

# Optimizing IV Fluids Therapy on Medicine Wards

Vaishvi Patel, Anastasia Howe, Inka Toman, Hernando Leon, Veron Pye and Pamela Mathura

## DEFINE OPPORTUNITY

### BACKGROUND:

IV fluid therapy (IVT) order is one of the most common orders that is placed for a medicine patient admission. Adjustments to intravenous (IV) fluids are made depending on volume status assessment and changing goals of therapy which remain rather subjective and physician dependent. IVF are very impactful and beneficial but can bring harms to patients if used incorrectly. There is no clearly documented Canadian guidelines on IVT. However, NICE (British) guidelines recommended daily reassessment of IV fluids and suggest choosing an alternative enteral way of fluid replacement if IV therapy for rehydration is exceeding 3 days. An Australian study showed the negative effect of both "restrictive" and "liberal" fluid replacement and FEDORA trial emphasized better outcomes in patients with goal-directed hemodynamic therapy compared to standard "liberal" infusions.

As for concurrent use of diuretics with IVT, there are very few indications for it and a cohort study in 2010 from Yale showed that in patients with heart failure it could lead to worse outcomes.

### THE PROBLEM:

Continuous IV fluid orders for admitted patients are not consistently reassessed (for example, there are many unchanged orders beyond 48 H post initial medicine unit admission order). At times, IVT is used concurrently with diuretics which is not only non-beneficial and potentially harmful for the patient, but it also creates unnecessary workload for nursing staff and increases healthcare expenditures.

### OBJECTIVES:

Optimize the use of IV fluids for medicine patients (more frequent reassessments, avoid simultaneous use of diuretics).

**Aim 1:** Reduce the number of IV fluid orders unreviewed beyond 48 hours on general medicine and family medicine units 17, 18, 19 at the Sturgeon Community Hospital (SCH) by over 50% over the post-intervention

**Aim 2:** Decrease the number of adverse events (local, phlebitis/systemic volume overload) due to the use of IV fluids.

**Aim 3:** Decrease the number of simultaneous IV fluid and diuretics orders.

**Aim 4:** Increase knowledge surrounding IV fluid therapy within the healthcare team.

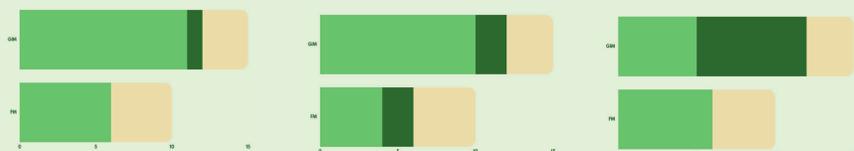
## BUILD UNDERSTANDING

### PROCESS ASSESSMENT:

IV fluids ordering and usage was assessed at three units (17,18, 19) at the Sturgeon Community Hospital using a mixed-method approach including both quantitative and qualitative analysis. Quantitative analysis consisted of a **chart audit**, while qualitative tools included **Gemba Walks** (meeting the staff at each site, observing the clinic space and the standard workflow) as well as the **Cause-and-Effect diagram** and **Process Map**.

### PREINTERVENTION CHART AUDIT:

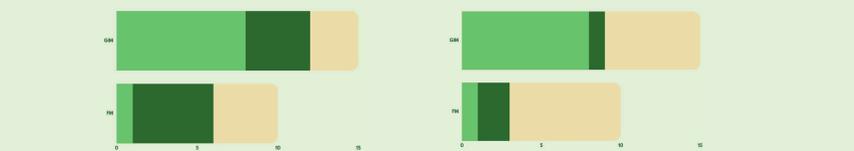
25 patient charts were randomly analyzed to assess IV fluid usage.



12/15 GIM and 6/10 FM patients had IV fluid orders placed on admission. 1/18 orders had a defined stop time.

2/12 GIM and 2/6 FM patients were being given on IV fluids and diuretics simultaneously.

7/12 GIM patients on had unchanged IV fluid order beyond 48 hours.

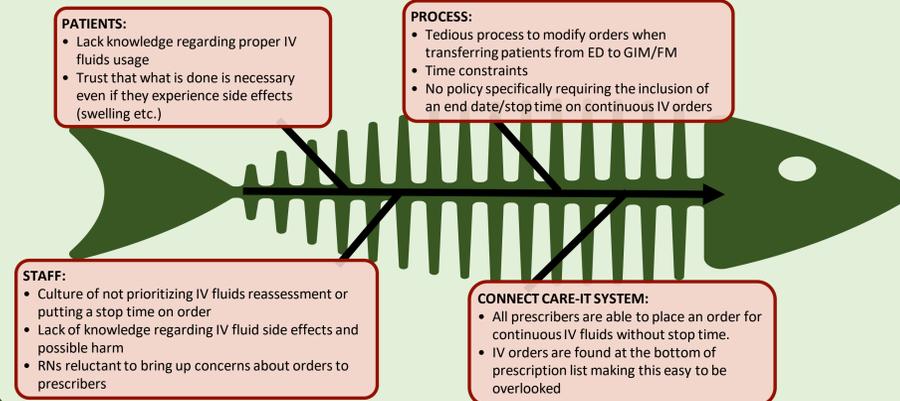


4/12 GIM and 5/5 FM patients on IV fluids had modified diet or NPO ordered.

Out of the patients who had their urine output recorded, 1/9 GIM and 2/3 FM patients had a urine output greater than 2.5L.

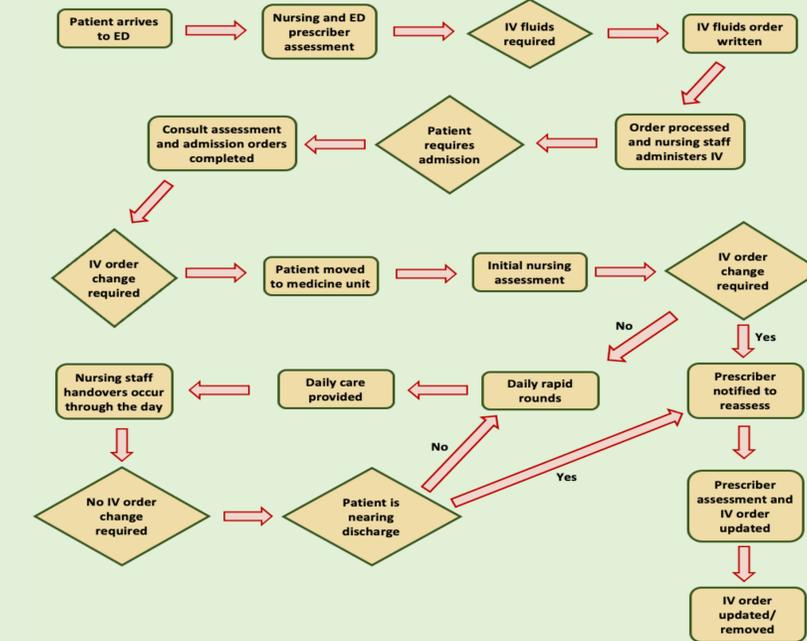
### FISHBONE DIAGRAM:

This method allows the team to list and group potential causes behind the high IV fluid usage.



### CROSS FUNCTIONAL PROCESS MAP:

This map illustrates the current procedure to placing and reassessing IV fluid orders, and this can be used to identify gaps in care areas where interventions would be most beneficial.



Based on the process map, most IVT orders are placed on admission and reminders for reassessment occur at that time and during daily rapid rounds (providing that the nursing staff bring up concerns about IVT to the attention of the attending physician or if the patient is nearing discharge). Otherwise, daily IVF reassessments are mainly based on on physician's memory and clinical judgment.

### REFERENCES AND ACKNOWLEDGEMENTS:

- Effect of goal-directed hemodynamic therapy on postoperative complications in low moderate risk surgical patients: a multicentre randomized controlled trial (FEDORA trial), J. M. Calvo-Vecino, J. Ripollés-Melchor, M. G. Mythen, R. Casans-Frances, A. Baliak, J. P. Artacho, E. Marti'nez-Hurtado, A. Serrano Romero, C. Fernandez Perez, S. Asuero de Lis, and FEDORA Trial Investigators Group, British Journal of Anaesthesia, 120 (4), 734-744, 2018
- Fluid overload, de-resuscitation, and outcomes in critically ill or injured patients: a systematic review with suggestions for clinical practice; Manu L N G Malbrain, Paul F Marik, Ine Witters, Colin Cordemans, Andrew W Kirkpatrick, Derek J Roberts, Niels Van Regenmortel, Anesthesiology and Intensive Therapy, Nov-Dec 2014;46(5):361-80.
- Overuse of intravenous infusions in China: focusing on management platform and cultural problems, Shuangshuang Zeng, Dong Wang, Wanli Liu, Yuanliang Yan, Minwen Zhu, Zhicheng Gong, Shusen Sun, Zheung, International journal of clinical pharmacology, 2019, 41:1133-1137
- The Canadian Vascular Access and Infusion Therapy Guidelines, 2019
- Intravenous fluid therapy in adults in hospital, NICE guideline, May 2013
- Avoiding common problems associated with intravenous fluid therapy, Andrew K Hilton, Vincent A Pellegrino and Carlos D Scheinkestel, MJA, Volume 189, Number 9, 3 November 2008
- Hyperchloremic metabolic acidosis is a predictable consequence of intraoperative infusion of 0.9% saline. Anesthesiology, 1999, 90:1247-1249
- Critical Care medicine, 2017, 45: 1382-88, PMID: 28504980
- Colloids versus crystalloids for fluid resuscitation in critically ill patients. Cochrane database Syst review, 2012, 6: CD000567
- Simultaneous use of intravenous fluids and diuretics in patients hospitalized with heart failure, Larry A. Allen, MD, MHS, JACC: HEART FAILURE VOL. 3, NO. 2, 2015 \* 2015 BY THE AMERICAN COLLEGE OF CARDIOLOGY FOUNDATION ISSN 2213-1779/\$36.00 PUBLISHED BY ELSEVIER INC. <http://dx.doi.org/10.1016/j.jchf.2014.11.001>

We would like to thank all the medicine staff at the Sturgeon Community Hospital.

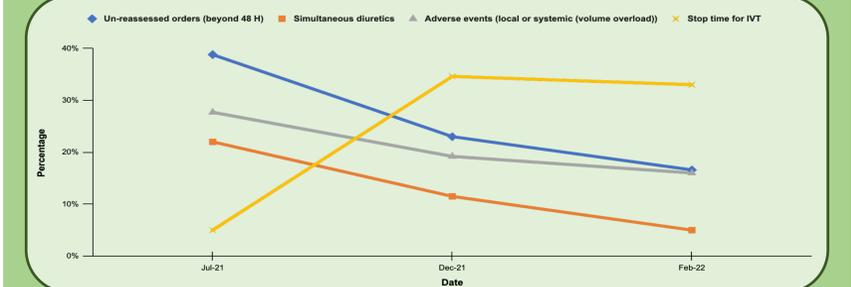
## ACT TO IMPROVE

### INTERVENTION AND MEASUREMENT APPROACH:

Interventions were chosen based on what was the most impactful, manageable, measurable, and affordable, as well as what required the least change to existing workflow.

- Survey:** Nursing and prescribing staff at SCH surveyed about current IV fluid ordering and management practices. Survey results analyzed and gaps identified.
- Education:** Virtual education session on Choosing IV fluids delivered to nursing staff and clinical assistants.
- Mandatory Stop Time:** 14 days of mandatory stop time for IV fluids on first admission order to units 17, 18, 19.
- Survey:** Electronic survey copies distributed to various teams at SCH to assess impact of education and stop time interventions. Survey data analyzed.
- Encouragement:** Staff members given continuous encouragement (Dr. Howe was present on units and discussed measures with the staff) on re-placing stop times on IV fluid orders and more frequent reassessment.
- Sticky Notes:** Nursing staff encouraged to use sticky note function on Connect Care to remind providers about fluids reassessment.
- Audit:** Random patient chart audit performed to assess effect of interventions.
- Feedback and Audit:** Feedback provided to SCH staff on efforts and chart audit performed to assess continuous compliance.

## POST-INTERVENTION RESULTS



### RESULTS:

Post-intervention there was an increase in admission IVF orders that included a 'stop time' (from 5% to 34%), nearly 40% reduction in un-reassessed IVF orders past 48 hours, a reduction in simultaneous IVF and diuretics use, and in adverse events by 33%, and 50%, respectively. The initial goal was not met on all aims but the main goal to achieve decrease adverse events and increase knowledge surrounding IVT was.

## SHARE LEARNING

### LESSONS LEARNED/ CONCLUSION:

Based on the initial chart audit and the process assessment along the multimodal intervention there are challenges to timely reassessment and discontinuance of IV fluids.

**Connect Care interface:** IV fluid orders can be placed without a stop time and are displayed at the bottom of the on-going medication list in Connect Care and thus often missed.

**Priority:** Fluid reassessment is a low priority.

**Role confusion:** There is no clear defined ownership of IV fluid reassessment, resulting in it not being completed.

**Busy environment:** Modifications and reassessments of IV fluids is considered cumbersome and time consuming.

### WHY THIS QI MATTERS:

Adverse events related to IVF misuse are often severe, yet missed. The aim of this QI project was to shed light on the lack of standardization in IV fluid prescription and use a multimodal approach to make improvements. This project intervention outcomes support patient outcomes, increase provider education, and reduce per capita cost of care. We hope that with increased awareness, IV fluid prescribing is given the same priority as other drug prescribing specifically through formal start and stop times. And perhaps inspire an agreement for standardizing IVT prescribing and reassessment practices in Alberta.