

Evaluation of the Impact of Implementing Automated Dispensing Cabinet System on Drug Administration Process: A retrospective study from a single medical center in Taiwan

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**ISQUA2023
-ABS-2250**

INTRODUCTION

- Automated dispensing cabinets (ADC) have been widely implemented in hospitals around the world. Such closed-loop medication management has shown to save time, prevent manual errors and improve efficiency in drug administration.
- However, importing such new technology and processes may lead to poor workflow, causing conflicts between different healthcare departments. Therefore, we conducted a retrospective study to evaluate the current use of the ADC system in our hospital, in order to optimize operation procedure, balance workloads and to enhance patients' safety.

METHOD

- Both clinical data and questionnaires were used to evaluate the safety, efficacy and time spent on dispensing medications in 4 wards implemented ADC system including ward 8A, 1-ICU, 2-ICU and 3-ICU.
- Data were collected from September 2021 to November 2022, including drug preparation time, delivery time, and the time spent on dealing with drugs returned from wards to pharmacy.
- Any error recorded in the adverse event reporting system (AERS) both before and after ADC implement was also evaluated.
- The questionnaire comprised seven domains, which were assessed using open-ended questions and 5-point Likert scale questions. Reliability was assessed using Cronbach's alpha coefficient, which was 0.91.

RESULTS

- The ADC system showed coverage of urgency medical prescription close to 85.7% in 8A ward, which is the highest, followed by 2-ICU (65.4%), 1-ICU (51.9%) and 3-ICU (48%). The injection drug proportions in ADC systems are 70.9%, 76.6%, 65%, and 68.1%, respectively.
- With a monthly total of 1569 STAT orders (an average of 78.45 orders per day), ADC system has significantly reduced the time for medication preparation, including medication wait times and time spent in the medication retrieval process, as well as decreased the time spent by pharmacists in checking medication carts.

Table 1: The time spent in checking medications carts before and after implementation of ADC system.

		Before Implementation	After Implementation	Time Saved	P-value
8A	Weekdays	42.05	19.50	22.55	< 0.001
	Weekend	64.18	40.00	24.18	< 0.001
2-ICU	Weekdays	40.97	34.88	6.09	0.095
	Weekend	59.17	39.50	19.67	0.008

- The medication error reported in AERS decreases from 0.00034% to 0.00024% after the implementation of ADC system.
- The proportions of medicines administered within 60 minutes in the three intensive care units decreased significantly after the ADC system was implemented. For an example, the proportions of medicines administered within 60 minutes in 2-ICU and 3-ICU decrease 16.57% and 33.61%, while proportions of medicines administered within 10 minutes increases to 1.29% and 13.74%.

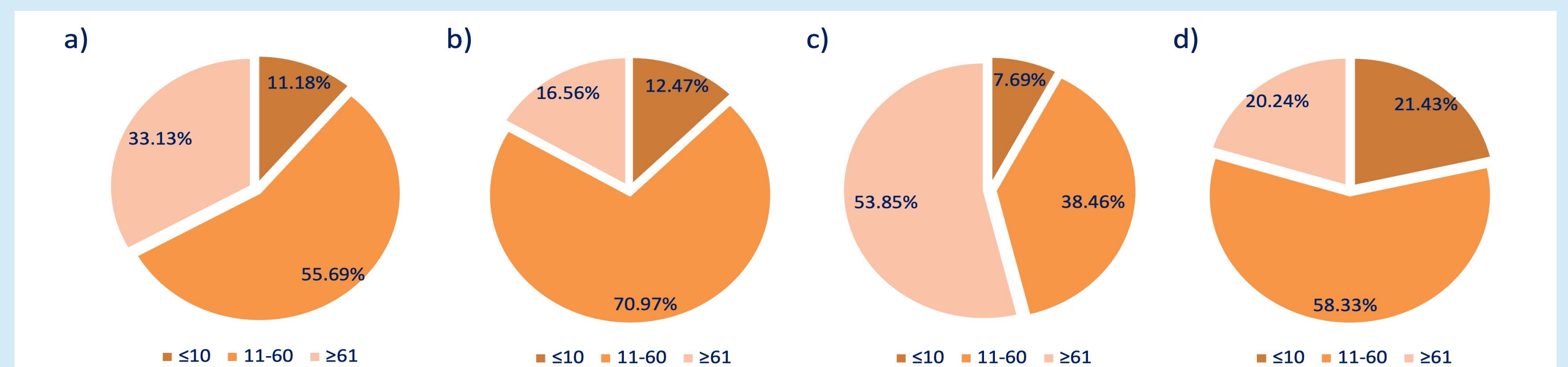


Figure 1: The proportions of medicines administered in (a) 2-ICU before ADC implementation (b) 2-ICU after ADC implementation (c) 3-ICU before ADC implementation (d) 3-ICU after ADC implementation

- The overall mean score of the questionnaire administered to nurses was 3.97 with overall Cronbach's $\alpha = 0.91$. Nurses were mostly satisfied with the implementation of ADC system. However, 5% of the nurses reported that screening medications process and drug storage in ADC should be further discuss to optimize the flow of ADC system.

CONCLUSIONS

The implementation of ADC system in the inpatient wards improved timely administration of medications, with lesser delivery and waiting time. Though pharmacists increase time to replenish medicines, time spent in checking, dispensing and withdrawing reduces as well. In general, most nurses were supportive with the implementation of the ADC. It is acknowledged that comprehensive education and training are important and necessary when implementing the ADC system in the future.

REFERENCES

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