Considerations for justifying medicines automation

1. Introduction

As with any form of capital investment there is the requirement for a robust assessment of the value of investment in medicines automation. Medicines automation includes pharmacy-based and ward / unit-based robotic / automated systems.. There is good evidence that there is value in automating a number of aspects of medicine storage, supply and distribution. Quantifying the value and benefits for a hospital's unique operating and network requirements is an important activity to undertake prior to investing in the technology and change leadership which is required for successful implementation and operation.

2. Choosing the best model

There is an increasing range of useful automation technology available in Australia which can provide performance and outcomes to meet objectives if chosen and implemented appropriately.

Without going into specific detail, the various automated systems, can be grouped into one of the three categories each of which can meet specific requirements of hospitals. These categories are:

- centralised model of robotic storage and dispensing systems based in the pharmacy which may also include pharmacy-based unit dose packaging and dispensing;
- decentralised model of ward / unit based automated dispensing cabinets ;
- combination model of centralised (pharmacy-based) and decentralised (ward-based) systems;

In addition pneumatic tube systems can be a valuable addition to medicine distribution automation.

2.1 Centralised model

The centralised model involves pharmacy-based robotic dispensing systems which can be used for individual patient dispensing and imprest supply. The centralised model may also include unit dose dispensing technology.

Advantages	Disadvantages
Greater control and management of inventory by Pharmacy	Slower medication turnaround times than ward-based automated dispensing cabinets
Reduced inventory levels and better control of slow moving and complex (i.e. access and compassionate use program) stock lines	Can result in "borrowing" between wards
Faster and more accurate supply of individual patient medicines required for dispensing	There can be the requirement for separate storage of refrigeration and large volume (IVs) medication
Better control and management of inventory levels and procurement	

2.2 Decentralised model

The decentralised model involves ADCs located in wards, units, emergency departments and operating suites. ADCs can be supplied from either pharmacy stores or preferably via an imprest box distribution service provided by wholesalers.

Advantages	Disadvantages
Dispensing at the point of demand	Reduced pharmacy control

Advantages	Disadvantages
No waiting for medicines to be supplied by pharmacy	Potential higher investment but dependent on the number of wards / units
Reduces the chance of missing medication	Requires good information systems integration
Effective user accountability and reporting	The multiple storage points increases the complexity of inventory and slow moving stock management and of expiry control
Improved nurse satisfaction	There is the opportunity for work arounds

2.3   Combination model

The combination involves centralised (pharmacy-based) robotic systems and decentralised (ward-based) automated dispensing cabinet systems.

Advantages	Disadvantages
Provides central pharmacy control and management of all medicines inventory	Harder to implement because of potential system integration issues and the application of technology capability
Labelled individual patient medicines dispensed from pharmacy and individual doses for inpatients supplied from ADC	Risk of information systems integration
Quick access to required medicines at the ward	Inventory management more complex
The medicine supply workload is distributed	Management processes may be more complex

2.4   Pneumatic Tube

Pneumatic tube systems can be used with all of the three models.

Advantages	Disadvantages
Enables fast transport of paperwork and medication	Requires building access for tubes
Can transport items over long distances	Must have secure drop points to be safe and effective
Reduces the need for ward staff and technicians to collect or delivery paperwork or medication	Limited by the size of the tube and carriers

3. Benefits and justification of automation

The key benefits of automated systems are in increased safety, quality and efficiency. The justification of any investment in automated systems will be based on the need to understand in a qualified and quantified way the impact that automation will have on performance in safety, quality and efficiency. This requires measuring current performance and then applying a projected improvement before committing to the investment and being able to measure and manage the outcomes progressively and to target.

Benefit	Potential outcome
Increased patient safety	Reduces potential errors by reducing the number of human touches because humans make mistakes.
	Delivers / presents medicines to the technician, pharmacist or nurse
	Tracks medicines to the patient

Benefit	Potential outcome
	Introduces high level of transaction tracking and operator accountability
	Simplifies the handling and accuracy of the medication delivery process
	Creates more time for nurses to focus on the patient
	Frees pharmacists from dispensing to spend more time with patients and clinicians
Increased efficiency	Stores and delivers medication up to 10 times faster than manual processes
	Eliminates many process steps and improves efficiency
	Reduces the turnaround time which reduces waiting times and improves delivery of medicines to the patient
	Reduces errors which reduces management and error correction time, including rework time, freeing up resources
	Controls inventory better and improves the inventory management and procurement processes
	Reduces ward staff and technician travel times
	Frees up nurses from chasing medicines supply
	Increases security
Reduced costs	Reduces inventory holding, typically by 10-20% depending on the mix of technology
	Improves control of inventory, reduces expired stock and missing doses (studies suggest up to a 40% reduction)
	Increases the number of prescriptions dispensed per FTE pharmacist or pharmacy technician
	Improves efficiency of processes and transaction performance increase FTE capacity to cope with growth
	Reduces wastage and missing medications
Improved compliance	Improves transaction control and tracking eases compliance reporting
	Simplifies reporting and management by reducing errors and mistakes
	Incorporates compliance measures in workflows
Hospital and Pharmacy management	Provides pharmacy management with improved controls and visibility of the transactions and performance
	Allows better alignment of measurement to hospital strategies and objectives and reporting of this
	Fees up management by simplifying reporting and management of inventory
	Improves quality and cost performance of medication handling and delivery
Other	Simplifies the processes
	Improves patient satisfaction (due to reduced wait times) and hospital reputation

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