

### **Project Title**

Automation of Manual Billing with Computerized Physician Order Entry (CPOE) System

### **Project Lead and Members**

- Tan Hui Ting
- Mabel Soh Sor Boh
- Low Jinrui

### **Organisation(s) Involved**

National University Hospital

### **Project Period**

Start date: 06-2016

Completed date: 07-2017

### **Lessons Learnt**

Changing the system of posting charges from manual to system-integrated is a complex issue that requires multi-disciplinary collaboration and coordination.

- Harmonisation of billing practices
- System Integration
- Trial in 2 ward locations
- Training and Education
- Progressive Rollout

### **Project Category**

Productivity, Technology, Informatics & Automation

### **Keywords**

Productivity, Technology, Informatics & Automation, Process Improvement, Workflow Improvement, Automate Manual Billing, Billing Process, Billing Automation, System-level Innovation, Change Management, Time Saving, Error Minimisation, National University Hospital, Nursing, Multi-stakeholder Collaboration, Ward Charging, Computerised Physician Order Entry System, Harmonise Billing Practices, System Integration, Progressive Rollout, Staff Training, Time motion Study, Job Satisfaction, IT skills, Billing Accuracy, Paperless Clinical Documentation

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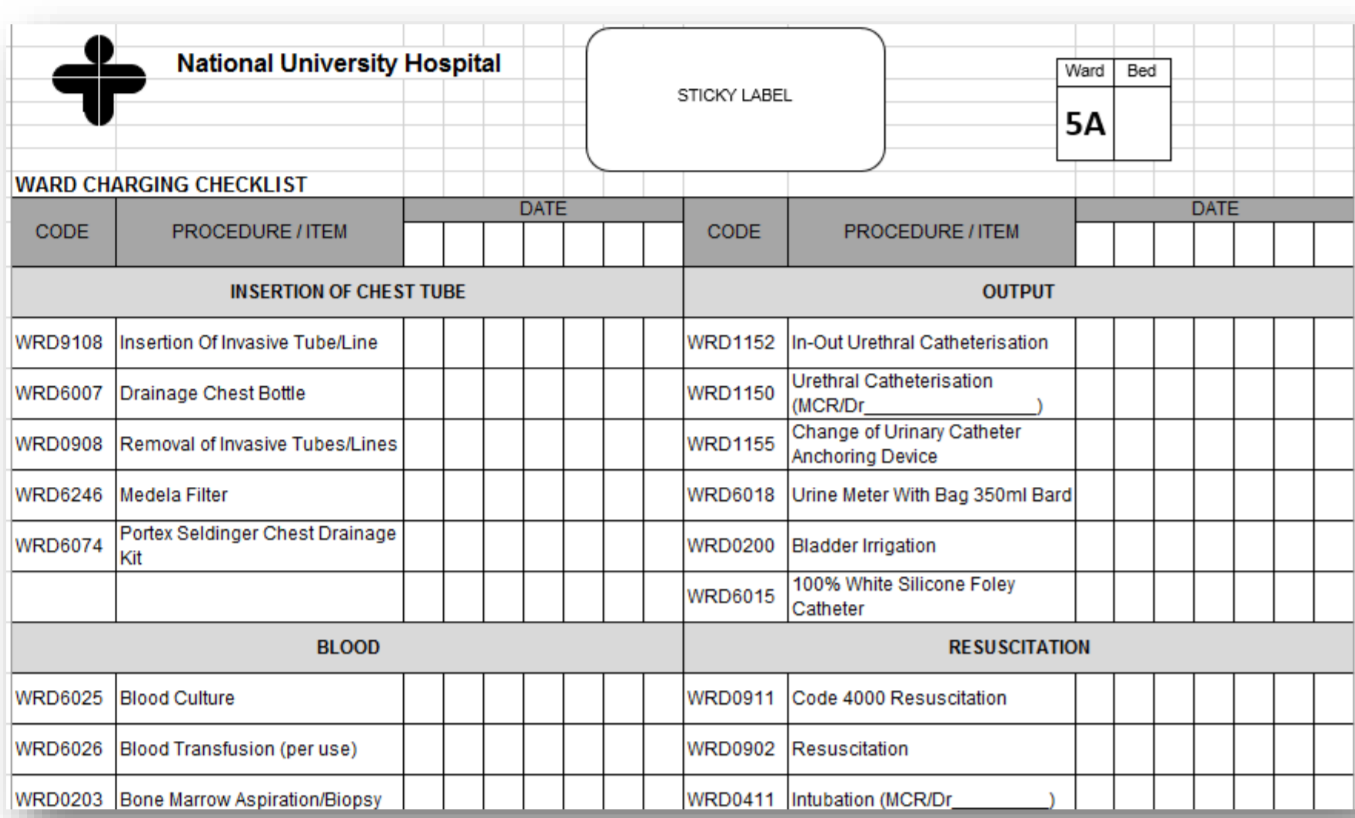
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# Automate Manual Billing Using Computerised Physician Order Entry (CPOE) System

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## 1. Background

Legacy paper-based billing process to charge patients for consumables and care rendered was manual: Ward charges were recorded into the hardcopy "Ward Charging Checklist" by nurses after each shift and then manually posted into the business system. This manual process was time-consuming and is prone to missing or wrong entries, which resulted in rework and missed revenue.



Sample of ward charging checklist

Staff charged according to the itemised code

## 2. Objectives

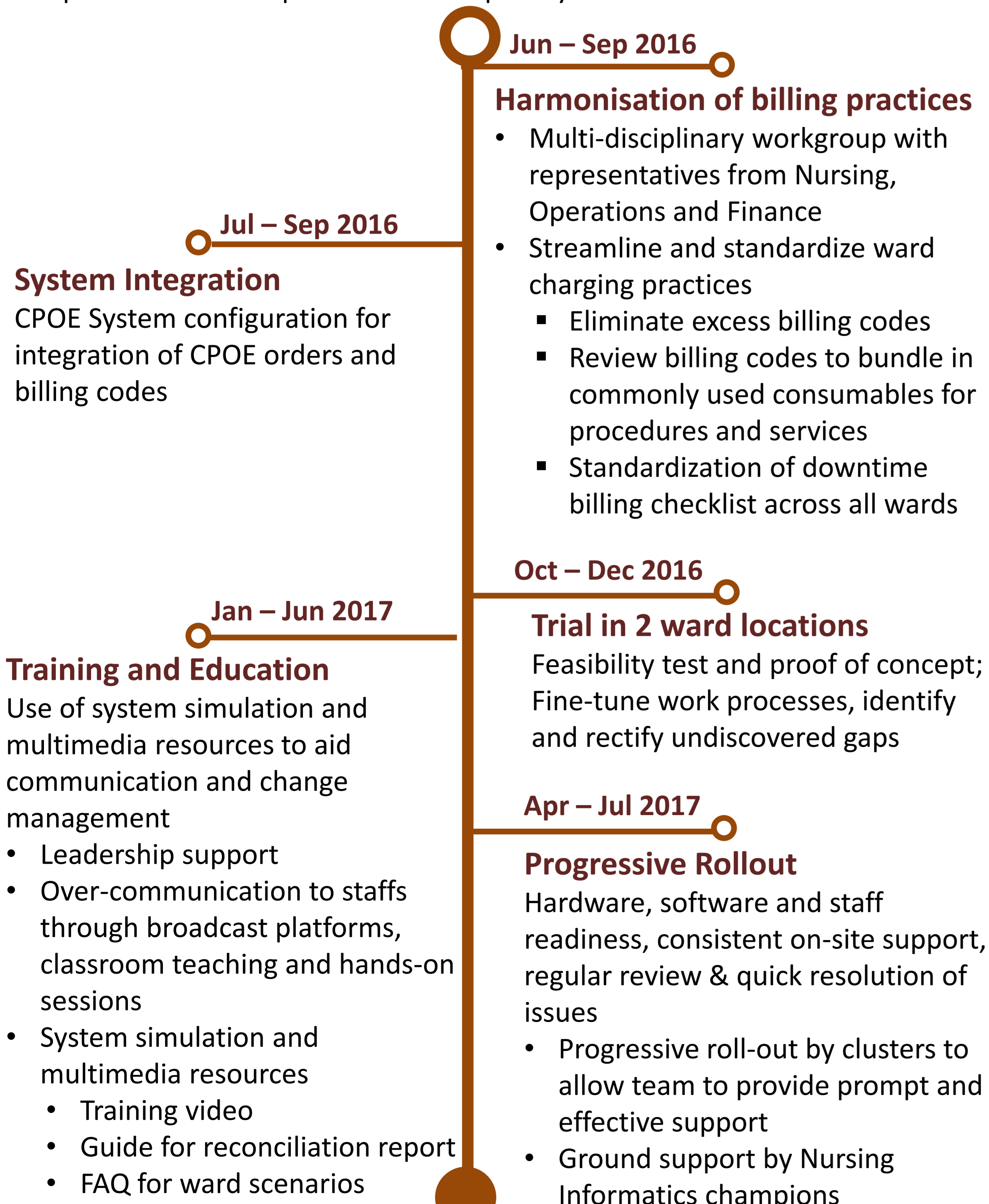
Computerised Physician Order Entry (CPOE) system is enhanced to support automated billing module. After treatment orders and nursing interventions are ordered or updated, CPOE system will transmit respective ward charges via interface to business system. This billing module also allows automation of specific ward charges on a daily basis after nurses initiated the intervention in CPOE system.

Through this implementation, NUH aims to:

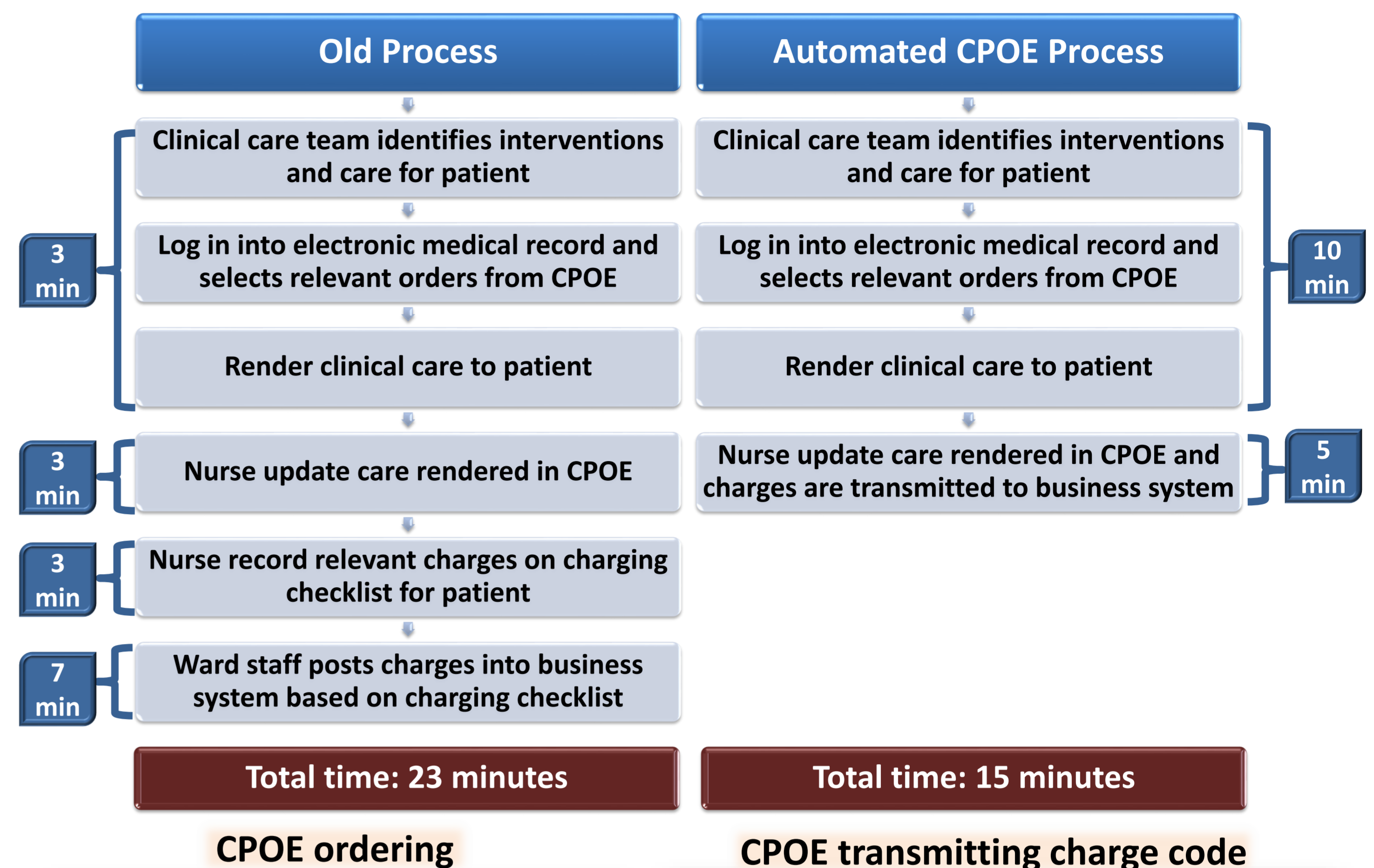
- ✓ Harmonize billing practices in NUH inpatient wards
- ✓ Improve billing accuracy
- ✓ Improve staff productivity for billing

## 3. Methodology & Execution

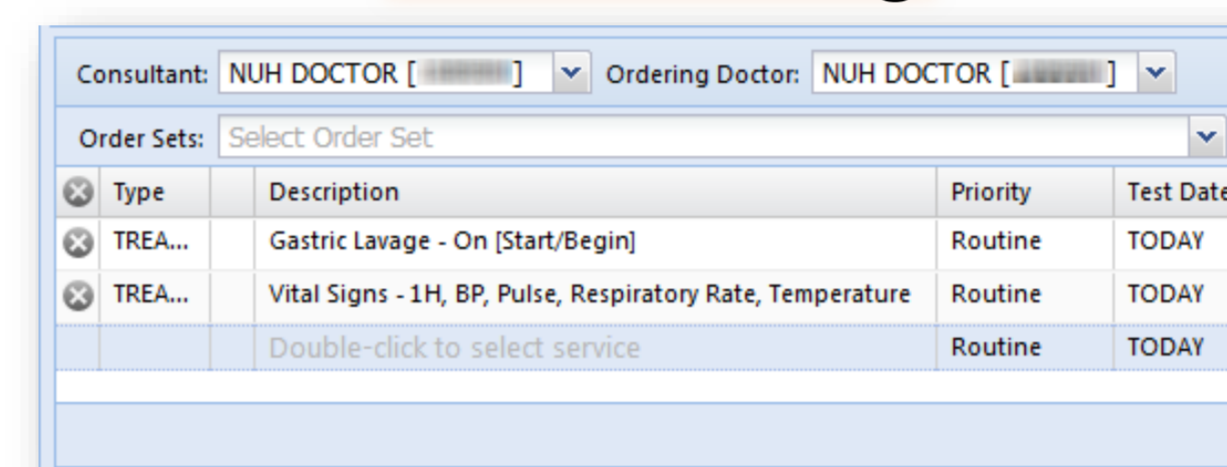
Changing the system of posting charges from manual to system-integrated is a complex issue that requires multi-disciplinary collaboration and coordination.



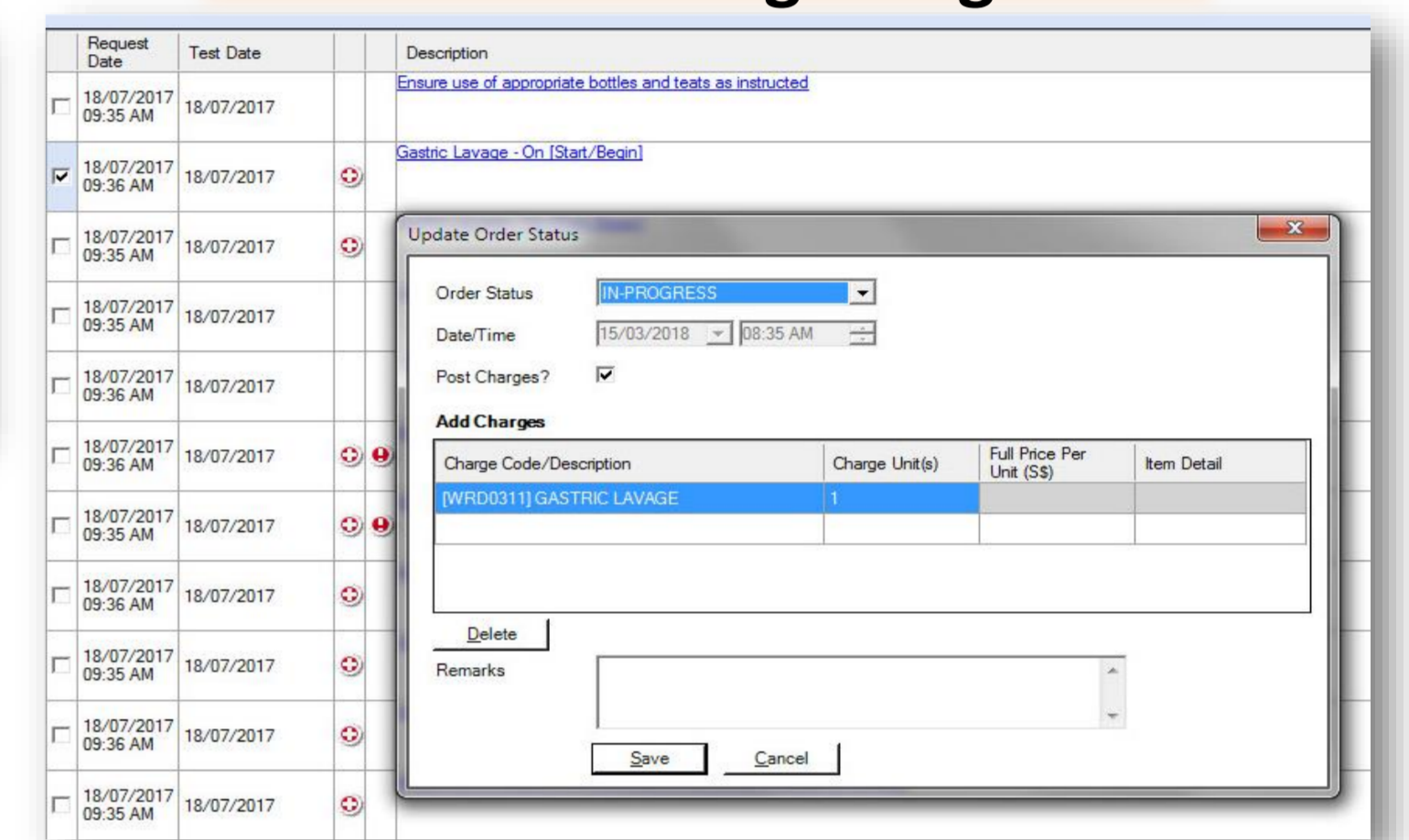
## 4. System Performance



### CPOE ordering



### CPOE transmitting charge code

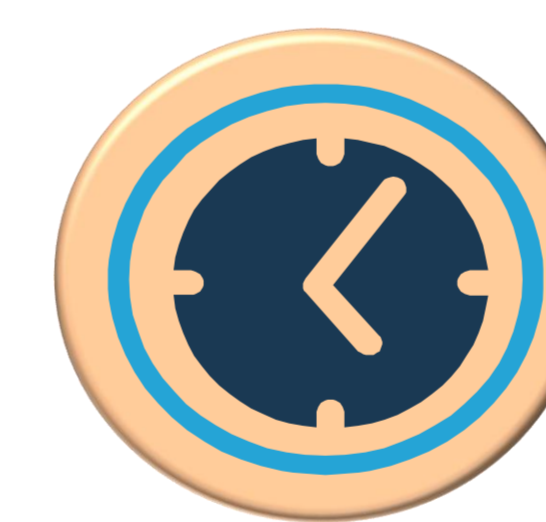


## 5. Results



### 89% Improved billing accuracy

- Reduction in missed gross revenue from \$16 to \$2 per patient day.
- Random audit conducted to compare bills of patients with clinical notes (n=30+30)
- Estimated improved recovery of \$4.9M gross annual revenue (based on 350,000 patient days)



### 35% Improved staff productivity

- Reduction in time taken to bill patients from 23 min to 15 min per patient
- Time motion study to compare time need to manual vs system-integrated process (n=45)
- Estimated time savings of 2.8M minutes (based on 350,000 patient days)



### Positive feedback from staff

- High utilization rate (above 90% are system-posted)
- Good hands-on training and rollout support
- Real time posting of charges within shift
- Better compliance for ordering and updating of clinical documentation
- Auto-daily charge mechanism saves effort
- New IT skills acquired

## 6. Sustenance & Conclusion

Automation of billing from CPOE system to business system (inpatient bills) allows for timely bill entry, which improves

- ✓ Billing accuracy
- ✓ Staff productivity for billing
- ✓ Clinical documentation
- ✓ Visibility on billing information and sources
- ✓ Staff IT skills and job satisfaction

This takes NUH a step further towards paperless clinical documentation, and has also been listed as a good practice in the recent MOHH GIA billing audit. The workgroup will continue to review of CPOE orders and billing codes, and meet regularly to address and resolve concerns/issues timely.