



# Dispensary automation

*Pharmacy automation has the potential to revolutionise pharmacy dispensing and stock management processes, achieve increased safety and quality in medicine use, and reduce cost*

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**A**utomated dispensing machines (ADMs) or as they are also known, pharmacy robotic dispensing units, automate functions such as dispensing prescriptions, picking imprest orders, and managing and storing centralised inventory.

Evidence from a number of UK hospitals over the last 10 years has shown that the introduction of pharmacy robotic dispensing has resulted in fewer dispensing errors, faster dispensing requiring fewer staff members, less expired stock and reduced stock holdings.

This article draws on research and opinion of Natalie Bula<sup>1</sup>, Stephen Goundrey-Smith<sup>2</sup> and Deloitte<sup>3</sup>, in this field.

### Drivers for automation

The positive UK experience has led to the adoption of pharmacy dispensing robots in Australia with the key drivers being:

- to improve the efficiency of the dispensing process;
- to increase the quality of patient care (through reducing waiting times, and redeployment of pharmacy staff to near-patient services); and
- to facilitate the application of Lean methodology to streamline the processes of inventory management and dispensing.

### Types of ADMs available in Australia

The pharmacy-based ADMs / pharmacy robots currently available in Australian fall into two categories:

- random storage robots (where stock is placed into a hopper and then automatically loaded to an assigned, random location within the unit and stored in the most space efficient location according to the dimensions of the pack); and

- channel storage robots (where stock is manually loaded into pre-determined gravity-fed channels).

### Benefits of pharmacy robotics

There is good evidence to support the following benefits:

#### 1. Safety & quality

Since 2001 there have been numerous reports on the impact of robotic dispensing on error rates. These analyses consistently show reductions in error rates ranging from a modest 16% decrease at Wolverhampton Hospital to a 65% decrease at King's College Hospital, London.

A number of hospitals in the UK (which use a similar dispensing model to Australia, i.e. full-pack dispensing) have shown that the use of robotic dispensing has enabled hospitals to release pharmacists to clinical pharmacy activities because pharmacists spent less time in the dispensary. This time was redeployed to focus on the quality and effectiveness of medicine use through clinical pharmacy services.

#### 2. Financial

The use of pharmacy robotics has led to a reduction (20%-30%) in the amount and value of inventory required to be held in pharmacies resulting in:

- savings in interest costs associated with holding inventory; and
- a reduction of stock holding in the order of 2.25% of annual turnover.

In addition to requiring less inventory, the first-in-first-out approach to stock rotation ensures that the products nearest expiry are used first.

Through the automation of the picking process, a number of UK hospitals have reduced employment costs by:

- shifting the skill mix towards lower paid staff without increasing error rates;
- reducing overtime and the use of agency staff despite increases in dispensing activity; and
- dealing with increased dispensing activity without additional staff.

Robotic dispensing machines have also been shown to increase security in relation to storage and access to medication.

### 3. Process efficiencies

Implementation evaluations have observed decreases in prescription turnaround times and increases of up to 20% in the number of items dispensed per hour. These efficiencies were achieved by stock being delivered directly to the staff dispensing the medicine thereby reducing unproductive walking and picking time.

While the primary function of pharmacy robots is individual patient dispensing, imprest order picking and restocking can also be done using pharmacy robots. These imprest activities can be scheduled as overnight or 'out of hours' processes. As one Australian pharmacist said: "One of the best features of the random storage robot is watching it still working, putting stock away as we leave for the day!"

In the after-hours situation, the implementation of a pharmacy dispensing robot has allowed pharmacists to remotely dispense a supply of medication supply (from home) to a secure location for nursing staff to access without the pharmacist having to come into the hospital. This has reduced wait times for nurses, travel time and associated 'on call' payments.

Traditional shelving, for reasons of access and workplace safety, has an approximate maximum capacity of 1,650 packs per sqm. Storage in ADMs allows 3,300 packs per sqm, thus reducing the storage space required by more than 50%.

### Drawbacks of robotic dispensing

Although technology with robots has advanced rapidly with refrigerated lines and S8 controlled drug storage now able to be accommodated, freezer lines, bulky items such as IV fluid bags, cytotoxics, and unboxed liquids still pose challenges to storage within ADMs and as such some conventional static shelving is still required.

Future articles will explore the business case and other considerations required to support decisions associated with robotic dispensing. [PH](#)

- 1 Bula N. IT and automation solutions for medicines management. The Society of Hospital Pharmacists of Australia 2010. Available at: [http://www.shpa.org.au/lib/pdf/grants/Bula\\_oct2009.pdf](http://www.shpa.org.au/lib/pdf/grants/Bula_oct2009.pdf)
- 2 Goundrey-Smith S. Information technology in pharmacy: an integrated approach. London: Springer 2013.
- 3 Deloitte. Robotic dispensing. Automation in pharmacy, November 2010. Available at: [http://www.deloitte.com/assets/Dcom-Australia/Local%20Assets/Documents/Industries/LSHC/1011\\_Automation%20in%20Pharmacy\\_National%203.PDF](http://www.deloitte.com/assets/Dcom-Australia/Local%20Assets/Documents/Industries/LSHC/1011_Automation%20in%20Pharmacy_National%203.PDF)

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