May 11th, 11:30 AM - 1:30 PM

Cost Savings from Implementation of Low-Flow Anesthesia

Laura Levine
Children's Mercy Hospital

Cost Savings from Implementation of Low-Flow Anesthesia

Submitting/Presenting Author (must be a trainee): Laura Levine, MD
Primary Email Address: ljoslin@cmh.edu

☐ **Resident/Psychology Intern**
× **Fellow**

Primary Mentor (one name only): Todd Glenski, MD
Other authors/contributors involved in project:

IRB Number (if applicable): n/a

Describe role of Submitting/Presenting Trainee in this project (limit 150 words):

The trainee became involved in the project after the potential for low-flow anesthesia to decrease the cost of inhaled anesthetics and reduce environmental exposure to greenhouse gases had been identified. With her mentor, the trainee then collected data from spot-checks over several months, which helped gauge how many anesthesia providers were using low-flow anesthesia in their practice. This data was then used to report the anesthesia department's progress at morning huddles and compare compliance over multiple months with graphs and tables. The trainee has also been working on completing an A3 diagram for the project and a quality improvement project write-up according to the SQUIRE method through the Improvement Academy's Problem Solving for Fellows course.

Problem Statement/Question, Background/Project Intent (Aim Statement), Methods (include PDSA cycles), Results, Conclusions limited to 500 words

Problem Statement/Question:

The inability to monitor patient-efficient fresh gas flows (FGF) and concerns of CO2 absorbent byproducts have shaped the current anesthesia practice of using at least 2 L FGFs while delivering volatile anesthetics. This results in inefficient delivery of the volatile anesthetic which leads to extra costs and gas exposure. With newer CO2 absorbents and anesthesia machine software, the goal is to implement low-flow anesthesia to decrease the amount of volatile anesthesia used.

Background/Project Intent (Aim Statement):

By March 2020, the anesthetics completed per bottle of Sevoflurane used will increase by at least 20%.

Methods (include PDSA cycles):

PDSA Cycle 1 (3/13/2019 – 4/26/19):

Plan:

We now use CO2 absorbents that eliminate byproducts, thus making low-flow anesthesia a safe option. Our anesthesia machines are now capable of utilizing a "Low-Flow Wizard", which calculates the minimal gas-flows needed. The initial step is to show the potential cost savings of low-flow anesthesia.

Do:

Data was collected from twenty laparoscopic appendectomies. For the current practice technique, the anesthesia provider was told to do their "normal" anesthetic technique using sevoflurane. For the low-flow technique, we instructed the anesthesia provider to use less than <1 L fresh gas flows while delivering sevoflurane. At the end of the procedure, the amount used (cc's) of sevoflurane was collected.

Study:

a. Percent reduction of sevoflurane using low-flow technique: **57%**
b. Potential savings based on FY 2017 ($397,513) and FY 2018 ($228,622) purchases of sevoflurane per year using low-flow: **$178,448**

Act:

1. Change the default view on anesthesia machines to include "Low-Flow Wizard".
2. Educate providers to utilize the "Low-Flow Wizard".

PDSA Cycle 2 (4/24/2019 – Current)

Plan:

The cost analysis performed in the PDSA cycle 1 shows the potential savings with a practice change to low-flow anesthesia. The next step is to educate staff and have the "Low-Flow Wizard" easily accessible for providers to view.

Do:

1. Add the "Low-Flow Wizard" on the default view of the anesthesia machine.
2. Educate staff at morning huddles.

Study:

1. Utilize spot-checks to determine how many anesthesia providers have incorporated low-flow into their practice.
2. Collect data on the total number of sevoflurane bottles purchased per month to calculate the number of anesthetics completed per sevoflurane bottle.

Act:

1. Begin a real time cost analysis that can show if the number of anesthetics completed per bottle of sevoflurane is increasing. An increasing number would indicate less sevoflurane being used per anesthetic.

Results:
In PDSA Cycle 1, the cc's used of sevoflurane was significantly lower in the low-flow anesthesia group, with a potential cost savings of over $170,000 a year. In PDSA Cycle 2, the anesthesia providers utilizing low-flow anesthesia increased from 45% to 75%, and the number of anesthetics completed per bottle of sevoflurane increased from an average of 8.33 to 10.35 after the implementation of the "Low-Flow Wizard".

Conclusions:
Changing the practice of delivering at least 2L FGFs to low-flow anesthesia has the potential for significant cost savings as well as a positive environmental impact. Low-flow anesthesia is a substantial value-added enhancement.