Project Title

Reduction of Plasma Sodium Overcorrection for Severe Hyponatremia Patients

Project Lead and Members

Project lead:

- Dr Huang Wenhui
- Dr Ang Joo Shiang

Project members:

- Dr. Chin Hao Ren
- Ms. Sundramala
- Adj A/Prof Robert Hawkins

Organisation(s) Involved

Tan Tock Seng Hospital

Healthcare Family Group(s) Involved in this Project

Allied Health, Medical

Applicable Specialty or Discipline

Laboratory Medicine

Project Period

Start date: 01 July 2021

Completed date: 28 February 2022

Aims

To reduce the proportion of overcorrection of severe hyponatremia *(Defined as plasma sodium <120mmol/L)* in Medical *(General Medicine inpatients)* inpatients (admitted from Emergency Department) within the first 48 hours *(First 48 hours from the time the 1st plasma sodium was run.)* from 44% to <25%; within 6 months.

Project Attachment

See poster attached/below

Background

See poster attached/below

Methods

See poster attached/below

Results

See poster attached/below

Conclusion

See poster attached/below

Additional Information

Accorded the NHG Quality Day 2022 (Category D: Building Strong Partnerships in Improvement Work) Merit Award

Project Category

Care & Process Redesign

Risk Management, Adverse Outcome Reduction

Keywords

Plasma Sodium, Overcorrection, Hyponatremia

Name and Email of Project Contact Person(s)

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Reduction of Plasma Sodium Overcorrection for Severe Hyponatremia Patients

[1] Dr. Huang Wenhui & [2] Dr. Ang Joo Shiang

[1] General Medicine (GM) | [2] Emergency Department (ED)

Mission Statement

To reduce the proportion of overcorrection of severe hyponatremia[1] in medical[2] inpatients (admitted from Emergency Department) within the first 48 hours[3] from 44% to <25%; within 6 months

[1] Defined as plasma sodium <120mmol/L

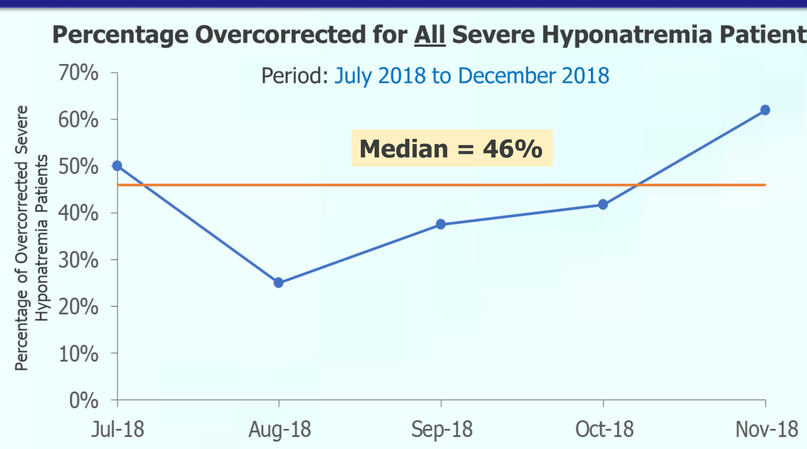
[2] General Medicine inpatients

[3] First 48 hours from the time the 1st plasma sodium was run. Existing international guidelines typically focus over the first 24 or 48 hours.

Team Members

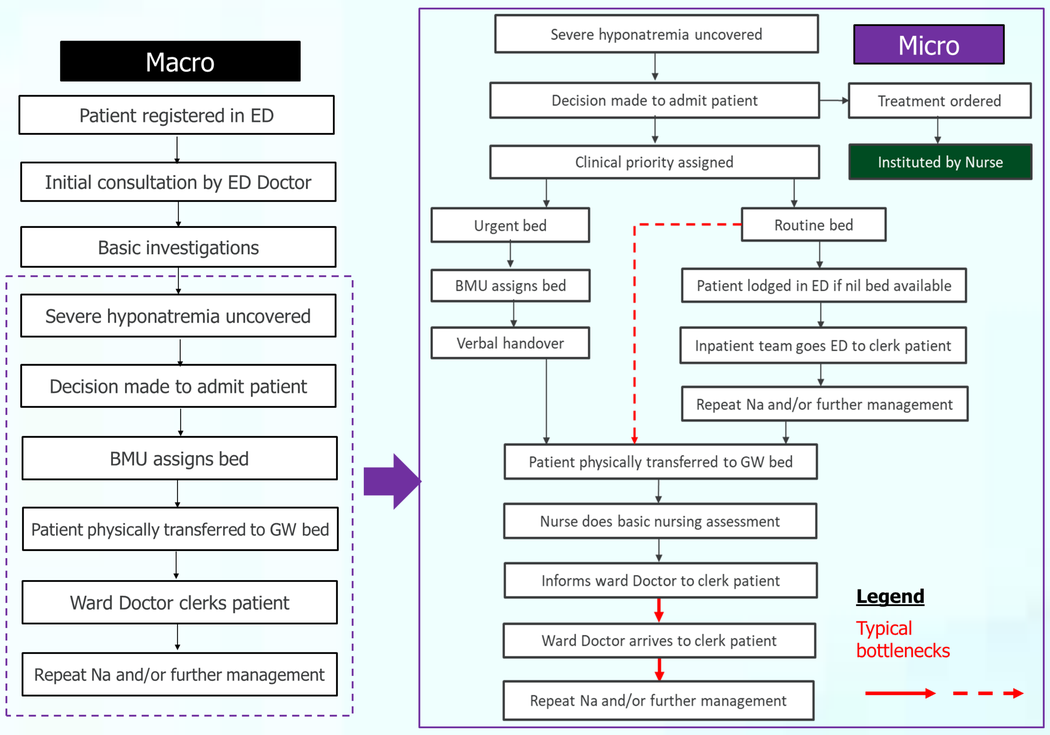
	Name	Designation	Department
Team Leaders	Dr. Huang Wenhui	Consultant	General Medicine
	Dr. Ang Joo Shiang	Consultant	Emergency Department
Team Members	Dr. Chin Hao Ren	Senior Resident	Emergency Department
	Ms. Sundramala	Nursing Manager	Emergency Department
	Adj A/Prof Robert Hawkins	Senior Consultant	Laboratory Medicine
Sponsors	A/Prof Jackie Tan Yu-ling (Head of General Medicine) Adj Asst Prof Ang Hou (Head of Emergency Department)		
Mentors	Dr Lim Yen Peng & Dr Tricia Yung Sek Hwee		

Evidence for a Problem Worth Solving

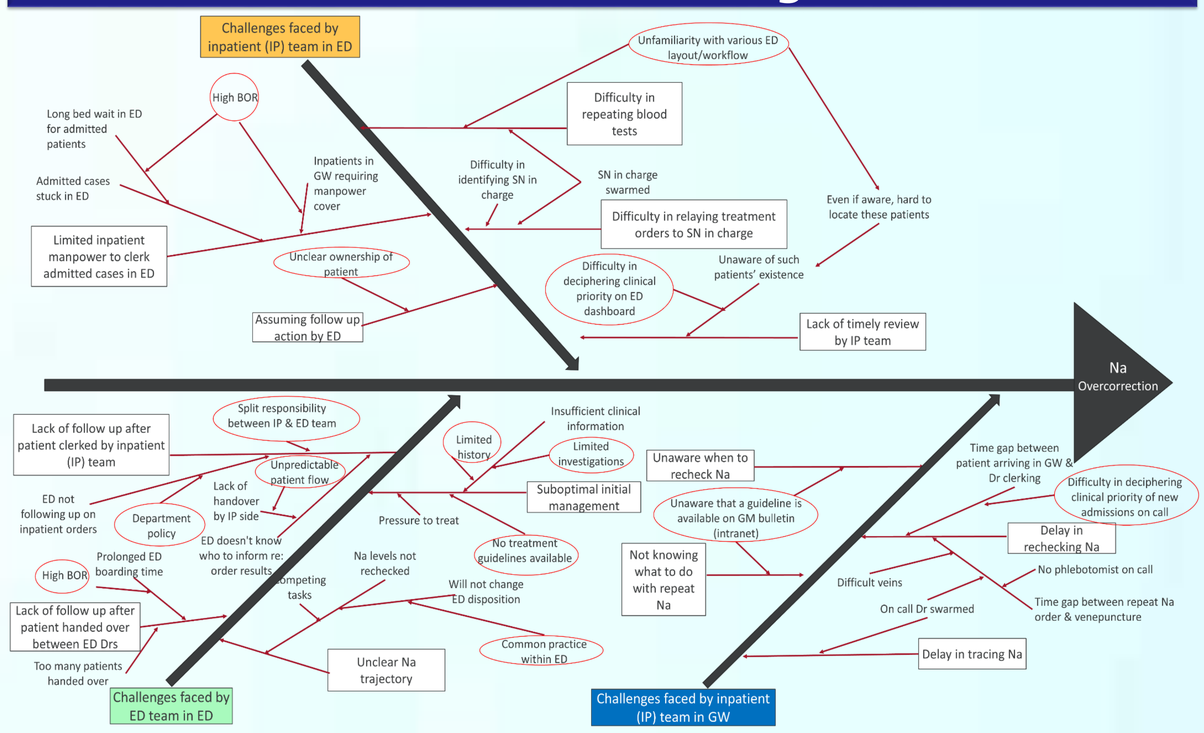


	Jul-18	Aug-18	Sep-18	Oct-18	Nov-18	Dec-18
# of Severe Hyponatremia Patients	30	16	16	12	21	17
# Overcorrected	15 (50%)	4 (25%)	6 (38%)	5 (42%)	13 (62%)	9 (53%)
# Appropriately Corrected	15	12	10	7	8	8

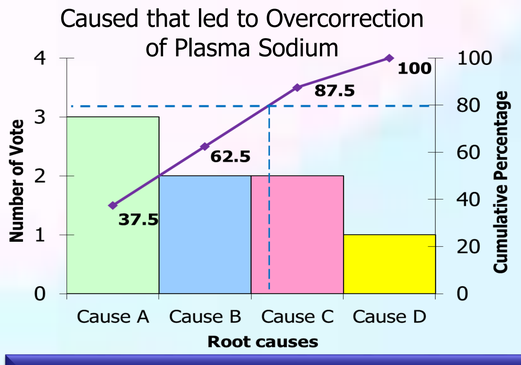
Flow Chart of Process



Cause and Effect Diagram



Pareto Chart



Cause A	No monitoring/treatment guidelines in ED
Cause B	Difficulty in deciphering clinical priority
Cause C	Unaware of clinical guideline in GM E-Bulletin
Cause D	Split responsibility between ED and inpatient

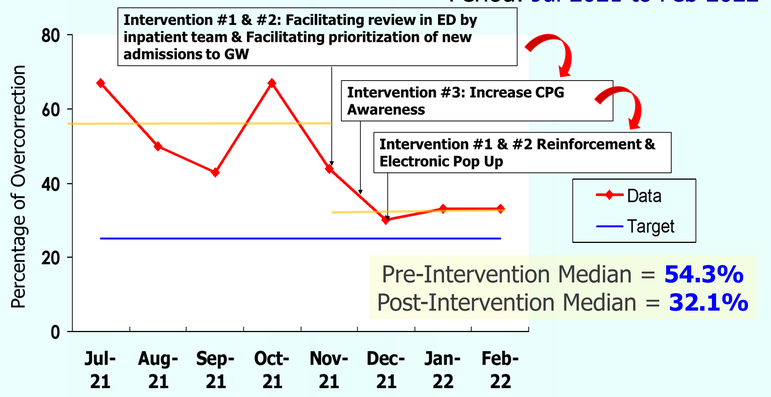
Implementation

SN	Root Cause	Intervention	Implementation Date
1	Time taken for inpatient team to review patients with severe hyponatremia lodged in ED	Reinforce existing workflow for ED Doctor to call inpatient team (waiting time >4 hours)	14 Nov 2021
2	On call medical general ward team (GW) has difficulty deciphering clinical priority of multiple "stable" new admissions	1. Improve precision of admitting diagnosis (to better convey a sense of urgency) i.e. to state "SEVERE hyponatremia" as the primary admitting diagnosis (instead of hyponatremia or symptoms e.g. vomiting) 2. Verbal handover from ED to GW team for early review	14 Nov 2021
3	Lack of awareness of severe hyponatremia CPG in GM bulletin (intranet)	1. Email reminder to junior doctors 2. Incorporate into junior doctors orientation	6 Dec 2021
4	Reinforcing items (1) & (2)	Creation of an electronic popup [see "Strategies to Sustain" below]	14 Dec 2021

Results

Percentage of Overcorrected Plasma Sodium for Severe Hyponatremia Patients

Period: Jul 2021 to Feb 2022



Month	Total # of cases	# Overcorrected	% Overcorrected
Jul 21	6	4	67
Aug 21	10	5	50
Sep 21	7	3	43
Oct 21	6	4	67
Nov 21	9	4	44
Dec 21	10	3	30
Jan 22	6	2	33
Feb 22	9	3	33

Cost Savings

	Pre-Intervention (5 Months)	Post-Intervention (3 Month)
Median LOS (per patient)	10.5	9
Median LOS saved (per patient)	10.5 – 9 = 1.5 days	
Cost saved (per patient)	1.5 x $1,114* = $1,671	
Assumption: Total number of patients with severe hyponatremia in a year (admitted to GM) = 78 x 2 = 156**		
Total Cost Savings (Annualized)	1.5 x 156 x $1,114 = **$260,676**	

**Unit cost for inpatient stay per day per patient = $1,114*

***As per Year 2018, 78 cases over July to December 2018 (to GM alone).*

Problems Encountered

ED Perspective	GM perspective
Different departments have different needs	Difficult to tackle a problem for which there is a strong element of clinical judgement required
Existing workflows affected by COVID-19	Lack of departmental awareness of our CPIP
Starting interventions concurrently makes it difficult to assess effectiveness of individual intervention	"Hard" outcomes less readily available for our CPIP

Strategies to Sustain

- Naturalize interventions - fitting them into the pre-existing system in the least unobtrusive way
- Audit & Reinforcement [see electronic POP up below]
- Feedback re-visitation - changing COVID-19 workflows; ED demands
- Planning regarding integration of interventions into EPIC