ASPIRE Measures
TEMP 02

June 2021

Holly Lockwood BSN, MBA

Temperature & MPOG SSI Toolkit

- Hypothermia triggers vasoconstriction and subsequent tissue hypoxia which impairs wound healing. Hypothermia may also impair neutrophil function, reducing the bodies natural protection against infection
- ASPIRE measures support SSI prevention
- Hypothermia commonly occurs during and after surgery due to impairment of thermoregulation caused by anesthesia medications and exposure to the cold environment of the operating room
- Redistribution of body heat from the core to the periphery decreases the core temperature 1-1.5 degrees Celsius during the first hour of anesthesia.
- After hour one of surgery, core temperature decreases at a slower rate.
- Pre-warming allows the peripheries to warm and decrease the overall impact to core temperature changes when redistribution occurs.

ASPIRE Measure: TEMP 02

Measure Summary: The percentage of cases where the anesthesia provider documented at least one core temperature intraoperatively for any patient receiving a general anesthetic.

Core or Near Core Temperature Monitoring Includes:

- Pulmonary Artery Temperature
- Distal Esophageal Temperature
- Nasopharyngeal Temperature
- Tympanic Membrane Temperature
- Bladder Temperature
- Rectal Temperature
- Axillary Temperature (arm must be at patient side)
- Oral Temperature

Inclusions: All surgical patients receiving general anesthesia

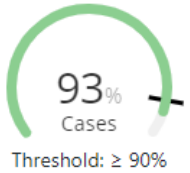
Success: Cases with at least one core temperature documented between Anesthesia Start and Patient out of Room.

Responsible Provider: Provider present at induction end

https://mpog.org/files/quality/measures/TEMP-02_spec.pdf

Temp 02 Core Temperature

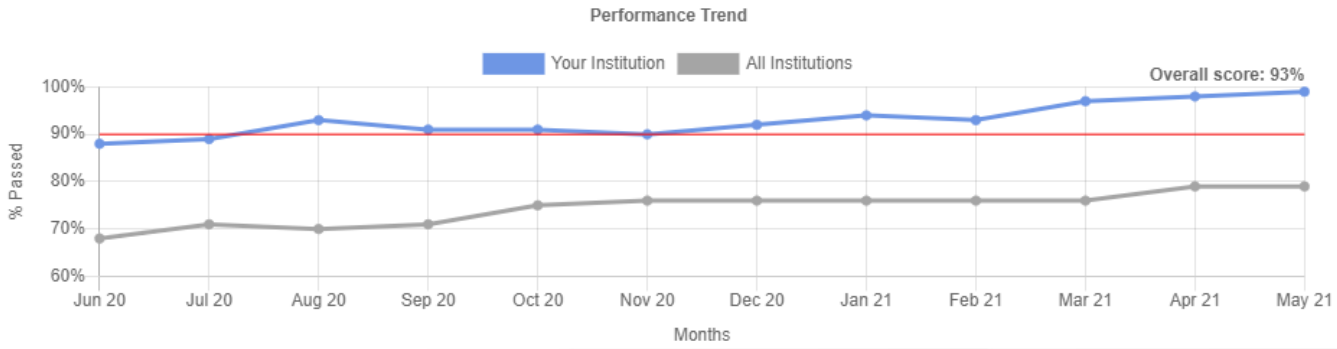
Overall Score



Threshold: ≥ 90%

Result Counts

Result	Case Count
Passed	6,521
Flagged	507
Excluded	7,675
Total	**14,703**

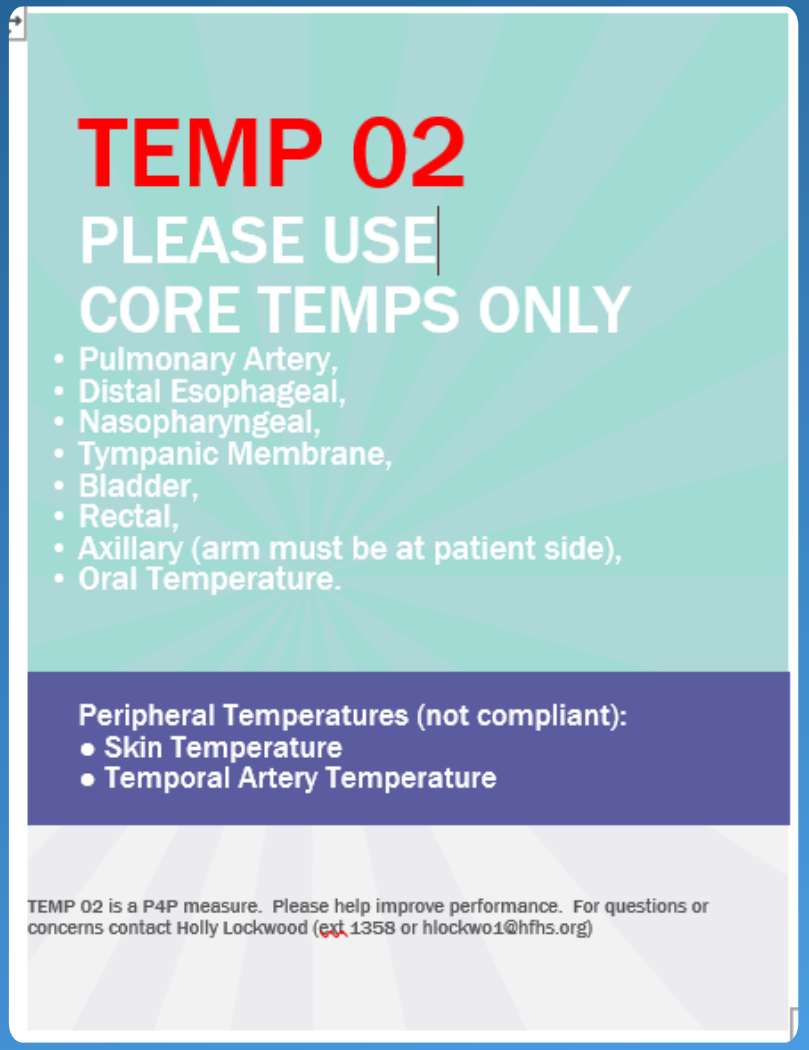


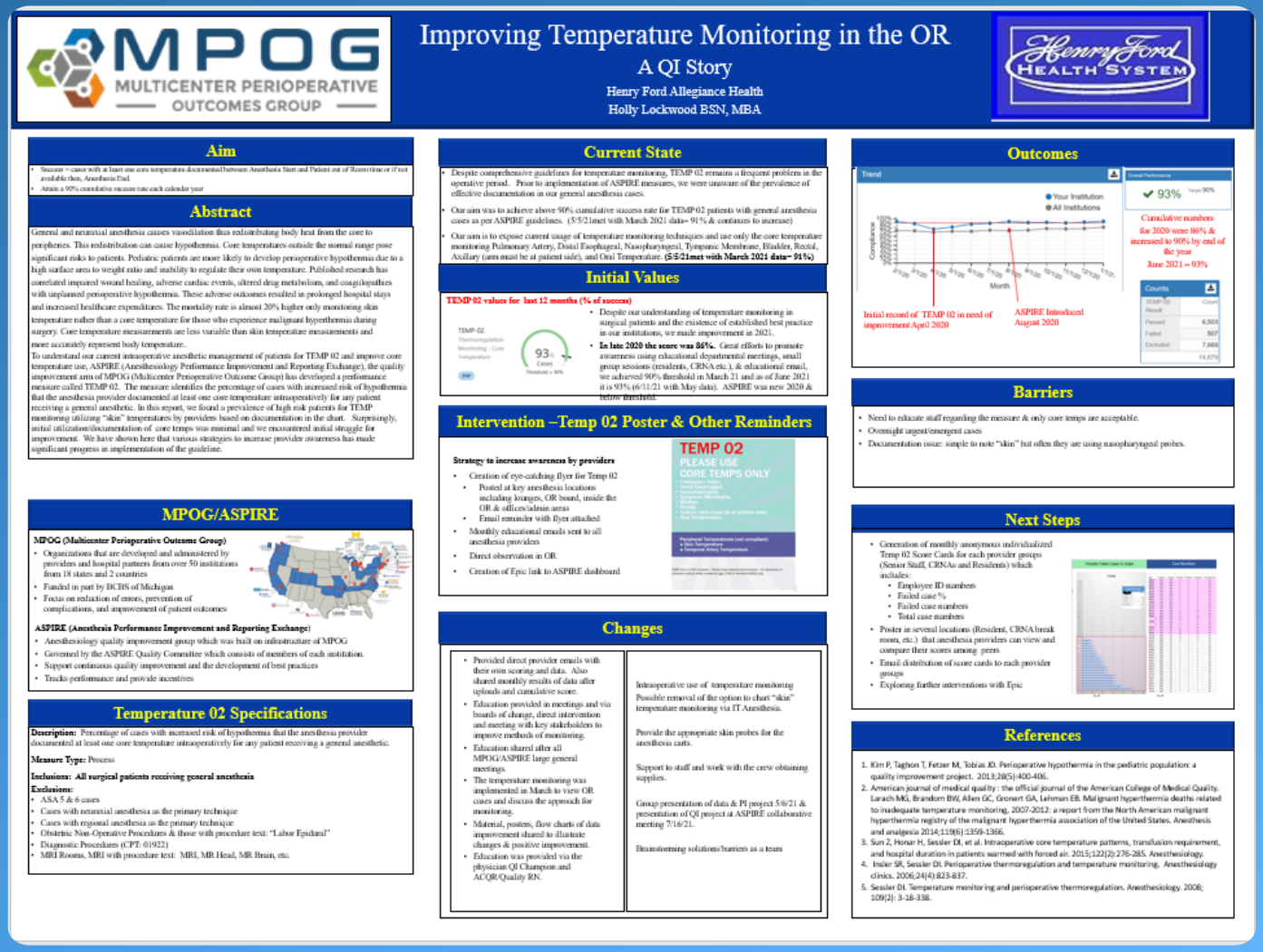
MPOG Summary of Recommendations: Normothermia

1. Apply active warming to maintain core body temperature of 36.0 degrees Celsius
2. Surgical patients often experience hypothermia within the first hour after induction of general anesthesia due to the anesthetic induced vasodilation.
3. Maintaining a core temperature below 36 degrees Celsius increases the rate of surgical site infections

(Allegranzi et al., 2016; Ban et al., 2017; Kurz, 2008; Kurz, Sessler, & Lenhardt, 1996; Sessler, 2016)

Temp 02 Tools





Improving Temperature Monitoring in the OR

A QI Story

Henry Ford Allegiance Health
Holly Lockwood BSN, MBA

Aim

Success = cases with at least one core temperature documented between Anesthesia Start and Patient out of Room time or if not available then, Anesthesia End.
Attain a 90% cumulative success rate each calendar year

Abstract

General and neuraxial anesthesia causes vasodilation thus redistributing body heat from the core to peripheries. This redistribution can cause hypothermia. Core temperatures outside the normal range pose
significant risks to patients. Pediatric patients are more likely to develop perioperative hypothermia due to a
high surface area to weight ratio and inability to regulate their own temperature. Published research has
correlated impaired wound healing, adverse cardiac events, altered drug metabolism, and coagulopathies
with unplanned perioperative hypothermia. These adverse outcomes resulted in prolonged hospital stays
and increased healthcare expenditures. The mortality rate is almost 20% higher only monitoring skin temperature rather than a core temperature for those who experience malignant hyperthermia during
surgery. Core temperature measurements are less variable than skin temperature measurements and more accurately represent body temperature..
To understand our current intraoperative anesthetic management of patients for TEMP 02 and improve core temperature use, ASPIRE (Anesthesiology Performance Improvement and Reporting Exchange), the quality improvement arm of MPOG (Multicenter Perioperative Outcome Group) has developed a performance measure called TEMP 02. The measure identifies the percentage of cases with increased risk of hypothermia that the anesthesia provider documented at least one core temperature intraoperatively for any patient receiving a general anesthetic. In this report, we found a prevalence of high risk patients for TEMP monitoring utilizing "skin" temperatures by providers based on documentation in the chart. Surprisingly, initial utilization/documentation of core temps was minimal and we encountered initial struggle for improvement. We have shown here that various strategies to increase provider awareness has made significant progress in implementation of the

MPOG/ASPIRE

MPOG (Multicenter Perioperative Outcome Group)
Organizations that are developed and administered by providers and hospital partners from over 50 institutions from 18 states and 2 countries
Funded in part by BCBS of Michigan
Focus on reduction of errors, prevention of complications, and improvement of patient outcomes

ASPIRE (Anesthesia Performance Improvement and Reporting Exchange)
Anesthesiology quality improvement group which was built on infrastructure of MPOG
Governed by the ASPIRE Quality Committee which consists of members of each institution.
Support continuous quality improvement and the development of best practices
Tracks performance and provide incentives

Temperature 02 Specifications

Description: Percentage of cases with increased risk of hypothermia that the anesthesia provider documented at least one core temperature intraoperatively for any patient receiving a general anesthetic.

Measure Type: Process

Inclusions: All surgical patients receiving general anesthesia
Exclusions:
ASA 5 & 6 cases
Cases with neuraxial anesthesia as the primary technique
Cases with regional anesthesia as the primary technique
Obstetric Non-Operative Procedures & those with procedure text: "Labor Epidural"
Diagnostic Procedures (CPT: 01922)
MRI Rooms, MRI with procedure text: MRI, MR Head, MR Brain, etc.

Current State

Despite comprehensive guidelines for temperature monitoring, TEMP 02 remains a frequent problem in the operative period. Prior to implementation of ASPIRE measures, we were unaware of the prevalence of effective documentation in our general anesthesia cases.

Our aim was to achieve above 90% cumulative success rate for TEMP 02 patients with general anesthesia cases as per ASPIRE guidelines. (5/5/21met with March 2021 data= 91% & continues to increase)

Our aim is to expose current usage of temperature monitoring techniques and use only the core temperature monitoring Pulmonary Artery, Distal Esophageal, Nasopharyngeal, Tympanic

Initial Values

TEMP 02 values for last 12 months (% of success)

Despite our understanding of temperature monitoring in surgical patients and the existence of established best practice in our institutions, we made improvement in 2021.
In late 2020 the score was 86%. Great efforts to promote awareness using educational departmental meetings, small group sessions (residents, CRNA etc.), & educational email, we achieved 90% threshold in March 21 and as of June 2021 it is 93% (6/11/21 with May

Intervention –Temp 02 Poster & Other Reminders

Strategy to increase awareness by providers
Creation of eye-catching flyer for Temp 02
Posted at key anesthesia locations including lounges, OR board, inside the OR & offices/admin areas
Email reminder with flyer attached
Monthly educational emails sent to all anesthesia providers
Direct observation in OR
Creation of Epic link to ASPIRE dashboard

Changes

Provided direct provider emails with their own scoring and data. Also shared monthly results of data after uploads and cumulative score.
Education provided in meetings and via boards of change, direct intervention and meeting with key stakeholders to improve methods of monitoring.
Education shared after all MPOG/ASPIRE large general meetings.
The temperature monitoring was implemented in March to view OR cases and discuss the approach for monitoring.
Material, posters, flow charts of data improvement shared to illustrate changes & positive improvement.
Education was provided via the physician QI Champion and ACQR/Quality RN.

Intraoperative use of temperature monitoring
Possible removal of the option to chart "skin" temperature monitoring via IT Anesthesia.

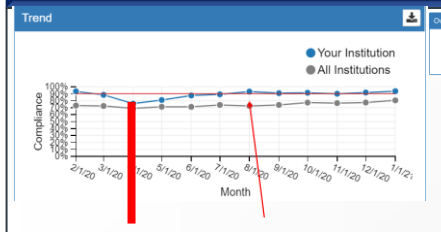
Provide the appropriate skin probes for the anesthesia carts.

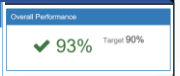
Support to staff and work with the crew obtaining supplies.

Group presentation of data & PI project 5/6/21 & presentation of QI project at ASPIRE collaborative meeting 7/16/21.

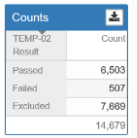
Brainstorming solutions/barriers as a team

Outcomes





Cumulative numbers for 2020 were 86% & increased to 90% by end of the year
June 2021 = 93%



Initial record of TEMP 02 in need of improvement April 2020

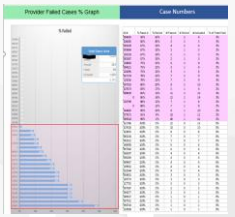
ASPIRE Introduced August 2020

Barriers

Need to educate staff regarding the measure & only core temps are acceptable.
Overnight urgent/emergent cases
Documentation issue: simple to note "skin" but often they are using nasopharyngeal probes.

Next Steps

Generation of monthly anonymous individualized Temp 02 Score Cards for each provider groups (Senior Staff, CRNAs and Residents) which includes:
Employee ID numbers
Failed case %
Failed case numbers
Total case numbers
Poster in several locations (Resident, CRNA break room, etc.) that anesthesia providers can view and compare their scores among peers
Email distribution of score cards to each provider groups
Exploring further interventions with Epic



References

1. Kim P, Taghon T, Fetzer M, Tobias JD. Perioperative hypothermia in the pediatric population: a quality improvement project. 2013;28(5):400-406.
2. American journal of medical quality : the official journal of the American College of Medical Quality. Larach MG, Brandom BW, Allen GC, Gronert GA, Lehman EB. Malignant hyperthermia deaths related to inadequate temperature monitoring, 2007-2012: a report from the North American malignant hyperthermia registry of the malignant hyperthermia association of the United States. Anesthesis and analgesia 2014;119(6):1359-1366.
3. Sun Z, Honar H, Sessler DI, et al. Intraoperative core temperature patterns, transfusion requirement, and hospital duration in patients warmed with forced air. 2015;122(2):276-285. Anesthesiology.
4. Insler SR, Sessler DI. Perioperative thermoregulation and temperature monitoring. Anesthesiology clinics. 2006;24(4):823-837.
5. Sessler DI. Temperature monitoring and perioperative thermoregulation. Anesthesiology. 2008; 109(2): 3-18-338.

Thank You!

Glu 03: High Glucose, Periop

Dr. Merajuddin Khan
Henry Ford Macomb

Henry Ford Health System

ALL FOR YOU

GLU 03

Measure Description:

- Percentage of cases with perioperative glucose > 200 mg/dL with administration of insulin or glucose recheck within 90 minutes of original glucose measurement

Measure Time Period:

- Preop through PACU

GLU 03

Inclusions:

- All patients with glucose level greater than 200 mg/dL
- Patients with ***and*** without diagnosis of diabetes

Exclusions:

- ASA 5 and 6 cases
- Patients < 12 years of age.
- Glucose measurements > 200 mg/dL within 90 minutes before measure end
- Outpatient cases with Anesthesia Start to Anesthesia end time less than 4 hours long
- Obstetric Non-Operative Procedures
- Labor Epidurals

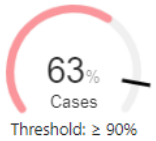
GLU 03

Success:

- Administration of insulin within 90 minutes
- Recheck of glucose level within 90 minutes

GLU 03- Current Scores

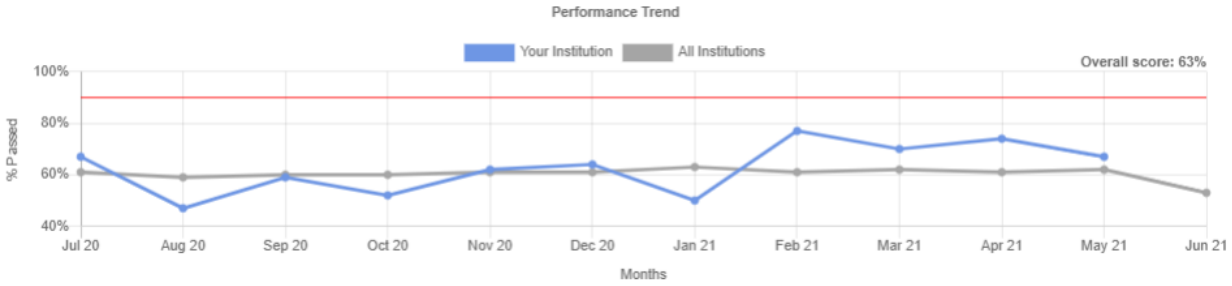
Overall Score

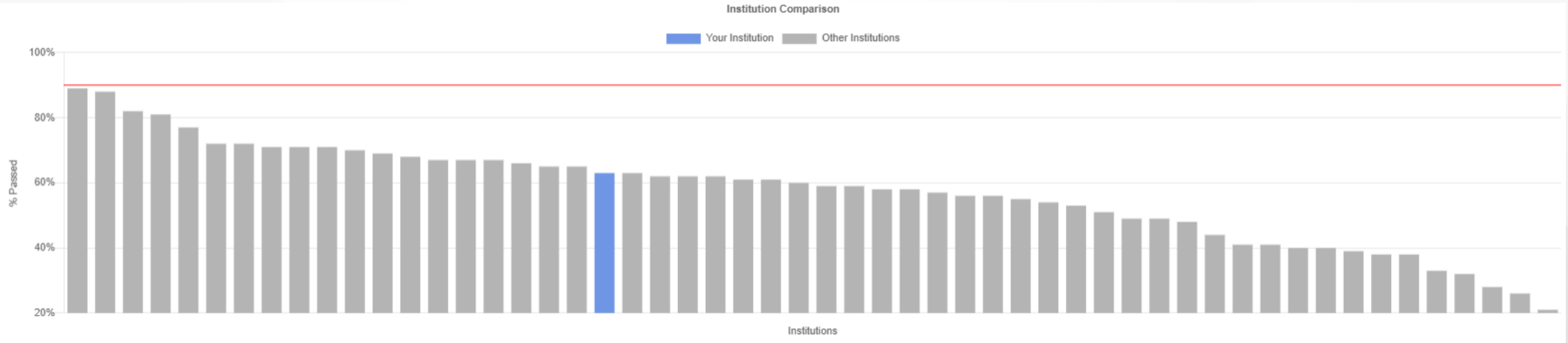


Threshold: ≥ 90%

Result Counts

Result	Case Count
Passed	160
Flagged	94
Excluded	18,652
Total	**18,906**





Henry Ford Health System ALL FOR YOU

GLU 03- Breakdown of Scores

MPOG/ASPIRE Metrics		Macomb						
Measure		Target/ Threshold	Jan-21	Feb-21	Mar-21	Apr-21	May-21	12 Month Rolling
Glucose Management	GLU 03: Glucose >200 with admin of insulin or glucose recheck within 90 mins (Peri-op)	90%	50	77	70	74	67	63

GLU 03- Actions

Implemented

- Educated anesthesia providers on glucose measures (June 21)
- Educated Pre and Postop staff on glucose measures (May 21)
- Added time glucose was taken to pre-op handoff sheet
- Analyzed ASPIRE data and counseled all providers who are not passing this measure

Next Steps

- Glucose BPA in Epic
  - Including a reminder to treat or recheck glucose
- Health system working on revising Tier 1 glucose policy
- Continue to analyze ASPIRE data and counsel all providers who are not passing this measure

Thank you!

SUS- 01: Low Fresh Gas Flow

Dr. Jimmy Boutin
Henry Ford Wyandotte

SUS 01

Measure Description:

- Percentage of cases with mean fresh gas flow (FGF) equal to, or less than 3L/min, during administration of halogenated hydrocarbons and/or nitrous oxide
  - Indirect measure of gas waste
  - Measure includes the time between placement of endotracheal tube or supraglottic airway and removal of the device
  - Excludes pre-oxygenation and emergence (inspired gas equal to zero)

Rational:

- Halogenated agents and nitrous oxide leaking or vented into the atmosphere are environmental pollutants. Reducing fresh gas flows can reduce cost of anesthesia without compromising patient care

SUS 01

Inclusions:

- Administration of anesthetic gases for greater than or equal to 30 minutes

Exclusions:

- Cases in which halogenated hydrocarbons and nitrous oxide are NOT used
- Cases in which maintenance period < 30 minutes
- Cases with > 20% of FGF values manually entered during the case
- Cases in which nitric oxide is administered

Success:

- Mean FGF equal to, or less than 3L/minute when inspired halogenated hydrocarbons is >0.2%, or nitrous oxide FGF >0.2L/min, during the maintenance period of anesthesia

SUS 01

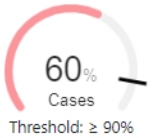
Atmospheric Lifetime and 100-year Global Warming Potential (GWP) of Commonly Used Anesthetic Vapors

Agent	Atmospheric Lifetime	GWP*
Sevoflurane	1.1 years	130
Isoflurane	3.2 years	510
Desflurane	14 years	2,540
Nitrous Oxide	114 years	298

*GWP is expressed relative to CO_2 which has a GWP of 1

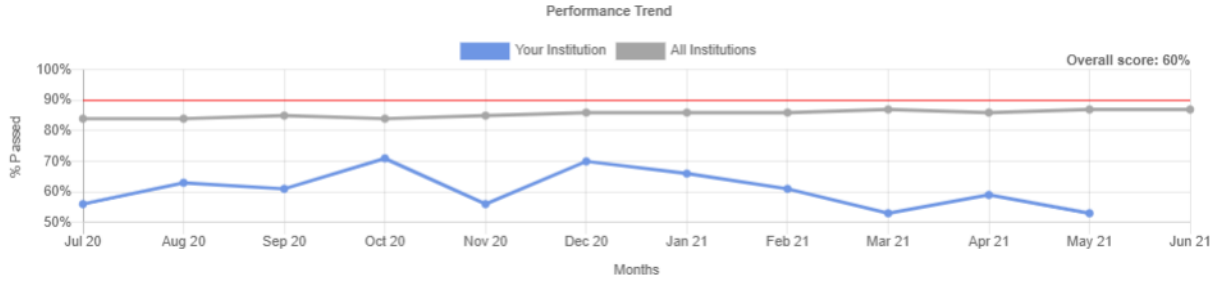
SUS 01-Current Data

Overall Score



Result Counts

Result	Case Count
Passed	1,193
Flagged	784
Excluded	13,174
Total	**15,151**



*Data subject to change once inspired agents recorded in Epic

SUS 01- Prior Recommendations

- Recommendations for FGF rates using sevoflurane from the FDA and sevoflurane manufacturers were made prior to safer CO2 absorbents
- This recommendation was exposure should not exceed 2 MAC – hours at flows 1-2 L/min
- FGF rates less than one not recommended
- CO2 absorbents with strong bases are worse
- Newer absorbents with no KOH and low NaOH do not produce compound A

At Henry Ford Wyandotte the Co2 absorbent has no KOH and less than 4% NaOH

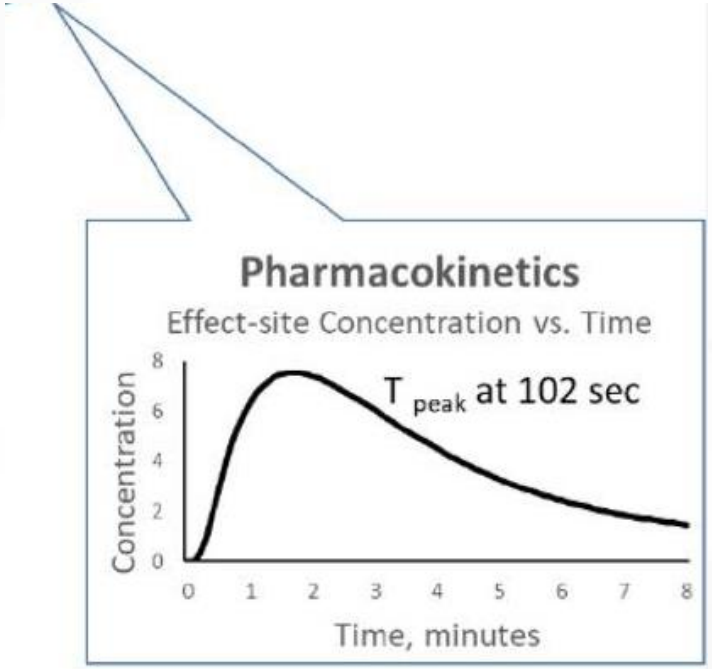
SUS 01- Observational Data

CRNA	Flow Rates	Minutes
1	15 L/min 4 L/min	4 1
2	15 L/min	5
3	15 L/min	5
4	10 L/min 2 L/min	1 4
5	15 L/min	5
6	8 L/min	5
7	15 L/min	5
8	6 L/min	5
9	15 L/min	5
10	15 L/min	5

Providers were observed for 5 minutes after induction and FGF rates were noted.

SUS 01-Pharmacokinetics of Propofol

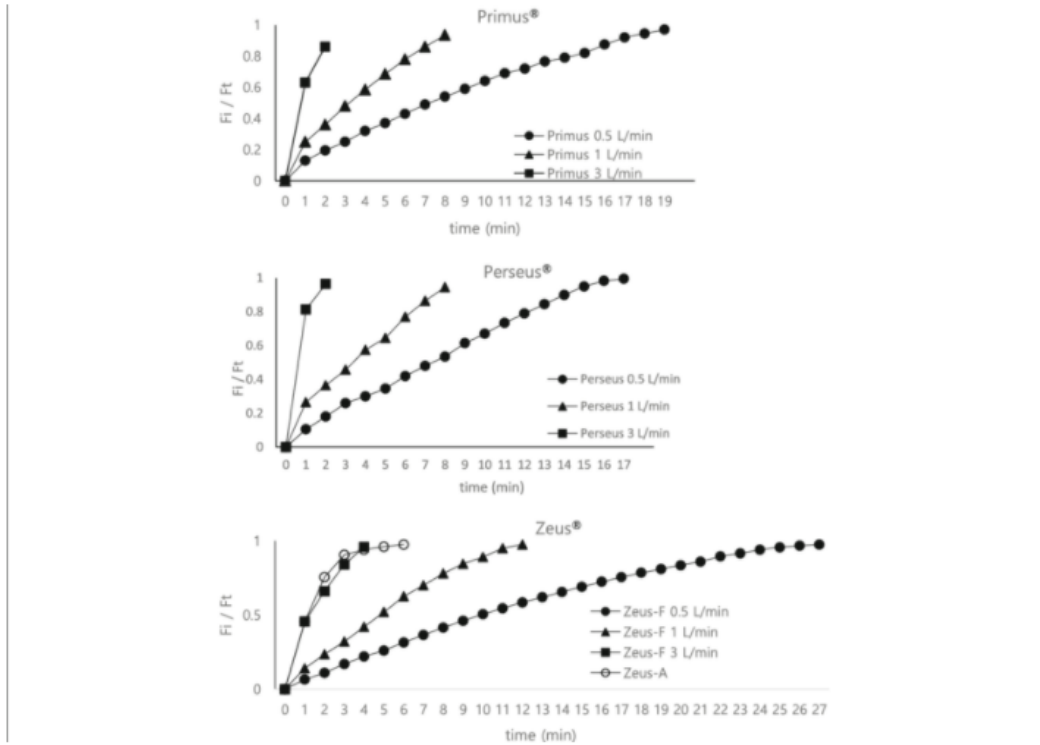
- The peak concentration for a bolus dose of propofol is approximately 2 minutes
- At 5 minutes there is approximately slightly less than half the peak concentration



SUS 01- Sevoflurane

- Due to sevoflurane's low blood-gas coefficient there is a quick onset
- The rate of induction is related to the gas coefficient, pulmonary blood flow, and minute ventilation
- A study analyzed the time to reach a target concentration (2 MAC = 4%) at variable FGF rates (0.5 L/min, 1 L/min, & 3 L/min) and vaporizer set at 6%
  - Appears that in 2 mins at a FGF rate of 3 L/min the inspired concentration is close to reaching the target.
  - A FGF rate of 1 L/min takes approximately 8 mins

SUS 01- Sevoflurane



The Fi/Ft ratio curves at variable rate of fresh gas flow (FGF) and different types of anesthesia machine (Primus ® , Perseus ® , and Zeus ® [Zeus ® - F; Zeus ® fresh gas mode, Zeus ® -A; Zeus ® auto-mode]). The Fi is the sevoflurane concentration measured at the Y-piece of breathing circuit, while the Ft is the target sevoflurane concentration.)

SUS 01- Tips/Actions

Tips

- When fresh gas flow exceeds the patient's requirement, gases and vapors will enter the scavenging system and into the atmosphere
- Minimizing the total fresh gas flow limits the environmental impact of volatile agents
- Strategies to mange fresh gas flow
  - Turn off the fresh gas flow, not the vaporizer, during intubation
  - Minimize fresh gas flow during maintenance
  - Set the vaporizer to deliver a concentration greater than intended

Actions

- Review this presentation with all providers – anesthesiologists and CRNA's
- Analyze ASPIRE data and counsel all providers who are not passing this measure

Thank you!