

RFID Ambulatory Treatment Unit Management System

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A Introduction

Managing high variability in patient flow which included facility, patient and treatment factors are key challenges in providing timely treatment to cancer patients in the Ambulatory Treatment Unit (ATU). Deployment of a Real time resource management system enhances the unit's ability to provide timely treatment as well as increases its capacity to treat.

B Problem

- Unevenness in the workload demand leads to long patient waiting time. Variability factors including bottleneck for the turnaround time of lab results and consultation process compound the problem leading to ATU being the reservoirs of 'all' waiting time.
- No SMS reminder before treatment; patients would frequently wait at the waiting area, afraid to go for meal, worried about missing their turn.

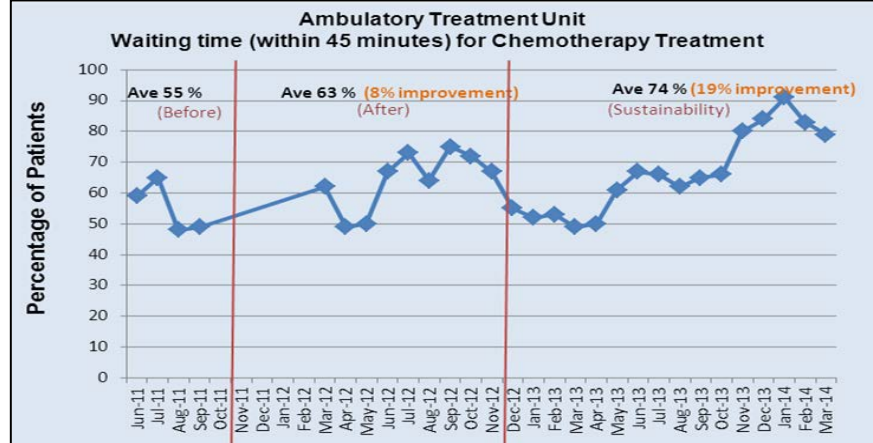
C Methodology

The solution was to develop an RFID system named Real time Ambulatory Patient Information Deployment Enabler (RAPIDE). It provides the following features for effective scheduling and efficient resource management.

- "VISIBILITY" into the real-time location, status and identification of patients, nurses and bed/recliners.
- Visual recognition of a patient's physical location for correct clinical placement and association of staff to patient.
- Shared communication platform for all service staff; Schedulers, Pharmacists and Nurses.
- Location and status data can be integrated into mobile devices for SMS service to patients.
- Flaggng of patient location and activity using colour codes for resource management.
- Generation of report for evaluation of resource scheduling and management for continuous improvement.

D Result

1. Reduction of wait time.



Phase 1 RAPIDE went live on 18 Oct 2011. Took 4 months (Nov to Feb) to stabilise the system. Phase 2 implemented in Jun 2012.

2. Time saving of 825hours averagely per year for nurses in manual search for treatment beds/chairs, phone calls to Scheduler when there is prolong treatment duration and checking of drugs status when nurses are ready to treat before patients' appointment time
3. Time saving of 744 hours averagely per year for front counter staff through faxing. Work process was re-engineered to enhance productivity by multi-tasking the Schedulers.
4. SMS service 30 minutes before appointment time yield high patients satisfaction where patient could productively use of their time.

E Learning Points

Accuracy of the RFID system in timely and correct update of the patients' treatment status has direct impact on the throughput of the unit. Tag management is a crucial part of the RFID process.

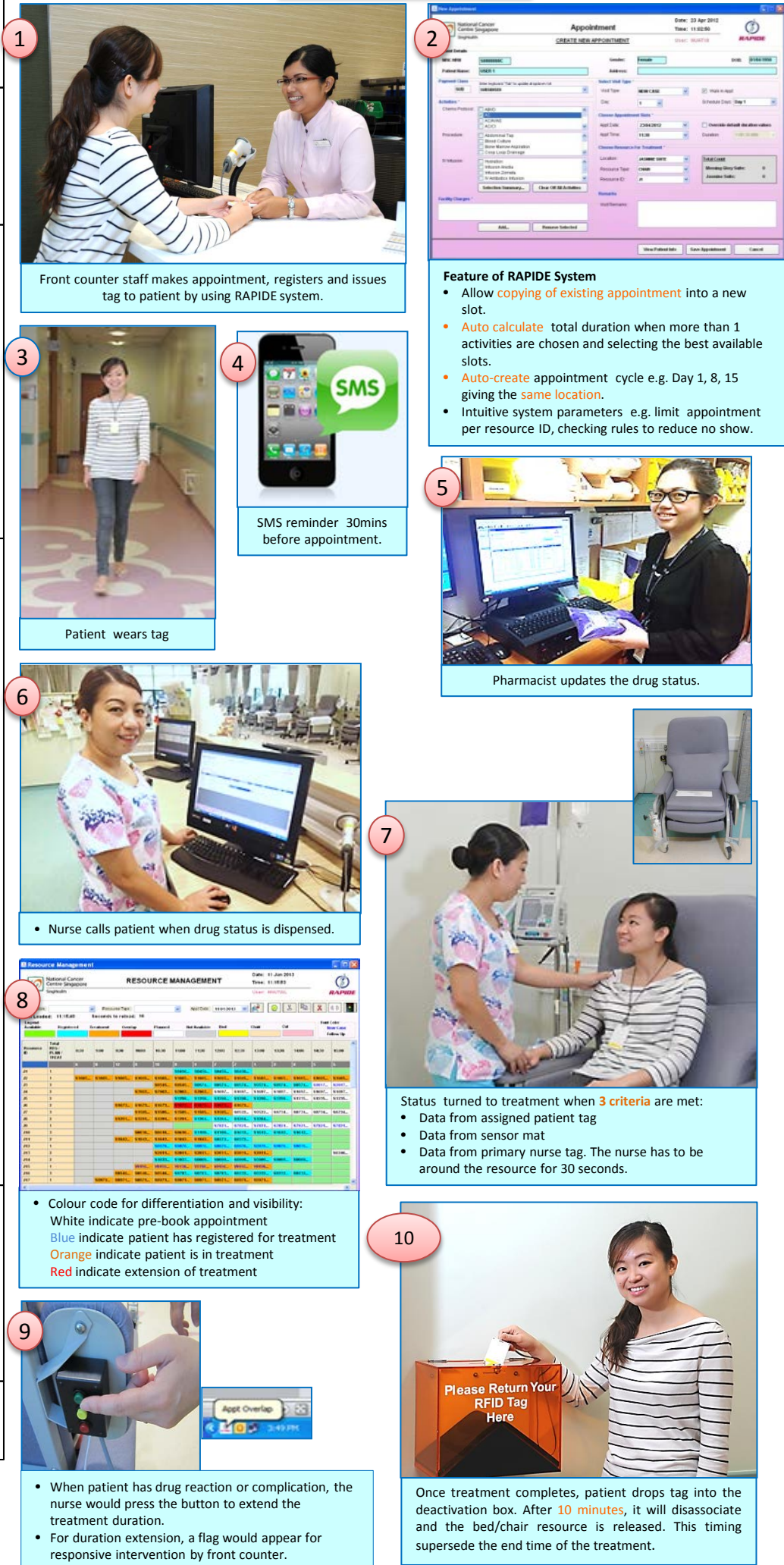
- Proper functioning of the hardware e.g. sensor mat, reader, patient/nurse tag
- Patient's behaviour i.e. placement of the patient's tag, seating position.
- Nurse's behaviour .

Effective tag management included proper maintenance of the hardware, patient education and titrating the right signal strength are crucial aspect.

F Conclusion

Using Real Time Resource Management has helped ATU in managing its variability and improve the patient's waiting time and the unit's throughput.

Patient Flow



1. Front counter staff makes appointment, registers and issues tag to patient by using RAPIDE system.
2. Feature of RAPIDE System:
 - Allow copying of existing appointment into a new slot.
 - Auto calculate total duration when more than 1 activities are chosen and selecting the best available slots.
 - Auto-create appointment cycle e.g. Day 1, 8, 15 giving the same location.
 - Intuitive system parameters e.g. limit appointment per resource ID, checking rules to reduce no show.
3. Patient wears tag
4. SMS reminder 30mins before appointment.
5. Pharmacist updates the drug status.
6. Nurse calls patient when drug status is dispensed.
7. Status turned to treatment when 3 criteria are met:
 - Data from assigned patient tag
 - Data from sensor mat
 - Data from primary nurse tag. The nurse has to be around the resource for 30 seconds.
8. Colour code for differentiation and visibility:
 - White indicate pre-book appointment
 - Blue indicate patient has registered for treatment
 - Orange indicate patient is in treatment
 - Red indicate extension of treatment
9. When patient has drug reaction or complication, the nurse would press the button to extend the treatment duration. For duration extension, a flag would appear for responsive intervention by front counter.
10. Once treatment completes, patient drops tag into the deactivation box. After 10 minutes, it will disassociate and the bed/chair resource is released. This timing supersede the end time of the treatment.