

# Vending machine for Centralised cupboard (CC) medical items and IT Accessories

Peng Yuan, Baolei Yang, Seol Ling Cheng, Rashina Rivera Campos

Institute of Mental Health

## BACKGROUND

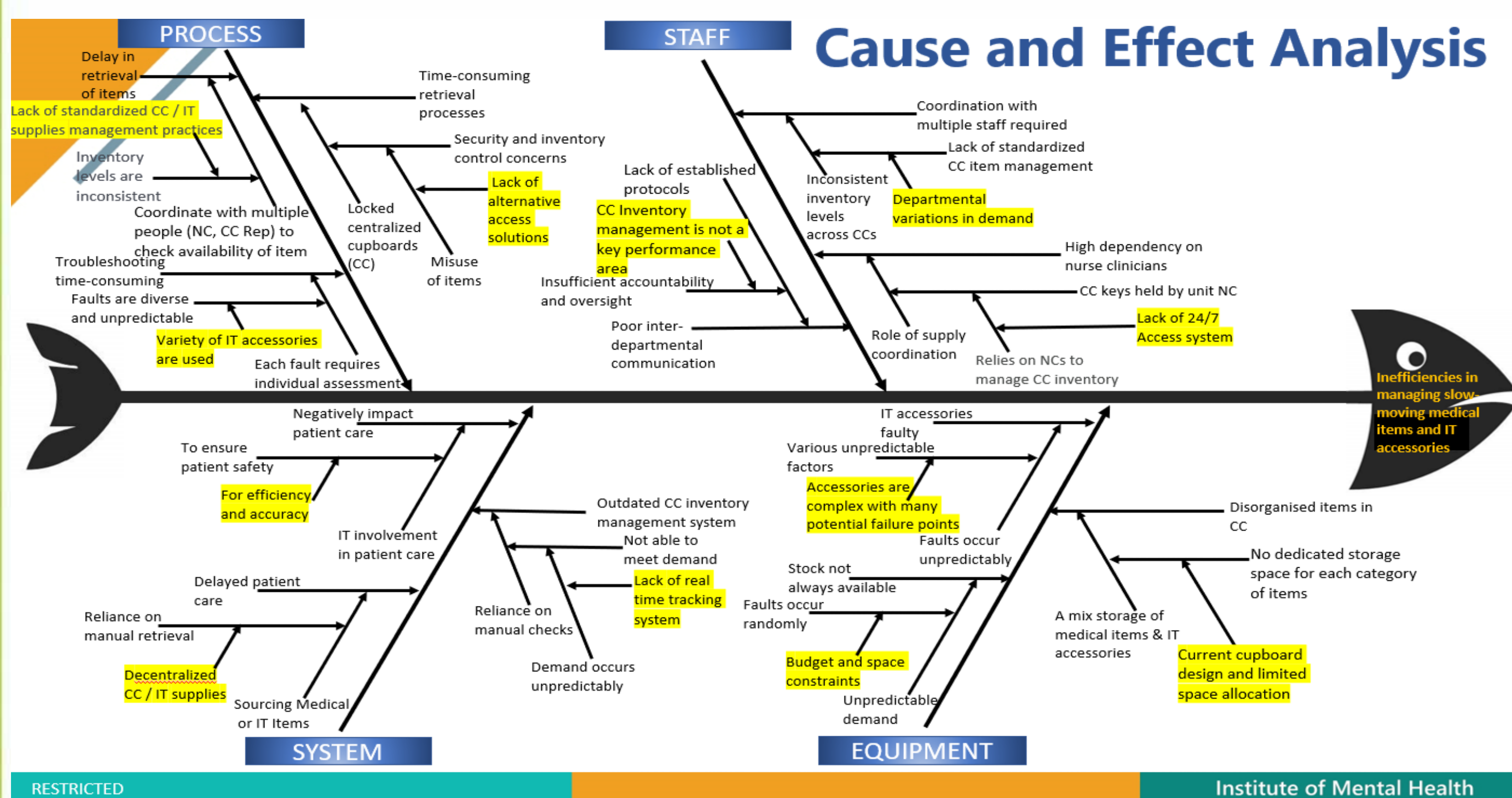
Previously, nurses contacted the ITD helpline for essential IT accessories like mouse, keyboards, and barcode scanners, crucial for patient identification in critical procedures such as medication serving, blood collection, and ECG taking. They also needed to contact block unit supervisors to obtain medical consumables from centralised cupboards (CC) in each block's storeroom. This decentralised system led to time-consuming retrieval processes and inconsistent inventory levels. The implementation of the Next Generation Electronic Medical Record (NGEMR) system further heightened the importance of IT accessories for patient identity verification and medication safety.

## AIMS

This project aims to address inefficiencies in managing medical supplies and IT accessories at IMH by using a customised vending machine system with user-friendly interfaces and cloud-based inventory tracking. The system will be complemented by a mobile application for usage monitoring and stock alerts. The primary objectives are to provide 24/7 access to essential supplies, centralise inventory management, and automate stock tracking. By achieving these aims, the project seeks to streamline supply management processes, reduce waste, and ensure timely availability of critical items for staff at IMH.

## ROOT CAUSES

To visualise and structure our findings, the team utilised a fishbone diagram and pareto chart, which revealed root causes such as lack of a 24/7 access system, decentralised CC/IT supplies and absence of a real-time tracking system.



## RESULTS

The innovation has been adopted within the Institute of Mental Health, over a period of 28 months from March 2022 to July 2024, with full implementation across IMH on 22 July 2024. The two vending machines are strategically located between Block 2 to Block 3 and at Block 5, accessible to nursing staff from 49 wards, 7 outpatient clinics, 3 special services departments, and 3 community nursing teams.

### 1. Measurement of Improvement

Metric	Pre-Implementation	Post-Implementation	Improvement
NC time checking CC (hours/year)	94	0	100% reduction
Nurse time retrieving from CC (hours/year)	188	0	100% reduction
Cost for replenishment service (\$/year)	2,880	0	100% reduction
Total time saved (hours/year)	-	282	282 hours gained
Emergency trolley issues (cases/year)	21	2*	90.5% reduction

### 2. Survey Results

The post-live survey for the Nursing Medical Consumables and IT Accessories Vending Machine received 156 responses. Overall satisfaction with the vending machine system was rated at an average of 4.20 out of 5. Nearly half (56.4%) were satisfied, and 31.4% were very satisfied, while very few respondents expressed dissatisfaction.

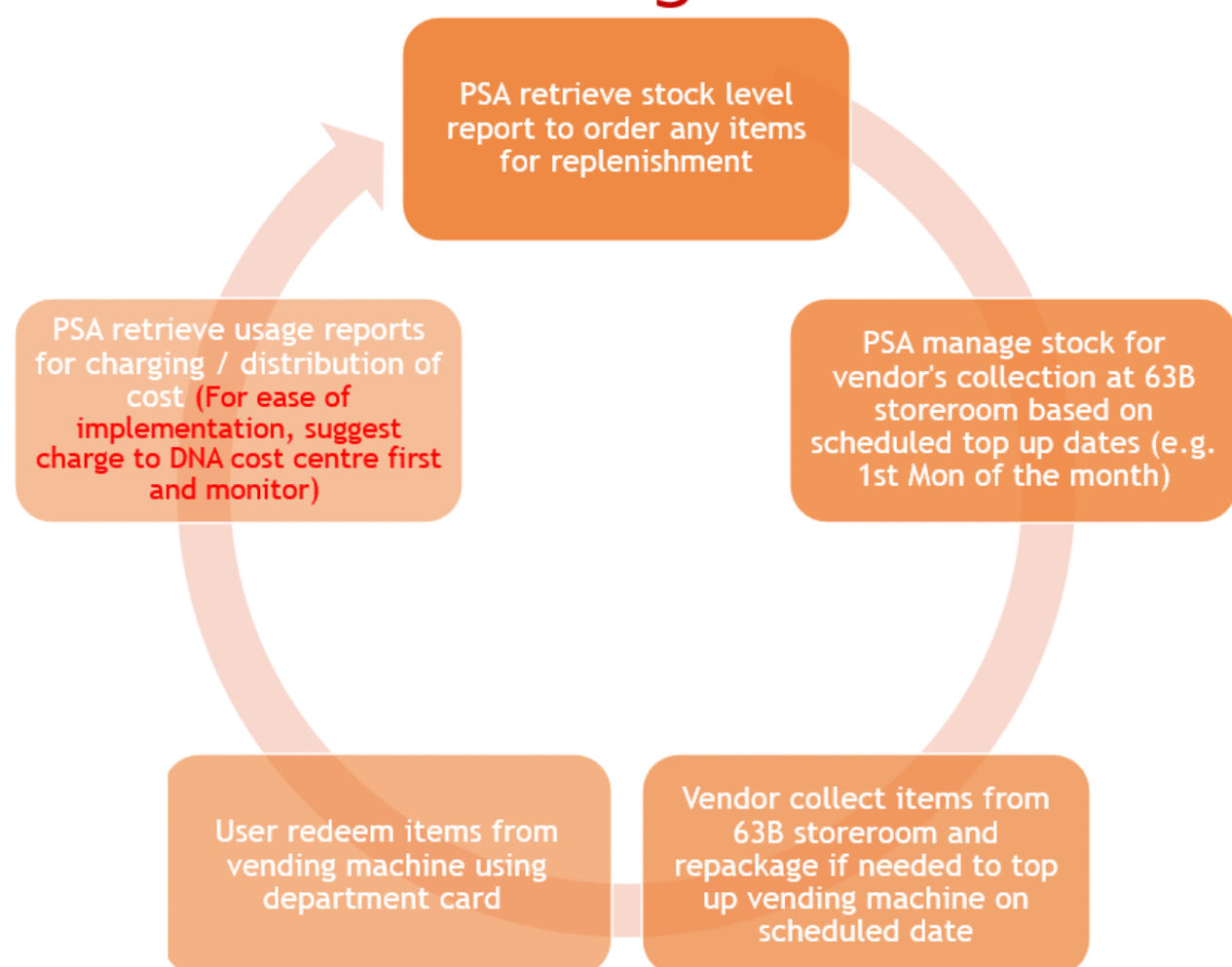
Aspect Evaluated	Average Score (out of 5)	Key Findings
Ease of Use	4.11	<ul style="list-style-type: none"> <li>51.1% found it "Easy"</li> <li>28.6% found it "Very Easy"</li> <li>Small percentage found it difficult</li> </ul>
Time Efficiency	3.9	<ul style="list-style-type: none"> <li>51.1% found it moderately faster</li> <li>26.1% found it significantly faster</li> <li>7.1% indicated no time saved</li> </ul>
Work Improvement	4.1	<ul style="list-style-type: none"> <li>81.1% agreed it had a positive impact</li> <li>13.9% remained neutral</li> </ul>
Overall Satisfaction	4.2	<ul style="list-style-type: none"> <li>56.4% were satisfied</li> <li>31.4% were very satisfied</li> <li>Very few expressed dissatisfaction</li> </ul>

## EFFECTS OF CHANGES

1. Customized vending machines replaced centralized cupboards for medical items, emergency supplies, and IT accessories, providing 24/7 access to supplies and streamlining the inventory management process.
2. The new system reduced time-consuming retrieval processes, improved inventory consistency, and decreased equipment replacement delays.
3. Patients benefited from timely access to equipment, enhanced safety through reduced treatment delays, and increased staff satisfaction allowing more focus on direct patient care.
4. Staff resistance was addressed through targeted training and ongoing support. Comprehensive training needs were met with regular sessions, and open feedback channels fostered effective communication.

## Vending Machine SOLUTION

### Workflow of Vending Machine



### Vending Machine Configurations

Item	Wireless Keyboard and Mouse	Wireless Scanner	Wireless Barcode and Hand Scanner
Block 1	Picture	Picture	Picture
Block 2	Picture	Picture	Picture
Block 3	Picture	Picture	Picture
Block 4	Picture	Picture	Picture
Block 5	Picture	Picture	Picture

### Vending Machine Configurations

Item	Langenshaw Pen (Box 1)	Langenshaw Pen (Box 2)	Langenshaw Pen (Box 3)	Yankee Sutures Tray
Block 1	Picture	Picture	Picture	Picture
Block 2	Picture	Picture	Picture	Picture
Block 3	Picture	Picture	Picture	Picture
Block 4	Picture	Picture	Picture	Picture
Block 5	Picture	Picture	Picture	Picture

## END USER EXPERIENCE

To ensure a smooth transition and widespread adoption, a comprehensive change management strategy and communication effort was deployed. Feedback mechanisms were established to continuously improve the system, including regular feedback platforms for users to report issues or suggest improvements, and monthly user experience surveys. Robust support systems were put in place, featuring a dedicated hotline during office hours, online support for post-office hours, and user manuals strategically placed in the teams group chat.

## LEARNING POINTS AND FUTURE PLAN

Based on the lessons learned from this project, several key insights have emerged regarding the implementation of change. Early stakeholder engagement proved crucial for enhancing the solution's relevance and effectiveness, with stakeholder insights and feedback significantly improving the project outcome. Comprehensive training was essential for staff comfort with new technologies, helping to mitigate resistance to change in the healthcare setting. Regular feedback mechanisms allowed for continuous system improvement, enabling adjustments based on real user experiences and challenges. If starting over, we would have conducted more extensive testing with the vendor before full-scale implementation.

The system's continuous enhancement involves expanding the vending machine's capabilities by incorporating additional locker modules. This expansion is in response to growing demands for a wider range of items, including specialised medical tools such as pill crushers and earpieces.