Association of Physical Examination with Pulmonary Artery Catheter Parameters in Acute Lung Injury

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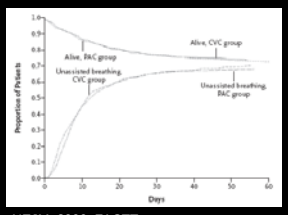
Outline

- Clinical Study
  - Method
  - Results
- Discussion
  - Internal Validation
  - External Validation

Clinical Study
Method

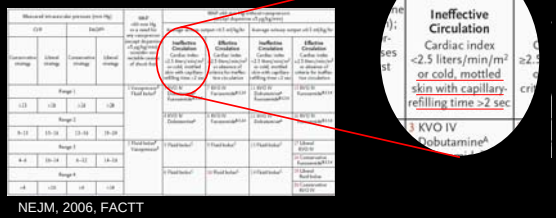
- Background
  - Clinical value of PAC insertion in ALI patients
  - Physical examination as a substitute for PAC



NEJM, 2006, FACTT

Clinical Study
Method

- Design
  - Retrospective study
  - Post-hoc analysis of FACTT

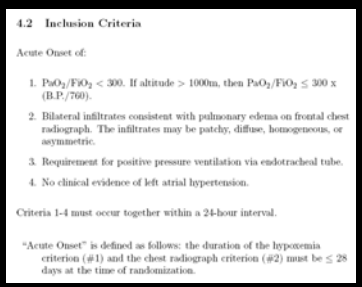


NEJM, 2006, FACTT

Clinical Study
Method

- FACTT Study Design

NEJM, 2006, FACTT



4.2 Inclusion Criteria

Acute Onset of:

1. $PaO_2/FiO_2 < 300$. If altitude > 1000m, then $PaO_2/FiO_2 \leq 300 \times$ (B.P./760).
2. Bilateral infiltrates consistent with pulmonary edema on frontal chest radiograph. The infiltrates may be patchy, diffuse, homogeneous, or asymmetric.
3. Requirement for positive pressure ventilation via endotracheal tube.
4. No clinical evidence of left atrial hypertension.

Criteria 1-4 must occur together within a 24-hour interval.

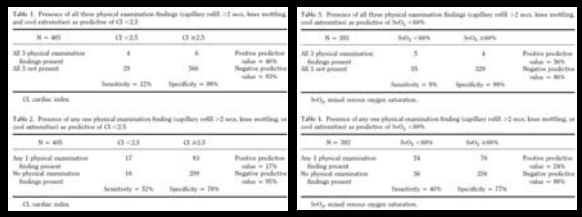
"Acute Onset" is defined as follows: the duration of the hypotoxemia criterion (#1) and the chest radiograph criterion (#2) must be ≤ 28 days at the time of randomization.

NEJM, 2006, FACTT, supp. data

Clinical Study
Method

- Objectives
  - Association of physical findings with CI<2.5 or SvO_2<60%
  - Association of physical findings and 24hr fluid output and CVP with CI<2.5 or SvO_2<60%
  - Correlation of $ScvO_2$ and SvO_2

Clinical Study
Result 1

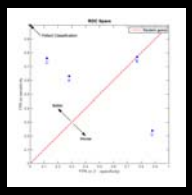


		Disease	
		(+)	(-)
Test	(+)	a	b
	(-)	c	d

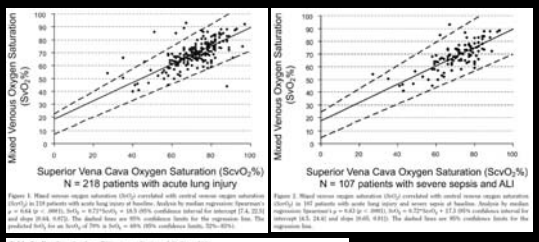
Sen= a/(a+c) pre-test probability= prevalence
Spe= d/(b+d) post-test probability= PPV or 1-NPV
PPV= a/(a+b) LR+ = sen/1-spe
NPV= d/(c+d) LR- = 1-sen/ spe
Prevalence= (a+c)/(a+b+c+d)

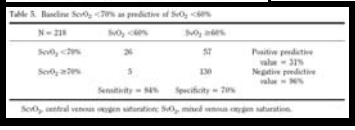
Clinical Study
Result 2

- CI<2.5 and cool extremities:
  - OR= 1.9 (p=1.0)
- CI<2.5 and high CVP:
  - OR= 1.06/1cm H_2O (p=0.002)
- CI<2.5 and low fluid output:
  - OR= 0.8/1L (p= 0.01)
- SvO_2<60% correlated with:
  - knee mottling (OR= 5.0, p= 0.09) and high CVP (OR= 1.09/1cmH_2O, p= 0.004)
- No clinical results via ROC analysis



Clinical Study
Result 3





Discussion

3 questions about diagnostic tests:

1. Is the evidence valid (internal validity)
2. Does the evidence show that the test can distinguish patients with or w/o the disorder (internal validity)
3. Can I apply the test to a specific patient (external validity)

Discussion
Internal Validation

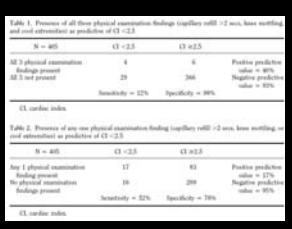
Table 3.2 Is this evidence about a diagnostic test valid?

1. **Measurement**: was the reference ("gold") standard measured independently, i.e. blind to our target test?
2. **Representative**: was the diagnostic test evaluated in an appropriate spectrum of patients (like those in whom we would use it in practice)?
3. **Ascertainment**: was the reference standard ascertained regardless of the diagnostic test result?

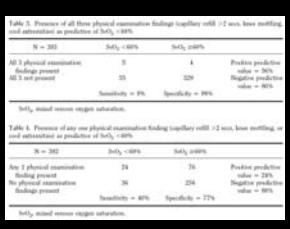
(Fourth question to be considered for clusters of tests of clinical prediction rules: was the cluster of tests validated in a second, independent group of patients?)

Discussion
Internal Validation

- SnNout and SpPin
- Pre-test probability and post-test probability
- Youden Index



CI<2.5 prevalence= 8.1%



SvO_2<60% prevalence= 15.5%

Discussion
External Validation

Table 3.5 Questions to answer in applying a valid diagnostic test to an individual patient

1. Is the diagnostic test available, affordable, accurate, and precise in our setting?
2. Can we generate a clinically sensible estimate of our patient's pre-test probability?
   - From personal experience, prevalence statistics, practice databases, or primary studies?
   - Are the study patients similar to our own?
   - Is it unlikely that the disease possibilities or probabilities have changed since this evidence was gathered?
3. Will the resulting post-test probabilities affect our management and help our patient?
   - Could it move us across a test–treatment threshold?
   - Would our patient be a willing partner in carrying it out?
   - Would the consequences of the test help our patient reach his or her goals in all this?

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Discussion
External Validity

- Consistency of physical examinations
- Knee mottling?

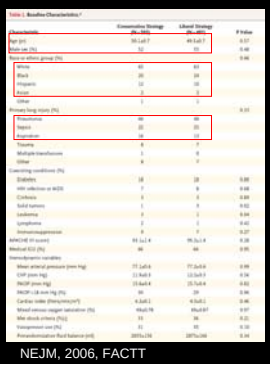
Mild (<20% Blood Volume)	*Moderate (20–40% Blood Volume)*	*Severe (>40% Blood Volume)*
Cool extremities Increased capillary refill time Diaphoresis Collapsed veins Anxiety	Same, plus: Tachycardia Tachypnea Oliguria Postural changes	Same, plus: Hemodynamic instability Marked tachycardia Hypotension Mental status deterioration (coma)

Harrison's 16th ed.

16. Signs of effectiveness of the arterial circulation (capillary refill time, knee mottling, skin temperature, etc.)

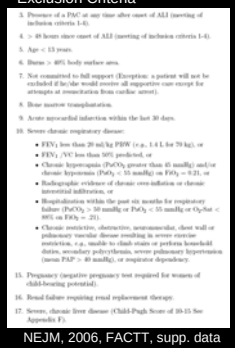
NEJM, 2006, FACTT, supp. data

Discussion
External Validation



NEJM, 2006, FACTT

Exclusion Criteria

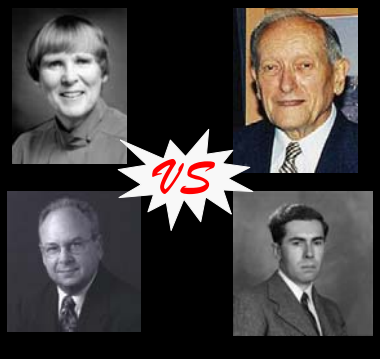


NEJM, 2006, FACTT, supp. data

Conclusion

- Physical examination (capillary refill, cool skin, or knee mottling) are not clinically useful to predict low CI or SvO_2.
- ScvO2 significantly correlates with SvO_2, but with wide confidence interval, and thus its clinical value is uncertain.

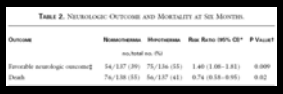
Questions and Comments

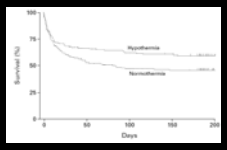


Perceived Barriers to Therapeutic Hypothermia for Patients Resuscitated from Cardiac Arrest

Clinical Study

- Background
  - Benefit from therapeutic hypothermia(TH) demonstrated in RCTs and meta-analysis
  - TH incorporated into AHA guildline
  - Only 26% of physicians regularly institute TH protocol





NEJM, 2002, Hypothermia after Cardiac Arrest Study Group

Clinical Study
Method

- Qualitative study design
- Semi-structured personal interviews
- Purposeful random sampling
  - Sampling from 14 hospitals (include community hospitals and centers)
  - More nurses and physicians from ED
  - Snowball sampling
- Total of 21 interviews (4 ICU physician, 7 ED physician, 10 nurses)

Clinical Study
Method

Results

- Barriers to TH
  - Awareness: lack of awareness of nurses in small community hospitals
  - Agreement: limited RCTs, uncertain risk/benefit
  - Adoption/Adherence: variably adopted among individuals, especially in ED. Inconsistency between ICU and ED, physicians and nurses.
  - Process Issues: equipment, cost, and workload
  - Lack of experience (rare)

Discussion

- Internal Validation
  - Behavior change model
  - Value of a qualitative study
- External Validation
  - Comparable to other scenarios of implementing novel intervention strategies
  - Application to a different country (numerous issues of concern, e.g. culture, economy, politics, insurance…etc)

Conclusion

- Systemic adoption of TH is met with many physical barriers.
- Future studies are needed to determine which implementation strategy may improve uptake of TH.

Questions and Comments

No need to fear a little freeze