Perceived Perception of Efficacy with Automated Medication Dispensing Systems in Outpatient Pharmacy setting

PROJECT #788

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BACKGROUND [1-5]

Automation and robotics in healthcare, particularly within pharmacy settings, aim to address several key objectives, including the reduction of medication errors, enhancement of the efficiency in the medication dispensing process, and enabling real-time monitoring of medication usage. However, alongside these aims, there exist notable drawbacks such as safety concerns, technology-related issues, and hesitancy from both staff and patients. Previous research has predominantly focused on the implementation of automation in inpatient pharmacy settings, where it has been associated with notable benefits including a smoother workflow, improved customer satisfaction, decreased workload for staff, and an overall enhanced reputation for the facility.

Despite these advancements, there remains a significant knowledge gap regarding the implementation and effects of automated medication dispensing systems in outpatient or community pharmacy settings. Therefore, our study seeks to address this gap by exploring the effects of an automated medication dispensing system, specifically the iLocalBox, within the outpatient Advanced Health Sciences Pavilion (AHSP) Pharmacy of Cedars Sinai Medical Center(CSMC). Through this investigation, we aim to gain insights into the potential benefits, challenges, and implications of implementing such systems in community pharmacy environments.

Research Objective

1. Determine the effect of automated medication dispensing system on medication dispensing time and workflow **efficiency** in a pharmacy setting
2. Investigate the **satisfaction** of pharmacy staff and patients with automated medication dispensing systems
3. Analyze the **accuracy and reliability** of automated medication dispensing systems in comparison to manual medication dispensing processes
4. Examine the **potential drawbacks** associated with automated medication dispensing systems and develop strategies to mitigate them

METHODS

The study focuses on patients and staff of CSMC utilizing the iLocalBox medication dispensing system at the AHSP Pharmacy. Data collection via an online survey forum spanned from January 2024 to March 2024. Inclusion criteria involved all current AHSP staff and all patients who have used the iLocalBox and traditional window pickup.

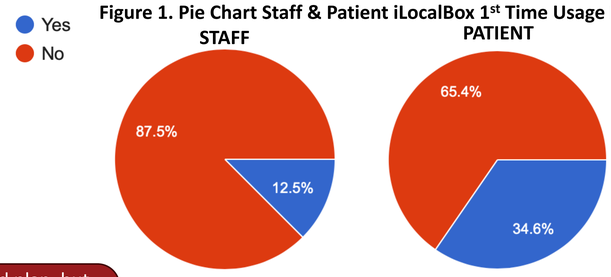
Data collection utilized an online anonymous survey where links were distributed via text message, as well as QR codes on patients' medication bags. Both the patient and staff surveys comprised of 5/6 questions based on a Likert scale and aimed to assess perception of efficiency, following the implementation of the iLocalBox. Patient questions addressed: ease of use, accuracy, problem free, speed/convenience, good alternative(compared to window pickup). Staff questions addressed: efficiency, accuracy, need for assistance, speed/convenience, good alternative(compared to window pickup) and training.

Statistical analysis was performed on the frequency distribution data via a Chi-Squared Test ($p \leq 0.05$).

RESULTS

Was this your first time using the iLocalBox? (If you have NEVER used the iLocalBox, please do not complete the survey!)

Figure 1. Pie Chart Staff & Patient iLocalBox 1st Time Usage Data



"Good plan, but login takes too long, touch screen delays and FSA cards decline"

"It works right when it doesn't have technical problems"

Figure 2. Staff Response: Histogram Analysis of iLocal Box Feedback (n=11)

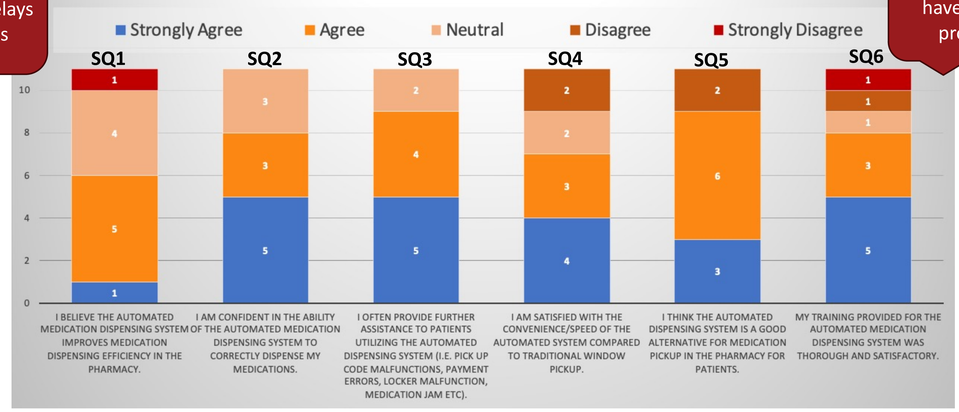


Table 1. Chi-Square Analysis: Staff Survey P-Values

	SQ1	SQ2	SQ3	SQ4	SQ5	SQ6
CHI Square	0.18	0.05	0.03	0.24	0.14	0.18

"I've been using this machine for a while and never any problems"

"I can't ask the pharmacist a medication question"

"No concern what's so ever"

"As someone with mobility issues I find it difficult to bend or squat."

"Would love a way to use this window service after hours"

Figure 3. Patient Response: Histogram Analysis of iLocal Box Feedback (n=27)

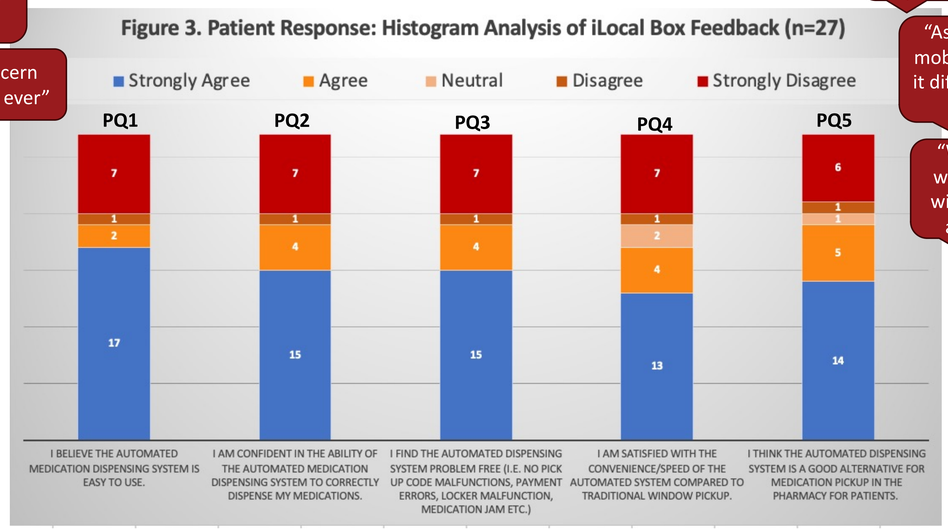


Table 2. Chi-Square Analysis: Patient Survey P-Values

	PQ1	PQ2	PQ3	PQ4	PQ5
CHI Square	0.03	0.03	0.03	0.07	0.02

DISCUSSION/ CONCLUSION

A chi-square analysis ($p \leq 0.05$) was performed on 11 staff and 27 patient surveys regarding their iLocalBox experience. Among staff, 2/6 questions were significant - confidence in the system's medication dispensing, perceived need for additional patient assistance($p=0.05$, $p=0.03$, respectfully). Among patients, 4/5 questions were significant - ease of use, confidence in dispensing accuracy, perceived problem-free operation, and suitability for medication pickup ($p=0.03$, $p=0.03$, $p=0.03$, $p=0.02$, respectfully).

To conclude, staff acknowledged the accuracy of the iLocalBox but remained unconvinced about its speed/convenience nor its ability to enhance dispensing efficiency in the pharmacy. They also expressed dissatisfaction with their training and their need for frequent patient assistance. Conversely, patients found the iLocalBox system easy to use, accurate, problem-free, and a good alternative to traditional window pickup. However, patients were also unconvinced with the speed and convenience of the system. Lastly, patient feedback indicated a need for improved education on system operation, while staff comments suggest the system has potential but could benefit from resolution of technical issues. Larger studies are warranted to validate these results and explore broader application in outpatient settings.

LIMITATIONS / CHALLENGES

- Limited response range as Likert scales typically have a finite number of response options, and may not capture the full complexity of respondents' opinions or attitudes
- Possible response bias including; Selection bias, Social desirability bias, Acquiescence bias, Extreme response bias
- Limited qualitative information as Likert scales provide quantitative data, but they do not fully capture attitudes or opinions
- Inability to measure change over time as Likert scales are less suitable for capturing changes in attitudes or opinions over time
- New medication pickups require consultations prior to pickup in the iLocalBox
- Management changes in study location delayed data collection, administration approval and distribution of survey link via messaging platform
- Patients chose not to respond to survey via text link as they associated message as spam

REFRERENCES

1.Zheng WY, Lichtner V, Van Dort BA, Baysari MT. The impact of introducing automated dispensing cabinets, barcode medication administration, and closed-loop electronic medication management systems on work processes and safety of controlled medications in hospitals: A systematic review. Res Social Adm Pharm. 2021;17(5):832-841. doi:10.1016/j.sapharm.2020.08.001

2.Do automated dispensing machines improve patient safety?. Can J Hosp Pharm. 2009;62(6):516-519. doi:10.4212/cjhp.v62i6.852

3.Cheung KC, van den Bemt PMLA, Bouvy ML, Wensing M, De Smet PAGM (2014) Medication Incidents Related to Automated Dose Dispensing in Community Pharmacies and Hospitals - A Reporting System Study. PLOS ONE 9(7): e101686. https://doi.org/10.1371/journal.pone.0101686

4.Batson S, Herranz A, Rohrbach N, Canobbio M, Mitchell SA, Bonnabry P. Automation of in-hospital pharmacy dispensing: a systematic review. Eur J Hosp Pharm. 2021;28(2):58-64. doi:10.1136/ejhpharm-2019-002081

5. Alam S, Osama M, Iqbal F, Sawar I. Reducing pharmacy patient waiting time. *Int J Health Care Qual Assur*. 2018;31(7):834-844. doi:10.1108/IJHCQA-08-2017-0144

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