INPATIENT HYPOGLYCEMIA REDUCTION BUNDLE

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Tan Tock Seng HOSPITAL

National Healthcare Group — Adding years of healthy life

Mission Statement

To reduce incidence of first episode of hypoglycemia in patients treated with oral hypoglycemic agents / insulin admitted to orthopaedic ward 12D by 50% over 6 months
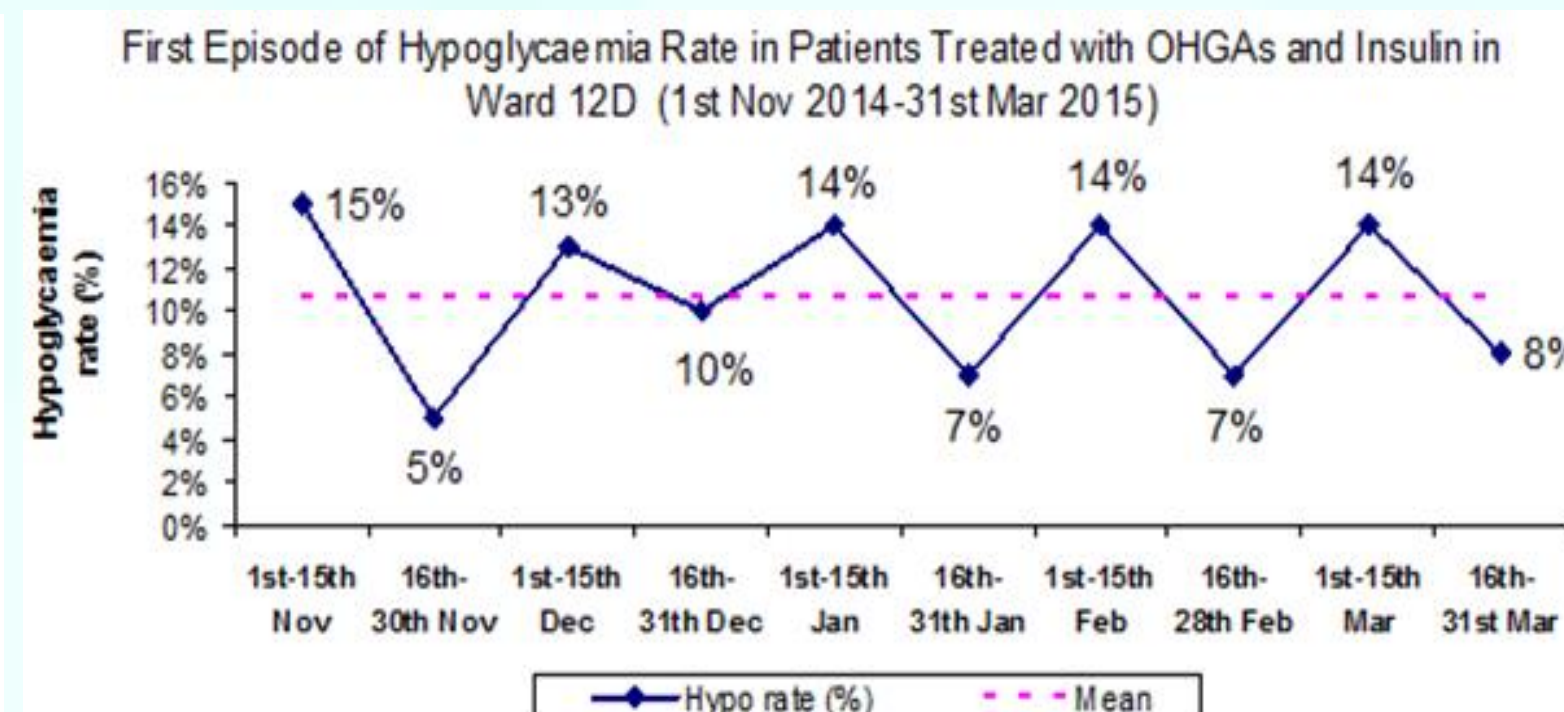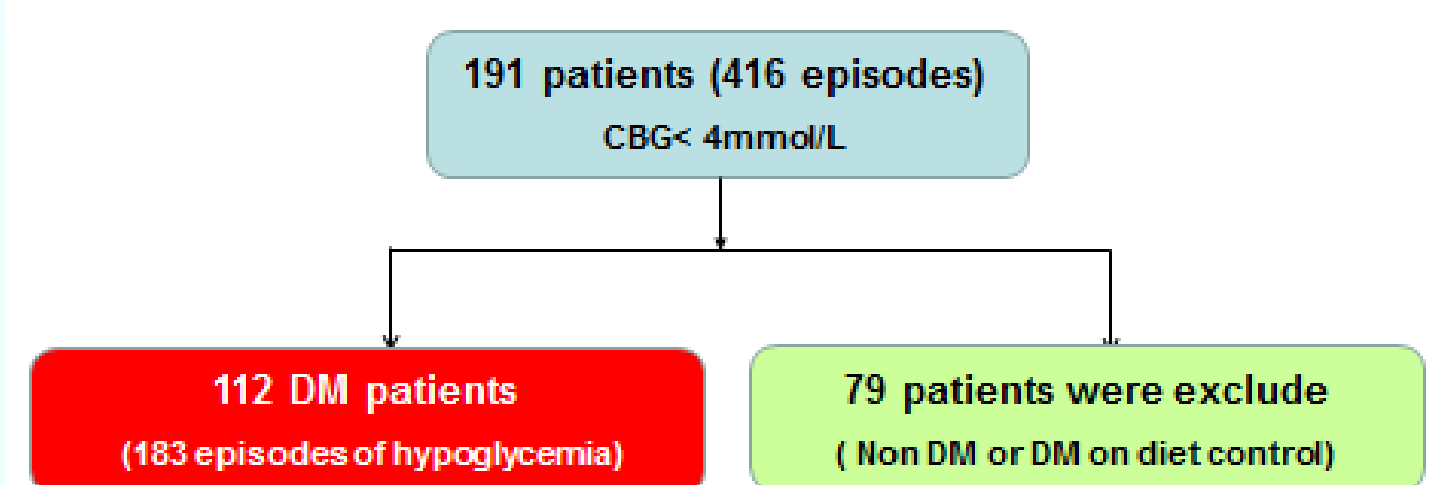
Definitions
1) Hypoglycaemia - Refers to a capillary blood glucose of less than 4 mmol/L
2) Patients with the following criteria are excluded:
   - Non-diabetes patients
   - DM patients on diet control
   - Patients admitted for hypoglycaemia

Team Members

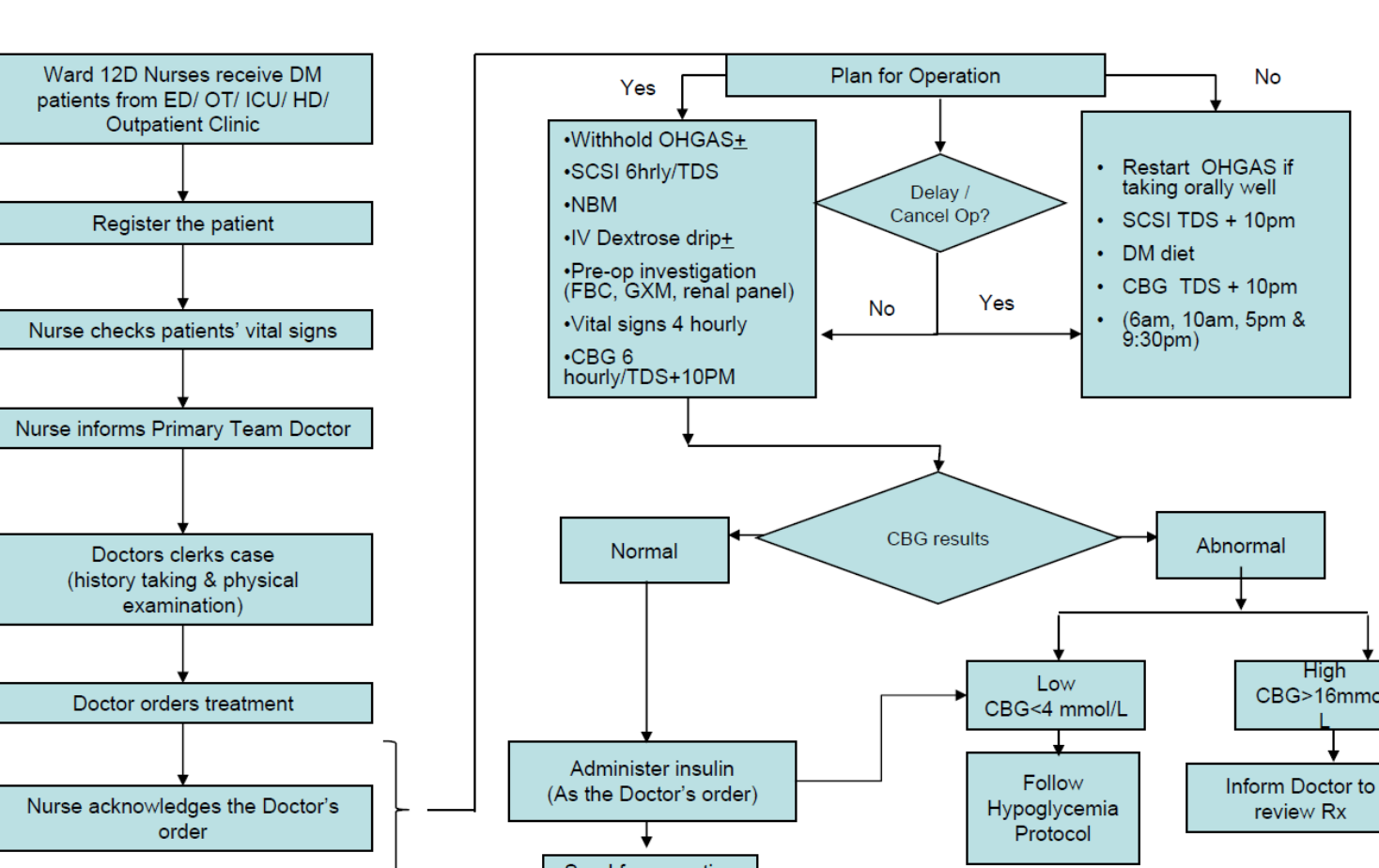| Name	Designation	Department	Role
Lian Xia	APN	Nursing Service	Leader
Michelle Jong	Senior Consultant	Endocrinology	Member
Muhammad Farhan	Associated Consultant	Orthopedic Surgery	Member
Wayne Yap	Resident	Orthopedic Surgery	Member
Lam Chin Chin	DNE	Nursing Service	Member
Lim Shu Fang	Senior Pharmacist	Pharmacy	Member
Chern Yann	Dietitian	Nutrition & Dietetics	Member
Koh Poh Sim	Senior Staff Nurse	Ward 12D	Member
Arumugam Saraswathi	F&B Supervisor	Kitchen	Member
Ho Si Rong	Assistant Manager	Ops Medicine	Member
Kellie Tedjo	Executive	Ops Medicine	Member
Daniel Chew	Senior Consultant	Endocrinology	Sponsor
George Julie	Senior Consultant	General Medicine	Mentor

Evidence for a Problem Worth Solving

- Two weeks hospital wide inpatient ward audit from 3rd-17th Nov, 2014.
- Data was retrieved from Cobas IT system & case notes.

191 patients (416 episodes) CBG< 4mmol/L
→ 112 DM patients (183 episodes of hypoglycemia)
→ 79 patients were exclude (Non DM or DM on diet control)

First Episode of Hypoglycaemia Rate in Patients Treated with OHGAs and Insulin in Ward 12D (1st Nov 2014-31st Mar 2015)
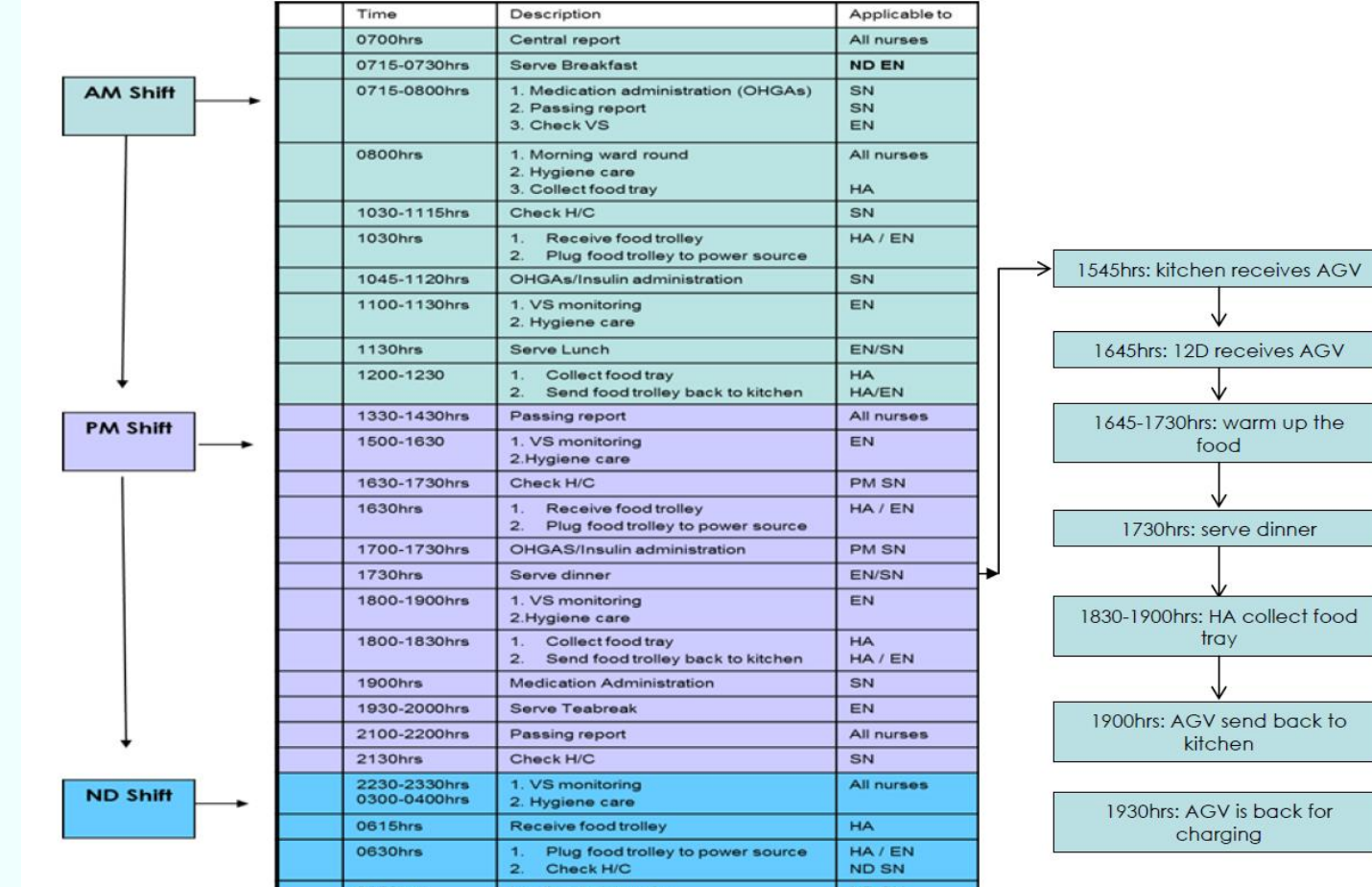
- Hypoglycemia in the hospital has been shown to have adverse consequences.
- In a study by Turchin et al. (2009) hypoglycemia during a single hospital day increased the length of stay by 1 day, and hypoglycemia recorded on two separate days increased the length of stay by over 2 days.
- Exposure to hypoglycemia increased the 1-year mortality rate proportionally to the number of days that hypoglycemia was observed by Wexler (2007).

Flow Chart of Process

Workflow (Patients going for Operation)

**Workflow (Patients NOT going for Operation)**

Cause and Effect Diagram

(Healthcare Personnel, Meal, Patient, Medication categories leading to First Episode of Inpatient Hypoglycemia)

Pareto Chart

1	Inappropriate dinner time (too early)
2	Insulin & meal time mismatch
3	No food supply after 6:30pm
4	Inappropriate NBM management
5	Lack of DM knowledge

Implementation

Cause / Problem	Interventions / PDSAs	Date of Implementation
Inappropriate dinner time (too early)	1. Delay dinner time from 5:30pm to 6:30pm	6 April 2015
Insulin & meal time mismatch	2a. Insulin labelling on food trays 2b. Readjust insulin administration with breakfast timing	20 April 2015 22 June 2015
No food supply after 6:30pm	3. Provide food for late admission	11 May 2015
No Snack for bedtime CBG<6mmol/L	4. Bedtime Snacks	27 May 2015
Inappropriate NBM management	5. Initiate NBM protocol	12 June 2015
Lack of Knowledge	6. Education - For patients on signs & symptoms of hypoglycaemia - For nurses on insulin action	24 May 2015 16 June 2015

Visual cues on food trays
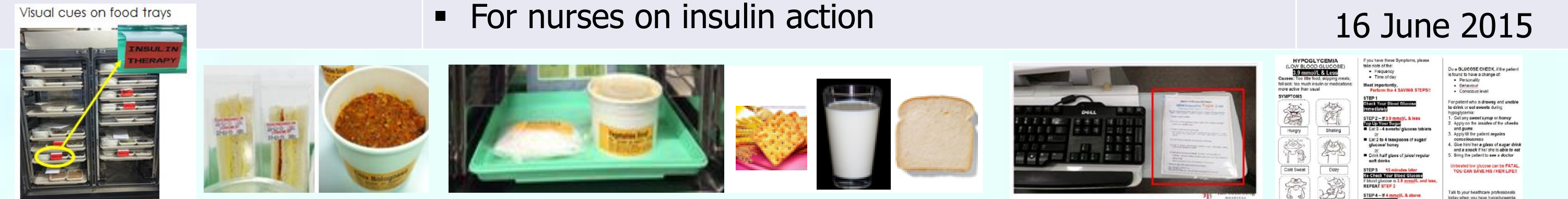
Results

Hypoglycemia Rate in Patients Treated with OHGAs & Insulin in Ward 12D (Nov 2014 to Jan 2017)
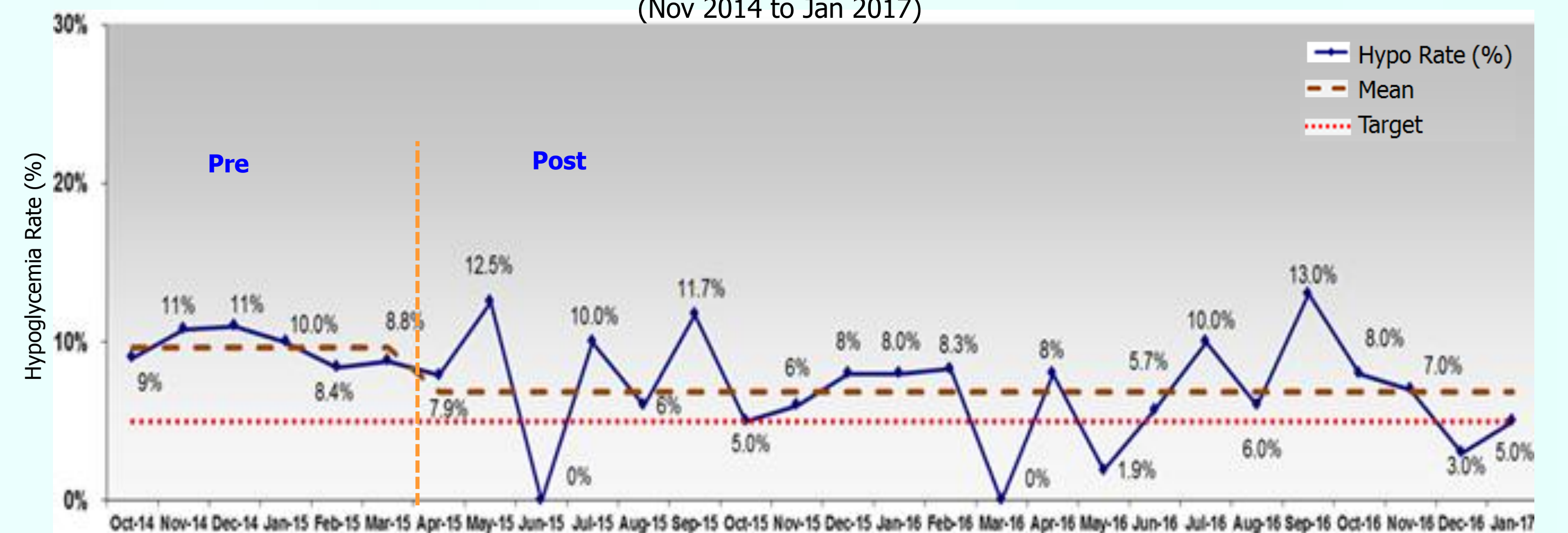
The percentage of patients with first episode of hypoglycemia was decreased significantly from baseline 11.8% (n=322) to 6.9% (n=1109) from April 2015 to January 2017.

Cost Savings

1) Reducing one episode of hypoglycemia will reduce one day of hospital stay

Productivity Outcome(s):		Item	2014	2015	2016	Outcome
	Per Patient	Average Length of Stay (ALOS)	9	8	8	-1
		Cost of Treatment(s) ($)	302.40	268.80	268.80	-33.60
		Cost of Intervention(s) ($)	0.00	24.00	24.00	24.00
		Total Cost of Care ($)	10,328.40	9,204.80	9,204.80	-1,123.60
	Annualized	Total Length of Stay (LOS)	1080	672	672	-408
		Cost of Treatment(s) ($)	36,288.00	22,579.20	22,579.20	-13,708.80
		Cost of Intervention(s) ($)	0.00	2,016.00	2,016.00	2,016.00
		Total Cost of Care ($)	1,239,408.00	773,203.20	773,203.20	-466,204.80

2) Decrease risk of hypoglycemia complications (e.g. Seizure, Cardiac arrhythmia & Sudden death)

Problems Encountered

- New nurses / doctors were not familiar with new workflow & protocol
- Frequent clinical rotations for physicians
- Low compliance rate among the physicians
- Challenge of data collection & analysis
- Difficulty in organizing team meetings due to different shift duty

Strategies to Sustain

- To create a sustainable education & learning environment for new doctors / nurses
  - ✓ Orientation checklist
  - ✓ E-learning modules
- Circulate the audit results among departments regularly
- Increase awareness among healthcare providers
- Continue monitoring the progress of the project & compliance rate across departments
- Create expert improvement & measurement support groups
- Positive reinforcement