

Hypercalcemia of Malignancy

Section 1: Case Summary

Scenario Title:	Hypercalcemia
Keywords:	Hypercalcemia, malignancy, bad news
Brief Description of Case:	<p>A 63-year-old male with stage 4 metastatic small cell lung cancer, presents to the ED with his wife. He is confused, and his wife says that he has been nauseous, constipated, and increasingly fatigued over the past week.</p> <p>He was first diagnosed with lung cancer 5 years ago and was in remission until recently when he was recently diagnosed with recurrent disease. He is not currently on treatment but has an upcoming appointment with oncology.</p>

Goals and Objectives	
Educational Goal:	To seek out goals of care information in an oncology patient, and to treat acute complications of malignancy accordingly
Objectives: (Medical and CRM)	<p><u>CRM Objectives:</u></p> <ol style="list-style-type: none"> Compassionately discuss bad news with patient's family, recognizing the limitations of prognostication within the ED Initiate a goals of care discussion with substitute decision maker to determine appropriate disposition <p><u>Medical objectives:</u></p> <ol style="list-style-type: none"> Order appropriate labs and diagnostic imaging workup for an elderly oncology patient presenting with confusion Recognize the signs and symptoms of hypercalcemia in an oncology patient Initiate emergency medical treatment for hypercalcemia of malignancy
EPAs Assessed:	

Learners, Setting and Personnel	
Target Learners:	<input checked="" type="checkbox"/> Junior Learners <input checked="" type="checkbox"/> Senior Learners <input type="checkbox"/> Staff
	<input checked="" type="checkbox"/> Physicians <input type="checkbox"/> Nurses <input type="checkbox"/> RTs <input type="checkbox"/> Inter-professional
	<input type="checkbox"/> Other Learners:
Location:	<input checked="" type="checkbox"/> Sim Lab <input checked="" type="checkbox"/> In Situ <input type="checkbox"/> Other:
Recommended Number of Facilitators:	Instructors: 1
	Embedded Actors: 1-2
	Sim Techs: 1

Scenario Development	
Date of Development:	31/03/2019
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Section 5: Scenario Progression

Scenario States, Modifiers and Triggers				
Patient State/Vitals	Patient Status	Learner Actions, Modifiers & Triggers to Move to Next State		Facilitator Notes
1. Baseline State Rhythm: NSR HR: 60 bpm BP: 88/50 RR: 18/min O ₂ SAT: 94% T: 37°C GCS: 14	Stable but confused	<u>Expected Learner Actions</u> <input type="checkbox"/> Cardioresp monitors <input type="checkbox"/> IV fluid bolus <input type="checkbox"/> Bedside cap glucose and temp <input type="checkbox"/> Obtain 12-lead ECG <input type="checkbox"/> Order labs <input type="checkbox"/> Order CXR and CT head	<u>Modifiers</u> <i>Changes to patient condition based on learner action</i> 1L IVF BP → 100/65 <u>Triggers</u> <i>For progression to next state</i> - All actions complete or 5 minutes	Participants should order an appropriate delirium work-up for an elderly oncology patient
2. Wife arrives HR: 60 bpm BP: 100/65 RR: 18/min O ₂ SAT: 94% T: 37°C GCS: 14	Wife arrives, asks for an update and requests to stay at the bedside	<u>Expected Learner Actions</u> <input type="checkbox"/> Explain to wife that patient is still undifferentiated and the team is trying to figure out underlying issue <input type="checkbox"/> Ask about goals of care	<u>Triggers</u> - Discussion with wife complete	
3. Results Back Vital signs remain stable		<u>Expected Learner Actions</u> <input type="checkbox"/> Recognize lung mets on CXR <input type="checkbox"/> Recognize short QT on ECG <input type="checkbox"/> Recognize elevated Ca on VBG	<u>Modifiers</u> - ECG, imaging results given <u>Triggers</u> - Results reviewed	
4. Initiate hyperCa treatment Vital signs remain stable	If does not recognize hypercalcemia, phone call to sim lab with a critical lab result	<u>Expected Learner Actions</u> <input type="checkbox"/> Fluids: NS IV 200-300mL/hr <input type="checkbox"/> Bisphosphonate 1. Zoledronic acid <i>OR</i> 2. Pamidronate <input type="checkbox"/> Calcitonin	<u>Modifiers</u> - Lab results given <u>Triggers</u> - Recognizing hypercalcemia, treatments ordered	See facilitator notes for medication dosing



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<p>5. Deliver bad news and initiate discussion around goals of care Vital signs remain stable</p>	<p>Wife is upset and wants to know what the diagnosis of hypercalcemia means for her husband's prognosis.</p>	<p><u>Expected Learner Actions</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> SPIKES <input type="checkbox"/> Explain that hypercalcemia is a sign of cancer progression <input type="checkbox"/> Explain that we do not have the full picture in the ED <input type="checkbox"/> Clarify that patient would want admission for further in-patient work-up and GoC discussion 	<p><u>Triggers</u></p> <ul style="list-style-type: none"> - Completed discussion with wife 	
<p>6. Disposition Vital signs remain stable</p>		<p><u>Expected Learner Actions</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> Admit to hospitalist/IM/oncology <input type="checkbox"/> Palliative care consult with permission from wife 	<p>End of Case</p>	<p>Substitute facility-appropriate services</p>



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Appendix C: Facilitator Cheat Sheet & Debriefing Tips

Key moments to watch:

1. Broad workup for altered mental status in cancer patients
2. Recognition of elevated calcium and appropriate treatment
3. Discussion with wife about prognosis

Questions for debriefing:

1. Why was this patient's diagnosis difficult? What are the main symptoms of hypercalcemia?
 - a. Symptoms are often vague and non-specific
 - b. Stones (renal), bones (pain), abdominal groans (n/v, constipation), psychiatric overtones (lethargy, fatigue, confusion, psychosis)
2. What is your approach to delivering bad news in the ED? What are some published systems?
 - a. SPIKES well known but not the only approach
3. How do you answer family members who want a prognosis in the ED?
 - a. Rarely have all the information
 - b. Often need specialist guidance for nuances to treatment and prognosis
 - c. Can help patients and families navigate the system/know what steps to expect next

Pathophysiology Questions

1. What are the ECG findings of hypercalcemia?
 - a. **Shortened QT** +/- ST elevation. In severe cases can have sinus bradycardia, BBB and high degree AV block
2. What are the causes of hypercalcemia of malignancy?
 - a. Ectopic secretion of PTH
 - b. Multiple Myeloma
 - c. Cancer metastasis bone (most commonly breast, lung, hematologic, kidney and prostate)
3. Treatment of hypercalcemia
 - a. Fluids – NS inhibits proximal tubule reabsorption of Ca and will correct volume depletion → give bolus initially to stabilize BP then rate ~200-300mL/hr depending on co-morbidities. Urine output goal ~2L/day
 - b. Bisphosphonates (avoid if GFR <30)- reduce osteoclast-mediated bone resorption
 - i. Zoledronic acid 4-8mg IV over 15 mins (preferred in cancer patient)
 - ii. Pamidronate 90mg over 2 hours
 - c. Calcitonin 4U/kg SC
 - d. Diuretics
 - i. Lasix does not enhance Ca elimination but can be used to augment saline diuresis
 - e. Denosumab (safe in renal failure, if refractory to bisphosphonates, not typically used in ED)

Breaking Bad News

1. S – Setting: minimize distractions, sit down if possible +/- social worker
2. P – Perception: What do they understand so far
3. I – Invitation: Would the family like further information
4. K – knowledge: provide information in a direct way using plain language
5. E – Emotions: respond to family member's emotions empathetically
6. S – Summarize: Summarize and set out plan of action +/- strategize for next steps in line with GOC



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References

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2. Baile WF, Buckman R, Lenzi R, Globler G, Beale EA, Kudelka AP. SPIKES-A six-step protocol for delivering bad news: application to the patient with cancer. *Oncologist*. 2000;5(4):302-311. doi:10.1634/theoncologist.5-4-302

