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**Postoperative Delirium,  
An Interactive Learning Experience  
Facilitator's Manual**

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Physician Training in Geriatric Medicine

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## Resource Description

Delirium, in particular, is of great importance to surgeons since it is associated with high rates of complications following surgery. Perioperative delirium is associated with increased cost, length of stay, poor recovery, institutionalization, and mortality. Health care cost attributed to development of delirium is estimated at \$165 billion annually. Thus development of perioperative delirium is of great importance to surgeons. Those 65 and older are expected to account for almost 20% of the U.S. population by 2030. Thus physicians need to know how to care for geriatric patients regardless of their scope of practice.

This session is designed to create active learning groups involving surgical residents and focuses on the common problem of Delirium. The delivery method includes an online module that the residents will need to complete the night prior to the day of the workshop. The workshop will include interactive learning groups and is delivered in the context of a one hour workshop. There will be a brief pre-quiz and then an introductory presentation along with a 5video showing how to perform a 4AT assessment tool followed by discussion within smaller groups of learners (4 residents per group). Each group will review a case and answer and review questions as the case progresses. Then the whole group of learners will review the information and conclusions of each group through a discussion facilitated by a faculty member. They will have 40 minutes to review the case. Then there will be closing remarks along with a post-quiz and a feedback form to complete.

## Purpose, Goals and Objectives

**Purpose:** To establish a formalized geriatric surgical curriculum with a foundation consisting of delirium prevention, assessment and management to improve surgeon's daily practice regarding the surgical care of older adults.

**Goal:** Improve the knowledge, skills, attitude, and behavior of surgery residents regarding perioperative delirium in surgical older adults

***By the end of this curriculum, the surgical resident will be able to:***

- 1) List preoperative, intraoperative, and postoperative risk factors.
- 2) Know how to calculate a delirium risk assessment score.
- 3) List treatment strategies for postoperative delirium
- 4) Correctly employed a 4AT assessment tool to diagnose postoperative delirium in non-ICU older confused surgical patient.
- 5) Calculated the correct delirium risk assessment score for a case scenario.
- 6) Proposed strategies for mitigating preoperative, intraoperative, and postoperative risk factors for a common general surgery case scenario.
- 7) Identified "best-practice" non-pharmacologic and pharmacologic treatment strategies to manage postoperative delirium given a case scenario.
- 8) As a result of the curriculum, surgical residents will rate as important that surgeons should know:
  - i) Treatment strategies for postoperative delirium.
  - ii) How to screen for postoperative delirium using a validated assessment tool (4AT)
  - iii) Strategies to prevent postoperative delirium.
- 9) List at least the 7 main key effects that postoperative delirium has on surgical outcomes (e.g. increased 30 day mortality, increased complication rates, increased length of stay, increased costs of care, increased readmission rates, decreased patient satisfaction, and decreased functional status leading to increased rates of institutionalization).

### **Intended Audience(s)**

Surgical Residents PGY1-PGY5

### **Prerequisites**

Residents must perform the pre-test along with complete the online postoperative delirium module prior to the start of the workshop.

### **Instructor Qualifications and Responsibilities**

Physicians trained in Geriatrics, who have good small-group facilitation skills. Instructors must have reviewed and understood the content. A general knowledge of delirium is helpful. They must also be capable of highlighting key teaching points, thereby making it a rewarding learning experience for the residents. The instructor must work to make the session very interactive, encouraging participation by most of the residents. The instructor must be careful to begin by giving the residents only the case

guide and the questions, and only handout the answer key when the session is over.  
Learners should not view the answer key prior to the end of session.

### **Required Resources**

Online module, Case guide, Questions and Answer sheet, Answer key, Video for 3D Cam Assessment, pre-post test, and feedback form.

### **Procedures for Implementation**

The group of target learners consists of 36 residents. There will be quarterly workshops scheduled with 8 residents assigned to each workshop who will be divided into smaller groups of about 4 residents per group. They will be given the Case Guide and Questions. They will be required to complete the online module on postoperative delirium prior to the start of the workshop. The session will start with pre-test, brief instructions on how to perform a 4AT assessment and then show a 3 minute video on a patient with hypoactive delirium. The resident will then use the scoring sheet to determine if the patient has delirium or not. Facilitator will briefly discuss the answers as a whole group. Then the residents will divide into 2 groups (4 residents per group) to review a case. There will be 40 minutes devoted to the case. The facilitator will direct the residents through the case, reviewing the questions, going around the group having everyone give answers to the questions. The facilitator will also highlight key teaching points for each question and fills in unanswered questions, thereby making it a rewarding learning experience for the residents. At the end of the session, the group with the highest number of correct answers will be rewarded a gift. The competitive nature of the interaction also encourages active participation by the groups.

### **Assessment**

Assessment of the achievement of the learning objectives is done in a subsequent post-quiz along with a CEX which must be completed within the year.

### **Evaluation**

A Likert - scale questionnaire and open-ended questions has been developed to allow learners evaluate the utility of the educational resource.

### **Relationship to Other Educational Materials**

None

## Overall Objectives for the Postoperative Delirium Curriculum.

Objective	Educational Strategy	Evaluation	Type of learning objective.
<i>After completion of the surgical council on resident education (SCORE) module on postoperative delirium, each surgical resident will be able to:</i>			
Identify pathophysiological causes of postoperative delirium.	Score online module	Pre-Post-test	Knowledge
Identify risk factors for the development of postoperative delirium.	Score online module	Pre-Post-test	Knowledge
Recognize interventions to prevent postoperative delirium.	Score online module)	Pre-Post-test	Knowledge
Describe the common presentation of delirium and be able to distinguish delirium from dementia and depression.	Score online module)	Pre-Post-test	Knowledge
Recognize evidence based assessment tools (e.g. 3D CAM, 4AT, ect.) as reliable ways to screen for postoperative delirium.	Score online module	Pre-Post-test	Knowledge
Describe the major effects that delirium has on surgical and patient outcomes (e.g. increased 30 day mortality, increased complication rates, increased length of stay, increased costs of care, increased readmission rates, decreased patient satisfaction, and decreased functional status leading to increased rates of institutionalization).	Score online module	Pre-post-test	Knowledge
<i>After completion of the small group learning session, each surgical residents will:</i>			
Recognize preoperative, intraoperative, and postoperative risk factors.	Small group learning session	Small group discussions, pre-post testing	Knowledge
Demonstrate how to calculate a delirium risk assessment score for a case scenario.	Small group learning session	Small group discussions	Knowledge, Skill
Correctly employed a validated delirium assessment tool (e.g. 4AT) to screen postoperative delirium in non-ICU older confused surgical patient.	Small group learning session	Small group discussions	Skill

Objective	Educational Strategy	Evaluation	Type of learning objective.
Proposed strategies for mitigating preoperative, intraoperative, and postoperative risk factors for a common general surgery case scenario.	Small group learning session	Small group discussions, pre-post test	Skill, knowledge
Identified "best-practice" non-pharmacologic and pharmacologic treatment strategies to manage postoperative delirium given a case scenario.	Small group learning session	Small group discussion, pre-post test	Skill, knowledge
As a result of the curriculum, surgical residents will rate as important that surgeons should know treatment strategies for postoperative delirium.	Small group learning session	Post-small group feedback form, pre-post test	Attitude
As a result of the curriculum, surgical residents will rate as important that surgeons should know how to screen for postoperative delirium using a validated assessment tool.	Small group learning session	Post-small group feedback form, pre-post test.	Attitude
As a result of the curriculum, surgical residents will rate as important that surgeons should know strategies to prevent postoperative delirium	Small group learning session	Post-small group feedback form, pre-post test.	Attitude
<b><i>By the end of the curriculum, each surgical residents will:</i></b>			
Demonstrated the correct use of a validated delirium assessment tool to screen for postoperative delirium in non-ICU older confused surgical patient	Mini-Cex	Mini-Cex	skill
<b><i>By the end of the curriculum, each surgical residents will:</i></b>			
Perform prevention measures and monitor delirium development via evidence based assessment method (e.g 4AT) prior to geriatric consult.	Consultant Check Sheet	Consultant check sheet/Chart review	Skill, Behavior



## Extension Activities

None

## List of References

1. Marcantonio EJ, Goldman L, Mangione CM et al. A clinical prediction rule for delirium after elective noncardiac surgery. *JAMA* 1994;271:134–139.
2. Fong TG, Tulebaev SR, Inouye SK. Delirium in elderly adults: diagnosis, prevention and treatment. *Nature reviews. Neurology*. 2009;5(4):210-220.
3. Inouye SK, Zhang Y, Jones RN, Kiely DK, Yang F, Marcantonio ER. Risk factors for delirium at discharge: development and validation of a predictive model. *Archives of internal medicine*. 2007;167(13):1406-1413.
4. Dasgupta M, Dumbrell AC. Preoperative risk assessment for delirium after noncardiac surgery: a systematic review. *J Am Geriatr Soc*. 2006;54(10):1578-1589.
5. Schwartz's Principles of Surgery, 10e : Chapter 47: Surgical Considerations in the Elderly.
6. Tan KY. Novel perioperative models make a difference in outcomes of elderly surgical patients. *Annals of Surgery*. 2014;259(4):e62-e63.
7. Shipway D, Harari D, Dhese J. Peri-operative management of older people undergoing surgery. *Reviews in Clinical Gerontology*. 2014;24(1):78-92.
8. Partridge JS, Harari D, Martin FC, Dhese JK. The impact of pre-operative comprehensive geriatric assessment on postoperative outcomes in older patients undergoing scheduled surgery: a systematic review. *Anaesthesia*. 2014;69 Suppl 1:8-16.
9. Strom C, Rasmussen LS, Sieber FE. Should general anaesthesia be avoided in the elderly? *Anaesthesia*. 2014;69 Suppl 1:35-44
10. Turrentine FE, Wang H, Simpson VB, Jones RS. Surgical risk factors, morbidity, and mortality in elderly patients. *J Am Coll Surg*. 2006;203( 6):865-877.
11. **Scientific American Surgery** :Chapter 103:Perioperative Considerations for Anesthesia.
12. Hirsch J, DePalma G, Tsai TT, Sands LP, Leung JM. Impact of intraoperative hypotension and blood pressure fluctuations on early postoperative delirium after non-cardiac surgery. *British journal of anaesthesia*. 2015.
13. Marcantonio ER, Ngo LH, O'Connor M, et al. 3D-CAM: derivation and validation of a 3-minute diagnostic interview for CAM-defined delirium: a cross-sectional diagnostic test study. *Annals of internal medicine*. 2014;161(8):554-561
14. Inouye, Sharon K. et al. Postoperative Delirium in Older Adults: Best Practice Statement from the American Geriatrics Society, *Journal of the American College of Surgeons* , Volume 220 , Issue 2 , 136 - 148.e1 2015.
15. Hsieh TT, Yue J, Oh E, et al. Effectiveness of multicomponent nonpharmacological delirium interventions: a meta-analysis. *JAMA Intern Med*. Published online February 2, 2015.
16. Bellelli G, Mazzola P, Morandi A, et al. Duration of postoperative delirium is an independent predictor of 6-month mortality in older adults after hip fracture. *J Am Geriatr Soc*. 2014;62(7):1335-1340
17. McAvay GJ, Van Ness PH, Bogardus ST, Jr., et al. Older adults discharged from the hospital with delirium: 1-year outcomes. *J Am Geriatr Soc*. 2006;54(8):1245-1250.

18. Bellelli G, Morandi A, Davis DH, Mazzola P, Turco R, Gentile S, Ryan T, Cash H, Guerini F, Torpilliesi T, Del Santo F, Trabucchi M, Annoni G, MacLulich AM. **Validation of the 4AT, a new instrument for rapid delirium screening: a study in 234 hospitalised older people.** *Age Ageing*. 2014 Mar 14.
19. Hopkins RO, Jackson JC. Assessing neurocognitive outcomes after critical illness: are delirium and long-term cognitive impairments related? *Curr Opin Crit Care*.2006;12:388–94

**Johns Hopkins  
General Surgery Resident Delirium Small group Session  
Facilitator Guide**

**Facilitator:** *Have someone in the group read the case.*

**Case : Mr. H.C.**

**Chief complaint:** abdominal pain.

**HPI:** Mr H.C. is a 78 year-old male who presented to the ED w/ RUQ abdominal pain. He states it is worse after eating. The pain began as a dull ache in the epigastrium but then localized to the right upper quadrant and started about 2 days ago. He reports some nausea but no vomiting. He admits to a number of previous episodes in the recent past. He states he hasn't eaten much recently because of the pain.

**PMH:** His medical history includes severe osteoarthritis for 10 years, HTN, mild dementia (with MMSE 21/30), hearing impairment, depression, anxiety, CAD, hypothyroidism, BPH, CKD stage III (baseline cr is 1.8), DM, and dyslipidemia.

**PSHX:** none

**Medications:** tramadol, Atenolol 50 mg PO daily, Prozac, ASA, Aricept, levothyroxine, terazosin, metformin, glyburide, and simvastatin.

**Social history:** He has been married for 50 years, lives with his wife. He quit smoking 10 years ago. He drinks about 2 beers/day. He wears glasses and hearing aids. He is independent in ADLs but dependent in IDLs. He uses a cane to get around the house because of his severe OA.

**Review of Systems:** Fatigue, diffuse weakness, and chronic knee and back pain.

**Physical exam:**

Vital: T 98.0F, BP 95/60 HR 103, RR 18 O2 97%

General: no acute distress

HEENT: mucous membranes dry.

Abd: patient has right upper quadrant abdominal tenderness and guarding. Murphy's Sign (a pause with inspiration on palpation of the right upper quadrant) is positive

Neuro: Motor 4/5 in all extremities. Sensory: normal and symmetric reflexes. The patient can recall his name and location but did not know the date, or the year.

Based on the patient's symptoms you order labs including a CBC, CMP, amylase, lipase, urinalysis, as well as an ultrasound of the patient's gallbladder

**Labs:**

Labs: 149 |110 |98 |/310                      \10.2/  
           3.2 |28 |2.1 | \                      13.0 / 30 | 201

TB 2.1, Direct Bilirubin 3.0 alkaline phosphatase 140 U/L, AST 45 U/L and ALT 30 U/L.  
 Amylase and lipase WNL.

**Question 1: What is this patient’s Delirium risk assessment score: low, medium or high?**

-give everyone a couple minutes to calculate their delirium risk score. They should come up with that it’s high.

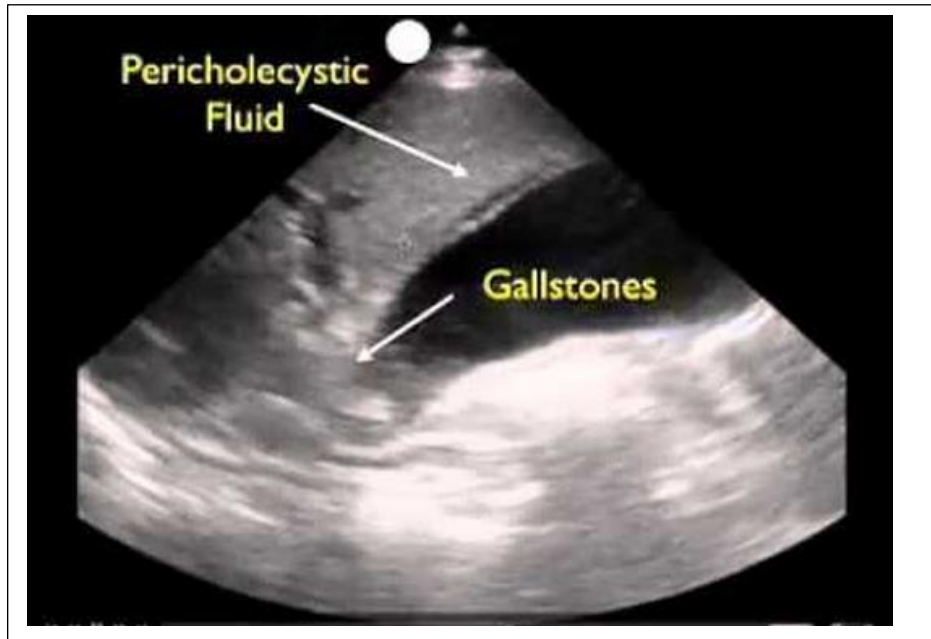
**Delirium Risk Assessment: Delirium Risk Screen**

<b>Delirium Risk Assessment: Delirium Risk Screen (Marcantonio et al.)</b>	
<b>Age ≥ 70</b>	<b>If YES: 1 point</b>
<b>Alcohol abuse</b>	<b>If YES: 1 point</b>
<b>Cognitive impairment:</b> MMSE < 25/30 or Telephone Interview for Cognitive Status (TICS) score <30	<b>If YES: 1 point</b>
<b>Electrolytes:</b> Abnormal sodium, potassium or glucose <small>* sodium, &lt;130 or &gt;150 mmol/L; potassium, &lt;3.0 or &gt;6.0 mmol/L; and glucose, &lt;60 or &gt;300 mg/dL.</small>	<b>If YES: 1 point</b>
<b>Poor functional status</b> =Specific Activity scale of Class IV. (means <2 mets (light intensity activity e.g Can’t dress without stopping because of symptoms.) <small>1 MET = the energy (oxygen) used by the body as you sit quietly, perhaps while talking on the phone or reading a book.</small>	If Yes: 1 point
<b>Type of surgery:</b> is it either non-cardiac thoracic surgery or AAA repair?	If Yes: 1 point
<b>Score:</b> 0 = low risk   1-2 = medium risk <b>≥3 = high risk of delirium</b>	
<b>Delirium Risk:</b> <input type="checkbox"/> Low (2%) <input type="checkbox"/> Medium (11%) <input type="checkbox"/> <b>High (50%)</b>	

**Suggested readings:**

1. Marcantonio EJ, Goldman L, Mangione CM et al. A clinical prediction rule for delirium after elective noncardiac surgery. JAMA 1994;271:134–139.
2. Fong TG, Tulebaev SR, Inouye SK. Delirium in elderly adults: diagnosis, prevention and treatment. Nature reviews. Neurology. 2009;5(4):210-220.

Ultrasound showed:



**Question 2: What are some risk factors for delirium in this patient?**

**Facilitator: Give them a few minutes to come up with some risk factors. Please then go around the group and have everyone name a different risk factor if they can and then review any that they missed.**

Check ones they identified	Pre-existing factors	
	1	Age
	2	Cognitive impairment/dementia
	3	hearing and visual impairment
	4	Impairment in IDLs
	5	Functional impairment
	6	Malnutrition ( alb 2.1)
	7	Polypharmacy and high risk medications (glyburide, Prozac, tramadol)
	8	CKD
	9	constipation
	10	Multiple comorbidities
	11	Alcohol use
	12	anemia
	13	Depression
	14.	Male

Preoperative Risk factors	
1	Uncontrolled pain
2	Acute on chronic kidney disease
3	Emergent/Urgent surgery
4	Dehydration
5	anemia
6	Electrolyte abnormalities
7	Uncontrolled glucose
8	Poor vision/hearing
9	Acute medical condition
10	Low blood pressure, tachycardia,
11	Elevated bilirubin/elevated AST/ALT
12.	Environmental changes
13.	Medication withdrawal: Betablocker, SSRI.

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### Suggested Readings:

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1. Inouye SK, Zhang Y, Jones RN, Kiely DK, Yang F, Marcantonio ER. Risk factors for delirium at discharge: development and validation of a predictive model. *Archives of internal medicine*. 2007;167(13):1406-1413.
  2. Dasgupta M, Dumbrell AC. Preoperative risk assessment for delirium after noncardiac surgery: a systematic review. *J Am Geriatr Soc*. 2006;54(10):1578-1589.
-

**Continue with the case:**

So he was admitted to the general surgery floor. He had some urinary incontinence, so a Foley catheter was placed into his bladder in the ED. He was started on IVFs since he appeared dehydrated along with morphine 2-4mg IV prn for pain. Pt was made NPO, started on insulin sliding scale, and scheduled for lap chole in the AM. Pt complained of some itching so Benadryl 50mg IV Q8 Prn was ordered. He also complained of uncontrolled pain in his abdominal and says it's about 7/10.

**Question 3: You are the upper level resident. Realizing the patient's delirium risk score is high, what adjustments would make to the intern's admission orders to reduce the patient's risk of developing delirium?(i.e what preventive measures would you implement?)**

**-give everyone a couple minutes to answer the question and then go around the group and have everyone come up with one preventive measure and then review any that they missed.**

Check ones they identified	Pre-existing factors	Prevention/Treatment orders	Nursing orders/Care orders
	1 Age ≥ 70	n/a	n/a
	2 Cognitive impairment/dementia	n/a	Get family involved with patient's care. Do environmental adaptations: (e.g., Use care boards, a large clock, calendars to aid in reorientation, enhanced lighting by opening shades and keep lights on during the day, and implement noise reduction.)
	3 Hearing and visual impairment	n/a	Make sure the patient has his glasses, hearing aids, dentures ect. -oral mouth care.
	4 Impairment in IDLs	n/a	n/a.
	5 Functional impairment	Order PT/OT consulted, early mobilization. Order appropriate anticoagulation to prevent DVT/PE.	Order to have patient OOB for each meal  Order Skin care by nurse to prevent skin breakdown.
	6 Malnutrition with alb 2.1	Make sure nutrition is consult and optimize nutrition.	Have the nurse encourage PO intake, possibly 1:1 Feeds.
	7 Polypharmacy and high risk medications (glyburide, Prozac, tramadol, Benadryl)	-Eliminate unnecessary medications -Treat pain initially with Tylenol, if still uncontrolled pain, use a low dose opiate (i.e. oxycodone 2.5mg) -Avoid glyburide in older adults with renal impairment (use insulin while in the hospital) -Avoid use of Tramadol and Benadryl in older patients is possible.	n/a
	8 CKD	Consult pharmacy to review medications and adjust medications for renal impairment and avoid nephrotoxic medications.	Monitor I/Os.
	9 constipation	Implement a good bowel regimen to prevent constipation. (goal is one BM a day or at least every other day) Recommendations are. 1 <sup>st</sup> : started with docusate/senna 2 tabs QHS 2 <sup>nd</sup> : if still constipated add Miralax daily 3 <sup>rd</sup> : if still no BM, do bisacodyl sup.	Monitor for daily bowel movements.
	10. Multiple comorbidities	n/a	n/a



Check ones they identified	Pre-existing factors	Prevention/Treatment orders	Nursing orders/Care orders
	11 Alcohol use	Many physicians forget to ask older adults about their drinking history. If patient had drinking history, recommend order CIWA to monitor for withdrawal.	Have the nurse perform CIWA.
	12 anemia	If elective surgery, try to correct/work up prior to surgery. Since this was not elective, then try and avoid intraoperative blood transfusion if possible. Recommend to only transfuse if Hb <7.0.	N/a
	13 Depression	n/a.	n/a
	14. Male	N/a.	n/a
<b>Preoperative Risk factors</b>			
	1 Uncontrolled pain	Evaluate and treat pain or discomfort Treat pain initially with Tylenol (po or IV), if still uncontrolled pain, use a low dose opiate (i.e. oxycodone 2.5mg liq). -Morphine 2-4mg IV would not be a good initial treatment option in this patient especially given his AKI/CKD. -So if the patient is NPO and rec'd low dose dilaudid 0.2mg IV if IV Tylenol is not controlling the patient's pain in a patients with renal impairment.	Order to have the nurse assess for pain and let you know if the patient is having uncontrolled pain.
	2 Acute on chronic kidney disease	Try and correct AKI if possible. Make sure you renally dose all your medications and avoid nephrotoxic medications.	Order to monitor urine output.
	3 Foley catheter	Preventing UTI will reduce the incidence of delirium, -try and avoid foley's or remove as soon as possible. So would rec'd not placing foley but if they are placed then to remove as soon as possible and do PVR to make sure the patient is not retaining. (want a PVR<200).	Order to have the nurse do Post-void residuals after foley is removed and call physician if PVR>250.  Monitor I/Os
	4 Emergent/urgent surgery	n/a	n/a
	5 Dehydration	Correct dehydration,	Monitor I/Os.
	6 anemia	If elective surgery, try to correct/work up prior to surgery. Try and avoid intraoperative blood transfusion if possible.	n/a
	7 Electrolyte abnormalities	Correct and monitor electrolyte abnormalities.	n/a
	8 Uncontrolled glucose	Monitor glucose closely and control with insulin is needed. Consider ISS. Recommend to hold oral hypoglycemic while acutely in the hospital. -Since this patient is NPO, rec'd FBG Q6 with ISS. Don't need to schedule standing insulin since pt was only on oral hypoglycemic at home. don't rec'd continuing oral hypoglycemic acutely while in the hospital.	If Diabetic order AC/HS FBG unless NPO then do Q6hr FBG.

Check ones they identified	Pre-existing factors	Prevention/Treatment orders	Nursing orders/Care orders
	9 Poor vision/hearing		-Make sure the patient has his glasses, hearing aids, dentures etc. -Speak clearly and directly to the patient so they can read lips -Arrange for earwax disimpaction if needed
	11 Low blood pressure, tachycardia	Monitor for dehydration and hydrate as needed. Monitor for Beta blocker withdrawal.	-Check orthostatic blood pressures.
	12 Medications:  morphine (esp. given AKI/CKD) and Benadryl  And Medication withdrawal: Betablocker, SSRI	-Eliminate unnecessary medications -Treat pain initially with Tylenol if necessary start with low dose opiate. -Limit morphine use in older adults with renal impairment -Avoid Benadryl in older patients.  Treatment of itching: -1 <sup>st</sup> line: Barrier repair creams/moisturizers/emollients -can try Topical corticosteroids if there is skin inflammation. - Menthol 1-3% cream: Useful in patients who report cooling as an alleviating factor - Pramoxine 1 to 2.5%: Useful for pruritus on face and that associated with CKD -If those don't work can try non-sedating anti-histamines like <u>loratadine</u> . - Monitor for medication withdrawal.	n/a.
	13 Elevated bilirubin/elevated AST/ALT	n/a	n/a
	14 Environmental changes	-order sitter if needed to help provide patient safety,.	-Minimize noise, Minimize staff and room changes. -Provide visual clocks and calendars. -Appropriate lighting, blinds open during day, bed by window. Lower bed. Move room near nurse station. -Encourage family to stay with patient. -Make sure call bell, personal items, glasses, hearing aids within reach at all times.

**Suggested readings:**

1. Schwartz's Principles of Surgery, 10e : Chapter 47: Surgical Considerations in the Elderly.
2. Tan KY. Novel perioperative models make a difference in outcomes of elderly surgical patients. *Annals of Surgery*. 2014;259(4):e62-e63.
3. Shipway D, Harari D, Dhese J. Peri-operative management of older people undergoing surgery. *Reviews in Clinical Gerontology*. 2014;24(1):78-92.
4. Partridge JS, Harari D, Martin FC, Dhese JK. The impact of pre-operative comprehensive geriatric assessment on postoperative outcomes in older patients undergoing scheduled surgery: a systematic review. *Anaesthesia*. 2014;69 Suppl 1:8-16.

**Continue with the case:**

Intraoperatively he was intubated and placed under general anesthesia. Laparoscopic surgery was attempted but unsuccessful so it had to be converted to open chole. He had some hypotension during the procedure along with >1000ml of blood loss and was transfused 1 unit of PRBC. Postoperatively he was extubated and transferred to the floor.

**Question 4: What are some factors intra-operatively that can cause postoperative delirium?**

Facilitator: give them a couple minutes to answer the question and then go around the group having everyone come up with one risk factor intraoperatively that can lead to postoperative delirium.

Intraoperative risk factors		
1		Blood loss >1000ml
2		Intraoperative blood transfusion.
3		Intraoperative hypotension/fluctuations in blood pressure
4		General Anesthesia (not monitored with EEG) and American Society of Anesthesiologists (ASA) Physical Status score of 3
	<p>ASA PS 3</p> <p>Patients with severe systemic disease</p>	<p>Some functional limitation; has a controlled disease of more than one body system or one major system; no immediate danger of death; controlled congestive heart failure (CHF), stable angina, old heart attack, poorly controlled hypertension, morbid obesity, chronic renal failure; bronchospastic disease with intermittent symptoms</p>
5		Urgent Surgery
6.		Longer duration surgery

### **Suggested Readings:**

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1. Strom C, Rasmussen LS, Sieber FE. Should general anaesthesia be avoided in the elderly? *Anaesthesia*. 2014;69 Suppl 1:35-44
2. Turrentine FE, Wang H, Simpson VB, Jones RS. Surgical risk factors, morbidity, and mortality in elderly patients. *J Am Coll Surg*. 2006;203( 6):865-877.
3. *Scientific American Surgery* :Chapter 103:Perioperative Considerations for Anesthesia.
4. Hirsch J, DePalma G, Tsai TT, Sands LP, Leung JM. Impact of intraoperative hypotension and blood pressure fluctuations on early postoperative delirium after non-cardiac surgery. *British journal of anaesthesia*. 2015.

### **Continue with the case:**

After extubation, you noticed he was lethargic and would drift in and out of sleep while talking to you. You also noticed that at times when you would ask him questions, he wouldn't answer and was distracted by the TV(would start watching something on the TV) or would just answer as Yes or No.

The nurse tells you that they have had no problems with the patient overnight and he slept throughout the night fine but that she did a 4AT and reports: the patient revealed that he had noticed a "problem" with his thinking and frequently found himself to be unsure of where he was and why people were coming in and out of his room. He was only oriented to self and place (didn't know the year). He knew his age and birth date. When she asked him "Please tell me the months of the year in backwards order, starting at December." He was only able to get 5 correctly. The next day you saw the patient and he complained of increasing pain during PT and stated his anxiety had been getting worse and asked for something to help with his anxiety so IV Ativan 1mg Q6h was ordered.

### **Question 5: Using the 4AT that we taught you, does this patient have delirium or just lethargy from surgery?**

Facilitator: give them a couple minutes to calculate the 4AT. Remind them that once one of the questions is wrong from each feature they can move on to the next one. Then go around the group and ask how many think the patient is delirious?

**So answer is yes he is delirious.**

CIRCLE

**[1] ALERTNESS**

*This includes patients who may be markedly drowsy (eg. difficult to rouse and/or obviously sleepy during assessment) or agitated/hyperactive. Observe the patient. If asleep, attempt to wake with speech or gentle touch on shoulder. Ask the patient to state their name and address to assist rating.*

Normal (fully alert, but not agitated, throughout assessment)	0
Mild sleepiness for <10 seconds after waking, then normal	0
Clearly abnormal	<u>4</u>

**[2] AMT4**

*Age, date of birth, place (name of the hospital or building), current year.*

No mistakes	0
1 mistake	<u>1</u>
2 or more mistakes/untestable	2

**[3] ATTENTION**

*Ask the patient: "Please tell me the months of the year in backwards order, starting at December."  
To assist initial understanding one prompt of "what is the month before December?" is permitted.*

Months of the year backwards	Achieves 7 months or more correctly	0
	Starts but scores <7 months / refuses to start	<u>1</u>
	Untestable (cannot start because unwell, drowsy, inattentive)	2

**[4] ACUTE CHANGE OR FLUCTUATING COURSE**

*Evidence of significant change or fluctuation in: alertness, cognition, other mental function (eg. paranoia, hallucinations) arising over the last 2 weeks and still evident in last 24hrs*

No	0
Yes	<u>4</u>

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**4AT SCORE** 10

**4 or above:** possible delirium +/- cognitive impairment

**1-3:** possible cognitive impairment

**0:** delirium or severe cognitive impairment unlikely (but delirium still possible if [4] information incomplete)

**Suggested Reading:**

1. Bellelli G, Morandi A, Davis DH, Mazzola P, Turco R, Gentile S, Ryan T, Cash H, Guerini F, Torpilliesi T, Del Santo F, Trabucchi M, Annoni G, Maclulich AM. Validation of the 4AT, a new instrument for rapid delirium screening: a study in 234 hospitalised older people. Age Ageing. 2014 Mar 14.

**Question 6: What are some treatment options non-pharmacological that you can implement to help treat this patient’s delirium?**

**Facilitator: Give everyone a couple minutes to come up with some non- pharmacological treatment options and then go around the group and have everyone name at least one and then review any they didn’t mention.**

- Interdisciplinary team approach involving nursing, geriatrics and surgery should be use for at-risk older adults to prevent delirium.
- Non-pharmacological treatment involves recognizing and treating precipitating factors as (refer to the mnemonic “Delirium”).
- It also involves reviewing medications to eliminate unnecessary medication, renally dosing medications if patient has renal failure, and avoiding high risk medications.

**Things to Think About in Terms of Risk Factor (RF), Prevention (P), and Management (M) of Delirium**

**Deficits** that can be corrected or accommodated: e.g. hearing, vision, dentures, oxygen, hydration, nutrition, metabolic imbalances, electrolytes, constipation, UA retention (RF,P,M)

**Environmental factors:** e.g. rest/sleep deprivation, stimulation control (avoid over and under stimulation), lighting, familiarity of surroundings, orientation (e.g. clock, pictures, reminders), implement non-pharmacological sleep protocol by the nurse instead of sleep aids.(RF,P,M)

**Longevity/age>70** (RF)

**Impaired functional status,** general health status: early mobilization, PT/OT consults (RF,M);

**Restraints,** avoid, along with other tethers (foley, IV, ect) (RF,P,M)

**Intellect/CNS function:** e.g. dementia, stroke, depression (RF)

**Uncomfortable;** manage **pain** pain control with scheduled tylenol (limit 3g/day), if needed use low dose opioid (e.g. 2.5mg oxycodone Q4 PRN, So if the patient is NPO and rec’d low dose dilaudid 0.2mg IV if IV Tylenol is not controlling the patient’s pain in a patients with renal impairment.) (RF,P,M)

**Medications / anesthetic agents** Avoid high risk medications in the elderly (see list below), especially benzodiazepines and monitor for drug withdrawal. (RF,P,M)

**Acute stressors:** surgery, infection, metabolic disorders, other acute illness (RF, M)

**Some Top High Risk Medications:**

Drug	Concern	Potential Alternatives
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<p>Carisoprodol</p> <p>Chlorzoxazone</p> <p>Cyclobenzaprine</p> <p>Metaxalone</p> <p>Methocarbamol</p> <p>Orphenadrine</p>	<p><b>Skeletal Muscle Relaxants:</b></p> <p><i>Anticholinergic side effects: worsened cognition &amp; behavioral problems (especially in dementia); urinary retention OR incontinence; confusion; sedation; weakness; questionable efficacy (at lower doses)</i></p>	<p>Non-pharmacologic treatment:</p> <p>Baclofen, tizanidine</p>
<p>Diphenhydramine,</p> <p>hydroxyzine</p>	<p><b>Older Antihistamines:</b></p> <p><i>Anticholinergic side effects: worsened cognition &amp; behavioral problems (especially in dementia); urinary retention OR incontinence; confusion; enhanced sedation</i></p>	<p>For itching</p> <p>triamcinolone cream 0.025% or OTC emollients</p> <p>For allergic rhinitis:</p> <p>nasal steroid sprays, or low-sedating antihistamines such as levocetirizine or OTC loratadine or cetirizine</p>
<p>Zolpidem,zaleplon, Lunesta</p>	<p><b>Non-benzodiazepine hypnotics</b></p> <p><i>Avoid chronic use &gt;90 days</i></p> <p><i>Associates with sleep walking,delirium and falls</i></p>	<p>Non-pharmacologic treatment :</p> <p>Sleep hygiene; cognitive behavior therapy;</p> <p>non-pharm sleep protocol.</p> <p>Pharm Treatment:</p> <p>Trazodone</p>
<p>Promethazine</p> <p>Reglan</p>	<p><b>Anti-Nausea medications</b></p> <p><i>Strong anticholinergic and sedation properties</i></p> <p><i>Associated with extrapyramidal adverse events.</i></p>	<p>Prochlorperazine</p> <p>Ondasetron</p>

Diazepam	<b>Benzodiazepines</b>  <i>Accumulation in elderly due to altered metabolism and active metabolites leads to daytime sedations, increase fall risk.</i>	Buspirone Fuloxetine Sleep hygiene Melatonin (OTC) Mirtazapine Trazadone
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**Suggested Readings:**

1. Inouye, Sharon K. et al. Postoperative Delirium in Older Adults: Best Practice Statement from the American Geriatrics Society, Journal of the American College of Surgeons , Volume 220 , Issue 2 , 136 - 148.e1 2015.
2. Fong TG, Tulebaev SR, Inouye SK. Delirium in elderly adults: diagnosis, prevention and treatment. Nature reviews. Neurology. 2009;5(4):210-220.

**Question 7: what are some pharmacological treatments that you could use if patient continues to have hyperactive delirium and risk at hurting self or others? List drug name, appropriate starting dose for an elderly patient and adverse reactions to monitor for.**

**Facilitator: Give everyone a couple minutes to come up with some pharmaceutical treatment options and then go around the group and have everyone name at least one and then review any they didn't mention. And discuss starting doses.**

A systematic review of acute drug treatments for delirium indicated that few high-quality, randomized, controlled trials have been performed to date, and current clinical practice is, therefore, based largely on case series and retrospective reports medications are usually reserved for patients in whom the symptoms of delirium might compromise safety or prevent necessary medical treatment (that is, those with hyperactive delirium).

-----Increasing sedative effects----->  
**Haloperidol(0.5-1mg) risperidone(0.5-1mg) olanzapine(2.5-5mg) quetiapine(12.5-25mg)**  
<-----Worsening EPS-----

Drug	Dose	Adverse effects	Comments
Typical antipsychotics			
Haloperidol	0.5–1 mg PO or	Extrapyramidal	Randomized, controlled trials



Drug	Dose	Adverse effects	Comments
	IM; can repeat every 4h (PO) or every 60 min (IM)	syndrome, prolonged QT interval	demonstrate reduction in symptom severity and duration

Atypical antipsychotics			
Risperidone	0.5 mg BID	Extrapyramidal syndrome, prolonged QT interval	Randomized, controlled trials comparing efficacy against haloperidol showed comparable response rates
Olanzapine	2.5–5 mg daily		
Quetiapine	25 mg BID		

**Extrapyramidal symptoms:**

- **Acute dystonic reactions:** muscular spasms of neck, jaw, back, extremities, eyes, throat, and tongue; highest risk in young men.
- **Akathisia:** A feeling of internal motor restlessness that can present as tension, nervousness, or anxiety
- **Pseudoparkinsonism:** drug-induced parkinsonism (rigidity, bradykinesia, tremor, masked facies, shuffling gait, stooped posture, sialorrhoea, and seborrhoea; greater risk in the elderly).
- **Tardive dyskinesia:** involuntary muscle movements in the lower face and distal extremities; this is a chronic condition associated with long term use of antipsychotics

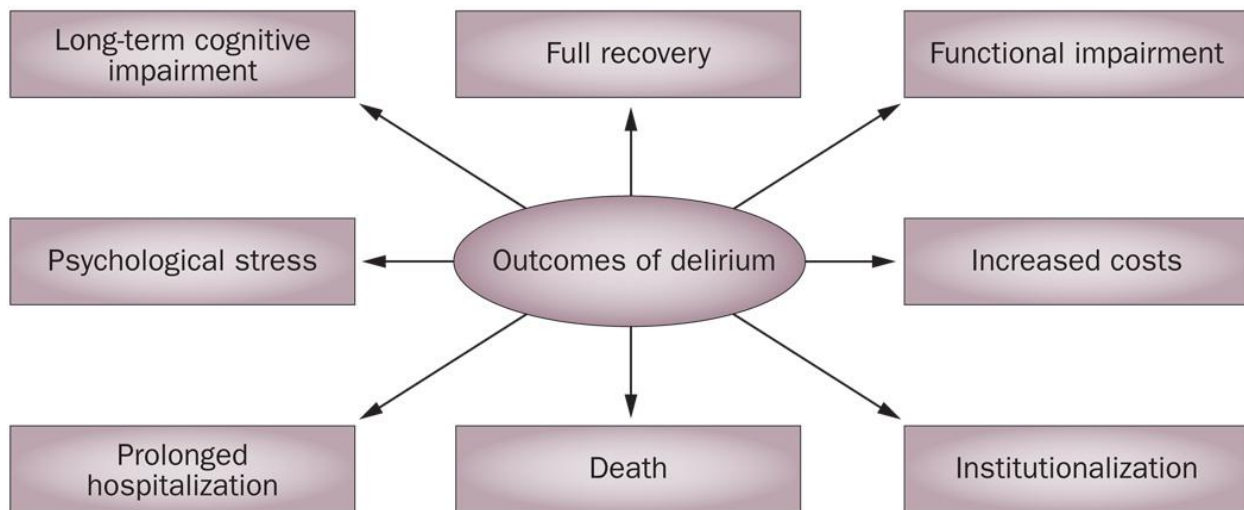
**Suggested Reading:**

1. Hshieh TT, Yue J, Oh E, et al. Effectiveness of multicomponent nonpharmacological delirium interventions: a meta-analysis. *JAMA Intern Med.* Published online February 2,2015.
2. Inouye, Sharon K. et al. Postoperative Delirium in Older Adults: Best Practice Statement from the American Geriatrics Society, *Journal of the American College of Surgeons* , Volume 220 , Issue 2 , 136 - 148.e1 2015.
3. Fong TG, Tulebaev SR, Inouye SK. Delirium in elderly adults: diagnosis, prevention and treatment. *Nature reviews. Neurology.* 2009;5(4):210-220

**Question 8: What are some ramifications that can occur since this patient developed postoperative delirium?**

**Facilitator: Give everyone a couple minutes to think of some ramifications and then go around the group and have everyone name at least one and then review any they didn't mention.**

Adverse outcomes of delirium (there are many ☺)	
1	mortality
2	Increased institutionalization esp since his delirium may not allow him to be able to participate in PT/OT.
3	Cognitive impairment (if they didn't have any prior then can last up to 1 year and be similar to a patient with TBI- In a pt with dementia who develops delirium can lead to further cognitive decline which can last up to 5 years.
4	Increased length of stay
5	Functional impairment
6.	Increase postoperative complication rates: infections, ect.
7.	Increase readmission rates
8.	Decreased patient satisfaction
9.	Increased caregiver burden.
10.	Falls



**Suggested readings:**

1. Bellelli G, Mazzola P, Morandi A, et al. Duration of postoperative delirium is an independent predictor of 6-month mortality in older adults after hip fracture. *J Am Geriatr Soc.* 2014;62(7):1335-1340
2. McAvay GJ, Van Ness PH, Bogardus ST, Jr., et al. Older adults discharged from the hospital with delirium: 1-year outcomes. *J Am Geriatr Soc.* 2006;54(8):1245-1250.
3. Hopkins RO, Jackson JC. Assessing neurocognitive outcomes after critical illness: are delirium and long-term cognitive impairments related? *Curr Opin Crit Care.*2006;12:388–94

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4. Fong TG, Tulebaev SR, Inouye SK. Delirium in elderly adults: diagnosis, prevention and treatment. *Nature reviews. Neurology*. 2009;5(4):210-220

**Question 9: If time, can someone tell an example of a case that they had recently of one of their patients developing postoperative delirium and what happened? what could you try differently based on what you learned today?**

# Postoperative Delirium General Surgery Curriculum Educational Plan

## Resident Guide: Educational Plan and Specific Learning Objectives

*All residents will complete the following activities listed below:*

### A. Assessment of Knowledge

- Complete the pre-test prior to starting the curriculum.
- Complete the post-test after completion of the curriculum.

### B. Self-Study Material

- Prior to the small group learning session, go online to <http://www.surgicalcore.org> and complete the surgical council on resident education (SCORE) module on Postoperative delirium and do the post-module quiz.

### Objectives

After completion of the online module, *the surgical resident will be able to:*

1. Identify the pathophysiological causes of postoperative delirium.
2. Identify risk factors for the development of postoperative delirium.
3. Recognize interventions to prevent postoperative delirium.
4. Describe the common presentation of delirium and be able to distinguish delirium from dementia and depression.
5. Recognize evidence based assessment tools (e.g. 3D CAM, 4AT, etc.) as reliable ways to screen for postoperative delirium.
6. Describe the major effects that delirium has on surgical and patient outcomes.

### C. Small group learning

- Attend the small group learning session on the date assigned to you and complete the case guide during that session.
- Complete the feedback form after completion of the small group learning session.
- You will be given pocket cards to have available to aid you when seeing patients in the hospital.

### Objectives

After completion of the small group learning session, *the surgical resident will be able to:*

1. Correctly employed a validated delirium assessment tool (e.g. 4AT) to screen postoperative delirium in non-ICU older confused surgical patient.
2. Calculated the correct delirium risk assessment score for a case scenario.

3. Proposed strategies for mitigating preoperative, intraoperative, and postoperative risk factors for a common general surgery case scenario.
4. Identified "best-practice" non-pharmacologic and pharmacologic treatment strategies to manage postoperative delirium given a case scenario.

*As a result of the curriculum, surgical residents will rate as important that surgeons should know:*

5. Treatment strategies for postoperative delirium.
6. How to screen for postoperative delirium using a validated assessment tool.
7. Strategies to prevent postoperative delirium.

**D. Mini-Cex**

- You will be given a mini-cex form to complete within 6 months after completion of the small group learning session and to be turned in to your program coordinator.

**Objectives**

*After completion of the postoperative delirium curriculum, the surgery resident will:*

- i. Have demonstrated to their attending or geriatric consultant the correct use of a validated delirium assessment tool to screen for postoperative delirium in non-ICU older confused surgical patient.

**E. Assessment of Behavior**

- Geriatric consultant team will be given a check sheet form when the residents call for geriatric consult on a surgical patient to see if after completion of this curriculum if there has been a change in behavior related to the prevention, assessment and treatment of postoperative delirium.

**Objectives**

*After completion of the postoperative delirium curriculum, the surgical resident will:*

- i. Perform prevention measures and monitor delirium development via evidence based assessment method (e.g 4AT) prior to geriatric consult.

## General Surgery Resident Delirium Small group Session

### Case : Mr. H.C.

**Chief complaint:** abdominal pain.

**HPI:** Mr H.C. is a 78 year-old male who presented to the ED w/ RUQ abdominal pain. He states it is worse after eating. The pain began as a dull ache in the epigastrium but then localized to the right upper quadrant and started about 2 days ago. He reports some nausea but no vomiting. He admits to a number of previous episodes in the recent past. He states he hasn't eaten much recently because of the pain.

**PMH:** His medical history includes severe osteoarthritis for 10 years, HTN, mild dementia (with MMSE 21/30), hearing impairment, depression, anxiety, CAD, hypothyroidism, BPH, CKD stage III (baseline cr is 1.8), DM, and dyslipidemia.

**PSHX:** none

**Medications:** tramadol, Atenolol 50 mg PO daily, Prozac, ASA, Aricept, levothyroxine, terazosin, metformin, glyburide, and simvastatin.

**Social history:** He has been married for 50 years, lives with his wife. He quit smoking 10 years ago. He drinks about 2 beers/day. He wears glasses and hearing aids. He is independent in ADLs but dependent in IDLs. He uses a cane to get around the house because of his severe OA.

**Review of Systems:** Fatigue, diffuse weakness, and chronic knee and back pain.

### **Physical exam:**

Vital: T 98.0F, BP 95/60 HR 103, RR 18 O2 97%

General: no acute distress

HEENT: mucous membranes dry.

Abd: patient has right upper quadrant abdominal tenderness and guarding. Murphy's Sign (a pause with inspiration on palpation of the right upper quadrant) is positive

Neuro: Motor 4/5 in all extremities. Sensory: normal and symmetric reflexes. The patient can recall his name and location but did not know the date, or the year.

Based on the patient's symptoms you order labs including a CBC, CMP, amylase, lipase, urinalysis, as well as an ultrasound of the patient's gallbladder

**Labs:**

Labs: 149 | 110 | 98 | /310                      \ 10.2/  
          3.2 | 28 | 2.1 | \                      13.0 / 30 | 201

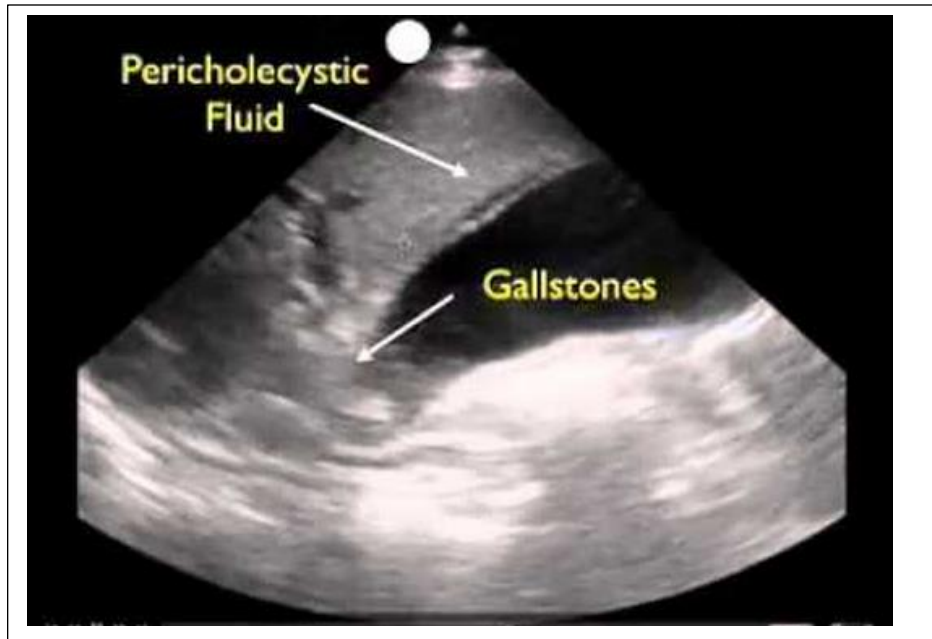
TB 2.1, Direct Bilirubin 3.0 alkaline phosphatase 140 U/L, AST 45 U/L and ALT 30 U/L.  
Amylase and lipase WNL.

**Question 1: What is this patient’s Delirium risk assessment score: low, medium or high?**

**Delirium Risk Assessment: Delirium Risk Screen**

<b>Delirium Risk Assessment: Delirium Risk Screen (Marcantonio et al.)</b>	
<b>Age ≥ 70</b>	If Yes: 1 point
<b>Alcohol abuse</b>	If Yes: 1 point
<b>Cognitive impairment:</b> MMSE < 25/30 or Telephone Interview for Cognitive Status (TICS) score <30	If Yes: 1 point
<b>Electrolytes:</b> Abnormal sodium, potassium or glucose <small>* sodium, &lt;130 or &gt;150 mmol/L; potassium, &lt;3.0 or &gt;6.0 mmol/L; and glucose, &lt;60 or &gt;300 mg/dL.</small>	If Yes: 1 point
<b>Poor functional status</b> =Specific Activity scale of Class IV. (means <2 mets (light intensity activity e.g Can’t dress without stopping because of symptoms.) <small>1 MET = the energy (oxygen) used by the body as you sit quietly, perhaps while talking on the phone or reading a book.</small>	If Yes: 1 point
<b>Type of surgery:</b> is it either non-cardiac thoracic surgery or AAA repair?	If Yes: 1 point
<b>Score:</b> 0 = low risk 1-2 = medium risk	
<b>Delirium Risk:</b> <input type="checkbox"/> Low (2%) <input type="checkbox"/> Medium (11%) <input type="checkbox"/> High (50%)	

Ultrasound showed:



**Question 2: What are some risk factors for delirium in this patient?**



**Continue with the case:**

So he was admitted to the general surgery floor. He had some urinary incontinence, so a Foley catheter was placed into his bladder in the ED. He was started on IVFs since he appeared dehydrated along with morphine 2-4mg IV prn for pain. Pt was made NPO, started on insulin sliding scale, and scheduled for lap chole in the AM. Pt complained of some itching so Benadryl 50mg IV Q8 Prn was ordered. He also complained of uncontrolled pain in his abdominal and says it's about 7/10.

**Question 3: You are the upper level resident. Realizing the patient's delirium risk score is high, what adjustments would make to the intern's admission orders to reduce the patient's risk of developing delirium?(i.e what preventive measures would you implement?)**

**Continue with the case:**

Intraoperatively he was intubated and placed under general anesthesia. Laparoscopic surgery was attempted but unsuccessful so it had to be converted to open chole. He had some hypotension during the procedure along with >1000ml of blood loss and was transfused 1 unit of PRBC. Postoperatively he was extubated and transferred to the floor.

**Question 4: What are some factors intra-operatively that can cause postoperative delirium?**

**Continue with the case:**

After extubation, you noticed he was lethargic and would drift in and out of sleep while talking to you. You also noticed that at times when you would ask him questions, he wouldn't answer and was distracted by the TV(would start watching something on the TV) or would just answer as Yes or No.

The nurse tells you that they have had no problems with the patient overnight and he slept throughout the night fine but that she did a 4AT and reports: the patient revealed that he had noticed a "problem" with his thinking and frequently found himself to be unsure of where he was and why people were coming in and out of his room. He was only oriented to self and place (didn't know the year). He knew his age and birth date. When she asked him "Please tell me the months of the year in backwards order, starting at December." He was only able to get 5 correctly. The next day you saw the patient and he complained of increasing pain during PT and stated his anxiety had been getting worse and asked for something to help with his anxiety so IV Ativan 1mg Q6h was ordered along with IV dilaudid 2mg Q6hr Prn pain. Pt still has a foley in place and nurse states patient hasn't had a bowel movement since admission.

**Question 5: Using the 4AT that we taught you, does this patient have delirium or just lethargy from surgery?**

**CIRCLE**

**[1] ALERTNESS**

*This includes patients who may be markedly drowsy (eg. difficult to rouse and/or obviously sleepy during assessment) or agitated/hyperactive. Observe the patient. If asleep, attempt to wake with speech or gentle touch on shoulder. Ask the patient to state their name and address to assist rating.*

Normal (fully alert, but not agitated, throughout assessment)	<b>0</b>
Mild sleepiness for <10 seconds after waking, then normal	<b>0</b>
Clearly abnormal	<b>4</b>

**[2] AMT4**

*Age, date of birth, place (name of the hospital or building), current year.*

No mistakes	<b>0</b>
1 mistake	<b>1</b>
2 or more mistakes/untestable	<b>2</b>

**[3] ATTENTION**

*Ask the patient: "Please tell me the months of the year in backwards order, starting at December."  
To assist initial understanding one prompt of "what is the month before December?" is permitted.*

Months of the year backwards	Achieves 7 months or more correctly	<b>0</b>
	Starts but scores <7 months / refuses to start	<b>1</b>
	Untestable (cannot start because unwell, drowsy, inattentive)	<b>2</b>

**[4] ACUTE CHANGE OR FLUCTUATING COURSE**

*Evidence of significant change or fluctuation in: alertness, cognition, other mental function (eg. paranoia, hallucinations) arising over the last 2 weeks and still evident in last 24hrs*

No	<b>0</b>
Yes	<b>4</b>

---

**4AT SCORE \_\_\_\_\_**

**4 or above:** possible delirium +/- cognitive impairment

**1-3:** possible cognitive impairment

**0:** delirium or severe cognitive impairment unlikely (but delirium still possible if [4] information incomplete)

**Question 6: What are some treatment options non-pharmacological that you can implement to help treat this patient's delirium?**

**Question 7: What are some pharmacological treatments that you could use if patient continues to have hyperactive delirium and risk at hurting self or others? List drug name, appropriate starting dose for an elderly patient and adverse reactions to monitor for.**

**Question 8: What are some ramifications that can occur since this patient developed postoperative delirium?**

**Question 9: If time, can someone tell an example of a case that they had recently of one of their patients developing postoperative delirium and what happened? what could you try differently based on what you learned today?**



(label)

Patient name:

Date of birth:

Patient number:

Date:

Time:

Tester:

Assessment test for delirium & cognitive impairment

CIRCLE

[1] ALERTNESS

This includes patients who may be markedly drowsy (eg. difficult to rouse and/or obviously sleepy during assessment) or agitated/hyperactive. Observe the patient. If asleep, attempt to wake with speech or gentle touch on shoulder. Ask the patient to state their name and address to assist rating.

Table with 2 columns: Description and Score. Rows: Normal (fully alert, but not agitated, throughout assessment) 0; Mild sleepiness for <10 seconds after waking, then normal 0; Clearly abnormal 4

[2] AMT4

Age, date of birth, place (name of the hospital or building), current year.

Table with 2 columns: Description and Score. Rows: No mistakes 0; 1 mistake 1; 2 or more mistakes/untestable 2

[3] ATTENTION

Ask the patient: "Please tell me the months of the year in backwards order, starting at December." To assist initial understanding one prompt of "what is the month before December?" is permitted.

Table with 2 columns: Description and Score. Rows: Months of the year backwards Achieves 7 months or more correctly 0; Starts but scores <7 months / refuses to start 1; Untestable (cannot start because unwell, drowsy, inattentive) 2

[4] ACUTE CHANGE OR FLUCTUATING COURSE

Evidence of significant change or fluctuation in: alertness, cognition, other mental function (eg. paranoia, hallucinations) arising over the last 2 weeks and still evident in last 24hrs

Table with 2 columns: Description and Score. Rows: No 0; Yes 4

4 or above: possible delirium +/- cognitive impairment
1-3: possible cognitive impairment
0: delirium or severe cognitive impairment unlikely (but delirium still possible if [4] information incomplete)

4AT SCORE

Empty box for 4AT score

GUIDANCE NOTES

Version 1.2. Information and download: www.the4AT.com

The 4AT is a screening instrument designed for rapid initial assessment of delirium and cognitive impairment. A score of 4 or more suggests delirium but is not diagnostic: more detailed assessment of mental status may be required to reach a diagnosis. A score of 1-3 suggests cognitive impairment and more detailed cognitive testing and informant history-taking are required. A score of 0 does not definitively exclude delirium or cognitive impairment: more detailed testing may be required depending on the clinical context. Items 1-3 are rated solely on observation of the patient at the time of assessment. Item 4 requires information from one or more source(s), eg. your own knowledge of the patient, other staff who know the patient (eg. ward nurses), GP letter, case notes, carers. The tester should take account of communication difficulties (hearing impairment, dysphasia, lack of common language) when carrying out the test and interpreting the score.

Alertness: Altered level of alertness is very likely to be delirium in general hospital settings. If the patient shows significant altered alertness during the bedside assessment, score 4 for this item. AMT4 (Abbreviated Mental Test - 4): This score can be extracted from items in the AMT10 if the latter is done immediately before. Acute Change or Fluctuating Course: Fluctuation can occur without delirium in some cases of dementia, but marked fluctuation usually indicates delirium. To help elicit any hallucinations and/or paranoid thoughts ask the patient questions such as, "Are you concerned about anything going on here?"; "Do you feel frightened by anything or anyone?"; "Have you been seeing or hearing anything unusual?"

**Risk Factors/Prevention (“DELIRIUM A”)**

**Things to Think About in Terms of Risk Factor (RF), Prevention (P), and Management (M) of Delirium**

**Deficits** that can be corrected or accommodated: e.g. hearing (Portable amplifying devices), vision(glasses), dentures, oxygen, hydration, nutrition, metabolic imbalances, electrolytes, constipation, UA retention (RF,P,M)

**Environmental factors:** e.g. rest/sleep deprivation, stimulation control (avoid over and under stimulation), lighting, familiarity of surroundings, orientation (e.g. clock, pictures, reminders), implement non-pharmacological sleep protocol by the nurse instead of sleep aids (Warm milk or herbal tea, relaxation tapes or music, and back massage, Unit-wide noise reduction strategies and schedule adjustments to allow uninterrupted sleep) (RF,P,M)

**Longevity/age>70** (RF)

**Impaired functional status,** general health status: early mobilization, PT/OT consults (RF,M);

**Restraints,** avoid, along with other tethers (foley, IV, ect) (RF,P,M)

**Intellect/CNS function:** e.g. dementia, stroke, depression (RF)

**Uncomfortable;** manage **pain:** scheduled tylenol (limit 3g/day), if needed use low dose opioid (e.g. 2.5mg oxycodone Q4 PRN. (RF,P,M)

**Medications / anesthetic agents** Avoid high risk medications in the elderly, especially benzodiazepines and monitor for drug withdrawal. (RF,P,M)

**Acute stressors:** surgery, infection, metabolic disorders, other acute illness (RF, M)

**Diagnosis: Key Components**

1: Acute Onset or Fluctuating Course
2: Inattention
3: Disorganized thinking
4: Altered Level of consciousness
There are several validated assessment tools you can use e.g. 4AT: <a href="http://www.the4at.com/">http://www.the4at.com/</a>

(page 2)

**3 types of Delirium:**

Hyperactive: restless and/or agitated.

Hypoactive: lethargic and/or apathetic.

Mixed: both hyperactivity and hypoactivity

**Differential Diagnosis: 3Ds**

Feature	Delirium	Dementia	Depression
Onset	Acute (hours to days)	Insidious (months to years)	Acute or Insidious
Acuity	Acute	Chronic, progressive	Episodic
Course	Fluctuate hourly throughout the day (worse at night)	Stable throughout the day (Behavior problems may be worse at night). Progressive worsening	Relative stable. May be self-limiting, recurrent or chronic. (worse in Am)
Duration	Days to months	Years, most types of irreversible.	Variable
Consciousness	Reduced, fluctuates	Clear until late stages	Clear
Hallucination	Very common (usually visual)	No common until late stages (usually visual)	Uncommon (usually auditory)
Attention/ concentration	Impaired	Normal until late stages	May be disorganized

**Some high risk medications to avoid:**

1. Anticholinergics (*promethazine, hyoscyamine*)
2. Skeletal muscle relaxants. (*carisoprodol, methocarbamol*)
3. Older Antihistamines (*diphenhydramine, hydroxyzine*)
4. Benzo- and Non-benzodiazepine hypnotics (*zolpidem, valium, xanax*)

(page 3)



**Treatment: Non-pharmacological options**

1. Recognize and treat precipitating factors (refer to "Delirium A" above).
2. Review medications and eliminate unnecessary medication, renally dose meds (if patient has renal failure), and avoid high risk medications.

**Treatment: Pharmacological options**

1. Limit use of antipsychotics, use the lowest dose for the shortest duration. (starting doses listed below)
2. Antipsychotics are not indicated to treat hypoactive delirium.

-----Increasing sedative effects----->

**Haldol    Risperidone    Olanzapine    Quetiapine**

<-----Worsening Extrapyrimal symptoms (EPS)-----<

Drug	Starting Dose
Haloperidol	0.5mg PO or IM; can repeat every 4h (PO) or every 60 min (IM)
Risperidone	0.5 mg BID
Olanzapine	2.5 mg daily
Quetiapine	12.5mg BID

**Delirium impact on surgical outcomes:**

1. Increased mortality (1 year mortality:40%)
2. Higher Complication rates (e.g. aspiration pneumonia, dehydration)
3. Enhanced Length of stay
4. Increased Costs of care (\$160 billion/year)
5. Higher Readmission rates
6. More frequent Falls
7. Higher use of Bladder catheter
8. Cognitive decline
9. Poor patient satisfaction
10. Worse functional status leading to increased institutionalization rates.

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**Postoperative Delirium**

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**Pre-op risk assessment**

<b>Delirium Risk Assessment:</b> (Marcantonio et al.)	
<b>Age ≥ 70</b>	If YES: 1 point
<b>Alcohol abuse</b>	If YES: 1 point
<b>Cognitive impairment:</b> MMSE < 25/30 or Telephone Interview for Cognitive Status (TICS) score <30	If YES: 1 point
<b>Electrolytes:</b> Abnormal sodium, potassium or glucose * sodium, <130 or >150 mmol/L; potassium, <3.0 or >6.0mmol/L; and glucose, <60 or >300 mg/dL.	If YES: 1 point
<b>Poor functional status</b> =Specific Activity scale of Class IV. (means <2 mets (light intensity activity e.g Can't dress without stopping because of symptoms.) <u>1 MET = the energy (oxygen) used by the body as you sit quietly, perhaps while talking on the phone or reading a book.</u>	If Yes: 1 point
<b>Type of surgery:</b> is it either non-cardiac thoracic surgery or AAA repair?	If Yes: 1 point
<b>Score:</b> 0 = low    1-2 = medium    ≥3 = high	
<b>Delirium Risk</b> <input type="checkbox"/> Low (2%) <input type="checkbox"/> Medium (11%) <input type="checkbox"/> High (50%)	

**(page 1)**





**EVALUATION OF CLINICAL PERFORMANCE WITH MINI-CEX: Postoperative Delirium**

Evaluator: \_\_\_\_\_

Date: \_\_\_\_\_

Level of Training: \_\_\_\_\_

Patient Problem/Dx: \_\_\_\_\_

Age of patient: \_\_\_\_\_ Sex:  Female  Male

**1. Medical interviewing skills for Delirium:**

○ 0	○ 2	○ 3	○ 4	○ 5
Insufficient Evidence (limited interaction with resident)	Below Expectation (skills are below expected at their level of training, needs attention)	Expected level of performance (at the same level as their peers)	Exceeds Expectations (skills above the level of their peers)	Outstanding (skills markedly above the level of their peers, can function independently)

**2. Physical examination skills: Performing a validated delirium assessment tool (e.g 4AT) :**

○ 0	○ 2	○ 3	○ 4	○ 5
Insufficient Evidence (limited interaction with resident)	Below Expectation (skills are below expected at their level of training, needs attention)	Expected level of performance (at the same level as their peers)	Exceeds Expectations (skills above the level of their peers)	Outstanding (skills markedly above the level of their peers, can function independently)

**3. Clinical judgment: Prevention and/or Management of Delirium**

○ 0	○ 2	○ 3	○ 4	○ 5
Insufficient Evidence (limited interaction with resident)	Below Expectation (skills are below expected at their level of training, needs attention)	Expected level of performance (at the same level as their peers)	Exceeds Expectations (skills above the level of their peers)	Outstanding (skills markedly above the level of their peers, can function independently)

4. Counselling skills: To patient or family about Delirium

○ 0	○ 2	○ 3	○ 4	○ 5
Insufficient Evidence (limited interaction with resident)	Below Expectation (skills are below expected at their level of training, needs attention)	Expected level of performance (at the same level as their peers)	Exceeds Expectations (skills above the level of their peers)	Outstanding (skills markedly above the level of their peers, can function independently)

5. Overall clinical competence:

○ 0	○ 2	○ 3	○ 4	○ 5
Insufficient Evidence (limited interaction with resident)	Below Expectation (skills are below expected at their level of training, needs attention)	Expected level of performance (at the same level as their peers)	Exceeds Expectations (skills above the level of their peers)	Outstanding (skills markedly above the level of their peers, can function independently)

Mini-CEX time: Observing: \_\_\_\_\_ Min Providing feedback: \_\_\_\_\_  
Min

Evaluator satisfaction with mini-CEX: Low 1 2 3 4 5 6 7 8 9 High

Resident's satisfaction with mini-CEX: Low 1 2 3 4 5 6 7 8 9 High

Comments:

Resident's signature \_\_\_\_\_

Evaluator signature \_\_\_\_\_



## General Surgery Resident Small group learning Feedback Form

**Training Level: Resident**

**Date:**

**Question 2: Which of the following “BIG 10” Principles were discussed during today’s session?**

**Check if apply**

1. Those 70 and older are at a higher risk of developing postoperative delirium especially if there is pre-existing cognitive impairment	<input type="checkbox"/>
2. There are multiple risk factors that can predispose older adults to postoperative delirium	<input type="checkbox"/>
3. Delirium is often underdiagnosed and undertreated.	<input type="checkbox"/>
4. There are many measures you can take to prevent delirium.	<input type="checkbox"/>
5. Delirium can be diagnosed using easy and fast validated assessment tools like 4AT	<input type="checkbox"/>
6. Postoperative delirium and cognitive impairment can last as long as 1 year postoperatively.	<input type="checkbox"/>
7. Delirium treatment includes non-pharmacologic treatment.	<input type="checkbox"/>
8. Uncontrolled pain can lead to increased incidence of delirium.	<input type="checkbox"/>
9. It is important to review the medication list and try to avoid high risk medications if possible in older adults.	<input type="checkbox"/>
10. Postoperative delirium is associated with increased cost, length of stay, readmission, institutionalization, and mortality (3 month and 6 month)	<input type="checkbox"/>

3. What could be done to improve this learning experience?

4. What was the most valuable part of this learning experience? Or what did you gain from this experience?

5. Do you think this small group session will cause you to change practice? If so how?

6. What are barriers to using the material taught today into actual practice?

7. Is there anything still confusing to you after this experience?

**Please use the next page if you have any additional comments**