

Overview of Geriatric Emergencies

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Abstract

The elderly, aged 65 or older, are more susceptible to illness or injury due to environmental factors, physiologic deterioration and co-morbid disease. Prompt referral of patients with acute decompensation to the Emergency Department promotes resuscitation, rapid evaluation and interventions where appropriate, to improve outcomes. Common life- or limb-threatening situations are reviewed as well as co-morbidities and social issues that may complicate decision making.

Key Words: Geriatric, emergency, emergency department, elder, aged, review.

IN THE U.S., ADVANCES IN MEDICINE, including antibiotics, cardiovascular interventions, surgical techniques and lifestyle modifications, have added years to longevity. Multicenter surveys in the 1990s indicated that approximately 15% of all visits to emergency departments (EDs) were made by the elderly. This number is projected to be 25% by the year 2020 as the baby boomers reach senior status (1, 2). By the year 2030, 1 in 5 persons will be older than 65 years. Relative to younger cohorts, elders require more ambulance transport, consume more time and ED resources, and are more likely to have serious disease or injury which requires admission to the hospital. Collaboration between the primary provider and ED physician is essential to identify patient problems amenable to outpatient evaluation as well as to provide early referrals for acute conditions of accident or illness for which rapid referral to the Emergency Department may promote a better outcome.

Resuscitation must always be a priority, with attention given to respiratory and circulatory status. Following stabilization of obvious

threats to life or limb, one must establish current deviation from baseline function. Often elders in the ED are too sick, or are unwilling or unable to provide a coherent history, or information on allergies, medications, medical/surgical history, or recent interventions. Fear of loss of independence or memory deficits may make it impossible for them to characterize their baseline level of cognitive and daily functional status. Information from health providers, family, paramedics or old records can provide essential clues to preexisting conditions and rate of decline, which can aid in targeting treatment. Transmittal of advance directives regarding DNR status also prevents the use of unwanted "heroic measures" and promotes respect for patient wishes regarding end-of-life care.

The task of the ED physician, beyond resuscitation, is to quickly sift through available information gained from the history, physical examination, initial imaging or laboratory studies, and then ascertain the likelihood of serious injury or illness.

Psychosocial confounders such as depression, suicide risk, elder abuse and alcoholism weigh heavily in the decision to admit a patient when the conditions are ordinarily amenable to outpatient management. Alcohol abuse has been shown to be an acute factor in up to 14% of elder ED visits (3). Presentations vary from the expected, such as falls and injury, rapid atrial fibrillation, or cardiomyopathy, to vague gastrointestinal complaints, insomnia, and depression. A useful screening device, developed by

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Ewing, is the CAGE score (4), in which any two positive responses have been shown to have a 70% sensitivity for significant alcohol involvement. CAGE stands for four possible responses to one's alcohol consumption: C (cutting down), A (annoyed about alcohol consumption questions), G (guilty about alcohol consumption) or E (need for an early morning eye opener). Failure to elicit alcohol dependence can lead to misdiagnosis when admitted patients go into withdrawal. Provision of adequate hydration and benzodiazepines to control agitation will reduce morbidity.

Drug-drug or adverse drug reactions (ADRs) account for up to 5% of hospital admissions among the elderly (5). Patients who maintain a list of their current medications can assist physicians in identifying this problem. On average, most elders use more than 4 prescription drugs and 1 or 2 over-the-counter drugs. Nursing home patients receive an average of 7.2 medications at any given time in their stay (6). Polypharmacy must be considered in the differential diagnosis of acute decline in mental status in the elderly. Drugs which are frequently implicated include anticoagulants, sedatives, antihistamines, tricyclic antidepressants and anticholinergics (7).

Major Disease Entities in the Elderly

Altered Mental Status

The differential diagnosis of altered mental status is broad and includes: central nervous system (CNS) bleeds; clots; mass or infection; post-ictal state; all forms of shock, particularly septic and hypovolemic; metabolic disorders, including end-stage dysfunction of any organ; environmental disorders such as hypothermia or heatstroke; and endocrine disorders, including thyroid, diabetes, Addison's, pulmonary embolus, toxins and trauma. Lacking historical or physical clues, the evaluation is extensive and includes a sepsis work-up, CT scanning, toxic and metabolic screens, chest X-ray and cardiac evaluation. It should be noted that in elder patients with extreme agitation lacking a readily reversible cause, small titrated doses of a neuroleptic, haloperidol, are less likely to cause oversedation and disinhibition than a benzodiazepine, such as lorazepam, although both have been used successfully in selected patients (8). The search for cause can thus be facilitated while reducing the chance of injury to the patient or others. If multiple or higher doses are

needed, meticulous ongoing attention to airway, arrhythmias and hemodynamic status is required. Hypotension, respiratory depression, and *torsades de pointes*, although rare, can occur.

Delirium

Delirium, which carries a 10–22% risk of in-hospital mortality, is possible in any patient with an acute alteration in mental status who has not had an obvious stroke (9). Although delirium is more common in patients with dementia, one must differentiate delirium from dementia and psychiatric illness, since delirium represents a more acute condition which may have a reversible cause. Delirium can be triggered by abnormalities in vital signs (temperature, blood pressure, pulse, respiratory rate or oxygen saturation), or by infection, myocardial infarction, acute abdomen or trauma. Delusions and hallucinations, often visual, can occur in up to 40% of patients. The Confusion Assessment Method, developed by Inouye, is shown in Table 1 (10); the presence of the first 2 features and one additional feature has a 94% sensitivity, 90% specificity in differentiating delirium from dementia.

TABLE 1
Confusion Assessment Method

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1. Acute onset or fluctuating course
 2. Inattention
 3. Disorganized thinking
 4. Altered level of consciousness
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(Examples: hypervigilant, lethargic, stuporous, comatose)

Reproduced with permission from Inouye SK, van Dyck CH, Alessi CA, et al. Clarifying confusion: the confusion assessment method. A new method for detection of delirium. *Ann Intern Med* 1990; 113:941–948 (10).

Gradual and progressive decline in cognitive function is more typical of dementia, of which the most common types are Alzheimer's and vascular dementias. The Folstein Mini-Mental Exam (11), easily administered in the ED, uses a cutoff of 23 or below to separate patients with delirium or dementia from those with other disorders. Comprehensive evaluation of memory decline is beyond the scope of the ED. Admission decisions revolve around discovery of acute illness requiring in-hospital treatment in lieu of clearly unsafe home situa-

tions. Finally, formerly independent patients who were recently able to “get up and go,” but are now unable to do so, are unlikely to be successfully discharged from the ED (12).

Stroke

Abrupt alteration in speech, vision, motor or sensory function suggests acute stroke, which is defined as the sudden onset of a focal deficit corresponding to a vascular territory. For outpatient providers, use of a simple screen such as the Cincinnati Stroke Scale (13) has a 72% sensitivity if any of three signs are positive: new changes in facial asymmetry enhanced by smiling, upper extremity motor drift with eyes closed when both arms are extended, or change in speech. If time of onset of stroke is known with certainty to be less than 3 hours earlier, the patient with moderate deficit and no contraindication may be eligible for brain salvage via clot dissolution. In such cases, rapid transport to, and notification of, the ED can activate a stroke team composed of the ED staff, neurologist and radiologist. This stroke team can facilitate evaluation and selection of candidates who would benefit from the procedure. Stroke mimics such as hypoglycemia, hypertensive crisis and post-ictal state must be excluded. Patients undergo noncontrast head CT to exclude those who have intracranial hemorrhage. Patients who arrive at the ED within the time frame, have a persistent significant deficit, and lack a preexisting risk of hemorrhage are candidates for tissue plasminogen activator (t-PA). NINDS (14) data demonstrated a 30% reduction in major disability from stroke for t-PA recipients with moderate deficit ischemic stroke under ideal circumstances.

Acute Coronary Syndromes

Acute coronary syndromes are represented in disproportionately high frequency and remain the leading cause of death among the elderly. As with strokes, early recognition and referral to the ED holds the key to reduction in disability and the number of deaths. All patients with potential ischemia by history should have an immediate ECG to assess for ST segment elevation myocardial infarction (STEMI), and prompt initiation of reperfusion strategy, which has been shown to reduce LV dysfunction and mortality (15). All patients with acute myocardial infarction (MI) may benefit from aspirin, beta-blockers, oxygen, heparin, and angiotensin-

converting enzyme inhibitors unless there are specific contraindications to their use. If pain persists, the use of nitrates may be appropriate (16). Reperfusion strategies may include percutaneous transluminal coronary angioplasty (PTCA) if available in less than 120 minutes from time of ED entry, or fibrinolysis in patients without bleeding contraindication who present in less than 6–12 hours of onset of symptoms. Many randomized controlled trials in acute MI patients have excluded the elderly. Although retrospective in nature, a recent multicenter review showed a positive benefit of fibrinolysis for those 65–75 years of age but a reverse effect on mortality for those over 75, due to severe hemorrhage (17).

Clearly, aggressive reperfusion strategies are appropriate for physiologically younger candidates. PTCA, when readily available in high-volume centers, achieves statistically better outcomes (18).

As for symptoms, patients over 85 years complain more often of dyspnea than of chest pressure (19). Other nonspecific symptoms include altered mental status, malaise, “flu,” diaphoresis, exhaustion and sudden inability to ambulate. Patients with symptoms and nondiagnostic ECGs should have serial cardiograms, cardiac markers (creatinine kinase-myocardial band [CK-MB] and troponin), and a period of monitoring of 6–24 hours, depending upon onset of pain. Troponin, which remains elevated for 5–10 days beyond CK-MB, is useful in identifying patients with acute MI, or those at high risk for adverse cardiac event who present after 24 hours of onset (20). Patients with true unstable angina, with a history and dynamic ST segment ECG changes, or elevated troponin appear to benefit from one of the parenteral IIb/IIIa glycoprotein inhibitors and reduced-dose heparin if PTCA is planned within 12–24 hours. No significant increase in intracranial hemorrhage was seen, although there was an increase in low platelets and in bleeding at catheter sites (21). Patients who might be candidates for interventional treatments and who have not developed an MI during the monitoring period can be further risk stratified using stress testing or cardiac catheterization.

Pulmonary Embolus and Aortic Dissection

Other critical diagnoses to consider when acute chest pain and/or shortness of breath present include pulmonary embolus and aortic dissection. Pulmonary embolus is more likely in pa-

tients with history of thromboembolism, stasis/immobility, hypercoagulable state or endovascular injury. Selection of the initial diagnostic test, such as CT angiogram, ventilation perfusion scan, or transesophageal echocardiogram, depends upon the stability of the patient and the available expertise within the institution. For pretest moderate-to-high likelihood of pulmonary embolus, anticoagulation with unfractionated or low-molecular-weight heparin is instituted in nonbleeders before diagnostic testing.

While potentially lifesaving for pulmonary embolus, anticoagulation would be life-threatening for cases of aortic dissection. Dissection, suspected in stable patients with severe and/or migrating chest pain, can often be diagnosed via CT angiogram. Unstable patients need analgesics and rapid lowering of severe hypertension via beta-blocker and sodium nitroprusside, as well as prompt cardiothoracic consultation. Beta-blockers, due to significant unopposed alpha vasoconstriction, cannot be used in patients whose chest pain is precipitated by cocaine abuse. Fortunately, this is a rare etiology among elderly patients with chest pain.

Infections

Infections represent another common cause of rapid functional decline among the elderly. Although presentation of infection may be atypical in the elderly due to absence of fever or localizing symptoms and signs, this has more to do with physiologic status than with exact chronologic age (22). Rectal temperatures should be obtained when fever is uncertain. Bacterial etiology is much more likely in febrile elders than are viral infections, which are so common in younger patients (23). Previously healthy, vigorous elders become infected with the same community-acquired organisms as do younger cohorts. Debilitated elders present more of a challenge in detection of infection and decision making about antibiotic coverage as a result of reduced immunocompetence, breakdown of skin barriers, indwelling tubes and prostheses, co-morbid diseases and recent antibiotic exposure, which may select for resistant pathogens. Respiratory infections account for approximately one-third, whereas urinary tract infections and sepsis each account for one-fifth of infections in elders (24). Abdominal infections, septic arthritis, endocarditis and meningitis, while less common, are not rare.

Pneumonia. Pneumonia is common in the elderly, in part because of their decreased abil-

ity to cough, diminished vital capacity and mucociliary clearance, and the increased potential for aspiration. It carries an inpatient mortality of 14–32% (25). Common organisms include pneumococcus and staphylococcus, but gram negatives and tuberculosis can occur, particularly in patients from nursing homes. Hospital-acquired pneumonia is more likely to include gram negatives such as *Klebsiella* or *Pseudomonas* (24). Assessment of adequacy of oxygenation via pulse oximetry, chest X-ray to confirm diagnosis and identify high-risk features, blood cultures before antibiotics in patients being admitted, and early administration of antibiotics have a favorable effect on outcome (26, 27). Suggested empiric antibiotics include an extended spectrum fluoroquinolone or third-generation cephalosporin and a macrolide (28). Most likely to require ICU care are patients with shock, hypoxemia, or increased work of breathing. Respiratory isolation is required for elders suspected of tuberculosis by indolent history or apical, miliary or cavitary infiltrates on X-ray. EDs can also play a valuable role by providing influenza vaccination as a preventative measure for elders who fail to get regular medical care (29).

Urinary Tract Infections. Urinary incontinence, pelvic floor relaxation, and prostatic obstruction, as well as over-reliance on indwelling urinary catheters, are believed to be responsible for the significant incidence of urinary tract infections among the elderly (30). Patients with new urinary symptoms and bacteriuria or pyuria require treatment. Patients suspected of having urosepsis need rapid administration of antibiotics after cultures are taken. Foley catheters, although implicated in etiology, are needed for urinary retention. Imaging studies, ultrasound or contrast CT may be needed if proximal obstruction or abscess is suspected. Antibiotics pending cultures, particularly in institutionalized patients, should cover resistant gram negative bacilli such as *Klebsiella*, *Enterococcus* and *Pseudomonas*. Local resistance patterns should be reviewed. A quinolone, beta lactam inhibitor, piperacillin-tazobactam or ampicillin and gentamicin are possible empiric choices (31).

Soft Tissue Infections. Serious soft tissue infections are more common in debilitated elders. Emergent surgical consultation should be sought for any soft tissue infection associated with severe pain, especially when the infection advances rapidly despite antibiotic therapy or has any black, necrotic areas. Compartment

syndromes, necrotizing fasciitis and perineal involvement (Fournier's gangrene) may have poor outcomes despite prompt, meticulous surgical attention.

Acute Abdominal Pain

Early collaboration with surgical colleagues is also essential in evaluation of selected cases of acute abdominal pain, since up to 40% of elderly patients presenting with acute abdominal pain require surgery (32). Delay in diagnosis is common, due to coexisting chronic conditions, fear of cancer, minimization by patients and their providers, dementia, and limited access to care. Red flags suggesting serious surgical pathology include acute onset of pain which awakens the patient from sleep, is continuous or steadily worsening; pain before onset of vomiting seen in small bowel obstruction or cholecystitis; localization of pain; peritoneal signs; bloody effluents; or frank shock (33).

Data from de Dombal (34) and modified from Telfer et al. (35), shown in Table 2, from a multinational series of patients spanning nearly 20 years in the late 1960s and 1970s, suggests important differences in etiologies when stratified by age. We anticipate that results of multicenter U.S.-based studies now in progress will clarify the impact of advances in imaging and surgical techniques on diagnosis and outcome.

Abdominal pain, representing 5–10% of ED visits, is the most time-consuming complaint in

the ED, because the approach must focus on excluding worst-case scenarios. However, in contrast to the situation with younger patients, the diagnosis can be made for approximately 75% of older patients (36). Although cholecystitis is the most common reason for abdominal surgery in the elderly, appendicitis and small bowel obstruction are the most frequent causes for elderly patients to be discharged inappropriately from the ED (37, 38). Inferior wall MI and lower lobe pneumonia should be considered in older patients who complain of epigastric pain and who appear acutely ill; other possible diagnoses are impending abdominal catastrophe, including dissection, leaking abdominal aortic aneurysm, volvulus or perforation.

The pathophysiology of aging involves thinning of the abdominal musculature, shrinking of omentum and diminished blood supply. Pain, therefore, may not be well localized; guarding and rebound may be delayed or absent while irreversible necrosis of the bowel is progressing (39).

Priorities in care include intravenous rehydration, nasogastric decompression if obstruction is likely, analgesia, and empiric antibiotics after cultures if there are signs of peritonitis. "Nondiagnostic" abdomens in patients with continuing complaints must be re-examined regularly by a skilled examiner. Imaging techniques, especially contrast CT scans, should be used more liberally for stable elders in whom urgent surgery is not contemplated or for whom the etiology of pain is obscure. Admission may be necessary in 50–60% of cases (40). Patients well enough to be discharged following a full examination should be expedited in reappraisal within 6–8 hours of discharge if symptoms recur or progress.

Abdominal aortic aneurysm (AAA) and acute mesenteric ischemia are associated with the highest mortality involving abdominal complaints, in excess of 70%, even when the diagnosis is made promptly. Vasculopathy elsewhere in the arterial tree and advancing age are associated risk factors. Consideration of leaking AAA is mandatory in any elder presenting with back pain, abdominal pain, syncope, hypotension, or "renal colic" (41). Identifying a midline laterally pulsatile mass is suggestive, but a technically adequate bedside ultrasound is 100% sensitive in demonstrating the presence of AAA (but not in demonstrating that it is leaking). Unstable patients need to be prepared for the operating room; stable patients can deteriorate abruptly, so that immediate vascular consul-

TABLE 2
Acute Abdominal Pain Stratified by Age (34, 35)

Diagnosis	≥ 50 Years n=2406	<50 Years n=6317
Biliary tract disease	21%	6%
Undifferentiated abdominal pain	16%	40%
Appendicitis	15%	32%
Bowel obstruction	12%	2%
Pancreatitis	7%	2%
Diverticular disease	6%	<0.1%
Cancer	4%	<0.1%
Hernia	3%	<0.1%
Vascular	2%	<0.1%
Gynecologic disease	<0.1%	4%

Modified from Telfer S, Fenyo G, Holt PR, de Dombal FT. Acute abdominal pain in patients over 50 years of age. *Scand J Gastroenterol Suppl* 1988; 144:47–50, www.tandf.no/gastro, by permission of Taylor and Francis AS (35).

tation is needed to plan further diagnostic imaging and surgical approach. In less symptomatic patients with well-defined anatomy and significant intraoperative risks, endovascular stenting has been employed with some success (42).

Acute mesenteric ischemia may be due to arterial embolism (65%), nonobstructive low flow (20%) or venous obstruction from hypercoagulable states (15%) (43). Patients with advanced congestive heart failure, recent MI or atrial fibrillation are at highest risk. Pain is often poorly localized, intermittent and sometimes resistant to narcotic administration. A benign abdominal examination early requires frequent re-examination by the physician and surgical consultation if mesenteric ischemia is suspected. Suggestive laboratory results such as marked leukocytosis, lactic acidosis and guaiac-positive stools may be late findings (44). Plain films have value in excluding other diagnoses such as free air or obstruction; the classic "thumb printing" due to submucosal edema or hemorrhage in intestinal ischemia is uncommon and usually signifies infarction. These critically ill patients require aggressive attention to volume status, oxygen-carrying capacity, management of congestive heart failure, and broad spectrum antibiotics. Stability of the patient, pretest likelihood and institutional availability and expertise will determine whether CT angiogram, selective angiogram or magnetic resonance angiogram (MRA) is performed next for more definitive diagnosis (45). The traditional selective angiography defines the anatomy of the obstruction and guides the surgeon in decisions regarding intra-arterial vasodilators, fibrinolysis, embolectomy, stent revascularization or bowel resection (46). Ongoing anticoagulation is always indicated for mesenteric venous thrombosis.

Colonic ischemia differs from mesenteric ischemia in that it is more common; may be associated in 10% of cases with local obstruction such as cancer, stricture, impaction or diverticulosis; can be associated with blood in stool; and presents with more gradual, milder pain and in patients who appear to be less ill. Since the differential includes inflammatory bowel and infectious diarrhea, stool cultures are obtained. Colonoscopy or gentle barium enema within 48 hours completes the work-up (47). Management includes fluids, antibiotics and correction of any cardiac issues. Most cases resolve uneventfully.

Acute cholecystitis is the most common cause of acute abdomen in the elderly. Although

classic vomiting, fever and leukocytosis may not be present in up to half of cases, this entity should be suspected in patients with right upper quadrant tenderness or fullness (48). Bedside biliary ultrasound may demonstrate a sonographic Murphy's sign and the presence of stones. Uncertain cases may require a functional study such as an hepato-iminodiacetic acid (HIDA) scan. Emphysematous or gangrenous cholecystitis, seen in elder diabetics, requires immediate decompression. Management of acute cholecystitis includes parenteral hydration, analgesia and antibiotics which include anaerobic and gram negative coverage, and eventual cholecystectomy.

Small bowel obstruction may be caused by adhesions, hernias or intussusception, in descending order. Large bowel obstructions arise more often from neoplasm or volvulus. In one study, gallstone ileus accounted for 35% of nonstrangulated small bowel obstructions (49). Differential air fluid levels on upright abdominal films suggest presence but not location of obstruction. Contrast CT has been used with success to define etiology and location of obstruction (50). Treatment includes rehydration, antibiotics, nasogastric decompression if vomiting is prominent, and surgical consultation. Parkinson's patients are at high risk for volvulus, although they may also have the more benign pseudo-obstruction seen in chronic constipation. Sigmoid, versus cecal or gastric volvulus, has a more gradual onset in patients with a longstanding history of constipation. As the twisted bowel loop grows ischemic and obstructed, severe colic ensues, with a markedly tender, distended abdomen. Obstructive series show dramatic dilatation, sometimes with the characteristic "bent inner tube" appearance. Treatment of sigmoid volvulus in a stable patient is colonoscopic decompression followed by surgery; less common cecal and gastric volvulus require immediate surgery.

Another entity in which the obstructive series may suggest the diagnosis is **perforated peptic ulcer**. Vomiting and a history of pain are not always present. The diagnosis can be missed because patients remain supine for chest and abdominal films. Free air, not always present on plain films, is readily apparent on abdominal CT or repeat upright plain films following the nasogastric tube insufflation of air into the stomach (51).

Appendicitis, present in 15% of elders presenting to the ED with acute abdominal pain, is

most likely to perforate in the very young and the very old because of delay in diagnosis (52). Classic findings of rapid migration of pain to the RLQ and anorexia may be absent (35). Leukocytosis is nonspecific and, when lacking, confers a false sense of security. Mild pyuria can occur due to ureteral proximity to the inflamed appendix (53). RLQ focal tenderness is ominous and should prompt immediate surgical consultation. Equivocal cases of appendicitis or diverticulitis may be diagnosed by abnormalities on rectal contrast CT. Findings include a collection, or fat stranding suggesting inflammation, and absence of normal appendix (54).

Trauma

Trauma is the fifth leading cause of death among the elderly and represents 25% of trauma fatalities and trauma costs (55, 56). The mechanism of injury differs between younger and older patients. Falls are most common, followed by motor vehicle collisions (MVC) and pedestrian-MVC, followed by stab wounds and gunshot wounds.

In addition to assessing the extent of the injuries, it is critical to evaluate the possibility of a precipitating event such as syncope, situational confusion, gait disturbance or metabolic abnormalities. Failure to appreciate transient ischemic attack, acute MI, cardiac dysrhythmia, orthostatic hypotension, pulmonary embolus, hypoglycemia, stroke, gastrointestinal hemorrhage, shock, adverse drug reaction, assault, elder abuse or other confounder will substantially increase mortality (57). Elders with trauma who cannot recall the event should be admitted for further evaluation.

Factors which will affect response to injury and outcome in elder trauma include: head injury, pedestrian vs. auto, multiple long-bone fractures, acidosis (pH < 7.35) and initial systolic blood pressure (SBP) < 130 (58). Close collaboration between emergency physicians, surgeons and intensivists is required to facilitate care and enhance outcome. Typical parameters for monitoring response to resuscitation in younger cohorts, such as blood pressure, pulse and urine output, are less sensitive indicators in the elderly. Aggressive assessment of extent of injury, attention to the need for ventilatory support, resuscitation with invasive hemodynamic monitoring, early transfusion, use of inotropes, and rapid provision of intensive care (within 2.2 hours) in multiply injured elder patients improved survival from 7% to 53%, according to Scalea (59).

Physiological alterations with age and their effects on injury and resuscitation are summarized in Table 3 (60–66).

Subdural hematoma, brain contusion and traumatic subarachnoid hemorrhage are more frequent than epidural hematomas in elderly pa-

TABLE 3
Age-Related Changes and Trauma Complications

System	Alteration in Age	Relevance in Trauma
Cardiac (61)	Decreased cardiac output Decreased LV function, amyloid Beta or calcium channel blockers Dysautonomia Coronary artery disease Cardiac dysrhythmias Obstructive valvular disease Antihypertensives, diuretics	Congestive heart failure Syncope, relative Bradycardia in shock Hypovolemia Ischemia Hypokalemia
Pulmonary (62)	Emphysema Decreased functional residual volume Decreased chest wall compliance	Hypoxia ARDS Rib fractures Pneumonia
Renal (63)	Decreased creatinine clearance Decreased concentrating ability	Acute tubular necrosis Contrast, drug toxicity
Neuro (64)	Adherent dura, cortical atrophy Decreased hearing, vision, increased time to react Vertigo Cognitive impairment	Acute/chronic subdural Falls, MVC Falls Falls, MVC, elder abuse
Hematologic (65)	Anemia Anticoagulation	Ischemia, hypoxia Bleeding, especially CNS
Skeletal (66)	Osteoporosis Limited mobility	C1–C3 fractures Wrist, humerus, hip, vertebral, pelvic, skull fractures Thromboembolic disease Skin breakdown, decubiti

ARDS = adult respiratory distress syndrome

MVC = motor vehicle collision

CNS = central nervous system

(In addition to references 61–66, this table is also based on data found in reference 60.)

tients with head trauma (67). The main symptom of acute subdural hematoma is dramatic alteration in mental status; chronic subdurals more often present as subtle personality or cognitive deficits. Noncontrast head CT readily differentiates between acute subdural and subarachnoid hemorrhage. Contrast head CT may be needed for subacute symptoms of more than one-week duration as blood becomes isodense. After stabilization of airway and circulation, liberal use of head CT is advised for all elders with trauma and new focal deficit, alteration in mental status, loss of consciousness, excessive anticoagulation, dementia or intoxication. Similarly, difficulties excluding cervical spine fracture with plain films may be resolved with CT if there is insufficient visualization of all 7 vertebrae or if this is significant degenerative disease. Since the cervical spinal canal may become stenotic from degenerative processes, patients should be closely questioned regarding tingling or burning hands and upper extremity over lower extremity weakness, as seen in central cord syndrome, a subtle but important spinal cord injury without vertebral fracture.

The low velocity of injuries in falls by elders, and seatbelt injuries, tend to select for rib fractures over aortic disruption or pulmonary contusion; nonetheless, multiple fractures can precipitate adult respiratory distress syndrome (ARDS) and require meticulous ICU care or admission for pain management (68). Abdominal injuries include contusions of kidney, liver, spleen and small bowel. In stable patients, contrast abdominal CT for retroperitoneal and solid organ injury, or bedside ultrasound over peritoneal lavage for less stable patients, has been successfully used to identify the need for surgical intervention (69). Mortality remains high.

Extremity Fractures

Extremity fractures due to skeletal fragility are the most common injuries in elder falls and MVCs. The patient may not always guide the examiner to the injured area, so a complete examination of all limbs is needed, looking for deformity, tenderness, crepitance, edema, ecchymosis, and loss of function and distal neurovascular integrity. Although isolated upper extremity fractures are rarely life threatening, impaired mobility of the dominant hand, titration of pain medication and rehabilitation, or concerns of possible elder abuse or neglect,

may prompt an admission. Fifty percent of upper extremity injuries are distal radius fractures, followed by humeral fractures and elbow fractures/dislocations (70). In the lower extremities, pelvic rami fractures are more common, but hip fractures are the most frequent indication for admission. If plain films are negative but clinical suspicion high, MRI or bone scan may be needed to delineate occult fracture and avoid displacement and neurovascular injury. Mortality from hip fractures within the year following the event can be as high as 30% (71). Hip dislocations in previously replaced joints, as well as fractures of the tibial plateau and patellar and lateral malleolus are also quite common. Promotion of early ambulation through prompt surgery for hip and some knee fractures, or immobilization and early rehabilitation for ankle fractures, may prevent secondary complications of deconditioning, skin breakdown and deep vein thrombosis.

Burns and Wounds

Tetanus immunization update and meticulous wound care are necessary to prevent morbidity in burns, lacerations and breakdown of the skin. Mortality in burns is a function of total body surface area involved with second and third degree burns, presence of inhalation injury and physiologic age. Fifty percent mortality is estimated for patients over 60 with 10–14% total body surface area burned. Referral to a burn center provides greater likelihood of early grafting for return of function and decrease in infectious complications (72).

Analgesia

Attention to adequate analgesia is paramount in the management of elders with serious illness or injury (73). Patients with dementia or aphasia should not be considered incapable of experiencing pain, even though they may be unable to complain. Titration of parenteral opiates is appropriate for patients in severe pain. Non-operative patients with mild-to-moderate pain syndromes can be managed with acetaminophen with or without codeine. Use of opiates will also require addition of a bowel regimen to prevent constipation. Selective COX-2 inhibitors appear to have less gastrointestinal toxicity than other nonsteroidals but should generally be avoided in patients with a history of bleeding, active peptic ulcer or renal insufficiency (74).

Summary

This article has sought to review some of the common and potentially life-threatening emergencies of the elderly. Early intervention in acute accident and illness requires prompt referral to the Emergency Department. Provision of key historical information by phone or fax or from the patient or caregiver is of inestimable value in focusing ED efforts and avoiding disaster or loss of patient autonomy. Work-ups are necessarily more comprehensive than those required for younger patients. Surgical consultation in cases of trauma and abdominal pain is often indicated. Rapid referral, diagnosis and treatment may reduce morbidity in cases of stroke, acute coronary syndrome, infection, abdominal crisis and injury. Precipitating events, co-morbid diseases, medications, social support systems and need for analgesia must be carefully considered. Admission for observation may be needed when serious illness or injury is suspected and cannot be excluded. Availability of high-quality emergency care and close collaboration with regular providers is essential to optimal outcomes from sudden decompensation in the elderly. When mortality is likely, given extent of injury, burn or irreversible underlying condition, provision of palliative care is paramount.

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