Eastern Association for the Surgery of Trauma

Advancing Science, Fostering Relationships, and Building Careers

Advanced Practitioners in Trauma Workshop

Addressing Professional & Clinical Development: Moving from Ideas to Publication, Ventilator Management, and Cardiac Emergencies

January 11, 2018
Disney's Contemporary Resort
Lake Buena Vista Florida, Florida

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Ventilator Strategies in the Trauma Patient

Common Causes of Respiratory Failure in the Trauma Patient

- Direct pulmonary injury
- Thoracic wall trauma
- Pulmonary embolus or fat embolus
- Transfusion related lung injury
- Sepsis
- Pneumonia

Effects of Pulmonary Contusion

- Loss of integrity to the fibroelastic structure of the lung
- Animal models have shown that these changes may occur on the unaffected side also (…)
- SIRS and associated release of immunologic factors has been shown to occur following pulmonary injury and these changes are exacerbated by mechanical ventilation

Negative effects of mechanical ventilation

- Volutrauma: Overdistention of the alveoli
- Barotrauma: Pressure related injury
- Atelectrauma: Repeated snapping of the alveoli open and close

Mechanisms to avoid VALI

- Minimize FiO_2
- Avoid high tidal volumes
- Plateau pressure < 30
- Avoid mechanical ventilation
- Have appropriate goals for the patient

How do we set goals for our patients ?

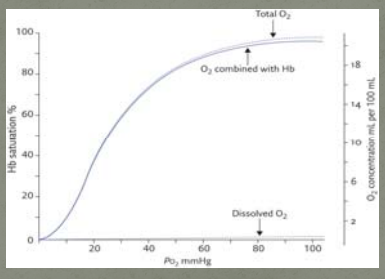
Oxygen Delivery

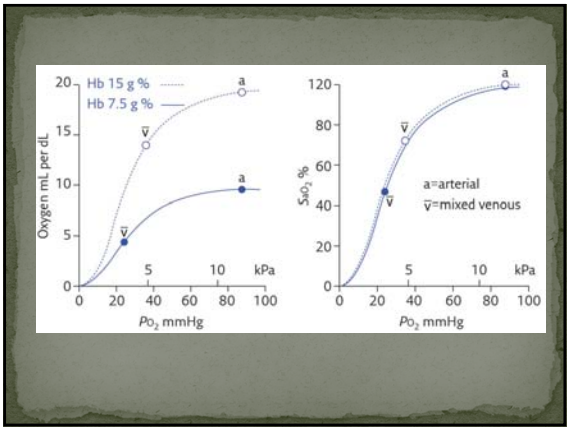
- $DO_2 = CO * CaCO_2$
- $CaCO_2 = (Hb * 1.34 * SaO_2) + (PO_2 * .0031)$

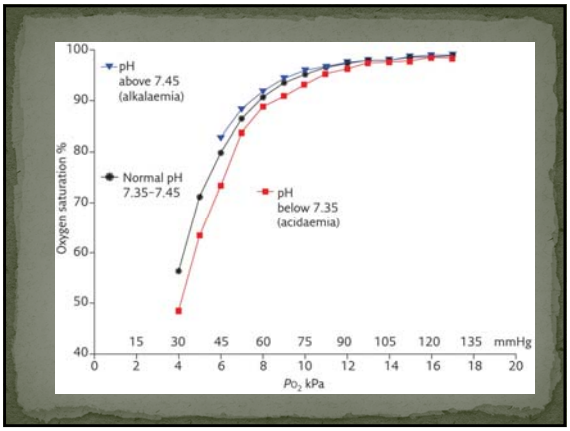
What is the role of dissolved oxygen in delivery?

Then why do we care about it?

Oxyhemoglobin Dissociation

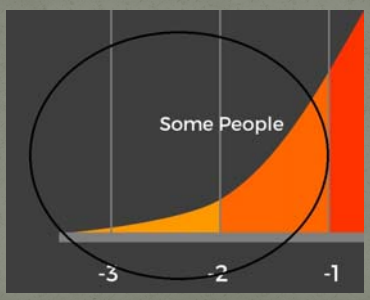



Hb 15 g %
Hb 7.5 g %
Oxygen mL per dL
a
v̄
kPa
P_{O_2} mmHg
S_{aO_2} %
a=arterial
v̄=mixed venous


pH above 7.45 (alkalaemia)
Normal pH 7.35–7.45
pH below 7.35 (acidaemia)
Oxygen saturation %
mmHg
P_{O_2} kPa


Who will we be talking about today?
Average Person
Most People
Some People
Some People
-3
-2
-1
0
1
2
3

Focusing on the tails of the curve



Early intervention with non-invasive ventilation

NIMV

- CPAP
- BiPAP

Indications for NIMV in the trauma patient

- Multiple rib fractures
- Flail chest
- Pulmonary contusions

Natural history of blunt chest trauma

- Most common injuries associated with blunt injury are rib fractures, flail chest, pneumothorax, hemothorax, and pulmonary contusions
- 20% of blunt chest trauma patients progress to ALI or ARDS
- Intubation rates range from 23-75 %

Early findings supported CPAP

- 69 patients were randomized to CPAP or intubation and mechanical ventilation
- Mean hospitalization days were 8.4 and 14.6 respectively
- ICU stay was 5.3 and 9.5
- Pneumonia occurred in 14% of the CPAP group and 48 percent of the intubated
- Conclusions from the study are limited due to different pain management techniques in the two groups

Bolliger CT, Van Eeden SF. Treatment of Multiple Rib Fractures Randomized Controlled Trial Comparing Ventilatory and Nonventilatory Management. Chest 1990; 97: 943-948

Reduction in intubation rates

- Given the known complications around intubation and mechanical ventilation, can NIMV reduce the rates of intubation in blunt chest trauma?
- Patients with PaO_2 / FiO_2 ratio <200 were randomized to HF mask or NIMV
- After 25 patients were enrolled in each group the study was stopped for significantly higher intubation rates in the control arm
- 40% vs 12%

Hernandez G, Fernandez R, Lopez-Reina P, et al. Noninvasive Ventilation Reduces Intubation in Chest Trauma Related Hypoxemia. Chest 2010; 137: 74-80

Outcomes in flail chest management

- 52 patients randomized to intubation or CPAP
- Patients included in the study had severe dyspnea present, SpO_2 <90%, and PaO_2 /FiO_2 <300 while receiving > 50%
- 7 of the 52 were excluded from the trial due to emergent need for intubation removing the most severely injured patients from the trial
- Of the remaining participants the CPAP group demonstrated lower nosocomial infection rates and lower mortality
- None of the patients randomized to CPAP required intubation

Gunduz M, Unlugenc H, Ozalevli M, et al. A comparative study of continuous positive airway pressure and intermittent positive pressure ventilation in patients with flail chest. Emerg med J 2005; 22:325-329

Meta-Analysis Data

- NIMV significantly reduces mortality, need for intubation, and length of ICU admission
- Attributed positive findings to lung recruitment and reduction in lung infections

Chiumello D, Coppola S, Froio S, et al. Noninvasive ventilation in chest trauma: systematic review and meta-analysis. Intensive Care Med (2013) 39: 1171-1180

Mortality Effect

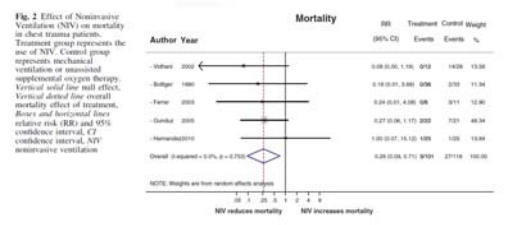


Fig. 2 Effect of Noninvasive Ventilation (NIV) on mortality in chest trauma patients. Treatment group represents the use of NIV. Control group represents mechanical ventilation or unassisted supplemental oxygen therapy. *Vertical solid line* null effect, *Vertical dotted line* overall mortality effect of treatment, *Boxes and horizontal lines* relative risk (RR) and 95% confidence interval, *CI* confidence interval, *NIV* noninvasive ventilation

Predicting failure with NIMV

- Age > 40
- ARDS
- CAP
- PaO2/FiO2 ratio < 146 after 1 hr of NIMV

All ICU patients

- Lowest intubation rates occurred in CPE, pulmonary contusions, and atelectasis

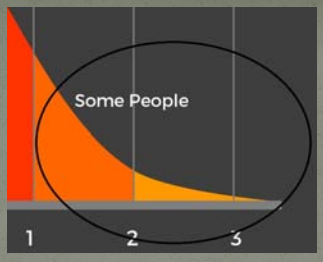
Antonelli M, Conti G, Moro ML, et al. Predictors of failure of noninvasive positive pressure ventilation in patients with acute hypoxemic respiratory failure: a mulit-center study. Intensive Care Med (2001) 27:1718-1728

Implementation of NIMV

- With the limited trials available there is very little consensus or guidelines available for when to utilize NIMV in the trauma patient
- If a patient is treated with NIMV it is reasonable to expect improvement in their condition in 1 to 4 hours
- Delay in intubation when NIMV is unsuccessful has been shown to worsen outcomes in some populations

Karcz M, Papadakos PJ. Noninvasive ventilation in trauma. World J Crit Care Med (2015) 4: 47-54

Case Study



What's on the other end of the curve ?

ALI and ARDS in the trauma patient

- Mortality estimated at 10-24% for ALI in the trauma patient
- Risk factors for the trauma patient
  - Aspiration
  - Contusion
  - Pneumonia
  - Inhalation injury
  - TRALI
    - PRBC and FFP transfusion are independent risk factors for developing ARDS and are dose dependent. PLT and Cryo have not been shown to be risk factors
  - Sepsis
  - TBI

Classification of ARDS

- Mild ARDS: PaO_2 / FiO_2 ratio <300 and >200
- Moderate ARDS: PaO_2 / FiO_2 ratio < 200 and > 100
- Severe ARDS: PaO_2 / FiO_2 ratio < 100

- Measurements must be made on a PEEP of at least 5
- Radiologic findings of bilateral opacities must be present
- Must be acute and occur within 1 week of clinical event

Treatment options

Proven Benefit

- Low tidal volumes of 6cc/kg
- PEEP > 5
- Plateau pressure < 30

Suggested Benefit

- Fluid restriction
- IS
- NIMV
- ECMO
- Rib fracture fixation
- Prone positioning

Treatment options

Intermediate Benefit

- Recruitment maneuvers
- APRV
- Steroids

No Benefit

- Surfactant
- ProstaglandinE1
- N-Acetylcysteine

Bakowitz M, Bruns B, McCunn M. Acute Lung injury and the acute respiratory distress syndrome in the injured patient. Scandinavian Journal of Trauma (2012) 20:54

APRV as a treatment option

- APRV was initially described in the 1980s as CPAP with intermittent releases
- There are 4 components to APRV
  - A continuous positive pressure referred to as P high
  - Prolonged period of time during which the patient remains at the continuous positive pressure known as T high
  - A cycled lower pressure known as P low
  - The time that the patient spends at P low is defined as T low
- These settings are unique when compared to almost any other ventilator mode
- It is important to avoid trying to equate these settings to traditional settings such a rate and TV

Concept of open lung ventilation

- In APRV there is constant lung recruitment as opposed to the repetitive opening and closing of the lung and the alveoli
- In theory open lung ventilation can minimize VILI

APRV Advantages

Oxygenation

- Attributed to better gas distribution through the poorly aerated portions of the lung due to the open lung concept
- Multiple studies have shown either improved oxygenation over conventional ventilation or equivalent oxygenation achieved at lower pressures which should be lung protective

Hemodynamics

- Pleural pressures decrease in APRV due to spontaneous breathing
- This leads to decreased thoracic pressure and improved venous return to the heart
- APRV vs. Inverse ratio PCV resulted in:
  - Increased CI
  - Increased DO_2
  - Increased UOP
  - Lower vasopressor requirements
  - Lower CVP

Kaplan LJ, Bailey H, Formosa V. Airway pressure release ventilation increase cardiac performance in patients with acute lung injury / adult respiratory distress syndrome. Crit Care (2001);5:221-226

Organ Perfusion

- Animal model showed increased blood flow to multiple organs.

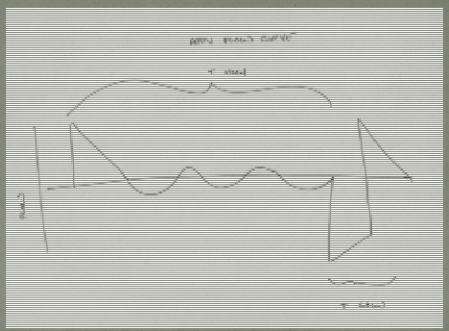
Hering R, Zinserling J, Wrigge H, et al. Effects of spontaneous breathing during airway pressure release ventilation on intestinal blood flow in experimental lung injury. Anesthesiology (2003); 99:1137-1144

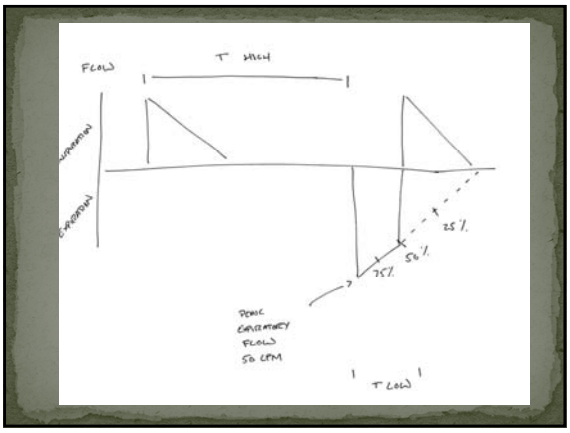
Safety

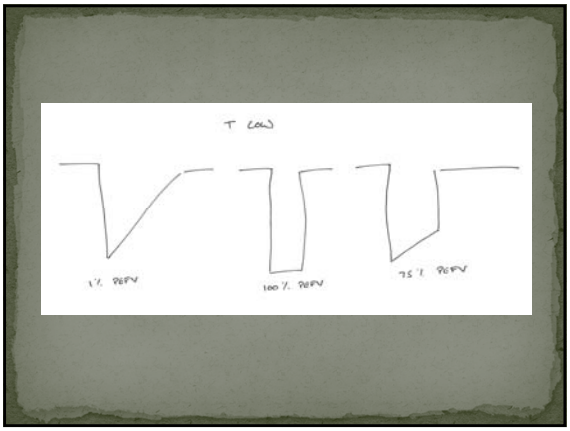
- When compared to low tidal volume strategies, APRV was found to have comparable effect and safety profile in a prospective trial

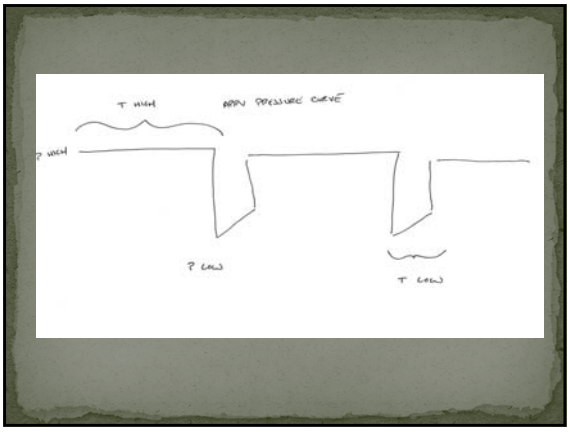
Maxwell RA, Green JM, Waldrop J, et al. A randomized prospective trial of airway release ventilation and low tidal volume ventilation in adult trauma patients with acute respiratory failure. J Trauma (2010); 69(3):501-10

Settings and Curves




FLOW
T HIGH
25%
50%
75%
PEAK EXPIRATORY FLOW 50 LPM
T LOW


T LOW
1% PEFV
100% PEFV
75% PEFV


T HIGH
AWW PRESSURE CURVE
P HIGH
P LOW
T LOW

Wake Forest School of Medicine

Cardiac Emergencies in the ICU

Andrew M. Nunn, MD
Assistant Professor of Surgery

Disclosures

- Zimmer-Biomet educational grant

Disclaimer

- I am not a cardiologist
- I am an intensivist

Objectives

- Recognize common cardiac emergencies in the ICU
- Apply treatment for common cardiac emergencies
- Review Ultrasound to assess cardiovascular status

ACUTE CORONARY SYNDROMES

Signs and Symptoms

- Chest pain
- Anxiety
- Diaphoresis
- Radiating pain
- Nausea

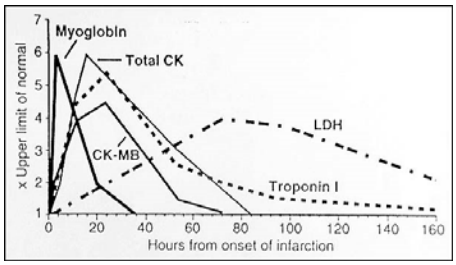
Differential

- Reflux
- PE
- Pericarditis (ST changes!)
- Intra-abdominal (pancreatitis, cholecystitis, etc)
- Acute Coronary Syndrome

Ibrahim et al. Crit Care Clin. 2014.

Workup

- Physical Examination
- EKG
- Laboratory Markers
  - Recheck in 2-6 hours if initial negative

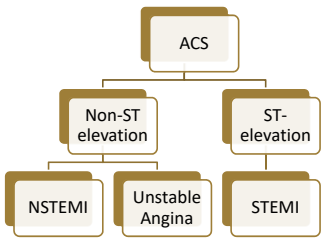


Dacic and Virji, http://path.upmc.edu/cases/case178/dx.html

MI Classification

- Type 1: coronary artery intraluminal thrombus
- Type 2: Demand ischemia
- Type 3: Sudden cardiac death (no biomarkers)
- Type 4a/b: MI after PCI or stent thrombosis
- Type 5: MI related to CABG

ST elevation or not?



STEMI is bad in the hospital!

ORIGINAL RESEARCH

Acute ST-Elevation Myocardial Infarction in Patients Hospitalized for Noncardiac Conditions

Xuming Dai, MD; Joseph Bumgarner, MD; Andrew Spangler, BA; Dane Meredith, MPH; Sidney C. Smith, Jr, MD; George A. Stouffer, MD

- Patients that have inpatient STEMI much more likely to die (survival to discharge 60 vs. 96%)
- More likely to have "clinical change" rather than symptoms

Unstable Angina

- New chest pain, increasing (crescendo) chest pain, or chest pain at rest
- No ST elevation identified on EKG
- May have depression or T-wave changes
- Simply put: NSTEMI without biological marker elevations

Management Principles: NSTEMI/UA

- Decrease cardiac work (oxygen demand)
- Improve cardiac oxygen delivery

Specific Treatments….

- Maintain SpO2 > 90 (more isn't better!)
- Nitroglycerin (anti-ischemia)
- Morphine (pain)
- β-blocker
- Antiplatelet agent (ASA, ADP-inhibitors, GP IIb/IIIa inhibitors)—chew the ASA!
- Anticoagulation (heparin, enoxaparin, fondaparinux)
- Statin

More treatments…..

- ACE: consider if depressed LVEF
- If shock, consider PCI
- Expert Consultation

Scoring Systems

- TIMI: Thrombolysis in Myocardial Infarction
- GRACE

STEMI

- Endocardial ischemia and necrosis progresses transmurally to the epicardium
- Reperfusion (either spontaneous or via intervention) or collateral flow is critical

Workup and Diagnosis

- Similar to NSTEMI/UA workup
- Symptoms and exam findings may be very obscure in the ICU population

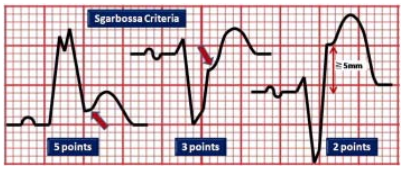
Interpretation of ST elevation

- >1mm ST elevation in two or more contiguous leads
- Bundle Branch Blocks can be confounding
  - Mandatory angiography for LBBB with concern for STEMI has a high false activation rate
  - Sgarbossa Criteria
  - New LBBB is pathological!

Larson et al. JAMA. 2007.
Jain et al. Am J Cardio. 2011.

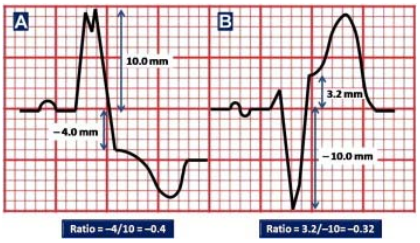
Sgarbossa Criteria

- Score ≥3 98% specificity for acute MI



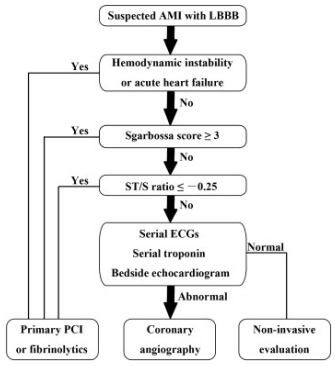
Cai et al. Cirr Card. 2013.

ST/S Ratio



- Ratio of -0.25 or less is significant

Cai et al. Cirr Card. 2013.

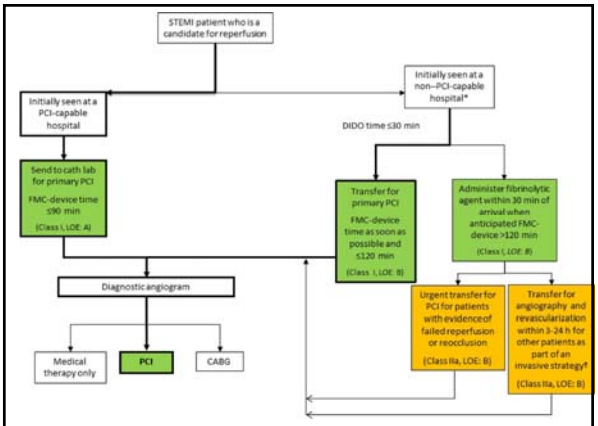


Cai et al. Cirr Card. 2013.

90 MINUTES

- For patients with symptom onset within 12 hours*
- Fibrinolytic therapy if cannot get to device within 120 minutes
- Initiate fibrinolytic therapy within 30 minutes

ACCF/AHA Practice guidelines, 2013.



ACCF/AHA Practice guidelines, 2013.

A Word About Stents…..

- Bare metal: 1 month dual antiplatelet
- Drug-eluting: 12 mos dual antiplatelet

ACS Summary

- Identify early with EKG and biomarkers
- Initiate treatment (antiplatelet, anticoagulation, reperfusion) early
- Expert consultation

COMMON ARRHYTHMIAS

Who Cares?

- Very common in the ICU
- Increased mortality
- Increased LOS

Tracy and Boushahri. Crit Care Clin. 2014.
Goodman et al. Anesth Analg. 2007

Broadly defined…..

- Tachy
  - SVT, afib, a-flutter, v-tach
- Brady
  - Sinus, heart block

Risk Factors

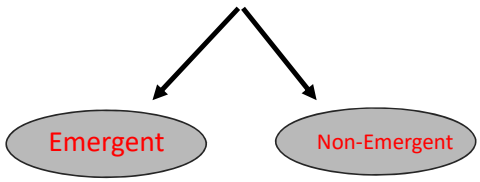
Box 1
Risk factors for arrhythmia in the intensive care unit

- Male gender
- Age greater than 70 years
- Cardiac disease (coronary artery disease, heart failure, valvular disease)
- Pulmonary disease (asthma)
- Thyroid disease
- Critically ill (APACHE score ≥25)
- Volume fluctuations
- Electrolyte disturbances
- Metabolic derangements
- Vasopressors

Tracy and Boushahri. Crit Care Clin. 2014.

Workup and Diagnosis

- Acuity?
- Change in patient status?

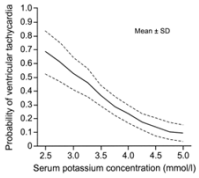


Workup and Diagnosis

- EKG
- Labs (CBC, BMP, Ca, Mg, Phos, ABG)
- Volume status (atrial stretch)

A word about the 'lytes…..

- Potassium: Keep it above 4 (caution in renal disease)
- Magnesium: Keep it above 2



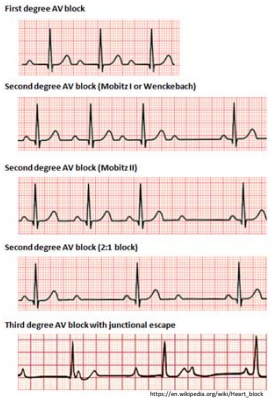
Macdonald and Struthers. J Am Coll Cardiol. 2001.

Bradyarrhythmia

- Impulse generation- sinus bradycardia/arrest
- Impulse conduction- heart block

Heart Block

- I: prolonged PR (>200ms), all beats
- II: occasional/intermittent conduction
  - Wenckebach- gradual prolongation followed by drop
  - Mobitz II- random dropped beat
- III: no conduction of atrial impulse



Tachyarrhythmia

- Supraventricular and ventricular in origin
- Wide vs. Narrow
- Caused by:
  - Increased automaticity
  - Reentry
  - Trigger

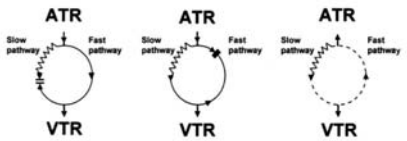
Automaticity

- Electrolyte/metabolic disturbances
- Stress
- Vasopressor/inotropes

Reentry

- 2 pathways (congenital or acquired) exist that form an electrical circuit
- Examples: AVRT (WPW), AVNRT, a-flutter, v-tach

Schematic of typical atrioventricular nodal reentry



Fox D J et al. Mayo Clin Proc. 2008;83:1400-1411

Mayo Clinic Proceedings

Triggered

- Cardiac cell reactivated during repolarization
- Digoxin toxicity and Torsades de pointes

Let's get specific!

Atrial Fibrillation

- Extremely common
- Up to 1/3 of ICU patients
- Not always benign
  - Stroke, heart failure, mortality
  - Lose atrial contraction which accounts for 25% of ventricular pre-load

Atrial Fibrillation: RATE CONTROL!

- Unstable: Immediate synchronized cardioversion
- Stable:
  1. Metoprolol 5mg IV over 2 min. May give up to 15mg over 15 min
  2. Diltiazem 0.25mg/kg over 2 minutes followed by infusion
     -may repeat with 0.35mg/kg bolus
     -negative inotrope so don't use in cases of heart failure
  3. Amiodarone 150mg bolus followed by infusion
     - 1mg/min for 6 hours followed by 0.5mg/min
     - Do not exceed 2.2g in 24 hours!

Atrial Fibrillation: Anticoagulation

- CHA_2DS_2-VASc
- HAS-Bled

Risk factors		
C	Congestive Heart Failure	+1 point
H	Hypertension	+1 point
A_2	Age ≥75	+2 point
D	Diabetes	+1 point
S_2	Stroke/TIA History	+2 point
V	Vascular Disease	+1 point
A	Age 65-74	+1 point
S	Sex (Female)	+1 point

Stroke risk per year	
0	0%
1	1.3%
2	2.2%
3	3.2%
4	4.0%
5	6.7%
6	9.8%
7	9.6%
8	6.7%
9	15.2%

Reference: European Heart Rhythm Association. Guidelines for the management of atrial fibrillation: the Task Force for the Management of Atrial Fibrillation of the European Society of Cardiology (ESC). Eur Heart J. 2010;31(19):2369-2429.

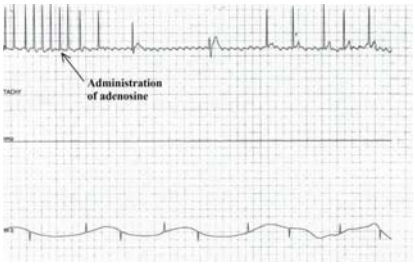
Atrial Flutter

- Similar to afib
- Atrial rates usually 240 or 300/min
- Sawtooth EKG pattern

http://www.clevelandclinicmeded.com/medicalpubs/diseasemanagement/cardiology/atrial-fibrillation/

Flutter

- Adenosine will not treat but may "uncover" rhythm



Faruqi et al. Clinical Diabetes. 2015

AVNRT

- Slow-fast pathway
- Buried P-wave (within QRS)
- Tx: vagal maneuvers, medication (adenosine), cardioversion, ablate aberrant pathway

Tip: if a SVT converts with adenosine, likely to be AVNRT

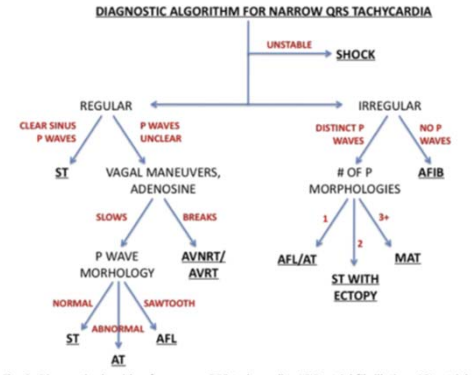


Fig. 6. Diagnostic algorithm for narrow QRS tachycardia. AFIB, atrial fibrillation; AFL, atrial flutter; AT, atrial tachycardia; AV, atrioventricular; AVNRT, AV nodal reentrant tachycardia; AVRT, AV reentrant tachycardia; MAT, multifocal atrial tachycardia; ST, sinus tachycardia.

Tracy and Boushahri. Crit Care Clin. 2014.

Wide Complex

- >120ms
- *Can* be supraventricular
- Majority are ventricular in origin
- Don't be fooled by a pacemaker!

Tracy and Boushahri. Crit Care Clin. 2014.
Akhtar et al. Ann Intern Med. 1988.

Monomorphic vs Polymorphic

https://lifeinthefastlane.com/ecg-library

Polymorphic

- Try to ascertain the baseline EKG for pt to evaluate QTc
- Torsades de pointes is polymorphic in setting of prolonged QTc.
- Treatment? MAGNESIUM!
- If QTc is normal, may be associated with myocardial ischemia

Treatment of Wide Complex Tachy

Stable

- Antiarrhythmic
- Cardiology consult
- Possible cardioversion

Unstable (with a pulse)

- Cardioversion
- Consider amiodarone maintenance

*If pulseless, follow ACLS algorithm

Bradyarrhythmia

- Ranges from sinus to heart block
- Medication management (atropine)
- Pacing may be needed

Cardiac Pacing

- Transcutaneous vs Transvenous
- Nomenclature

Transcutaneous Pacing

- Place pads anteriorly and posteriorly
- Set rate to desired HR (70-80)
  - Needs to be well above intrinsic rhythm!
- Fixed vs. Demand mode
- Determine capture by palpating a pulse
  - Start with 70mA (higher if unstable)
  - Set about 5-10mA above capture threshold

Transvenous

- Longer term (but still short term) solution
- Need central access with sheath
- Ideally in apex of RV
- Generator and cables needed
- Properly placed will demonstrate LBBB

Nomenclature

- 1st Letter: Paced Chamber
- 2nd Letter: Sensed Chamber
- 3rd Letter: Response to Sensing

A = atrium
V = ventricle
D = atrium and ventricle
O = none

I = inhibited
T = triggered/activated
D = inhibited and triggered

Generator Settings

- Rate: default is 80
- Output: energy delivered to cardiac muscle to induce depolarization
  - 10mA default, but use minimum needed for capture
  - Set ABOVE capture threshold
- Sensitivity: generator's ability to detect patient's intrinsic rhythm

What if transvenous pacing fails?

- Check all connections
- Press "EMERGENCY" mode, if present
  - This increases output to 25mA (or max)
- Place pads for external pacing

SHOCK

Cardiogenic shock

- End organ hypoperfusion secondary to decreased cardiac output
- Acute MI is the most common cause
- High mortality (>50%)

Goldberg et al. *Circulation*. 2009
Hochman et al. J Am Coll Cardiol. 2000.

Workup and Diagnosis

- Elevated JVP
- S3 gallop

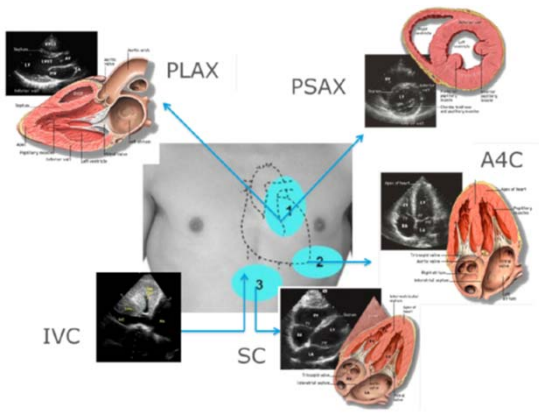
→ Increased Mortality

- Cool extremities
- Rales
- Edema
- Pulmonary artery catheter?
  - ESCAPE Trial

Drazner et al. NEJM. 2001.

Don't forget the Ultrasound!!!!

- 4 Cardinal Views
- Quick
- Easy*
- Safe
- Inexpensive



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Slide courtesy of Ravi Agarwala, MD

Parasternal Long Axis

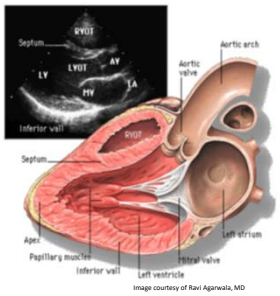

Image courtesy of Ravi Agarwala, MD

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Parasternal Short Axis

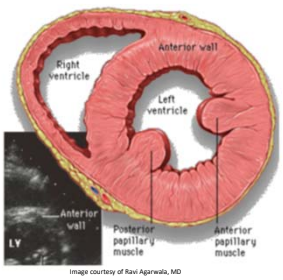

Image courtesy of Ravi Agarwala, MD

Parasternal Short Axis

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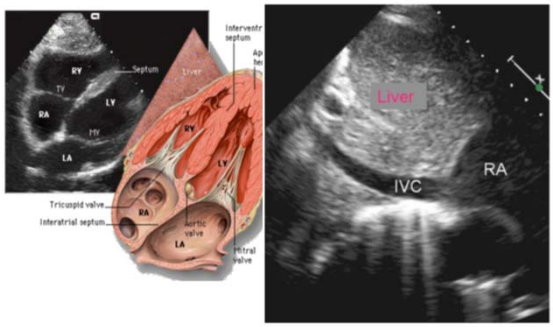
Subcostal



Images courtesy of Ravi Agarwala, MD

Apical (4-chamber)

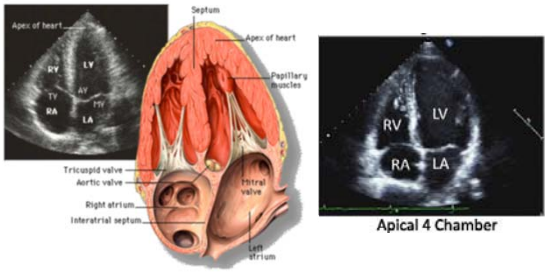


Image courtesy of Ravi Agarwala, MD

Treatment

- Recognize
- Treat cause (valve/wall rupture, hypokinesis, etc)
- Restore CO

Inotropes

- Used to maintain systemic perfusion
- Assoc with adverse outcomes in heart failure
- Dobutamine- stimulates β1 and β2
  - Increases cAMP production
  - Beware of systemic hypotension
- Milrinone- phosphodiesterase-3 inhibitor
  - Also increases cAMP production

Elkayam et al. Am Heart J. 2007

Vasopressors

The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 MARCH 4, 2010 VOL. 362 NO. 9

Comparison of Dopamine and Norepinephrine in the Treatment of Shock

Daniel De Backer, M.D., Ph.D., Patrick Biston, M.D., Jacques Devriendt, M.D., Christian Madl, M.D., Didier Chochrad, M.D., Cesar Aldecoa, M.D., Alexandre Brasseur, M.D., Pierre Defrance, M.D., Philippe Gottignies, M.D., and Jean-Louis Vincent, M.D., Ph.D., for the SOAP II Investigators*

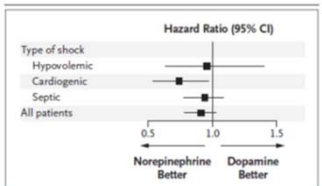


Figure 3. Forest Plot for Predefined Subgroup Analysis According to Type of Shock.

A total of 1044 patients were in septic shock (542 in the dopamine group and 502 in the norepinephrine group), 280 were in cardiogenic shock (135 in the dopamine group and 145 in the norepinephrine group), and 263 were in hypovolemic shock (138 in the dopamine group and 125 in the norepinephrine group). The P value for interaction was 0.87.

Intra-Aortic Balloon Pump (IABP)

- Device inserted into descending aorta
- Inflates during diastole
  - Coronary augmentation (↑ supply)
  - Decreases left heart work (↓ demand)
- Deflates during systole

Figure 2. Aortic pressure tracing showing the effect of IABP in 2:1 ratio. The central waveform is of an unassisted beat while the first and third waveforms are of assisted beats. (A) Unassisted aortic end diastolic pressure. (B) Unassisted systolic pressure. (C) Balloon inflation. (D) Diastolic augmentation. (E) Assisted end diastolic pressure. (F) Assisted systole and G-Natural dicrotic notch.

Mehrotra. J Clin Prev Cardiol. 2013

The NEW ENGLAND JOURNAL of MEDICINE
ESTABLISHED IN 1812 OCTOBER 4, 2012 VOL. 367 NO. 14

Intraaortic Balloon Support for Myocardial Infarction with Cardiogenic Shock

Holger Thiele, M.D., Uwe Zeymer, M.D., Franz-Josef Neumann, M.D., Miroslaw Ferenc, M.D., Hans-Georg Olbrich, M.D., Jörg Hausleiter, M.D., Gert Richardt, M.D., Marcus Hennersdorf, M.D., Klaus Empen, M.D., Georg Fuernau, M.D., Steffen Desch, M.D., Ingo Eitel, M.D., Rainer Hambrecht, M.D., Jörg Fuhrmann, M.D., Michael Böhm, M.D., Henning Ebelt, M.D., Steffen Schneider, Ph.D., Gerhard Schuler, M.D., and Karl Werdan, M.D., for the IABP-SHOCK II Trial Investigators*

Table 3. Clinical Outcomes.

Outcome	IABP (N = 300)	Control (N = 298)	P Value	Relative Risk with IABP (95% CI)
	number (percent)			
Primary end point: all-cause mortality at 30 days	119 (39.7)	123 (41.3)	0.69	0.96 (0.79–1.17)
Reinfarction in hospital	9 (3.0)	4 (1.3)	0.16	2.24 (0.70–7.18)
Stent thrombosis in hospital	4 (1.3)	3 (1.0)	0.71	1.32 (0.30–5.87)
Stroke in hospital	2 (0.7)	5 (1.7)	0.28	0.40 (0.08–2.03)
Ischemic	2 (0.7)	4 (1.3)	0.45	0.49 (0.09–2.71)
Hemorrhagic	0	1 (0.3)	0.50	—
Peripheral ischemic complications requiring intervention in hospital	13 (4.3)	10 (3.4)	0.53	1.29 (0.58–2.90)
Bleeding in hospital*				
Life-threatening or severe	10 (3.3)	13 (4.4)	0.51	0.76 (0.34–1.72)
Moderate	52 (17.3)	49 (16.4)	0.77	1.05 (0.74–1.50)
Sepsis in hospital	47 (15.7)	61 (20.5)	0.15	0.77 (0.54–1.08)

LVAD and Percutaneous Devices

- Impella
- TandemHeart
- ECMO

PULMONARY EMBOLISM

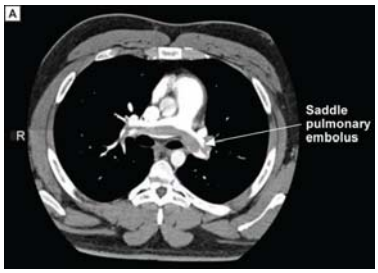


Photo: Shum and Gore. J Am Osteopath Assoc. 2015.

Pulmonary Embolism

- VTE accounts for up to 15% of in-hospital deaths
- Other long term effects:
  - Recurrent VTE
  - Venous insufficiency
  - Pulmonary hypertension
- Not *always* from the legs/pelvis!

Konstantinides. NEJM. 2008
Busse and Vourlekis. Crit Care Clin. 2014.

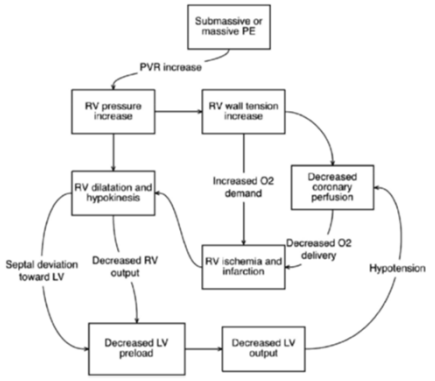
PE Definitions

- **Low-risk**: garden variety PE
- **Submassive**: HD stable but with right heart strain
- **Massive**: SBP <90mmHg or drop in SBP >40mmHg for >15 minutes

TABLE 1. In-Hospital Mortality According to the Degree of Hemodynamic Compromise in 1001 Patients With Acute PE[3]

	n	Mortality, %	95% CI
RV dysfunction, no arterial hypotension	407	8.1	5.8–11.2
Arterial hypotension*	316	15.2	11.6–20.0
Cardiogenic shock†	102	24.5	17.2–33.7
Cardiopulmonary resuscitation	176	64.8	57.5–71.4

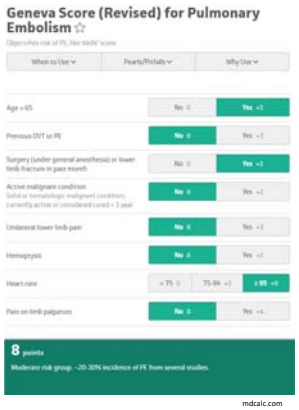
Kucher and Goldhaber. Circulation. 2005



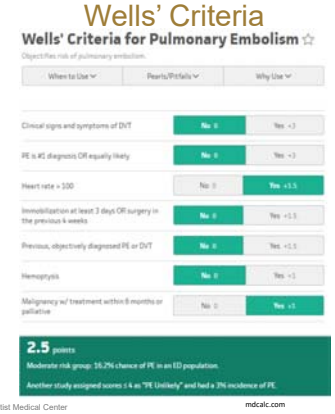
Busse and Vourlekis. Crit Care Clin. 2014.

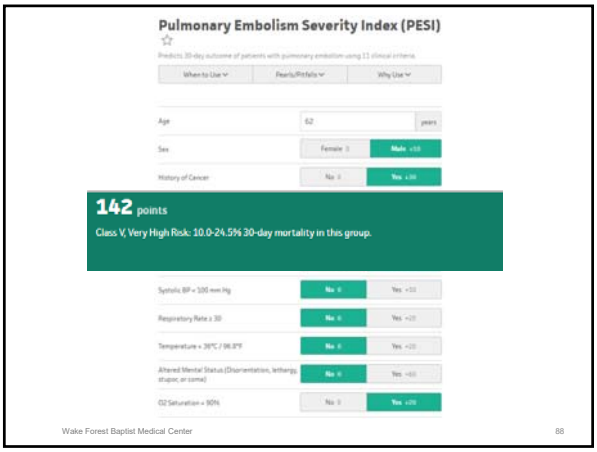
Prediction Tools

- Geneva Score
  - May predict mortality
- Wells Score
- Pulmonary Embolism Severity Index (PESI)



Wells' Criteria



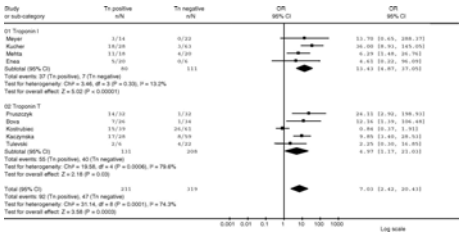


Exam Findings

- Hypotension
- Hypoxemia
- Sudden onset
- EKG
- US

Biomarkers

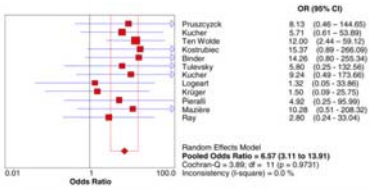
- Troponin



Becattini et al. Circulation. 2007.

Biomarkers

- BNP: secreted in response to ventricular stress/stretch/strain



Coutance et al. Crit Care. 2008.

Diagnosis

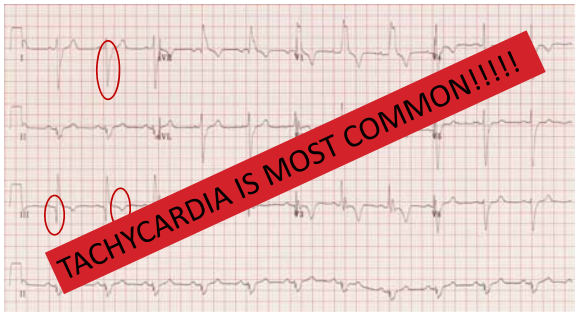
- EKG
- CTA
- US

Table 5. Positive and Negative Predictive Values of CTA, as Compared with Previous Clinical Assessment.*

Variable	High Clinical Probability		Intermediate Clinical Probability		Low Clinical Probability	
	No./Total No.	Value (95% CI)	No./Total No.	Value (95% CI)	No./Total No.	Value (95% CI)
Positive predictive value of CTA	22/23	96 (78–99)	93/101	92 (84–96)	22/38	58 (40–73)
Positive predictive value of CTA or CTV	27/28	96 (81–99)	100/111	90 (82–94)	24/42	57 (40–72)
Negative predictive value of CTA	9/15	60 (32–83)	121/136	89 (82–93)	158/164†	96 (92–98)
Negative predictive value of both CTA and CTV	9/11	82 (48–97)	114/124	92 (85–96)	146/151†	97 (92–98)

Stein, et al (PIOPED II). NEJM. 2006.

EKG



https://lifeinthefastlane.com/ecg-library/pulmonary-embolism/

S1 Q3 T3

Ultrasound

- Dilated right heart
- Decreased TAPSE
- Flattened septum

PE Treatment

- Anticoagulation
- Restore cardiac output

Anticoagulation: Chest Guidelines

- Recommend DOAC over VKA (if no cancer)
- Suggest LMWH over UFH** (9th ed)
- 3 months duration

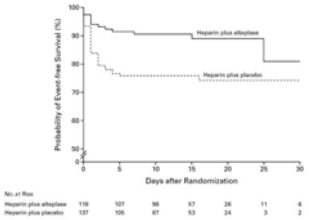
Thrombolysis

*22. In most patients with acute PE not associated with hypotension, we recommend against systemically administered thrombolytic therapy (Grade 1B).

*23. In selected patients with acute PE who deteriorate after starting anticoagulant therapy but have yet to develop hypotension and who have a low bleeding risk, we suggest systemically administered thrombolytic therapy over no such therapy (Grade 2C).

MAPPET 3

- Heparin + Alteplase vs. Heparin in Submassive



MOPETT Trial

Table 2
Primary end points at 28 ± 5 mo of follow-up

Variable	TG (n = 58; 100%)	CG (n = 56; 100%)	p Value
Pulmonary hypertension*	9 (16%)	32 (57%)	<0.001
Pulmonary hypertension plus recurrent pulmonary embolism	9 (16%)	35 (63%)	<0.001

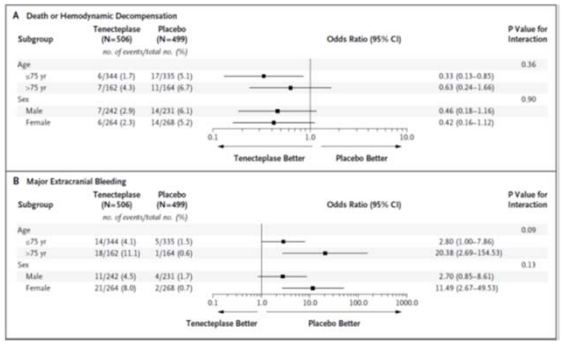
* Pulmonary artery systolic pressure ≥40 mm Hg.

- Alteplase regimen
- Is this clinically relevant?
- No mortality difference

PEITHO Trial

- Primary Outcome: Decreased mortality
  - 2.6% vs. 5.6%, p = 0.02
- Safety outcomes: increased bleeding and stroke

Meyer et al. NEJM. 2014.



Meyer et al. NEJM. 2014.

PEAPETT Study

- PEA Pulmonary Embolism Treat with Thrombolysis
- 50mg tPA push over 1 minute during CPR
- 20/23 (87%) alive at 22 months
- No major bleeding events

tPA Dose:

- Cardiac Arrest: 50mg over 1-2min
- Massive/Submassive PE:
  - 10mg bolus followed by 90mg over 2 hrs
    - OR
  - 10mg bolus followed by 40mg over 2 hrs

***PAUSE HEPARIN DURING ADMIN!

ECMO

- Salvage only
- Consider if hypotension/hypoxemia persists despite thrombolysis
- No good RCT

TAMPONADE

The Pericardial Sac

- Visceral and parietal layer
- Contains 10-50mL fluid
- Alterations of the sac and/or fluid lead to pathology
  - Increased production
  - Decreased absorption
  - Change in quality of fluid

Characterizing the Problem:

- Onset: acute, subacute, chronic
- Distribution: circumferential, loculated
- Hemodynamic impact: none, tamponade, effusive-constrictive
- Composition: blood, exudate, transudate, gas/air
- Size: mild (<10mm), moderate (10-20mm), large (>20mm)

Onset	Acute Subacute Chronic (>3 months)
Size	Mild <10 mm Moderate 10–20mm Large >20 mm
Distribution	Circumferential Loculated
Composition	Transudate Exudate

- Hemodynamic impact: none, tamponade, effusive-constrictive

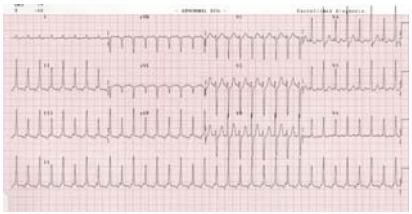
Adler et al. 2015 ESC Guidelines. European Heart Journal. 2015.

Signs and Symptoms

- Dyspnea
- Chest pain
- Elevated JVD
- Pulsus paradoxus
- Hypotension
- Muffled heart sounds

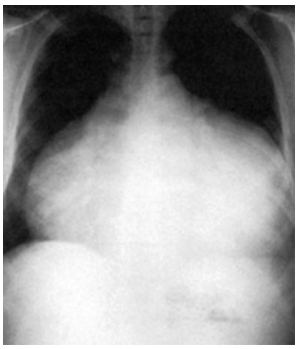
Diagnosis

- Physical Exam
- EKG
- ECHO
  - CXR
  - CT
  - MRI

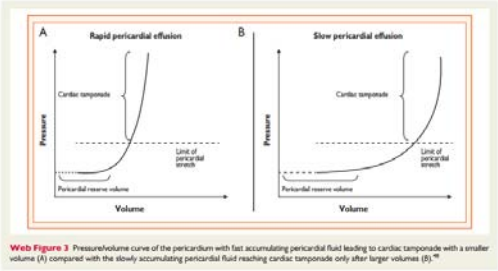


https://www.reddit.com/r/Pathognomonic/comments/21mxoj/electrical_alternans_pericardial_effusion/

Don't expect to see this….



https://emedicine.medscape.com/article/152083-overview



Web Figure 3 Pressure/volume curve of the pericardium with fast accumulating pericardial fluid leading to cardiac tamponade with a smaller volume (A) compared with the slowly accumulating pericardial fluid reaching cardiac tamponade only after larger volumes (B).[48]

Adler et al. 2015 ESC Guidelines. European Heart Journal. 2015.

Treatment

- Address underlying disease
- Drainage
  - US guided
  - Window
  - Sternotomy/thoracotomy

Conclusions

- Myriad of cardiac emergencies in the ICU
- Have a structured approach to cardiac evaluation
- Become more comfortable with US…use it on every patient!


Thank you!
Wake Forest Baptist Medical Center

RUTGERS
Robert Wood Johnson Medical School

Idea to Abstract & Publication

Dr. Gregory Peck
Assistant Professor, Surgery
Associate Director of Performance Improvement, Trauma, ACS Fellowship
EAST 2018 AP Workshop

RUTGERS

Be Unorthodox – Nurses are/think different

- Idea
  - Needs Assessment – Trauma Systems / Nursing key
  - Global Issue
  - Out of the Ordinary – SAO - N
  - Sustainability – Intramural Funding
- Abstract
  - Concept – Relationship
  - Multidisciplinary Team – Trauma Surgeon and Nurse
  - Project - Symposium
- Publication
  - Target
  - Long term – Gender Balance and Professional Balance
  - Build further

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Background

- 2015 Lancet Commission on Global Surgery's (LCOGS) Executive Summary meeting - four new working groups on Global Surgery and injury.
  - 1) workforce, education, and training -> Trauma Nursing
  - 2) health care delivery and management - > Trauma Systems
  - 3) economics and finance -> Trauma Programs
  - 4) information management -> Trauma Registries

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Colombia Trauma Center of Excellence

- 2011 – *Prefeasibility proposal of medical emergency development for pacific region with implementation of a center of excellence in Trauma and Emergency*
  - *Carlos Ordonez, Pino Fernando, Marsiol Badiel, Monica Morales*
    - Pacific Ocean Region: Cauca, Narino, Choco, Valle
    - 20000 trauma victims, 6343 deaths (29% Country Trauma mortality)
    - 1/3 Homicide
    - 5232 disabling injuries
  - Presidential Program in Comprehensive Action Against anti-personal Mines (PAICMA) b/t 1990-2012.
    - 10094 landmine victims, Mortality 1498 (15%)

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Burden in Global Surgery and Injury Care

- Lack of access
  - Surgical burden projected as #1 cause of mortality by 2030[1]
  - Only 3-5% of the 313 million procedures worldwide occur in LMIC[1]
  - $12.3 trillion lost in LMIC b/c lack of standard surgical care and catastrophic expenditure associated with basic surgical care[1]
- INJURY - 5.7 million deaths annually
  - 1º cause of death worldwide[2] (conservative estimates, 3-5 year lag in WHO data)
  - 90% world Injury Burden is in the LMIC
  - 11-15% of world's disability-adjusted life years (DALYs) due to basic and life sustaining surgical conditions[3]

1. Meara JG et al. Surgery and Global Health: a Lancet Commission. Lancet. 2014 Jan4; 383(9911):12-3. Doi:10.1016/S0140-6736(13)62345-4. Epub 2013 Dec11.
2. World Health Organization 2014 Methods and Data sources for country level causes of death 2000-2012. Department of Health Statistics and Information systems, WHO Geneva may 2014. Global Health Estimates Technical Paper.
3.World Health Organization (2009) Global Initiative for Emergency and Essential Surgical Care (GIEESC). http://www. who.int/surgery/globalinitiative/en/. Accessed 25 August 2009.

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2015 World Health Assembly Resolution 68.15

- *Need* was highlighted with call for:
  - "multi-sectoral partnerships and multidisciplinary policies to support national, regional, and global efforts to… enhance education, workforce capacity, and training."
- Colombia roadmap
  - Inclusive public health approach

World Health Assembly Resolution 68.15, *Strengthening emergency and essential surgical care and anaesthesia as a component of universal health coverage.* May 26, 2015.

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Global Surgery and Injury beginnings

Instituto Cisalva
Universidad del Valle

- 2014 Rutgers and Universidad de Valle
  - MOU and Needs Assessment
- 2015 USAID Grant
  - Divisions of Acute Care Surgery Rutgers and HUV and GAIA
    - *"A Syndemic Approach to Trauma Systems Regionalization in Colombia."*
- 2014 - 2016 Education
  - Surgery Fellows
    - Acute Care Surgery Global Injury Burden Electives
      - 2015 Approval by American Association for the Surgery of Trauma[4]
  - Medical Students
    - Chancellors Global Health Scholars, USAID and Global Distinction Students, International Global Surgery Research
  - General Surgery Residency and School of Public Health
    - Global Surgery Resident Investigational year in Global Health and Injury in University of Anticquia
- 2016 - Multidisciplinary Injury care – ACS Surgery/Nursing Leadership[5]
  - Nursing
    - Lisa Falcon, RN, RWJ - Trauma Program Manager
    - Consuelo Burbano, HUV, School of Nursing
    - Suzanne Willard, PhD, APNc, FAAN, Associate Dean for Global Health, Rutgers School of Nursing
    - Jasmine Garces, DNP, APN, NJMS University Hospital Trauma

4. Peck GL, and Gracias V et al. Can We augment the US Trauma Fellow's Operative Training? The PTS Fellowship: A US Surgical Critical Care Fellow's Experience in Colombia. *Panam J Trauma, Crit Care Emerg Surg.* 2014;3(1):1-7.
5. David N. Blitzer, Rajan Gupta, Gregory L. Peck. Extending the Acute Care Surgery Paradigm to Global Surgery. *JAMA Surg.* Published online January 27, 2016.

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Six core Surgical indicators

	Definition	Target
Access to timely essential surgery	Proportion of the population that can access, within 2 h, a facility that can do caesarean delivery, laparotomy, and treatment of open fracture (the Bellwether Procedures)	A minimum of 80% coverage of essential surgical and anaesthesia services per country by 2030
Specialist surgical workforce density	Number of specialist surgical, anaesthetic, and obstetric physicians who are working, per 100 000 population	100% of countries with at least 20 surgical, anaesthetic, and obstetric physicians per 100 000 population by 2030
Surgical volume	Procedures done in an operating theatre, per 100 000 population per year	80% of countries by 2020 and 100% of countries by 2030 tracking surgical volume; a minimum of 5000 procedures per 100 000 population by 2030
Perioperative mortality	All-cause death rate before discharge in patients who have undergone a procedure in an operating theatre, divided by the total number of procedures, presented as a percentage	80% of countries by 2020 and 100% of countries by 2030 tracking perioperative mortality; in 2020, assess global data and set national targets for 2030
Protection against impoverishing expenditure	Proportion of households protected against impoverishment from direct out-of-pocket payments for surgical and anaesthesia care	100% protection against impoverishment from out-of-pocket payments for surgical and anaesthesia care by 2030
Protection against catastrophic expenditure	Proportion of households protected against catastrophic expenditure from direct out-of-pocket payments for surgical and anaesthesia care	100% protection against catastrophic expenditure from out-of-pocket payments for surgical and anaesthesia care by 2030

These indicators provide the most information when used and interpreted together; no single indicator provides an adequate representation of surgical and anaesthesia care when analysed independently.

Table 1: **Core indicators for monitoring of universal access to safe, affordable surgical and anaesthesia care when needed**

www.thelancet.com Vol 386 August 8, 2015

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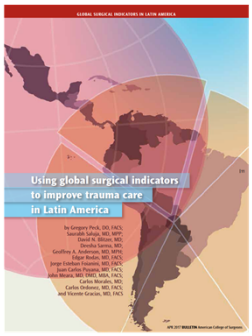

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TABLE 1.
LCoGS CORE INDICATORS
AND ASSOCIATED TRAUMA PROGRAM/SYSTEM ELEMENT

Category	LCoGS indicator	Description	Proposed trauma program/ system element focus
Preparedness	1	The geographic accessibility of surgical facilities	Prehospital system and integration with hospital registry
	2*	The density of specialist surgical providers	Acute care surgeon/fellowships; trauma program manager
Delivery	3*	The number of surgical procedures provided per 100,000 population	Trauma and emergent/essential hospital/ societal registries
	4	30-day perioperative mortality rates	Trauma and emergent/essential hospital/societal registries, formal trauma performance improvement and patient safety, and trauma morbidity/mortality review process
Impact	5*	The risk of impoverishing expenditure when surgery is required	Future work—ministries of health/ education/finance and trauma/acute care surgery divisional business administration
	6*	The risk of catastrophic expenditure when surgery is required	Future work—ministries of health/ education/finance and trauma/acute care surgery divisional business administration

*World development indicators

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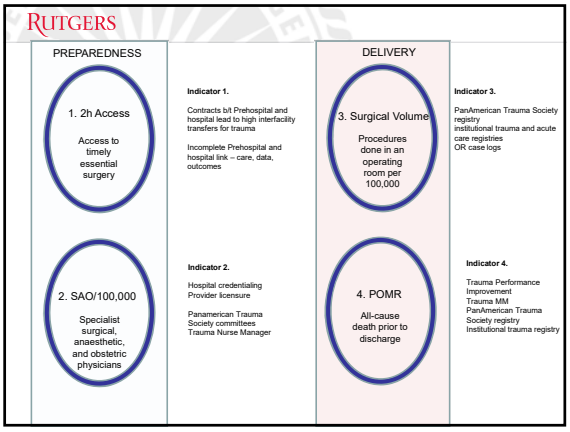

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A process for implementation

- Indicator Measurement within Trauma Systems Development
  - Trauma Registry – PanAmerican Trauma Society
  - Trauma Nurse Manager – Ministry of Education
  - Trauma Performance Improvement – Nurse ownership

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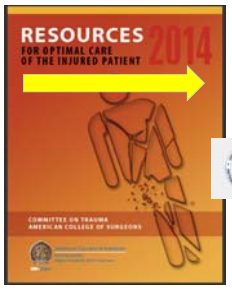
Needs assessment -> trauma system expansion -> USAID RIFP

1. Institutional capacity
2. Societal capacity
3. MIC/HIC Funding



Trauma Center
- Trauma Registry (PTS)
- Pre-hospital Integration
- Trauma Education
- Trauma Nurse Manager
- Trauma Performance Improvement

USAID
FROM THE AMERICAN PEOPLE

Resources for the Optimal Care of the Injured Patient. https://www.facs.org/.../vrc%20resources/resources%20for%20optimal%20care%202014%20v11.ashx

4. US Department of Health and Human Services, Health Resources and Services Administration[1]

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LCOGS Indicator 3 and 4. Implementation with Societal Registries – Virginia Commonwealth University ITSDP

- ***Experiencia en dos hospitales de tercer nivel de atención del suroccidente de Colombia en la aplicación del Registro Internacional de Trauma de la Sociedad Panamericana de Trauma***
  - 2011 – 2012

Carlos A. Ordóñez MD[I]; Luis Fernando Pino MD[II]; Jorge W. Tejada MD[III]; Marisol Badiel MD[IV]; Jhon Harry Loaiza[V]; Lina V. Mata[VI]; Michael B. Aboutanos, MD[VII]
Rev. Col. Bras. Cir. vol.39 no.4 Rio de Janeiro July/Aug. 2012, http://dx.doi.org/10.1590/S0100-69912012000400003

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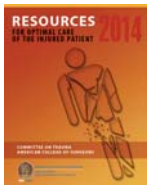
Trauma Nursing – Implementation of Indicator 4

- Universidad de Valle, School of Nursing
  - *"Especializacion en Enfermeria en Trauma, Emergencia Quirurgica y Cuidado Critico del Trauma"* Consuelo Burbano and Pino Fernando, HUV
  - Trauma Nurse Manager
    - Trauma Director support
    - Hospital Organization of Trauma Program
    - Injury Prevention
    - Trauma Research and Scholarship
  - Trauma Performance Improvement process
  - Trauma Morbidity and Mortality
  - Trauma Registry



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SOAN - Trauma Program Managers - System Expansion

- Trauma Nurse Manager Role
  - University Hospital
    - Lisa Falcon, MSN, RN, CTRN, NE-BC
      - Nov. 2015 - Trauma Nursing Symposium Podium
  - University de Valle, University of Antioquia
    - Consuelo Burbano (Cali) and Yuly Andrea Santa Mejia (Medellin)
  - Rutgers – School of Nursing
    - Susan Willard, PhD, APN, FAAN
  - Pan-American Trauma Society
    - Cristiane de Alencar Domingues
    - Director of PTS Nursing Course, Gaspar Reboredo
    - Jasmine Garces, DNP, RN, CCRN, ACNP-BC

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Vision for the future

- Latin America and Africa
  - Nursing professions (work focused symposium) as capacity expansion in injury
    - Trauma (Injury) Nurse Managers – systems oversight
    - Trauma (Injury) Nursing Educators – curriculum to include TNM - administrative
    - Roles specifically for women
      - *"I can tell you by confronting the problems once marginalized as women's issues, we can tackle the greatest dangers of the 21st century. From small villages to whole nations, we know now know the well being of women determines the well being of society."* - Gloria Steinem

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Using RFA to create teams

. . . . And Collaborate despite academic politics

PanAmerican Trauma Society Nursing Course

1766-2016 RUTGERS 250

2016 Rutgers Centers for Global Advancement and International Affairs (GAIA) Symposium – Interprofessional models in Global Injury Care and Education

RUTGERS

2016 Symposium - Inter-professional Models in Global Injury Care and Education

-

PANAMERICAN TRAUMA SOCIETY
SOCIEDAD PANAMERICANA de TRAUMA

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2017 Workshop – Operationalize Global Team

RUTGERS

All the credit

Writing for Impact: How to Prepare a Journal Article

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University of Michigan
Ann Arbor, MI 48109

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Publication

- Identify your journal target - JTN
  - Format
  - References from previous works
  - Champions
  - Team of Capabilities/Background
  - Writing
  - Editing
  - Administration

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The work – Don't be scared

- Each manuscript must include the following:
  - Separate title page with the following information:
    - (a) complete manuscript title;
    - (b) authors' full names, highest academic degrees, and affiliations;
    - (c) name and address for correspondence, including fax number, telephone number, and e-mail address;
    - (d) address for reprints, if different from that of corresponding author;
    - (e) any footnotes to these items;
    - (f) a short running title not exceeding 45 letters and spaces;
    - (g) and sources of support that require acknowledgment.

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Abstract

- No more than 250 words and 3 to 5 key words
- Team action essential

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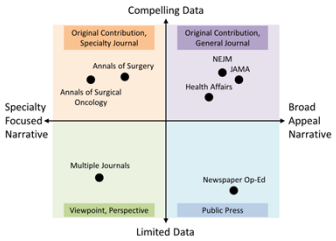
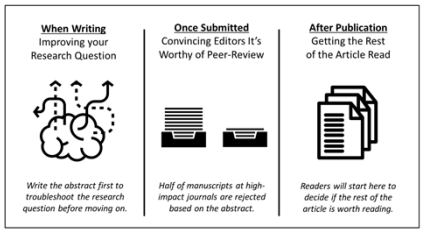
Figure 4. Where Should You Submit Your Manuscript?



RUTGERS

Abstract

Figure 1. The Three Roles of an Abstract Across the Manuscript Timeline



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Introduction

- Paragraph 1
  - Give context to problem
- Paragraph 2
  - Create a knowledge gap
- Paragraph 3
  - Preview your work plan

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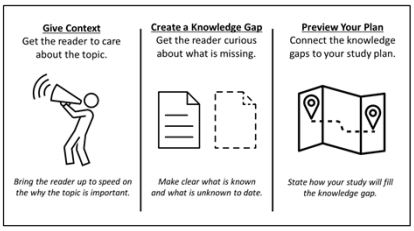
Figure 2. The Three Paragraphs of an Effective Introduction



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Methods

- Data source
- Patient population
- Outcomes
- Statistical analysis

RUTGERS

Results

- Paragraph 1
  - Describes the study group characteristics
- Paragraph 2-3
  - Describe outcomes of study
- Order correctly 1 and 2 outcomes

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Discussion

- Paragraph 1
  - Summarize findings
- Paragraph 2 -3
  - Put your findings into context
- Paragraph 4
  - Recognize Limitations
- Paragraph 5
  - Implications moving forward
- 4 Ps of discussion

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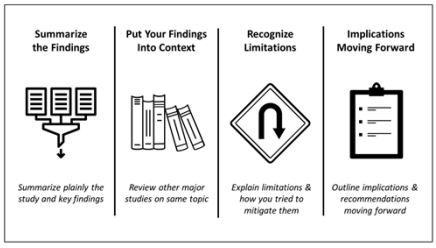
Discussion

Figure 3. Four Components of a Compelling Discussion



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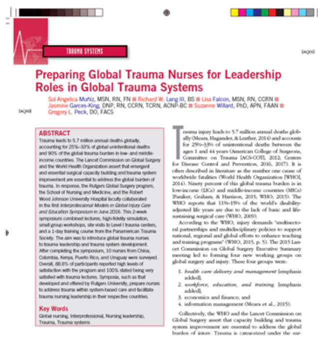

TRAUMA SYSTEMS

[AQ01]

Preparing Global Trauma Nurses for Leadership Roles in Global Trauma Systems

[AQ02] Sol Angelica Muñiz, MSN, RN, FN ■ Richard W. Lang III, BS ■ Lisa Falcon, MSN, RN, CCRN ■ Jasmine Garces-King, DNP, RN, CCRN, TCRN, ACNP-BC ■ Suzanne Willard, PhD, APN, FAAN ■ Gregory L. Peck, DO, FACS

ABSTRACT

Trauma leads to 5.7 million annual deaths globally, accounting for 25%–33% of global unintentional deaths and 90% of the global trauma burden in low- and middle-income countries. The Lancet Commission on Global Surgery and the World Health Organization assert that emergent and essential surgical capacity building and trauma system improvement are essential to address the global burden of trauma. In response, the Rutgers Global Surgery program, the School of Nursing and Medicine, and the Robert Wood Johnson University Hospital faculty collaborated in the first *Interprofessional Models in Global Injury Care and Education Symposium* in June 2016. This 2-week symposium combined lectures, high-fidelity simulation, small group workshops, site visits to Level I trauma centers, and a 1-day training course from the Panamerican Trauma Society. The aim was to introduce global trauma nurses to trauma leadership and trauma system development. After completing the symposium, 10 nurses from China, Colombia, Kenya, Puerto Rico, and Uruguay were surveyed. Overall, 88.8% of participants reported high levels of satisfaction with the program and 100% stated being very satisfied with trauma lectures. Symposia, such as that developed and offered by Rutgers University, prepare nurses to address trauma within system-based care and facilitate trauma nursing leadership in their respective countries.

Key Words

Global nursing, Interprofessional, Nursing leadership, Trauma, Trauma systems

Trauma injury leads to 5.7 million annual deaths globally (Meara, Hagander, & Leather, 2014) and accounts for 25%–33% of unintentional deaths between the ages 1 and 44 years (American College of Surgeons, Committee on Trauma [ACS-COT], 2012; Centers for Disease Control and Prevention, 2016, 2017). It is often described in literature as the number one cause of worldwide fatalities (World Health Organization [WHO], 2014). Ninety percent of this global trauma burden is in low-income (LICs) and middle-income countries (MICs) [Paniker, Graham, & Harrison, 2015; WHO, 2015). The WHO reports that 11%–15% of the world's disability-adjusted life years are due to the lack of basic and life-sustaining surgical care (WHO, 2009).

According to the WHO, injury demands "multisectoral partnerships and multidisciplinary policies to support national, regional and global efforts to enhance teaching and training programs" (WHO, 2015, p. 5). The 2015 Lancet Commission on Global Surgery Executive Summary meeting led to forming four new working groups on global surgery and injury. These four groups were:

1. *health care delivery and management* [emphasis added],
2. *workforce, education, and training* [emphasis added],
3. economics and finance; and
4. information management (Meara et al., 2015).

Collectively, the WHO and the Lancet Commission on Global Surgery assert that capacity building and trauma system improvement are essential to address the global burden of injury. Trauma is categorized under the sur-

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Research articles

- Following structure:
  - Background/Significance
  - Purpose
  - Research questions and/or hypotheses
  - Methods (includes population, sample size, instruments, data collection, etc.)
  - Results
  - Discussion
  - Conclusions or recommendations or implications for practice
  - Limitations
  - Reference
  - Key Points
  - Include Clinical Decision Support tools as relevant

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Non-research articles

- Following structure:
  - Topic
  - Purpose
  - Sources
  - Conclusions
  - References
  - Include Clinical Decision Support tools as relevant
  - Key Points

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Using Publication to create teams

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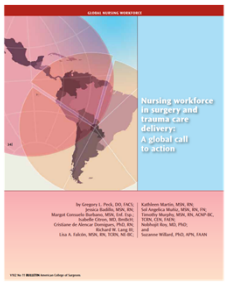
Relationship Expansion



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Improving your writing process

- Learn what is tried and true
- 20 minute bursts, 2 hour blocks
- Stick to parallel writing structure
- Be consistent with terminology
- Getting the most from feedback
- Wrote as you go
- Diversify
- Eat humble pie

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Sources

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3. World Health Organization (2009) Global Initiative for Emergency and Essential Surgical Care (GIEESC). Available at http://www.who.int/surgery/globalinitiative/en/. Accessed 25 August 2009.
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5. David N. Blitzer, Rajan Gupta, Gregory L. Peck. Extending the Acute Care Surgery Paradigm to Global Surgery. *JAMA Surg*. Published online January 27, 2016.doi:10.1001/jamasurg.2015.5099
6. **Gregory L. Peck, DO, FACS**, David N. Blitzer, MD, Isabelle Citron, MB, BCh, John Dutton, Jorge Esteban Foianini, MD, FACS, Vicente Gracias, MD, FACS, Ramiro Manzano, MD, John G. Meara, MD, DMD, MBA, FACS, Dhaval Mehta, Zina Model, Carlos Morales, MD, Rachel NeMoyer, MD, Carlos Ordonez, MD, FACS, Luis Fernando Pino, MD, Juan Carlos Puyana, MD, FACS, Edgar Rodas, MD, FACS, Mary E. Schroeder, MD, FACS, Tom Sullivan, MBS, Miyerlandi Torres, MBA, Paul Truché, MD and Martha P. Vega, MD Latin America Indicator Research Coalition examines prehospital care using a trauma systems application of LCoGS indicator 1. Bulletin of the American College of Surgeons. Volume 102. Number 7. July 1, 2017
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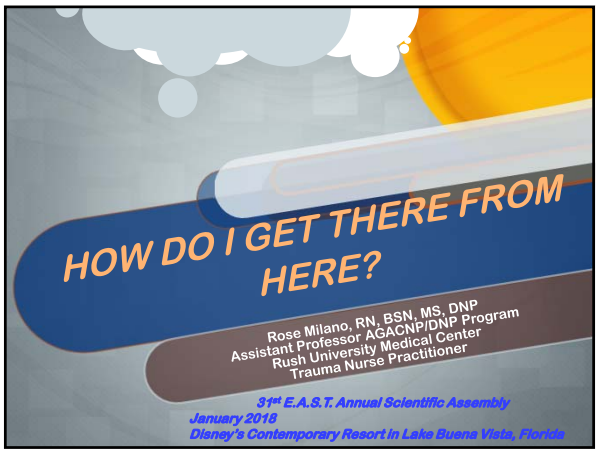
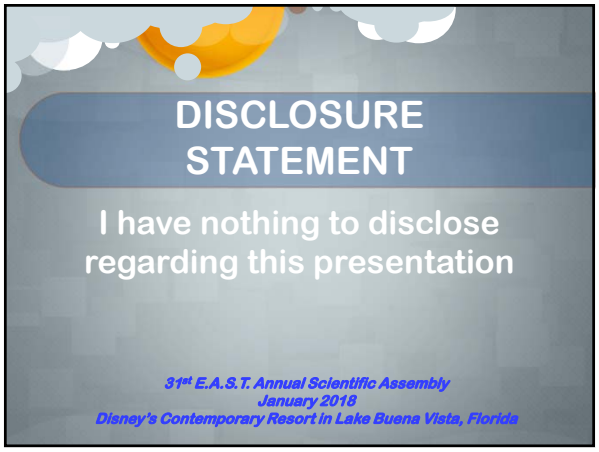
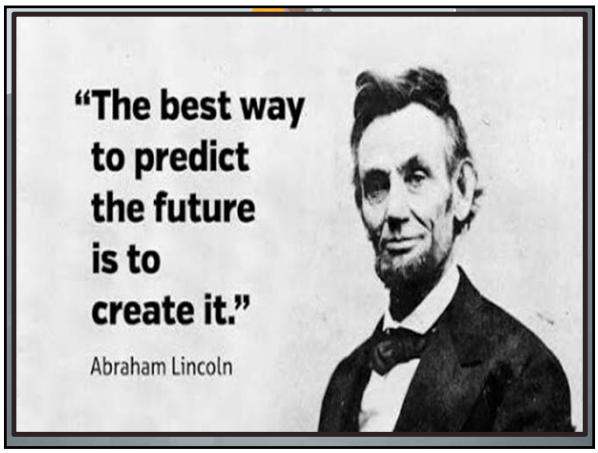




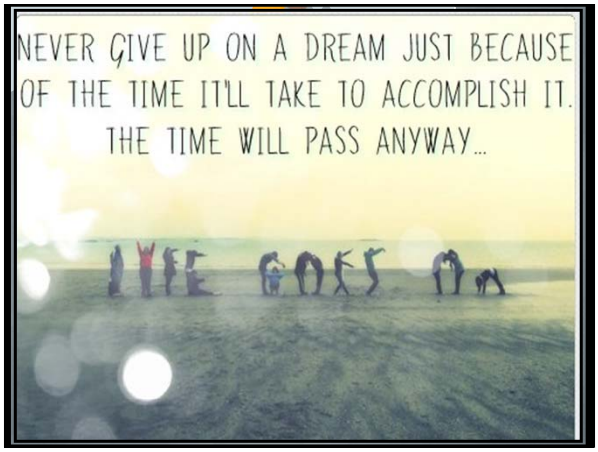
YEAR	SETBACKS/FAILURES	SUCCESSES
1832	Lost Job Defeated for State Legislature	Elected company captain of the state militia in Black Hawk War
1833	Failed in business	Appointed postmaster of New Salem Appointed deputy surveyor of Sangamon County
1834		Elected to the state legislature
1835	Childhood Sweetheart died	
1836	Had nervous breakdown	
1838	Defeated for Speaker	
1846		Elected to Congress
1848	Lost Re-election	
1854	Defeated for US Senate	Elected to State Senate but declined to run for US Senate
1856	Defeated for Vice President	
1858	Again defeated for US Senate	
1860		Elected 16th US President

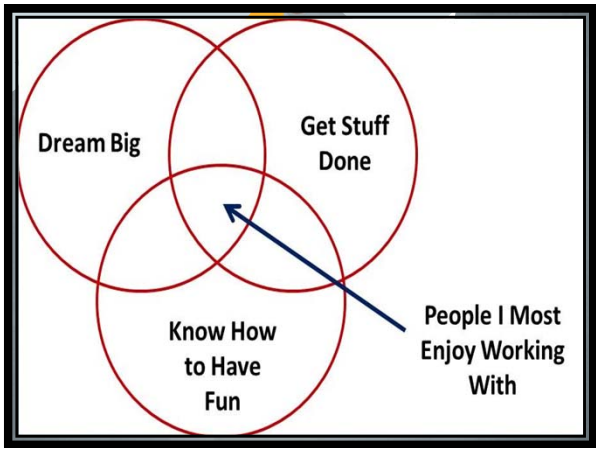

"The best way to predict the future is to create it."
Abraham Lincoln

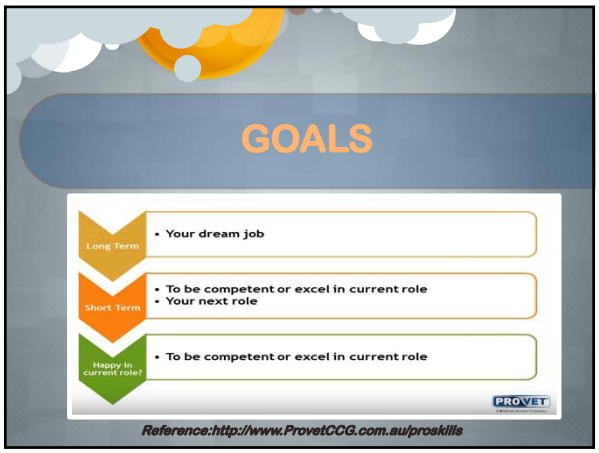

"Efforts and courage are not enough without purpose and direction."
John F Kennedy
FUTURE


START
Step 1
Step 2
Step 5
Step 4
UNDER CONSTRUCTION
Step 6
NEXT GOAL!

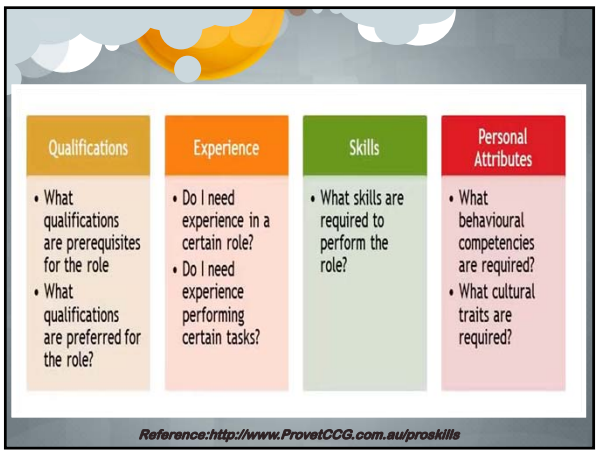

Step 1
Step 2
Step 5
Step 4
UNDER CONSTRUCTION
Step 6
START
Reference:http://www.pnbhs.school.nz/wp-content/uploads/2015/11/7-Habits-of-Highly-Effective-People-Summary-Covey.pdf


NEVER GIVE UP ON A DREAM JUST BECAUSE OF THE TIME IT'LL TAKE TO ACCOMPLISH IT. THE TIME WILL PASS ANYWAY...


Dream Big
Get Stuff Done
Know How to Have Fun
People I Most Enjoy Working With


GOALS
Long Term
• Your dream job
Short Term
• To be competent or excel in current role
• Your next role
Happy in current role?
• To be competent or excel in current role
PROVET
Reference:http://www.ProvetCCG.com.au/proskills


NETWORKING
Manager
External colleagues
You
Internal colleagues
Team
Reference:http://www.ProvetCCG.com.au/proskills


Qualifications
• What qualifications are prerequisites for the role
• What qualifications are preferred for the role?
Experience
• Do I need experience in a certain role?
• Do I need experience performing certain tasks?
Skills
• What skills are required to perform the role?
Personal Attributes
• What behavioural competencies are required?
• What cultural traits are required?
Reference:http://www.ProvetCCG.com.au/proskills


Career Opportunities
Administration Corporate
Administration
Unit Manager
Assistant Unit Manager/Charge
Supervisor
Director
Chief Nursing Officer
Practice Manager
Sales
Pharmaceuticals
Medical Equipment
Consultant
Legal
Practice
Political


Career Opportunities
Clinical
Bedside Nurse
Unit Educator
Unit Clinical Leader
Case Manager
Research Coordinator
Advanced Practice Nurse
Nurse Practitioner
Nurse Midwife
Nurse Anesthetist
Clinical Nurse Specialist


Career Opportunities
Academia
Affiliate / Adjunct Faculty
Instructor
Professor
Assistant
Associate
Professor
Program Director
Dean

PhD or DNP?

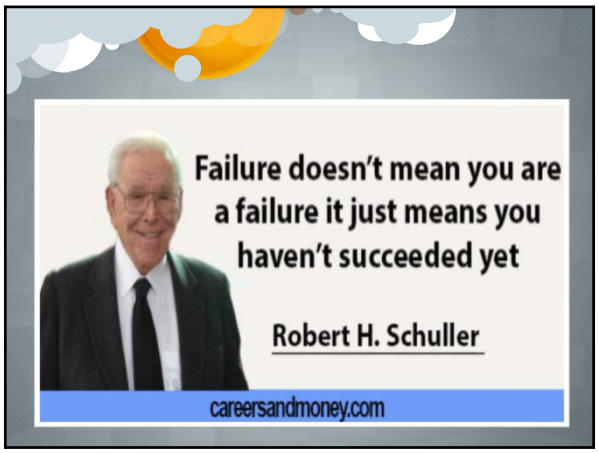
- PhD
  - Research Doctorate
  - Terminal Degree for Research Science
  - Prepares Individual to Conduct Independent Research
- DNP
  - Practice Doctorate
  - Terminal Degree for Clinical Practice
  - Prepares Individual to be Experts in Translation of Research to Bedside

PhD or DNP?

- PhD
  - Experts in Research
  - Oriented to Creating New Knowledge
  - Commitment to Research Career
- DNP
  - Experts in Evidence Based Practice
  - Oriented to Improving Patient Outcomes
  - Commitment to Clinical Practice

PhD and DNP Roles

- PhD
  - Independent Researcher
  - Academic Faculty
  - Practice Leadership
  - High Level Executive Positions
  - Policy Development
- DNP
  - Clinical Practice Expert
  - Academic Faculty
  - Practice Leadership
  - High Level Executive Positions
  - Policy Development


Failure doesn't mean you are a failure it just means you haven't succeeded yet
Robert H. Schuller
careersandmoney.com


The only limit to the height of your achievements is the reach of your dreams and your willingness to work hard for them.
— Michelle Obama —
AZ QUOTES

Postgraduate Physician Assistant Education

STEPHEN ROBIE, MSHS/MPH, PA-C

Financial Disclosures

- I have no financial disclosures to provide.

History of PA Education

- The PA profession started in 1965 at Duke University to develop a civilian equivalent for Navy corpsmen.
- Medicare/Medicaid were introduced around this time, exacerbating physician shortages with increased demand.
- The American Medical Association endorsed the concept of a "physician's assistant" and looked to explore accreditation.

History of PA Profession

- What makes a profession?
  - Professional organization:
    - Society of practitioners.
  - Education organization:
    - Association of training programs.
  - Accreditation body:
    - Formalizing training requirements and minimum standards of practice.
  - Certifying body:
    - Process of certification to ensure safe practice.
- Each of these Developed over the course of the 1970s:
  - AAPA established in 1968.
  - NCCPA formed in 1974.
  - ARC-PA (accrediting education) became freestanding accreditation agency in 2001.

Current Education Requirements

- Modern day PA programs are almost exclusively Masters' level.
- As of 2016, there were 218 accredited PA programs, more than double the number in 2000 (Hooker, Cawley, Everett, 2017).
- Postgraduate education programs are not required as most view PA work as 'on the job' training.
- There has been a movement endorsing progression of PA education to the doctoral level.
  - Arguments raised:
    - Remaining competitive against other advanced care practitioners moving to doctoral models.
    - Increased respect in the work place.
    - Increasing credentialing demands as other clinicians move toward doctoral level training.

Mittman, D. (2017). The PA Doctorate: Is it needed or not? *Clinician Today*. http://cliniciantoday.com/the-pa-doctorate-is-it-needed-or-not/

Postgraduate Programs

- First program was a surgical program started at Montefiore Medical Center in 1971 (Hussaini et al., 2016).
- The Association of Postgraduate PA Programs:
  - Nearly 58 member programs currently available (Hussaini et al., 2016).
  - Majority are specialty-specific.
- There is no consensus definition regarding postgraduate training.
- Data regarding these programs is limited.
- Accreditation:
  - Previously accredited by ARC-PA which had accredited 8 programs starting in 2008.
  - In 2014, the accreditation process was placed in abeyance. Programs are not actively being accredited.
- Lack of specific accreditation standards makes comparison across programs difficult.

Postgraduate Programs

- Survey of program directors showed that 47 percent are affiliated with physician residency programs and all included structured didactic as well as supervised clinical training (Hussaini et al., 2016).
- Some evidence suggests that postgraduate program trained surgical PAs had a 15% higher salary compared to their colleagues, though this was balanced by a 16% higher number of work hours (Hussaini et al., 2016).
- Vast majority of PAs who undergo training cite increased confidence in clinical capacity as primary factor (Hussaini et al., 2016).
- Though there are a number of programs available, it is estimated that only about 1% of PA graduates participate in these programs.

Postgraduate Programs

- Con:
  - Not necessary for PA practice.
  - Not actively regulated/accredited.
  - Work is frequently at a reduced salary with long hours comparative to practicing PAs.
- Pro:
  - Some evidence to suggest better confidence in clinical abilities, more competitive in job market, potentially higher salary (though market competition and salary data are questionable).

Postgraduate Programs

- The NCCPA (certifying body of PAs) recently introduced a CAQ (Certificate of Added Qualifications) program.
- This allows for PAs to obtain 'specialty' certification if they work in a field for 1-2 years and pass an examination in particular subject areas.
- Though in current form, this has no bearing on practice, it has potential credentialing implications in the future (Carpenter, 2006).
- There are concerns this may limit versatility of PA practice (Carpenter, 2006).

https://www.nccpa.net/specialty-caqs

Paths of Further Training

- PA-to-DO bridge
  - LECOM (Lake Erie) offers an 'Accelerated Physician Assistant Pathway' to a DO degree.
  - Can potentially avoid taking the MCAT.
  - 3-year curriculum.
  - Allow 12 slots in class. 6 may be 'undeclared' and 6 must be 'primary care'.
- 'Doctor of Medical Science'
  - A new entity offered at Lynchburg College (VA) and Lincoln Memorial University (TN).
  - Being offered as a potential bridge to a new medical degree.
  - Currently does not influence scope of practice. Though there is currently ongoing legislation in TN reviewing this potential.
- Wake Forest University offers a dual MMS-PhD degree focusing on translational clinical research.

Need for Doctoral Training

- As of 2012, only about 34% of PA faculty held a doctoral degree (Hooker, Cawley, Everett, 2017).
- Only about 1 in 5 were tenured, full professors at their institutions (Hooker, Cawley, Everett, 2017).

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