

Establishing an Inpatient Online Prescription Closed-Loop Management System to Enhance Medication Safety and Efficiency

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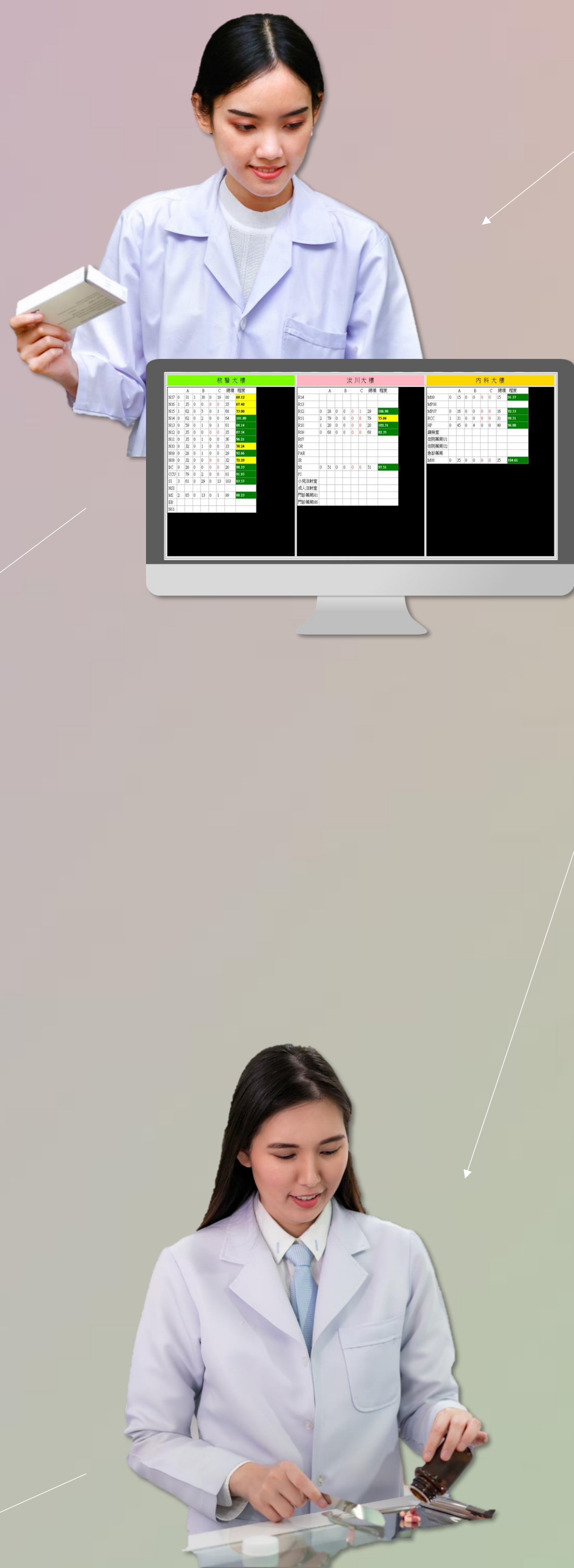
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Introduction

After experiencing the pandemic, a medical center with a total of 1,140 beds faced challenges of insufficient medical manpower. In order to enhance the timeliness and safety of medication administration for inpatients, a closed-loop control approach was adopted. The center systematically reviewed processes and identified areas where improvements were needed. Innovative systems were designed to strengthen and enhance these weaker areas, aiming to achieve the dual goals of smart healthcare and patient medication safety.

Methods

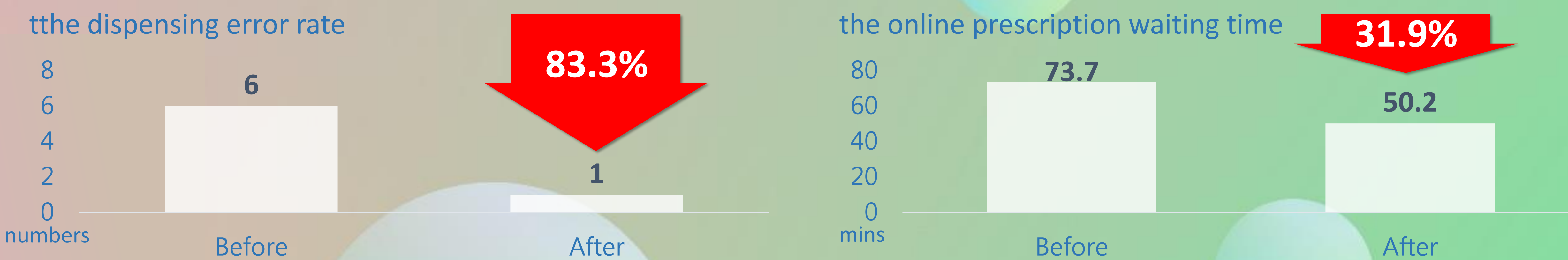
Using the HFMEA method to identify risk points in the process, a cross-team QCC quality control circle was formed for improvement, combined with human factors engineering mode as follows: (1) Installing Automated Dispensing Cabinets (ADC) at each nursing station, a total of 31, and developing a centralized control system for the ADC dashboard to provide pharmacists and nurses with flexible control over medication status. (2) To strengthen the correctness of medication retrieval after using ADC, independently developing medication image recognition technology to instantly match physician orders with medication. (3) Apart from medication retrieval using ADC, improving the manual process of prescription deduction, establishing an intelligent guide transmission cabinet, and integrating with the transmission system for real-time control of the entire process.



Results

Based on the analysis conducted from November 2022 to January 2023 (pre-improvement) and from November 2023 to January 2024 (post-improvement):

(1) Regarding the dispensing error rate, by utilizing ADC to control error-prone medications, the error rate decreased from 6 instances pre-improvement to 1 instance post-improvement, resulting in an improvement rate of 83.3%. (2) For the online prescription waiting time: pre-improvement, the average waiting time was 73.7 minutes, which reduced to 50.2 minutes post-improvement, achieving a 31.9% improvement rate. (3) In terms of the efficiency of the new system, the medication identification accuracy reached 99.5%. The intelligent transmission cabinet assisted in streamlining the transmission process, reducing the steps from 9 to 4, thereby improving time efficiency by 96.7%.



Conclusions

Through data analysis, we've discovered that optimizing the system can enhance the safety of medication administration, thus effectively leveraging the efficiency of smart healthcare hardware. In the era of smart healthcare, pharmacists play a crucial professional role. Apart from utilizing smart devices such as ADC, it's also necessary to introduce a safety closed-loop management mechanism to achieve the goal of improving medication safety and effectiveness.

Keywords

Closed-Loop , Medication Image Recognition , Intelligent Cabinet