

# Rap #12, 08/16 Regions Rap Summary (Pulmonary/ Thoracic)

Wednesday, August 17 2016, 9:17 AM

## Rap #14, 12/16 Regions Rap Overview (HEENT & Heme)

### Pan Scans (EMLoN 7/5/16, Authored by Ryan Radecki) - Reviewed by Sarah Mott

- Review of REACT-2 RCT comparing total-body CT with imaging guided by clinical evaluation
  - Multi-center RCT of adult trauma patients with suspected serious injury
  - 1,403 total patients: ~540 randomized to each group
    - Well-matched on baseline characteristics, all physiologic markers
    - Triage Revised Trauma Score slightly worse for total-body CT group
  - Primary outcome: in-hospital mortality
  - Secondary outcomes: timeliness of dx, mortality in other time frames, morbidity, cost
- Results
  - Weakly favor selective scanning over pan-scans
  - No difference in mortality, complications, length-of-stay, costs, "nor virtually any reliable secondary outcome"
  - Time-to-dx slightly faster in total-body CT group (skipped initial radiography)
  - Radiation exposure slightly lower in selective imaging group
- Author's comments
  - CT still frequently used in selective CT group (almost 50% ultimately went for pan-scan), might account for lack of differences
  - Differences in in-hospital Injury Severity Scores likely influenced by additional injuries found with pan-CT
    - Further discussed here at [EM Nerd](#)
- Study can be used to justify either pan-scan or selective imaging
  - Selective-scan proponents point out lack of differences in patient-oriented outcomes
  - CT proponents point out minimal cost/radiation savings at expense of timeliness

### Evaluation

- [AIR Grade](#):

| Tier 1: BEEM Rater Scale  | Score-choose only 1              | Tier 2: Content accuracy  | Score-choose only 1              | Tier 3: Educational Utility   | Score-choose only 1              | Tier 4: EBM   | Score-choose only 1              | Tier 5: Referenced                            | Score-choose only 1              |
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| Useless information   | <input type="radio"/>            | Yes, many concerns from many inaccuracies   | <input type="radio"/>            | Low value: No valuable pearls   | <input type="radio"/>            | Not EBM based, only expert opinion (and thus more biased)                 | <input type="radio"/>            | No  | <input type="radio"/>            |
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| Interesting and new, but doesn't change practice  | <input type="radio"/>            | Yes, a major concern about few inaccuracies   | <input type="radio"/>            | Yes, but there are only a few (1-2) valuable or multiple (>=3) less-valuable educational pearls   | <input type="radio"/>            | Minimally EBM based   | <input checked="" type="radio"/> |   | <input type="radio"/>            |
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| Your Score  | 4                                |   | 5                                |   | 5                                |   | 3                                |   | 7                                |

- Has potential to change practice but all services/providers have to come to consensus
- Minor concerns about conclusions (author doesn't back them up with much)
- Has a pearl or two: not sending patients for pan-scan isn't associated with a significantly worse outcome
- EBM: it's based on an article but the conclusions are subjective and the blog is a little vague
- Referenced: yes, link at the end

### NEXUS Chest CT (ALiEM 10/13/15, Authored by Michelle Lin) - Reviewed by Dave Benjamin

- "NEXUS Chest CT Decision Instrument in Blunt Trauma"
- Goal: **Develop rule to safely reduce # of Chest CTs in adult blunt trauma**
- Background:
  - Increasing use of "pan-CT" in adult blunt trauma but no increase prevalence, no changes in management.
  - 1 Chest CT = \$3,600 and 350 CXRs worth of radiation.
- Methods: Prospective, observational study at 8 urban level-1 trauma centers
  - Inclusion Criteria:
    - Age >14 years

- Presenting to the ED for blunt trauma occurring within 6 hours of arrival
- Having chest imaging (CXR or chest CT) in the ED
- Major/Minor Injuries:** Basically any injury in the thorax that required a procedure (Major) or did not require a procedure (Minor)
- 14 Clinical Criteria used to derive (6033 patients) and then validate (5501) 2 Decision Instruments
- 2 Rules Developed:**
  - Chest CT Major (detected only major injuries) Rule
  - Chest CT All (detected major + minor injuries) Rule
- Decision Instrument:**
  - Abnormal CXR
  - Distracting injury
  - Chest wall, sternum, thoracic spine, or scapula tenderness ("Burrito Wrap")
  - Rapid Deceleration (fall >20 ft, MVA >40 mph)
- Conclusion:** Safe, 2-tier Decision Instrument. Used to RULE OUT getting Chest CT.
  - Both have >99% sensitivity to detect Major injuries.
  - The Chest CT-All instrument has a >95% sensitivity to detect major AND minor injuries.
  - Forego 25-37% of chest CTs.

**Evaluation**

- [AIR Grade:](#)

| Tier 1: BEEM Rater Scale  | Score-choose only 1              | Tier 2: Content accuracy  | Score-choose only 1              | Tier 3: Educational Utility   | Score-choose only 1              | Tier 4: EBM   | Score-choose only 1              | Tier 5: Referenced                            | Score-choose only 1              |
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| Your Score  | 6                                |   | 6                                |   | 3                                |   | 6                                |   | 7                                |

**VBG vs. ABG (LITFL 1/7/16, Authored by Chris Nickson) - Reviewed by Brian Mehus**

- Overview
  - VBG commonly obtained as opposed to ABG in ED
  - Most data suggest sufficient pH agreement between arterial and venous blood
  - No data in shock states
- ABG advantages
  - Gold standard test
  - Can determine PaO2
- ABG disadvantages
  - Painful
  - Increased risk of bleeding/hematoma
  - Risk of aneurysm and AV fistula
  - Nerve injury
  - Digital ischemia
  - Higher potential for needlestick injury
  - Venous sampling may better represent tissue milieu
- Correlation between VBG and ABG
  - pH:
    - Good correlation
    - Mean difference: ABG with higher pH by 0.03
  - pCO2:
    - Good correlation in normocapnic patients
    - Mean difference +5.7 mmHg (wide range of 95% confidence intervals based on study - some studies +/- 20 mmHg)

- Correlation dissociates in hypercapnia
  - If true PaCO2 >45mmHg, values correlate poorly
- Poor evidence for correlation in severe shock
- Sensitivity for Hypercapnia:
  - 100% sensitive in detecting arterial hypercarbia in COPD exacerbations with cutoff of 45
  - So if VBG CO2 within normal limits, then hypercarbia ruled out (McCanny et al, 2012)
  - However, more recent meta-analysis suggests high variability, with 95% confidence interval of pvCO2 compared to paCO2 being -10.7 to +2.4 mmHg, in some cases pvCO2 lower than paCO2. Study highly heterogeneous, with I-squared value approaching 100% - questionable reliability (Byrne 2014)
- HCO3
  - Good correlation
  - Mean difference -1.41 mmol/L
- Lactate
  - Dissociation above 2 mmol/L
  - Mean difference 0.08 (95% confidence interval: - 0.27 to +0.42)
- Base Excess
  - Good correlation
  - Mean difference 0.089 mmol/L (95% confidence interval: -0.974 to +0.552)
- PO2
  - Poor correlation
  - PaO2 ~37 mmHg greater than venous with significant variability (95% confidence interval: 27.2 to 46.6 mmHg)
- DKA Example
  - VBG can guide management as opposed to ABG
  - Mean difference in pH -0.015 +/- 0.006 units
  - Compared to VBG pH, ABG pH only changed treatment or disposition in 2.5% of cases (Ma et al, 2003)

**Bottom line: When to get an ABG?**

- Determine PaCO2 in severe shock
- Determine PaCO2 if severely hypercapnic (>45 mmHg)
- Determine PaO2
- Determine arterial lactate

**Evaluation**

- [AIR Grade:](#)

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| Your Score  | 4                                |   | 6                                |   | 5                                |   | 7                                |   | 7                                |

**Approaching undifferentiated cardiopulmonary failure (PulmCrit 2/1/15, Authored by Josh Farkas) - Reviewed by Kevin Torkelson**

**Undifferentiated Cardiopulmonary Failure**

- Most crashing patients are suffering from some form of cardiopulmonary failure
- POCUS provides immediate and critical information
- Much debate about which test is best for any given condition

**The Triple-Barreled Shotgun**

- At the bedside of a crashing patient with cardiopulmonary failure, there are three tests which are fast, widely available, and yield immediate information:

1. CXR

- 2. EKG
- 3. POCUS

- Combining these three may help us confirm our findings and avoid missing the diagnosis
- A finding on one test may also help clarify or detect an abnormality on another test
  - Ex. EKG features of right ventricular strain would prompt us to search more carefully for evidence of pulmonary embolism with POCUS

• **What is the role of an ABG in a patient with undifferentiated cardiopulmonary failure?**

- ABG is immediately available, but often not helpful
- Most patients have an adequate pulse oximetry tracing and a known bicarbonate level, so ABG only adds information about ventilation (PaCO2)
- Unlike EKG, CXR, and POCUS, an ABG cannot yield a specific diagnosis
- ABG is sometimes used as a trigger for intubation or transfer to the ICU
  - A decision which should be based primarily on clinical information including the overall picture, diagnosis, and expected disease course
- The interpretation of an ABG depends largely on the diagnosis that the patient has
  - Ex. A normal ABG in an asthmatic patient would be highly concerning
- ABG is most likely to alter management if it reveals ventilatory failure (i.e., hypercapnia)
  - For a patient with clinical signs of hypercapnia (e.g. somnolence, multifocal myoclonus) or a history suggestive of hypercapnia (e.g. COPD or obesity hypoventilation syndrome), obtaining an ABG may be helpful
- VBG correlates very well with ABG
  - If the VBG doesn't reveal hypercapnia, clinically significant hypercapnia is very unlikely
- No evidence to support the utility of ABG for diagnosing patients with undifferentiated respiratory failure
  - [Burri 2011](#), which performed a post-hoc analysis of patients presenting to the emergency department with dyspnea
    - The only disorder for which ABG had any diagnostic utility was anxiety-induced hyperventilation

• **Conclusions**

- Most crashing patients are suffering from some form of cardiopulmonary failure (cardiac failure, pulmonary failure, or both)
- EKG, CXR, and POCUS can each reveal a wealth of information immediately at the bedside
- ABG may be useful to answer a specific clinical question
- No evidence supporting the use of ABG for a patient with undifferentiated respiratory failure

• **Evaluation**

- [AIR Grade](#):

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| Your Score  | 3                                |   | 6                                |   | 4                                |   | 3                                |   | 7                                |

**Fluoroquinolone's (Pulmcrit 8/1/16, Authored by Josh Farkas) - Reviewed by Zlata Vloderov**

"As an internal medicine resident and pulmonary/critical care fellow, I loved fluoroquinolones. They were effective, easy to prescribe, and had 100% oral bioavailability...However..."

- Six reasons to avoid fluoroquinolones in the critically ill
  1. Number one most commonly used abx for outpatient prescribers (very broad, from common colds to diverticulitis).
    - This has likely fueled significant resistance.
    - Most antibiograms show fluoroquinolones only cover ~75% of E.Coli
  2. Double coverage for pseudomonas is BS ([see this link for further discussion](#)).
    - If it's resistant to Zosyn, it's probably resistant to Levoquin as well (~20% sensitivity).
  3. Fluoroquinolone use induces multi-drug resistance
    - When used, bugs not only become resistant to quinolones, but also to other abx (beta lactams, carbapenems).

- Also facilitate C. Diff infections, especially of one highly virulent strain (could also be a separate reason of its own).
- 4. There are better options for penicillin allergy
  - Third or fourth generation cephalosporins.
- 5. Can cause delirium, insomnia, agitation, seizures
  - Not good in critically ill patients
- 6. May rarely cause persistent neurological abnormalities
  - Associated with weakness and delirium.
  - Black box warning recently issued.
  - Difficult to diagnose this in intubated patients
    - Therefore don't know when to discontinue.
  - Critically ill patients already at an increased risk of Critical Illness Neuropathy, so further neurotoxicity causes more issues in this context.
  - Malpractice lawyers already suing for this!
- Author's end conclusion
  - "My objection to fluoroquinolones isn't that they are evil, but rather that better alternatives usually exist in the ICU. The utility of fluoroquinolones is probably greater among outpatients, among whom many of the above considerations are less pertinent."

• **Evaluation**

- [AIR Grade:](#)

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| Your Score  | 6                                |   | 5                                |   | 5                                |   | 5                                |   | 7                                |

Edited by Brian Hahn, Matt Bogan and Joe Walter