

Case Scenarios on Cognitive Biases In Clinical Decision Making:

Discussion Guide and Suggested Scoring Rubric

Note: The accompanying scoring rubric only serves as a guide for the instructors

Case 1

A 23-year old salesman presents to an emergency department complaining of acute onset of shortness of breath and central chest discomfort for 3 hours prior to arrival. He appears anxious, sweaty and feverish. He says that he had two episodes of passing loose stools and vomiting the night before, claiming that it could possibly be due to eating curry noodles for dinner. At the triage counter, he says that his term paper for a course in a part-time degree program is due in three days' time and he requests that the doctor gives him a 1-day medical leave.

His initial vital signs are: BP 140/90 mmHg, PR 140/min, temperature 39°C (102.2°F) and respiratory rate 30/min. The physician's assistant at triage counter gives him with a diagnosis of "acute gastroenteritis" and treats him with 500 ml of normal saline solution.

About half an-hour later, when seen by an attending physician, the patient says that he was having a drink with his friends at a nightclub and "just to unwind from the stress of his job." He admits to consuming cocaine during the party. He also admits that he consumes cocaine "on a regular basis". After the party, he had curry noodles at a nearby restaurant.

Nonetheless, except for some mild chest discomfort, he says he feels much better after the intravenous saline and impatiently requests to be discharged with a day of medical leave. The attending physician finds no significant findings on physical examination. His volume status is good.

Objectives of this case:

- To test the ability of the student to identify the signal in a high noise-to-signal ratio case. The noise in this case is the anxiety symptoms that the patient manifests. The signal in this case is the life threatening condition that should be ruled out, i.e., the possibility of cocaine-induced myocardial ischemia in view of the history of consuming cocaine and the persistent history of chest discomfort.
- While it may be true that the patient has symptoms suggestive of acute gastroenteritis secondary to food poisoning the student should not be satisfied with just this diagnosis. The possibility of cocaine-induced myocardial ischemia must be ruled out. The noise in this case is the anxiety symptoms and the pestering for time off of work.
- Even if the student is not able to link cocaine with myocardial ischemia, the student should still rule out the worst-case scenarios for the patient's chest pain.

- More points should be given if the student can explain why cocaine is a risk factor for coronary ischemia.
- Cognitive biases that are likely involved in this case: search satisficing; anchoring

Suggested points

Questions:

1. If you were the doctor that attends to him, would you have discharged him with a one-day medical leave certificate? Why or why not? (suggested total points: 5 points)

- Do not discharge yet – 1 point
- Do not discharge because of persistent chest pain – 1 point
- Need to rule out coronary ischemia – 1 point
- Because of ingestion of cocaine – 1 point
- Why? Because cocaine results in catecholamine surge – 1 point
- Which then results in sympathetic over-activity and coronary artery vasoconstriction and spasm – 1 point

(No mark to be given if the student agrees to discharge the patient at this juncture without further investigation)

2. What could have influenced the attending doctor's thinking process in concluding that there is "no significant finding on physical examination"? (suggested total point: 1 point)

The suspicion that the patient could be manipulating him to obtain time off from work.

Groves (1978), for example, listed four stereotypical behaviors of the "hateful" patients whom many physicians dread attending:

- The dependent clingers
- The entitled demanders
- The manipulative help-rejecters
- The self-destructive deniers

(Ref: Groves J. Taking care of the hateful patient. N Eng J Med. 1978; 298: 883-887.)

Why these groups of patients are difficult for doctors and how these behaviors may influence the doctor's decision-making process could be discussed and explored further with the students.

3. List your provisional and differential diagnoses for this patient according to their pre-test probabilities. Explain your answers. (suggested total points: 3 points)

Differential diagnosis	Pre-test probability [Tick (✓) where appropriate]			Comments
	Low probability	Moderate probability	High probability	
Myocardial ischemia/infarction/acute coronary syndrome			✓ (2 points)	
Acute gastroenteritis		✓ (1 point)		
Anxiety disorder/malingering	✓ (0 point)			

4. What additional clinical information do you want (history, physical exam, laboratory or imaging) and why do you want it? (suggested total points: 1 point)

ECG changes suggestive of coronary ischemia/infarction.

Case 2

A 40-year-old female presents to an emergency department at 3.00 am with a headache. Upon arrival to the emergency department, her vital signs are: BP 150/100 mmHg, heart rate 90/min, temperature 37°C (98.6°F) and respiratory rate 35/min.

She describes the headache as a generalized headache with sudden onset (describe as “thunder clap headache”). When asked further, she says that she has had similar episodes of headache in the past but she feels that her current episode is the worst ever headache she ever has. Her pain score at this time is 10/10 but the attending doctor finds no abnormality from physical examination.

She is then treated with intravenous diclofenac sodium and is kept under observation. Several hours later, when re-examined by another doctor, she says that her headache has significantly improved with a pain score of 6/10. But now she also complains of some neck pain. Nonetheless, she insists on going home as she says she has a lot of house chores to do. The doctor discharges her accordingly.

The objectives of this case:

- to assess the student’s ability to pick up the potential red flags of headache in this case.
- Despite the patient’s improvement in the intensity and her insistence to be discharged, the student should not be satisfied with this improvement and send the patient home.
- Cognitive biases that are likely involved in this case:
 - anchoring
 - Search satisficing
 - Availability bias

Suggested points

Questions:

- 1. If you were the doctor in charge, would you have discharged her at this juncture as per her insistence? Or would you have admitted her to the ward? Why or why not? (suggested total points: 5 points)**
 - Not ready for discharge yet – 1 point
 - The fact that the patient presents to the department at 3 am should alert that student that this could be something more sinister than just a tension headache – 1 point
 - Should perform a repeat neurological examination – to rule out meningismus – 1 point
 - Should think of CT scan of brain – 1 point
 - Potential red flags in this case:
 - Acute onset – 1 point

- Thunder-clap headache – 1 point
- Different from previous episodes of headache experienced – 1 point
- Neck pain – 1 point

2. Is the doctor’s action on discharging her an example of predominantly Type 1 or predominantly Type 2 decision making? (suggested total points: 1 point)

Type 1 decision. Pattern recognition (previous history of occasional headaches, probably due to migraine); missing out symptom differences (“worst headache”, “thunderclap headache”); sleepiness/fatigue at 3 am; patient’s insistence/pestering for discharge.

3. List your provisional and differential diagnoses for this patient according to their pre-test probabilities. Explain your answers. (Total marks: 3 points)

Differential diagnosis	Pre-test probability [Tick (✓) where appropriate]			Comments
	Low probability	Moderate probability	High probability	
Subarachnoid hemorrhage			✓ (2 points)	
Meningitis		✓ (1 point)		
Migraine headache	✓ (0 point)			

4. What additional clinical information do you want (history, physical exam, laboratory or imaging) and why do you want it? (suggested total points: 1 point)

CT scan/Lumbar puncture

Case 3

On New Year's Eve, a 50-year old male patient is brought in by the ambulance to a emergency department with complaints of epigastric pain associated with sweating. This patient has history of hypertension for which he takes a beta-blocker and an angiotensin-converting enzyme (ACE) inhibitor. He also takes ibuprofen, as needed, for arthritis. His initial vital signs upon arrival to the emergency department are: BP 150/90 mmHg, pulse rate 70/min, temperature 37°C (98.6°F) and respiratory rate 25/min. The triage nurse thinks that this patient probably has acute coronary syndrome. On examination, he is pale and his epigastric region is tender. His ECG shows an ST depression in the lateral leads. His blood sugar is 234 mg/dl. The attending doctor agrees with the diagnosis of acute coronary syndrome. Half an hour later, when re-examined, the patient says that his epigastric pain has improved. His BP now is 90/60 mmHg and pulse rate 90/min.

The purpose of this question:

- Is to assess the student's ability to analyze the trend or the dynamics of vital signs changes as well as the potential influence of hypertensive medications on the vital signs manifestations.
- The student should be able to identify the drop in blood pressure from 150/90 mmHg to 90/60 mmHg and state the possibilities for this acute drop in BP.
- The trend of the blood pressure changes is more important than the absolute value interpreted in isolation.
- Cognitive biases that are likely involved in this case:
 - Search satisficing
 - Availability bias

Suggested points

Questions:

1. List your provisional and differential diagnoses for this patient according to their pre-test probabilities. Explain your answers. (Total marks: 6 points)

Differential diagnosis	Pre-test probability [Tick (✓) where appropriate]			Comments
	Low probability	Moderate probability	High probability	
Acute coronary syndrome			✓ (2 points)	Reason: Maybe precipitated by the anemia; patient could have both pathologies – bleeding peptic ulcer with anemia;

				this in turn, precipitating a coronary event (1 point)
Bleeding peptic ulcer			✓ (2 points)	Reason: This can occur despite the absence of the manifestation of tachycardia due to masking effect of medications such as beta-blockers) (1 point)

2. What additional clinical information do you want (history, physical exam, laboratory or imaging) and why do you want it? (suggested total points: 3 points)

- Refer the patient for an early esophagogastroduodenoscopy (EGD) – 1 point
- Repeating an ECG – 1 point
- Repeating a complete blood count, looking for trends in hemoglobin, hemotocrit, etc -1 point
- Performing a digital rectal exam may be helpful – 1 point
- Ask further history on risk factors for developing peptic ulceration, e.g., the use of NSAIDS – 1 point
- Perform a bedside ultrasound, e.g., free fluid in abdomen, cardiac contractility/regional wall abnormality – 1 point

3. Which predominant type of cognitive process the attending doctor is using in agreeing with the diagnosis of acute coronary syndrome? (suggested total points: 1 point)

Type 1 decision. Stressful working environment (“chaotic emergency department, festive holidays) increase propensity to use predominant Type 1 decision-making process.

Case 4

A 37-year old male patient, with no previous medical illness, is brought to the emergency department at midnight with a complaint of bilateral progressive lower limb numbness and weakness for a week. He says that the numbness starts at the level of the umbilicus and progresses distally. He also complains of occasional low back pain, which he believes is due to a road traffic accident that occurred 3 years ago. On examination, his vital signs are: BP 111/65 mmHg, HR 90/min, Temperature 37°C (98.6°F), SaO₂ 98% under room air. Muscle strength is 4/5 in the bilateral lower extremities; strength is 5/5 in the upper extremities.

His lumbrosacral X-ray shows evidences of a compression fracture of the vertebral body of L1 with osteophytes formation. The resident who sees the patient thinks that his symptoms are most probably due to the fracture and suggests that he could be discharged with an out-patient appointment in the orthopedic clinic.

The objectives of this case:

- to assess the student's ability to correlate clinical findings with findings from the laboratory/radiological investigations
- The student should be able to state that the finding of sensory loss at the level of umbilicus (T10) does not correlate with the level of L1 fracture on X-ray.
- Furthermore, the x-ray findings include osteophytes formation and the history points to an old traumatic event (motor vehicle accident). These do not correlate with the relatively acute numbness that the patient is experiencing.
- Cognitive biases that are likely involved in this case:
 - Search satisficing
 - Availability bias
 - Anchoring
 - Confirmation bias

Suggested points

Questions:

1. **Would you discharge this patient as suggested by the attending doctor or would you admit him? Explain your answer. (suggested total points: 6 points)**
 - Not agreeing to discharge – 1 point
 - Call up orthopedic doctor, discuss case again, and insist on admitting the patient – 1 point
 - Considering immediate referring to the neurologist – 1 point
 - Finding of sensory loss at the level of umbilicus (T10) does not correlate with the level of L1 fracture on X-ray – 1 point
 - osteophytes formation – point to an old fracture, does not correlate with the one-week history of bilateral numbness and weakness – 1 point

- X-ray findings probably due to a previous motor vehicle accident history - 1 point
- The history points to a progressively worsening neurological condition – 1 point

2. Is the resident’s decision that this patient could be discharged an example of predominantly Type 1 or Type 2 thinking? (suggested total points: 1 point)

Type 1 decision. (Sleepiness, fatigue increases propensity to use predominant Type 1 decision making)

3. What are your other differential diagnoses to consider for this patient? Why? (suggested total points: 2 points)

Differential diagnosis	Pre-test probability [Tick (✓) where appropriate]			Comments
	Low probability	Moderate probability	High probability	
Mixed sensorimotor neuropathy			✓ (2 points)	Reason: Progressive bilateral sensorimotor deficits.
Guillain-Barre syndrome		✓ (1 point)		Reason: Progressive bilateral weakness; against GBS: deficit progresses distally.
		✓ (1 point)		Reason: MS can present with virtually any neurological symptoms. Young age group supports diagnosis. Against MS: progressively worsen, rather than episodic; no cognitive or psychological impairment
Spinal cord trauma from the old fracture	✓ (1 point)			Finding of sensory loss at the level of umbilicus (T10) does not correlate with the level of L1 fracture on X-ray

4. What additional information in the case presentation should prompt the attending doctor to re-evaluate the decision to discharge? (suggested total points: 1 point)

A more thorough history – neurological deficits

A more thorough neurological examination, gait examination, etc

An MRI scan of the spin

Case 5

A 72 year-old lady with a history of hypertension and a right eye cataract comes to the emergency department after falling from a height of about one meter high step ladder at around 6.00 am. The family believes that the patient's fall was due to her poor eyesight. No history of loss of consciousness and she can remember the complete history of the fall. When the patient is first examined in the emergency department, she is fully conscious, alert and orientated; her GCS 15/15. Except for a small abrasion on the right elbow, no other findings are noted on examination. A skull x-ray reveals no fracture. Other than complaining of a headache and having three episodes of vomiting in the emergency department, she is well. The attending doctor is contemplating discharging this patient.

The objectives of this case:

- Is to assess the student's ability to identify red flags suggestive of intra-cranial injury secondary to the fall.
- The student should also be aware of the multiple risk factors and co-morbidities in an elderly patient who falls. The student should also know that skull x-rays have been superseded by CT scan (see NICE Clinical guideline for Head injury: Triage, assessment, investigation and early management of head injury in children, young people and adults. Jan 2014; Available at URL: <http://www.nice.org.uk/guidance/cg176>)
- Cognitive biases that are likely involved in this case:
 - Search satisficing
 - Confirmation bias

Suggested points

Questions:

- 1. Would you have discharged the patient at this juncture? Explain your answer (suggested total marks: 5 points).**
 - Do not discharge- 1 point
As mentioned, the student needs to consider:
 - the various co-morbidities in this case - 1 point
 - the red flags for traumatic intra-cranial injury: headache, repeated episodes of vomiting - 2 points
 - the lack of sensitivity and specificity of skull x-rays to rule out head injuries - 1 point
 - the anatomical changes in the brain of an elderly patient, e.g. cerebral atrophy, allowing more space for blood to accumulate before intracranial pressure increases, etc. - 2 points
 - Student who agrees to discharge the patient will receive no mark for this part.

- 2. Is the doctor's plan on discharging her an example of predominantly Type 1 or predominantly Type 2 decision making? (suggested total marks: 1 point)**
Type 1 decision

3. What your provisional and differential diagnoses for this patient according to their pre-test probabilities. Explain your answers (suggested total marks: 3 points)

Differential diagnosis	Pre-test probability likelihood [Tick (✓) where appropriate]			Explanation
	Low probability	Moderate probability	High probability	
Head injuries, to rule out intracranial bleeding (e.g., subdural hemorrhage)			✓ (2 points)	lack of sensitivity and specificity of skull x-rays to rule out head injuries.
Stroke, followed by a fall		✓ (1 point)		

4. What additional clinical information do you want (history, physical exam, laboratory or imaging) and why do you want it?" (suggested total marks: 1 point)

A more thorough history/physical examination; CT scan