Feasibility of Redcap database for monitoring of e-kits' expiry and location in NUH

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Introduction

At the National University Hospital (NUH), medications used to manage life-threatening conditions are kept in a toolbox and are known as "emergency-kit" (e-kit). These e-kits are sealed with generic plastic locks and are found in every ward. Once opened, these e-kits would then be brought back to the pharmacy to be exchanged.

Previously, there was no system in place for tracking the location of these e-kits. The expiry dates of drugs kept in the e-kit were manually written on a sheet of paper attached to it and required manual updates by nurses and pharmacists when doing expiry checks.

We were not able to identify e-kits which contain drugs with shorter expiry dates once they were issued by the pharmacy.

Between March and June 2019, there were three incidents of expired drugs being found in e-kits. Thus, we needed to set up a system where we can track the expiry dates of drugs within the e-kits and their locations. This would allow efficient recalls of e-kits containing drugs with shorter expiry dates. Ultimately, this facilitates the process of re-channelling drugs with shorter expiry dates to areas of higher usage and minimising overall hospital drug wastages.

The Redcap system, an institutional research electronic database mainly used to collect research data, was used to capture the relevant e-kit information that we needed to track as it is a reliable password-protected database easily accessible by NUH staff.
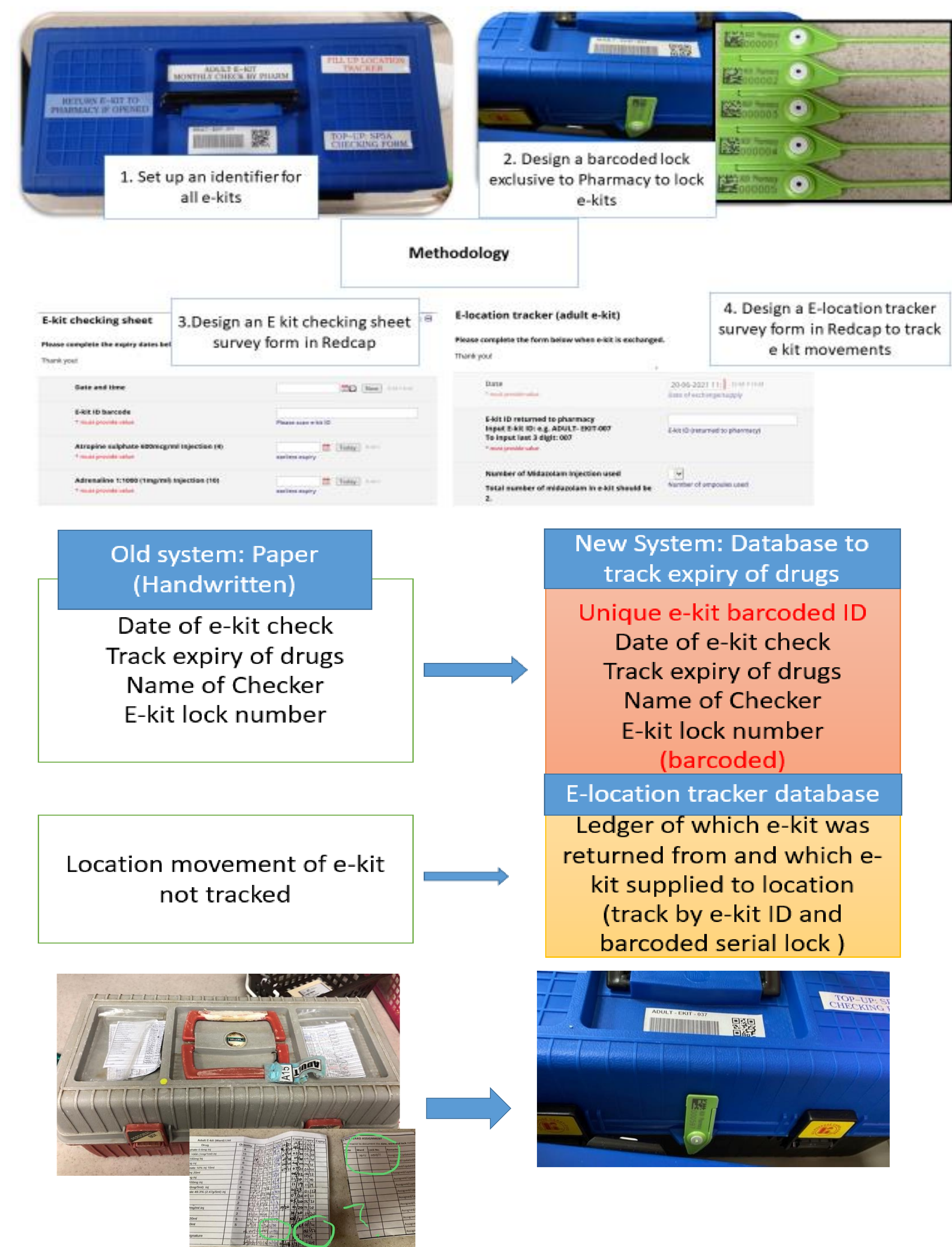
Aim

1. To convert the manual task of tracking short-expiry drugs stored in e-kits located at various parts of the hospital into a system-directed process, by storing the relevant information in an electronic database with real-time function
2. To minimise drug wastage by allowing timely channelling and rotation of slow-moving drug stocks

Methodology

A workgroup consisting of 3 polytechnic students and 1 pharmacist was formed in 2019. Root-cause analyses were performed to ensure conformance to e-kit management by pharmacists.

No.	Root Cause	System recommendation(s)
1	Medications nearing expiry dates in e-kits were not recycled before expiry	- To introduce an electronic database that tracks medications' expiry date. This is to facilitate timely medications exchange to improve safety and reduce wastage - To form an administrative team which actively manages the database and due actions e.g. prompting medications exchange by respective ward pharmacists, preparing medications for exchange and channelling short-expiry medications to be utilised in time
2	Expired medications in e-kits were undetected despite weekly expiry date checks	- To introduce an electronic form which captures the person and time of the expiry date checks to enhance vigilance
3	Due to lack of documentation and ease of access, e-kits were often freely tampered with	- To provide a unique identifier and lock for each e-kit - To create an electronic database that tracks the movement of each e-kit and its corresponding time/place/person to increase accountability

Two e-learning guides were subsequently provided in the NUH e-learning portal to train all pharmacists on the e-kit workflows. For the administrative team, the Inpatient Adult e-kit Tracking and Revamping Guide was also created to standardize the formation of future new e-kit.

1. Set up an identifier for all e-kits
2. Design a barcoded lock exclusive to Pharmacy to lock e-kits
3. Design an E kit checking sheet survey form in Redcap
4. Design a E-location tracker survey form in Redcap to track e kit movements

Methodology

Old system: Paper (Handwritten)	New System: Database to track expiry of drugs
Date of e-kit check Track expiry of drugs Name of Checker E-kit lock number	Unique e-kit barcoded ID Date of e-kit check Track expiry of drugs Name of Checker E-kit lock number (barcoded)
Location movement of e-kit not tracked	E-location tracker database Ledger of which e-kit was returned from and which e-kit supplied to location (track by e-kit ID and barcoded serial lock)

Results

With the introduction of the new e-kit monitoring system from August 2019, expired drugs were no longer found in any of the 131 e-kits. This translates to an estimated of $16,022.42 cost avoidance resulting from drug wastage due to expired drugs. With the success of this system, it was further implemented to the paediatric, neonate and pre-eclampsia e-kits in the hospital.

This remote monitoring system also reduces the need for ward pharmacists' hands-on checking of the e-kits drugs from 6 times per year to 4 times per year. With the new system, nurses are no longer required to perform weekly e-kit expiry checks. This results in an annual savings of 570 hours in nursing time per year.

Conclusion

The use of Redcap database to monitor expiry of all e-kit drugs and location of e-kit has proven to be efficacious. It reduced drug wastage due to expired drugs and also cut down on the time taken by nurses and pharmacists to perform expiry checks.