Assessment of the Impact of Automated Dispensing Cabinet Implementation in a Tertiary Hospital in Malaysia

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BACKGROUND

In Sunway Medical Centre, all inpatient medication orders are traditionally supplied from the central pharmacy to the wards by patient basis. However, this can lead to inefficiencies as hospital operations become busier (Figure 1).

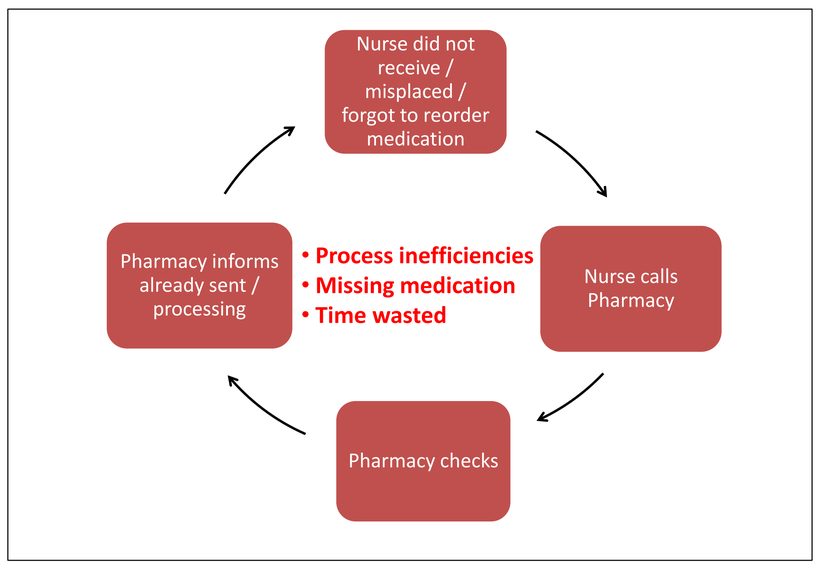

Figure 1: Operational inefficiency in a centralised dispensing system

As these problems will escalate in magnitude as the hospital grows in its size and capacity, it would be essential to innovate the medication dispensing system to reduce inefficiencies from manual processes. With advent of technology, hospital pharmacies are evolving to incorporate automation into their systems to improve safety and efficiency.

Automated Dispensing Cabinets (ADCs) are an advanced point-of-use system that automates the distribution, management and control of medications. They often form part of the solution to achieve closed loop medication management. With ADCs, common medications used are kept securely in stations located at ward level, providing access to nurses after pharmacy review of prescription orders.

AIM

To assess the impact of implementing ADCs on medication management in inpatient wards in the hospital.

METHODS

i) Implementation and Process Reengineering

To improve the inpatient medication dispensing model in Sunway Medical Centre, ADCs were implemented in stages as depicted in Figure 2. The steps of dispensing inpatient prescriptions were re-designed following ADC implementation.

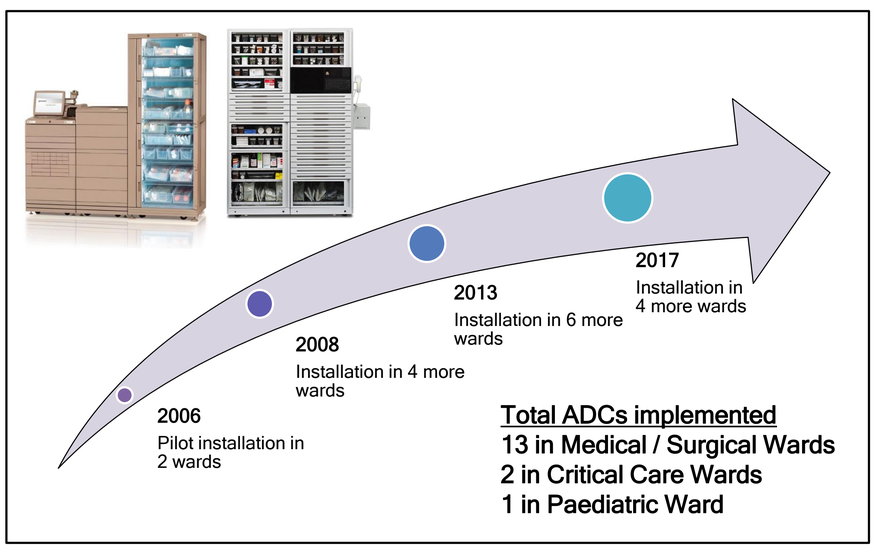

Figure 2: Sunway Medical Centre ADC implementation

ii) Impact Analysis

The following scope of data were collected and evaluated to measure the impact from ADC implementation in the hospital:

Scope	Type of Data Collected
Operational Efficiency	• Percentage of inpatient medications available in ADCs
	• Turnaround time for inpatient medication supply
Productivity	• Pharmacy and nursing time spent on filling medication resupplies
	• Nursing time spent on managing manual ward stocks
	• Nursing time spent on performing check of Controlled Drugs
Inventory Control	• Percentage of medication stock discrepancies between locations with ADCs and those without
Medication Safety	• Number of medication errors related to ADC use in critical care wards before and after profile mode implementation *(Note: Profile mode is a feature of ADCs whereby medications can only be removed by nurses after the order has been reviewed electronically by pharmacy)*

iii) Evaluation of ADC Usage

To evaluate the hospital's practice of using ADCs, a multi-disciplinary self-assessment was done, guided by the Institute for Safe Medication Practices (ISMP) 2009 Medication Safety Self Assessment® for Automated Dispensing Cabinets.

RESULTS

Operational Efficiency

- 70% of inpatient prescriptions had medications fully available in the ADCs.
- **45% reduction in turnaround time for medication supply** for wards with ADCs compared to wards without.

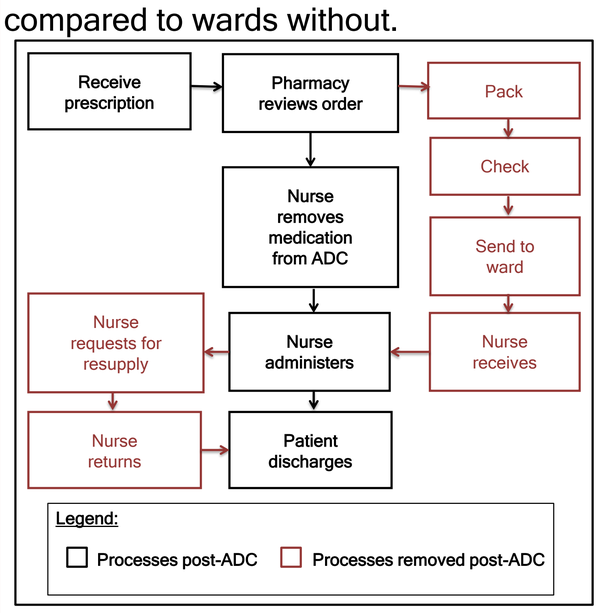

Figure 3: Process re-designed with ADC implementation

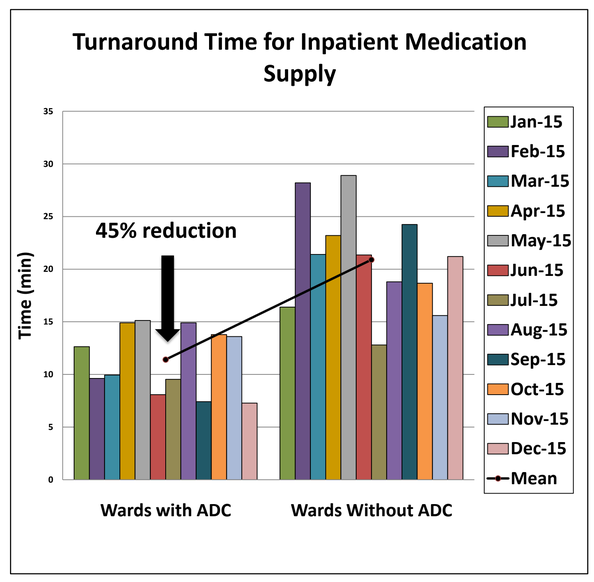

Figure 4: Turnaround time for inpatient medication supply to wards

Productivity

- **Nurse savings of 21 hours per week** on managing resupplies and ward stocks.
- **Pharmacy savings of 53 hours per week** on processing medication resupplies.
- Pharmacy Full Time Equivalent (FTE) savings: **6 FTE (MYR 280,800 per year)**.

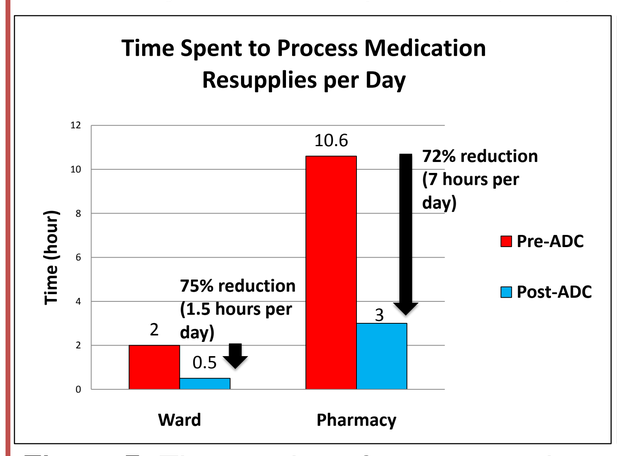

Figure 5: Time savings from processing medication resupplies

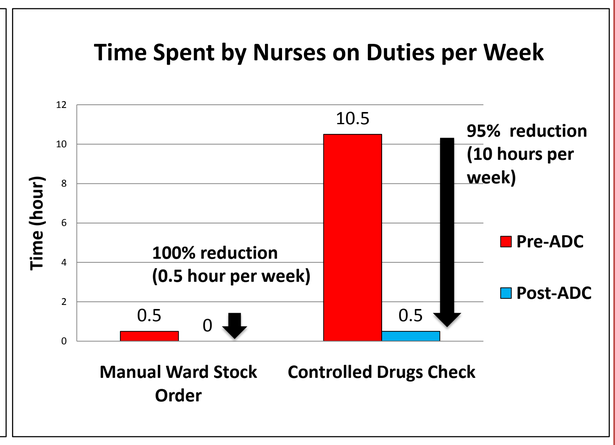

Figure 6: Time savings for nurses from inventory management

Inventory Control and Medication Security

- **93% less inventory discrepancies** in wards with ADCs compared to those without.
- Improved security via fingerprint access with full audit trail traceability.

Medication Safety

The use of profile mode in ADCs, where medication orders are reviewed by pharmacy prior to medication removal, has **reduced the number of medication errors related to ADC usage in critical care wards by 71%**.

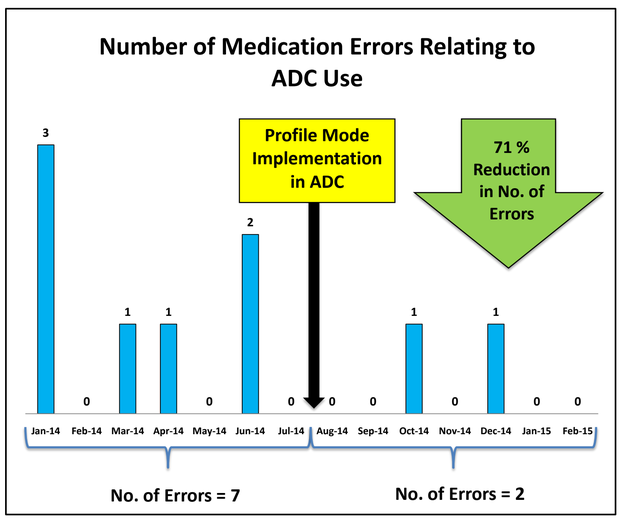

Figure 7: Medication error analysis in critical care wards before and after profile mode implementation in ADC

Evaluation of ADC Usage

Using the ISMP Medication Safety Self Assessment® for ADC (2009), **the hospital's score on safe use of ADCs (82%)** was comparable to aggregate scores from other respondent hospitals of similar bed size (79%).
However, limitations exist as there could be variations in interpretation of criteria and different organizational settings. Scores obtained are relative and not meant for direct comparison of usage.

CONCLUSION

- Implementation of ADCs has automated the distribution and management of medications in this hospital, resulting in various benefits ranging from medication safety to process efficiency.
- The improved productivity enabled pharmacy and nursing staff to spend more time on clinical care of patients.
- This augurs well as the hospital embarks on the journey to eventually achieve a closed loop medication management system to improve patient safety.

REFERENCE

© Institute for Safe Medication Practices (2009). ISMP Medication Safety Self Assessment® for Automated Dispensing Cabinets (ADC). Retrieved from http://www.ismp.org/selfassessments/ADC/Login.asp

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