STREAMLINING OF MEDICATION ADMINISTRATION PROCESS

IE3100R/IE3100M Systems Design Project | Department of Industrial Systems Engineering and Management

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ABSTRACT: Medication administration is an increasingly complex process, influenced by the increasing number of medications, prescriptions for each patient and new medical discoveries, on top of the administration policies and safety precautions. The current medication administration round took 45 minutes on average. Given the limited manpower of nurse in the hospital, it is more desirable if nurses can spend more time to provide quality patient care outside the medication administrations rounds. The hospital thus aims to reduce duration of medication administration round, through eliminating the root causes of disruptions, while ensuring safe administration practices are followed.

1. OBJECTIVE

To reduce its Medication Administration Round (MAR) duration to improve patient contact time by nurses. The reduction can be achieved through:
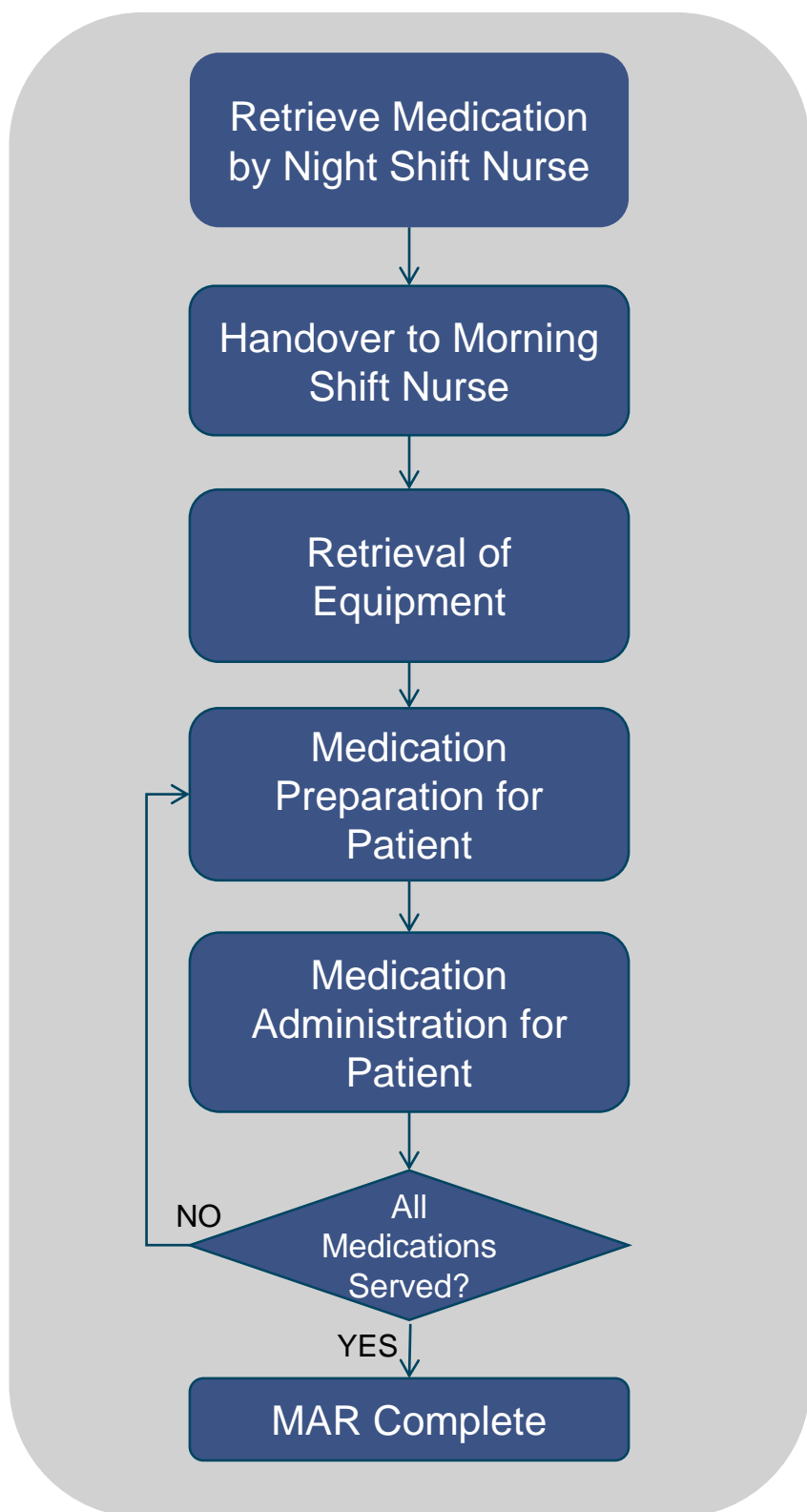
1. Identification of Disruptions during MAR
2. Collection & Analysis of Disruption Data
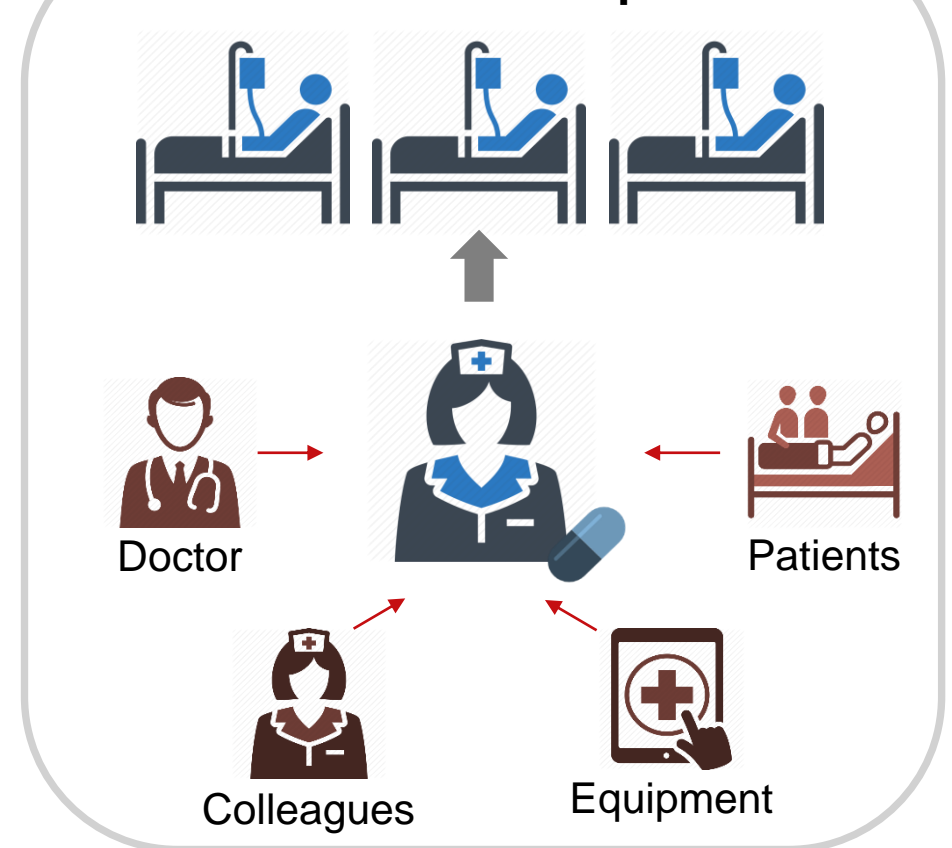3. Implementation of Solution

2. INVESTIGATION

Observations

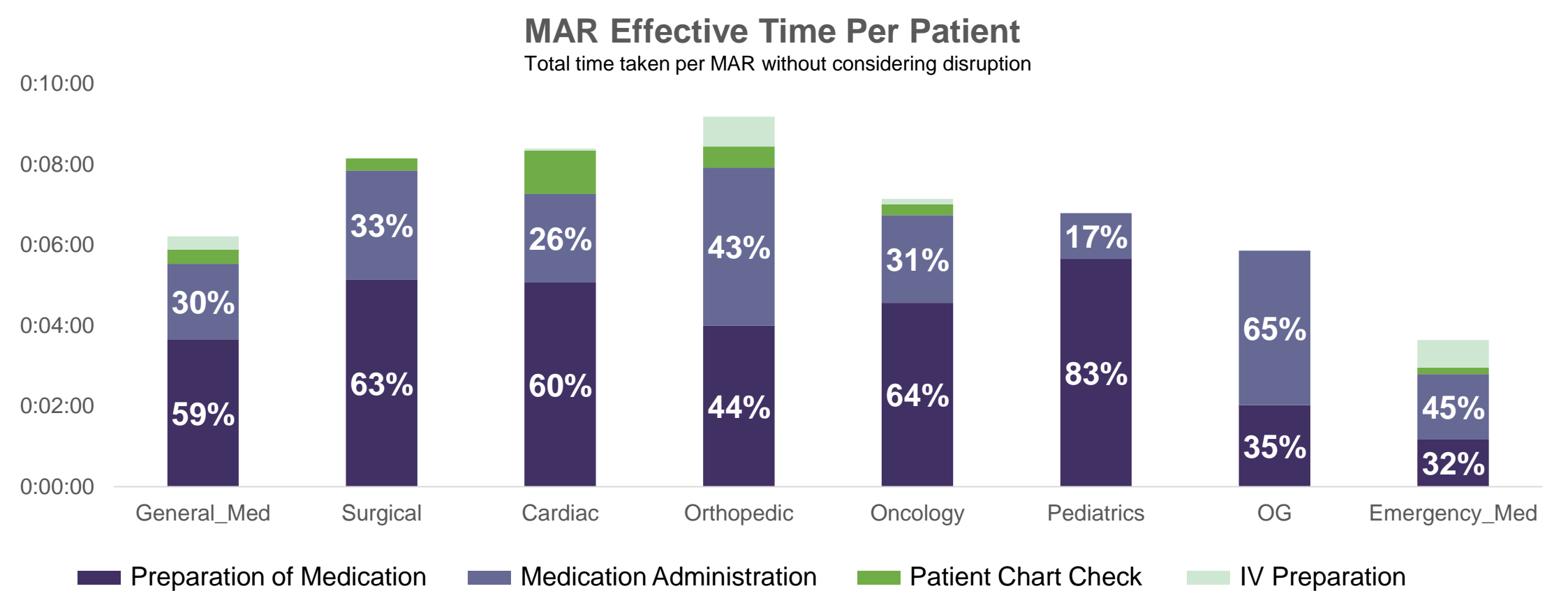- Nurses have to follow Standard Operating Procedure (SOP)
- "5 Rights" Check: Right Patient, Right Medication, Right Dose, Right Time and Right Route
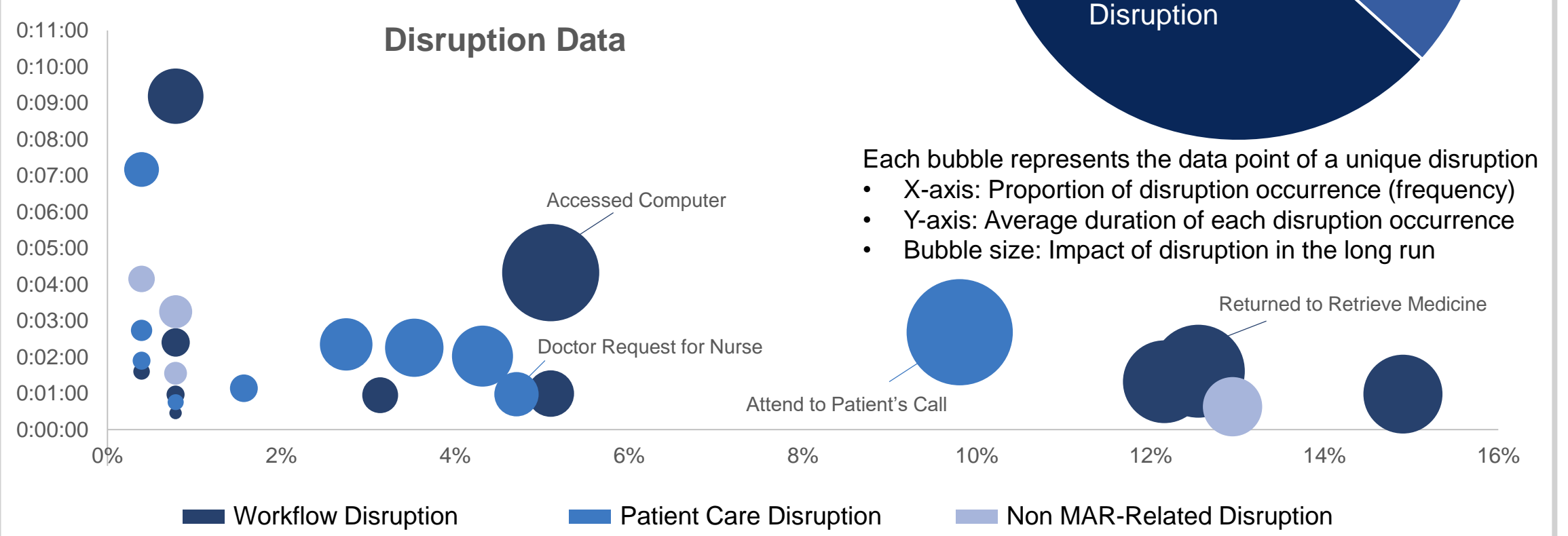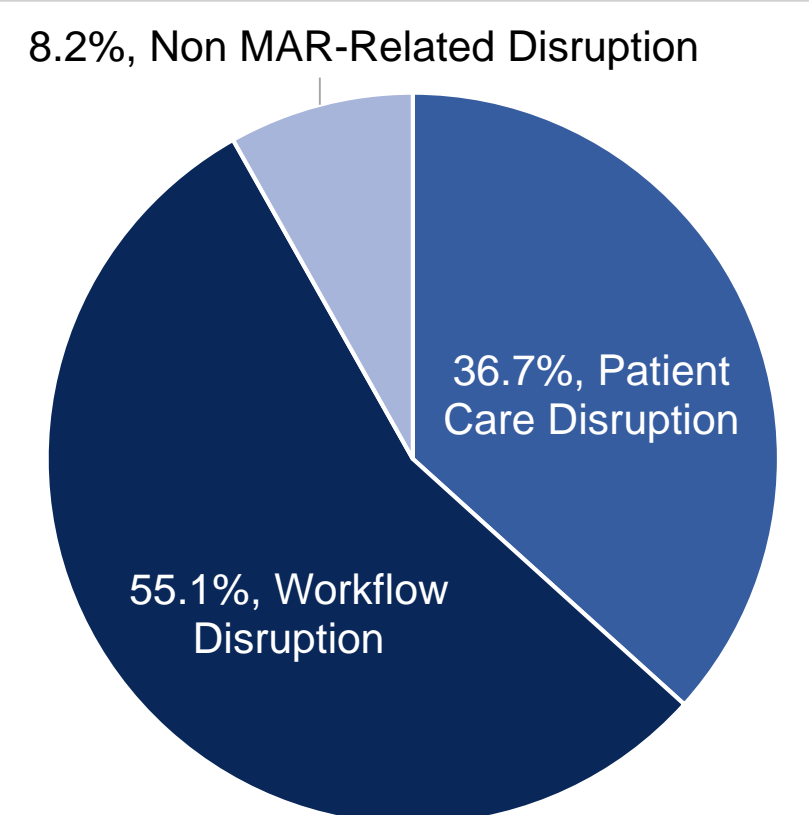- Nurses face constant disruptions during Medication Administration Round (MAR)

Flowchart:
- Retrieve Medication by Night Shift Nurse
- Handover to Morning Shift Nurse
- Retrieval of Equipment
- Medication Preparation for Patient
- Medication Administration for Patient
- All Medications Served? — NO (loop back), YES
- MAR Complete

Sources of Disruptions

Doctor → Nurse ← Patients; Colleagues, Equipment

3. DATA ANALYSIS

MAR Effective Time Per Patient
Total time taken per MAR without considering disruption

	General_Med	Surgical	Cardiac	Orthopedic	Oncology	Pediatrics	OG	Emergency_Med
Medication Administration	30%	33%	26%	43%	31%	17%	65%	45%
Preparation of Medication	59%	63%	60%	44%	64%	83%	35%	32%

Legend: ■ Preparation of Medication ■ Medication Administration ■ Patient Chart Check ■ IV Preparation
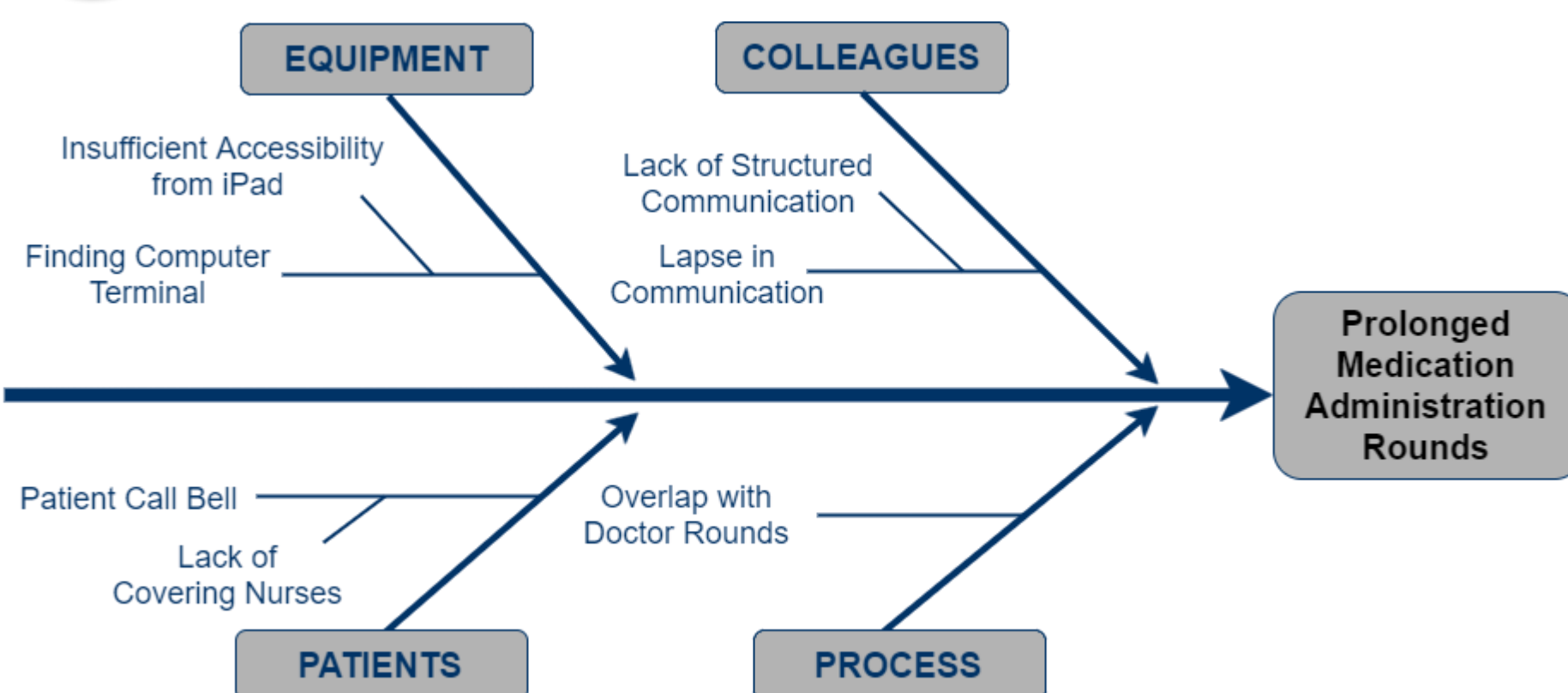
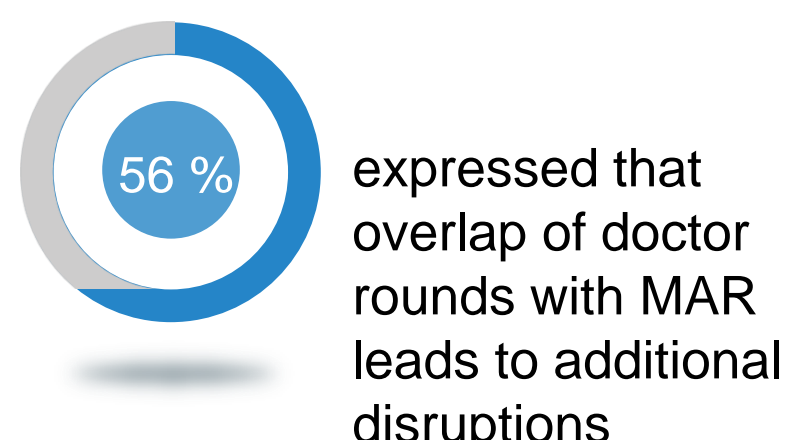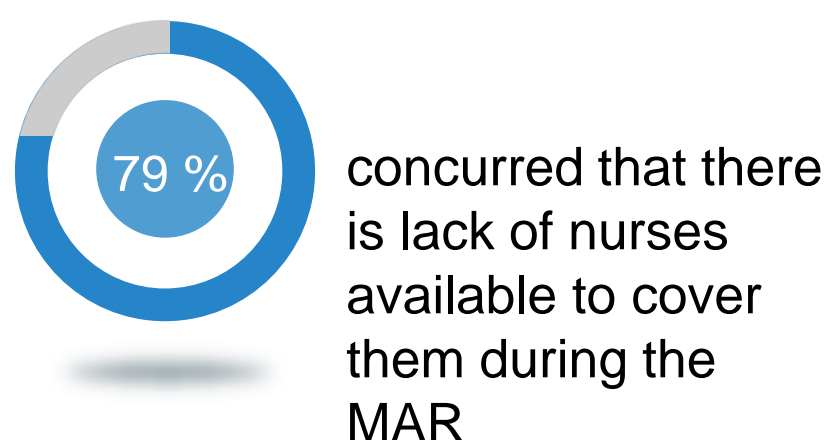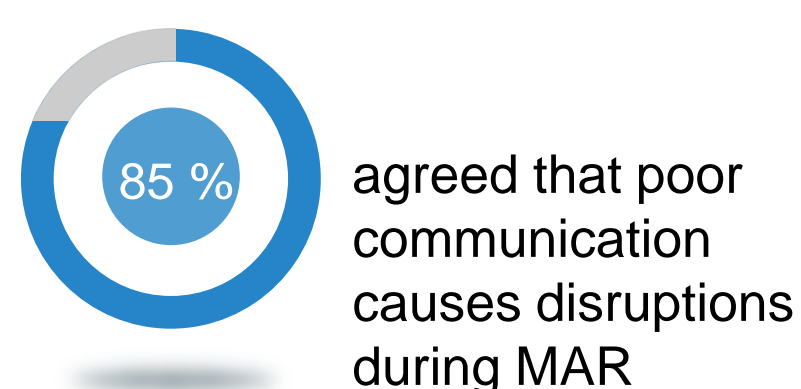| Average Statistics	General Med (9 wards)	Surgical (5 wards)	Cardiac (3 wards)	Orthopedic (3 wards)	Oncology (4 wards)	Pediatrics (4 wards)	OG (2 wards)	Emergency (2 wards)
MAR Effective Time per Round	33:40	39:52	41:15	46:11	26:11	29:05	25:59	19:18
Patients per Nurse	5	4	5	5	4	5	5	6

Disruption Breakdown

- **Workflow Disruption**: activities related to MAR, such as wasted transportation from repeated trips to retrieve medicines
- **Patient Care Disruption**: interactions with patients, such as attending to patient's call
- **Non MAR-Related Disruption**: activities not associated with MAR

Pie chart: 55.1% Workflow Disruption, 36.7% Patient Care Disruption, 8.2% Non MAR-Related Disruption

Disruption Data

Each bubble represents the data point of a unique disruption
- X-axis: Proportion of disruption occurrence (frequency)
- Y-axis: Average duration of each disruption occurrence
- Bubble size: Impact of disruption in the long run

Labels: Accessed Computer, Doctor Request for Nurse, Attend to Patient's Call, Returned to Retrieve Medicine

Legend: ■ Workflow Disruption ■ Patient Care Disruption ■ Non MAR-Related Disruption

4. ROOT CAUSE

Fishbone diagram → Prolonged Medication Administration Rounds

- EQUIPMENT: Insufficient Accessibility from iPad; Finding Computer Terminal
- COLLEAGUES: Lack of Structured Communication; Lapse in Communication
- PATIENTS: Patient Call Bell; Lack of Covering Nurses
- PROCESS: Overlap with Doctor Rounds

Interview with Nurses

- **70%** highlighted that the iPad poses various problems during MAR
- **85%** agreed that poor communication causes disruptions during MAR
- **79%** concurred that there is lack of nurses available to cover them during the MAR
- **56%** expressed that overlap of doctor rounds with MAR leads to additional disruptions

5. SOLUTIONS

1. **Communication Framework**
   - Doctors have to notify nurse for orders made during MAR
   - Nurses are to escalate any potential order issues to doctor
   - ✓ Reduce movements of nurses to retrieve medications during MAR

2. **Coverage of Duties**
   - At least one staff is present during MAR to serve patients
   - ✓ Patients/ Doctors will no longer disrupt nurses carrying out medication administration
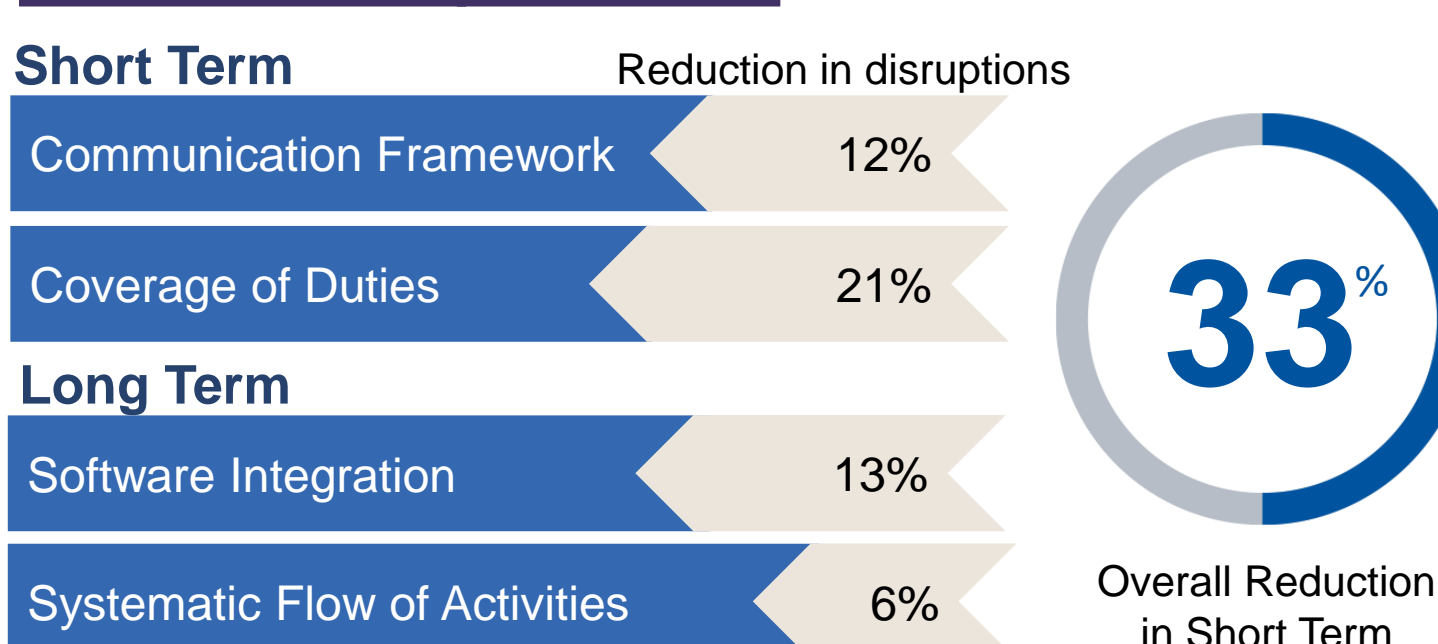
3. **Software Integration**
   - Integration of computer patient medical data with the iPad application
   - Allow access to patient medication records from iPad
   - ✓ Eliminate needs to access records through computer

4. **Systematic Flow of Activities**
   - Other procedures to start only after MAR
   - ✓ Reduce disruptions from doctors or other personnel

Forecasted Improvement

Short Term	Reduction in disruptions
Communication Framework	12%
Coverage of Duties	21%
Long Term	
Software Integration	13%
Systematic Flow of Activities	6%

33% Overall Reduction in Short Term

Limitations

These proposed solutions may vary in its implementations due to the different environment of each discipline or even ward.

Furthermore, integration of software and cultural improvements in communication will take time to set in.

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