



Orthogeriatrics program—Assessment items for surgeons

Version 5.0 (November 2016 and reapproved for 2017 and 2018)

No.	Course objective	Questions
1	Surgically manage fragility fractures either with osteosynthesis or arthroplasty techniques to avoid revision surgeries	2
2	Recognize and address comorbidities and polypharmacy during preoperative optimization through to postoperative follow-up	2
3	Manage a fragility fracture patient with preexisting anticoagulation	2
4	Prevent, identify, and treat medical complications such as delirium	2
5	Organize secondary fracture prevention	2
6	Manage problems coming along with an orthogeriatric comanagement model	2
7	Aim for early restoration of musculoskeletal function, functionality, independence, and prefracture quality of life	2

Objective 1	Surgically manage fragility fractures either with osteosynthesis or arthroplasty techniques to avoid revision surgeries	
Question 1	Level of difficulty: Easy, medium, or difficult	Easy
<div>  <p>An 84-year-old woman has a closed fracture of the tibial shaft, with poor soft-tissue condition on the medial side (venous insufficiency). Furthermore, the patient is on aspirin and clopidogrel for a previous myocardial infarction. Nonoperative treatment with plaster cast immobilization fails after 6 weeks. What would be a safe and appropriate option for the treatment of this delayed union?</p> </div>		
Option A	MIPO, anteromedial plate fixation	
Option B	Reduce varus, another 6 weeks in plaster cast	
Option C	MIPO, long plate with locking head screws on the lateral side	
Option D	Open reduction and internal fixation on lateral side using LCP	
Answer	C	
Rationale	In this osteoporotic tibia with poor soft-tissue condition on the medial side, plating with a long plate and a number of angular stable locking head screws on the lateral side is safer than plating on the anteromedial side. Treatment with a plaster cast has been unsuccessful in this case, and nailing is impossible due to the knee prosthesis. Open reduction and internal fixation cause too much damage to the biology at the fracture which already showed sign of compromised healing.	
Reference(s)	Hasenboehler E, Rikli D, Babst R (2008) Locking compression plate with minimally invasive plate osteosynthesis in diaphyseal and distal tibial fracture: a retrospective study of 32 patients. <i>Injury</i> ; 38(3):365–370.	

Objective 1	Surgically manage fragility fractures either with osteosynthesis or arthroplasty techniques to avoid revision surgeries	
Question 2	Level of difficulty	Difficult
	<p>An 80-year-old woman sustained a grade I open fracture of the tibia after a fall. She is suffering from severe Alzheimer's disease and chronic obstructive pulmonary disease (COPD). She is taking two medications: clopidogrel and a coumarin anticoagulant and has an international normalized ratio (INR) of 4. Besides antibiotics and correction of the coagulopathy, which treatment is most appropriate?</p>	
	Option A	Debridement and external fixation
	Option B	Open reduction, lag screws and neutralization plate
	Option C	Minimally invasive plate fixation and temporary plaster casting
	Option D	Nailing and temporary plaster casting
Answer	D	
Rationale	<p>Fixation for pain relief is necessary in this case. When the initial displacement is >30% in a diaphyseal fracture, a plaster cast will be insufficient as definitive treatment. Grade I open fractures can safely be treated in the same way as closed fractures, therefore, an external fixator is not necessary. Early weight bearing is essential in this patient, and this will be possible only after nailing.</p>	
Reference(s)	<p>Toivanen JA, Kyrö A, Heiskanen T, et al (2000) Which displaced spiral tibial shaft fractures can be managed conservatively? <i>Int Orthop</i>; 24(3):151–154</p>	

Objective 2	Recognize and address comorbidities and polypharmacy during preoperative optimization through to postoperative follow-up	
Question 1	Level of difficulty: Easy, medium, or difficult	Easy
<p>An 86-year-old woman weighing 45 kg is admitted with a proximal humeral fracture. She complains about loss of appetite since her husband passed away 2 years previously.</p> <p>What should you do regarding her nutritional status?</p>		
Option A	No further action is required at this time	
Option B	Screen with a Mini Nutritional Assessment (MNA) for malnutrition/risk of malnutrition	
Option C	Ask for a dietary consultation to do a calorie count	
Option D	Order blood test for serum albumin and cholesterol levels	
Answer	B	
Rationale	Weight loss is a good indicator when screening for malnutrition but does not assess current nutritional status. The MNA is the only screening/assessment test specifically developed for assessing nutritional status in elderly people. A swallowing study is most useful to assess patients for aspiration of their food. A calorie count is useful but is mostly based on what is fed to the patient during the count. The serum albumin level is not always an accurate representation of the patient's metabolic health status. Patients who have been starved for a time period will often have a normal serum albumin.	
Reference(s)	Bauer JM, Kaiser MJ, Anthony P (2008) The Mini Nutritional Assessment—its history, today's practice, and future perspectives. <i>Nutrition in Clinical Practice</i> ; 23(4):388–396.	

Objective 2	Recognize and address comorbidities and polypharmacy during preoperative optimization through to postoperative follow-up	
Question 2	Level of difficulty: Easy, medium, or difficult	Easy
<p>A 79-year-old female nursing home resident is brought to the hospital with a displaced femoral neck fracture. She has several comorbidities including dementia, congestive heart failure, breast cancer, and diabetes mellitus. Her family voices concerns that she will die after the surgery if she undergoes the operation.</p> <p>What is the most appropriate next step?</p>		
Option A	Request an oncologist to assess her current breast cancer status	
Option B	Wait for another 2 days for the operation	
Option C	Go for a comanagement approach, determine if chronic diseases are not exacerbated, and establish her goals for care	
Option D	Consult a palliative care specialist to organize nonoperative treatment plan.	
Answer	C	
Rationale	<p>The patient has several severe comorbidities and suffers now from a hip fracture. The only way to avoid complications is to operate on her as soon as possible in order to remobilize the patient. The risk of having a complication without surgery is higher than with surgery. None of her comorbidities can be cured or improved before surgery. Any inappropriate reactions which lead to significant higher preoperative waiting time have to be avoided. The geriatrician is the best partner to handle these kinds of patients as he is used to address comorbidities as well as upcoming social aspects. A discussion with the whole team of orthopedic surgeon, geriatrician and anesthetist is the best way to find a fast solution and share responsibility. In advance the family members have to be convinced that surgery improves the pain situation and ensures remobilization.</p>	
Reference(s)	<p>Robinson TN, Eiseman B, Wallace JI, et al (2009) Redefining geriatric preoperative assessment using frailty, disability and co-morbidity. <i>Ann Surg</i>; 250(3):449–455.</p> <p>British Orthopaedic Association (2007) The Care of the Fragility Fracture Patient. Vol 1. <i>British Orthopaedic Association (ed)</i>.</p>	

Objective 3	Manage a fragility fracture patient with preexisting anticoagulation	
Question 1	Level of difficulty: Easy, medium, or difficult	Easy
<p>An elderly man who has atrial fibrillation is admitted to the hospital with a fractured hip. He is anticoagulated with warfarin and his INR value on admission is 4.1. He also has mild cognitive dysfunction but lives at home.</p> <p>How would you proceed in this case?</p>		
Option A	Withhold warfarin and check INR daily until INR <1.5 with a preoperative cardiology consultation	
Option B	Reversal of the anticoagulation with intravenous vitamin K, 7 units of fresh-frozen plasma, then surgical repair	
Option C	Reversal of the anticoagulation with subcutaneous injection of vitamin K, then early surgery	
Option D	Reversal of the anticoagulation with oral vitamin K, followed by surgical intervention	
Answer	D	
Rationale	<p>A perioperative team approach is most likely to help avoid complications with this elderly man who is likely to have cardiac issues. The reversal of anticoagulation with 7 units of plasma may cause a fluid overload condition. The use of oral vitamin K allows the clotting system to work properly again and has no big risk of perioperative thromboembolism. With this method you can almost operate on the patient within the time-frame of 48 hours. Any longer waiting time for operation may cause severe complications.</p>	
Reference(s)	<p>Friedman SM, Mendelson DA, Kates SL, et al (2008) Geriatric co-management of proximal femur fractures: total quality management and protocol-driven care result in better outcomes for a frail patient population. <i>J Am Geriatr Soc</i>; 56(7):1349–1356.</p> <p>British Orthopaedic Association. (2007) The Care of the Fragility Fracture Patient. Vol 1. <i>British Orthopaedic Association (ed)</i>.</p>	

Objective 3	Manage a fragility fracture patient with preexisting anticoagulation	
Question 2	Level of difficulty:	Difficult
<p>An 87-year-old woman who has chronic heart failure (due to longstanding hypertension) and atrial fibrillation is admitted with hip pain after falling on the pavement. Plain x-rays confirm a hip fracture. The patient is taking five different medications, including warfarin. Her international normalized ratio (INR) is 2.9.</p> <p>What is the most significant risk to the patient regarding the reversal the warfarin?</p>		
Option A	There is a risk of her developing postoperative bleeding	
Option B	There is a risk of thromboembolism in the postoperative period after the current anticoagulation is reversed	
Option C	There is a very high risk of stroke after correcting her elevated INR	
Option D	It is difficult to restore therapeutic anticoagulation levels during the perioperative phase	
Answer	B	
Rationale	<p>This patient's INR is too high for surgery. Hip fracture surgery should be performed in a timely manner, therefore, the effects of warfarin should be reversed to minimize bleeding and to allow surgery to proceed. After correcting the INR, the patient is at low risk for stroke due to having atrial fibrillation, but the risk of a postoperative thromboembolic event is of more concern due to immobility if an alternative anticoagulant treatment is not initiated. The patient is typically treated with a second injectable anticoagulant in a higher (therapeutic) dosage until the INR is restored to a therapeutic level.</p>	
Reference(s)	<p>Arnold DM, Anderson J, Kearon C (2009) Preoperative risk assessment for bleeding and thromboembolism. <i>BMJ</i>; 339:b.2299.</p> <p>Watson T, Shanstila E, Lip GY (2007) Modern management of atrial fibrillation. <i>Clin Med</i>; 7(1):28–34.</p>	

Objective 4	Prevent, identify, and treat medical complications such as delirium	
Question 1	Level of difficulty:	Easy
<p>A 91-year-old female nursing home resident is admitted with a femur fracture after falling earlier that day. She has several medical problems including aortic stenosis with a valve area of 1.8 cm² and has been hospitalized several times. The medical record notes difficulty during past hospitalizations due to development of delirium.</p> <p>What approach has the greatest likelihood of reducing development of delirium in the perioperative period?</p>		
Option A	Request an echocardiogram	
Option B	Administer haloperidol	
Option C	Request a geriatric medicine consultation	
Option D	Administer spinal anesthesia without sedation for the surgery	
Answer	C	
Rationale	<p>A geriatric medicine consultation is useful to review potentially problematic medications, to optimize medical conditions both before and after surgery, and to help prevent the development of delirium. Early surgery is helpful but an echocardiogram is frequently unnecessary prior to surgery especially when the known aortic valve area is non-critical. The use of spinal anesthesia does not prevent the development of delirium, although it may reduce the frequency of this problem. Haloperidol may be useful to control hyperactive delirium but is not protective against the development of delirium.</p>	
Reference(s)	<p>Batsis JA, Phyllis MP, Joseph Melton L 3rd, et al (2007) Effects of a hospitalist care model on mortality of elderly patients with hip fractures. <i>J Hosp Med</i>; 2(4):219–225.</p> <p>Friedman SM, Mendelson DA, Kates SL, et al (2008). Geriatric co-management of proximal femur fractures: total quality management and protocol-driven care result in better outcomes for a frail patient population. <i>J Am Geriatr Soc</i>; 56(7):1349–1356.</p> <p>Friedman SM, Mendelson DA, Bingham KW, et al (2009) Impact of a co-managed Geriatric Fracture Center on short-term hip fracture outcomes. <i>Arch Intern Med</i>; 169(18):1712–1717.</p> <p>Robinson TN, Raeburn CD, Tran ZV, et al (2009) Postoperative delirium in the elderly: risk factors and outcomes. <i>Ann Surg</i>; 249(1):173–178.</p>	


Objective 4	Prevent, identify, and treat medical complications such as delirium	
Question 2	Level of difficulty:	Difficult
<p>An 89-year-old woman is admitted to hospital with a distal femur fracture. When prescribing her postoperative medications, which of the following is a most reasonable pain management protocol along with around the clock acetaminophen for the patient?</p>		
Option A	Meperidine (eg, Demerol) for severe pain, oxycodone for mild pain	
Option B	Hydromorphone for severe pain, codeine for mild pain	
Option C	Ibuprofen (eg , Advil, Motrin)	
Option D	Morphine sulfate, oxycodone for mild pain	
Answer	D	
Rationale	<p>Meperidine and all nonsteroidal anti-inflammatory drugs (NSAIDs) are harmful to elderly patients. Meperidine has long half-life metabolites that may cause seizures or delirium. Codeine is less effective and causes constipation in many elderly patients. Ibuprofen is an NSAID and causes decreased renal blood flow, which can cause acute renal failure to develop in the elderly patient. From the list of medications above, morphine and oxycodone are least likely to cause harm, especially when used in small doses.</p>	
Reference(s)	<p>Morrison RS, Flanagan S, Fischberg D, et al (2009) A novel interdisciplinary analgesic program reduces pain and improves function in older adults after orthopedic surgery. <i>J Am Geriatr Soc</i>; 57(1):1–10.</p>	

Objective 5	Organize secondary fracture prevention	
Question 1	Level of difficulty: Easy, medium, or difficult	Easy
<p>A 76-year-old woman trips over a step, landing on her outstretched hand. She is seen in the clinic and is found to have a proximal humeral fracture, which is to be managed nonoperatively with a shoulder sling. A diagnosis of osteoporosis is made first time.</p> <p>What is the most appropriate initial medical therapy for this patient?</p>		
Option A	Bisphosphonate only (eg, alendronate 70 mg, once a week)	
Option B	1,000 mg calcium plus 400 IU vitamin D3 daily	
Option C	1,000 mg calcium plus 800 IU vitamin D3 daily, plus consideration of bisphosphonate therapy	
Option D	Strontium ranelate only	
Answer	C	
Rationale	<p>Bisphosphonates, strontium ranelate, and calcium with vitamin D each has been shown to reduce the risk of osteoporotic fracture. However, meta-analysis clearly shows the need to provide at least 800 IU vitamin D3 daily for secondary fracture prevention in a patient with osteoporosis. The single use of the basis-therapy calcium and Vitamin D is only appropriate in patients with mild osteoporosis or osteopenia. The fact of having a fragility fracture is the strongest predictor for a subsequent fracture and therefore it should be used in combination with a specific bone medication. Strontium is known to enlarge the risk of having a thromboembolic event and therefore not used in fragility fracture patients with low mobility at baseline. Before starting the specific therapy a primary osteoporosis should be excluded either by a geriatrician or bone specialist.</p>	
Reference(s)	<p>Tang BM, Eslick GD, Nowson C, et al (2007) Use of calcium or calcium in combination with vitamin D supplementation to prevent fractures and bone loss in people aged 50 years and older: a meta-analysis. <i>Lancet</i>, 370(9588):657–666.</p> <p>Bilezikian JP (2009) Efficacy of bisphosphonates in reducing fracture risk in postmenopausal osteoporosis. <i>Am J Med</i> ;122(2 Suppl):S14–S21.</p> <p>Deeks ED, Dhillon S (2010) Strontium ranelate: a review of its use in the treatment of postmenopausal osteoporosis. <i>Drugs</i>; 70(6):733–759.</p>	

Objective 5	Organize secondary fracture prevention	
Question 2	Level of difficulty: Easy, medium, or difficult	Difficult
<p>An 81-year-old woman sustains a hip fracture and is treated with a sliding hip screw. She has had several recent falls.</p> <p>Which of the following interventions is the LEAST LIKELY to have a positive impact on her risk of future falls?</p>		
Option A	Tai Chi program	
Option B	Home hazard assessment and modification	
Option C	Withdrawal of psychotropic medication	
Option D	Self-directed home exercises	
Answer	D	
Rationale	<p>The Cochrane Database has identified the following to be associated with a reduction in fall rate: Multidisciplinary, multifactorial, health/environmental risk factor screening/intervention programs, muscle strengthening and balance retraining programs, home hazard assessment and modification in patients with previous falls, withdrawal of psychotropic medication, cardiac pacing for fallers with cardioinhibitory carotid sinus hypersensitivity, and Tai Chi. Group-delivered and home exercise interventions did not have a beneficial effect.</p>	
Reference(s)	<p>Gillespie LD, Gillespie WJ, Robertson MC, et al (2003) Interventions for preventing falls in elderly people. <i>Cochrane Database Syst Rev</i>; (4):CD000340.</p>	

Objective 6	Manage problems coming along with an orthogeriatric comanagement model	
Question 1	Level of difficulty:	Easy
How does a comprehensive patient centered, protocol driven system for hip fracture care address an administrator's complaint of un-coordinated care with low satisfaction scores?		
Option A	Improved nursing care plans on the ward resulting in better and more personal care	
Option B	Better pain medications and implementation of pain protocols	
Option C	Improvement of the patient experience at each phase of inpatient care	
Option D	Surgeons spending more time with patients as part of a "patient family centered care model"	
Answer	C	
Rationale	The system of care is much more likely to correct multiple areas of concern for patients than the other interventions listed. Coordination of care is inherent to systematized care and is built into the system at every level. Better pain medication will only satisfy the issue of pain management. Spending more time with the patient does increase satisfaction scores but will not improve uncoordinated care. Replacing the nurse manager may help with nursing issues but is unlikely to change the satisfaction scores on the ward.	
Reference(s)	<p>Batsis JA, Phy MP, Joseph Melton L 3rd, et al (2007) Effects of a hospitalist care model on mortality of elderly patients with hip fractures. <i>J Hosp Med</i>; 2(4):219–225.</p> <p>Friedman SM, Mendelson DA, Bingham KW, et al (2009) Impact of a comanaged Geriatric Fracture Center on short-term hip fracture outcomes. <i>Arch Intern Med</i>; 169(18):1712–1717.</p>	

Objective 6	Manage problems coming along with an orthogeriatric comanagement model	
Question 2	Level of difficulty:	Difficult
<p>A 76-year-old lady is operated on a hip fracture following a simple fall. Postoperatively the patient is getting mobilized and her geriatric rehabilitation is organized. How can you ensure that every patient is screened for underlying osteoporosis?</p>		
Option A	Inform colleagues that osteoporosis is an important comorbid condition in these patients.	
Option B	Request all nurses to check for osteoporosis at every hip fracture	
Option C	Organize a fracture liaison service where a specialized nurse checks all fragility fracture patients for underlying osteoporosis, initiates bone therapy, and negotiates the cases within the team.	
Option D	Write the diagnosis of osteoporosis in the discharge letter and the family doctor is asked to check for osteoporosis and subsequent therapy	
Answer	C	
Rationale	Therapy rates for osteoporosis are still below 10% after fragility fractures. This shows that the acceptance of orthopedic surgeons is low and several studies have shown that the single discussion with the colleagues does not improve treatment rates. The same is true if just the diagnose is written in the discharge letter as the family doctor is mostly not taking care of osteoporosis due to different reasons. The nurses cannot do this alone as this is the doctors' responsibility. A fracture liaison service within an organized system where a specialized nurse checks all fragility fracture patients improves osteoporosis therapy rates significantly and leads to reduced refracture rates.	
Reference(s)	Schray D, Neuerburg C, Stein J, Gosch M, Schieker M, Böcker W, Kammerlander C. Value of a coordinated management of osteoporosis via Fracture Liaison Service for the treatment of orthogeriatric patients. Eur J Trauma Emerg Surg. 2016 Jul 25. Nakayama A, Major G, Holliday E, Attia J, Bogduk N. Evidence of effectiveness of a fracture liaison service to reduce the re-fracture rate. Osteoporos Int. 2016 Mar;27(3):873-9.	

Objective 7	Aim for early restoration of musculoskeletal function, functionality, independence, and prefracture quality of life	
Question 1	Level of difficulty: Easy, medium, or difficult	Easy
	<p>An 85-year-old woman residing at home has been treated for a pertrochanteric fracture with surgery. As shown in the x-ray, the entry point is not ideal, and there is no anatomical reduction achieved. The patient has severe pain in her right hip on day 2 postoperatively. Pain medication is being optimized.</p> <p>Which of the following options is the most appropriate?</p>	
	Option A	Mobilization in a wheelchair
	Option B	Start mobilization with partial weight bearing
	Option C	Start weight bearing as tolerated with a walker
	Option D	Bed rest until pain subsides
	Answer	C
Rationale	<p>Older adults cannot do partial weight bearing, and early rehabilitation improves their outcomes. Early rehabilitation involves ambulation with support on the days following surgery. Bed rest is harmful to older adult patients—they are more likely to develop a pressure sore, pneumonia, or a urinary tract infection if left on bed rest. The risk of delirium is reduced by early weight bearing and functional rehabilitation.</p>	
Reference(s)	<p>Barone A, Giusti A, Pizzonia M, et al (2009) Factors associated with an immediate weight-bearing and early ambulation program for older adults after hip fracture repair. <i>Arch Phys Med Rehabil</i>; 90(9):1495–1498.</p> <p>Karunakar M, McLaurin TM, Morgan SJ, et al (2009) Improving outcomes after pertrochanteric hip fractures. <i>Instr Course Lect</i>; 58:91–104.</p> <p>Moseley AM, Sherrington C, Lord SR, et al (2009) Mobility training after hip fracture: a randomised controlled trial. <i>Age Ageing</i>; 38(1):74–80.</p> <p>British Orthopaedic Association (2007) The Care of the Fragility Fracture Patient. Vol 1. <i>British Orthopaedic Association</i> (ed).</p>	

Objective 7	Aim for early restoration of musculoskeletal function, functionality, independence, and prefracture quality of life	
Question 2	Level of difficulty: Easy, medium, or difficult	Easy
<div data-bbox="126 396 681 801" data-label="Image"> </div> <p>An 82-year-old male nursing home resident with severe dementia and a Charlson Comorbidity Index of 3 has a Vancouver type B1 fracture of the femur at the tip of a cemented revision femoral hip stem. The hip implant had been inserted only 3 months earlier. Examination reveals that his thigh is deformed and swollen. His arthroplasty surgeon is away on holiday.</p> <p>What is the most appropriate treatment to achieve a good early functional result?</p>		
Option A	Immediate surgery with revision of a long stem prosthesis	
Option B	Surgery with plate fixation as soon as possible	
Option C	Surgery with plate fixation in several days when the bleeding has stopped	
Option D	Temporary traction followed by surgery when his arthroplasty surgeon is available	
Answer	B	
Rationale	<p>Immediate surgery will allow this patient to be mobilized with physiotherapy. Delay of surgery offers no benefits in this case. The Charlson Comorbidity Index gives information about the comorbidities of the patient. Temporary traction in this case may result in cut out of the traction pin. Skeletal traction also means that the patient is placed on bed rest and at higher risk for development of a pressure sore or pneumonia. Delay of the surgery for return of the arthroplasty surgeon is undesirable for the same reasons. Plate fixation as soon as possible is the preferred option.</p>	
Reference(s)	<p>Karunakar M, McLaurin TM, Morgan SJ, et al (2009) Improving outcomes after pertrochanteric hip fractures. <i>Instr Course Lect</i>; 58:91–104.</p> <p>Orosz GM, Magaziner J, Hannan EL, et al (2004) Association of timing of surgery for hip fracture and patient outcomes. <i>JAMA</i>. 2004; 291(14):1738–1743.</p>	