this information while travelling between sites, streamlining workflow, for example to allow pharmacy technicians to initiate the dispensing of medicine orders in advance of the pharmacist returning to the pharmacy department or central site to perform the final checking process.

This technology may provide significant benefits in the revised hub-and-spoke model proposed in Section 3.3.2 to support greater efficiency for pharmacists working between multiple sites. In addition, such devices may also provide the platform required to support the decentralised telepharmacy model outlined in Section 3.3.4.

A tablet device would likely be the most appropriate for this application, and a number of mobile devices (e.g. Microsoft Surface, iPad, Android tablet) may be suitable. The District's IT department should be consulted in the selection of the most appropriate device to ensure compatibility with the District's IT architecture and the necessary pharmacy software. As shown in Table 35, only a modest amount of pharmacist time would need to be saved per day in order to break even on the purchase and setup costs for each device. This suggests that the implementation costs should not be a barrier to adoption of this solution.

Table 35: Minimum number of saved Pharmacist minutes[17] to break even on mobile device purchase and setup cost

	Minimum saved minutes to break even	
Est. device and setup costs	**Total**	**On average per day**
$1,500	1701	5
$2,000	2268	6
$3,000	3403	9
$4,000	4537	12

Recommendation 27: The District should provide mobile tablet devices (configured to access relevant pharmacy software across sites) to pharmacists who are required to undertake significant non-value-added travel, either within or between sites.

3.8.2 Barcode readers

Barcode readers are not currently used in District facilities for routine dispensing, despite evidence that they reduce dispensing errors and associated adverse drug events (ADEs).

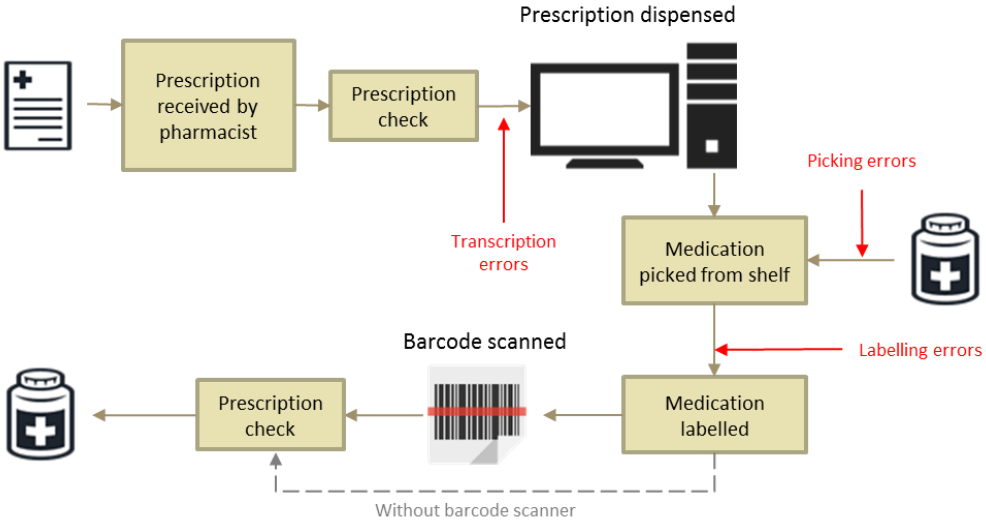
Barcode readers are commonly used in routine dispensing across public and private hospital departments and community pharmacy settings and are identified as required for safe dispensing by a range of relevant pharmacy guidelines and recommendations:

- Pharmacy Board of Australia (PBA) guidelines – 'Guidelines for dispensing medication'
- NSQHS accreditation standards – 'Criterion 4.5.2'
- SHPA guidelines – 'Standards of Practice for Hospital Pharmacy Outpatient Services'
- Clinical Excellence Commission recommendations
- The NSW Health Information Bulletin (July 2014) – 'Implementation of Barcode Scanning in NSW Public Hospital Pharmacy Departments'
- Pharmaceutical Defence Limited (leading professional indemnity insurance provider) – 'Good Dispensing Practice Guidelines'

Figure 12 outlines the point of integration of barcode checking and different potential error types present in the dispensing process.

[17] Based on Grade 2 Second Year Pharmacist salary equating to $52.90/hour

Figure 12: Integration of barcode checking in the medication dispensing process



Transcription errors – wrongly entered data into dispensing system including patient name, medication, dose, strength, form, brand etc.

Picking errors – wrong medication chosen from the shelf

Labelling errors – unmet legal requirements, illegible labelling etc.

Barcode readers are designed to reduce the rate of picking errors but are not designed to prevent transcription or labelling errors. In addition, while they provide additional safety support, they do not replace the need for manual checking by the pharmacist which remains a safety and legal requirement.

The cost of a barcode reader ranges from approximately $90 to >$1000 per unit. However, a relatively basic barcode reader (costing in the order of approximate $200 to $300 per unit) would likely be adequate to meet the requirements of pharmacy dispensing. The key functional requirements include compatibility with i.Pharmacy and 1D and 2D barcode reading capacity.

While 2D barcodes are relatively nascent and are not the standard for pharmaceutical packaging in Australia (TGA – 'Best practice guidelines on prescription medicine labelling'[18] recommends the use of 1D barcodes for pharmaceutical packaging) the use of 2D barcodes is expected to increase in the future and have started to emerge in consumer information resources attached to medication packaging.

Assuming an average cost of $250 per unit, the indicative investment required to implement barcode readers across Base and District hospitals approximates $4,250 for a total of 17 barcode readers.

- Base hospitals (3 sites) – 3 dispensing terminals per site = 9 barcode readers at a total cost of $2,250
- District hospitals (4 sites) – 2 dispensing terminals per site = 8 barcode readers at a total cost of $2,000

Recommendation 28: The District should evaluate, select and implement barcode readers for use at all dispensing terminals across the District as a matter of priority.

[18] https://www.tga.gov.au/publication/best-practice-guideline-prescription-medicine-labelling

3.8.3 Electronic Medications Management (EMM)

The implementation of an Electronic Medications Management System (EMMS) in a hospital is reported by many early adopters to be the single most complicated, of any, project they had ever undertaken. The introduction of an EMMS impacts almost all disciplines in the hospital including Medical, Pharmacy and Nursing, and almost all patients, as medication prescription remains the single most common medical intervention provided to patients.

For this reason, the most successful EMMS implementations are those that treat the project as one of broad organisational transformation supporting a significant change in clinical workflows, rather than an 'IT project'.

In the last five years there has been an increase in the amount of published information about the impacts of implementing EMMS. EMMS are anticipated to yield the following benefits for health services, some of which would directly address many of the issues identified for pharmacy services across WNSWLHD in the Diagnostic Report:

- Improved data on drug usage at the patient level
- Improved stock control
- Reduced potential ADEs
- Improved formulary management
- Improved recording of medication administration
- Improved medication reconciliation workflows and recording
- Improved clinical decision making
- Improved communication between clinicians and clinical handover
- Reduced unnecessary orders
- Reallocation of clinician time from administrative to clinical tasks.

While a growing body of evidence shows the positive benefits of such implementations, there remains the identification of new and different risks and errors associated with EMMS which must be understood to ensure the safe and effective implementation of such systems.

In 2010, the Australian Commission in Safety and Quality in Health Care (ACSQHC) commissioned the development of a 'Guide to Safe Implementation' for Electronic Medications Management Systems. This document (revised second-edition released in 2012[19]) provides a comprehensive roadmap for the safe implementation of an EMMS and was developed based on academic research and the first-hand advice and lessons learned from Australia's early-adopter hospitals.

The overall implementation of EMMS at the identified WNSWLHD lead site will be supported by eHealth NSW, starting with a comprehensive Implementation Planning Study (IPS). However, significant resources will still be required by WNSWLHD to effectively support the EMMS implementation and drive local clinician buy-in to the system. In addition, in the early stages of the EMMS implementation the District must consider its resource requirements going forward to support ongoing maintenance of the system.

Pharmacy resources are required to lead and support a range of activities to ensure the effective and safe implementation of EMMS. A high-level list of these roles is provided in Table 36, a more comprehensive list is provided under section 10.2.2 of the ACSQHC's Guide to Safe Implementation.

[19] *Electronic Medication Management Systems: A Guide to Safe Implementation 2nd Edition*, Australian Commission on Safety and Quality in Health Care (2012), http://www.safetyandquality.gov.au/publications/electronic-medication-management-systems-a-guide-to-safe-implementation/, accessed 11 April 2016

Table 36: Roles for pharmacy resources in EMMS implementation

EMMS Implementation stage	Typical Roles for Pharmacy in EMMS implementation
Planning	• Pharmacy workflow mapping and redesign • Localised formulary tailoring and normalisation between the EMMS and existing dispensing system • Development/tailoring of standardised order sets • Participation in multi-disciplinary system design committees • Review and provision of advice on the system functional requirements including the extent to which alerts should be switched on* • Assistance in critical evaluation and selection of the medicines information reference source* • Undertaking EMMS training (including training as Super Users) • Supporting development and implementation of EMMS benefits evaluation
Go-Live	• Assisting to monitor and manage clinical risk • Training and support staff for system Go-Live (including provision of Super Users) • Provision of advice on refinements to system functionality as needed
Maintenance	• Electronic formulary and other clinical decision support (CDS) database maintenance • Ongoing monitoring of EMMS benefits realisation • Ongoing system development support and upgrades

*Roles denoted with an (*) indicate roles or activities that are likely to be undertaken by eHealth NSW and therefore the resource cost to WNSWLHD is likely to be incremental only.

A high-level estimate of required resources is provided in Table 37.

Table 37: Estimated District resources required to support EMMS implementation and maintenance

Category	Planning (EMMS Project Team) ^	Go-Live	Maintenance
Resources required	2.0 FTE Pharmacist 1.0 FTE Pharmacy technician/Systems Administrator 0.5 FTE Nurse 1.0 FTE Project coordinator	As for Planning phase plus: • Pharmacist support as Super Users • EMMS application trainers	1.0 FTE Pharmacist 1.0 FTE Pharmacy technician/Systems Administrator
Total estimated costs	Approximately ~$400k	Dependent on hospital size	Approximately ~$180k

^Assumes that only one hospital site is implemented at a time. This team would need to be increased (or additional site-specific teams created) in the event of simultaneous implementation of EMMS at more than one site in the District.

The estimates above include primarily only the pharmacy resource needs (except the EMMS Project Team). However, the District will also need to consider the requirements for:

- Nursing, medical, IT, project management and training staff for all stages of EMMS implementation
- Network infrastructure costs, if required
- IT and other consulting support
- Software licenses.

There are still very few structured studies that have undertaken cost-effectiveness analyses for EMMS implementations, and therefore accurately quantifying the cost-benefits of EMMSs is particularly difficult. However, a recent study[20] from Professor Johanna Westbrook's group at the Centre for Health Systems and Safety Research at Macquarie University reported on a comprehensive cost-effectiveness analysis of the implementation of an EMMS in the cardiology ward of a 326 bed academic teaching hospital in Sydney.

The study estimated a cost saving of approximately $63-$66 per admission, achieved through a 71% reduction in the proportion of potential ADEs (from an incidence of 0.17 pre-EMMS to 0.05 post-EMMS). The study undertook a sensitivity analysis which showed the EMMS to remain cost-effective when varying key assumptions (e.g. the extent of potential ADE avoidance, the EMMS costs, estimated increase in LOS due to ADE), over a wide range.

While the Westbrook study was based on a single cardiology ward, which may have a unique ADE profile, in the absence of more robust cost-savings estimates, we have used these values to estimate the potential cost-savings associated with implementing an EMMS at each of the Base and District sites across WNSWLHD (Table 38).

Table 38: Estimated potential cost savings from EMMS implementation by top six WNSWLHD health services by separation volume

WNSWLHD site	2014/15 Separations*	Estimated potential cost savings^
Orange Health Service	16,614	$1,053,826
Dubbo Base Hospital	15,509	$983,736
Bathurst Base Hospital	8,998	$570,743
Lachlan Health Service	4,535	$287,655
Cowra Health Service	3,126	$198,282
Mudgee Health Service	2,972	$188,514
Total	**51,754**	**$3,282,756**

**Source: WNSWLHD Planning and Service Development; ^Assumes the lower bound of $63/admission cost saving.*

The Westbrook study also estimates the costs associated with the EMMS implementation itself. However, these have not been adopted here as the costs associated with implementation of EMMSs are dependent on multiple factors that may be unique to the site, the product selected and the implementation approach, such as:

- Maturity of existing IT infrastructure and availability and maturity of, and integration with, related and dependent systems such as Electronic Medical Records (EMR), Patient Administration System, electronic pharmacy dispensing and stock control systems, pathology results.
- Number of different systems in use that need to interface with the EMMS
- Amount of local system development required (e.g. order sets, formulary, etc.)
- 'Big Bang' vs staged implementation approach.

[20] http://jamia.oxfordjournals.org/content/22/4/784.abstract, accessed 11 April 2016

Recommendation 29: In parallel with the commencement of EMMS implementation planning with eHealth NSW, all District Executives are encouraged to review the ACSQHC's guide to safe implementation of EMMS, starting with Section B *EMM Organisational Considerations*.

Recommendation 30: The District should resource a dedicated EMMS project team for the duration of the EMMS implementation process at the lead site, and retain at least part of the team on a permanent basis as a resource for the District in rolling EMMS out to further sites. This EMMS project team is encouraged to read in full the ACSQHC's guide to safe implementation of EMMS, starting with Section B *EMM Organisational Considerations.*

Recommendation 31: The EMMS project team should work closely with eHealth NSW to determine reasonable estimates of other clinical resources required to effectively support the lead-site implementation. This should include consideration for the development and implementation of a robust evaluation of EMMS impacts, including measuring a baseline of key metrics before EMMS implementation.

Recommendation 32: The District should develop a broader EMMS roll-out strategy to continue to support EMMS roll-out across the District following the lead-site implementation (e.g. post eHealth NSW involvement and support).

3.8.4 Automation of drug dispensing

The use of centralised Automated Dispensing Systems (ADSs) and decentralised Automated Dispensing Cabinets (ADCs) in Australia is growing following trends well established in the United States, Europe and United Kingdom. The potential benefits of these automated systems include improved:

- medication safety through reduced dispensing error rates
- improved workflow efficiency through reduced manual handling of drugs
- increased storage capacity and efficiency compared to traditional shelving configurations
- reduced medication wastage through improved stock control and reporting.

Major suppliers of ADSs and ADCs in Australia include:

Omnicell® BD ARxIUM

The indicative cost of purchasing an ADS is approximately $250 to $350k and an ADC is approximately $50 to $100k per unit, excluding ongoing support and maintenance requirements from vendor and on-site staff. Key implementation requirements for consideration include:

- Compatibility and implications of i.Pharmacy, EMM and EMR system integration, workflow and maintenance. Full integration means every action has a system wide impact
- Limited training opportunities prior to instalment as there is no 'spare' ADS or ADC
- Testing requirements are significant e.g. mapping stock locations requires testing and validation both manually and in the integrated systems by a pharmacist
- Ongoing maintenance and optimisation is significant and must be factored in to resource estimates for post go-live
- Maintenance and software upgrades are likely to require pharmacy staff involvement to ensure medication access is uninterrupted.

Centralised Automated Dispensing System (ADS)

Automated Dispensing Systems provide computer-controlled storage, dispensing and management of medicines. They are designed to typically support central or 'main' pharmacy dispensing and tend to be large machines

designed to replace the static storage of medicines in the main pharmacy department in a hospital or community pharmacy. ADSs come in two main configurations, described in Table 39.

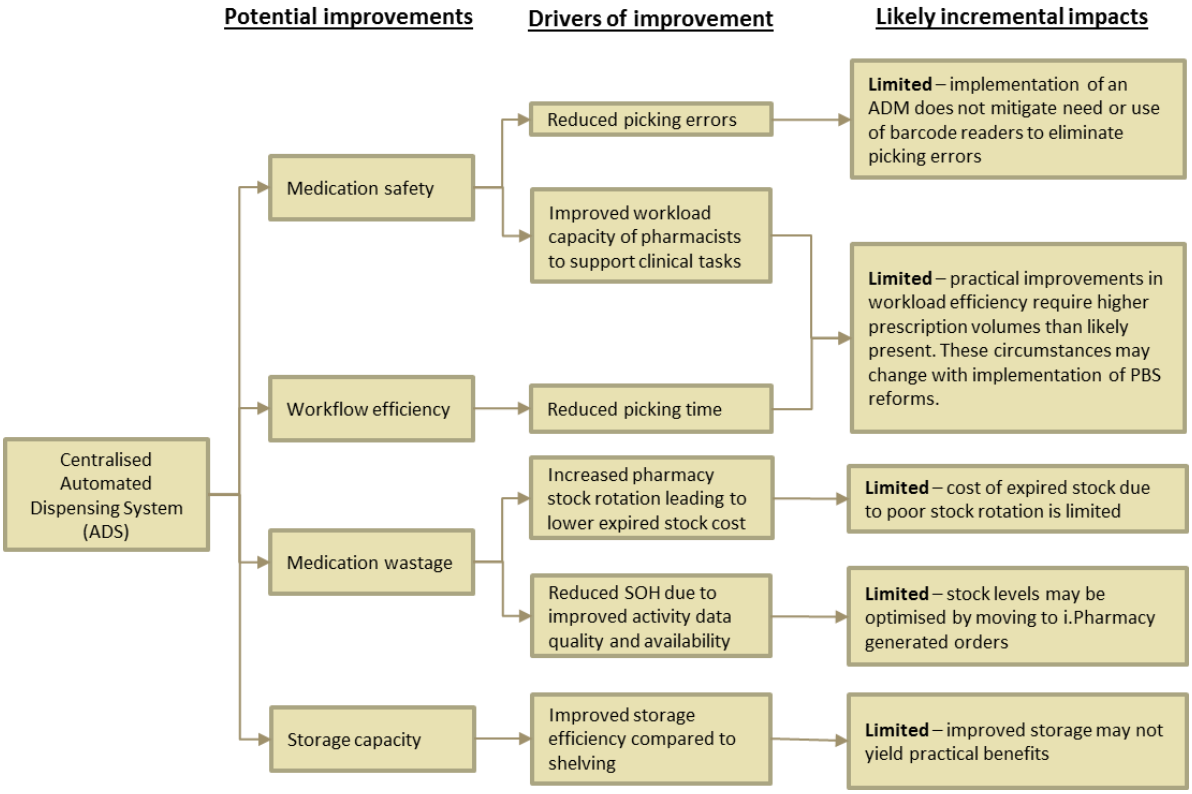
Table 39: Profile of channel vs chaotic ADSs

ADS configuration	Profile
Channel	• Store drug products in designated shelf or 'line' in machine • Less complex robotics • Drugs are 'loaded' into the machine in a consistent spot each time (unless product lines are moved intentionally by the users) • Act as regular shelving in the event of connectivity or IT failure
Chaotic	• Store drug products 'randomly' in the machine, dynamically moving products to optimise usage of space within the machine • More complex robotics • Drugs can be loaded into machine by product or (with additional system modules for some systems) drugs can be loaded randomly into a 'hopper' to be sorted and stored automatically by the machine • The fact that products are moved dynamically within the machine may make it more difficult to find products in the event of a connectivity or IT failure

A recent review of the evidence for ADS and ADC benefits, undertaken by ACSQHC[21], indicated that they have the potential to improve picking error rates, storage capacity and stock control but there is currently limited definitive evidence of improved workflow or other realised cost savings. Figure 13 outlines the potential benefits of ADSs and the likely realisation of these benefits for WNSWLHD.

[21] http://www.safetyandquality.gov.au/wp-content/uploads/2013/12/Evidence-briefings-on-interventions-to-Improve-medication-safety-Automated-dispensing-systems-PDF-832KB.pdf, accessed 9 April 2016

Figure 13: Potential benefits of Automated Dispensing Systems



Current volumes of individual dispensing, even at Base sites, are unlikely to warrant the costs associated with installation and maintenance of ADSs. This may change if NSW adopts PBS reforms and dispensing volumes increase.

Decentralised Automated Dispensing Cabinets (ADCs)

Several observational studies have reviewed the impact of ADCs on medication related errors, time saving and net cost. The evidence for reduced medication related errors and time saving remain inconclusive. However, a recent review[22] of ADCs implemented by UnitingCare Health at St Stephen's Hospital, Hervey Bay suggests ADCs facilitated a reduction in imprest holding value by 30.6% across Surgical, Medical and Theatre cabinets while increasing the number of SKUs by 88.9%. Translated to the District, similar (30%) reductions in Stock on Hand (SOH) would equate to approximately $440k in total across Base and District sites (see Table 40).

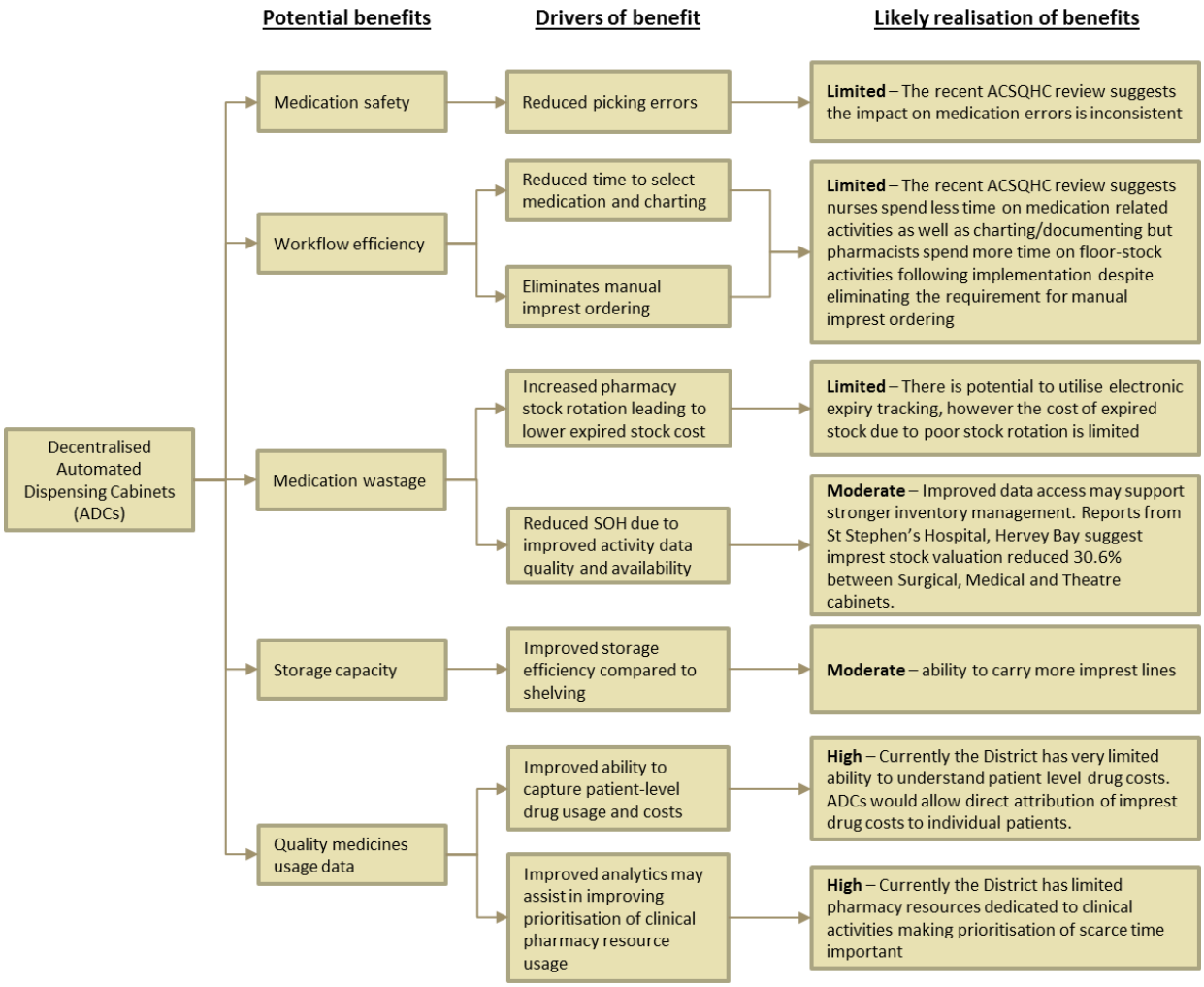
Table 40: Potential reduction in SOH value through ADC implementation

Site	SOH (As at 11/11/15)	Potential reduction in SOH value through ADCs
Dubbo	$485,145	$148,454
Orange	$458,147	$140,193
Bathurst	$188,566	$57,701
Broken Hill	$97,878	$29,951
Lachlan	$93,281	$28,544
Mudgee	$57,470	$17,586
Cowra	$55,419	$16,958
Total	**$1,435,905**	**$439,387**

Figure 14 outlines the potential benefits of ADCs and the likely realisation of benefits for WNSWLHD.

[22] http://www.slideshare.net/informaoz/samantha-nothling-clinical-informatics-pharmacist-unitingcare-health?qid=331360a2-d71d-4d53-97c4-8c27235c2dcd&v=&b=&from_search=1, accessed 14 April 2016

Figure 14: Potential benefits of Automated Dispensing Cabinets



Dubbo Base Hospital submitted a business case in July 2015 for implementation of ADCs across the Dubbo redevelopment. The business case included estimates of staffing requirements and costs for implementation of ADCs. It also estimated a cost saving of ~$300,000 per annum through a 15% reduction in drug expenditure. Without the ability to understand the current efficiency of imprest usage, it is difficult to verify the likelihood that this estimate will be achieved. In any case, while Dubbo has sourced initial quotes for the capital equipment ($500k-600k to implement ADCs across Dubbo hospital), a more detailed business case including all costs of implementation should be developed and a realistic ROI period estimated. UnitingCare St. Stephen's Hospital estimated an approximate Return on Investment (ROI) period of 5-6 years for the implementation of ADCs.

Other implementation considerations:

- ADCs may replace ward imprest cupboards – require less space and allow for better auditability of medicines usage at patient-level
- Nurses must be included in product selection and workflow redesign as nurse workflow will change significantly with implementation of ADCs
- Training and maintenance time required is significant and must be included in costing of implementation
- Need to consider 'hidden' costs of depreciation, maintenance contracts, software upgrades
- Implementing ADCs across all wards with current imprest is preferable to running a 'dual' system
- Need to consider physical space requirements
- There will be an ongoing maintenance requirement to ensure effectiveness of the system, including a need for ongoing database maintenance, monitoring and reporting requirements.

Recommendation 33: The District should not implement ADSs at this point in time, but reassess the costs and benefits in the event that NSW adopts PBS reforms, informed by the estimated increase in dispensing volumes.

Recommendation 34: The District should develop a detailed business case, including working with potential vendors to estimate the ROI period based on site-specific data, and estimating resource costs for project team and ongoing maintenance resources for initial piloting of ADCs across one Base hospital site.

Recommendation 35: The impact of the ADC implementation at the pilot site should be evaluated, measuring a baseline of key indicators pre-implementation compared with post-implementation, to inform the decision to implement more ADCs across the District.

3.8.5 e-Approval system

During the development of the Diagnostic Report it was identified that currently some DTC decisions are made via email communication where the monthly meeting schedule does not support a timely clinical decision. As outlined in section 3.2.3, the emailing process does not satisfy Principle 9 of the guiding principles for DTCs outlined by the CATAG.

Implementation of an electronic approval (e-Approval) system for urgent DTC decisions may support improved decision turn-around time and auditability of drug approval decisions undertaken by DTCs outside the monthly meeting roster.

The District has invested in implementing SharePoint to aid information sharing and communication. SharePoint offers the creation of 'Discussion Boards' which may provide a transparent and easily accessible environment to discuss drug approval decisions. With Discussion Boards, users are able to create a forum for discussion with the potential to flag discussions as 'Answered questions' or 'Unanswered questions' and manage user permissions and permission levels.

Using SharePoint for this purpose would incur only incremental development costs, compared with sourcing a stand-alone software package to perform the same function.

Recommendation 36: The District should incorporate an electronic DTC approvals functionality into its development of SharePoint and implement it for use across all local DTCs and the District DTC.

3.8.6 Dose Administration Aid management software

Dose Administration Aid (DAA) management software is designed to support packing workflow, accuracy and record keeping by managing patient packing profiles, best-practice labelling requirements and provide clinical safety features for patients and pharmacists, such as tablet images and descriptions on labels.

DAA management software is widely used across public and private hospital pharmacy settings and community pharmacy settings. However, current DAA packing processes across the District are largely manual and may be misaligned with best practice guidelines outlined by the Pharmaceutical Society of Australia (PSA) in 'Standard 7: Dose Administration Aids Service'.

Major providers of DAA management software include, Webstercare and Fred.Pak:

The indicative cost of purchasing a software license is approximately $200 with ongoing annual costs of $180 per license. Key functional requirements for consideration include:

- Compatibility with i.Pharmacy
- Capacity to support labelling of heat seal and cold seal DAA package designs

- Alignment to best practice labelling considerations outlined by PSA - 'Standard 7: Dose Administration Aids Service'

The analysis in Table 41 suggests implementation of DAA management software across Base sites will incur an indicative initial investment of approximately $1,076 with ongoing annual costs of $540.

Table 41: Estimated implementation costs for DAA management software

	Indicative costs	Notes
Licence fees	$ 600	$200 per licence across 3 sites
Training costs	$ 476	3 hours of training across 3 sites for a Grade 2 Second year pharmacist cost of $52.90/hr
Total initial cost	**$ 1,076**	
Annual licence fees	**$ 540**	$180 per licence across 3 sites

However, the implementation of DAA management software will support automation of the current manual packing process and is likely to deliver workflow efficiencies in parallel to improved service delivery. The required efficiency gains to break even with the total first year cost of $1,616 is approximately 35 minutes/week of a Grade 2 Second year pharmacist ($52.90/hr) equal to approximately 12 minutes/site/week.

This time saving should be easily achievable. However, we understand that the District does not manage a high volume of DAAs (or 'Webster Packs'), as these are managed primarily by community pharmacies across most sites in the District, particularly for MPSs. Therefore, the overall impacts of this solution may be limited.

Recommendation 37: The District should consider procuring a DAA management software package and implementing at the sites that generate the most Webster Packs.

3.8.7 Prescription tracking software

Prescription tracking software may reduce the administrative burden on pharmacists having to update other clinical staff on the dispensing status of prescriptions. John Hunter Hospital, NSW, was reported to have developed an in-house prescription tracking solution which retrieves dispensing information from i.Pharmacy (e.g. ward, dispensed time, patient details, medication details etc.) and makes this information accessible to nursing staff on ward terminals. The software provides nursing staff the ability to view the dispensing status of prescriptions without the need to contact the pharmacy department directly.

With staff at Orange receiving an estimated 30 to 40 phone calls each day regarding the dispensing status of prescriptions, the implementation of prescription tracking software across Base and District facilities has the potential to generate workflow efficiencies. Staff at Orange have previously discussed with John Hunter Hospital the potential to acquire and implement the software across WNSWLHD, at no cost. However, pharmacy staff noted a need for some local configuration and setup costs (estimated at approximately $2k) before the prescription tracking software can be implemented. Ongoing maintenance requirements are likely to be negligible.

The analysis in Table 42 suggests that implementing an electronic prescription tracking solution may liberate 18 hours of pharmacist time weekly across the District. Assuming each site will incur the initial setup costs of $2k, the total initial cost across the six Base and District sites is $12k. To achieve a payback period of 1 year, the implementation of prescription tracking software must liberate 4.3 hours of Grade 2 Second year Pharmacist time ($52.90/hr) weekly across the 6 sites. This equates to approximately 45minutes/site/week, representing only 20% of the total estimated freed pharmacist time.

Table 42: Estimated saved pharmacist time through electronic prescription tracking

		Estimated pharmacist time on calls (hrs)		Potentially liberated weekly pharmacist time	
	Est. calls received daily	Daily	Weekly (5 day week)	50% efficiency	80% efficiency
Dubbo	35	1.17	5.83	2.92	4.67
Orange	35	1.17	5.83	2.92	4.67
Bathurst	25	0.83	4.17	2.08	3.33
Parkes/Forbes	15	0.50	2.50	1.25	2.00
Mudgee	15	0.50	2.50	1.25	2.00
Cowra	15	0.50	2.50	1.25	2.00
Total	**140**	**4.67**	**23.33**	**11.67**	**18.67**

The modelling above does not include the likely time saved through improvements to pharmacist handover procedures that would be aided by the ability to electronically track the status of prescriptions for dispensing.

Recommendation 38: The District should work with John Hunter Hospital to source and implement the prescription tracking solution in operation at that site, across all WNSWLHD sites with dedicated pharmacy departments.

3.8.8 Outpatient prescription management software

Outpatient prescription management software is designed to manage patient dispensing reminders (SMS reminders) and expiry audits associated with prescriptions held on-site at a pharmacy department. Currently, sites across the District manage on-file outpatient prescriptions manually with these prescriptions consisting primarily of HCDs.

With some sites reporting the management of up to 1,000 on-file outpatient prescriptions, the implementation of management software has the potential to provide workflow efficiencies such as:

- Improved patient compliance support
    - Prescription management software actively supports patient compliance by providing SMS prescription reminders before patients are expecting to run out of medication.
- Improved capacity to manage stock and workloads
    - The current dispensing process relies on patients calling the pharmacy department to order medications and repeat dispensing. Pharmacy staff have limited capacity to prioritise and manage stock holding or workloads. Prescription management software provides prompts to pharmacy staff of patients requiring medication in the next few days and therefore provides opportunity for pharmacy staff to smooth the dispensing workload and order required stock.
- Reduced liability to provide continuity of care
    - Within the current process patients have limited capacity to understand the number of remaining repeat prescriptions or the expiry of prescriptions without a manual prompt from the pharmacy department. Pharmacy staff reported that patients may unknowingly run out of prescription repeats or request medications from expired prescriptions. This situation requires the pharmacy department to contact prescribers to obtain a valid prescription and risks the continuity of patient care. The use of prescription management software will prompt patients and pharmacy staff of pending prescription expiry dates.

Major providers of prescription management software include Healthnotes and medAdvisor:

These major suppliers do not currently support integration with i.Pharmacy. However, Healthnotes is undergoing final testing for this integration, with the view of launching a revised version later in 2016.

Key functional requirements for consideration include:

- i.Pharmacy integration to support automatic population of patient information
- SMS reminder and email reminder capacity
- Automatic scheduling of medications based on previous dispensing
- Prompts for pending prescription expiries.

Table 43 shows the number of both general and S100 drugs ordered by site between 2014/15 with the top 3 sites by activity (Dubbo, Orange and Bathurst) representing the basis for calculating SMS activity costs.

Table 43: Volume of items ordered by site 2014/15

	Number of items ordered between 2014/15		
Site	**General drugs**	**S100 drugs**	**Total**
Dubbo	199,702	5,071	204,773
Orange	214,981	4,111	219,092
Bathurst	65,468	2,261	67,729
Sub total	**480,151**	**11,443**	**491,594**
Broken Hill	48,533	1,380	49,913
Cowra	18,589	786	19,375
Mudgee	13,129	655	13,784
Parkes/Forbes	31,481	1,350	32,831
Total	**591,883**	**15,614**	**607,497**

Table 44 summarises high level initial and ongoing costs of implementing prescription management software.

Table 44: Indicative costs for implementation and maintenance of prescription management software

	Indicative costs	Notes
Training costs	$ 192	2 hours of training for each of the 3 sites for a Technician Grade 2 Year 1
Total initial cost	**$ 192**	
Annual licence fees	$ 3,600	$1,200 per site for 3 sites
SMS costs	$ 1,725	$0.15 per SMS for 11,500 prescriptions annually
Total ongoing costs	**$ 5,325**	

High level analysis suggests implementation of prescription management software across 3 sites will incur an indicative initial investment of $192 in pharmacy technician training costs, with ongoing annual costs of $5,325 (inclusive of SMS costs). This estimate is conservative as it represents the high end of the licence fee cost range and assumes all HCD drug activity at the three largest sites (measured by HCDs ordered between 2014/15) incurs an SMS cost.

The required efficiency gains to break even with the total first year cost of $5,517 is approximately 3.2 hours/week of a Grade 1 First year Technician ($31.92/hr) equal to approximately 1 hour/site/week.

3.8.9 Electronic Dangerous Drug register

The Poisons and Therapeutic Goods Regulation 2008 (NSW) requires that records of supply for drugs of addiction (i.e. Schedule 8 drugs/Dangerous Drugs) are maintained in all pharmacy environments (Clause 111). Currently these records are maintained manually with entries into a designated Dangerous Drug register book upon supply, which is subject to regular internal audits and stocktakes.

The recent development and use of Electronic Dangerous Drug (e-DD) registers is becoming increasingly common amongst public, private and community pharmacy settings. This push is driven by a wider health industry movement towards real time prescribing and dispense recording of Dangerous Drugs and the benefits of improved auditability of stock holdings and reduced risk of fraudulent or erroneous entries.

Current regulations surrounding the use of e-DD registers are managed by state legislation, with separate functional, technical and accountability requirements also outlined by state. In NSW, Clause 111(2) of the Poisons and Therapeutics Goods Regulation 2008 stipulates that DD registers are to be in the form of a book. However, Clause 111(4) outlines that the Secretary of the Ministry of Health may from time to time approve the keeping of a drug register in any other form. This clause allows the approval of an e-DD register by submission on a case-by-case basis.

While there is legislative capacity to adopt e-DD registers across NSW, major providers of e-DD register software do not currently support i.Pharmacy integration and have not undertaken an accreditation process to meet NSW legislative requirements. However, these providers are developing capabilities to meet NSW market needs and adoption of e-DD registers may be a consideration for future implementation. The functional and technical requirements under NSW legislation are outlined in the document 'Electronic Drug Register for Pharmacy' TG213/1'.

4. Recommended work programs

The tables in this section provide a summary 'plan on a page' for each recommended work program designed to address the recommendations outlined in the options analysis section (section 3). Where appropriate, these work programs consolidate multiple activities within a theme to address related recommendations in a single coordinated work program.

These plans are not intended to be exhaustive but to provide a starting point for more detailed implementation planning for individual projects.

4.1 Medications Management Strategy

<table>
<tr><th colspan="4">Work Program 1 - Develop Medications Management Strategy</th></tr>
<tr><td>Cost/resource requirements</td><td>Moderate</td><td>Impact</td><td>High</td></tr>
<tr><td colspan="4">Rationale

The District lacks a robust overall plan for the quality use of medicines, which is the root cause of many of the issues identified through the Diagnostic Report.</td></tr>
<tr><td colspan="4">Supporting evidence

• Pharmacy Departments do not appear to work as 'one District' and there is substantial inconsistency in pharmacy practices across the District
• There is a need for improved collaboration between pharmacy and other clinical disciplines with respect to quality use of medicines
• There is no overarching strategic plan or objectives for pharmacy services</td></tr>
<tr><td colspan="2">High level implementation activities

• Finalise Paxton Partners Review of Pharmacy Services and determine which recommendations to endorse
• Convene a multi-disciplinary working group to guide development of MMS
• Elicit multi-disciplinary input into objectives and goals for medications management across the District and identify timelines for achievement
• Develop and validate Draft MMS with broader group of stakeholders and get ELT endorsement
• Develop communications strategy for MMS
• Launch MMS across District
• Develop and implement operational plans to address strategic goals</td><td colspan="2">Implementation considerations

• Should be completed as a matter of priority following current pharmacy services review
• Should include objectives for pharmacy, nursing, medical, IT and clinical governance.
• Clear roles and responsibilities for achievement of the strategic goals should be defined in the MMS, including the role of DTCs at both the local and District levels
• Buy in from clinicians and executive endorsement will be critical to success of strategy implementation</td></tr>
<tr><td colspan="4">Practice examples

• Few examples of formalised strategic plans for overall medication management were identified. However, South Australia has developed a delivery framework for pharmacy services that aims to reduce variation in practice across the state and assist in guiding decision-making around local decisions, such as procurement model, recognising that local needs mean that there is no 'one-size-fits-all' approach.

• The Clinical Excellence Commission's Medication Safety Self Assessment may assist in identifying specific practice gaps that require multi-disciplinary organisational responses that would be identified in a MMS.</td></tr>
<tr><td colspan="4">Financial impacts

• If completed 'in-house' will require a dedicated project manager, project team and part time resource allocation for approximately 3-4 months.

• If contracting external consulting support, cost would be estimated at ~$40-60k on the basis that this review report would provide a substantial foundation for the MMS.</td></tr>
</table>

4.2 Governance

4.2.1 Overall pharmacy governance

Work Program 2 - Revise overall pharmacy governance			
Cost/resource requirements	Low	**Impact**	High

Rationale

Current pharmacy governance could be strengthened to improve transparency and consistency of strategic decision making.

Supporting evidence

- Pharmacy staff reported being unclear of decision making processes particularly around pharmacy-related project work, status and outcomes of business cases for resources, and related developments in initiatives being undertaken by other clinical areas.
- There is a lack of consistency in how pharmacy services across the District are managed.

High level implementation activities	Implementation considerations
• Validate feasibility of proposed governance structure • Adjust cost centres as required to support pharmacy as its own business unit • Modify personnel reporting lines, accountabilities and PDs • Define and assign District-wide functional lead sites	• Need to determine the most appropriate Directorate for Pharmacy to report to, to support its success as a business unit • Functional lead sites must be selected to ensure balance in distribution of workload across District and alignment to site-specific strengths

Practice examples

- Pharmacists in Murrumbidgee LHD report to Directors of Medical Services

Financial impacts

- No material direct costs identified
- Potential cost savings through improved pharmacy efficiency and consistency

4.2.2 Chief Pharmacist role

Work Program 3 - Increase resourcing of Chief Pharmacist role			
Cost/resource requirements	Moderate	**Impact**	High

Rationale

Current Chief Pharmacist resourcing at 0.2 FTE appears to be insufficient for the role to be effective and a strong and supported pharmacy champion is required to drive improvements in pharmacy services across the District.

Supporting evidence

- There is limited implementation of strategic initiatives across the District and in some cases pharmacy services are misaligned with contemporary practice
- The Chief Pharmacist, while currently providing an advisory role, has no capacity to mandate changes at site level
- There is a perceived lack of ownership/accountability for development of District-wide processes and approaches

High level implementation activities	Implementation considerations
• Review and refine Chief Pharmacist PD • Increase resource allocation of WNSWLHD Chief Pharmacist role	• Strong leadership of pharmacy will be required to drive the transformation of pharmacy services and motivate pharmacy, and other, staff to implement the recommendations from this review and achieve the broader strategic goals to be defined in the Medications Management Strategy proposed under Recommendation 1.

Work Program 3 - Increase resourcing of Chief Pharmacist role			
Cost/resource requirements	Moderate	**Impact**	High
		• Alignment of Chief Pharmacist role with District medications management strategy • Alignment of mandate over individual site departments to the Chief Pharmacist • Capacity for governance over smaller sites without pharmacy departments	

Practice examples

- Murrumbidgee 0.84 FTE reporting to Director of Medical Services
- Far West 1.0 FTE Pharmacist Manager
- Southern NSW LHD 1.0 FTE Director of Pharmacy

Financial impacts

Increasing the resourcing of a Chief Pharmacist by 0.81 FTE to total 1.0 FTE will incur an additional annual S&W cost of $129k to a total of $159k. While the position will not inherently generate revenue to offset this cost, the improved governance and focus on the strategic needs of the District with respect to pharmacy services is expected to lead to improved efficiency of pharmacy services and cost savings.

4.2.3 Local Drug and Therapeutics Committees (DTCs)

Work Program 4 - Strengthen DTC processes			
Cost/resource requirements	Low	**Impact**	Moderate

Rationale

Refining the focus of Base hospital DTC meetings may improve accountability and the alignment of decisions with strategic District initiatives.

Supporting evidence

- Site DTCs are perceived by some staff as largely procedural and lacking strategic focus
- Assignment of accountability for, and follow up of, action items discussed at DTCs was reported as variable
- Smaller sites are sometimes required to make drug selection and purchase decisions in the absence of timely support or input from a formal Base hospital DTCs
- A high level review of current DTC processes and sample minutes suggests a potential misalignment with some of the guiding principles of the Council of Australia Therapeutic Advisory Group (CATAG)
- Base hospital DTC decisions at some sites often lack the support of targeted benefits analysis/evidence base and follow up (which may themselves be limited by poor data availability)

High level implementation activities	**Implementation considerations**
• Map DTC processes and accountability lines • Identify gaps in processes and supporting documents/forms against best practice principles and the District MMS (Recommendation 1) • Review and ensure standardisation of processes and supporting documents across all DTCs • Develop annual work plans for DTCs • Define monitoring process • Revise processes and monitor changes	• Role of Chief Pharmacist in supporting accountability and driving District strategy • Optimisation of governance support for smaller sites and improve decision turn-around time • Potential need to support DTC decisions with economic analysis of drug impacts • Will be supported by Work Program 12 – Review and strengthen procurement processes

Practice examples

- Council of Australian Therapeutic Advisory Groups (CATAG) – 'Guiding Principles for the roles and responsibilities of Drug and Therapeutics Committees in Australian public hospitals'
- World Health Organisation (WHO) – 'Drug and Therapeutics Committees – A Practical Guide'

Financial impacts

Work Program 4 - Strengthen DTC processes			
Cost/resource requirements	Low	**Impact**	Moderate
• No significant costs have been identified to implement this work program.			

4.3 Service Model Options

4.3.1 Revise hub and spoke configuration

Work Program 5 - Revise hub and spoke configuration to better support small sites			
Cost/resource requirements	Moderate	**Impact**	High

Rationale

Current hub and spoke model configuration does not allow for adequate support to the smaller sites across the District, leading to inequity, inefficiency and sub-optimal levels and quality of clinical provision to smaller sites.

Supporting evidence

- Pharmacy service delivery to small sites is limited to a supply function only – no consistent clinical services
- Resources from hub sites are typically only able to visit satellite sites on an ad hoc and infrequently basis - not frequently enough to support quality use of medicines at small sites

High level implementation activities	Implementation considerations
• Assess viability of new 'hub' sites and consult with satellite sites where hub is proposed to change from Dubbo • Revise governance arrangements between sites • Define minimum service requirements for hub sites to provide to satellite sites • Stage transition and assess effectiveness of revised model after Stage 1 • Resource additional pharmacy workforce to support revised configuration, as required	• Need to validate most appropriate hub site for development of new pharmacy services to service far northern sites. • New hubs will require additional pharmacy resources to adopt the proposed changes and support satellite sites appropriately • Any pharmacy resource time that is liberated at Dubbo through the revised configuration should be re-allocated specifically to increase the amount of clinical time Dubbo pharmacists provide

Practice examples

- Murrumbidgee LHD currently provides outreach support to small sites from Wagga Wagga Rural Referral Hospital and Griffith Base Hospital.
- If opting to implement Stage 2 of the proposed transition, to our knowledge, WNSWLHD would be unique in providing dedicated pharmacy resources in a remote area and at a health service at a role delineation of 1 for pharmacy.

Financial impacts

Cost impacts associated with this solution include:

- Additional pharmacy salary costs: approximately ~$260k
- Pharmacy technician salary savings offset: approximately ~$50k
- New pharmacy department infrastructure at Walgett in Stage 2: approximately ~$80-100k (including physical infrastructure build, IT equipment, shelving)
- Initial pharmacy stocking costs for Walgett: $30-40k

4.3.2 Develop and implement telepharmacy strategy

Work Program 6 - Develop and implement telepharmacy strategy			
Cost/resource requirements	Moderate	**Impact**	High

Rationale

It is not viable to provide dedicated pharmacy resources at all District sites, nor is it necessary considering the differential clinical role delineation of sites across the District. Telepharmacy may improve the clinical pharmacy support provided to all sites.

Supporting evidence

- Limited capacity to provide basic clinical pharmacy services (e.g. patient counselling, education, medication safety)
- Limited or no pharmacy service provision at smaller sites impacts access to medications and clinical pharmacy services (e.g. patient/prescriber education, counselling, medication reconciliation, antimicrobial stewardship). This has the potential to impact equity and clinical safety and quality.
- The limited scope of practice for both technicians and pharmacist's impacts job satisfaction and potentially workforce attraction/retention

High level implementation activities

- Define objectives for adopting telepharmacy
- Develop telepharmacy service models in conjunction with nurses, doctors, patients to determine most appropriate model for the District
- Define implementation strategy
- Determine infrastructure and hardware requirements
- Evaluate and select telepharmacy system
- Determine resource gaps
- Reconfigure workforce and/or recruit and train staff
- Develop evaluation and monitoring framework
- Staged roll-out of telepharmacy
- Manage change process
- Monitor and refine telepharmacy model on ongoing basis

Implementation considerations

- The telepharmacy strategy and model should be developed within the context of the District's broader investment in telehealth and the Telehealth Strategy developed by KPMG
- Workforce requirements to support delivery of telepharmacy model (including training and education)
- Potential need to pilot different telepharmacy models to identify most appropriate model for the District or sub-areas within the District
- Need for dedicated and specific telepharmacy hardware to support effective checking of medications by remote pharmacist
- Telepharmacy should be seen as a facilitator of the overall model of pharmacy service provision and support the achievement of the MMS (Recommendation 1) strategic goals, not just be 'technology for the sake of technology'
- Time requirements and roll-out approach for implementation

Practice examples

- North Dakota State University has successfully developed, implemented and researched telepharmacy models across a range of settings and has published a series of guidelines and papers outlining how to effectively implement telepharmacy in hospitals (https://www.ndsu.edu/telepharmacy/publications/).

Financial impacts

Costs associated with engaging an external consultant to develop a specific telepharmacy strategy for the District are estimated at $60k - $70k, including preliminary analysis of available technical solutions to support the strategy.

Implementation costs are undetermined and should be estimated as part of a dedicated business case for telepharmacy. Costs associated with this solution will be influenced by the ability to leverage existing (where it exists) infrastructure and the service and device configuration selected.

4.3.3 Increase support for medication reconciliation

Work Program 7 - Increase support for medication reconciliation			
Cost/resource requirements	Moderate	**Impact**	High

Rationale

The District is challenged in meeting Standard 4 (Medication Safety) of the NSQHS standards as limited pharmacist time is dedicated to clinical activities such as medication reconciliation. Implementing medication reconciliation at admission, transfer and discharge has been shown to reduce medication errors by 50%-94% and improve patient outcomes and reduce readmissions.

Supporting evidence

- Limited current capacity to meet NSQHS Standard 4
- Limited capacity to provide basic clinical pharmacy services (e.g. patient counselling, education, medication safety)
- The limited scope of practice for both technicians and pharmacist's impacts job satisfaction and potentially workforce attraction/retention

High level implementation activities

- Form multidisciplinary medication reconciliation project team
- Review CEC Medication Reconciliation Toolkit
- Review and map current medication reconciliation processes
- Undertake readiness assessments and baseline audits across Base and District sites initially and then smaller sites
- Develop medication reconciliation implementation plan
- Roll-out standardised medication reconciliation processes, governance and templates across sites
- Monitor and evaluate impact of improved processes through repeat audits and comparison to baseline.
- Make refinements to processes and tools where required to improve outcomes.

Implementation considerations

- Need to align to state-wide rollout of toolkit by CEC but consider expediting process as far as possible
- Need to consider role of doctors, nurses and pharmacy technicians in medication reconciliation model
- May be able to fund BPMH (first step of medication reconciliation) through pharmacist-led Tier 2 clinics (see section 3.5.2.1)
- Need to consider specific needs of smaller sites and tailor approach where appropriate
- Consider potential for telepharmacy to improve support for medication reconciliation at remote sites (see section 3.3.4)

Practice examples

- The NSW CEC has developed a comprehensive Medication Reconciliation Toolkit which clearly outlines the process for forming a project team and rolling out a consistent medication management process across a LHD. The toolkit includes templates and guidance to support the process and is based on contemporary evidence.
- The ACSQHC has produced a range of tools and support resources that are available to guide structured medication reconciliation implementation (http://www.safetyandquality.gov.au/our-work/medication-safety/medication-reconciliation/).

Financial impacts

It is difficult to model the exact number of pharmacy resources required to provide sufficient coverage to ensure all patients get adequate medication reconciliation, as the current provision of medication reconciliation across the District is so limited. However, high-level estimates based on published literature suggests that approximately $8k could be saved per ADE prevented, based on avoiding on average 4.6 days increased LOS per ADE.

On the assumption of a pharmacist salary of $100k, this suggests a requirement for the pharmacist to prevent just one ADE per month to break-even. A sensitivity analysis showed that even when reducing the potential increased LOS to just one day, a pharmacist would only need to prevent five ADEs per month to break-even.

4.4 Workforce requirements

Work Program 8 - Address immediate pharmacy resource needs and develop overall pharmacy workforce strategy			
Cost/resource requirements	Moderate	**Impact**	High

Rationale

Improved workforce design should support additional clinical pharmacy time and broader pharmacy initiatives. Current levels, mix, and distribution of pharmacy resources support basic services only at most sites and there appears to be limited capacity to adopt additional work within the current resourcing model.

Supporting evidence

- Potential difficulty/failure to provide services in accordance with NSQHS accreditation standards (particularly, Standard 4 - Medication safety and 3.14 – Antimicrobial Stewardship)
- Provision of basic pharmacy services only (e.g. supply, patient counselling, education, medication safety)
- Limited or no pharmacy service provision at most smaller sites impacts access to medications and clinical pharmacy services (e.g. patient/prescriber education, counselling, medication reconciliation, antimicrobial stewardship). This impacts equity and clinical safety and quality
- Pharmacists spend significant time on non-clinical administrative work (e.g. unpacking boxes, stock control, dispensing) that could be completed by technicians/assistants
- The limited scope of practice for both technicians and pharmacists impacts job satisfaction and potentially workforce attraction/retention

High level implementation activities

- Address resourcing of immediate pharmacy needs to support improved equity of access to basic pharmacy services and proposed reconfiguration of hub and spoke model (Work Program 5)
- Develop overarching pharmacy workforce strategy
  - Determine Guiding Principles for pharmacy workforce
  - Determine key resource gaps
  - Determine optimal utilisation of resource capacity released through efficiencies gained via other solution options adopted
  - Redeploy freed pharmacist capacity
  - Reconfigure workforce and/or recruit and train staff
- Align pharmacy personnel performance management goals with MMS (Work Program 1)

Implementation considerations

- Workforce impacts of other implemented solutions (especially service model changes)
- Limited existing capacity to measure workload activity to more accurately determine gap in current resourcing
- Alignment of resources with medications management strategic goals, including better use of pharmacy technicians to take on non-clinical tasks
- Requirements for recruiting and upskilling
- Professional development pathways for pharmacists and changes in expectations with differing service models (e.g. remote 'outreach' pharmacy from hub sites, telepharmacy as a mode of pharmacy delivery, EMM)

Practice examples

- Murrumbidgee LHD shares similar challenges to WNSWLHD in delivering pharmacy services to its communities and the outreach and direct procurement models utilised by MLHD may be adopted in WNSWLHD to alleviate some of the identified issues with respect to workforce limitations (See Work Program 11).
- The SHPA provides guidance in its *Standards of Practice for Clinical Pharmacy Services* on ideal workforce levels to support clinical hospital pharmacy services based on acuity of hospital bed type.[23] However, it is recognised that few hospitals can achieve the recommended levels of resourcing[24].

Financial impacts

Assuming no change initially to current hub and spoke configuration, the augmentation of existing pharmacy workforce to meet immediate needs is estimated at approximately $722k (~$240k of this is funded by the oncology grant).

[23] http://jppr.shpa.org.au/lib/pdf/2013_06_suppl/S32-S34_Chapter9-ro.pdf, accessed 18 April 2016
[24] http://mm2015shpa.com/wp-content/uploads/2015/11/016-Richards-Cathie-Can-the-SHPA-FTE-recommendations-be-used-to-establish-clinical-performance-indicator-CPI-benchmarks.pdf, accessed 18 April 2016

Work Program 8 - Address immediate pharmacy resource needs and develop overall pharmacy workforce strategy			
Cost/resource requirements	Moderate	**Impact**	High
Additional salary costs are identified to support the proposed transition to a revised hub and spoke configuration for pharmacy services. These are estimated at approximately an additional $260k (also identified in Section 4.3.1). Additional workforce requirements (or savings) and associated cost impacts would need to be identified through the development of a broader pharmacy workforce strategy, aligned to the proposed MMS and as may be identified through the results of the CEC MSSA (see Work Program 13).			

4.5 Financial management

4.5.1 Access to quality financial data

Work Program 9 - Improve access to, and quality of, financial data			
Cost/resource requirements	Low	**Impact**	High

Rationale

Poor visibility and timely access to quality financial data limits the capacity to identify pharmacy cost drivers and monitor efficient use of drugs.

Supporting evidence

- There is limited visibility into efficiency of drug usage and costs
- There is limited reconciliation of drug expenditure by DRG or auditability of drug usage
- There is limited access to workload data for workforce benchmarking
- There is no ability to understand stock valuation of imprest at any given point in time
- There is no ability to generate historical stock valuation of ward imprest or pharmacy department stock

High level implementation activities	Implementation considerations
• Define key financial performance indicators as part of the development of the overall Pharmacy PMF (see section 3.7) (e.g. HCD drug usage trends, highest volume general drugs usage, hospital funded outpatients etc) • Perform gap analysis on current data and performance reporting capabilities • Revise processes and systems to improve quality and capture of required performance data • Develop, implement and monitor financial performance reporting • Support change process	• Limited reporting capacity of i.Pharmacy • Impacts on pharmacy and other workflows to capture data • Impact of EMMS and/or ADC implementation on improving access to drug utilisation data and trends

Practice examples

- Not typically possible to capture patient level financial data on medicines usage without EMMS (except individual dispensed drugs).
- St Stephen's UnitingCare Hervey Bay has implemented Closed Loop Electronic Medication Management Systems (CLEMMS) and have reported significant and sustainable drug savings through better access to patient-level drug usage and costs data. This data allows for better stock control while increasing the number of product lines able to be held.

Financial impacts

- Should not require material additional funds to implement.

4.5.2 Revenue sources

4.5.2.1 Non-admitted Tier 2 clinics

Work Program 10 - Implement pharmacist-led Tier 2 non-admitted clinics			
Cost/resource requirements	Moderate	**Impact**	High

Rationale

There is potential to generate WIES revenue through pharmacist-led Tier 2 Non-admitted care clinics.

Supporting evidence

- Potential pharmacy-led Tier 2 clinics include:
  - Review of medicine orders, new and repeat for clinical appropriateness (40.04)
  - Counsel patients or carers to ensure that the patient understands all information required for safe and proper use of medicines (40.04)
  - Provide consumer medicines information required for the safe and proper use of medicines (40.04)
  - Diagnosis, treatment and management of patients who overuse and or are dependent on substances that are harmful to the body (40.30)
  - Follow up and support of patients recently admitted following a fall or identified at risk of falling (40.56)
  - Review and follow-up of the effectiveness of the ongoing care plan and strategies implemented for patients with chronic or complex health conditions requiring care planning (40.58)

High level implementation activities

- Identify potential pharmacist-led workflows that would be eligible for Tier 2 clinic funding
- Develop evaluation criteria to prioritise clinics for implementation
- Rationalise and prioritise potential clinics
- Work with clinical coders to a) determine viability of revenue capture b) better understand governing rules and eligibility criteria
- Develop detailed implementation plans
- Train staff and implement clinics models
- Advertise clinics and recruit patients
- Evaluate and monitor impact and revenue captured through clinics
- Review and refine models periodically

Implementation considerations

- Impact on other clinical disciplines
- Training requirements
- Limited capacity within current pharmacy resources to deliver additional work
- Need to ensure clinical coders are kept informed about clinic models to ensure appropriate coding and revenue capture from new clinic activities

Practice examples

- No existing examples in other LHDs were immediately apparent
- The Alfred Hospital in Melbourne is about to commence pharmacist-led smoking cessation clinics

Financial impacts

- High level modelling of potential program funding for some Tier 2 clinics is presented below. Understanding the detail in incremental costs requires further investigation. However, high level S&W costs have been considered - determined for a Grade 2 Second Year Pharmacist ($52.90/hr)

Tier 2 Clinic	Description	Indicative funding	Pharmacist time requirements (hrs)	Indicative S&W cost ($52.90/hr)	Indicative surplus/clinic	Clinics per week required to fund Pharmacist ($104k p.a)
40.04	Clinical pharmacy	$ 833.14	1.0	$ 52.90	$ 780.24	2.6
40.30	Alcohol and other drugs	$ 169.51	0.5	$ 26.45	$ 143.06	14.0
40.56	Falls prevention	$ 81.52	1.0	$ 52.90	$ 28.63	70.2
40.58	Hospital avoidance programs	$ 264.95	1.0	$ 52.90	$ 212.06	9.5

4.6 Procurement

4.6.1 Direct from supplier distributions

Work Program 11 - Establish direct drug distribution to smaller sites			
Cost/resource requirements	Low	**Impact**	High

Rationale

Direct to site delivery will reduce the need to double handle orders at base hospitals, improve delivery turn-around times and reduce the logistical risks and complexity of the current courier network

Supporting evidence

- Pharmacists spend significant and unnecessary time on administrative work associated with inter-site drug distribution activities within the District.

High level implementation activities	Implementation considerations
• Develop ordering workflows • Develop ordering governance processes • Define financial charging arrangements and processes • Define performance indicators • Make wholesaler account arrangements • Train staff and support change process	• Impact of workforce redesigns • Impact of formulary standardisation and imprest lists • Impact of procurement standardisation • Changes to ordering workflows • Hub sites will continue to support satellite sites for their clinical needs, despite diminishing involvement in order handling

Practice examples

- Murrumbidgee LHD has used direct drug delivery effectively for many years. The model employed by Murrumbidgee would appear to be appropriate for WNSWLHD (see section 3.6.1).

Financial impacts

- Implementation of direct distribution is anticipated to liberate a total of 2.6 FTE pharmacy technicians and 0.43 FTE pharmacists to be utilised for other (primarily clinical) activities.

4.6.2 Review and strengthen procurement processes

Work Program 12 - Review and strengthen procurement processes			
Cost/resource requirements	Low	**Impact**	Moderate

Rationale

In some cases there is material difference in the price paid for the same or equivalent drugs across the District and as a whole the District may not always be accessing the most favourable pricing.

Supporting evidence

- Despite generally good stock control and consistency in drug purchase prices, there are examples of individual sites negotiating at a local level with drug suppliers for particular 'off-contract' drugs, as opposed to taking a co-ordinated District-wide approach.
- In some cases there are cheaper clinically-equivalent alternatives to current drugs that are not being accessed.

High level implementation activities	Implementation considerations
• Review and map current procurement processes at each site • Identify opportunities to streamline process • Develop a District-wide policy around procurement, including clear guidance on mandated decision pathways • Communicate policy to pharmacy, medical and nursing staff • Review and refine policy periodically • Assess the need for dedicated pharmacy procurement officer for the District and define Position Description	• The procurement policy must consider and align with the requirements of the DTC • The procurement policy must accommodate variations to the norm, but define robust governance for 'once-off' cases • The impact of changes to procurement policies should be monitored periodically through the PMF (Recommendation 24)

• If deemed necessary, employ pharmacy procurement officer • Monitor improvements in procurement practices	

Practice examples

- Murrumbidgee employs dedicated procurement officers at both Wagga Wagga Rural Referral Hospital and Griffith Base Hospital, and one for the District overall. These procurement officers handle the majority of procurement across MLHD.

Financial impacts

- Improving consistency in pricing paid for drugs across the District has the potential to yield cost savings. Through the Diagnostic Report, it was identified that the variation in price paid for a small number of drugs accounts for the majority of overall potential cost savings. For example, in 2014/15 the three drugs with the highest variations in actual spend vs potential spend at the lowest available price would have saved the District approximately $620k, if purchased at the lowest available price. The next three highest would have saved only ~$65k.
- If opting to employ a dedicated District Pharmacy procurement officer, the cost would be at the level of a Pharmacy Technician (approx. $55k pa).

4.7 Performance management

Work Program 13 - Strengthen pharmacy performance management			
Cost/resource requirements	Low	**Impact**	High

Rationale

Improved performance management capacity will support improved governance and accountability, and improve the robustness and timeliness of strategic decisions. Strengthening performance management includes:

- development of a Pharmacy Performance Management Framework
- improved access and timeliness to quality supporting data
- development of technical capabilities to support strategic decisions

Supporting evidence

- Sites have limited capability to perform evaluations and performance monitoring and management
- Sites have limited capability to build evidence base and credible 'story' around costs, benefits and impacts for initiatives, projects, practice changes and investments. This is a barrier to making informed strategic decisions and may stall the broader roll-out of initiatives
- There is limited routine access to quality information regarding a variety of financial and performance metrics

High level implementation activities	**Implementation considerations**
• Map and review existing performance management and reporting accountabilities and processes • Define performance and monitoring indicators for various aspects of pharmacy service provision (see Table 34 for examples) • Conduct gap analysis of data available to support an understanding of the indicators • Review technical, workforce and infrastructure/enabler requirements to deliver the PMF • Implement process/system changes to support improved data capture and reporting • Take baseline measurements of key indicators where possible • Administration of CEC MSSA to establish medication safety performance baseline at all Base and District sites • Launch Pharmacy PMF and support change process • Monitor and refine Pharmacy PMF, as required, and periodically	• Alignment with the District medications management strategy (Recommendation 1) • Limited capacity of current data collection systems such as i.Pharmacy • Impact of EMMS and ADCs in supporting improved data capture and reporting • Significant consultation with pharmacy staff, finance, and the District Business Intelligence Unit will be required to refine the PMF • Limited capacity and capability within current pharmacy workforce to support development of PMF • PMF should include consideration of accountability for, and governance of, pharmacy services at smaller sites

Practice examples

Work Program 13 - Strengthen pharmacy performance management			
Cost/resource requirements	Low	**Impact**	High

- The 2011/12 Hospital Pharmacy in Canada Report[25] provides a comprehensive overview of pharmacy indicators used to assess and monitor hospital pharmacy services in Canada. Most of the indicators would be directly applicable to measuring the performance of pharmacy services in WNSWLHD and could be considered a basis for developing a pharmacy PMF for the District.
- A poster presented at the SHPA conference on Medications Management 2015 outlines an approach to develop FTE-adjusted targets for clinical performance indicators[26]. This may be considered for adoption by WNSWLHD to set realistic targets for benchmarking of some key clinical performance indicators across sites, such as: pharmacist FTE available for clinical activities, medication reconciliations conducted and recorded, discharge medications reconciliations conducted and recorded.

Financial impacts

Development of the Pharmacy PMF could be developed 'in house' by pharmacy staff, with independent facilitation/review to provide advice on PMF development and to validate and assist in refining the draft PMF. This approach would improve buy-in to the resultant PMF and build capability within the pharmacy workforce. It is estimated that a pharmacist could project manage the development of the PMF with a day of dedicated time per week over a period of 2-3 months.

4.8 Enabling technologies

4.8.1 Barcode readers

Work Program 14 - Implement barcode scanners at all dispensing terminals			
Cost/resource requirements	Low	**Impact**	Moderate

Rationale

Barcode readers for dispensing have been shown to reduce dispensing error rates and are recommended by many clinical safety and quality standards, guidelines and NSW Health policies. WNSWLHD is currently non-compliant with these guidelines.

Supporting evidence

- Recommended by:
  - PBA - 'Guidelines for Dispensing Medicines'
  - NSQHS accreditation standards
  - SHPA - 'Standards of Practice for Hospital Pharmacy Outpatient Services'
  - NSW Health Information Bulletin (July 2014) - 'Implementation of Barcode Scanning in NSW Public Hospital Pharmacy Departments'

High level implementation activities	**Implementation considerations**
• Define barcode reader functional and technical requirements • Develop revised dispensing workflows • Take baseline measurement of dispensing error rates • Purchase and install barcode readers • Train staff and support change process • Monitor improvements in dispensing errors	• i.Pharmacy compatibility • 1D and 2D scanning capacity and requirements • Compliance with labelling requirements as per ACSQHC guidelines

Practice examples

- Barcode readers are routinely employed across other states, private hospitals and community pharmacy to reduce dispensing errors

Financial impacts

[25] http://www.lillyhospitalsurvey.ca/hpc2/content/2012_report/FULL-2012.pdf, accessed 18 April 2016
[26] http://mm2015shpa.com/wp-content/uploads/2015/11/016-Richards-Cathie-Can-the-SHPA-FTE-recommendations-be-used-to-establish-clinical-performance-indicator-CPI-benchmarks.pdf, accessed 18 April 2016

Work Program 14 - Implement barcode scanners at all dispensing terminals			
Cost/resource requirements	Low	**Impact**	Moderate

- The cost of barcode readers ranges from approximately $90 to >$1000 per unit. However, the modest functional requirements for a pharmacy department means the cost of an appropriate reader is likely to be approximately $200 to $300 per unit.
- Assuming 3 terminal installations at all Base sites (9 terminals) and 2 terminals installations at District sites (8 terminals), the total installation cost would approximate $4,250 ($250/unit across 17 terminals).

4.8.2 Electronic Medications Management

Work Program 15 - Support implementation of EMMS across the District			
Cost/resource requirements	High	**Impact**	High

Rationale

EMMS has the potential to address many of the issues identified through the Diagnostic Report. In supporting its objective to be leaders in rural and remote pharmacy provision, EMMS will be an essential tool to support contemporary workflows for medications management including for pharmacy, medical and nursing. EMMS has been shown to reduce ADEs.

Supporting evidence

- There is currently limited visibility of medicines usage at the patient level and heavy reliance on manual processes for pharmacy service provision and clinical decision support at the point of prescribing.
- Medication reconciliation is currently poorly supported throughout the District.

High level implementation activities

- Identify and resource EMMS project team
- Actively support eHealth NSW Implementation Planning Study (IPS) for lead site implementation
- Develop key metrics to measure EMMS impact and take baseline (implementation of the Clinical Excellence Commission Medication Safety Self-Assessment may provide measurement of a robust baseline for comparison post EMMS implementation – per Work Program 13)
- Implement EMMS at District lead site identified by eHealth NSW
- Develop EMMS roll-out strategy for rest of District
- Implement EMMS across Base and District sites as soon as practical following evaluation and refinement of lead site configuration to tailor to District, where necessary
- Measure key metrics post EMMS implementation (at least 12 months following go-live) to assess EMMS impact on key indicators

Implementation considerations

- Implementing EMMS is a complex clinical change management process and must be fully understood and appropriately resourced before commencement
- Pharmacy must play a lead role in supporting the implementation of EMMS
- WNSWLHD will need to work closely with eHealth NSW to ensure the EMMS is implemented safely and effectively, including assistance with mapping local workflows.
- eHealth NSW will drive the timelines and resource the lead site implementation. However, WNSWLHD will need to dedicate resources to form a project team to lead local developments and tailoring of the system and support buy-in from local clinicians
- EMR2 rollout will provide the majority of the required infrastructure to support EMMS.
- Full EMMS roll out to the District is likely at least a five-year program

Practice examples

- NSW eHealth is in the process of rolling out EMMS across the state.
- UnitingCare Hervey Bay St Stephen's Hospital is the only Australian Hospital to have implemented a completely Closed Loop Electronic Medications Management System (CLEMMS).

Financial impacts

A detailed stand-alone business case for EMMS implementation for the District should be developed.

For the lead site implementation, which will be supported by eHealth NSW, resourcing of a dedicated EMMS project team by WNSWLHD will be required, estimated to cost ~$400k. In addition, permanent additional resources are required to support ongoing maintenance, monitoring and evaluation of the EMMS, estimated at approximately $180k p.a.

Work Program 15 - Support implementation of EMMS across the District			
Cost/resource requirements	High	**Impact**	High
Applying published cost-saving estimates to the volume of admitted activity at Base and District hospital sites suggest that it may be possible for the District to save approximately $3.3m p.a. through implementation of EMMS at these sites, primarily as measured through reduced potential ADEs. These estimates are based on results achieved at a metropolitan hospital and, as the impacts of EMMS are context specific, would require further validation in a specific study of the District's ADE rates, to verify if their achievement may be realistic.			

4.8.3 Automated Dispensing

Work Program 16 - Pilot and roll-out implementation of Automated Dispensing Cabinets			
Cost/resource requirements	High	**Impact**	High

Rationale

Implementation of automated dispensing cabinets would be expected to reduce dispensing error rates, improve workflow efficiency and visibility into medicines usage and reduce medication wastage through improved tracking of stock.

Supporting evidence

- Albeit small, there is an amount of medicine wastage across the District in the form of expired stock
- There is currently no ability to understand stock valuation of imprest at any given time
- Imprest stock management is largely a manual process currently
- There is currently no ability to track imprest medicines usage to a specific patient and therefore limited ability to understand patient-level drug costs

High level implementation activities

- Work with ADC vendors to estimate cost-benefit and ROI of ADC implementation using actual site-specific data
- Develop detailed business case, including resource costs for implementation and ongoing post-implementation maintenance activities
- Determine technical capacity to implement ADCs
- Develop workflows and optimal deployment of any freed pharmacist time
- Evaluate products and identify preferred system
- Determine procurement approach (e.g. capital purchase vs lease)
- Procure ADCs for single site as pilot
- Train staff and manage change process
- Monitor and critically evaluate pilot to determine benefits and costs of rolling out to further sites

Implementation considerations

- Alignment with medications management strategy priorities
- i.Pharmacy integration capacity
- Impact of, and integration with, EMMS
- Physical space requirements
- Potential for PBS reform uptake to increase outpatient prescription workload significantly that may improve attractiveness of implementing Automated Dispensing Systems in pharmacy departments – this would further improve efficiency of medications management.
- Implementation of ADCs should be considered at whole of site level to optimise the achievement of benefits

Practice examples

- Automated dispensing units and electronic drug cabinets are widely used across the USA, UK and Europe however robotic pharmacy systems are relatively nascent in Australia. Major providers include: BD, Omnicell and Willach.
- Sites supporting automated units include:
    - University Hospital Geelong, Barwon Health, Victoria
    - Box Hill Hospital, Eastern Health, Victoria
    - Epworth Hospital, Richmond, Victoria
    - St Stephen's Hospital, Hervey Bay, Queensland

Work Program 16 - Pilot and roll-out implementation of Automated Dispensing Cabinets			
Cost/resource requirements	High	**Impact**	High

Financial impacts

- Indicative cost for automated dispensing systems range between $100k to $300k while automated dispensing cabinets range between $50k and $100k per unit.
- St Stephen's Hospital Hervey Bay presented the results of a recent cost-benefits analysis of the implementation of ADCs and reported a ~30% reduction in value of stock on hand, while more than doubling the number of imprest lines held in some wards. Translated to the District, a 30% reduction in SoH would equate to approximately $440k across Base and District sites.

Site	SOH (As at 11/11/15)	Potential reduction in SOH value through ADCs
Dubbo	$485,145	$148,454
Orange	$458,147	$140,193
Bathurst	$188,566	$57,701
Broken Hill	$97,878	$29,951
Lachlan	$93,281	$28,544
Mudgee	$57,470	$17,586
Cowra	$55,419	$16,958
Total	**$1,435,905**	**$439,387**

- Taking into account all implementation costs and estimated cost savings, the ROI period for ADC implementation at St. Stephen's Hospital, Hervey Bay was estimated at 5-6 years. It should be noted that St. Stephen's implemented unit-dose dispensing, which may be more expensive, but may also yield higher drug cost savings through reductions in drug wastage.

4.8.4 e-Approval system

Work Program 17 - Configure SharePoint to manage approvals of out-of-session DTC decisions			
Cost/resource requirements	Low	**Impact**	Moderate

Rationale

Implementation of an e-approval system may support improved DTC decision turn-around time and auditability for drug approval decisions made outside the monthly DTC roster. This may also support improved District standardisation of drug approvals and provide clinical and governance support to smaller facilities.

Supporting evidence

- Smaller sites are sometimes required to make drug selection and purchase decisions in the absence of timely support or input from a formal DTC
- The District DTC on occasion makes decisions via email communication where the monthly schedule does not support a timely clinical decision
- Decisions made by unstructured emails may not be consistent with the need for 'transparent and accessible documentation which can be reviewed and/or audited' outlined by Principle 9 of the CATAG guiding principles

High level implementation activities	Implementation considerations
• Define functional requirements of E-approval system • Review technical capacity to develop in SharePoint • Develop revised workflows • Configure SharePoint site to manage and track approvals • Train staff and support change process	• Opportunity to leverage SharePoint development at the District level

Practice examples

- SharePoint offers the creation of 'Discussion Boards' which may provide a transparent and easily accessible environment to discuss drug approval decisions. With Discussion Boards users are able to create a forum for

Work Program 17 - Configure SharePoint to manage approvals of out-of-session DTC decisions			
Cost/resource requirements	Low	**Impact**	Moderate
discussion with the potential to flag discussions as 'Answered questions' or 'Unanswered questions' and manage user permissions and permission levels			
Financial impacts SharePoint is currently being implemented across the District to support improved communication. As such, configuration of a dedicated e-Approval functionality in SharePoint should incur incremental costs only.			

4.8.5 Dose Administration Aid (DAA) management software

Work Program 18 - Source and implement Dose Administration Aid management software			
Cost/resource requirements	Low	**Impact**	Low
Rationale Current DAA packing process is completed manually and supportive software may reduce risk of error and improve auditability and process efficiency			
Supporting evidence • Pharmacists have reported having to hand write medication instructions and patient details on DAAs and have limited capacity to maintain appropriate DAA administration records			
High level implementation activities • Identify number of DAAs managed at each site to determine if benefits will outweigh the costs of implementing the DAA software • Define functional and technical specifications of DAA software • Review technical capacity to adopt software • Evaluate and procure software • Redesign DAA packing workflows • Install DAA software • Migrate existing patient information into DAA software • Train packing staff in new workflows and software use and capabilities		**Implementation considerations** • Impact of workforce redesign • Time required to migrate existing patient information into DAA software • Capacity of software to support potential outsourcing of DAAs to third parties	
Practice examples • DAA packing software is widely used in both hospital and community pharmacy settings with major providers including Fred.Pak and Webstercare			
Financial impacts • The cost of purchasing a software licence is approximately $200 with ongoing monthly costs of approximately $15 • Initial training is a likely requirement, with a total training time of 3 hours per site across all Base hospitals at a cost of $52.90/hr (Grade 2, Second year Pharmacist) the total initial training costs are estimated to be $476 across the District. • Installing DAA packing software at one dispensing terminal at all Base hospitals will incur an approximate initial investment of $1,076 with ongoing annual costs of $540. The efficiency requirements to break even with total first year costs approximate 35 minutes/week (12 minutes/site/week) based on a Grade 2 Second year Pharmacist wage of $52.90/hr.			

4.8.6 Prescription tracking software

Work Program 19 - Source and implement prescription tracking software			
Cost/resource requirements	Low	**Impact**	Moderate

Rationale

Prescription tracking software may reduce the administrative burden on pharmacists having to update other clinical staff on the dispensing status of prescriptions.

Supporting evidence

- Pharmacy staff reported spending considerable time on the phone providing nursing and medical staff information on the status of prescriptions
- Interruptions to pharmacists during medication dispensing and checking poses a potential clinical safety risk

High level implementation activities

- Define function and technical specifications of prescription tracking software
- Review technical capacity to adopt software
- Develop revised workflows
- Work with John Hunter Hospital to source prescription tracking software developed 'in house'
- Implement software
- Train pharmacy and other clinical staff
- Support change process and monitor uptake

Implementation considerations

- Buy-in from nursing and medical staff will be required to support uptake of prescription tracking software
- Medical and nursing staff access prescription tracking software (e.g. availability of computers on wards and access via other devices)

Practice examples

- John Hunter Hospital has developed their own in-house prescription tracking solution and estimate they save approximately 8hrs/week of pharmacist time through avoided phone calls.
- Commercial systems also exist: https://www.emishealth.com/products/prescription-tracker/

Financial impacts

- Implementation of prescription tracking software across 3 sites has an indicative initial cost of $12k for an initial setup costs of approximately $2k per site.
- Prescription tracking software may liberate up to 23 hours of total pharmacist time each week, per table below, assuming 2 mins per phone call:

		Estimated pharmacist time on calls (hrs)		Potentially liberated weekly pharmacist time (hrs)	
	Est. calls received daily	Daily	Weekly (5 day week)	50% efficiency	80% efficiency
Dubbo	35	1.17	5.83	2.92	4.67
Orange	35	1.17	5.83	2.92	4.67
Bathurst	25	0.83	4.17	2.08	3.33
Parkes/Forbes	15	0.50	2.50	1.25	2.00
Mudgee	15	0.50	2.50	1.25	2.00
Cowra	15	0.50	2.50	1.25	2.00
Total	**140**	**4.67**	**23.33**	**11.67**	**18.67**

5. Implementation planning and considerations

The following sections outline the key implementation planning considerations applicable to all work programs and include:

- Overarching implementation principles, prioritisation and approximate implementation timing
- Project resourcing considerations
- Ongoing evaluation and monitoring of initiative rollout.

5.1 Overarching implementation principles

In prioritising and implementing the various work programs identified in this report a number of key principles should be considered as a reference point, per below:

All pharmacy projects:

1. must align to:
    1.1 the Western NSW LHD Strategic Health Services Plan 2013-2016
    1.2 the Living Well Together strategy
    1.3 the District's Strategic Priorities
    1.4 the National Medicines Policy, especially QUM Principles.
2. should apply a consistent and structured approach to project management and reporting
3. should be appropriately resourced to avoid projects failing during implementation
4. should consider existing pharmacy workloads and local site contextual issues to avoid disrupting 'business as usual' activities
5. should plan for, and implement, an approach to evaluate the effectiveness of the project implementation and impact of the project overall on an ongoing basis.

5.2 Work program prioritisation and implementation timing

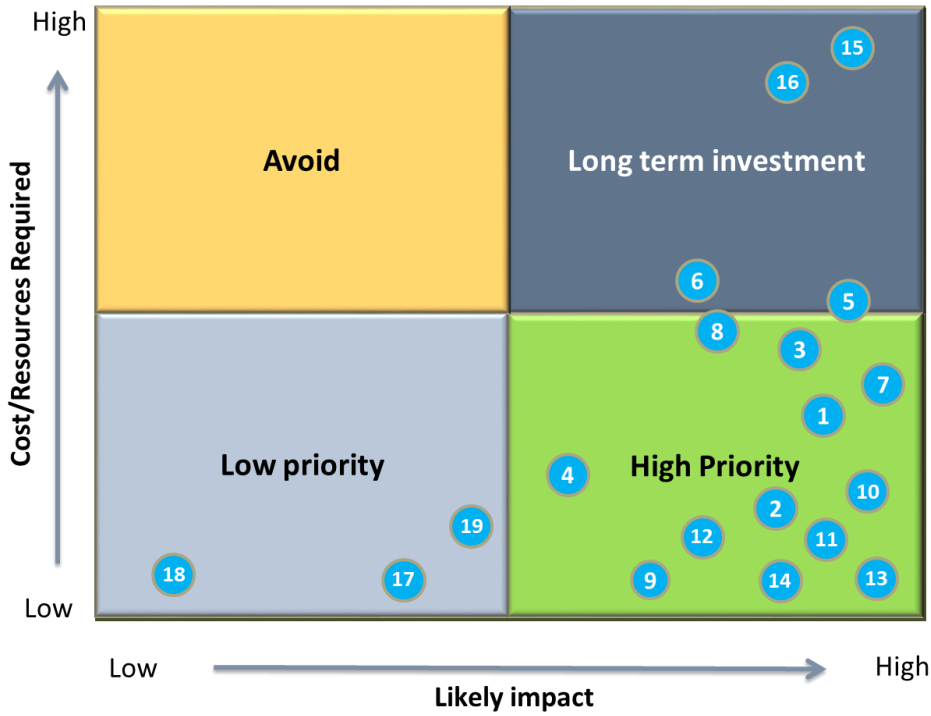
Section 4 describes a series of work programs to be considered for implementation by the WNSWLHD ELT over the next four years. Most work programs consist of a series of sub-projects and discrete implementation activities. Implementation of each work program may be dependent on, or facilitated by, activities outlined in other work programs, and the overall proposed suite of work programs is designed to be complementary.

It is recognised that it will not be possible for the District to commence implementation of all work programs at the same time, as many will require significant planning and are likely to be informed by the results achieved by other work programs.

Therefore, this section provides a high-level framework with which the implementation of the proposed work programs were prioritised, and a high-level implementation timeline has been defined. However, more detailed implementation timing will need to be developed for each work program and activity once the final set of work programs has been endorsed for implementation.

Figure 15 maps each work program against the cost/resources required to implement them and the approximate magnitude of the likely impact that it will create for the District.

Figure 15: Prioritisation of proposed work programs



1. Develop Medication Management Strategy
2. Revise overall Pharmacy governance
3. Increase resourcing of Chief Pharmacist role
4. Strengthen DTC processes
5. Revise hub and spoke configuration to better support small sites
6. Develop and implement telepharmacy strategy
7. Increase support for medication reconciliation
8. Address immediate workforce requirements and develop workforce strategy
9. Improve access to and quality of pharmacy financial data
10. Implement pharmacist-led Tier-2 non-admitted clinics
11. Establish direct distribution of drugs to smaller sites
12. Review and strengthen procurement processes
13. Strengthen pharmacy performance management
14. Implement barcode scanners at all dispensing terminals
15. Support implementation of EMM across District
16. Pilot and roll-out implementation of ADCs
17. Configure SharePoint to manage approvals of out of session DTC decisions
18. Source and implement Dose Administration Aid management software
19. Source and implement prescription tracking software

Given the findings of the Diagnostic Report and the fact that many of the issues identified were similarly identified in the previous reviews of the District's pharmacy services in 2010 and 2014, most of the work programs have been categorised as high priority for implementation. A number of key exceptions are the implementation of EMMS and ADCs which will require a longer term investment and substantial preparatory planning. Conversely, the implementation of DAA management software is considered to be low priority as the anticipated impact is likely to be low, despite the cost also being low.

Figure 16 presents the high-level proposed timelines and sequencing for implementation of the proposed work programs. Where significant planning will be required prior to implementation, this has been identified and in the case of the hub and spoke re-configuration, the proposed timing for the two transition stages have been identified.

Figure 16: High-level implementation timing and sequencing for work programs

Proposed Work Programs	2016/17	2017/18				2018/19				2019/20				2020/21			
	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
1 - Develop Medication Management Strategy																	
2 - Revise overall Pharmacy governance																	
3 - Increase resourcing of Chief Pharmacist Role																	
4 - Strengthen DTC processes																	
5 - Revise hub and spoke configuration			Planning		Stage 1				Stage 2								
6 - Develop and implement telepharmacy strategy		Planning															
7 - Increase support for medication reconciliation		Planning															
8 - Address immediate workforce and develop workforce strategy																	
9 - Improve financial data																	
10 - Implement pharmacist-led Tier 2 clinics				Planning													
11 - Establish direct distribution of drugs to smaller sites	Planning																
12 - Review and strengthen procurement processes																	
13 - Strengthen pharmacy performance management	Planning																
Technology enablers																	
14 - Implement barcode scanners at all dispensing terminals																	
15 - Implementation of EMM across District	Planning																
16 - Pilot and rollout ADCs			Planning														
17 - Configure SharePoint to manage DTC approvals																	
18 - Source and implement DAA management software																	
19 - Source and implement prescription tracking software																	

5.3 Project resourcing

There is limited capacity within current pharmacy resources to provide substantial support for specialist projects. The implementation of each proposed work program should therefore consider the need for additional resourcing to support project design, implementation and post-delivery support in some cases.

In particular, given the number and nature of the proposed work programs, the District is likely to need to establish a dedicated Project Management Office (PMO) function to ensure the effective implementation of the proposed work programs.

The PMO should develop and establish standardised project management tools and documents to drive consistency in project reporting and delivery.

Each work program, and in some cases sub-projects, should be assigned a responsible project manager. Where pharmacists are assigned to be project managers, it would be beneficial to provide at least basic project management training. For larger projects such as the telepharmacy, EMMS and ADC implementations, the District should consider employing dedicated project management professionals and/or external advisory support.

The District should setup a Pharmacy Project SharePoint site to assist in tracking and communicating progress of all project implementations and to provide a readily accessible repository of resources and periodic status update reporting.

5.4 Ongoing evaluation and monitoring of work program rollout

The District should monitor the implementation progress of each proposed work program on a structured and periodic basis to ensure momentum is maintained and the anticipated benefits are being achieved. This role would ideally sit with the proposed PMO, with periodic reporting to the ELT. If a PMO is not formed, then each project manager should be responsible for reporting periodically to joint pharmacy meetings and providing regular status update reports on the proposed common Pharmacy Project SharePoint site.

Throughout the course of this project, the lack of easily accessible data on pharmacy operations and outcomes made it difficult to determine the effectiveness and/or efficiency of pharmacy processes and approaches. To understand whether the investment made in the proposed work programs can be considered value-for-money, the District must develop structured processes to support a greater understanding of the impacts of the work programs (per work program 13). This will assist in ensuring that the District is progressing towards its goal of being leaders in the provision of rural and remote pharmacy services.

6. Next steps

The following activities constitute the immediate next steps for the project:

- Validation of the proposed work programs with the Project Advisory Committee and Project Steering Committee
- Refinement and finalisation of Solution Options Report
- Endorsement of solutions for further analysis/implementation support in Phase 2 of the project
- Scoping and planning of Phase 2 activities
- Further implementation support for identified work programs.

Appendix A – Committee members and stakeholders consulted

The tables below outline the membership of established project committees and list stakeholders consulted during the process of developing the Solution Options Report.

Project Steering Committee

- Richard Cheney (Chair) - Director, Allied Health Services, WNSWLHD
- Dianne Wykes - Director, Clinical Governance
- Josh Carey - Director, Finance
- Adrian Fahy - Director, Nursing and Midwifery
- Libby Brunheim - General Manager, Northern
- Graham Dyer - General Manager, Dubbo
- Sharon Mckay - General Manager, Southern
- Pauline Rowston - Health Service Manager, Cowra/Grenfell

Project Advisory Committee

- Ian Mawbey - Chief Pharmacist, WNSWLHD
- Kelvin Chan - Pharmacist, Dubbo
- Ann Wormald - Pharmacist, Mudgee
- Kate Symonds - Pharmacist, Dubbo
- Derek Kay - Pharmacist, Bathurst
- Nicole Vizard - Pharmacist, Parkes and Forbes
- Taren Gill - Pharmacist, Orange
- Gerard Hawthorn - Pharmacist, Orange
- Margaret Joliffe - Pharmacist, Cowra
- Tabatha Jones - Pharmacist, Dubbo community
- Liz Mitchell - Health Service Manager, Lachlan
- Mary Urquhart - Health Service Manager, Cobar
- Tove Riphagen - GP & Ambulatory care, Orange

Other stakeholders consulted

- Steve Morris – Executive Director of South Australia Pharmacy, South Australia
- Emma Dean – Smoking Cessation Coordinator, Alfred Health, Victoria
- Pei San Gan – Director of Pharmacy, Epworth Richmond, Victoria
- John Carroll – District Chief Pharmacist, Murrumbidgee Local Health District
- Ruth Jones – Director Cancer Services, WNSWLHD
- Vicki Ibrahim – Director of Pharmacy Services, UnitingCare