

2009 LLSA Review
Mary Ann Edens, MD, FACEP

- ### When Do Patients Need Admission to a Telemetry Bed?
- Good evidence for monitoring
 - AICD has fired
 - If fired appropriately, discontinue monitoring
 - If fired inappropriately, continue monitoring until cause is found and corrected
 - AV block
 - Complete block
 - Until cause is found and corrected

- ### When Do Patients Need Admission to a Telemetry Bed?
- Good evidence for monitoring
 - AV block
 - Mobitz I
 - A third of patients will develop a higher block
 - Do not need monitoring if chronic and stable
 - Mobitz II
 - Often develops into complete block
 - Monitor until resolves or pacer is placed

- ### When Do Patients Need Admission to a Telemetry Bed?
- Good evidence for monitoring
 - Prolonged QT and associated ventricular arrhythmias
 - Increased risk of sudden death, presumably from ventricular arrhythmias
 - Acute heart failure/pulmonary edema
 - Monitor for arrhythmia development
 - Particularly when treating with inotropic agents

- ### When Do Patients Need Admission to a Telemetry Bed?
- Good evidence for monitoring
 - Acute cerebrovascular disease
 - Increased risk of arrhythmias
 - Acute coronary syndrome
 - Reperfusion arrhythmias
 - Massive blood transfusion
 - May develop hypocalcemia and hypomagnesemia
 - Prolonged QT/torsade de pointes

- ### When Do Patients Need Admission to a Telemetry Bed?
- Monitoring may be beneficial
 - Syncope
 - Increased risk of dysrhythmia with age >45, abnormal ECG, history of heart failure, history of dysrhythmias
 - Gastrointestinal hemorrhage after endoscopy
 - Vasopressin and neuroleptics for procedural sedation may cause prolonged QT

When Do Patients Need Admission to a Telemetry Bed?

- Monitoring may be beneficial
 - Atrial arrhythmias receiving therapy for rate or rhythm control
 - Assess the efficacy of therapy
 - Some agents have proarrhythmic properties
 - Electrolyte imbalances
 - Potassium, calcium and magnesium

When Do Patients Need Admission to a Telemetry Bed?

- Monitoring may be beneficial
 - Subacute congestive heart failure
 - More studies need to be done to evaluate

When Do Patients Need Admission to a Telemetry Bed?

- No evidence for monitoring
 - Simple blood transfusion
 - Chest pain
 - If initial ECG normal or nonspecific changes and normal cardiac markers, < 1% risk of life-threatening arrhythmias and 0% risk of sudden death

When Do Patients Need Admission to a Telemetry Bed?

- No evidence for monitoring
 - Acute exacerbation of COPD
 - Unless a cardiac etiology of dyspnea is suspected
 - Stable patients with PE receiving anticoagulation
 - Low risk patients may even be able to be treated at home

Clinical Policy: Critical Issues in the Evaluation and Management of Adult Patients with Asymptomatic Hypertension in the Emergency Department

- Hypertension affects about 50 million in the US and 1 billion worldwide
- Each increment of 20 mm Hg in SBP or 10 mm Hg in DBP doubles the risk of cardiovascular events

Clinical Policy: Critical Issues in the Evaluation and Management of Adult Patients with Asymptomatic Hypertension in the Emergency Department

- Are ED BP readings accurate and reliable for screening asymptomatic patients for hypertension?
 - Blood pressure elevation in the ED may be due to hypertension, pain or anxiety
 - There is evidence from several studies that show 2 separate BP measurements in the ED are adequate for screening

Clinical Policy: Critical Issues in the Evaluation and Management of Adult Patients with Asymptomatic Hypertension in the Emergency Department

- Are ED BP readings accurate and reliable for screening asymptomatic patients for hypertension?
 - Level B recommendation – if SBP > 140 or DBP > 90 persistently, patient should be referred for follow-up and possible blood pressure management
 - Level C recommendation – patients with a single elevated BP may require follow-up

Clinical Policy: Critical Issues in the Evaluation and Management of Adult Patients with Asymptomatic Hypertension in the Emergency Department

- Do asymptomatic patients with elevated BP benefit from rapid lowering of their blood pressure?
 - Little data addresses this issue
 - Number of case studies and reports of poor outcomes, including hypotension, myocardial ischemia and infarction, strokes and death

Clinical Policy: Critical Issues in the Evaluation and Management of Adult Patients with Asymptomatic Hypertension in the Emergency Department

- Do asymptomatic patients with elevated BP benefit from rapid lowering of their blood pressure?
 - Level B recommendations
 - Initiating treatment not needed if patients have follow-up
 - Rapid lowering of may be harmful
 - Aim at gradually decreasing pressure, do not expect to normalize in ED

Noninvasive Ventilation in Acute Cardiogenic Pulmonary Edema

- Two types of invasive ventilation
 - Continuous positive airway pressure – CPAP
 - Bilevel noninvasive pressure support ventilation – NIPSV or biPAP
 - Different levels during inspiration and expiration
- Both reduce mortality when compared to oxygen

Noninvasive Ventilation in Acute Cardiogenic Pulmonary Edema

- Both reduce need for intubation
- Although a previous study showed increased incidence of MI with biPAP compared to CPAP, this meta-analysis showed no difference

Time to Treatment in Primary Percutaneous Coronary Intervention

- Best chance of survival with fibrinolytic therapy within 2-3 hours of symptom onset
 - Little benefit after 12 hours
- PCI has lowest mortality within 90 minutes of hospital arrival
 - Delays in door-to balloon time have consistently been shown to result in poorer outcomes

Time to Treatment in Primary Percutaneous Coronary Intervention

- CMS and Joint Commission include door-to-balloon time in core measurements of quality
- When both PCI and fibrinolytics are available, PCI has been shown to be better
- Article suggests if access to PCI > 90 minutes and fibrinolytics < 30 minutes, use fibrinolytics

Time to Treatment in Primary Percutaneous Coronary Intervention

- Decreasing door-to-balloon time
 - Prehospital ECG
 - Activation of cath lab by EM physician
 - Single call activation
 - 24/7 cardiology availability
 - Prompt feedback on door-to-balloon times

Time to Treatment in Primary Percutaneous Coronary Intervention

- No good data on combined fibrinolytics and PCI
 - Some hospitals use PCI to rescue “failed” fibrinolytics

Does This Patient with a Pericardial Effusion Have Cardiac Tamponade?

- Best way to detect effusion is echocardiography
 - Right atrial collapse during systole
 - Right ventricular collapse during diastole
 - Inferior vena cava plethora
 - Exaggeration of respirophasic changes in flow velocities across the tricuspid and mitral valves

Does This Patient with a Pericardial Effusion Have Cardiac Tamponade?

- Symptoms
 - Dyspnea
 - Chest pain or fullness
 - Nonspecific symptoms such as lethargy, fever, cough, weakness, fatigue, anorexia and palpitations
 - Often patient too critically ill to give any history

Does This Patient with a Pericardial Effusion Have Cardiac Tamponade?

- Signs
 - Beck’s triad
 - Decreasing arterial blood pressure
 - Increasing jugular venous pressure
 - Small quiet heart
 - Generally seen in acute cases
 - Medical patient’s with slowly increasing effusion are often hypertensive

Does This Patient with a Pericardial Effusion Have Cardiac Tamponade?

- ECG findings may include
 - Low voltage QRS
 - Electrical alternans
 - Atrial arrhythmias
 - ST segment elevation and PR depression
 - If inflammation present

Clinical Policy: Critical Issues in the Evaluation and Management of Adult Patients Presenting to the Emergency Department with Acute Heart Failure Syndromes

- Does a B-type natriuretic polypeptide (BNP) or NT-proBNP measurement improve the diagnostic accuracy over standard clinical judgment in the assessment of possible acute heart failure syndromes in the ED?
 - Level B recommendations
 - A single measurement may improve accuracy
 - BNP < 100 or NT-proBNP < 300 – acute heart failure unlikely
 - BNP > 500 or NT-proBNP > 1000 – acute heart failure likely

Clinical Policy: Critical Issues in the Evaluation and Management of Adult Patients Presenting to the Emergency Department with Acute Heart Failure Syndromes

- Is there a role for noninvasive positive-pressure ventilatory support in the ED management of patients with acute heart failure syndromes and respiratory distress?
 - Level B recommendations
 - Use 5-10 mm Hg CPAP for patients without hypotension or need for emergent intubation to improve heart rate, respiratory rate, blood pressure and reduce the need for intubation
 - May reduce in-hospital mortality

Clinical Policy: Critical Issues in the Evaluation and Management of Adult Patients Presenting to the Emergency Department with Acute Heart Failure Syndromes

- Is there a role for noninvasive positive-pressure ventilatory support in the ED management of patients with acute heart failure syndromes and respiratory distress?
 - Level C recommendations
 - Consider biPAP as an alternative to CPAP
 - Data about possible association between biPAP and myocardial infarction (disproved in meta-analysis discussed in earlier article)

Clinical Policy: Critical Issues in the Evaluation and Management of Adult Patients Presenting to the ED with Acute Heart Failure Syndromes

- Should vasodilator therapy (eg. Nitrates, nesiritide, and ACE inhibitors) be prescribed in the ED management of patients with acute heart failure syndromes?
 - Level B recommendations
 - Administer IV nitrate therapy to patients with acute heart failure
 - High dose nitrates with low dose furosemide found to be more effective than high dose furosemide and low dose nitrates
 - Lower in-hospital mortality compared to inotropic agents

Clinical Policy: Critical Issues in the Evaluation and Management of Adult Patients Presenting to the ED with Acute Heart Failure Syndromes

- Should vasodilator therapy (eg. Nitrates, nesiritide, and ACE inhibitors) be prescribed in the ED management of patients with acute heart failure syndromes?
 - Level C recommendations
 - Nesiritide should not be considered first line therapy secondary to lack of clear superiority over nitrates and uncertainty regarding its safety
 - May be associated with increased mortality and rises in creatinine levels

Clinical Policy: Critical Issues in the Evaluation and Management of Adult Patients Presenting to the ED with Acute Heart Failure Syndromes

- Should vasodilator therapy (eg. Nitrates, nesiritide, and ACE inhibitors) be prescribed in the ED management of patients with acute heart failure syndromes?
 - Level C recommendations
 - ACE inhibitors may be used, but must monitor for first dose hypotension

Clinical Policy: Critical Issues in the Evaluation and Management of Adult Patients Presenting to the ED with Acute Heart Failure Syndromes

- Should diuretic therapy be prescribed in the ED management of patients with acute heart failure syndromes?
 - Level B recommendations
 - Treat patients with moderate to severe pulmonary edema with furosemide in combination with nitrates

Clinical Policy: Critical Issues in the Evaluation and Management of Adult Patients Presenting to the ED with Acute Heart Failure Syndromes

- Should diuretic therapy be prescribed in the ED management of patients with acute heart failure syndromes?
 - Level C recommendations
 - Aggressive diuretic monotherapy unlikely to prevent need for intubation when compared to aggressive nitrate monotherapy
 - Should be given judiciously given potential association with worsening renal function
 - Known association with increased long-term mortality

Drug-Induced Immune Thrombocytopenia

- Heparin-induced thrombocytopenia is the most common drug-related cause of a drop in the platelet count
 - Complex reaction
 - Thrombosis, not thrombocytopenia, is the major threat for the patient

Drug-Induced Immune Thrombocytopenia

- Generally, patient will have taken the drug for 7 days before signs of thrombocytopenia develop
 - May occur sooner occasionally, particularly in patients given platelet inhibitors
 - Systemic symptoms often precede bleeding
 - Lightheadedness, chills, fever, nausea and vomiting

Drug-Induced Immune Thrombocytopenia

- Once causative agent is stopped, symptoms generally resolve in 1-2 days

Drug-Induced Immune Thrombocytopenia

- Heparins
- Cinchona alkaloids
 - Quinine, quinidine
- Platelet inhibitors
 - Abciximab, eptifibatide, tirofiban
- Antirheumatic agents
 - Gold salts
- H2 blockers
 - Cimetidine
- Antimicrobial agents
 - Linezolid, rifampin, sulfonamides, vancomycins
- Anticonvulsant agents
 - Carbamazepine, phenytoin, valproate
- Analgesic agents
 - Acetaminophen, diclofenac, naproxen

Drug-Induced Immune Thrombocytopenia

- Diuretic agents
 - Chlorothiazide
- Chemotherapy agents
 - Fludarabine, oxaliplatin

Drug-Induced Immune Thrombocytopenia

- Testing for antibodies is generally not useful except in heparin-induced thrombocytopenia
 - Often negative even though drug was the cause
- May consider giving a small test dose
 - Even 1 or 2 mg of a drug, may cause a substantial decrease in platelet levels

Drug-Induced Immune Thrombocytopenia

- Patient must avoid the causative agent permanently
 - However, reaction tends to be very specific to the agent and patient can usually tolerate a pharmacologic equivalent

Oncologic Emergencies: Diagnosis and Treatment

- Hypercalcemia
 - 10-30% of all cancer patients
 - 3 types
 - Humoral hypercalcemia – most common
 - Local bone destruction
 - Tumor production of vitamin D analogues

Oncologic Emergencies: Diagnosis and Treatment

- Hypercalcemia
 - Symptoms
 - Lethargy, confusion, anorexia, nausea, constipation, polyuria and polydipsia
 - Treatment
 - Aggressive IV hydration with normal saline
 - Bisphosphonates
 - Remove sources of calcium

Oncologic Emergencies: Diagnosis and Treatment

- Tumor lysis syndrome
 - Caused by massive release of intracellular contents after tumor cell death
 - Most common after therapy for aggressive hematologic malignancies
 - High-grade lymphomas and leukemia

Oncologic Emergencies: Diagnosis and Treatment

- Tumor lysis syndrome
 - Causes hyperuricemia, hyperkalemia, hyperphosphatemia and hypocalcemia
 - Treatment
 - Allopurinol may be given 2-3 days before chemotherapy in attempt to prevent
 - Treat electrolyte abnormalities as appropriate

Oncologic Emergencies: Diagnosis and Treatment

- Malignant spinal cord compression
 - All cancers can cause, but breast, lung, and prostate cancer account for about 2/3 of cases
 - Most commonly caused by tumors metastatic to the adjacent vertebral bodies that then erode into the cord space
 - Occasionally tumor can enter through the intervertebral space with no bone involved

Oncologic Emergencies: Diagnosis and Treatment

- Malignant spinal cord compression
 - Most patients present with increasing back pain
 - Important to diagnose prior to development of neurologic symptoms
 - Once at this stage, increased mortality
 - MRI is diagnostic study of choice
 - CT myelography if MRI not available or contraindicated

Oncologic Emergencies: Diagnosis and Treatment

- Malignant spinal cord compression
 - Treatment with glucocorticoids as soon as possible
 - Treatment with radiation versus surgery still being debated

Oncologic Emergencies: Diagnosis and Treatment

- Brain metastases and increased ICP
 - Any cancer can cause, but most common culprits are lung, breast and melanoma
 - Usually associated with gradual onset of symptoms
 - Only 50% have headaches
 - MRI is the most sensitive diagnostic test

Oncologic Emergencies: Diagnosis and Treatment

- Brain metastases and increased ICP
 - Most commonly treated with steroids
 - Dexamethasone is the most lipid soluble, so is generally the first choice

Oncologic Emergencies: Diagnosis and Treatment

- Malignant pericardial effusion
 - Associated with poor prognosis with most patients dying within a year
 - Symptoms include dyspnea, cough, chest pain, dysphagia, hiccups and hoarseness
 - If symptomatic or deteriorating, ultrasound guided pericardiocentesis is a safe and effective treatment

Oncologic Emergencies: Diagnosis and Treatment

- Superior vena cava syndrome
 - SVC becomes occluded or compressed, restricting blood return to the heart
 - Malignancies are most common cause
 - Most commonly lung cancer and lymphoma
 - May also be caused by benign conditions

Oncologic Emergencies: Diagnosis and Treatment

- Superior vena cava syndrome
 - Symptoms
 - Dyspnea, facial swelling, cough
 - Aggravated by bending over
 - Signs
 - Distended neck and chest wall veins, facial edema, edema of the upper extremities
 - Diagnosis
 - Usually made by CT

Oncologic Emergencies: Diagnosis and Treatment

- Hyperviscosity due to dysproteinemia
 - More common in IgA myeloma
 - Symptoms
 - Mental status changes, visual changes, retinal hemorrhage, papilledema, engorged retinal veins, purpura
 - Treatment
 - Plasmapheresis

Oncologic Emergencies: Diagnosis and Treatment

- Hyperleukocytosis and leukostasis
 - Causes increased viscosity
 - Symptoms
 - In addition to previously discussed symptoms, pulmonary symptoms and fever are common
 - Treatment
 - Leukopheresis
 - Hydroxyurea until chemotherapy can be started

Oncologic Emergencies: Diagnosis and Treatment

- Neutropenic fever
 - Most commonly occurs in patient receiving chemotherapy
 - WBC nadir usually occurs 5-10 days after last dose
 - Recovery occurs 5 days after nadir
 - May be longer with agents used to treat leukemias and lymphomas

Oncologic Emergencies: Diagnosis and Treatment

- Neutropenic fever
 - Start antibiotic therapy as soon as possible
 - Broad spectrum antibiotics

Abscess Incision and Drainage

- Incision and drainage is the primary therapy for management of abscesses
 - Most localized abscesses without associated cellulitis do not need antibiotics
- Bedside US can be used to localized abscess and determine size
 - If greater than 5 mm in diameter and in accessible location, appropriate for drainage

Abscess Incision and Drainage

- Universal precautions should be followed
- Use local anesthesia prior to procedure
 - Epinephrine will help decrease amount of bleeding
 - Local anesthetic may not give good anesthetic results secondary to the acidic tissue around the abscess
 - May need to supplement with other analgesia

Abscess Incision and Drainage

- Make incision directly over the center of the abscess
 - If incision is made parallel to existing skin lines, this gives best cosmetic results
- Pack wound to allow continued drainage
 - Repack in 2-3 days if wound continues to drain

Are Antibiotics Necessary After Incision and Drainage of a Cutaneous Abscess?

- One study showed small advantage to using antibiotics before and after abscess drainage
 - May marginally reduce recurrence rates
- Most studies have shown no effect on healing rates when antibiotics given
 - Even with patients found to have MRSA

Are Antibiotics Necessary After Incision and Drainage of a Cutaneous Abscess?

- These conclusions do not apply when there is significant overlying cellulitis

Computed Tomography – An Increasing Source of Radiation Exposure

- The use of CT has increased rapidly, both in the US and worldwide
 - Estimated that more than 62 million scans obtained in the US each year
 - Largest increases in pediatric diagnosis and adult screening

Computed Tomography – An Increasing Source of Radiation Exposure

- Risks of low dose radiation
 - Increased risk of cancer shown in a subgroup of atomic bomb survivors who received low doses of radiation, ranging from 5-150 mSv
 - Equivalent to about 2-3 CT scans for the adult
 - Children, however, receive more radiation per scan because they have thinner torsos

Computed Tomography – An Increasing Source of Radiation Exposure

- Risks of low dose radiation
 - This can be extrapolated to an increased risk of cancer with CT
 - Estimated that 1.5-2% of cancers may be caused by CT
 - There is a large scale epidemiologic study beginning to look at this

Clinical Practice Advisory: Emergency Department Procedural Sedation With Propofol

- Propofol has been found to be safe and effective for use in procedural sedation in the ED
 - Contraindicated in patients allergic to eggs and soy products
- Lower doses of propofol are needed in patients older than 55
 - The hypotensive effect is more pronounced in this age group

Clinical Practice Advisory: Emergency Department Procedural Sedation With Propofol

- Patients with ASA score of III or IV are at increased risk of propofol induced hypotension as well
- Pharmacology
 - Onset of sedation 30 seconds
 - Half-life about 1-3 minutes
 - Clinical effects typically resolve within 6 minutes

Clinical Practice Advisory: Emergency Department Procedural Sedation With Propofol

- Dosing
 - Start with 1 mg/kg IV in both adults and children
 - Follow with 0.5 mg/kg every 3 minutes until sedation level is reached
- Clinical effect
 - Is not an analgesic
 - Serves as a sedative and amnesic

Clinical Practice Advisory: Emergency Department Procedural Sedation With Propofol

- Unlike other sedation combinations that are titrated together, propofol should be given as a sole agent after analgesia obtained with an opiate
- Adverse effects – rare
 - Inadequate sedation, oversedation, hypoxemia, respiratory depression, airway obstruction, hypotension and hemodynamic instability, nausea, pain with injection

Missed and Delayed Diagnoses in the Emergency Department: A Study of Closed Malpractice Claims From 4 Liability Insurers

- This study looked at malpractice claims to determine contribution of systems, cognitive behavior and the patient
- The leading missed diagnoses were fractures (19%), infections (15%), myocardial infarctions (10%) and cancer (9%)

Missed and Delayed Diagnoses in the Emergency Department: A Study of Closed Malpractice Claims From 4 Liability Insurers

- The leading errors were due to failure to order tests, inadequate history and physical examination, incorrect interpretation of tests and failure to request a consult
- Handoffs and excessive workload were felt to be contributing factors in missed diagnoses

Replacing Hindsight With Insight: Toward Better Understanding of Diagnostic Failures

- Knowing the outcome of a case impairs the ability to judge the decisions made by the initial physician
 - Hindsight is always biased
 - What are considered errors after the fact, were not necessarily errors at the time
 - Need to try to understand the circumstances involved in the situation

Replacing Hindsight With Insight: Toward Better Understanding of Diagnostic Failures

- How do we improve our understanding of problems in diagnosis
 - Must use more sophisticated models of diagnostic reasoning that look at what people actually do, rather than what we imagine should be done
 - Minimize the effects of hindsight and outcome bias

Replacing Hindsight With Insight: Toward Better Understanding of Diagnostic Failures

- How do we improve our understanding of problems in diagnosis
 - Avoid the temptation to use data that were collected for another purpose

Emergency Physicians and Disclosure of Medical Errors

- A medical error need not cause harm to a patient
- With publication of the IOM report *To Err is Human* in 2000, the general public is more aware of the possibility of medical errors
- High patient volumes, high acuity, and the episodic nature of care in the ED may increase the risk of errors and inhibit their identification and disclosure

Emergency Physicians and Disclosure of Medical Errors

- Ethics standards suggest that physicians have a duty to disclose what a 'reasonable' person would want to know about his or her care
- Most patients want to be informed about all errors that occur in their care
 - With inconsequential errors, can reassure the patient that the error has been corrected and no there were no adverse effects

Emergency Physicians and Disclosure of Medical Errors

- Barriers to disclosure
 - Many fear that disclosure of an error will cause an erosion of patient trust but it fact it may actually enhance trust
 - Some fear litigation as a result of disclosure
 - Disclosure and apology may decrease possibility of litigation

Emergency Physicians and Disclosure of Medical Errors

- Disclosure of errors made by others
 - Errors should not be kept from the patient
 - Errors should be reported back to the person who made the error

Refusal of Care: The Physician-Patient Relationship and Decisionmaking Capacity

- A patient who refuses care either has that capacity and should be discharged against medical advice or lacks capacity and must be treated against his/her will
- Understanding the patients reasons why they are refusing care may help us devise a plan that is acceptable for both us and the patient

Refusal of Care: The Physician-Patient Relationship and Decisionmaking Capacity

- We should enlist family, friends, clergy or the patient's personal physician in the discussion when patient's refuse care
- We need to balance the patient's autonomy with our responsibility to protect the patient from harm
 - Respect for autonomy takes precedence

Refusal of Care: The Physician-Patient Relationship and Decisionmaking Capacity

- We need to assess decisionmaking capacity
 - Give the patient all the relevant information
 - Have the patient paraphrase what who have said
 - After the patient expresses a choice, as the patient to explain the reasoning behind the choice

Refusal of Care: The Physician-Patient Relationship and Decisionmaking Capacity

- For patient's who lack capacity
 - Our first responsibility is to determine if the patient has left any guidance
 - Written advance directive
 - Surrogate decisionmaker
 - If either of these exist, we must allow it to guide our care despite what we feel is best for the patient

Refusal of Care: The Physician-Patient Relationship and Decisionmaking Capacity

- The presence of mental illness is not sufficient for determining that the patient lacks capacity
 - This assessment is best made by the physician caring for the patient