Alberta Health Services | University of Alberta | Covenant Health

Edmonton Zone Medicine Quality Council
Partnerships in Action
Strategic Clinical Improvement Committee

Improving Oxygen Use on General Internal Medicine (GIM) Wards

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DEFINE OPPORTUNITY

BACKGROUND:
Oxygen is one of the most accessible and commonly administered drugs in hospitals. Liberal use of oxygen is associated with an increased risk of death in hospitalized patients compared to conservative oxygen use. In a systematic review by Chu et al (1), they found that in 1600 acutely ill patients with normal oxygen saturation, liberal supplementation oxygen therapy did not improve patient outcomes, but in fact increased mortality.

There is documented concern regarding consistent over-prescribing and administration of oxygen therapy within the inpatient setting. The process of delivering appropriate oxygen therapy is complicated by outdated guidelines, varying provider knowledge of the harmful effects of oxygen use and provider comfort level related to oxygen titration and weaning.

PROBLEM:
A current state review of the University of Alberta Hospital five GIM units identified an overuse of oxygen therapy. Of the 50 randomly sampled patients on supplemental oxygen, 36 (72%) patients were at or exceeding ordered target saturations, and 5 (10%) patient charts had documented orders to initiate weaning. Furthermore, 2 (4%) had a documented plan to wean oxygen, however oxygen therapy continued to be documented in various forms (vitals, Kardex/ team sheet and Nursing notes). These patients spent an average of 9.4 days on oxygen. Excess oxygen use may negatively impact patient outcomes by increasing mortality, morbidity and increased length of stay, as well as increasing healthcare costs.

AIM STATEMENT
For PDSA#1 - By October 2019 we will increase formal oxygen weaning orders by 50% by:

- Adding a weaning flowchart to existing oxygen policy
- Increase nursing and physician education/awareness of best practice in the form of education sessions
- Increasing visual cues to wean in the form of posters
- Calling attention to the patients on oxygen therapy by documenting on the "Doctor's Board"

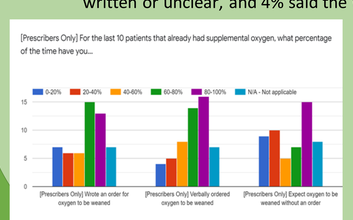
Using these interventions we successfully increased formal written oxygen weaning orders from 10% of patients to 30% of patients

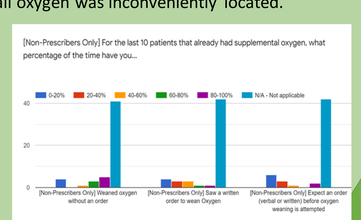
MANAGE CHANGE

COLLABORATIONS & COMMUNICATION STRATEGIES:
For change implementation to be successful it is vital to engage the main stakeholders and ensure that they buy into the proposed interventions.

We surveyed 54 health professionals from medicine, nursing, physiotherapy at various levels of training. Practitioners had between 1-25 years of experience. 87% of practitioners reported they learned oxygen management techniques through practical experience/clinical rotations, and other sources of education included professional school lectures, journals and practice guidelines.

46% of providers cited a lack of time/heavy workload as their biggest barrier to weaning. 31% stated that a major barrier to weaning was patients or nursing staff feeling more comfortable with oxygen remaining on, 5% said orders were either not written or unclear, and 4% said the wall oxygen was inconveniently located.

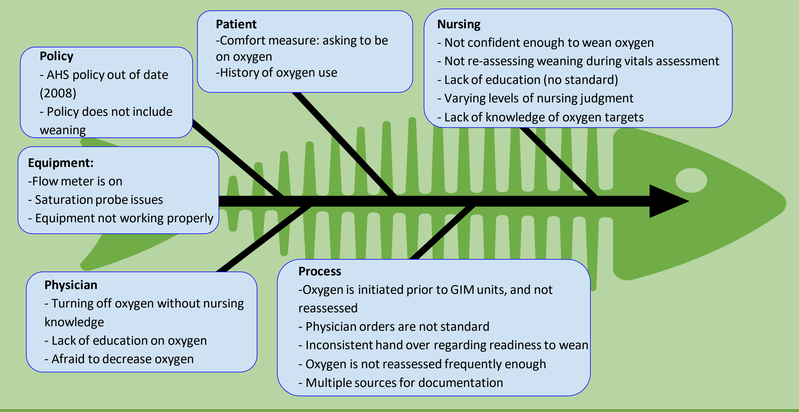




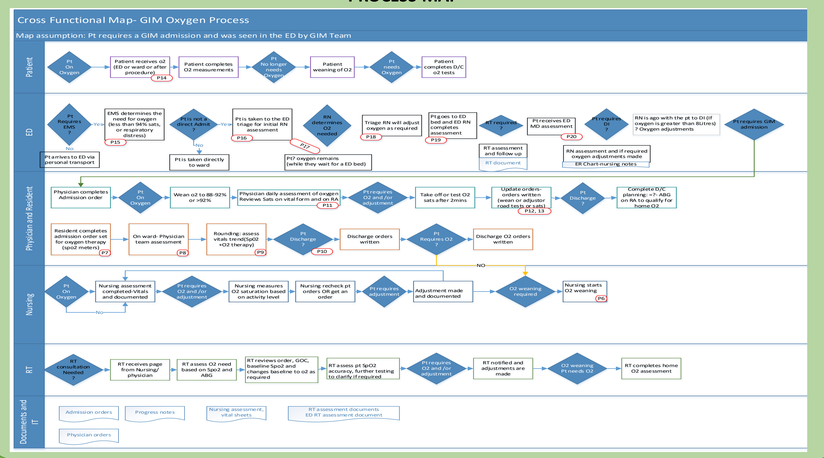
BUILD UNDERSTANDING

PROCESS ASSESSMENT:
We conducted a literature review from 2009-2019 including data about oxygen therapy gaps and solutions. In collaboration with the healthcare providers involved in administering oxygen therapy to patients on five GIM units, the **Cause-and-Effect diagram**, **process map**, and **Gemba walk** (meeting the staff on each unit and observing workflow) were completed to help determine current process and gaps in practice.

CAUSE-AND-EFFECT/ FISHBONE DIAGRAM
This method allows the team to list and group potential causes behind oxygen overuse in GIM units.

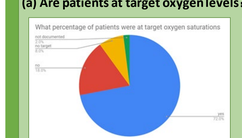


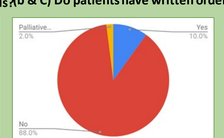
PROCESS MAP

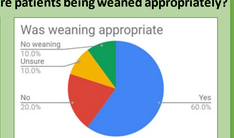


STRENGTH STATEMENT:
Oxygen is being appropriately ordered by physicians and guidelines are in place to ensure that patients do not experience the detrimental effects of low oxygen saturations. Nursing staff and respiratory therapists are closely monitoring patient vitals and recording them often to ensure patient safety, and these findings are communicated face to face during rapid rounds. There are occasional documented efforts to wean oxygen when nursing staff feel comfortable to do so. These behaviours show patient safety is being prioritized and that oxygen delivery is timely when required.

QUANTITATIVE ANALYSIS
(a) Are patients at target oxygen levels? (b & C) Do patients have written orders to wean (Pre-PDSA 1/PDSA 1) (d) Are patients being weaned appropriately?







(a) 72% of patients had saturations that were at or exceeding their ordered target, **(b & c)** In Pre-PDSA Cycle 1 only 10% of patients had formal written weaning orders, compared to Post-PDSA 1 where 30% of patients had formalized weaning orders **(d)** and emerging trend found in Post-PDSA 1 was that patients were being weaned inapropriately (those on Home oxygen for COPD, and palliative patients near end of life.

ACT TO IMPROVE

Baseline
1) Weaning not taught in student, resident physician or nursing orientations
2) Unit oxygen policy not updated since 2008, and does not include weaning guidelines
3) Physicians and Nurses have informal conversations about when to wean patients
4) Medicine admission order set does not have space to indicate when to wean patient
4) Formal orders to wean oxygen are usually written only at discharge

Phase 1: Interventions from PDSA Cycle 1
1) Visual cues to oxygen use and weaning
- Posters encouraging weaning placed strategically around unit and GIM handover room

2) Education sessions for provider knowledge and confidence building
- Session at orientation done by clinical nurse educator (CNE) for new staff
- Session for current nursing staff done by CNE
- Session for students and resident physicians done during orientation

4) Daily discussion of patients on oxygen and readiness to wean through use of the unit "Doctor's Board"
5) Provide a weaning flowchart to accompany the oxygen policy

Phase 2: Proposed Interventions for PDSA Cycle 2
1) Visual cues to oxygen use and weaning
- Weaning orders to be added into Connect Care under "Medications"
- Stop dates on oxygen therapy to reinforce reassessment

2) Continue education sessions for new staff and students/residents, ensuring it matches what is in Connect Care
- Focus on provider comfort working in the SpO2 range of 92-96%
- Appropriate vs inappropriate weaning practices

3) Creating flags or triggers in Connect Care Graphs for visual cues of when weaning should begin
4) Inserting the weaning algorithm into Connect Care for ease of provider use

SUSTAIN RESULTS

REINFORCE OWNERSHIP & MEASUREMENT:
- We will complete a post-discharge chart audit of patients who were discussed using the "Doctor's Board" tool during morning rounds to learn if this intervention was effective at increasing weaning and decreasing total time spent on oxygen. If determined to be successful we will continue its use.
- We will continue educating new staff on oxygen ordering, titration and weaning to improve practitioner confidence.

CONTINUOUS IMPROVEMENT:
- To increase the number of patients who have formal weaning orders written in PDSA Cycle 2 we will introduce changes to the Connect Care admission orders to include weaning parameters for oxygen therapy.
- We will also continue to conduct teaching/orientation sessions for new learners, nursing staff and physicians.

SHARE LEARNING

LESSONS LEARNED:
The GIM teams relied on face-to-face communication regarding oxygen therapy, especially with respect to decision to wean oxygen.

There was a lack of formal, centralized documentation of oxygen orders, monitoring and discontinuation of oxygen on the patient charts.

Acknowledgements

Thank you to the University of Alberta GIM unit staff, physicians and management for the direction and assistance during chart reviews and developing interventions.

WHY THIS QUALITY IMPROVEMENT MATTERS

...TO PATIENTS
In acutely ill patients, the liberal use of oxygen is not associated with better clinical outcomes, but rather an increase in mortality. Therefore, overuse of oxygen may potentially lead in increased hospital stay, morbidity and mortality.

...TO ALBERTANS
Optimizing oxygen use may help prevent complications associated with excess oxygen and shorten hospital stays due to oxygen overuse.

...TO THE HEALTHCARE SYSTEM
Improving the use of oxygen may decrease cost to the healthcare system by shortening length of hospital stay and treatment to manage complications.

References
(1) Chu, D. K., Kim, L. H., Young, P. J., Zamiri, N., Almenawer, S. A., Jaeschke, R., ... & Alhazzani, W. (2018). Mortality and morbidity in acutely ill adults treated with liberal versus conservative oxygen therapy (IOTA): a systematic review and meta-analysis. *The Lancet*, *391*(10131), 1693-1705.