Documentation of Severity of Illness Scores in Critically Ill Patients

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Problem/Background

- Rather than being used for clinical decision making, severity of illness scores are used primarily in research for
  - risk stratification
  - defining patient populations
  - controlling for severity of illness within and between subjects
- At our institution, there is no standardized process for recording severity of illness which limits research opportunities

Current Situation

- The Acute Physiology and Chronic Health Evaluation (APACHE) II is considered the most commonly used score worldwide
  - it is a better predictor of hospital mortality when compared to co-morbidity scores
  - it has been associated with length of stay in the intensive care unit

- Calculating the score retrospectively is difficult as
  - elements are often missing like ventilator settings or Glasgow Coma Score
  - one element, acute renal failure, is dependent on clinical judgment
  - some elements may not be collected within the specified time frame of 24-48 hours
  - some of the elements may not be beneficial to obtain for patient care

	Physiologic variable[a]	Point score								
		+4	+3	+2	+1	0	+1	+2	+3	+4
1	Temperature	≥41°	39–40.9°	–	38.5–38.9°	36–38.4°	34–35.9°	32–33.9°	30–31.9°	≤29.9°
2	Mean arterial pressure (mm Hg)	≥160	130–159	110–129	–	70–109	–	50–69		≤49
3	Heart rate	≥180	140–179	110–139	–	70–109	–	55–69	40–54	≤39
4	Respiratory rate(non-ventilated or ventilated)	≥50	35–49	–	25–34	12–24	10–11	6–9	–	≤5
5	Oxygenation:									
	a) $FIO_2 \geq 0.5$: use $A\text{-}aDO_2$	≥500	350–499	200–349	–	<200	–	–	–	–
	b) $FIO_2 < 0.5$: use PaO_2 (mm Hg)	–	–	–	–	>70	61–70	–	55–60	<55
6	Arterial pH	≥7.7	7.6–7.69	–	7.5–7.59	7.33–7.49	–	7.25–7.32	7.15–7.24	<7.15
7	Serum Na (mMol/L)	≥180	160–179	155–159	150–154	130–149	–	120–129	111–119	≤110
8	Serum K (mMol/L)	≥7	6–6.9		5.5–5.9	3.5–5.4	3–3.4	2.5–2.9	–	<2.5
9	Serum creatinine (mg/dL): double point score for acute renal failure	≥+++3.5	2–3.4	1.5–1.9	–	0.6–1.4	–	<0.6	–	–
10	Hct (%)	≥60	–	50–59.9	46–49.9	30–45.9	–	20–29.9	–	<20
11	WBC (in 1000s)	≥40	–	20–39.9	15–19.9	3–14.9	–	1–2.9	–	<1
12	Glasgow coma score (GCS)	Score = 15 minus actual GCS								
	Acute physiology score is the sum of the 12 individual variable points									
	Add 0 points for the age ≤44.2 points; 45–54 years: three points; 55–64 years: five points; 65–74 years: six points ≥75 years									
	APACHE II score = acute physiology score + age points + chronic health points. Minimum score = 0; maximum score = 71. Increasing score is associated with increasing risk of hospital death									
	Add chronic health status points: two points if elective postoperative patient with immunocompromise or history of severe organ insufficiency: five points for nonoperative patient or emergency postoperative patient with immunocompromise or severe organ insufficiency[b]									
13[d]	Serum HCO_3 (venous-mMol/L) use only if no ABGs	≥52	41–51.9	–	32–40.9	22–31.9	–	18–21.9	15–17.9	<15

Adapted from Knaus WA, Draper EA, Wagner DP, Zimmermann JB: APACHE II: A severity of disease classification system. *Critical care medicine* 13: 818–829. 1985.
Interpretation of APACHE II scores (predicted mortality rate).
0–4 = ~4% death rate 10–14 = ~15% death rate 20–24 = ~40% death rate 30–34 = ~75% death rate.
5–9 = ~8% death rate 15–19 = ~25% death rate 25–29 = ~55% death rate Over 34 = ~85% death rate.
[a] APACHE II Score = acute physiology score + age points + chronic health points. Minimum score = 0; maximum score = 71. Increasing score is associated with increasing risk of hospital death.
[b] Choose worst value in the past 24 h.
[c] Chronic health status: Organ sufficiency (e.g. hepatic, cardiovascular, renal, pulmonary) or immuno-compromised state must have preceded current admission.
[d] Optional variable: use only if no ABGs.

- Increasing documentation of these scores would allow for more robust research production at our institution

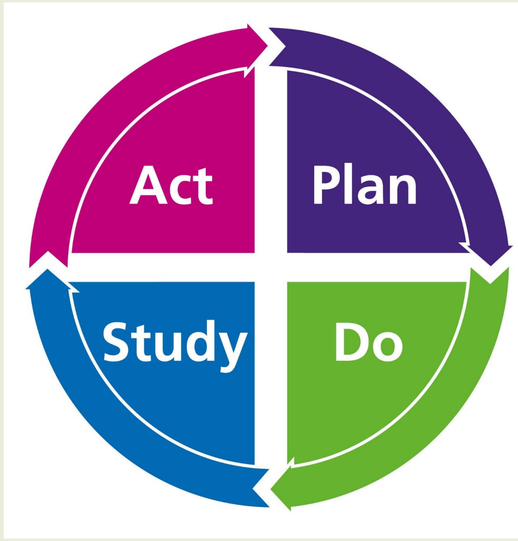
AIM and Measures

Improve documentation of the APACHE II score in critically ill patients by 50% within 48 hours of admission to the medical ICU after implementation of a designated space for this scoring system in the electronic health record (EHR) and protocolizing the collection of missing elements needed to calculate the score by using provider prompts to minimize unnecessary tests and maximize documentation of clinical data that has already been obtained

- Create a space in the EHR where APACHE II is easily documented and accessible for risk stratification purposes
- Improve documentation rates of the severity of illness scores in critically ill patients
- Ensure that all data required to calculate the severity of illness scores is documented in the EHR within the first 24-48 hours of a patient's ICU stay
- Implement provider prompts in the EHR to facilitate ordering or entering all missing components needed for calculation of the APACHE II score

Outcome measure: ability to calculate the APACHE II score in critically-ill patients
Process measure: ensure data required to calculate the APACHE II score is documented within the first 24-48 hours of a patient's ICU stay
Balancing measure: maintain communication with critical care teams to minimize alarm fatigue and documentation burden

Change Ideas



Plan:
- discuss with information technology and critical care teams to make a designated space for APACHE II, and prompt for collection of missing data elements

Do:
- integrate scoring system in to the EHR

Study:
- discuss with critical care teams any unforeseen obstacles

Act:
- implement changes to the scoring tool as indicated

Discussion

Currently discussing with critical care teams and information technology to protocolize documentation of APACHE II
- create a location for ease of access to the score, presumably in the "summary" tab in the EHR
- plan to utilize nursing and respiratory flow sheets to optimize data already collected
- anticipate one provider prompt within the first 24-48 hours of a patient's ICU stay *if* elements needed to calculate the patient's score are missing
  - provider to click if acute renal failure is present if unable to pull this from patient's problem list
  - provider to click to order any missing lab values

Barriers:
- creating the space in Epic
- decreasing alarm and pop-up fatigue
- minimizing unnecessary tests
- maximizing clinical data that has already been obtained but is not easily accessible

References

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