E-BOOK OF EXTENDED ABSTRACT
THE 14TH INTERNATIONAL INVENTION, INNOVATION & DESIGN COMPETITION 2025

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SPIREX: SPUB INDENT UBAT EXPRESS

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ABSTRACT

Sistem Pendispesan Ubat Bersepadu (SPUB) is an initiative aimed at ensuring uninterrupted medication supply to patients. It is especially favored by patients receiving treatment at specialist hospitals in Kedah, such as Hospital Sultanah Bahiyah and Hospital Sultan Abdul Halim. SPUB allows patients to collect follow-up medications from nearby district hospitals or health clinics, promoting accessibility and continuity of care. However, due to the absence of a Pharmacy Information System (PhIS) at these major hospitals, the medication indent process is inefficiently handled manually using Microsoft Office tools and email. To overcome these, a digital solution called SPIREX was developed using Google Sheets and JavaScript. This tool automates the indent process between referring and receiving facilities, allowing users to generate complete, accurate indent forms that include patient information and current stock levels. These forms are sent automatically via email in PDF format to ensure data safety, timeliness, efficiency, and accuracy. Before SPIREX, issues such as low data security, time-consuming processes, and frequent medication errors resulted in poor satisfaction among patients and pharmacy staff. Data showed that only 55% of patients received complete prescriptions, and 40% did not obtain medications on time. After implementation, patient satisfaction increased from 65% to 89%, staff satisfaction rose from 60% to 85%, and medication fulfillment and timeliness improved to 90% and 92% respectively. The average time to manage SPUB orders decreased from 3 hours 40 minutes to just 1 hour. SPIREX has since been replicated in 12 health clinics and 1 hospital across Kedah, with no additional cost.

Keywords: SPUB, SPIREX, medication dispensing, pharmacy automation, patient satisfaction.

1. INTRODUCTION

Sistem Pendispesan Ubat Bersepadu (SPUB) plays a vital role in ensuring patients continue receiving their medications seamlessly, particularly those referred from major specialist hospitals. Despite its advantages, manual processes due to the absence of PhIS have hampered efficiency. The need for an automated, secure, and scalable solution was evident, prompting the development of SPIREX.

2. METHODOLOGY

2.1 Creative Problem-Solving Strategy

The 'Design Thinking' methodology was employed as the overarching strategy and tool for problem resolution. A Gantt chart, incorporating 'Design Thinking' elements, was developed to structure the team's workflow. The 'Empathy' and 'Define' phases were operationalised through surveys conducted among patients at Pejabat Kesihatan Daerah Yan (PKD Yan) and Pejabat Kesihatan Daerah Kubang Pasu (PKD Kubang Pasu) to assess and improve patient satisfaction with pharmacy services, specifically SPUB. Feedback was also gathered from pharmacy staff managing SPUB services at PKD Yan and PKD Kubang Pasu to evaluate job satisfaction, workload, and work-life balance. Consequently, a database was created using 'Google Sheets' to automate the SPUB workflow as a solution.

2.2 Prototype Development and Testing

In the 'Ideate' phase of Design Thinking, brainstorming was used to generate ideas for Prototype 1. The concepts of 'Easy,' 'Attractive,' and 'Radical' guided idea selection. This was followed by the 'Prototype' and 'Testing' phases. Prototype 1 involved the development of a database using Google Sheets where users record patient names, medication lists, and prescription expiry dates. Automated generation of medication order lists helped facilitate stock checks and order submissions to referring facilities. This version was tested at Klinik Kesihatan Guar Chempedak and Klinik Kesihatan Sungai Limau Dalam, with user acceptance testing conducted to evaluate functionality and usability.

Based on feedback from the initial user acceptance test, Prototype 1 was refined using wireframe feedback to identify areas for improvement. Prototype 2 was then developed through iterative prototyping and testing, again using brainstorming and the 'Easy, Attractive, and Radical' principles to guide idea generation. SPIREX (SPUB Inden Rx Ekspress) in its second iteration included individual Google Sheets for each user, featuring sheets for a dashboard, R1 transcription, medication history, indent form, monthly report, and settings. Prototype 2 was tested at Klinik Kesihatan Sungai Limau Dalam, Klinik Kesihatan Guar Chempedak, Klinik Kesihatan Changlun, and Klinik Kesihatan Kodiang, followed by second round of user acceptance testing.

2.3 Official Approval

The project received approval from the Kedah State Pharmacy Services Division and support from Pegawai Kesihatan Daerah Yan and Pegawai Kesihatan Daerah Kubang Pasu, as well as the Director of Pendang Hospital. Approval was also granted by the ICT units of the PKD Yan and PKD Kubang Pasu.

2.4 Innovation Implementation

The proposed solution was presented to pharmacy officers at the PKD Yan and PKD Kubang Pasu and the Kedah State Pharmacy Services Division. Support letters for system implementation were obtained from participating clinics. Training and practical sessions were conducted for pharmacy staff involved in SPUB medication management.

3. FINDINGS

To evaluate the effectiveness of the SPIREX system, several key performance indicators were measured before and after its implementation. Table 1 summarises the key findings of the project.

Table 1 Key Findings

Outcome Category	Metric	Before SPIREX	After SPIREX	Target
Patient Satisfaction	Patient satisfaction with SPUB services	65%	89%	>85%
Staff Satisfaction	Staff satisfaction with SPUB management system	60%	85%	>85%
Medication Availability	Percentage of patients receiving sufficient medication per prescription	55%	90%	N/A
Timeliness of Medication Delivery	Percentage of patients receiving medication on the designated date	71%	92%	N/A
Process Efficiency	Time spent on SPUB medication management	3 hours 40 minutes	1 hour	<3 hours

The study also revealed several additional findings on the impact of SPIREX. SPIREX use is associated with improved medication adherence among patients. The system contributes to a reduction in patient complaints regarding SPUB services and facilitates the integration of innovation and technology into daily pharmacy workflows. It enhances pharmacy service delivery and aligns with the vision and mission of the Pharmacy Service Program and the Kedah State Health Department. SPIREX also contributes to improved staff productivity and potentially enhances staff mental health and work-life

balance. Notably, there was a decrease in patient complaints, from 33 before SPIREX to 5 after implementation.
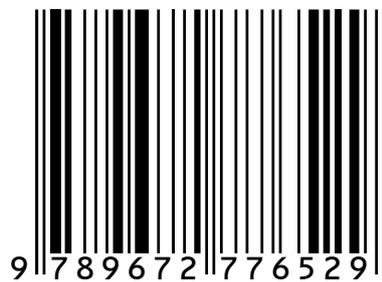
4. CONCLUSION

SPIREX has proven to be an effective solution in automating and enhancing SPUB medication ordering processes. Developed using a widely accessible and user-friendly platform, it not only improved service delivery but also reduced processing time significantly without incurring additional costs. It has positively impacted the satisfaction levels of both patients and pharmacy staff.

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