Effective EMT Instruction

2013 Virginia EMS Symposium

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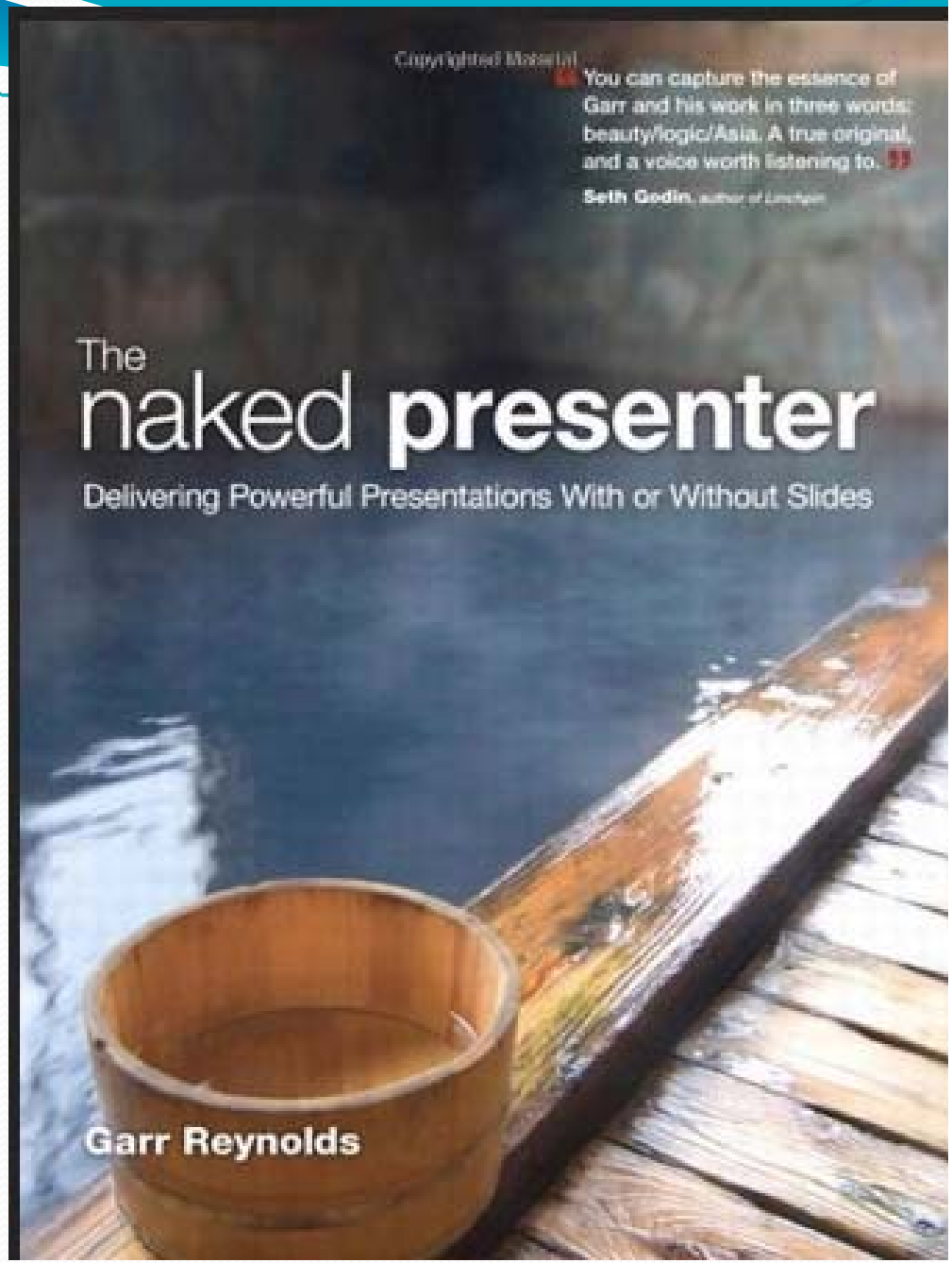
We seem too wedded to powerpoints and rigid curriculum.

Keeps us from doing the best job we can in teaching students our trade.



What we will cover:

- Clinical critical thinking
- How emergency medicine became a profession
- The Educational Standard
  - Breadth and Depth
- EMT as critical thinker
- The new or expanded knowledge areas
- Assessment as a critical thinking EMT
  - "Sick" patient acuity
- Instructor resources
- Concept mapping

Physician Critical Thinking

Medical inquiry – history, physical exam and diagnostic testing

Clinical decision-making – a cognitive process that evaluates information to diagnose or manage a patient's condition

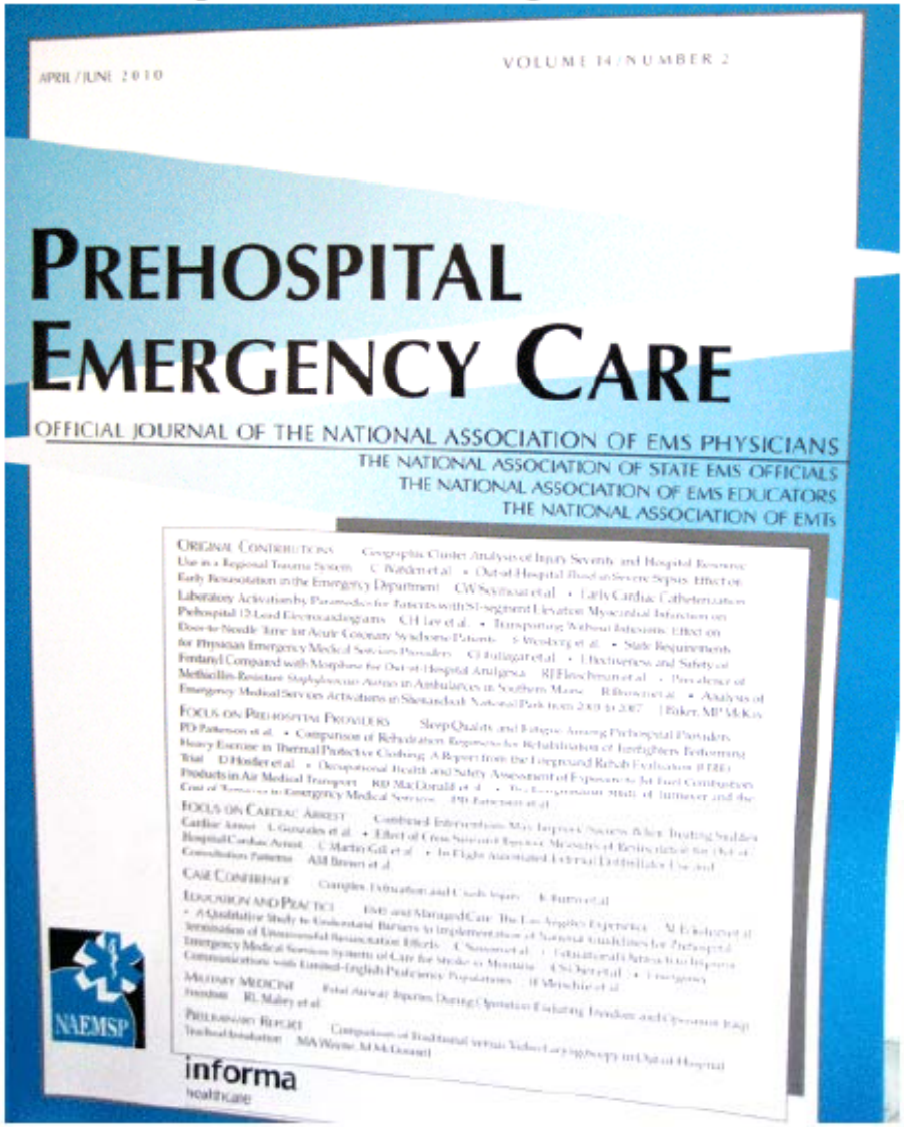
Clinical reasoning – combining medical inquiry with clinical decision making and physician knowledge

Marx, J (ed), et al. (2009) **Rosen's Emergency Medicine – Concepts and Clinical Practice**, **7th edition**. Mosby.

EMS as ACEP Subspecialty

National Association of EMS Physicians (1984)

- ***Prehospital Emergency Care*** (1997)
- May 2009 application to **American Board of Emergency Medicine**
  - 2nd appeal in 20 years
  - ***Sept 2010 decision***



American College of Emergency Physicians®
ADVANCING EMERGENCY CARE

What makes a profession?

Unique body of knowledge

Professional Association

Peer-reviewed vetting of knowledge acquisition

Testing of competence

Institutional training (internship, fellow, clerkship)

American College of Emergency Physicians (1968)

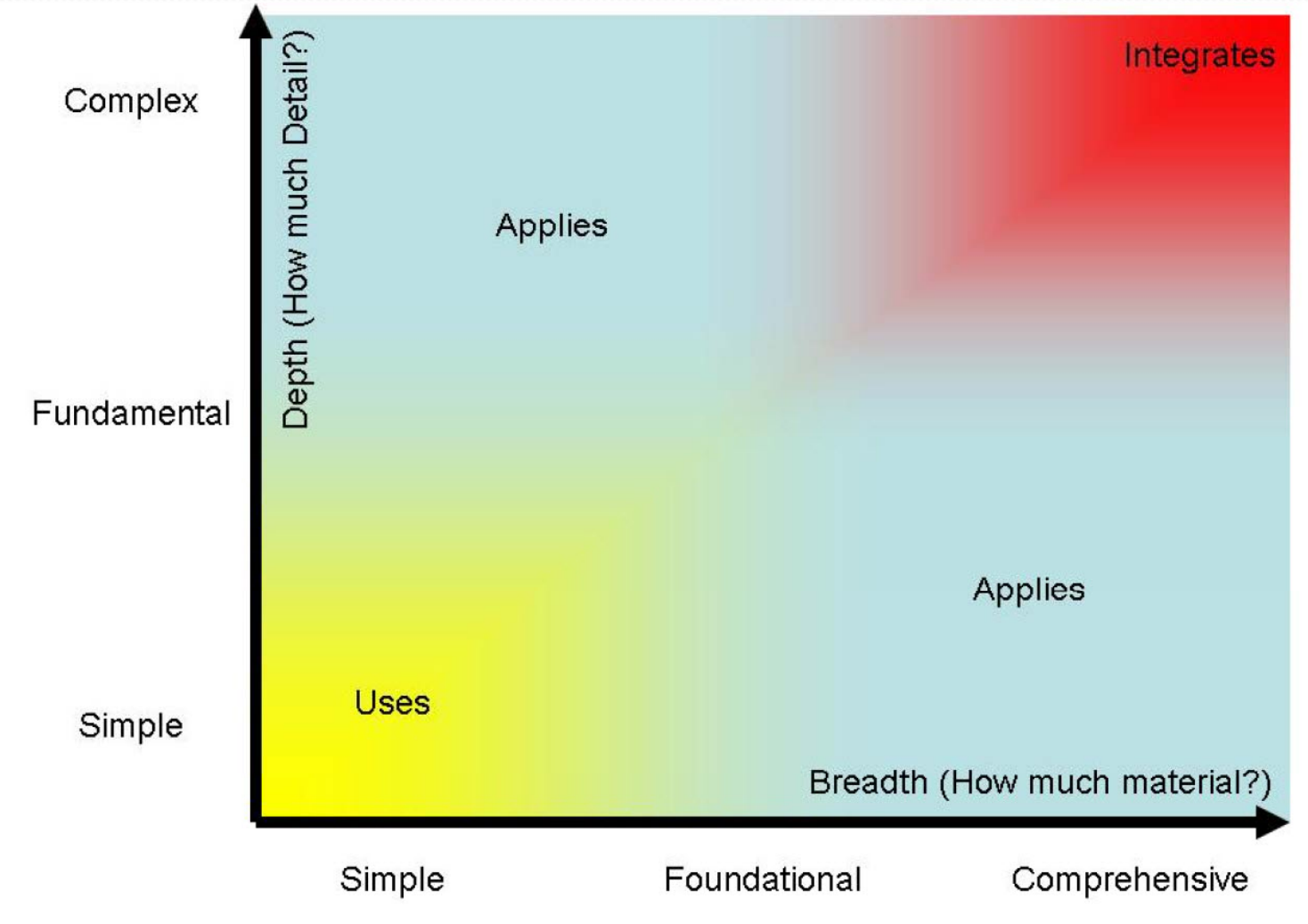
- ***Annals of Emergency Medicine*** (1972)
- Emergency Medicine becomes 23rd specialty (1979)

NAEMSP (1984)

- ***Prehospital Emergency Care*** (1997)
- EMS subspecialty (2010)

"**Eagles**" (1998)

EMS Educational Standards



Depth (How much Detail?)

Integrates

Applies

Applies fundamental knowledge to provide basic emergency care and transportation based on assessment findings for an acutely injured patient.

Uses

Breadth (How much material?)

Depth (How much Detail?)

Integrates

Fundamental depth, foundational breadth

Applies

Pathophysiology, assessment, and management of the trauma patient

- **Trauma scoring**
- **Rapid transport and destination issues**

Applies

Uses

- **Transport mode**

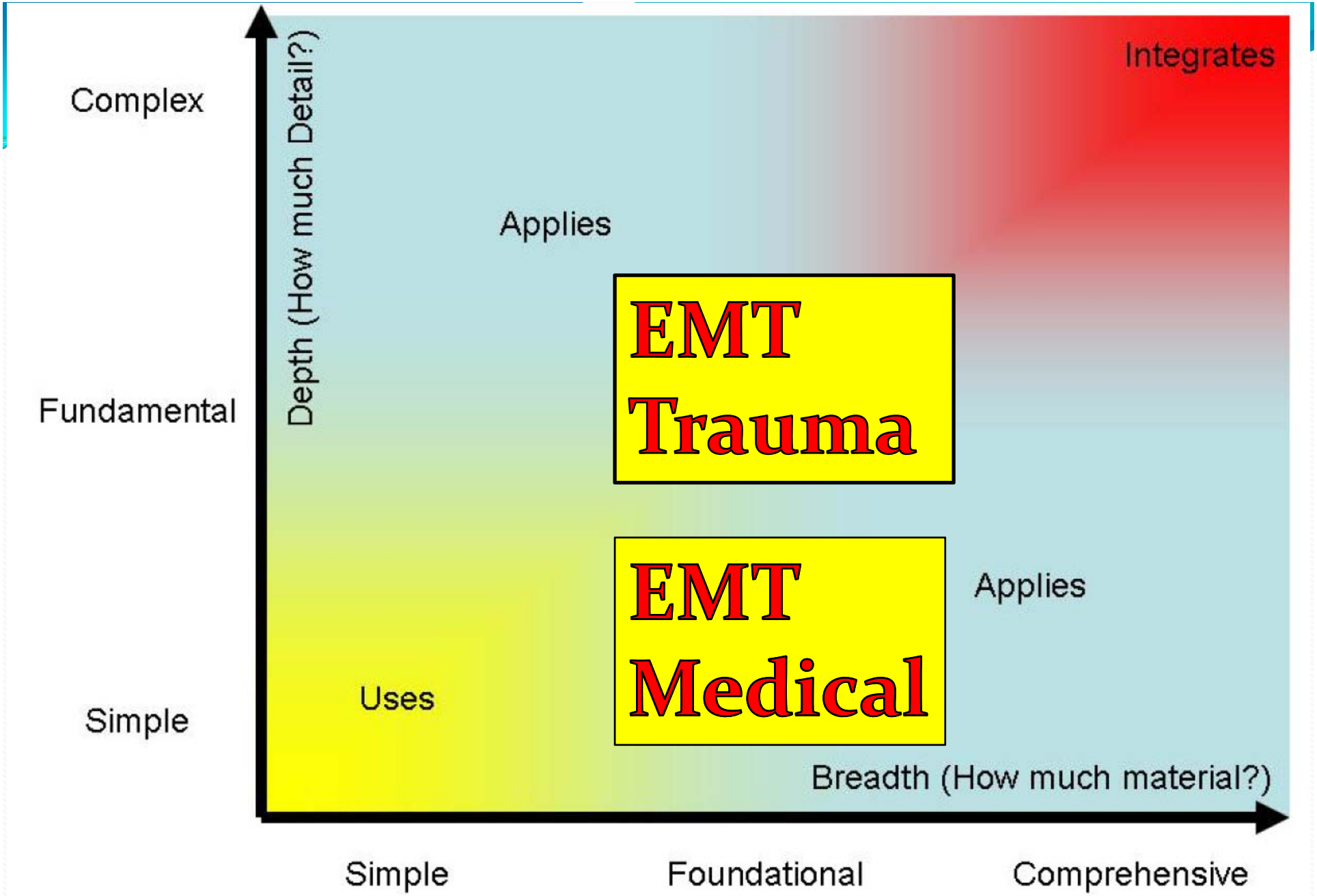
Breadth (How much material?)

Applies fundamental knowledge to provide basic emergency care and transportation based on assessment findings for an acutely ill patient.

Simple depth, foundational breadth

Pathophysiology, assessment, and management of medical complaints to include:

- **Rapid transport and destination issues**
- **Transport mode**

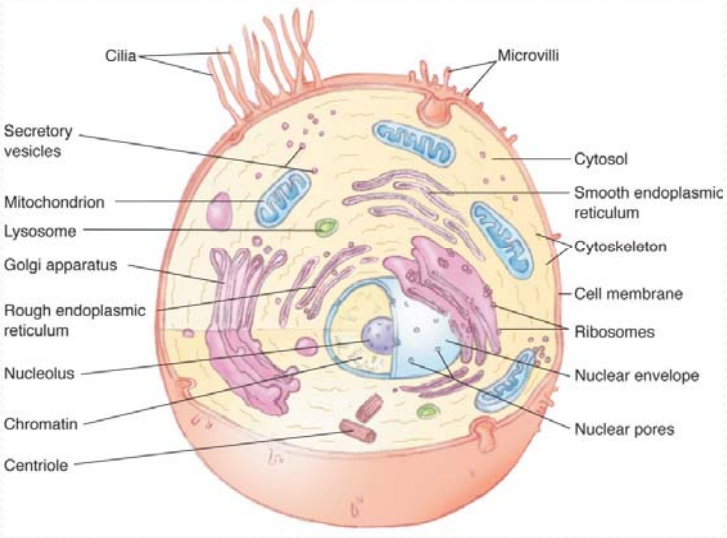

Complex
Fundamental
Simple
Depth (How much Detail?)
Integrates
Applies
EMT
Trauma
EMT
Medical
Applies
Uses
Breadth (How much material?)
Simple
Foundational
Comprehensive

EMT as critical thinker

Critical thinking is evaluating patient assessment results against past patient encounters and the caregiver's knowledge of the disease process.

Application of **pathophysiology** is a new element in the Educational Standards. Teaching pathophysiology and using it as part of a critical thinking process are new learning outcomes.

Pathophysiology?



The **2009 Educational Standard** added pathophysiology as a new topic for **Emergency Medical Technician**

Virginia adopted the 2009 Educational Standard July 1, 2012.

EMT-Ambulance fossils like me had to demonstrate 85% mastery of this topic before credentialed to teach under the VEMSES standard.

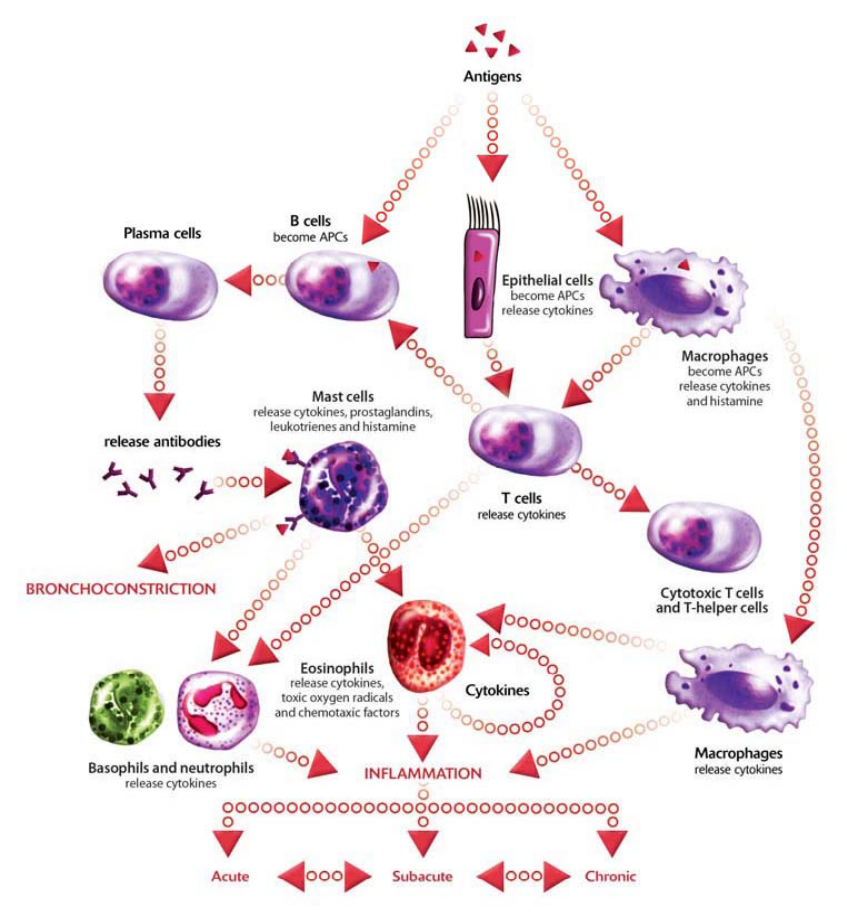
Pathophysiology covers:

Cell

Cardiopulmonary System

Other systems

- Fluid balance
- Nervous system dysfunctions
- Structure and dysfunction of
  - Endocrine
  - Immune



Pathophysiology of asthma

Metabolism

Converting nutrients into ENERGY

Aerobic metabolism

- **Oxygen** is used to metabolize **glucose**
- Diabetics have trouble with this
  - Hyperglycemia

Anaerobic metabolism

- Combustion of carbohydrates in the absence of oxygen
- Inefficient, many waste products
- You have experienced this during physical training

Anaerobic Metabolism

Anaerobic metabolism kicks in when you increase your level of exercise. Eventually, your body cannot supply itself with enough oxygen, thus reaching what is often termed your "anaerobic threshold."

At this point, your body produces ATP faster, but in limited quantities for shorter amounts of time -- as in bursts of speed. Anaerobic metabolism is associated with your fast-twitch muscle fibers, and is essential for high-intensity exercise.

Unfortunately, **lactic acid** is also a byproduct of anaerobic metabolism, which leads to muscle fatigue.

If you want to increase your endurance threshold, strength or speed, including workouts that lead to an anaerobic state, or fatigue, are necessary. In a sense, anaerobic metabolism "pushes your boundaries."

aerobic vs anaerobic metabolism during exercise - @livestrong.com

Respiratory Dysfunction

Eight FDNY firefighters overcome
1944 by Weegee (Arthur Fellig/
International Center of Photography)
photo via Dan Gerard

Disruption of:

- Respiratory Control
- Pressure
- Lung Tissue

Chemoreceptors

Perfusion

Blood

Plasma oncotic pressure

- Large proteins in the blood tends to pull water from the body into the bloodstream

Hydrostatic pressure

- Pressure within a blood vessel that tends to push water out of the vessel

Blood dysfunction

Volume

Conditions that affect blood components:

- Anemia
  - Sickle Cell
- Liver Failure
  - Affects large proteins

Salt versus Fresh water drowning

Perfusion

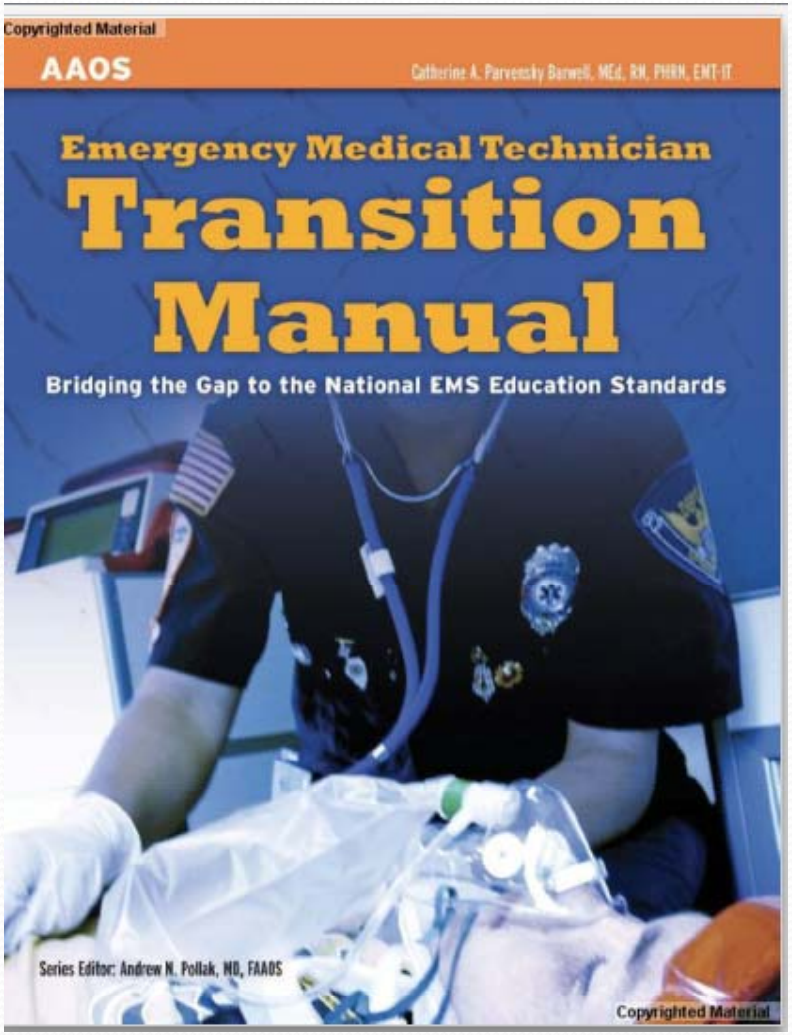
V/Q match

ventilation/perfusion ratio

Perfusion

The supply of oxygen to, and removal of wastes from, the cells and tissues of the body as result of the flow of blood through the capillaries.

Hypoperfusion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AAOS
Catherine A. Parvensky Barwell, MEd, RN, PHRN, EMT-IT
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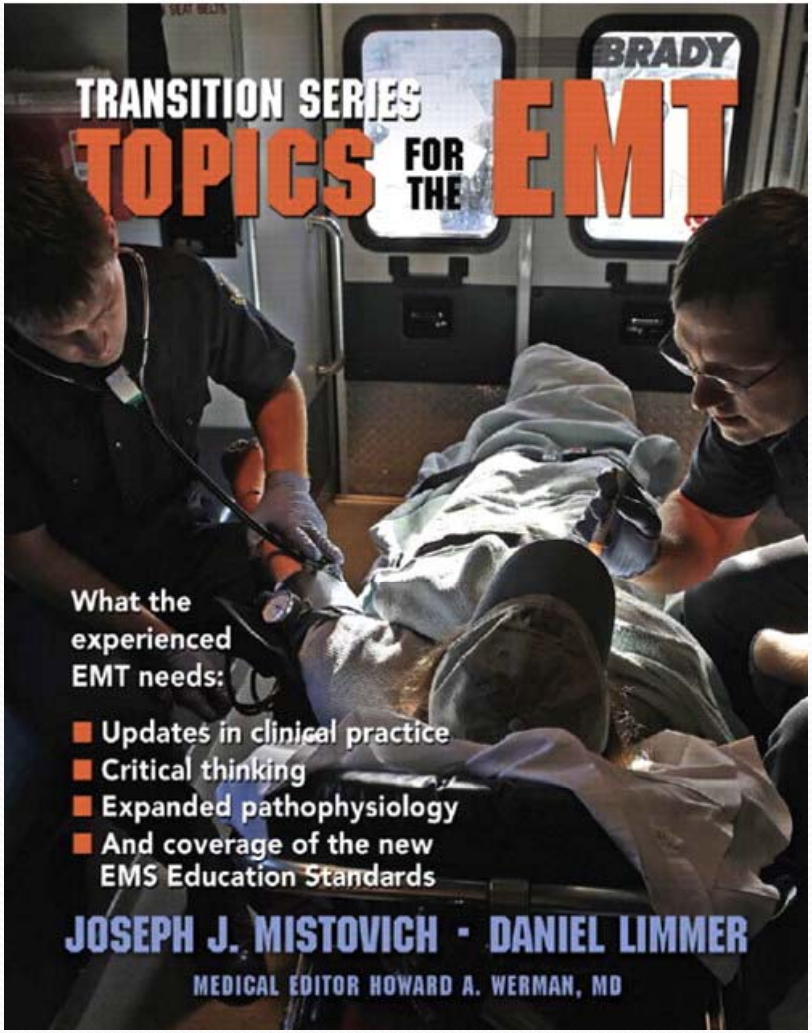

BRADY
TRANSITION SERIES
TOPICS FOR THE EMT
What the experienced EMT needs:
Updates in clinical practice
Critical thinking
Expanded pathophysiology
And coverage of the new EMS Education Standards
JOSEPH J. MISTOVICH · DANIEL LIMMER
MEDICAL EDITOR HOWARD A. WERMAN, MD

"Treat for **SHOCK**"

The inability of the body to adequately circulate blood to the body's cells to supply them with oxygen and nutrients

Critical Criteria: (You must thoroughly explain your reason for checking any critical criteria on the back of this sheet)

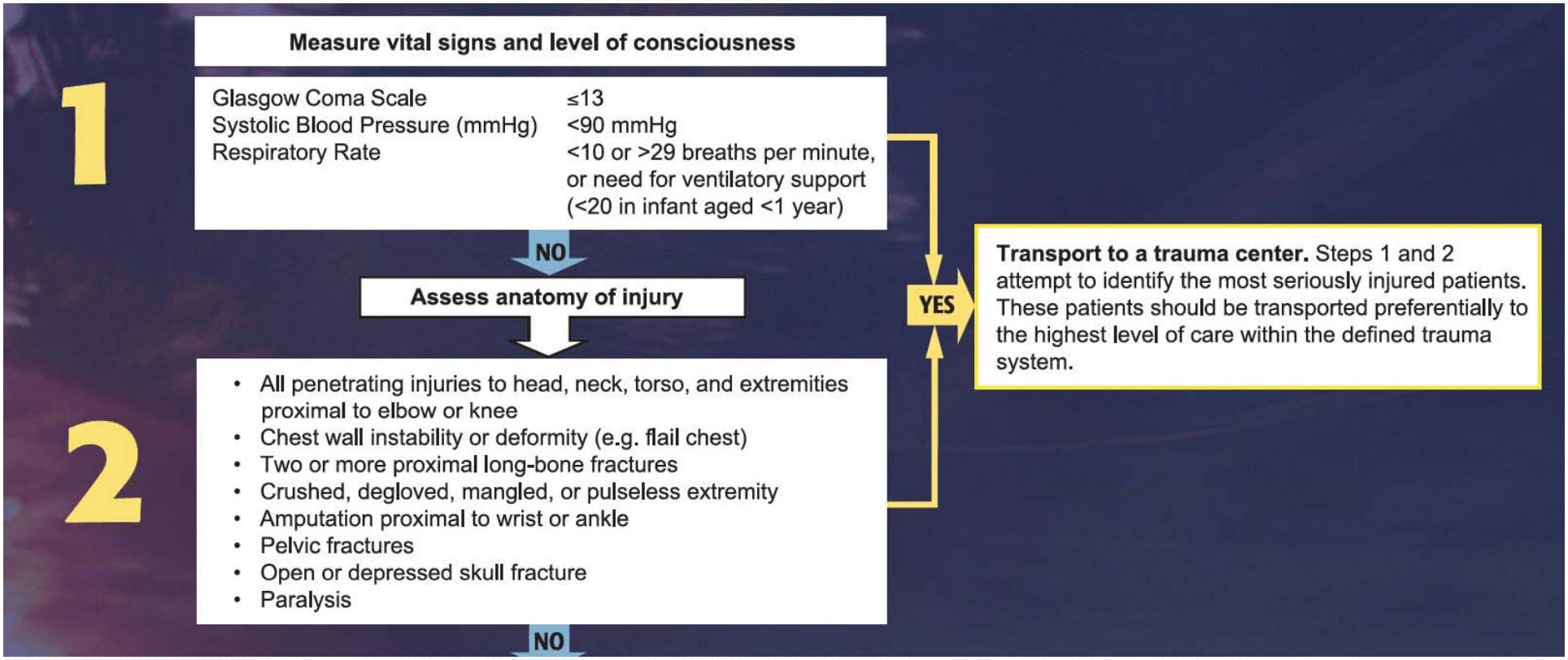
- ☐ 111- Did not determine scene safety
- ☐ 112- Did not provide for spinal protection when indicated
- ☐ 113- Did not assess for and verbalize high concentration of oxygen, if indicated
- ☐ 114- Did not find, or manage, problems associated with airway, breathing, hemorrhage or shock (hypoperfusion)
- ☐ 115- Did other detailed physical examination before assessing the airway, breathing and circulation
- ☐ 116- Did not verbalize appropriate intervention or verbalized inappropriate/unsafe treatment
- ☐ 117- Did not verbalize transporting patient within 10-minute time limit, if EMT candidate
- ☐ 118- Did not obtain 32 or more points

Trauma Patient Assessment

Overview of VEMSES / National Registry

Trauma Patient Assessment

Field Triage of Injured Patients



2011 Guidelines for Field Triage of Injured Patients

National Center for Injury Prevention and Control
Centers for Disease Control and Prevention

GLASGOW COMA SCALE

Eye Opening	Spontaneous	**4**	
	To Voice	**3**	
	To Pain	**2**	
	None	**1**	
Verbal Response	Oriented	**5**	
	Confused	**4**	
	Inappropriate Words	**3**	
	Incomprehensible Sounds	**2**	
	None	**1**	
Motor Response	Obeys Command	**6**	
	Localizes Pain	**5**	
	Withdraws (pain)	**4**	
	Flexion (pain)	**3**	
	Extension (pain)	**2**	
	None	**1**	
Glasgow Coma Score Total			

Trauma center

If GCS is

less than or equal to

13

Out of

15

Critical Thinking

Boston EMS and Fire
via Dan Gerard

Does my patient have a serious or potentially serious head injury? Should the patient be transported to a trauma center?

Do my patient's complaint and MOI indicate spinal stabilization? Is immobilization warranted?

Field Triage of Injured Patients

- Paralysis

NO

Assess mechanism of injury and evidence of high-energy impact

3

- **Falls**
  - — Adults: >20 feet (one story is equal to 10 feet)
  - — Children: >10 feet or two or three times the height of the child
- **High-risk auto crash**
  - — Intrusion, including roof: >12 inches occupant site; >18 inches any site
  - — Ejection (partial or complete) from automobile
  - — Death in same passenger compartment
  - — Vehicle telemetry data consistent with a high risk of injury
- **Auto vs. pedestrian/bicyclist thrown, run over, or with significant (>20 mph) impact**
- **Motorcycle crash >20 mph**

YES

Transport to a trauma center, which, depending upon the defined trauma system, need not be the highest level trauma center.

NO

Assess special patient or system considerations

- **Older Adults**

Field Triage of Injured Patients

4

- **Motorcycle crash >20 mph**

NO

Assess special patient or system considerations

- **Older Adults**
  - — Risk of injury/death increases after age 55 years
  - — SBP <110 may represent shock after age 65
  - — Low impact mechanisms (e.g. ground level falls) may result in severe injury
- **Children**
  - — Should be triaged preferentially to pediatric capable trauma centers
- **Anticoagulants and bleeding disorders**
  - — Patients with head injury are at high risk for rapid deterioration
- **Burns**
  - — Without other trauma mechanism: triage to burn facility
  - — With trauma mechanism: triage to trauma center
- **Pregnancy >20 weeks**
- **EMS provider judgment**

YES

Transport to a trauma center or hospital capable of timely and thorough evaluation and initial management of potentially serious injuries. Consider consultation with medical control.

NO

Transport according to protocol

When in doubt, transport to a trauma center.

EMT as thinking clinician

An EMT who is a thinking clinician is able to identify patients who are stable or unstable and require prompt transport.

The EMT clinician also makes decisions such as when to call for advanced life support or air-medical evacuation, when to perform rapid extrication and when to immobilize the patient before removing him from the vehicle

Limmer, D., et al. (2008) Beyond the basics, the art of critical thinking, Part 1. ***EMS Magazine*** 37(4) p. 87.

Embrace ambiguity

Two summers ago I taught our first Educational Standard course with a brand-new edition of a popular EMT textbook. I provided this feedback to the editor:

"A frustration is the vagueness of some numbers. For example on page xxx, Table xx-x 'Vital Signs'. Need to read through two paragraphs to parse out what would qualify as a blood pressure reading that would be hypertensive or hypotensive."

I was channeling my vocational instructor need to have the "right" number to define a "normal" blood pressure. In medicine there is no absolutely correct number for blood pressure determination.

Patient Assessment

II: General Patient Care

3. Obtain a complete set of vital signs
   a. Pulse (quality, rate, regularity)
   b. Respirations (rate and depth)
   c. Blood pressure
   d. Pupils (size, equality, reactivity)
   e. Skin (color, temp, condition)
   f. Pulse oximetry
   g. Temperature (tympanic/oral/rectal/tactile)

Critical Criteria: (You must thoroughly explain your reason for checking any critical criteria on the back of this sheet)

- ☐ 101- Did not determine scene safety
- ☐ 102- Did not correctly assess B/P, Pulse, and/or Respiratory Rate
- ☐ 103- Did not assess for and verbalize administration of high concentration of oxygen, if indicated
- ☐ 104- Did not find, or manage, problems associated with airway, breathing, circulation or shock (hypoperfusion)
- ☐ 105- Did other detailed physical examination before assessing the airway, breathing and circulation
- ☐ 106- Did not verbalize transporting patient within 10-minute time limit
- ☐ 107- Did not verbalize appropriate intervention/safe medication administration/contact medical control

INITIAL ASSESSMENT		
Verbalizes general impression of the patient		1
Determines responsiveness/level of consciousness		1
Determines chief complaint/apparent life threats		1
Assess airway and breathing	Assessment	1
	Initiates appropriate oxygen therapy	1
	Assures adequate ventilation	1
Assess circulation	Assesses/controls major bleeding	1
	Assesses pulse	1
	Assesses skin (either color, temperature, or condition)	1
Identifies priority patients/makes transport decision		1
HISTORY AND PHYSICAL EXAMINATION/MEDICAL ASSESSMENT		

2. Destination Determination
   a. Emergent patients shall be transported to the closest appropriate emergency department regardless of reroute status.
   b. Urgent and Non-Urgent patients shall be transported to the closest appropriate emergency department that is not on reroute. If at any time the EMS provider believes the patient's care could be compromised by bypassing a facility on reroute, he/she may transport the patient to that facility.
   c. Stable patients requiring specialty care will be transported to the closest appropriate specialty referral center.

3. Status: Evaluate the need for Priority 1 versus Priority 2 transportation.

Clinical Priority

Emergent

Critically ill or injured person requiring immediate attention; unstable patients with potentially life threatening injury or illness.

Urgent

Less serious condition, requiring emergency medical attention but not immediately endangering the patient's life.

Non-urgent

Non-emergent condition, requiring medical attention but not on an emergency basis.

Medical examples

Emergent

- End-stage disease presentation
- Acute presentation of chronic condition

Urgent

- Acute presentation of “first-time” medical events
- Multiple disease etiologies

A brief look at patient severity

Nationally the number of transported patients ***requiring*** ONE ALS skill is **18%**

- IV line, cardiac monitoring, breathing treatment, EPI pen or glucose

Of that 18%, about one-third require TWO ALS skills. (the **SICK SIX PERCENT**)

- Airway control, chest decompression, two or more medications

SICK SIX PERCENT

***The Sick Six Percent are the ones that MOST benefit from street-delivered ALS care*.**

- Cardiac arrest patients resuscitated with AED
- Significant emergency/existing respiratory, cardiac or metabolic diseases
- Controllable trauma (airway, chest, fluid replacement)

Critical 2 percent

These patients need two paramedics to aggressively take multiple actions to keep patient alive.

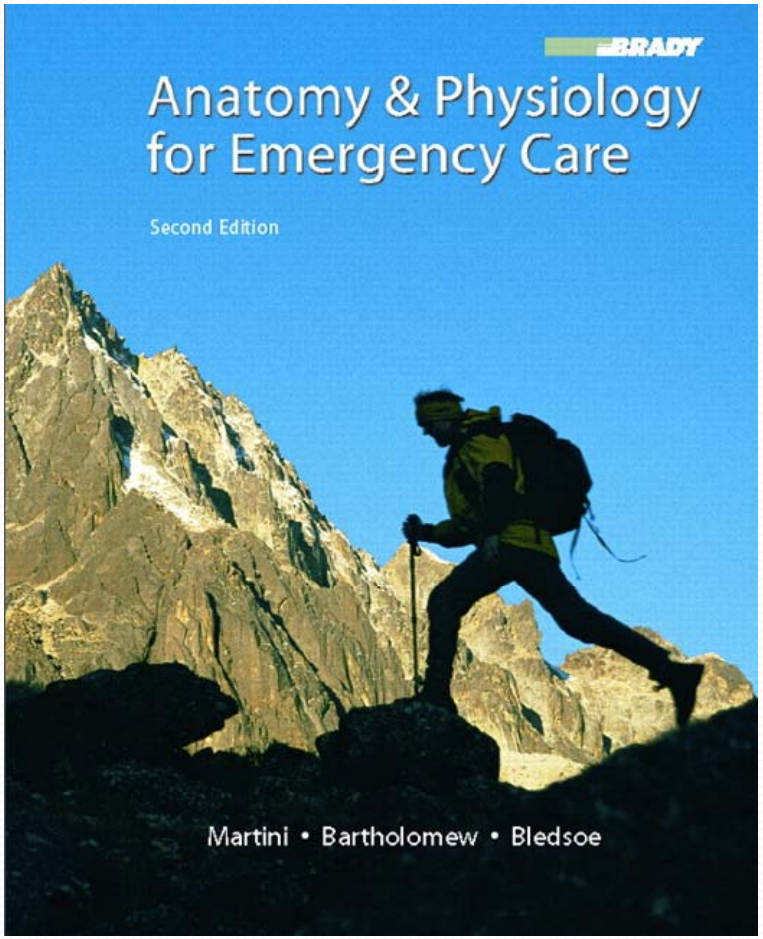
- Smoke inhalation/burns
- Multiple system trauma
- Not breathing/severe trouble breathing
- Myocardial infarction/stroke

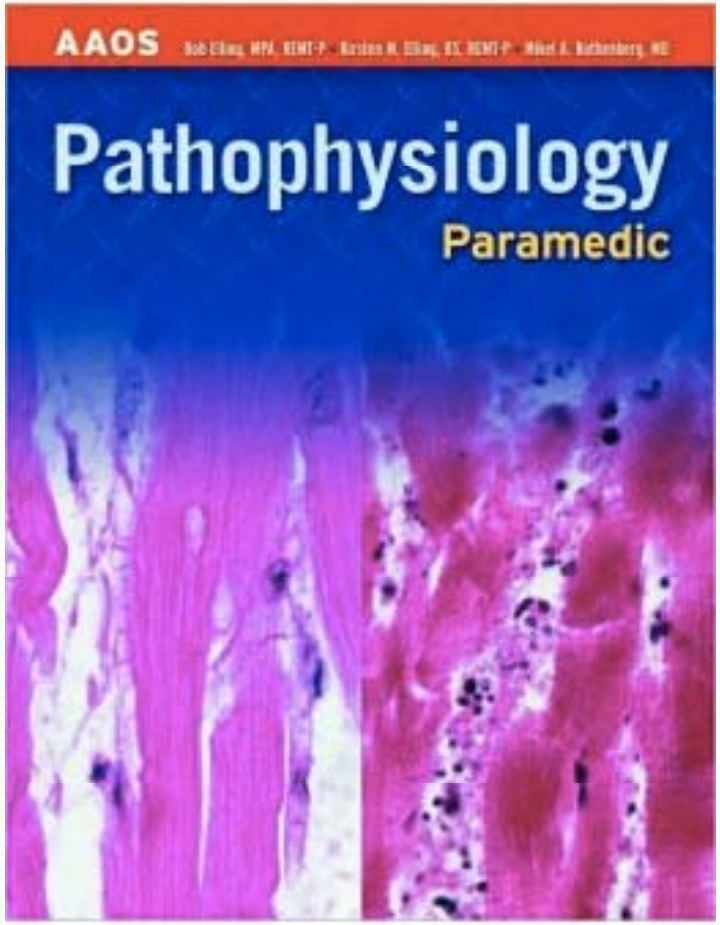
The number getting to hospital discharge with intact capabilities is **low.**

What we really need

Is a course that EMT instructors could attend that provides ems-focused anatomy, physiology and pathophysiology that would include teaching techniques and examples.

- Asking instructors to read a physiology textbook may be as effective as my experience filling in for a physician educator.


BRADY
Anatomy & Physiology for Emergency Care
Second Edition
Martini • Bartholomew • Bledsoe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Dr. Anthony A. Goodman

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Video Download	$619.90
DVD	$729.90

History & Focused Physical exam

HISTORY AND PHYSICAL EXAMINATION/MEDICAL ASSESSMENT	
Signs and symptoms (*Assess history of present illness/OPQRST)*	1
Allergies	1
Medications	1
Past pertinent history	1
Last oral intake	1
Event(s) leading to present illness	1
Performs focused physical examination	1
Vitals *(obtains baseline vital signs)*	1
Interventions *(obtains medical direction for medication interventions and verbalizes proper additional intervention/treatment)*	1
Transport *(re-evaluates the transport decision)*	1
Verbalizes the consideration for completing a detailed physical examination	1
ONGOING ASSESSMENT (verbalized)	

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Case – based problem solving

The goal is to determine what assessment and clinical findings are important to develop a patient care plan and determine transport priority.

This requires a willingness on the instructor's part to teach more of the "grey" and less of the "black and white." It will take longer, and may be more frustrating to students. But the result will be a student who is more willing to look at the big picture, rather than just a number.

EMS application

"Concept Maps offer a way for instructors to help students conceptualize ideas in the classroom and help them develop the critical-thinking skills necessary for determining a field diagnosis. Each Concept Map, utilizing a typical emergency scenario, walks students through the critical thinking steps used during an EMS response."

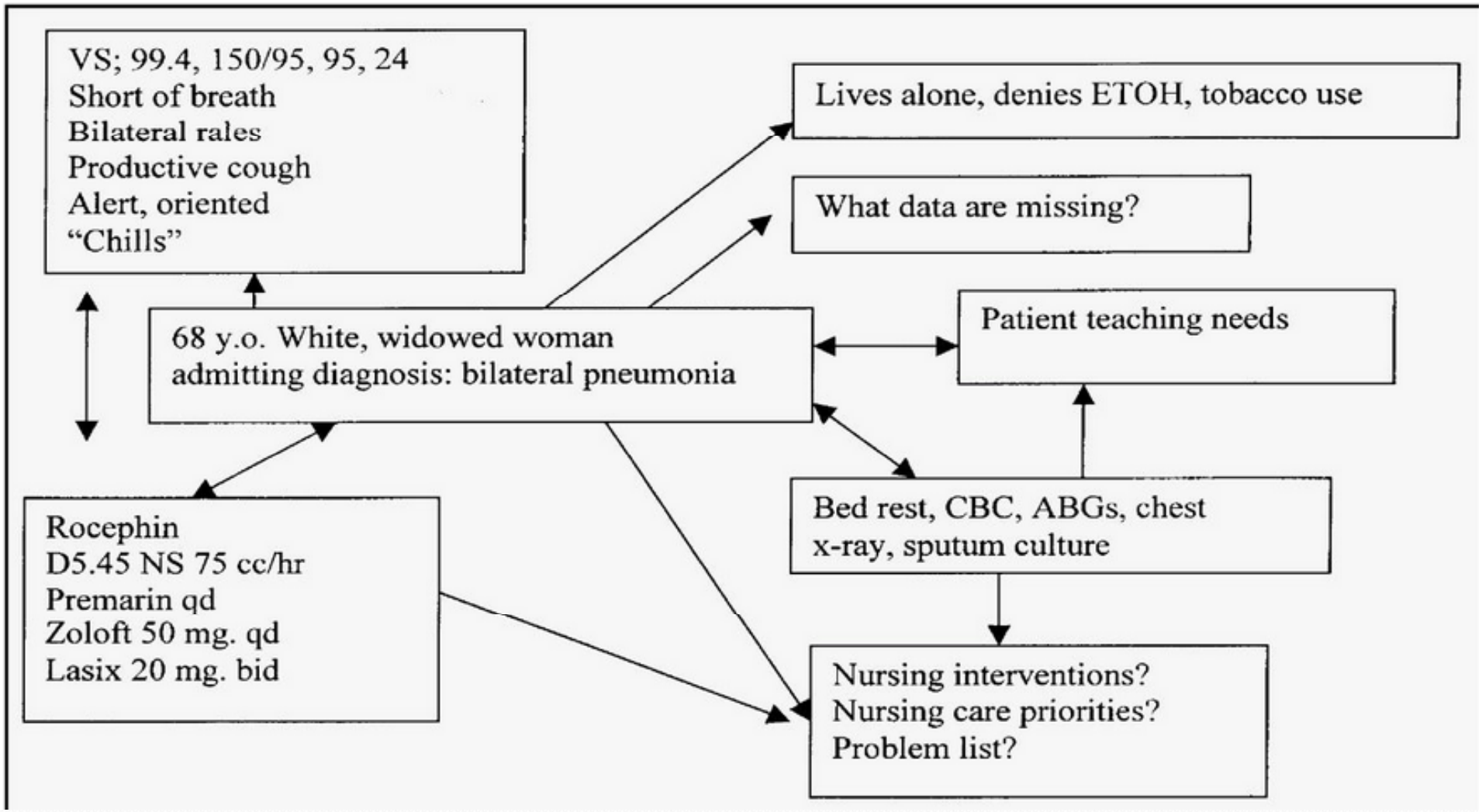
- Start with boxes, each representing a component of the patient's condition. Each box will have a sign, symptom, pertinent negative, general EMT impression of patient or other data. You will have six to twenty boxes

6 to 20 boxes

Consider how the boxes are related to each other, and make connections between each box. Use descriptions, such as FEELING LIGHTHEADED "may be due to" BLOOD PRESSURE 86/52. This process facilitates differential diagnosis and can guide inquisitive assessment, identifying areas for focused assessment.

Once all of the boxes are connected, the student has a better understanding of what is happening to the patient and can develop a strategic and dynamic care plan.

Sample Concept Map with fictitious client data (King & Shell, 2002).



1. Select a topic of choice, perhaps a medical diagnosis and relevant client data. Write the concepts on post-it notes.
2. Arrange the pieces of paper, on a poster board, so that the ideas go directly under the ideas they are related to. At this point, add concepts that help explain, connect, or expand the ideas.
3. Draw lines from the main concepts to the concepts they are related to. It may be necessary to rearrange the notes of paper.
4. Label the lines with "linking words" to indicate how the concepts are related.
5. Copy the results onto a single sheet of paper.

How to use Concept Mapping

- Introducing a new topic
  - Clinical situation to OPEN a topic
  - Describe situation that would be close to “textbook”
- Reinforce learning concepts
  - At end-of-topic review
  - More complex situation that requires the student to differentiate clinical differences
    - Angina versus MI
- Throughout course
  - Ever-complex clinical conditions that reinforce earlier learning

Clinical scenario sources

- Chart reviews
- Workbooks
- Near-miss medical misadventures
- "Torn from the Internet"

- (Replaces war stories)

Online resources covered in presentation

- http://www.emseducast.com/
- http://roguemedic.com/
- http://www.ems1.com/
- http://www.saem.org/
- http://www.cochrane.org/

The Conscience of EMS
JEMS
JOURNAL OF EMERGENCY MEDICAL SERVICES

Although scientific journals are superficially similar to **professional magazines**, they are actually quite different. Issues of a scientific journal are rarely read casually, as one would read a magazine.

The publication of the results of research is an essential part of the **scientific method**.

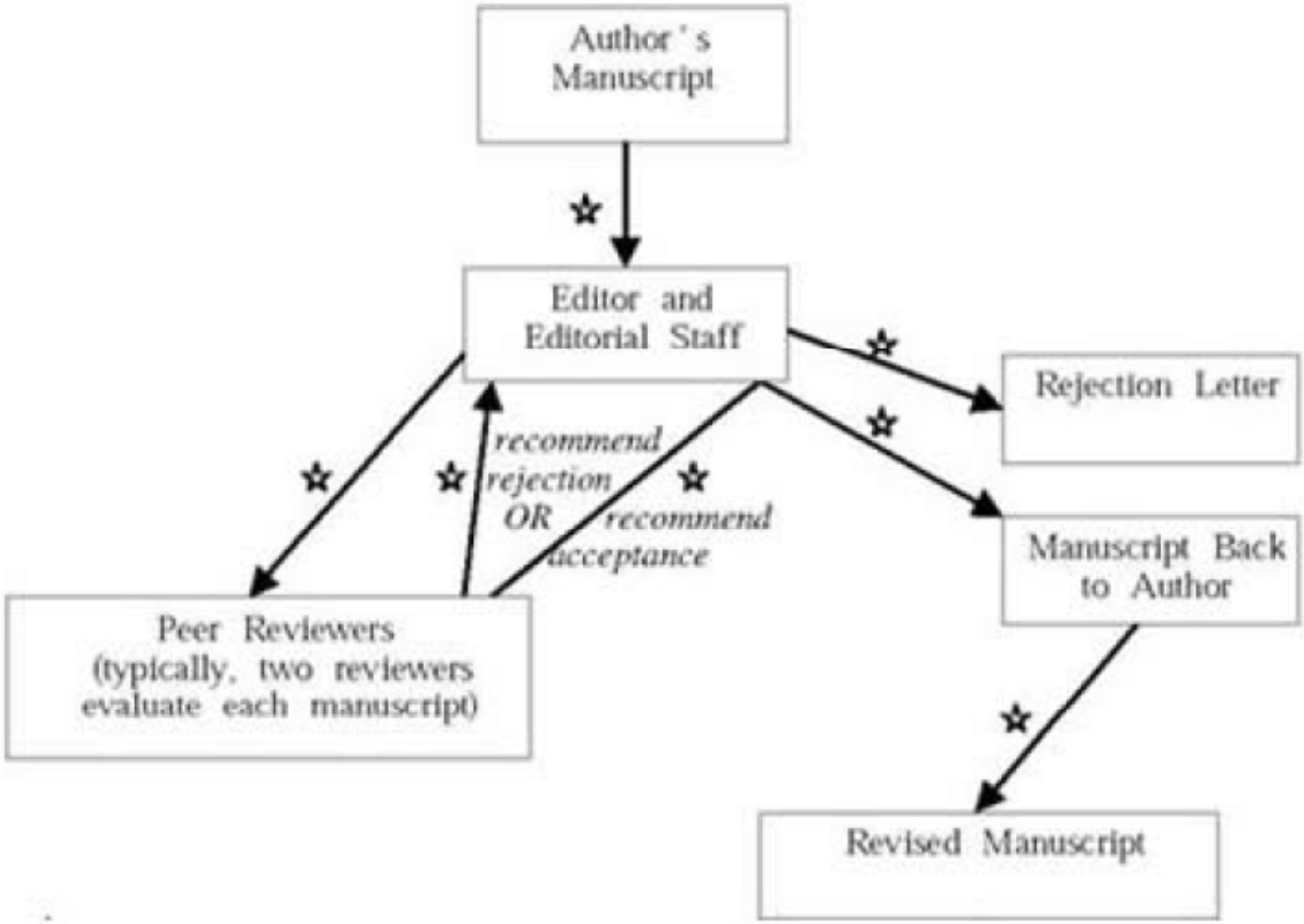
Each such journal article becomes part of the **permanent scientific record**.

In academic publishing, a **scientific journal** is a periodical publication intended to further the progress of science, usually by reporting new research.

Scientific journals contain articles that have been **peer reviewed** in an attempt to ensure that articles meet the journal's standards of quality, and scientific validity.

Source: "Scientific Journal" ***Wikipedia*** accessed 13 July 2010
http://en.wikipedia.org/wiki/Scientific_journal

WIKIPEDIA
The Free Encyclopedia


Author's Manuscript
Editor and Editorial Staff
Rejection Letter
recommend rejection OR recommend acceptance
Manuscript Back to Author
Peer Reviewers (typically, two reviewers evaluate each manuscript)
Revised Manuscript

The Cochrane Collaboration

Working together to provide the best evidence for health care

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- Evidence Aid Project
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Navigation aids

Cochrane Reviews

What are Cochrane Reviews?

Cochrane Reviews are systematic reviews of primary research in human health care and health policy. They investigate the effects of interventions for prevention, treatment and rehabilitation. They also assess the accuracy of a diagnostic test for a given condition in a specific patient group and setting.

Each systematic review addresses a clearly formulated question; for example: *Can antibiotics help in alleviating the symptoms of a sore throat?* All the existing primary research on a topic that meets certain criteria is searched for and collated, and then assessed using stringent guidelines, to establish whether or not there is conclusive evidence about a specific treatment. The reviews are updated regularly, ensuring that treatment decisions can be based on the most up-to-date and reliable evidence.

Information for...

- Practitioners, providers & policymakers
- Patients
- Authors & researchers
- Journalists & bloggers

Special Collections from The Cochrane Library

- Neurological cancers

Cochran: out-of-hospital

Smith E, et al. The **Cochrane Library** as a Resource for Evidence on Out-of-Hospital Health Care Interventions ***Annals of Emergency Medicine*** March 2007 (Vol. 49, Issue 3, Pages 344-350)

Rowe BH, Brown MB. A Primer on the **Cochrane Collaboration**, Its New Priorities in Out-of-Hospital and Emergency Health, and the Role of *Annals of Emergency Medicine*. ***Annals of Emergency Medicine*** March 2007 (Vol. 49, Issue 3, Pages 351-354)