Evaluation of SOFA to predict sepsis in post-cardiotomy patients: a retrospective chart review

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BACKGROUND

- Sepsis defined: a dysregulated host response to infectious insult
  - public health threat in the United States and globally
  - CDC names sepsis as one of the leading causes of death in the United States, and one of the most costly clinical syndromes to treat (The Centers for Disease Control [CDC], 2018).
- Most recent diagnostic criteria and treatment guidelines put forth by the Society of Critical Care Medicine (SCCM) implement the use of the Sequential Organ Failure Assessment (SOFA) score to trend the degree of dysregulated host response in the setting of suspected or confirmed infectious insult (Singer, Deutschman, Seymour, Shankar-Hari, Annane, Bauer, et al., 2016)
  - Acute increase in SOFA score ≥ 2 in setting of confirmed or suspected infection
  - Early recognition and timely treatment important

S

- Se
  - fraction of inspired oxygen (PaO_2/FiO_2)
  - on necessary to prevent hypotension

Use the *worst* value for each physiological variable within the past 24 hours.

Respiration

FiO_2		%
PaO_2		mmHg
Mechanical ventilation	No / Yes	

Coagulation

Platelets		$x10^3/mm^3$

Liver

Bilirubin		mg/dL

Neurological

Glasgow coma score		

Cardiovascular

MAP		mmHg
Vasopressors	No / Yes	

Renal

Creatinine		mg/dL
Urine output	Greater than 500 mL/day	

Reset | Calculate

IMPETUS ⟶ 12K CVICU

- CT Surgery patients exhibit unique inflammatory response post CPB
- Cytokine release:
  - Transient organ dysfunction
  - Fluctuations in core temperature
  - Elevated WBC
  - Elevated lactate
- Still at risk for developing infection and subsequent dysregulated response to infectious insult
- Data collected by Sepsis task force at OHSU demonstrated CT Surgery had highest rate of not-present-on-arrival sepsis related mortality of all elective surgical services at OHSU

OBJECTIVE: PICO QUESTION

Patient/Population/Problem: Cardiothoracic surgical patients admitted to the CVICU who meet inclusion criteria and are managed by the CVICU service and who are on the unit for greater than 24 hours.

Intervention: We seek to determine whether the SOFA (Sequential Organ Failure Assessment) scoring system demonstrates acceptable sensitivity and specificity to predict sepsis in a population of patients after undergoing cardiothoracic surgery in the adult cardiovascular intensive care unit (CVICU) at Oregon Health and Science University (OHSU).

Comparison Current standard of practice for identifying sepsis in our patient population

Outcome have sensitivity and specificity predictive values which demonstrate their utility in our CVICU patient population

Time Looking at data over the course of one year (more?)

EVIDENCE INFORMING PROJECT

- Current Sepsis diagnostic criteria (Singer, Deutschman, Seymour, Shankar-Hari, Annane, Bauer, et al., 2016)
  - Difficulty accurately capturing incidence and mortality trends
  - Shifts in clinical awareness, revisions in diagnostic criteria, and variations in coding practice contribute to the challenge of collecting data to accurately capture sepsis incidence and mortality trends (Dantes & Epstein, 2018; Rhee et al., 2017)
- CT Surgery Patients have expected transient organ dysfunction following CT Surgery (Howitt et al., 2018; Mitchell, Grocott, Phillips-Bute, Mathew, Newman & Bar-Yosef, 2007).

METHODS

- IRB Submission (approval late March/early April 2019)
- Single Center Retrospective Chart Review
- Minimize variability observed when relying upon ICD coding data
  - A **Sepsis Event** will be defined using the guidelines provided by the CDC in the 2018 Hospital Toolkit for Adult Sepsis Surveillance: presumed infection with concomitant organ dysfunction
  - **Presumed Infection** will be defined as: *both* blood culture obtained (regardless of result) and at least 4 qualifying antimicrobial days (QAD) starting within the time period 2 days before and after the collection of a blood culture (CDC, 2018)
    - Mitigates potential problem with perioperative prophylactic abx
  - **Organ Dysfunction** will be defined as an increase in SOFA score of 2 or more within the time period 2 calendar days before and after the collection date of a blood culture (CDC, 2018).

METHODS

Chart Review will be performed independently by two operators to ensure inter-rater reliability

Note date of surgery

Extract SOFA score one time each day of hospitalization

Results review, microbiology/infectious, to identify if blood cultures were drawn within hospitalization

If blood cultures were drawn within hospitalization, will examine in chart review tab, medication tab, if 4 qualifying antimicrobial days are present (see definition of QAD as outlined by CDC recommendation above).

Examine for increase of 2 or more in SOFA score is present within the 2 days preceding or following blood culture collection, Sepsis Event (SE) present.

SEPSIS MORTALITY BREAKDOWN AT OHSU

Principal Procedure Service	Adult Elective Volume	All Sepsis Cases	Expired All Elective	Expired Sepsis Cases	% Elective with sepsis	% Elective sepsis that die
Cardiothoracic Surg	609	8	9	4	1.3%	50%
Internal Med Heme/Onc	599	16	7	5	2.7%	31%
General Surgery	1082	20	5	4	1.8%	20%
Oncologic Surg	280	6	2	1	2.1%	17%
Urology Surgical	382	4	0	0	1.0%	0%
Neurosurgery	943	2	0	0	0.2%	0%
Orthopedic Surg	1506	2	1	0	0.1%	0%
Otolaryn/Head&Neck	371	2	3	0	0.5%	0%

FY2017
Adult, Elective, non-POA Sepsis

- Excluding low volume services, CT surgery has the highest percent of elective mortalities sepsis cases followed by Hem/Onc and General Surgery.

NEXT STEPS

- More time and data are needed
  - Until more is known about true incidence of SE (Sepsis Event) “n,” remains unclear
  - Inter-rater reliability
- OHSU Nursing Strategic Priorities
  - Supports clinical nurses contributing to important decision making
  - May reduce cost of care by avoiding costly sequelae and resource utilization associated with delayed treatment
  - Implements the most current evidence into practice
  - Serve to disseminate new knowledge about current guidelines and standards via formal research

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