Streamline Inpatient Medication Supplies and Providing a Safe Medication Administration Process

Singapore Healthcare Management 2014

NUH National University Hospital

Ms Hooi Pik Yee, National University Hospital
Ms Tai Sook Ping, National University Hospital
Ms Stacy Leong, National University Hospital

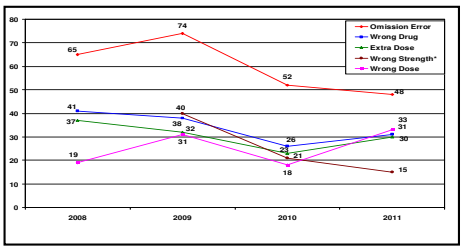
BACKGROUND

Medication errors were frequent causes of adverse events. 65% of total medication errors were omission errors (Figure 1). There was an average of 2129 (33%) medication omissions per month.

The first time quality (FTQ) of medications available for patients all the time was 88.7%. The unavailability of medications during the medication round caused delays and omissions in the administration of medications on patients.

Pharmacists and Nurses had to find workaround solution each time they encountered delays in supplies. Ward staff would reorder medicine from Pharmacy if medicines have not reached the ward within turnaround time (TAT). After office hours, Ward staff had to reorder medicine from Emergency Department which caused longer delays.

Figure 1: Top 5 medication errors by types (source: electronic Hospital Occurrence Report)



OBJECTIVES

Streamline the inpatient medication supply process to:

1. Ensure that medications are available all the time
2. Improve turnaround time for supply and administration of medicine

Therefore, reducing omission of medication in the General Wards, Intensive Care Unit (ICU) and High Dependency Wards (HD) and improving patient safety.

METHODOLOGY

A 4.5 days Rapid Improvement Event (RIE) was conducted.

Value Stream Mapping, Identification of waste, Root Cause Analysis (Figures 2-4) and Paradigm Breaking were applied to analyze the problems.

Figure 2 Root Cause Analysis

Problem	Cause	Cause	Cause	Root Cause	Solution
Why nurses request for "resupply" unnecessarily?	• There are no medication supply at point of administration. • Nurses need to serve medication by 8am. • Too many new orders in the morning.	• Doctor rounding, ordering and changing orders at the same time as Nurses Medication Serving time in the morning.		• Nurses medication serving time coincides with Doctors' round and Pharmacy Supply time at around 8am	• Review medicine serving time • Doctors to order pre-planned medicines 1 day prior (in eMR). • Compulsory eMR training for all doctors.
Why medicine arrive in the ward but nurses are unaware of the arrival?	• They are unable to locate the medicine in the designated drawer	• Colleagues have placed the medicine in another area (such as medication trolley or in cubicle). • Too many things in the drawer • Porters may put the medicines in the wrong drawer.	• There are no standardization and visual aids. • There are too many drawers that a nurse must check in order to locate the medicine. • Drawers design and usage varies at different wards. Porters may be unfamiliar with the ward layout or practice.	• Nurses did not communicate among each other. • Nurses did not check thoroughly.	• Review the number of drawers. Keep to 3 drawers for all wards. • Provide visual label cooler codes for each drawers. • Standardize area for nurses to check (fridge and drawers only) • Standardize timing to check supply (eg. 10am or 5pm)

Figure 3 Root Cause Analysis

Problem	Cause	Cause	Cause	Root Cause	Solution
Why medication supply turnaround time is so long?	• Pharmacist, PTs and PAs print and pick in batches.	• There is no first in first out prioritization in eMR. • PTs need to attend lecture twice a month causes shortage in PT on certain days. • Discharge medicine is the 1st priority		• Giving peak period, requests are overwhelming. PA and PT do not know which request is urgent and which is routine.	• Send back PTs after lectures. • Allocate 2 supplier packers from 8-11am in Pharmacy • Coloured bags for 'STAT' drugs to help porters differentiate between urgent and non-urgent
	Porters dispatch medicines in batches.	• Porters will go to the nearest wards. • Porter did not indicate "urgent" on the file.		• There is no standard route or priority tasks for porters.	• Use pneumatic tube for supplies to the ward. • Prioritize porters' task to send the 'STAT' first. • Design a standard route for porters. • Job re-design (1 porter for supplies, 1 porter for 'Stat' med and 1 porter for return medication, discharge or billing.

Figure 4 Root Cause Analysis

Problem	Cause	Cause	Cause	Root Cause	Solution
Real Time Quality for routine medicines is not 100% at 8am (during medicine serving)	• Outstanding supply finish at 8am • Unable to complete supplying outstanding supplies to the wards on time. • Par level in Omnicell not enough • Too many requests for medication (Stat, once only)	• Nurses are unaware that they need to key in "full bottle" volume instead of "ml" • Common medicines shared among patients. • Par level in Omnicell is not being reviewed on a regular basis (6-8 months) • Doctors are not familiar with the impact of ordering STAT or Once only prescription.	• Pharmacy has limited resources to check omnicell par level regularly.	• Pharmacy to schedule par level reviews on a regular basis • Nurses to key in "full bottle" instead of "ml" • Only 50% of new doctor attend the training	• Pharmacy to review par level in Omnicell every 4 months • Educate nurses on the correct way to capture medicine taken from the Omnicell. • Educate nurses not to share medicine among patients. • Charge dose supply for STAT dose 3 days + morning dose • To standardize re-supply under "routine" dose • Compulsory training (Re-training) for doctors. Increase training hours if necessary.

Figure 5: 6S Steps

Lean tools (1 piece flow, standard work, visual management, error proofing) were also introduced to guide the team to redesign the workflow and stretch the team to think out of the box.

6S (workplace organization method) (Figure 5) was implemented in the Satellite Pharmacy to organize the work environment to facilitate a smoother flow.

To prove the improvement hypothesis, the team spent 0.5 day to run "Rapid Experiment" to test the functionality of the new workflow.

IMPLEMENTATION

2 key changes were implemented to reduce TAT for medication supplies.

1. A standard workflow (Figure 6) and Communication guide (Figure 7) was established for the nurses when requesting for supply of inpatient medication. It reduced the time spent on unnecessary visits and phone calls to the Satellite Pharmacy and on non-value added rework and reordering of medication. It increased nurse-patient contact time greatly.
2. The pharmacist packing workflow was streamlined to allow prioritization of urgent and non-urgent medicine delivery. Packers consolidated medications for the same ward so as to reduce the porters' time in walking to the same ward in a short time frame. Porters' transport routes were revised to reduce motion waste and more efficient trips to the wards (Figure 8). Medication can therefore arrive on time for patients during the medication serving rounds.

Figure 6: Recipe Card for Requesting for Supply of Inpatient Medication

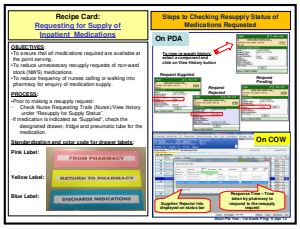


Figure 7: Communication Slide to the Nurses

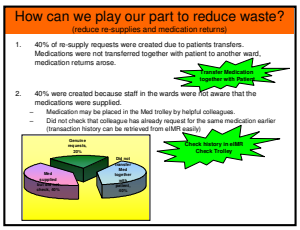
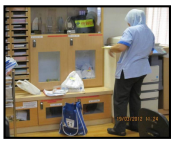


Figure 8: More efficient Trips to the Wards



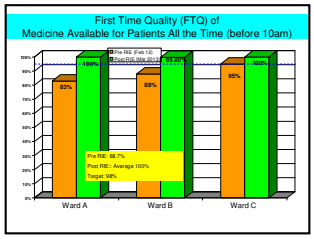
The initiatives were spread and adopted in all General Wards and ICUs/ HDs.

A Senior Staff Nurse from ICU commended on the standard recipe cards. She was more confident when requesting for supply of inpatient medications. Requests for "Urgent" medications arrived on time too.

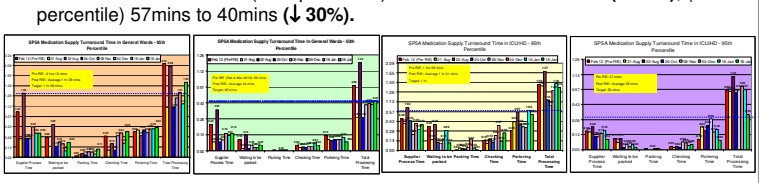
RESULTS

After the improvement event, none of the medication orders were omitted during the medication serving rounds and patients were given all their medication timely.

1. **First time quality** of medications available all the time for nurses improved from an average of **88.7% to 100%.**



2. The reduction in **turnaround time (TAT)** for medication supplies from Pharmacy to General Wards and ICUs/HDs are as follows:
   General Wards reduced from: (95th percentile) 2hr 12mins to 1hr 21mins **(↓ 39%)**, (50th percentile) 59mins to 42mins **(↓ 29%).**
   ICUs/HDs reduced from: (95th percentile) 1hr 38mins to 1hr 14mins **(↓ 24%)**, (50th percentile) 57mins to 40mins **(↓ 30%).**



SUSTAINING THE GAINS & LESSONS LEARNT

- The benefits were evident in the hospital and still sustaining at the targeted results after more than 12 months from the implementation date.
- The workplace redesign at Satellite Pharmacy was practical and facilitated a more efficient workflow. The pharmacists liked the visual organization and arrangements which promoted greater productivity and safety.
- Senior leaders' support and recognition of the team's effort played a key role in sustaining the good results.