Eastern Association for the Surgery of Trauma

Advancing Science, Fostering Relationships, and Building Careers

Professional Development Strategies Regarding Provider Value and Burnout
and
Clinical Strategies for Radiologic Ordering and Interpretation

January 12, 2017
The Diplomat Beach Resort
Hollywood, Florida

CME

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ACGME Competencies - Patient care

Advanced Practitioners in Trauma Workshop – Professional Development Strategies Regarding Provider Value and Burnout and Clinical Strategies for Radiologic Ordering and Interpretation
Thursday, January 12, 2017 12:30 pm – 4:00 pm
Presented by the EAST and the Society of Trauma Nurses (STN)

Target Audience: Advanced Practitioners in the field of Trauma/Surgical Critical Care/Acute Care Surgery and Physician Supervisors and Liaisons for Advanced Practitioner Groups

Needs Statement: Advanced practitioners are often faced with professional challenges of showing their value and maintaining job satisfaction while, at the same time, avoiding the growing challenge of provider burnout. The vast majority of practitioners will be involved in an adverse patient event during their career. However, healthcare systems often do not provide the necessary emotional support needed for these practitioners. Without this support practitioners can become the second victim of the adverse event. A clinical portion of the program will address the educational needs focusing on radiological interpretation and diagnostic imaging modalities for the trauma, critical care, and emergency general surgery patient.

Overview: The professional development portion of the workshop will focus on strategies regarding the maintenance of job satisfaction and communicating the value of an advanced practitioner program to facility physicians and administrators. We will also address the topic of provider burnout and the untoward sequelae that can occur for the provider who is involved in an adverse patient event. Speakers will also provide concrete strategies that healthcare systems may implement to emotionally support the practitioner. A clinical portion of the workshop will address the clinical educational needs of advanced practitioners regarding the ordering and interpretation of common diagnostic radiological imaging. This segment of the program will focus on more specifically on body and neurological imaging.

Learner Objectives:
At the conclusion of this workshop, the participant should be better able to:
1. Provide strategies to maintain job satisfaction and demonstrate value when communicating with physicians and administrators.
2. Define the term second victim, the negative consequences a second victim may face if left untreated, and strategies of a rapid response team to deliver provider support.
3. Better understand and interpret radiologic diagnostic imaging studies focusing on CT body and imaging for neurological injuries.

Workshop Director: A. Britton Christmas, MD

Faculty: A. Britton Christmas, MD; Jamie Jones Coleman, MD; Coleen Dever, MSN, APRN, ACNS- BC; Jasmine Garces-King, DNP, RN, CCRN, TCRN, ACNP-BC; Cragin Greene, MHS, PA-C; Gaurav Sachdev, MD

Schedule:

12:30 pm – 1:30 pm	Advanced Practitioners Bring CLEaR Value to the Trauma/Critical Care Service – Jasmine Garces-King, DNP, RN, CCRN, TCRN, ACNP-BC & Cragin Greene, MHS, PA-C
1:30 pm – 2:30 pm	The Second Victim and Burnout: How to Help Providers Who Have Been Involved in an Adverse Patient Outcome – Coleen Dever, MSN, APRN, ACNS- BC
2:30 pm – 3:15 pm	Ordering and Interpretation of Diagnostic Imaging Studies for Neurological Injuries: CT Head & Spine – Jamie Jones Coleman, MD
3:15 pm – 4:00 pm	Ordering and Interpretation of Diagnostic Imaging for Truncal Injuries: CT Body – Guarav Sachdev, MD

Advanced Practitioners Bring CLEaR Value to the Trauma/Critical Care Service

Jasmine Garces-King DNP, RN, CCRN, TCRN, ACNP-BC
Cragin Greene MHS, PA-C

Faculty Disclosure

- Faculty have nothing to disclose

Objectives

- Describe the benefits of the AP role in bringing a multifaceted approach to the trauma/critical care service
- Describe the similarities and differences between PAs and NPs
- Identify the advantages to AP leadership
- Recognize the impact of AP led education
- Establish strategies to maintain AP job satisfaction
- Indicate and express AP value when communicating with physicians and administrators.

CLEaR Value

- Clinical
- Leadership
- Education
- And
- Research

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History of the PA Profession

- Late 1950's there is a recognized shortage of healthcare providers
- 1961 Dr. Charles Hudson proposes a provider with training between that of a nurse and physician
- 1965 Dr. Eugene Stead forms the first PA program at Duke University enrolling 4 navy corpsman, first class of PAs graduated in 1967.
- Concept is to combine extensive military clinical experience with structured medical education creating the new provider.

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History of the PA Profession

- PAs were originally intended to fill the healthcare access concerns in rural primary care
- As time has evolved PAs now practice in all medical and surgical specialty areas
- PAs are certified by a single national certifying body (NCCPA) and obtain state licensure to practice.
- Scope of practice is determined in part by the state medical board but primarily by the PA and supervising physician through a supervisory arrangement.

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PA Education

- PAs are trained in the general medical model, similar to medical students
  - Concept derived from the WWII fast track physician training.
- Programs are generally 24-32 months
  - 4-5 semesters of didactic (12-16 months)
  - 12-16 months of clinical rotations averaging roughly 2500 contact hours in both inpatient and outpatient settings.
- All programs must meet accreditation standards set by the ARC-PA.
  - Some programs choose to add additional competencies in a particular specialty.

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NP History

1960s

- Dr. Loretta Ford & Dr. Henry Silver develop the first Nurse Practitioner (NP) program at the University of Colorado
- Boston College initiates one of the earliest master's programs for NPs
- Directed by a nurse and physician team, the Boston-based Bunker Hill/Massachusetts General Nurse Practitioner Program begins

1970s

- 65 programs in the U.S.
- University of Colorado offers its first continuing education symposium for NPs
- PNP curriculum
- Approximately 15,000 NPs in the U.S
- The American Nurses Association (ANA) develops the Council of Primary Care Nurse Practitioners, helping legitimize the role

1980s

- More than 200 NP programs or tracks
- Approximately 22-24,000 NPs in the U.S.
- 90% of NP programs are either master's degree granting programs or post-master's degree programs
- A steering committee forms to study the need for an organization representing NPs nationwide

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NP History

1990s

- AANP actively works with nursing associations such as the Royal College of Nursing UK to develop role of NPs internationally
- Approximately 68,300 NPs in the U.S.
- Mundinger publishes "Advanced Practice Nursing – Good Medicine for Physicians" in *The NEJM*, further supporting facts that NPs are cost-effective and quality primary health care providers

2000s

- AANP initiates the Fellows program, hosts first international NP conference in U.S. and creates the Political Action Committee (PAC)
- National NP Week, held annually in November, is recognized in a proclamation by U.S. Congress
- The American Association of Colleges of Nursing (AACN) publishes position paper on Doctorate of Nursing Practice
- Approximately 130,000 NPs in the U.S.

2010s

- Health policy activities center predominantly on Health Care Reform, CMS regulations, Medicare payment, Appropriations, Medical Home and state and local issues
- President Obama's White House briefing on Health Care Reform legislation
- Masters or DNP programs
- More than 192,000 NPs in the U.S.

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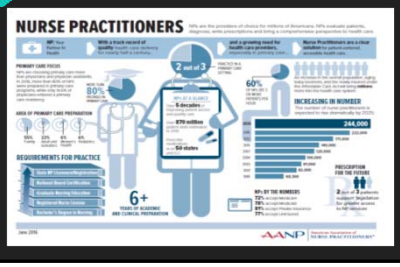
2016



Similarities and Differences Between PAs/NPs

- PA and NPs are often used interchangeably in clinical practice however their background and training is quite different.
- State rules and regulations may impact clinical practice creating differences in the roles of PAs and NPs.
  - Extremely important to understand your state rules and regulations.
  - Many changes underway so stay tuned

- **Clinical**
- Leadership
- Education
- And
- Research

Clinical

- Clinical experts
- Utilize APs to their full scope of practice
- Extension of existing services: Innovative models of care
- Cost effective growth of service line: Manage expanding volume and services
- Appropriate distribution of workforce: Surgeons in the OR, proceduralists, consultant services
- Bridge the gaps between service lines.
- Continuity of care
- Improve outcomes

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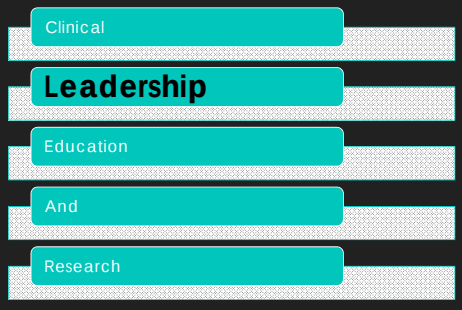

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Leadership

- AP leadership is crucial to a highly functioning team
  - Recruitment
  - Education and onboarding
  - Management of APs
  - Liaison between APs, physicians and administration
  - Opportunities beyond the clinical setting
  - Retention and satisfaction
  - Interprofessional team leaders bring different approaches and skill sets

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Recruitment

- Identify and vet best candidates for open positions:
  - Understand education, background and history better than non AP recruiters
- Develop networks within AP communities:
  - State and national organizations, Specialty organizations, AP programs, outside markets
- Streamline credentialing and privileging process
  - Create process specific for their service, decrease time to practice

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Onboarding

- Lack of effective onboarding is a huge driver of dissatisfaction and turnover
  - Should be structured but specific to the individual
  - Inclusive of system based tools and protocols
  - Progression based on competencies
  - Expectation should be well communicated and clearly evaluated
- Well defined onboarding works as a recruitment tool

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Management

- Oversee the day to day operations:
  - Scheduling and staffing parameters
  - Personnel issues
  - DOPs (privileges)
  - Maintenance of certification
  - Annual evaluations
- APs should report to clinical leaders not administrative leaders
  - Many service lines have APs reporting to office managers while physicians report to medical directors

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Liaison Role

- Dedicated time to attend administrative/clinical meetings
  - Represent APs: Need a seat at the table, decision made with not for
  - Report out information to the APs
- Meet with APs: Identify issues, concerns and successes early
- Work with physician colleagues to ensure best practice
- Bridge between administration and APs, line of communication

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Professional Development

- Facilitate opportunities beyond the bedside
  - Involvement with system committees/councils/work groups
  - State, national and specialty organizations
  - Work on interdisciplinary teams to bridge gaps between service lines

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Clinical

Leadership

Education

And

Research

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Education

- APs can play a large role in education
  - Medical students and residents
  - AP students
  - Nursing staff
  - Mentoring new hires
  - Patient and Family education
  - Beyond the unit to ancillary service lines
  - Both at the bedside and through formal classroom education

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Education

- Invest in your AP team
  - Ongoing structured education for existing APs
    - Ensure quality and standardization of care delivery
  - Formalized curriculum for new hires
    - Could be as structured as a fellowship
    - Tailored onboarding experience

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Clinical

Leadership

Education

And

Research

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Research

- APs can design and maintain protocols and algorithms
- Implement evidence based practice models
- Design and run quality improvement projects
  - Moving the needle on quality metrics
- Facilitate ongoing research
  - Design
  - Participate
  - Manage
  - Data collection/analysis

Summary

Clinical

- Despite differences in PA and NP background and training, they are often used interchangeably in clinical practice and each bring a different valuable skillset to the team
- APs are clinical experts who if utilized to the full extent of their scope of practice provide continuity, cost effective quality care, and facilitate extension of services through innovative models of care, as well as bridging gaps between service lines

Summary

Leadership

- The AP as leader is crucial to a highly functioning team. Formalized AP Leadership is essential for
  - Recruitment
  - Education and onboarding
  - Management of APs
  - Serving as a liaison between APs, physicians and administration
  - Opportunities beyond the clinical setting
  - Retention and satisfaction

Summary

Education

- APs can play a large role in the education of inter-professional teams, patients & families, and ancillary service lines
- There should be ongoing structured, quality education for existing APs with a formalized curriculum for new hires

Research

- APs can design and maintain protocols and algorithms, performance improvement projects, and facilitate ongoing research

References

- American Association of Nurse Practitioners https://www.aanp.org/
- American Academy of Physician Assistants https://www.aapa.org/
- Mundinger, M. O. (1994). Advanced-practice nursing--good medicine for physicians?. *New England Journal of Medicine*, *330*(3), 211-214.

Thank You

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CARE FOR THE CAREGIVER

Burnout, Compassion Fatigue and the "SECOND VICTIM"

Coleen Dever MSN, AGCNS, TCRN, CEN
Trauma APRN

CHRISTIANA CARE HEALTH SYSTEM

Conflict of Interest Disclosure

I have nothing to disclose…

CHRISTIANA CARE HEALTH SYSTEM

Objectives:

- Define burnout, compassion fatigue, and the second victim.
- Identify the relationship between burnout, compassion fatigue and the second victim.
- Describe the role of the healthcare organization in supporting second victims.

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Why did you become a nurse?

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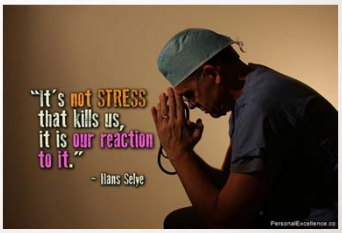
Burnout and compassion Fatigue



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Compassion Fatigue

- **Physical, Emotional and Spiritual depletion associated with caring for patients.**
  - You personally experience the pain and emotional stress patient and their families are experiencing.
- **What are the Consequences…**

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Compassion Fatigue

- **Work:**
  - Avoidance/dread of working with certain patients.
  - decrease ability to feel empathy
  - Increased sick days
  - Lack of joyfulness
- **Physical**
  - HA
  - Digestive problems
  - Cardiac Symptoms:
    - CP, palpations, tachycardia
- **Emotional:**
  - Mood Swings
  - Restless
  - Irritable
  - Oversensitivity
  - Anxiety
  - Use of substances
    - ETOH
    - Nicotine
    - Illicit Drugs
  - Depression
  - Loss of Objectivity
  - Poor concentration, focus and judgement

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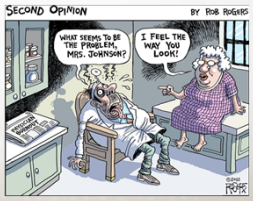
Burnout

- The consequence of extreme stress experienced by healthcare professionals
  - Doctors and Nurses:
    - Sacrifice themselves for their patients which leads to ….



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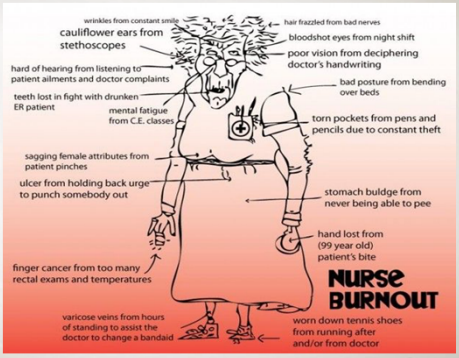

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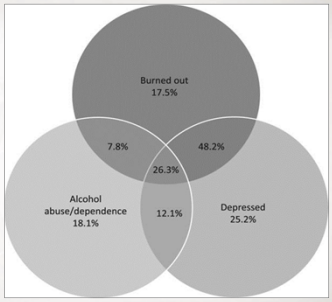

Jackson, E. et. al (2016). Burnout and alcohol abuse/ dependence among U.S. medical students. *Academic Medicine* 91 (9): 1251-1256.

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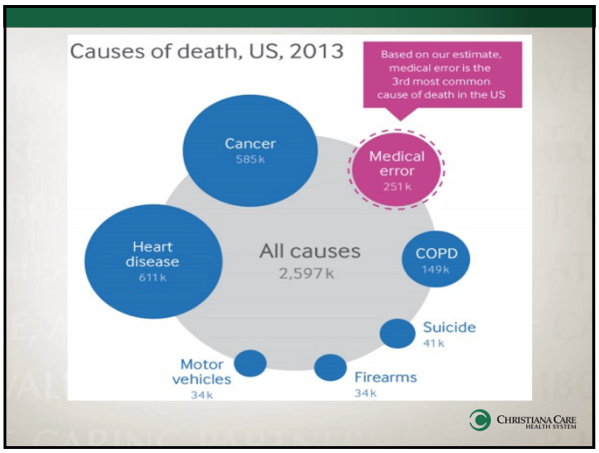
To Err is Human: Building a Safer Health System

- 44,000 – 98,000 deaths/yr
- 8th leading cause of death in US
- National Costs: $17 to $29 billion
- $2 billion Adverse Rx event costs alone
  - 2% hospital admissions (preventable)
  - Add $4,700 in costs to each hospitalization

Institute of Medicine, 1999

CHRISTIANA CARE HEALTH SYSTEM



Now What??

- Compassion Fatigue
- Burnout
- No place for mistakes in modern medicine.

The Second Victim

- Definition: "a health care provider involved in an unanticipated adverse pt event, medical error and/or a pt-related injury who become victimized in the sense that the provider is traumatized by the event."

The Second Victim

- Leads to:
  - Feelings of being personally responsible for the unexpected outcome
  - Sense of having failed the patient
  - Second-guessing clinical skills and knowledge base

Commonly Heard Phrases

- "This event shook me to my core."
- "This has been a turning point in my career."
- "It just keeps replaying over and over in my mind."
- "I'm going to check out my options as a Walmart greeter. I can't mess that up."
- "I'll never be the same."

" I will never forget this experience….This patient will always be with me – I think about her often…."

Commonly Reported Symptoms

- Extreme fatigue
- Sleep disturbances
- Increased BP
- Muscle tension
- Loss of confidence
- Frustration
- Difficulty concentrating
- Flashbacks
- Grief/remorse

Consequences

- Medical errors and unanticipated patient outcomes are equally devastating
- Regardless of job title, staff respond in predictable manners
- First tendency of staff seems to be isolation

Scott SD, et al: Caring for our own: deploying a systemwide second victim rapid response team. *JC Journ on Qual and Patient Safety 2010*;36(5): 233-40

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Consequences

- Medical errors are associated with significant decreases in quality of life:
  - Increased rate of depression (30-55%), substance abuse, suicide
  - Increased anxiety about future errors (61%)
  - Decreased job satisfaction, increased burnout
  - 15% seriously contemplate leaving their profession

West CP, et al. Association of perceived medical errors with resident distress and empathy: a prospective longitudinal study. *JAMA* 2006;296(9):1071-8.

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Consequences

- Stress and burnout lead to poorer pt care:
  - Increased risk of future errors
  - Avoidance of patient care (32%)
  - Decreased patient satisfaction

Fahrenkopf AM, et al. Rates of medication errors among depressed and burned out residents: a prospective cohort study. *BMJ* 2008;336(7642):488-91

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Current State[5]

- 92% of surveyed physicians have been involved in a medical error (57% serious)
- 90% felt that their hospital did not adequately support them in coping with medical error-associated stress
  - Culture of silence
  - No break in clinical duties following adverse event
- 30-50% of health professionals may be considered second victims after an AE

Waterman AD. The emotional impact of medical errors on practicing physicians in the US and Canada. *JC Journ on Qual and Patient Safety* 2007;33(8):467-76

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What currently happens after an adverse event?

- Culture of silence.
- What has happened to the patient?
- What will happen to me?
  - Job
  - Peers

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What are we to do??

- Organizational and social support
- Perceptions of organizational support are inversely related to burnout and other consequences of occupational stress.
  - Lack of support leads to increased absenteeism,

Watts, J.; Robertson, N.; Winter, R; & Lesson, D. (2013). Evaluation of organizational culture and nurse burnout. Nursing Management (Harrow,,20(6), 24-29

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Path Forward

- CANDOR program
  - 1852 Candor in medical reports. *Journal of Boston Medical and Surgical Journal*
  - IOM report *"To Err is Human"*
  - Improves patient safety through an empathetic, fair and just approach to medical errors
  - Shown to reduce medical liability
  - Focus on:
    - Caring for the patient, family and caregiver

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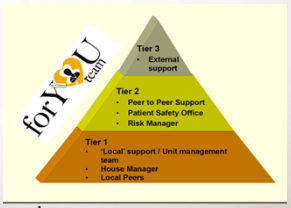
A Better Way

- Proactive adverse event management
  - RRT model-deployment of a dedicated team with knowledge and experience in supporting clinicians during acute stage of emotional trauma
- 3 tiers



University of Missouri

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Peer Supporters

- **Residents:**
  - OB, surgery, IM, peds, EM, FM
- **Attending physician, PA/NP staff:**
  - OB, surgery, IM, cardiology, neonatology, anesthesiology, MICU, ED
- **Nursing:**
  - NICU, L&D
  - CVCC, SCC, MICU
  - ED
  - PACU

CARE FOR THE CAREGIVER

CHRISTIANA CARE HEALTH SYSTEM

Care for the Caregiver Peer Support Process

- **When should I activate Care for the Caregiver?**
  - After any event which might trigger the second victim phenomenon
- **How can I contact the team?**
  - Pager 884-9321 (immediate response 24/7)
  - Email/text
  - Online
- **How does peer support work?**
  - Peer supporter will make contact within 24 hrs

When contacted the Care for the Caregiver Team Responder Will…

- Determine the nature of the incident.
- Assess the need for and plan an intervention.
- Identify appropriate Care for the Caregiver team peer to serve as supporter and contact them with basic case information including contact information for the second victim.
- An alternative Care for the Caregiver team member will be contacted if the initially identified supporter is unavailable or unable to be reached in a timely manner.
- Care for the Caregiver peer supporter will be contacted and requested to contact the second victim as soon as possible (preferably within 24 hours of notification).
- If the need for support involves staff death or serious illness/injury, the director of Pastoral Services will be notified.

Just in Time Resources

Key actions for supporting:
- Acknowledge what the second victim is saying or feeling.
- Don't try to fix it — your supportive presence is all you need to give.
- Be there. / Practice active listening.
- Offer support. / Share your experiences.
- Reinforce that they make a difference.
- Provide a referral if needed.

24/7 Pager ..... (302) 884-9321
Heather Farley, C4C Team director ..... (302) 528-6796 (cell)
Pastoral care pager ..... #1367
Employee Assistance (EAP) 1-877-595-5284

CARE FOR THE CAREGIVER

Responsibilities:
A. Monitor colleagues in your work area for second-victim experiences.
B. Interaction — One-on-one support to mitigate symptoms of critical events
1. Introduction
   a. Introduce the goal of the C4C team.
   b. Do not critique the incident. Allow time to express emotions in a confidential manner. Ask: "Are you OK?" and "What do you need?"
2. Exploration
   a. How do you feel about what happened?
   b. What was your first thought after the situation?
   c. What was the worst thing for you personally?
3. Information "normalizing"
   a. Validate normal reactions to an abnormal event.
   b. Provide information (brochures, contact info, self-care ideas, etc.)
   c. Who will be your support person at home, and what do you need from them?
4. Follow-up (referral, next discussion)
   a. Determine if an additional visit is needed, and schedule it.
   b. Refer to EAP, Pastoral Care as needed; contact team director for additional resources
C. Documentation – Complete an encounter form on the C4C collaboration site.

THANK YOU TO
DR. HEATHER FARLEY

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Institute for Learning, Leadership, and Development (*iLEAD*)
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Newark, DE
Associate Professor of Emergency Medicine
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In order to carry a positive action we must develop here a positive vision.

Ordering & Interpretation of Diagnostic Imaging for Neurologic Imaging: CT Head and Spine

Jamie Jones Coleman, MD, FACS

SCHOOL OF MEDICINE INDIANA UNIVERSITY | Indiana University Health | ESKENAZI HEALTH

Nothing to Disclose

Jamie Jones Coleman, MD, FACS

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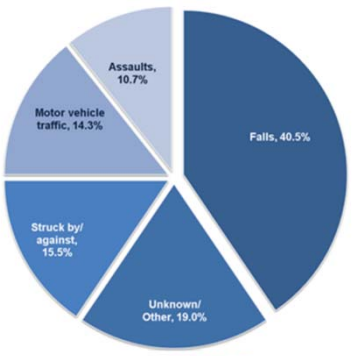
Objective

- Discuss radiologic diagnostic imaging studies focusing on CT body and imaging for neurological injuries.

Traumatic Brain Injury

- Acquired when sudden trauma to the head causes damage to the brain
- Large range in severity
  - Loss of consciousness
  - Confusion
  - Headache



Traumatic Brain Injury

- 2.5 million ED visits
- Contributes to 30% of all traumatic deaths
- Survivors can face effects lasting a few hours or days to disabilities which may last the rest of their lives
- $30 billion annual cost to society

Classification of TBI

- Mild
  - GCS 13-15
- Moderate
  - GCS 9-12
- Severe
  - GCS 3-8

Patient Scenarios

- 23 year old male, MVA, GCS 15, doesn't remember accident
- 57 year old female, fall from standing, GCS 13 (appears post-ictal), history of seizures
- 81 year old male, fall from standing, no LOC, on Xarelto
- WHO NEEDS IMAGING?

Goals of Imaging

- Detecting injuries that require immediate intervention
- Detecting injuries benefit from early medical therapy or neurologic supervision
- Prognosis
  - Family counseling
  - Discharge planning/rehabilitative needs
  - Mild and Severe

CT

- Noncontrast
- Initial diagnostic imaging of choice
- Intracranial hemorrhage
- Skull fractures
- Cerebral edema
- Signs of herniation

CT Advantages

- Widespread availability
- Rapid
- Few contraindication
  - Radiation exposure

MRI

- Provide prognostic information
- More sensitive than NCCT
  - Subacute SAH
  - Small SDH
  - Brain contusions
  - Brain stem injuries
  - Axonal injuries

Why not MRI everyone?

- Logistics
  - Incompatibility with medical devices
  - Need to screen patients
  - Time
  - Availability
  - Sensitivity to patient motion

Moderate – Severe TBI

- CT first line of imagine
- MRI may be indicated
  - When CT scan normal and persistent unexplained neurologic findings

Mild TBI

Canadian CT Head Rule

CT head is only required for minor head injury patients with any one of these findings:

High Risk (for Neurological Intervention)

1. GCS score < 15 at 2 hrs after injury
2. Suspected open or depressed skull fracture
3. Any sign of basal skull fracture*
4. Vomiting ≥ 2 episodes
5. Age ≥ 65 years

Medium Risk (for Brain Injury on CT)

6. Amnesia before impact ≥ 30 min
7. Dangerous mechanism ** *(pedestrian, occupant ejected, fall from elevation)*

Caveats

- Patients on anticoagulation were excluded
- Sensitivity
  - 100% requiring intervention
  - 83-100% clinically "important"

23 year old male

- MVA
- GCS 15
- +LOC, doesn't remember accident

57 year old female

- PMH significant for seizures
- Seizure witnessed
- Fall from standing after seizure began
- GCS 13 (appears post-ictal)

81 year old male

- Mechanical fall from standing height, tripped over dog
- No LOC
- GCS 15
- Small abrasion to forehead
- Xarelto

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Interpretation of Head CT

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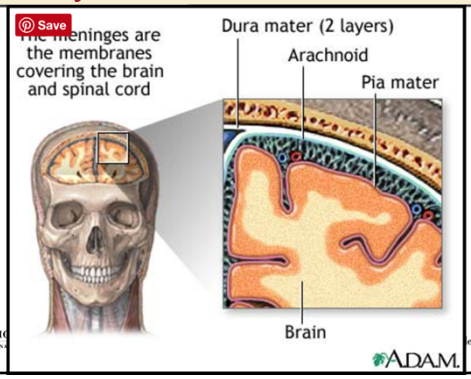
Anatomy



Epidural hematoma

- Above the dura mater (between dura and skull)
- 90% overlying skull fracture
- Laceration meningeal arteries
- Lucid interval followed by unconsciousness

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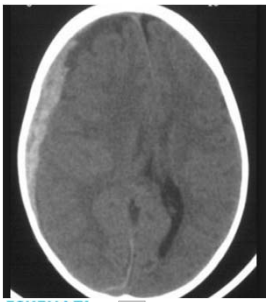
Subdural hematoma

- Inside the dura (between dura and arachnoid)
- Bridging veins
- Gradually increasing headache and confusion



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Subarachnoid hemorrhage

- Bleeding between arachnoid and pia mater
- Often associated with other types of TBI
- Linked with poorer prognosis

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Intraparenchymal hemorrhage

- Bleeding within brain parenchyma
- Acceleration-deceleration trauma
- Acute or delayed after trauma

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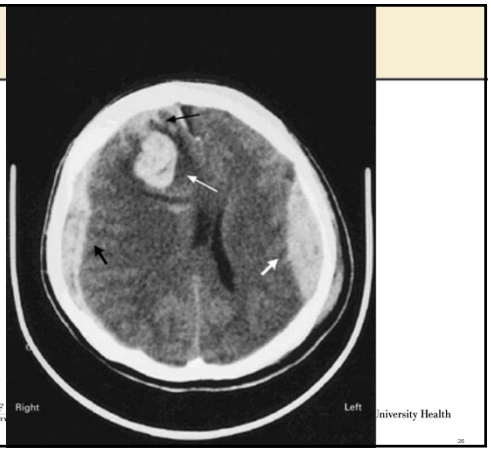

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Spine Trauma

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Spine Trauma

- 30,000 injuries to the spinal column every year
- Majority due to blunt trauma
- 2-5% of all blunt trauma victims have cervical spine trauma
  - 40-50% produce neurological defect
    - $1,000,000 costs of lifetime care and rehabilitation

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Not just fractures…

- Spinal cord injury
- Neck strain
- Vertebral artery dissection
- Epidural hematoma
- Acute on chronic neck pain

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Patient Scenarios

- 23 year old male s/p MVA, awake, alert, no neck pain
- 37 year old female s/p MVA, awake, alert, neck pain
- 87 year old female s/p ground level fall, awake, alert, “cannot move my arms”
- Who needs imaging and what?

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Menu

- Nothing
- C spine plain films
- C spine CT
  - From occiput to T1
  - Sagittal and coronal reconstructions
- C spine MRI
- CTA of neck

23 year old male

- Awake, alert, no neck pain
  - No distracting injuries*
  - No chemical impairment
  - Full range of motion
- NO imaging needed!
  - Clear C collar

What is a distracting injury?

- Ability of patient to focus
- "Ugly" Factor
- Judgment

23 year old male

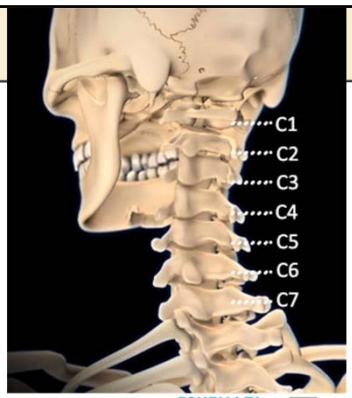
- Awake, alert, no neck pain
  - With open femur fracture
  - Etoh level 104
  - + Marijuana
  - Unable to complete full ROM
- CT C spine

23 year old male – CT C Spine

- Negative – remove collar
- Positive for injury – consult neurosurgery

37 year old female

- Awake, alert, + neck pain, no neurologic deficits
- 3 view Plain films?
  - Cross table lateral
  - Odontoid
  - AP
- CT?
- MRI?



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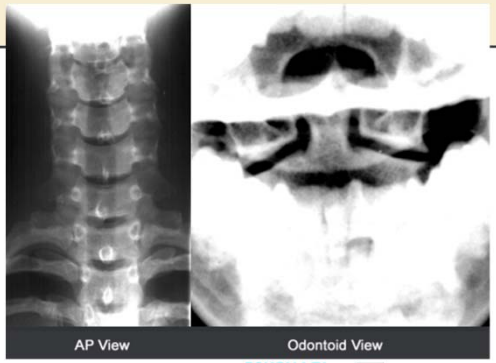

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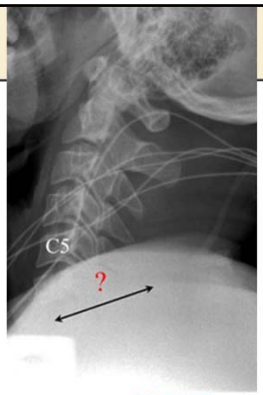

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Swimmer's View

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X ray vs CT

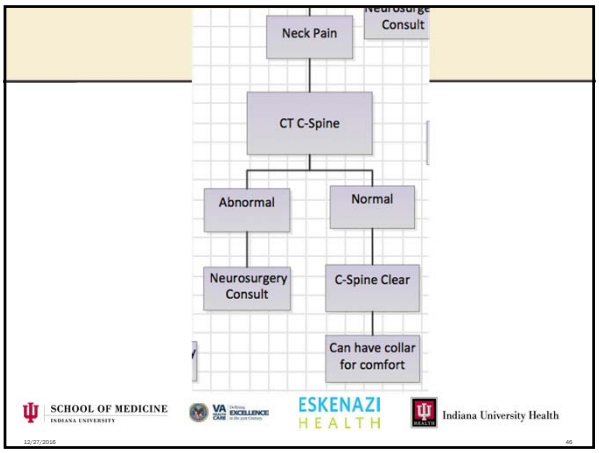
- 2005 meta-analysis
  - Plain film 52% sensitivity
  - CT 98% sensitiviy
- "Plain radiographs contribute no additional information and should not be obtained"

37 year old female

- Awake, alert, + neck pain, no neurologic deficits
- CT scan
  - Demonstrates injury = spine consult
  - No injury?
    - Pain resolved = clear collar
    - Pain unresolved?

Neck pain with negative CT

- Options per EAST guidelines
  1. Continue collar
  2. Obtain MRI – remove collar if negative
  3. Obtain Flexion/Extension films – remove collar if negative
- Options per local practice
  - Remove collar
  - Spine consult



87 year old female

- 87 year old female s/p ground level fall, awake, alert, "cannot move my arms"
- CT scan
  - Shows injury = spine consult
  - Negative
    - Continue collar
    - MRI
    - Spine consult

What about obtunded patients?

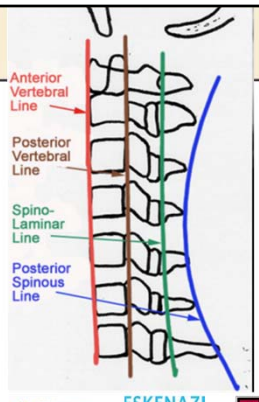
- CT scan
  - Shows injury = spine consult
  - No injury
    - "conditionally recommend" collar removal
    - 0% cumulative literature incidence of unstable injuries in negative CT scans

What about the rest of the spine?

- High energy mechanisms
- Midline tenderness
- Neurologic deficit
- Spine fracture
  - 20% noncontiguous
- Intoxication
- Distracting

Interpretation of CT for the spine

- Cervical Spine
  - 1/3rd at C2 level
  - ½ at C6 or C7



Jefferson Fracture

- Anterior & posterior arches of C1
- Diving

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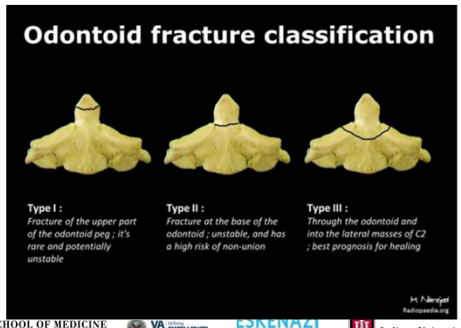
Dens Fracture



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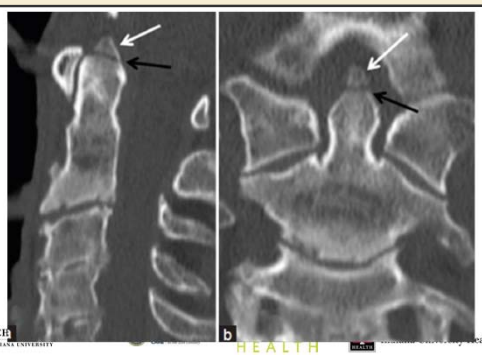

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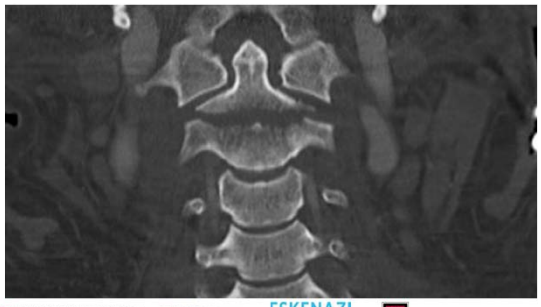

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Hangman's Fracture

- Bilateral lamina and pedicle fracture

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Hangman's fracture

- Anterolisthesis of C2 on C3

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Flexion tear drop fracture

- Posterior ligament disruption
- Anterior compression fracture
- Quadriplegia
- C5-C6 level

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Clay Shoveler's Fracture

- Spinous process of lower cervical spine

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Chance Fracture

- T12 – L2
- Flexion
- Compression injury anterior portion of VB
- Transverse fracture posterior portion of VB

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Compression vs Burst

- Compression
  - Posterior vertebral body cortex intact
  - No retropulsion
- Burst
  - Posterior vertebral body cortex always involved
  - Retropulsion into spinal canal
  - Between T11 and L1

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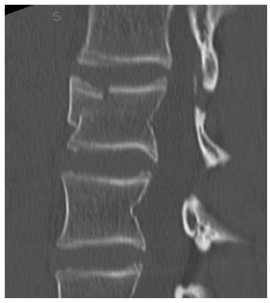

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Questions?

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Thank you!

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Ordering and Interpretation of Diagnostic Imaging for Truncal Injuries: CT Body

Gaurav Sachdev, MD FACS
Assistant Professor
Acute Care Surgery
Carolinas Medical Center
Charlotte, NC

30th EAST Annual Scientific Assembly

No Disclosures

Outline

- Trauma Workup (interactive case)
- Ordering diagnostic tests
- Abdomen Anatomy
- Interactive Cases
- Thoracic Anatomy
- Interactive Cases

11pm, Friday

What to do?

ABC's

Airway, Breathing, Circulation

Primary Survey, Secondary Survey

Universal Precautions, Large IVs, C-collar

ATLS

Case

- 25 yo Helmeted Motorcycle crash.
- 98.7F, 120, 80/40, 36, 88%, GCS 15
- C-collar, Large IVs, Trauma labs.
- No Left sided breath sounds
- Needle decompression, Chest tube, Intubation.
- 1L NS fluid bolus
- 110, 90/40, 18, 99%

Case

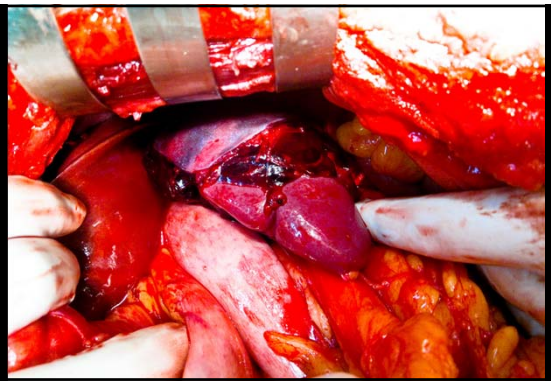
- Hypovolemic shock
- Where is he bleeding from?

- 5 Compartments:
  - Chest
  - Abdomen
  - Pelvis
  - Long bones
  - Scalp/Scene

Case

- CXR = no blood
- Pelvis xray = stable, no fracture
- No scalp laceration or Long bone fx

- Diagnosis?
  - Hemodynamic status
  - Diagnostic studies
  - Operating Room



Outline

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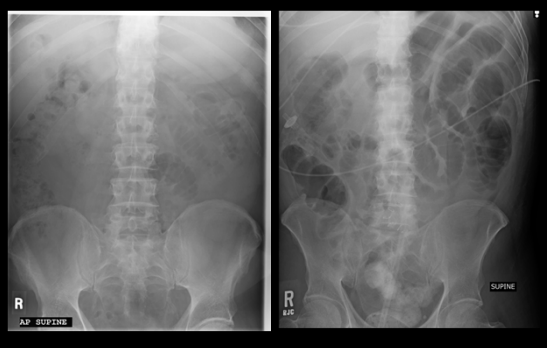
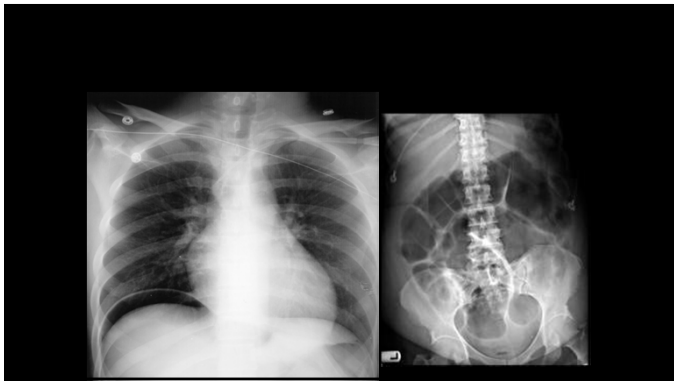
Diagnosis

- History, Mechanism and Anatomy
- Physical Exam
- Laboratory data
- Imaging
  - Xray
  - Ultrasound (F.A.S.T)
  - CT scan
  - Angiography





F.A.S.T

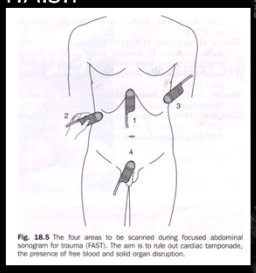


Fig. 18.5 The four areas to be scanned during focused abdominal sonogram for trauma (FAST). The aim is to rule out cardiac tamponade, the presence of free blood and solid organ disruption.

Angiography

Computed Tomography (CT) non-contrast

Computed Tomography (CT) with contrast

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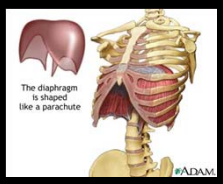
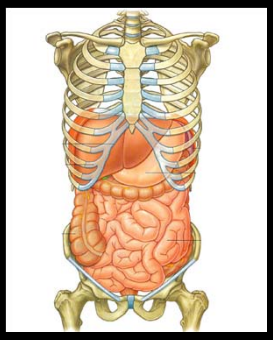
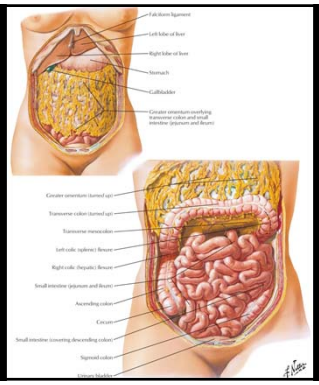
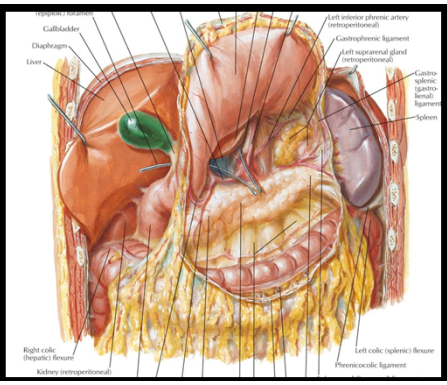
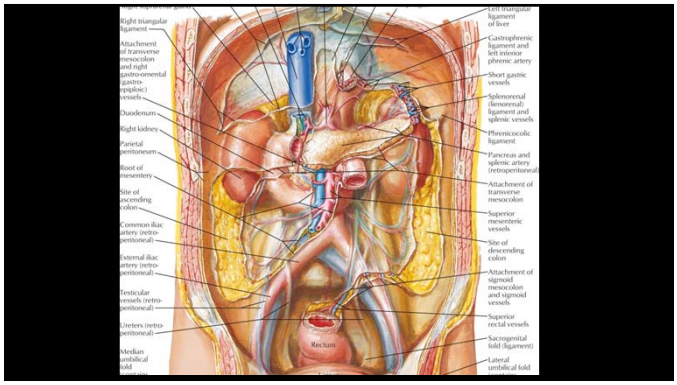
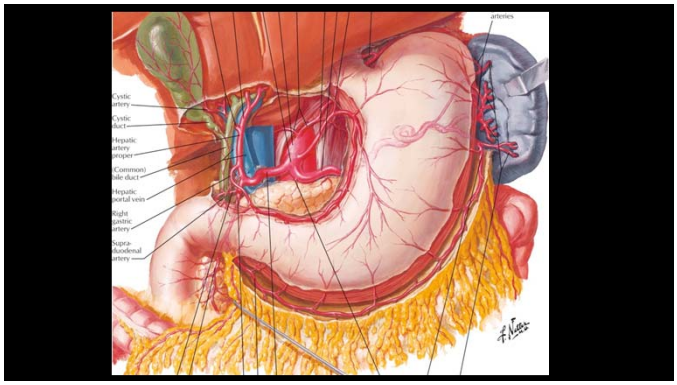


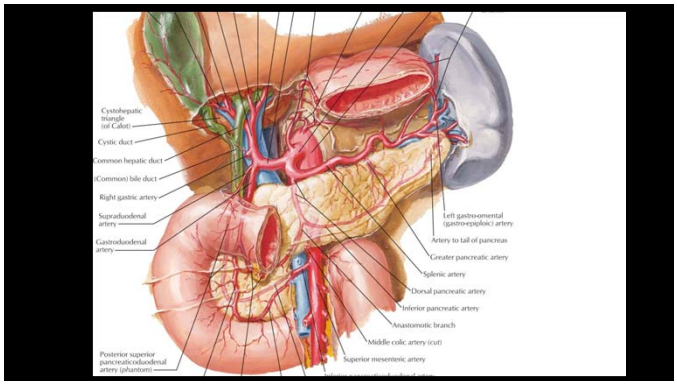


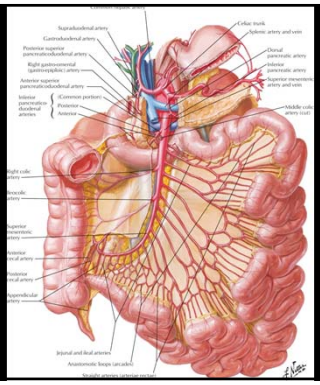

Falciform ligament
Left lobe of liver
Right lobe of liver
Stomach
Gallbladder
Greater omentum overlying transverse colon and small intestine (jejunum and ileum)
Greater omentum (turned up)
Transverse colon (turned up)
Transverse mesocolon
(left colic (splenic) flexure
Right colic (hepatic) flexure
Small intestine (jejunum and ileum)
Ascending colon
Cecum
Small intestine (covering descending colon)
Sigmoid colon
Urinary bladder

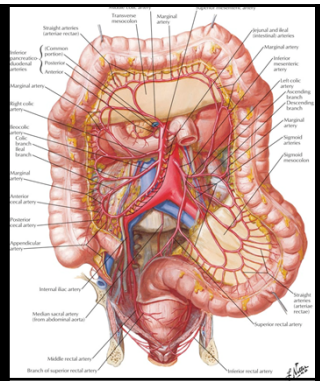

Gallbladder
Diaphragm
Liver
Left inferior phrenic artery (retroperitoneal)
Gastrophrenic ligament
Left suprarenal gland (retroperitoneal)
Gastro-splenic (gastro-lienal) ligament
Spleen
Right colic (hepatic) flexure
Kidney (retroperitoneal)
Left colic (splenic) flexure
Phrenicocolic ligament

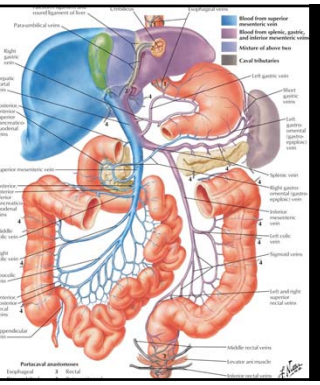

Right triangular ligament
Attachment of transverse mesocolon and right gastro-omental (gastro-epiploic) vessels
Duodenum
Right kidney
Parietal peritoneum
Root of mesentery
Site of ascending colon
Common iliac artery (retroperitoneal)
External iliac artery (retroperitoneal)
Testicular vessels (retroperitoneal)
Ureters (retroperitoneal)
Median umbilical fold
Left triangular ligament of liver
Gastrophrenic ligament and left inferior phrenic artery
Short gastric vessels
Splenorenal (lienorenal) ligament and splenic vessels
Phrenicocolic ligament
Pancreas and splenic artery (retroperitoneal)
Attachment of transverse mesocolon
Superior mesenteric vessels
Site of descending colon
Attachment of sigmoid mesocolon and sigmoid vessels
Superior rectal vessels
Sacrogenital fold (ligament)
Lateral umbilical fold
Rectum


arteries
Cystic artery
Cystic duct
Hepatic artery proper
(Common) bile duct
Hepatic portal vein
Right gastric artery
Supra-duodenal artery


Cystohepatic triangle (of Calot)
Cystic duct
Common hepatic duct
(Common) bile duct
Right gastric artery
Supraduodenal artery
Gastroduodenal artery
Posterior superior pancreaticoduodenal artery (phantom)
Left gastro-omental (gastro-epiploic) artery
Artery to tail of pancreas
Greater pancreatic artery
Splenic artery
Dorsal pancreatic artery
Inferior pancreatic artery
Anastomotic branch
Middle colic artery (cut)
Superior mesenteric artery


Supraduodenal artery
Gastroduodenal artery
Posterior superior pancreaticoduodenal artery
Right gastroepiploic artery
Anterior superior pancreaticoduodenal artery
Inferior pancreaticoduodenal arteries
(Common portion)
Posterior
Anterior
Celiac trunk
Splenic artery and vein
Dorsal pancreatic artery
Inferior pancreatic artery
Superior mesenteric artery and vein
Middle colic artery (cut)
Jejunal and ileal arteries
Anastomotic loops (arcades)


Transverse mesocolon
Marginal artery
Straight arteries (arteriae rectae)
Inferior pancreaticoduodenal arteries
(Common portion)
Posterior
Anterior
Marginal artery
Right colic artery
Ileocolic artery
Ileal branch
Anterior cecal artery
Posterior cecal artery
Appendicular artery
Jejunal and ileal (intestinal) arteries
Marginal artery
Inferior mesenteric artery
Left colic artery
Ascending branch
Descending branch
Marginal artery
Sigmoid arteries
Sigmoid mesocolon
Internal iliac artery
Median sacral artery (from abdominal aorta)
Middle rectal artery
Branch of superior rectal artery
Straight arteries (arteriae rectae)
Superior rectal artery
Inferior rectal artery


round ligament of liver
Paraumbilical veins
Right gastric vein
Hepatic portal vein
Posterior
Anterior
Superior pancreaticoduodenal veins
Superior mesenteric vein
Middle colic vein
Right colic vein
Ileocolic vein
Anterior
Posterior
Appendicular vein
Portacaval anastomoses
1 Esophageal
2 Rectal
Esophageal veins
Blood from superior mesenteric vein
Blood from splenic, gastric, and inferior mesenteric veins
Mixture of above two
Caval tributaries
Left gastric vein
Short gastric veins
Left gastroepiploic vein
Splenic vein
Right gastroepiploic vein
Inferior mesenteric vein
Left colic vein
Sigmoid veins
Left and right superior rectal veins
Middle rectal veins
Levator ani muscle

Normal Abdomen 1

Normal Abdomen 2

Normal Abdomen 3

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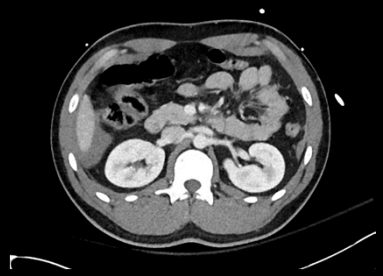
Abdominal Trauma Case 1



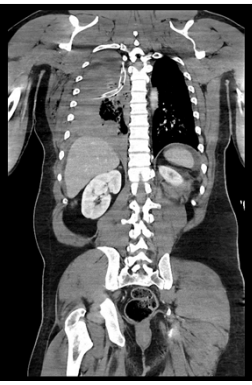
Abdominal Trauma Case 2

Abdominal Trauma Case 3

Abdominal Trauma Case 4

Abdominal Trauma Case 5

Abdominal Trauma
Case 5 - coronal

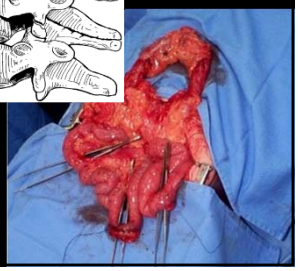


Seatbelt sign?

Abdominal Trauma Case 6- free fluid

Deceleration Injury

- Flexion – extention
- Small bowel
- Colon
- Stomach
- Spine fracture – Chance fracture



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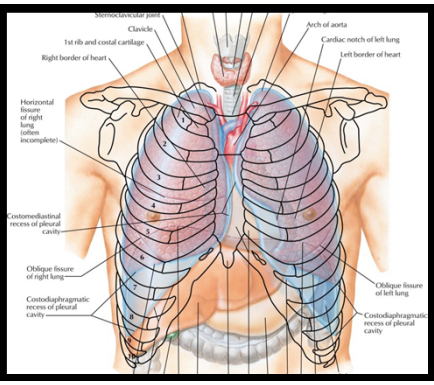
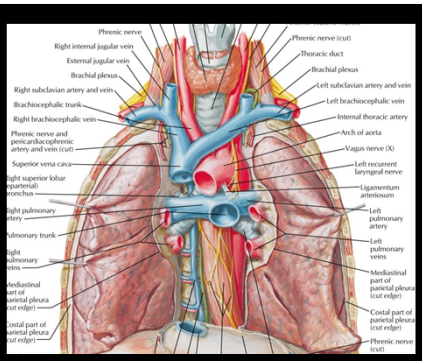
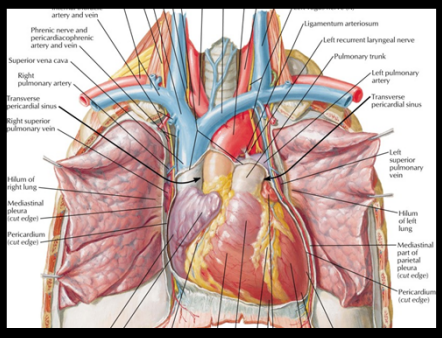
- Thoracic Anatomy
- Interactive Cases

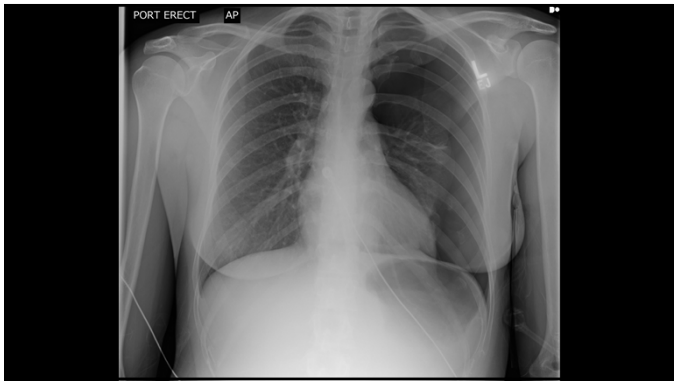




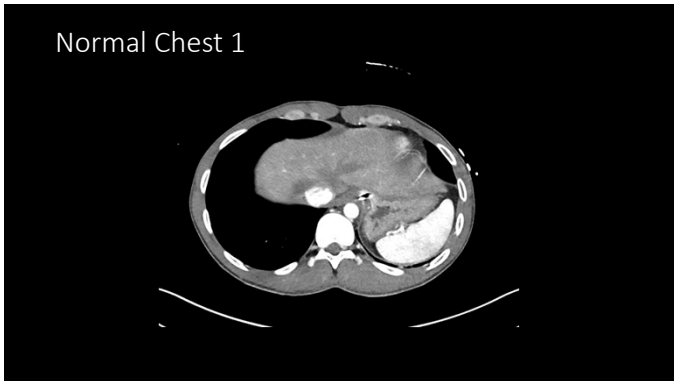


Outline

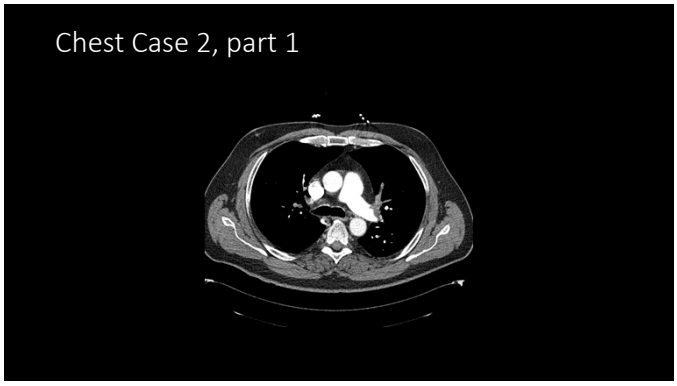
- Trauma Workup (interactive case)
- Ordering diagnostic tests
- Abdomen Anatomy
- Interactive Cases
- Thoracic Anatomy
- Interactive Cases



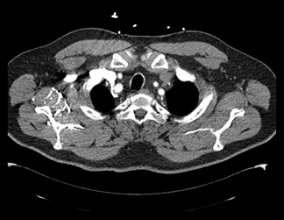
Normal Chest 1

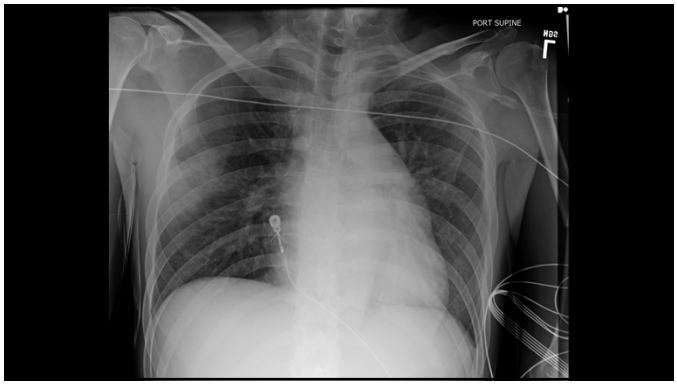


Chest Case 2, part 1

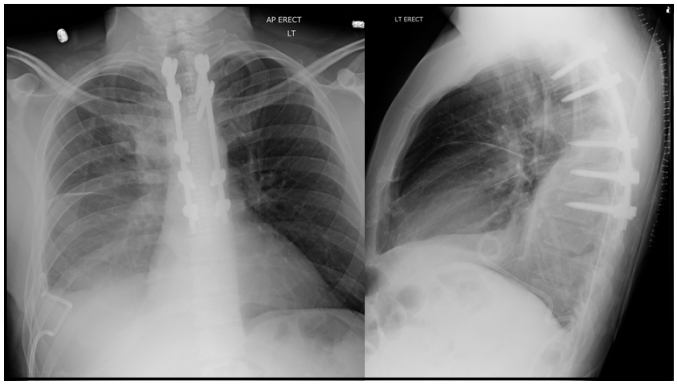


Chest Case 2, part 2

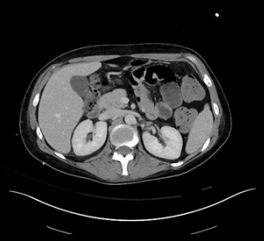




Chest Case 3



Chest Case 4



Final Case - Abdomen

Questions?