Managing the Elderly Emergency Department Patient

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Older US adults make more than 20 million emergency department (ED) visits annually, accounting for more than 15% of all visits.[1] In contrast to younger ED patients, older ones typically have more medical problems, are taking more medications, are more likely to have baseline impairments in function and cognition, and are less likely to fully recover from illness or injury. Older adults are also more likely to experience social isolation, malnutrition, and abuse or neglect,[2,3] which may contribute to their ED presentation and influence outcomes. Like younger adults, however, most older adults want to receive prompt emergency care and would rather not be admitted to the hospital.[4] These characteristics create two of the central challenges of emergency care for older adults: to provide efficient care without missing a serious medical condition, and to honor, when possible, the patient's desire for discharge despite the risk of adverse outcomes.[5,6] They also suggest a third challenge that pushes the scope of emergency care beyond traditional boundaries: to recognize and address nonmedical problems that may influence health outcomes. In recognition of these and other challenges, guidelines to improve ED care for older adults have been established,[7] and the American College of Emergency Physicians (ACEP) has created a Geriatric ED Accreditation Program (https://www.acep.org/geda). Here, we discuss our approach to the care of the elderly ED patient according to our expertise and available evidence, with implications for physician practice and ED processes of care.

ATYPICAL PRESENTATIONS

Across a variety of emergency conditions, older ED patients present a greater diagnostic challenge than younger ones. The atypical presentation of even common conditions is in part due to age-related physiologic changes that affect the body's response to injury or illness. Polypharmacy, delirium, and dementia can also cloud the clinical picture. Here, we describe several conditions for which providers should be aware of the inherent diagnostic challenges.

Acute Coronary Syndrome

Older adults with acute coronary syndrome often present with atypical symptoms, defined as the absence of chest pain.[8,9] Common symptoms include dyspnea (50%), diaphoresis (26%), and nausea or vomiting (24%). Patients with atypical symptoms are less likely to receive out-of-hospital ECGs, have longer times from first medical contact to percutaneous coronary intervention,[10] and have higher mortality than patients with typical symptoms.[11] Acute coronary syndrome should be considered in all older patients who present with dyspnea, diaphoresis, nausea, syncope, abdominal pain, or altered mental status. In the absence of an alternative diagnosis, an ECG and troponin level should be obtained early during the evaluation.

Abdominal Pain

Older ED patients with abdominal pain are more likely to have serious underlying pathology and have higher rates of surgery (20% to 30%) and mortality (5% to 10%).[12-15] Abdominal pain in the elderly also leads to a time-consuming evaluation, often requiring multiple imaging modalities.[16] The most common causes of abdominal pain in older adults are biliary disease, bowel obstructions, and gastritis.[17] Less common causes include aortic dissection, aneurysmal rupture, and mesenteric ischemia. As with acute coronary syndrome, older patients with abdominal pathology can have atypical presentations, including a benign abdominal examination result or the absence of fever and leukocytosis.[16,18] Whereas for younger patients with abdominal pain clinicians should have a good reason to obtain advanced imaging, for older patients clinicians should have a good reason not to obtain advanced imaging.

TRAUMA

Older adults are at high risk for serious injury from low-energy mechanisms such as ground-level falls and low-speed motor vehicle crashes. Common injuries include

pelvis and lower extremity fractures, head injuries, and rib fractures. Older adults also have higher mortality rates than younger patients with the same injuries.[19] Because of undertriage by out-of-hospital providers, emergency providers working in non–trauma center EDs will often care for older adults with serious injuries.[20-22] Physiologic markers associated with increased mortality in older trauma patients include pulse rate greater than 90 beats/min, systolic blood pressure less than 110 mm Hg, and lactate level greater than 2.5 mmol/L, but these markers are insensitive.[23,24] Our recommendation is that all older patients with a history or physical findings indicating injury to the head or torso receive evaluation by a physician within 10 minutes of ED arrival, consistent with triage as an Emergency Severity Index level 2, and be reassessed (ie, repeated examination and vital signs) within 60 minutes, regardless of what tests have been ordered or obtained.

Head injuries are a leading cause of trauma-related morbidity and mortality in older patients.[25,26] Because significant injuries are common in older adults with blunt head trauma (7% to 9%[27,28]), widely used head computed tomography (CT) decision rules exclude older adults.[29,30] We routinely obtain head CTs for older patients with head trauma, even in the absence of loss of consciousness, but will consider avoiding imaging if the patient has a minor mechanism of injury, has no headache or neurologic symptoms, is not receiving anticoagulants, can return rapidly if they develop symptoms, and understands the risk of not receiving a head CT. A common related question is whether imaging of the cervical spine is necessary in all older adults with blunt trauma. In the context of a research study, the National Emergency X-Radiography Utilization Study criteria had a sensitivity of 100% (95% confidence interval 97% to 100%) for identifying clinically significant cervical spine injuries.[31] These criteria have been externally validated in older fall patients.[32] We think the criteria can be applied to older adults but that patients with baseline cognitive impairment should be considered to have an "altered level of consciousness" and thus not meet criteria for avoiding imaging.[33]

Rib fractures are also common and morbid in older adults. The probability of developing pneumonia increases with each rib fracture, with reported rates of 30% in older adults with 3 to 4 rib fractures and 50% with 6 or more fractures.[34] Given the low sensitivity of chest radiograph (<50%)[35] and the risks of respiratory failure and pneumonia, chest CT should be considered in patients with a negative radiograph result but in whom rib fractures are suspected according to chest wall tenderness, tachypnea, hypoxia, or splinting. It is especially important to identify rib fractures in patients who are frail or have underlying cardiopulmonary disease. Admission should be considered for older patients with rib fractures to provide analgesia, monitoring of respiratory function, and pulmonary therapy.

Hip fractures occur almost exclusively in older adults and usually are the result of a ground-level fall.[36] Radiographs are an appropriate initial imaging test, with a sensitivity of 90% to 98%. For cases in which the radiograph result is negative but fracture is suspected, advanced imaging should be obtained. CT has a 58% to 80% sensitivity for radiograph-occult hip fractures; magnetic resonance imaging has a sensitivity of 99% to 100%.[37,38] In patients with hip fractures, ED ultrasonographically guided femoral nerve block should be considered. When followed by a continuous fascia iliaca block, this approach is associated with reduced opioid use, improved postoperative pain, and improved functional outcomes at 6 weeks.[39] Physicians performing regional anesthesia should have immediate access to lipid emulsion for the treatment of systemic toxicity.[40] Operative treatment of hip fractures in the first 24 hours is associated with lower 30-day morality (≈1% absolute mortality benefit),[41] and development of an interdisciplinary pathway involving orthopedics and medicine can help facilitate admission and early surgical repair.

Elder mistreatment affects an estimated 10% of community-dwelling older adults and a similar percentage of ED patients.[3,42,43] Most elder mistreatment is in the form of psychological abuse and neglect, and does not present with trauma or physical findings.[43] Nonetheless, physical abuse does occur and is suggested by injuries to the head, face, neck, and upper extremities and delays in presentation.[44]

ADVERSE DRUG REACTIONS

Adverse drug reactions account for 10% of ED visits by older adults.[45,46] In older adults, adverse drug reactions frequently present as syncope, falls, and diarrhea[47]; bleeding, hypotension, and hypoglycemia may underlie these presentations. Polypharmacy, most commonly defined as receiving 5 or more medications, is a major risk factor for adverse drug reactions.[48,49] Classes of medications that frequently result in ED visits for adverse drug reactions include anticoagulants, antibiotics, diabetes agents, and analgesics[50]; individual medications are listed in the Table. Identifying adverse drug reactions requires a healthy distrust of medications and a careful history and review of medications. Physicians should inquire about new medications, a change in dose or adherence, and the use of over-the-counter or herbal medications. Routine pharmacist review of medications for older ED patients can help to identify adverse drug reactions.[51]

Table. Medications most commonly implicated in ED visits for clinician-diagnosed adverse drug event among patients aged 65 years and older.

Medication	Clinical Presentation	Notes
Warfarin	Bleeding	Increased risk with concurrent aspirin, clopidogrel, or nonsteroidal anti-inflammatory drugs. Alcohol, herbs, and some medications (including many types of antibiotics) decrease warfarin metabolism and increase bleeding risk.
Insulin	Hypoglycemia	Increased risk in older adults with cognitive or visual impairments that make it difficult to monitor glucose levels and dose and inject insulin[61]
Clopidogrel	Bleeding, diarrhea, rash	Risk of bleeding from clopidogrel similar to that for aspirin, except aspirin has higher risk of gastric bleeding[62,63]
Aspirin	Bleeding, particularly gastric bleeding	
Rivaroxaban	Bleeding	
Lisinopril	Hypotension, renal impairment, cough[64]	Older adults, female patients, and nonblacks at increased risk for angiotensin-converting-enzyme inhibitor–induced cough[65]
Metformin	Lactic acidosis, diarrhea, nausea, vomiting	Risk for lactic acidosis increased in patients with kidney disease (decreased lactate clearance) or heart failure or respiratory disease (increased lactate production)[61]
Glipizide	Hypoglycemia	
Trimethoprim/ Sulfamethoxazole	Allergic reactions, dizziness, renal impairment, seizures	Trimethoprim/sulfamethoxazole is a competitive inhibitor of *CYP2C9*, which plays a major role in the metabolism of many medications, including warfarin, phenytoin, losartan, glipizide, and some nonsteroidal anti-inflammatory drugs.[66]
Dabigatran	Bleeding	
Acetaminophen-hydrocodone	Nausea, constipation, cognitive impairment	
Metoprolol	Syncope, hypotension, bradycardia	Sleep disturbances, depression, and vision problems also common

Data are from the National Electronic Injury Surveillance System–Cooperative Adverse Drug Event Surveillance project sampling of approximately 60 US EDs, 2013 to 2014.[50]

For patients with adverse drug reactions who do not require hospitalization, emergency providers should strongly consider stopping the offending medication. Tapering may be necessary with antidepressants, antihypertensives, and benzodiazepines. Patient-specific deprescribing, which is a process to reduce medication burden, has been shown to reduce mortality,[52,53] and although not yet studied in the ED, older adults presenting to EDs with adverse drug reactions are probably an ideal population for deprescribing efforts. Deprescribing algorithms can be found at http://www.deprescribing.org. When prescribing new medications, emergency physicians should consider the potential for adverse drug reactions and medication interactions. Any changes in medications should be explained to the patient and communicated to the primary physician and relevant specialty physicians.

GOALS OF CARE

Although often relegated to an afterthought during emergency care, inquiring about an older patient's goals of care at the beginning of the evaluation can be important because it may inform decisions in regard to diagnostic testing and disposition. Often patients' preferences can be inferred from the presentation and do not need to be made explicit: a healthy 70-year-old presenting to the ED with chest pain probably wants to know if he or she is having an acute myocardial infarction. For patients with advanced illness or reduced quality of life because of cognitive or functional impairments, directly asking about goals of care can be invaluable. For patients who have documented preferences of care, confirmation should be obtained from the patient when possible because goals change over time and may depend on the details of the acute medical condition. Providers should acknowledge the opinions of family members while preserving the autonomy of the patient. Some patients will want the emergency physician to make a decision for them; this should be done cautiously, recognizing that the ideal outcome is for the patient, family members, and physician to agree and feel confident that the decision reflects the patient's values and preferences. Remember that patients who do not want life-prolonging care still want to be cared for, and that sometimes optimizing symptom treatment also prolongs life.[54]

TRANSITIONS OF CARE

Because hospitalizations account for one third of US health care expenditures, reducing them is a major focus of efforts to control health care costs. Examples of these efforts

include penalties for readmissions, bundled payments for an episode of care, and the use of ED care managers by accountable care organizations. Because more than half of hospitalizations are initiated in the ED,[55] pressure on emergency providers to reduce admissions is likely to increase. For older ED patients who are being considered for discharge, we offer the following suggestions. If there is a question about the patient's physical function, the provider should directly observe the patient's ability to ambulate,[56] which provides information about the patient's risk for falls and the need for in-home care. Timely follow-up with an outpatient provider should be arranged, and findings from the ED evaluation should be communicated with the primary provider. Both written and verbal discharge instructions should be provided to the patient.[57] If in doubt, comprehension of key points should be confirmed by asking patients to restate instructions.[58] Patients with nonmedical problems that may influence their health (eg, social isolation) should be provided with information about local services (eg, local department on aging, food assistance programs, transportation services). Although the method is resource intensive, ED-based case managers, focusing on patients with the greatest needs and providing structured assessment and follow-up, can reduce ED revisits and subsequent hospitalizations.[59]

CONCLUSION

During the next 2 decades, the percentage of older adults in the United States will grow to exceed 20%, and ED visits by older adults will almost certainly increase to an even greater proportion.[60] Caring for these patients is often difficult and requires attention to the possibility of subtle acute severe illness and injury, patient preferences about care, and nonmedical problems that may influence outcomes. Additional ED resources and coordination of care with inpatient teams and community services will be essential to optimize outcomes.

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REFERENCES

1. National Center for Health Statistics. National Hospital Ambulatory Medical Care Survey: 2014 Emergency Department Summary Tables. Atlanta, GA: Centers for Disease Control and Prevention; 2014. Available at: https://www.cdc.gov/nchs/data/nhamcs/web_tables/2014_ed_web_tables.pdf. Accessed September 5, 2018.
2. Pereira GF, Bulik CM, Weaver MA, et al. Malnutrition among cognitively intact, noncritically ill older adults in the emergency department. *Ann Emerg Med*. 2015;65:85-91.
3. Stevens TB, Richmond NL, Pereira GF, et al. Prevalence of non-medical problems among older adults presenting to the emergency department. *Acad Emerg Med*. 2014;21:651-658.
4. Hunold KM, Pereira GF, Jones CW, et al. Priorities of care among older adults in the emergency department: a cross-sectional study. *Acad Emerg Med*. 2016;23:362-365.
5. Nagurney JM, Fleischman W, Han L, et al. Emergency department visits without hospitalization are associated with functional decline in older persons. *Ann Emerg Med*. 2017;69:426-433.
6. Obermeyer Z, Cohn B, Wilson M, et al. Early death after discharge from emergency departments: analysis of national US insurance claims data. *BMJ*. 2017;356:j239.
7. Carpenter CR, Bromley M, Caterino JM, et al. Optimal older adult emergency care: introducing multidisciplinary geriatric emergency department guidelines from the American College of Emergency Physicians, American Geriatrics Society, Emergency Nurses Association, and Society for Academic Emergency Medicine. *J Am Geriatr Soc*. 2014;62:1360-1363.
8. Alexander KP, Newby LK, Cannon CP, et al. Acute coronary care in the elderly, part I: non–ST-segment-elevation acute coronary syndromes: a scientific statement for healthcare professionals from the American Heart Association Council on Clinical Cardiology: in collaboration with the Society of Geriatric Cardiology. *Circulation*. 2007;115:2549-2569.
9. Ahn SH, Tsalik EL, Cyr DD, et al. Gene expression–based classifiers identify *Staphylococcus aureus* infection in mice and humans. *PLoS One*. 2013;8:e48979.
10. Cannon AR, Lin L, Lytle B, et al. Use of prehospital 12-lead electrocardiography and treatment times among ST-elevation myocardial infarction patients with atypical symptoms. *Acad Emerg Med*. 2014;21:892-898.
11. Brieger D, Eagle KA, Goodman SG, et al. Acute coronary syndromes without chest pain, an underdiagnosed and undertreated high-risk group: insights from the Global Registry of Acute Coronary Events. *Chest*. 2004;126:461-469.
12. Martinez JP, Mattu A. Abdominal pain in the elderly. *Emerg Med Clin North Am*. 2006;24:371-388; vii.
13. Kizer KW, Vassar MJ. Emergency department diagnosis of abdominal disorders in the elderly. *Am J Emerg Med*. 1998;16:357-362.
14. Laurell H, Hansson LE, Gunnarsson U. Acute abdominal pain among elderly patients. *Gerontology*. 2006;52:339-344.
15. Lewis LM, Banet GA, Blanda M, et al. Etiology and clinical course of abdominal pain in senior patients: a prospective, multicenter study. *J Gerontol A Biol Sci Med Sci*. 2005;60:1071-1076.
16. Ragsdale L, Southerland L. Acute abdominal pain in the older adult. *Emerg Med Clin North Am*. 2011;29:429-448; x.

17. Hendrickson M, Naparst TR. Abdominal surgical emergencies in the elderly. *Emerg Med Clin North Am*. 2003;21:937-969.
18. Potts FE, Vukov LF. Utility of fever and leukocytosis in acute surgical abdomens in octogenarians and beyond. *J Gerontol A Biol Sci Med Sci*. 1999;54:M55-M58.
19. Perdue PW, Watts DD, Kaufmann CR, et al. Differences in mortality between elderly and younger adult trauma patients: geriatric status increases risk of delayed death. *J Trauma*. 1998;45:805-810.
20. Ichwan B, Darbha S, Shah MN, et al. Geriatric-specific triage criteria are more sensitive than standard adult criteria in identifying need for trauma center care in injured older adults. *Ann Emerg Med*. 2015;65:92-100.e3.
21. Lane P, Sorondo B, Kelly JJ. Geriatric trauma patients—are they receiving trauma center care? *Acad Emerg Med*. 2003;10:244-250.
22. Platts-Mills TF, Evans CS, Brice JH. Prehospital triage of injured older adults: thinking slow inside the golden hour. *J Am Geriatr Soc*. 2016;64:1941-1943.
23. Heffernan DS, Thakkar RK, Monaghan SF, et al. Normal presenting vital signs are unreliable in geriatric blunt trauma victims. *J Trauma*. 2010;69:813-820.
24. Salottolo KM, Mains CW, Offner PJ, et al. A retrospective analysis of geriatric trauma patients: venous lactate is a better predictor of mortality than traditional vital signs. *Scand J Trauma Resusc Emerg Med*. 2013;21:7.
25. Thompson HJ, McCormick WC, Kagan SH. Traumatic brain injury in older adults: epidemiology, outcomes, and future implications. *J Am Geriatr Soc*. 2006;54:1590-1595.
26. Stippler M, Holguin E, Nemoto E. Traumatic brain injury in elders. *Ann Long-Term Care: Clin Care Aging*. 2012;20:41-46.
27. Nishijima DK, Offerman SR, Ballard DW, et al. Immediate and delayed traumatic intracranial hemorrhage in patients with head trauma and pre-injury warfarin or clopidogrel use. *Ann Emerg Med*. 2012;59:460-468.e7.
28. Rathlev NK, Medzon R, Lowery D, et al. Intracranial pathology in elders with blunt head trauma. *Acad Emerg Med*. 2006;13:302-307.
29. Stiell IG, Wells GA, Vandemheen K, et al. The Canadian CT Head Rule for patients with minor head injury. *Lancet*. 2001;357:1391-1396.
30. Haydel MJ, Preston CA, Mills TJ, et al. Indications for computed tomography in patients with minor head injury. *N Engl J Med*. 2000;343:100-105.
31. Touger M, Gennis P, Nathanson N, et al. Validity of a decision rule to reduce cervical spine radiography in elderly patients with blunt trauma. *Ann Emerg Med*. 2002;40:287-293.
32. Evans D, Vera L, Jeanmonod D, et al. Application of National Emergency X-Ray Utilizations Study low-risk c-spine criteria in high-risk geriatric falls. *Am J Emerg Med*. 2015;33:1184-1187.
33. Barry TB, McNamara RM. Clinical decision rules and cervical spine injury in an elderly patient: a word of caution. *J Emerg Med*. 2005;29:433-436.
34. Bulger EM, Arneson MA, Mock CN, et al. Rib fractures in the elderly. *J Trauma*. 2000;48:1040-1046; discussion 6-7.
35. Livingston DH, Shogan B, John P, et al. CT diagnosis of rib fractures and the prediction of acute respiratory failure. *J Trauma*. 2008;64:905-911.
36. Parker M, Johansen A. Hip fracture. *BMJ*. 2006;333:27-30.
37. Ward RJ, Wissman BN, Kransdorf MJ, et al. ACR appropriateness criteria: acute hip pain—suspected fracture. *J Am Coll Radiol*. 2014;11:114-120.
38. Lubovsky O, Liebergall M, Mattan Y, et al. Early diagnosis of occult hip fractures MRI versus CT scan. *Injury*. 2005;36:788-792.
39. Morrison RS, Dickman E, Hwang U, et al. Regional nerve blocks improve pain and functional outcomes in hip fracture: a randomized controlled trial. *J Am Geriatr Soc*. 2016;64:2433-2439.
40. Neal JM, Bernards CM, Butterworth JF IV, et al. ASRA practice advisory on local anesthetic systemic toxicity. *Reg Anesth Pain Med*. 2010;35:152-161.
41. Pincus D, Ravi B, Wasserstein D, et al. Association between wait time and 30-day mortality in adults undergoing hip fracture surgery. *JAMA*. 2017;318:1994-2003.
42. Acierno R, Hernandez MA, Amstadter AB, et al. Prevalence and correlates of emotional, physical, sexual, and financial abuse and potential neglect in the United States: the National Elder Mistreatment Study. *Am J Public Health*. 2010;100:292-297.
43. Platts-Mills TF, Dayaa JA, Reeve BB, et al. Development of the Emergency Department Senior Abuse Identification (ED Senior AID) tool. *J Elder Abuse Negl*. 2018;30:1-24.
44. Rosen T, Bloemen EM, LoFaso VM, et al. Emergency department presentations for injuries in older adults independently known to be victims of elder abuse. *J Emerg Med*. 2016;50:518-526.
45. Hohl CM, Dankoff J, Colacone A, et al. Polypharmacy, adverse drug-related events, and potential adverse drug interactions in elderly patients presenting to an emergency department. *Ann Emerg Med*. 2001;38:666-671.
46. Alhawassi TM, Krass I, Bajorek BV, et al. A systematic review of the prevalence and risk factors for adverse drug reactions in the elderly in the acute care setting. *Clin Interv Aging*. 2014;9:2079-2086.
47. Hohl CM, Robitaille C, Lord V, et al. Emergency physician recognition of adverse drug-related events in elder patients presenting to an emergency department. *Acad Emerg Med*. 2005;12:197-205.
48. Masnoon N, Shakib S, Kalisch-Ellett L, et al. What is polypharmacy? a systematic review of definitions. *BMC Geriatr*. 2017;17:230.
49. Saedder EA, Lisby M, Nielsen LP, et al. Number of drugs most frequently found to be independent risk factors for serious adverse reactions: a systematic literature review. *Br J Clin Pharmacol*. 2015;80:808-817.
50. Shehab N, Lovegrove MC, Geller AI, et al. US emergency department visits for outpatient adverse drug events, 2013-2014. *JAMA*. 2016;316:2115-2125.
51. Shaw PB, Delate T, Lyman A Jr, et al. Impact of a clinical pharmacy specialist in an emergency department for seniors. *Ann Emerg Med*. 2016;67:177-188.
52. Scott IA, Hilmer SN, Reeve E, et al. Reducing inappropriate polypharmacy: the process of deprescribing. *JAMA Intern Med*. 2015;175:827-834.
53. Page AT, Clifford RM, Potter K, et al. The feasibility and effect of deprescribing in older adults on mortality and health: a systematic review and meta-analysis. *Br J Clin Pharmacol*. 2016;82:583-623.
54. Temel JS, Greer JA, Muzikansky A, et al. Early palliative care for patients with metastatic non–small-cell lung cancer. *N Engl J Med*. 2010;363:733-742.
55. Morganti KG, Bauhoff S, Blanchard JC, et al. The evolving role of emergency departments in the United States. *Rand Health Q*. 2013;3:3.
56. Roedersheimer KM, Pereira GF, Jones CW, et al. Self-reported versus performance-based assessments of a simple mobility task among older adults in the emergency department. *Ann Emerg Med*. 2015;67:151-156.
57. Samuels-Kalow ME, Stack AM, Porter SC. Effective discharge communication in the emergency department. *Ann Emerg Med*. 2012;60:152-159.
58. Spandorfer JM, Karras DJ, Hughes LA, et al. Comprehension of discharge instructions by patients in an urban emergency department. *Ann Emerg Med*. 1995;25:71-74.
59. Sinha SK, Bessman ES, Flomenbaum N, et al. A systematic review and qualitative analysis to inform the development of a new emergency department–based geriatric case management model. *Ann Emerg Med*. 2011;57:672-682.
60. Ortman JM, Velkoff VA, Hogan H. *An Aging Nation: The Older Population in the United States*. Washington, DC: US Census Bureau; 2014:25-1140.

61. Kim KS, Kim SK, Sung KM, et al. Management of type 2 diabetes mellitus in older adults. *Diabetes Metab J*. 2012;36:336-344.
62. McQuaid KR, Laine L. Systematic review and meta-analysis of adverse events of low-dose aspirin and clopidogrel in randomized controlled trials. *Am J Med*. 2006;119:624-638.
63. Cay S, Cagirci G, Aydogdu S, et al. Safety of clopidogrel in older patients. *Drugs Aging*. 2011;28:119-129.
64. Rush JE, Merrill DD. The safety and tolerability of lisinopril in clinical trials. *J Cardiovasc Pharmacol*. 1987;9:S99-S107.
65. Morimoto T, Gandhi TK, Fiskio JM, et al. Development and validation of a clinical prediction rule for angiotensin-converting enzyme inhibitor-induced cough. *J Gen Intern Med*. 2004;19:684-691.
66. Zagaria MA. Antibiotic therapy: adverse effects and dosing consideration. *US Pharm*. 2013;38:18-22.

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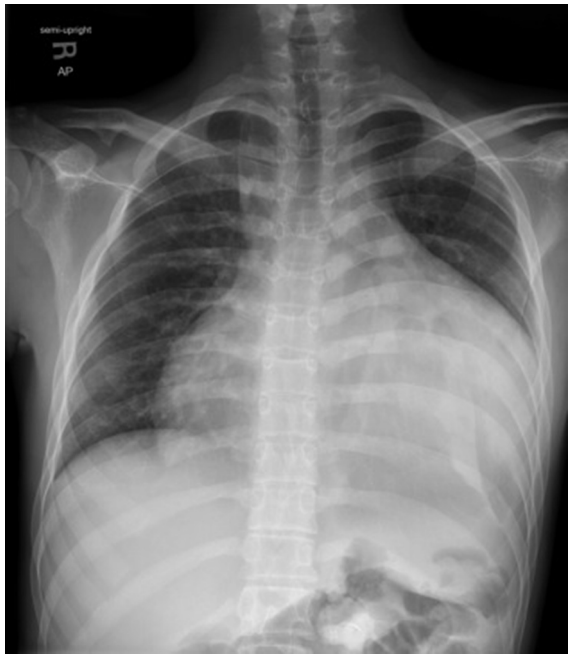

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