MEDICAL SCHOOL AND RESIDENCY PROGRAM
CURRICULUM RESOURCES ON DRUG ABUSE AND ADDICTION

Two Problem-Based Learning Cases: Methamphetamine

Creighton University School of Medicine

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Creighton UNIVERSITY Medical Center

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http://www.drugabuse.gov/coe

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Introduction

This curriculum module contains two problem-based learning (PBL) cases that provide clinical presentations of substance abuse problems. These cases can be used in teaching situations where it may not be feasible to use clinical material or standardized patients. The PBL cases can be used to augment lecture material about the topic of drug abuse and dependence with clinically relevant cases that depict real-life scenarios for students to work through—either in a small-group format or an interclerkship seminar. The PBL cases introduce students to clinical presentations of substance abuse problems. The cases are realistic and can be adapted for use in different courses or clerkships. Case 1 is designed for three sessions, each approximately 60 to 90 minutes. Case 2 is designed for two sessions, each approximately 60 to 90 minutes. Both cases should be offered to third-year medical students or advanced second-year medical students. First-year medical students and some second-year medical students do not possess sufficient knowledge for participation.

This PBL module is adapted from the following two MedEdPORTAL publications:

Rosenstock, J. (2006). *The Impact of Psychiatric Distress on Co-morbid Medical Illness: A Problem Based Learning (PBL) Case*. MedEdPORTAL: http://services.aamc.org/30/mededportal/servlet/s/segment/mededportal/?subid=251

Koestler, J., Waite, E., Chietero, M., Shulman, J., Rose, S., Poliandro, E., et al. (2009). *Problem-Based Learning (PBL): Abdominal Pain in a Pregnant Woman.* MedEdPORTAL: http://services.aamc.org/30/mededportal/servlet/s/segment/mededportal/?subid=517

Key words: drug abuse; drug addiction; methamphetamine abuse; methamphetamine treatment; substance abuse

Educational Objectives

- Integrate and apply collected data to problem solving, including the generation and prioritization of a differential diagnosis for acute psychosis and for acute chest pain.
- Develop the skills necessary for the interpretation and utilization of relevant historical, physical examination, and laboratory information in a patient who is acutely ill.
- Integrate the concepts of evidence-based medicine to develop an approach to an acutely ill patient.
- Assess the impact of culture on obtaining information detrimental to the diagnosis and management of the clinical cases.

Curriculum Module Components

This curriculum resource module includes:

- Two student cases.
- A Facilitator Guide for each case.
- Student handouts for each case and session.
- A lecture evaluation form.
- A learner self-assessment form.
- A facilitator evaluation form.
- Pilot information.

Keys to Successful Implementation of PBL

Requirements for PBL

- PBL facilitator.
- Student leader, reader and scribe.
- Small-group or conference room.
- Computer.
- Screen.
- LCD projector.
- Supplemental readings or reading list.
- Information about local resources for the treatment of methamphetamine abuse/dependence.

Suggestions for PBL Facilitation

Techniques for getting members of the group to talk to one another:

- Make it clear that students should address questions to other students, not to you. You will probably observe that the group goes silent when you begin leading it too much.
- If you are asked a question directly, acknowledge the question with nonverbal signs (e.g., nod and smile) and then make eye contact with others in the group to encourage a response from the other group members.
- Be patient. Give members of the group time to think quietly about what they are reading.

Techniques for dealing with a quiet/nonparticipating student include asking that person:

- Can you summarize the case so far?
- Do you agree with all the hypotheses/learning objectives presented?
- Do you agree with what [insert name] is saying?
- What's going on in your mind?

Metacognitive questions that can be used for eliciting responses:

- What made you decide to say that?
- Why did you say that?
- Why did you think of saying that?
- How do you know that what you are saying is correct?
- Why do you think that is an important issue?
- What made you bring that up?
- What do you think about the importance of your statement?
- How do you feel about your idea(s), in light of the facts we have so far?
- How do you know your information is reliable?
- How do you know that textbook information is reliable?

- What is your confidence, on a scale from 0 to 10, that your idea is correct?
- What do you see as the problem at this point?
- What information would you like to know next?

Problem Presentation Session(s)

- At the first PBL session of the course, get acquainted with your students. For example, ask each member of the group to introduce himself/herself and describe why he/she is unique.
- Introduce yourself and briefly describe your interests.

Mention the following to the students:

- It's perfectly acceptable to say what's on your mind.
- It's perfectly acceptable to disagree with another student.

Feel free to keep the group on the right track. You are responsible for the group, but do not dominate the discussion. Pass out the case handout and tell students to focus initially only on page 1.

- Ask the group to choose one person to be the scribe. Have the scribe divide the chalkboard into three columns: Facts, Hypotheses, and Learning Objectives (LOs).
- Sequentially read and discuss each page of the case. Make sure everyone agrees about when it is time to proceed to the next page.
- Near the end of meeting, remind students to refine and divide up the LOs (allow ~15 minutes for this activity) to be researched and presented at the next session. Encourage students to use visuals (e.g., slides, handouts, blackboard, computer images) to teach the group about what they have learned. Discourage dry "book reports."
- All pages of the case should be read and discussed prior to the end of the introductory session.
- At the second PBL session, review and discuss the sections of Case 1 scheduled for this meeting.

Problem Resolution Session

- Read through the scenario again and stop to have students present their LO materials when they are relevant to the case.
- Discuss the health problem again in light of the new information that is brought back to the group with every step of this case.
- Ask each individual to evaluate and critique his/her sources of information. Why did they choose to use the source(s)? Are there other sources they might consider using in the future?

At the end of the session:

- Pass out the “official” list of LOs and discuss any major differences between this list and the one generated by the students.
- Ask the group to evaluate the effectiveness of the just-completed PBL as a learning experience.

Methamphetamine: An Overview

Methamphetamine is a sympathomimetic amine in the class of compounds the phenethylamines, which have a variety of stimulant, anorexiant, euphoric, and hallucinogenic effects. Commonly referred to as “speed,” “meth,” “chalk,” “ice,” “crystal,” and “glass” (National Institute on Drug Abuse [NIDA], 2009a) [Note: “Street names” should be updated regularly to accurately reflect current slang terminology.] Methamphetamine was first synthesized in 1893 and was widely used by German, Japanese, and American forces during World War II to increase alertness and decrease fatigue. For more information on methamphetamine, its mechanism of action, prevention of use, and treatment, see http://www.nida.nih.gov/ResearchReports/methamph/methamph.html.

Recreational use of methamphetamine and other amphetamine-derived stimulants has reached epidemic proportions in the United States. After cannabis, which is commonly referred to as “marijuana,” “pot,” “grass,” and “weed” (NIDA, 2009b), methamphetamine is the most widely abused drug worldwide. According to the 2008 National Survey on Drug Use and Health, 5 percent of the U.S. population over the age of 12 has reported methamphetamine use at some time in their lives and 850,000 people reported use in the past year (Substance Abuse and Mental Health Services Administration, 2009). [Note: This curriculum resource should be updated annually as new data become available; see http://www.oas.samhsa.gov].

Facilitator Guide Case 1:
Diagnosis and Treatment of a Woman
With an Acute Psychotic Presentation

The main objective of PBL is to use a realistic clinical scenario to explore with students the different causes of acute mental status changes and to streamline the diagnosis and treatment of this condition.

Audience

This PBL case has been developed for use with second- and third-year medical students as a way to integrate knowledge and raise awareness of important comorbidity.

Format

Case 1: *Diagnosis and Treatment of a Woman With an Acute Psychotic Presentation* comprises 11 narrative sections covered over 3 sessions. Each section is printed on a separate sheet of paper, and students are to receive only one section at a time as directed by the Facilitator Guide (please note that students are not to be provided with PBL case materials prior to the first PBL session). Once a section has been reviewed in detail, students will be given the corresponding information on the teacher's notes and discuss why the case was managed as it was. During these sessions students are responsible for reading the case, identifying pertinent facts, and developing hypotheses. At the first session each group of students will also generate its own LOs. During the final "problem resolution" session students will also teach one another what they have learned by presenting relevant LO materials, preferably with the assistance of visual aids (e.g., computer images, slides, handouts). The resolution session concludes with a discussion of any major differences between the LOs generated by students and the LOs provided to the facilitator, which are to be distributed to students at this time.

To assist faculty facilitators in coaching the student-led discussions, notes and LOs are provided for each step of the case. The notes are suggestions for possible discussion of the major points presented in each section. Facilitators may expand on any portion of the case to pursue their interests or the interests of their students.

In general, facilitators are encouraged to gradually shift from being less directive to more directive and from less talkative to more talkative. Thus, during the first session, the facilitator would offer fewer comments and redirection than during the second. If the facilitator is too active or directive early on, the group will wait for cues and further input from the facilitator. Likewise, if the facilitator becomes less involved over time, the group may feel the facilitator is withdrawing.

It is important to not divulge any important information to the students prematurely, as this will prevent them from analyzing the data and reaching their own conclusions.

THE FACILITATOR NOTES SHOULD NEVER BE GIVEN TO THE STUDENTS. HANDOUTS FOR STUDENTS ARE PROVIDED.

PBL Case 1 Overview: Diagnosis and Treatment of a Woman With an Acute Psychotic Presentation

This PBL guide includes a case with 11 narrative sections, detailed process guidelines (how to facilitate a PBL group), suggested student LOs, and substantial background information designed to make this case useful for faculty from any specialty. Topics include how to diagnose and treat substance use disorders (in particular, methamphetamine) and bipolar disorder and the nature of the relationship between these conditions and other causes of acute agitation and acute mental status changes, such as infection, trauma, and postpartum depression. Some psychiatric diagnostic and treatment information is included; however, the goal of this PBL case is to develop the medical students' understanding of the comorbidity and to prevent them from assuming a particular case is only a psychiatric presentation, without developing an understanding of the nuances of the case.

This PBL exercise allows learners (second- and third-year medical students) to consolidate their educational experiences across clerkships and encourages multidisciplinary thinking in their clinical interactions. The case, developed by faculty from multiple clinical departments, allows learners to integrate and apply collected data to problem solving. It also helps students develop the skills necessary for the interpretation and utilization of relevant historical, physical examination, and laboratory information about a patient who is acutely ill. Topics addressed in the exercise include symptom presentation/evolution, generation of differential diagnosis, diagnostic testing, and patient management. The exercise reiterates the clinical relevance of basic science topics, including physiology, pharmacology, and pathophysiology. It also allows students to address cultural differences, intimate partner violence, health beliefs, population medicine, and evidenced-based practice. The problem-based format fosters self-directed learning, reflection, and collaborative practice. The strength of the case is that students are required to think outside the context of a specific clerkship and integrate symptoms across organ systems.

A. Facilitator Notes––Introduction

This PBL involves a patient with acute mental status change who presents with psychotic symptoms. The intent of this exercise is to encourage students to consider the impact of psychiatric comorbidity on the pathophysiology and prognosis of the patient and on their treatment decisions. Because the patient has multiple concurrent conditions, students may reasonably deal with the medical, psychiatric, and substance use conditions separately. While this approach is fine up to a point, the students must also attend to the potential interaction among the three conditions.

It is relatively new for students to consider interdisciplinary or comorbid issues in PBLs. Hence, interdisciplinary discussions should be encouraged. Comments to help further such discussions could include:

- What issues are involved? Is the presentation purely related to psychiatry?
- Where else may this patient present with a similar set of symptoms?

- Might her psychiatric problems be contributing to her presenting complaints? If so, how?
- Might her postpartum status be affecting her mental health? If so, how?

Another unusual facet of this PBL is that it raises ethical issues and questions that have not been completely answered by medical research. Thus, students will be dealing with partially resolved questions and hypotheses with incomplete empirical support. For these LOs, students will need to consult current medical journals rather than standard text references.

Because students are more accustomed to learning concrete facts, this exercise may make them uncertain or uncomfortable either at the stage of defining their LOs or during their attempts to find the answers. We hope the case does not lead down a path to a single diagnosis and simple treatment choice but, rather, to the acquisition of knowledge that informs students of the cross-talk among the ethics, psyche, bodily functioning, and complexities that arise when caring for patients with comorbid medical and psychiatric disorders.

B. Student Learning Objectives

LOs should describe actions or behaviors that students are expected to execute/perform by the end of the PBL. The following are important LOs for this PBL, but students should pick their own before seeing this list. LOs picked by students may be different from those on the list below. You can share this list with students after resolution of the case.

LO 1	Explain the diagnostic criteria for postpartum depression and psychosis.
LO 2	Explain the diagnostic criteria for bipolar disorder.
LO 3	Explain emergency management of an uncooperative and agitated patient.
LO 4	Explain the circumstances for maintenance and breaking of confidentiality.
LO 5	Explain the symptoms of methamphetamine intoxication.
LO 6	List the symptoms of sedative withdrawal.
LO 7	Discuss the proper use of medications for the acute management of agitation.
LO 8	Describe the standard assessment of head injury.
LO 9	Describe the laboratory workup of the acutely agitated patient.
LO 10	Explain the diagnostic criteria for substance abuse/dependence.
LO 11	Discuss treatments options for methamphetamine dependence.
LO 12	Summarize the long-term goals of a patient who is facing multiple stressors.
LO 13	Summarize the key facts that support addiction as a medical disease, with a cause, effect, treatment, and response.

C. Goals

- To reintroduce basic science concepts and relate them to clinical scenarios.
- To think about cases in a multidisciplinary fashion, across specialty lines, and from a cultural perspective.
- To introduce self-directed and life-long learning using the tools of evidence-based medicine.

D. Session Objectives

- Integrate and apply collected data to problem solving, including the generation and prioritization of a differential diagnosis for acute agitation/mental status changes.
- Develop the skills necessary for the interpretation and utilization of relevant historical, physical examination, and laboratory information for a patient who is acutely ill.
- Integrate the concepts of evidence-based medicine to develop an approach to an acutely ill patient.
- Assess the impact of culture/ethnicity on the healthcare delivery process.
- Recognize the medical ramifications of addictive disorders.

E. Logistics

- Review goals/objectives.
- Appoint a group leader, reader, and scribe.
- Have students list facts, hypotheses, and learning objectives.
- Keep a copy of the LOs that are generated from each interdisciplinary clinical reasoning session.
- Ask questions to stimulate discussion only (e.g., guiding questions may be used to get the group back on track, but you should try to let students grasp the material on their own). Suggested guiding questions are italicized in this text. (You should refer to these questions if the group goes off on a tangent or is at an impasse. We suggest you refrain from using the questions too early in the process, as the students should be encouraged and given the time to formulate questions for themselves.)

F. Schedule

- Session 1, case parts A–D.
- Session 2, case parts E–H.
- Session 3, case parts I–K.

PBL Case 1:
Diagnosis and Treatment of a Woman With an Acute Psychotic Presentation

Facilitator's Notes
Session 1: Case Parts A–D

** (Student side)	** (Faculty side) **Distribute Case 1 Part A Student Handout**
<u>Case 1 Part A</u> A 30-year-old Hispanic woman is brought to the emergency department because of her agitated and restless behavior. The triage nurse tells you the woman speaks little English. The history you obtain through a trained interpreter indicates the patient delivered a baby at your medical school's OB clinic last month. She had been attending the prenatal clinic on a regular basis. She delivered about 10 days previously and gave birth to a healthy boy. Her previous labs obtained from the medical record were as follows: Blood type: O^+, antibody screen negative, VDRL negative, PPD negative, HIV negative, hepatitis B surface antigen negative, rubella immune, maternal serum triple screen WNL, glucose challenge test WNL, hemoglobin electrophoresis 97% hemoglobin A. The patient is not willing to stay in bed and is pushing staff members away. She is very agitated, loud, and swearing at people around her. She is afraid and looking behind herself constantly. She is refusing to allow the nurse to examine her or to draw blood.	**<u>Case 1 Part A</u>** The case begins with an agitated, Hispanic female patient who is brought to the hospital because of aggressive and restless behavior. ***Significant historical facts****:* The patient is a nonnative English speaker who has limited English proficiency. She delivered a baby less than 2 weeks ago. She is very agitated, restless, and paranoid. She is threatening staff members. A quick review of her medical records does not identify any ongoing medical problems. The differential diagnosis of an agitated woman includes delirium, postpartum psychosis, psychosis due to a postpartum infection or other medical causes, psychosis due to substance intoxication, psychosis due to substance withdrawal, bipolar disorder, and trauma/domestic violence or head injury. ***What more do you want to know?*** HPI: Timing, onset, and precipitating factors of agitation? Agitation relieved by? Aggravated by? Specific psychotic features? Potential for harm to self or others? ***At this point, would you feel comfortable if you were asked to proceed with this medical encounter without an interpreter? Why or why not? How do you balance the need to get information with the inability to communicate? What are the liabilities of "making do" with a relative or a staff worker as a stand-in translator?***

	Describe what instructions you need to give the interpreter to optimally use his/her services in this clinical encounter. Whom should you talk to when using an interpreter? ***Would you be willing to intervene in the absence of the interpreter? What if the patient's condition worsened and the agitation escalated? What if the agitation did not escalate?*** **Distribute Case 1 Part B Student Handout.**

** (Student side)	** (Faculty side)
<u>Case 1 Part B</u> With some effort, an interpreter is able to obtain contact information for the patient's mother, but the agitated patient forbids the staff to make any contact with her family. When the interpreter asked her for more information about her condition, she stopped talking. When the interpreter insisted, she became even more agitated. When she was offered medications to help her relax and calm down, she became even more agitated, screaming that she is not crazy and will not take any medications. She threatened to kill the medical staff and is thrashing around to the point where she is banging her head against the metal side rails of the bed.	**<u>Case 1 Part B</u>** ***What do you do when a patient specifically forbids you to contact any family members?*** ***What do you do when the patient is offered medications but he/she refuses?*** ***What are your obligations when his/her behavior worsens to the point that he/she may be putting himself/herself or others at risk?*** ***How does your differential diagnosis change with this additional information?*** Not much; and this is a major point of this case. ***What more do you want to know?*** Additional history related to the case. **Distribute Case 1 Part C Student Handout.**

** (Student side)	** (Faculty side)
Case 1 Part C The patient's mother is contacted and is able to provide the following history: The patient is a single mother with a history of "mood swings and anger problems." She had been on psychiatric medications in the past, but her medication adherence has been "sketchy." Her mother does not know what medications she has been prescribed in the past. The patient was following up with a psychiatrist in the past but it may have been a while since her last visit. She has had treatment at a local inpatient psychiatric hospital with similar agitated presentations; but according to her mother, the last time this happened was several years ago. **PMHx**: Asthma since childhood; no hospitalizations. Occasional visits to the emergency room. She has been prescribed inhalers and may have taken more than recommended. She was told she got asthma when her mother was sick with a cold at the time of her birth. Her parents told her she could not exercise with other children because she had asthma and was sickly. She is about 1.5 weeks postpartum. **PSHx**: Had Cesarean section in 2000 under epidural anesthesia.	**Case 1 Part C** ***What are the most important points about this presentation?*** The mother was contacted without the patient's consent, as the condition was deemed to be an emergency with potential risks to the patient and others. ***What possible diagnosis should be considered based on the history obtained from the mother?*** The patient has a history of "mood swings and anger problems," which suggests a psychiatric diagnosis. She was treated with psychiatric medications, but has a history of nonadherence to treatment. Plus, she has a lot of stress with three young children, one a newborn, and a boyfriend who may not be supportive. These factors would increase the risk of a relapse of bipolar disorder, schizophrenia, or other psychiatric disorders. Asthma may or may not be relevant to the diagnosis; but her history of possibly abusing inhalers may explain her acute agitation, if inhalers were abused prior to start of agitation. She also is 1.5 weeks postpartum. This increases the likelihood of a postpartum delirium due to infection, postanesthesia, or a postpartum mood or psychotic disorder. She is also an immigrant who moved to the United States at age 15. Further, if the relationship with her boyfriend is abusive, there is a possibility of her presentation being related to a trauma-induced delirium. With her past history of alcohol and drug use, substance use may also be a very likely reason for her presentation. Her symptoms can be explained by intoxication with a stimulatory substance or withdrawals from a sedative agent.

Psych Hx: See above. **Allergies**: No known drug or food allergies. **Medications**: Proventil multidose inhaler prn, multivitamins, iron. **Social Hx**: Patient was born in the Dominican Republic. Has lived in the run-down part of town since the age of 15. Smokes about 1½ PPD, ETOH dependent, has a history of IVDA for cocaine, methamphetamine, smokes marijuana periodically. Has been in drug treatment in the past. Currently is unemployed, lives with boyfriend and three children, ages 1½ weeks, 5 years, and 7 years. Her boyfriend may be abusive. He also has a history of drug dependence. **Family Hx**: Mother 50, mild hypertension on medication. Father 55, heart disease, hypertension, has had multiple strokes, in public housing. Sister 26, brother 22, both with asthma. Both abuse alcohol and drugs. Both have been diagnosed with bipolar disorder and depression. Grandmother and grandfather on both sides have hypertension, heart disease CVA, and have been treated for depression.	***How might bias play a role in this case?*** It is imperative that physicians are supportive and understanding of the lives and challenges facing patients. Racism, ethnicism, sexism, and classism undermine the underpinning of the oath to "Do no harm." Being aware of issues that are troubling to us is important in framing what issues are ours and what is coming from the patients. Providing this patient with support and access to services and resources may be pivotal in helping her live a productive life. ***How should you inform the family of their loved one's hospitalization?*** Be brief, informative, and to the point. Offer support to comfort them, provide information, and address their concerns. Give them your name and/or contact number for further contact/information. ***What additional questions would you want to ask the patient/informant?*** Students should ask additional questions to rule out physical trauma/abuse, recent drug and alcohol use, and symptoms/signs of infection. Using some of the questions outlined above, the students should find out more about the patient's (or her family members') perspective about illness and inquire about the patient's use of complementary and alternative medications and traditional healers. ***What more do you want to know?*** A physical exam would be useful at this point, specifically: • **Vital signs:** increased BP and pulse may suggest an infection, trauma, substance intoxication or withdrawals. Increased HR associated with fever/infection, substance use and/or medication abuse or trauma, acute pain. • **Lungs:** given asthma history. • **Abdomen:** abdominal organs, postpartum abdomen. • **Vagina/cervix:** for blood, discharge, infection. • **Mental status examination:** for ruling out psychiatric symptoms, delirium, and

Review of Systems: Significantly positive for insomnia.	psychosis. ***How would you manage this patient who does not want to get any treatment?*** Things to consider: • Agitation. • Potential to hurt others. • Potential to hurt herself. • Psychosis. • Lack of consent. • Diminished capacity. • Responsibility of medical staff to keep patient and staff safe. • Patients should be treated in emergency situations. If emergency situations arise, treat the patient without his/her consent. ***Options at this point, without any further information:*** • Applying restraints: justified in case of potential harm to self or others as a last resort, because restraining can cause more hyperthermia from increased muscle contractions from the agitated patient fighting against the restraints. • Use of involuntary medications: justified in case of potential harm to self or others. **Distribute Case 1 Part D Student Handout.**

** (Student side)	** (Faculty side)
Case 1 Part D **Physical Exam** **General**: Anxious-appearing woman is very agitated. **Vitals**: 160/90 mmHg **HR**: 100 BPM **Temp**: 40° C **RR**: 24 BPM **Height**: 165 cm **Weight**: 65 kg **Skin**: Several small skin excoriations noted on the cheeks and both forearms. **HEENT**: Anicteric with mildly dry mucous membranes. Teeth with several caries. **Chest**: Lungs clear to auscultation and percussion. **CV**: Tachycardic, Normal S1, S2. **Abdomen**: Soft, nontender, with active bowel sounds, no rebound or guarding. **Back**: Within normal. **Pelvic**: Not done. **Extremities**: No clubbing or cyanosis. **Psych**: Alert and oriented, but agitated. **Neuro**: Cranial nerves grossly intact. Full strength all extremities and sensation grossly intact. Deep tendon reflexes 3+.	**Case 1 Part D** ***How would you interpret the physical exam?*** • **Vital signs:** BP elevated; temperature elevated; high HR associated with fever/infection, blood loss, asthma and/or medications, alcohol/drug withdrawal or drug intoxication, trauma, or agitation. Increase in temperature suggests infection; however, some drug use intoxication states could also present with hyperthermia; Ht & wt: WNL. • **CVS:** Tachycardia, which may be present in any of the conditions noted above. • **Abdomen:** No abnormality, suggesting less chance of a postpartum abdominal complication. • **Pelvic:** Exam could not be done. • **Extrem:** WNL. • **Neuro:** DTRs suggest anxiety or substance intoxication, withdrawals. • **Psych:** Mood possibly consistent with psychotic disorder, either primary or secondary. ***Do the results of the physical exam alter your differential diagnosis?*** Given this information, the focus of the differential diagnosis would be on ruling out underlying medical causes of her acute behavior changes and ruling out trauma, hypertensive disorders and their consequences, inflammatory processes, and infectious processes. If there is no underlying medical problem, the focus should be on identifying whether the symptoms are induced by substance use or withdrawal. If this is ruled out, then a primary psychiatric diagnosis should be considered.

MSE:	Hispanic female, appears stated age, not cooperative, appears paranoid, may be responding to internal stimuli, agitated, not talking to herself, does appear to be looking around and behind herself constantly as if she is afraid of something, speech is not spontaneous, does not speak English well. Unable to determine whether she is suicidal or homicidal; however, she appears to threaten staff and through the interpreter has said she does not want anyone to come close to her. A Folstein MMSE cannot be done, due to her uncooperativeness.	***What laboratory tests would you like to order and why?*** Useful laboratory tests may include the following: complete metabolic panel; CBC (for infection); LFTs to assess metabolic problems, alcohol use; urinalysis and culture; urine drug screen. **SUGGESTED END POINT FOR SESSION 1** ***MAKE SURE EACH STUDENT IS ASSIGNED AT LEAST ONE LEARNING ISSUE TO RESEARCH AND PRESENT TO THE GROUP AT THE NEXT SESSION***

Session 2: Case Parts E–H

Discussion of Learning Issues From Prior Session

Most of the learning issues will be of the diagnosis or etiology type. The facilitator should inquire of each student:

- Where did you look to find the answer to your learning issue? (e.g., textbook or UpToDate? If you went to PubMed, did you use a review article, case series, or control trial?).
- How difficult was it to find the answer to your learning objective?
- If you found a diagnostic article, did it actually apply to our patient (a woman who is postpartum)? Or did it apply to making a general type of diagnosis (e.g., diagnosing an infection or substance use disorder) in adults, in which case we need to decide whether we can apply it to a postpartum female? Is that OK with the group? (Note: This is common in medicine—extrapolating data to other patient populations: pediatrics, elderly, and the surgical patient).
- If looking at diagnostic tests, did the article mention the sensitivity and specificity of the test? Which one is more important to the group members for the question they looked up?
- Is there a good gold standard for diagnosing these problems?
- Examples of learning issues from previous sessions have been:
  - How do we manage confidentiality with a nonconsenting individual?
  - How do we manage an acutely agitated patient without his/her consent?
  - What is the difference between agitation due to psychiatric conditions versus medical/substance-induced conditions?
  - Are blood/urine tests necessary for a diagnosis of acute agitation?

Session 2 Parts E–H

** (Student side)

Case 1 Part E

Studies: The patient is refusing to cooperate with further examination; therefore, she is administered IM lorazepam 4 mg, and after 30 minutes of not responding to the lorazepam, she is administered haloperidol 10 mg IM. She calms down after about 30 minutes and goes to sleep. Blood is drawn at this point and IV fluid resuscitation is administered.

Lab Data

SMA_7:

Na	146 mmol/l	(135–145)
K	4.6 mmol/l	(3.5–5.5)
Cl	100 mmol/l	(95–108)
Bicarb	23 mmol/l	(22–32)
BUN	14 mg/dl	(6–20)
Cr	0.6 mg/dl	(0.5–1.5)
Glucose	72 mg/dl	(60–115)

CBC:

WBC	15,300/ul	(4,800–11,000)
Hemoglobin	10.9 gm/dl	(11–15)
Hematocrit	32.7%	(35–47)
Platelets	167 k/ul	(150–500)

** (Faculty side)
Distribute Case 1 Part E Student Handout.

Case 1 Part E

Discussion of Laboratory Results
Do the results of these tests alter your differential diagnosis?
The most likely diagnosis is infection, but the UA is otherwise normal. The physical exam was not suggestive of a localized infection.

LFTs do not suggest recent alcohol use. The normal MCV does not suggest chronic alcohol use. High Na levels suggest there is dehydration due to some cause, whether an infection or drug-induced dehydration—possibly methamphetamine intoxication.

Alkaline phosphatase and CPK are elevated, most likely due to agitation of the patient; but this may also occur with some cases of substance abuse, in particular stimulant intoxication.

The WBC count is elevated, which suggests an infection; but remember that acute agitation often occurs in certain psychiatric conditions or in cases of drug intoxication, in particular methamphetamine intoxication, which also increase the WBC level significantly due to demargination.

What additional information and/or tests do you want?
A CT will be helpful to rule out brain pathology for an acute mental status change and to rule out trauma, especially because of her history with an abusive boyfriend and increased BP and pulse. A sonogram would be useful to determine whether there is any abdominal/pelvic organ pathology. The results of cultures would be important. And a urine drug screen would be useful.

LFTs:

Calcium	8.6 mg/dl	(8.5–11)
Total protein	6.5 gm/dl	(6.0–8.5)
Albumin	3.0 gm/dl	(3.5–5)
Alkaline phosphatase	480 u/l	(35–125)
CPK	950u/l	(<150u/l)
SGPT	40 u/l	(5–65)
SGOT	31 u/l	(5–50)
Total bilirubin	0.6 mg/dl	(0.2–1.3)
Direct bilirubin	0.1 mg/dl	(0–0.4)
Amylase	97 u/l	(30–300)
Lipase	134 u/l	(23–300)

Urinalysis: Spec. gravity 1.035

Urine gram stain: WNL.

Urine C&S, cervical cultures: Pending.

Urine drug screen: Pending.

Distribute Case 1 Part F Student Handout.

** (Student side)	** (Faculty side)
<u>Case 1 Part F</u> A CT of head is generally WNL. Abdominal ultrasound is WNL. No other abnormal findings.	**<u>Case 1 Part F</u>** **Discussion of Ultrasound and CT Results** The results of the ultrasound, which show normal findings, decrease the likelihood of liver or gallbladder disease. The normal findings on the head CT also rule out the possibility of acute head trauma as the cause of the acute mental status changes/delirium. ***What diagnosis ranks the highest on your differential now?*** Substance use (intoxication or withdrawal) or postpartum psychosis or infection, secondary to postpartum sepsis. ***How would you treat this patient?*** Acute management with symptomatic treatment, reduction of the symptoms of autonomic arousal, rehydration, and management of agitation. **Distribute Case 1 Part G Student Handout.**

** (Student side)	** (Faculty side)
Case 1 Part G A presumptive diagnosis of postpartum psychosis versus methamphetamine dependence and methamphetamine-induced psychosis. The patient was given IM haloperidol (10 mg) and lorazepam (4 mg) earlier; however, after 4 hours she is awake again and shows only partial improvement. She is getting agitated again and is disruptive. IV fluids and a repeat dose of the haloperidol and lorazepam are given intravenously. Her fever is down to 38.1° C. **Physical exam**: An agitated woman lying in bed on her right side. **$Temp_{max}$**: 38.2° C **BP**: 130–140/70–84 mmHg **HR**: 112 BPM **RR**: 24 BPM **Chest**: Lungs clear to auscultation and percussion. **CV**: Tachycardic. **Abd**: Nontender. **Back**: CTA, WNL.	**Case 1 Part G** ***What is your differential diagnosis now?*** Because the temperature decreased with hydration, haloperidol, and lorazepam, it suggests the hyperthermia was not related to infection. The differential diagnosis includes substance intoxication (e.g., stimulants such as cocaine or methamphetamine) and withdrawal from sedative agents. However, the LFTs do not suggest recent or chronic alcohol use, which decreases the chance of her symptoms being alcohol-withdrawal related. The autonomic arousal that initially resolved with the dose of haloperidol and lorazepam—and the recent worsening after 3 to 4 hours (essentially after the effects of benzodiazepine, which has a short half-life, wore off)—suggest this presentation might be related to substances of abuse, most likely a stimulant. A postpartum psychosis may also be responsible for the presentation; the drug screen will help decide the definitive diagnoses. ***How would you reevaluate this patient? What lab/ imaging studies would you order and why?*** Evaluation of fluid status, CBC, and drug screen; consultation with psychiatry may also be useful. **Distribute Case 1 Part H Student Handout.**

** (Student side)	** (Faculty side)
<u>Case 1 Part H</u> **Lab Data** **CBC**: WBC: 15,300/ul (4,800–11,000) Hemoglobin: 10.2 gm/dl (11–15) Hematocrit: 31.4% (35–47) Platelets: 118 k/ul (150–500) **Urine culture** (from admission): WNL. **Cervical culture**: Gonorrhea negative; chlamydia negative. **Abdominal-pelvic ultrasound**: WNL. **Urine drug screen**: + for methamphetamine.	**<u>Case 1 Part H</u>** ***Do these results change your approach to the patient? How would you proceed with the management of this patient?*** Again, review the laboratory results reflecting on normal values with the students and the improvement of the WBC count without the use of any antibiotics, the resolution of the temperature with hydration, the resolution of the agitation with the haloperidol and lorazepam, and the positive findings on the urine drug screen. ***What diagnosis ranks the highest on your differential diagnosis now?*** The most likely diagnosis is methamphetamine dependence and methamphetamine-induced psychosis. There is still the possibility of the symptoms being due to a postpartum psychosis, but a careful history from the patient or collateral sources should clarify that. **SUGGESTED END POINT FOR SESSION 2** ***MAKE SURE EACH STUDENT IS ASSIGNED AT LEAST ONE LEARNING ISSUE TO RESEARCH AND PRESENT TO THE GROUP AT THE NEXT SESSION***

Session 3: Case 1 Parts I–K

Discussion of Learning Issues From Prior Session

Today there may be a mix of diagnostic and treatment types of learning issues. Examples of learning issues that have been raised include:

- How do you diagnose the cause of acute mental status changes in a postpartum patient?
- How do you differentiate mental status changes that are secondary to medical conditions such as infections, trauma, substance use/withdrawal, or primary psychiatric conditions?
- What medications can be used to control acute agitation?
- What are the criteria for using physical restraints?
- What are the criteria for administering involuntary medications?
- How quickly should agitation resolve?

Session 3: Cases 1 Parts I–K

** (Student side)	** (Faculty side)
Case Part I Based on these results, a presumptive diagnosis of methamphetamine dependence and methamphetamine-induced psychosis is made.	**Distribute Case 1 Part I Student Handout.** **Case Part I** **Diagnosing Methamphetamine Abuse Versus Dependence** For the patient in this case, ask the students to identify which of the *Diagnostic and Statistical Manual of Mental Disorders (4th ed.) (*DSM-IV-TR) criteria for abuse versus dependence are met. Dependence is the more severe of the two, and in the presence of dependence, abuse should not be diagnosed. The patient in this case meets the criteria for dependence because: • Her mother reports the patient uses IV methamphetamines, which may be a sign of tolerance. Generally, individuals start with snorting and progress to IV use due to their tolerance. • The patient has been in a drug rehab program in the past, which shows a desire or attempt to decrease or stop use. • She has severe psychiatric effects from the drug use, which have occurred before; but she continues to use despite knowledge of these adverse effects. The limited information that is available is enough to make a presumptive diagnosis of methamphetamine dependence. Review the DSM-IV-TR criteria for abuse and dependence in Appendix A. **Distribute Case 1 Part J Student Handout.**

** (Student side)	** (Faculty side)
<u>Case 1 Part J</u> The patient received two doses of haloperidol and lorazepam. She responds to the second dose of the medications and is stabilized. Her agitation and psychotic symptoms are controlled. She is cooperative and is willing to participate in treatment for her illness.	**<u>Case 1 Part J</u>** ***Discuss the responsibility of informing social services, child protective services, referral for battered spouses. Specifically, what supports would students recommend given this patient's sociocultural history.*** ***Discuss how to elicit information from the patient in a nonjudgmental manner:*** The Explanatory Model of Illness, advanced by Arthur Kleinman, is an excellent tool for eliciting the patient's perspective of his/her illness (Kleinman, 1978). Kleinman's model offers a nonjudgmental approach for encouraging the patient to explain his/her understanding of the illness. Although derived from anthropologic and cross-cultural research, the model is useful for understanding any patient's perspective on his/her illness, including the personal and social meaning he/she attaches to illness, the expectations about what will occur and what the doctor will do, and the patient's own therapeutic goals. ***What would be your next steps in treating this patient?*** **Symptom management:** • The pharmacologic treatment entails symptom management and supportive measures. • For the patient in the case, the agitation requires management with benzodiazepines and/or atypical antipsychotic agents. • Oral medications should be used before the use of intravenous or intramuscular medications as much as possible. • However, due to the patient's agitation and unwillingness to take any medications orally, intramuscular medications are the only option.

	• This treatment should follow general treatment principles of using the smallest possible dose for the shortest possible time. • Haloperidol, as well as other antipsychotic agents, is excellent in the acute management of severe agitation. However, their use is risky because of the side effects possible with this class of medications, including lowering the seizure threshold, neuroleptic malignant syndrome, tardive dyskinesia, akathisia, prolongation of the QT interval, torsades de pointes, and extra-pyramidal movements. • Use of lorazepam, which is a sedative-hypnotic medication, minimizes the use of haloperidol. If used alone, excessive doses of lorazepam may be needed, which in itself can cause delirium, confusion, and respiratory depression. **Referral for further substance use assessment and/or drug treatment.** • **Distribute Case 1 Part K Student Handout.**

** (Student side)	** (Faculty side)
Case 1 Part K The patient is put on a scheduled dose of ziprasidone (Geodon) 20 mg po BID and sent to the psychiatric unit for stabilization and further treatment of her substance abuse.	**Case 1 Part K** For this patient, outpatient medications were prescribed to help control underlying psychiatric symptoms. She is being referred for outpatient substance treatment with psychotherapeutic interventions. ***Treatment of methamphetamine dependence:*** Treatment requires a long-term approach that must include treatment of underlying medical and/or psychiatric conditions, supportive and motivational enhancement therapies (METs), and behavioral interventions. Treatment should also be individualized to patient's abilities/preference/resources. ***Pharmacological options for methamphetamine treatment:*** • No approved pharmacotherapy. ***Nonpharmacological treatment options (i.e., psychotherapy treatment options):*** • **Matrix Model** (Rawson, 2004), a comprehensive behavioral treatment approach that combines behavioral therapy, family education, individual counseling, 12-step support, drug testing, and encouragement for nondrug-related activities. More information is available at: http://www.nida.nih.gov/BTDP/Effective/Rawson.html). • **MET or motivational interviewing** - Uses a nonconfrontational approach. - Identifies contradictions between what an individual is saying and what is happening in his/her life. - Utilizes rolling with the resistance.

	• **Cognitive behavioral therapy** - Identifies thoughts that trigger thoughts of using drugs. - Identifies behaviors that can be used in lieu of drug use whenever thoughts of using drugs arise. - Provides opportunities to practice these behaviors and offers followup. • **Contingency management** (Petry et al., 2005) - Uses system of offering a tangible reward for consistently staying drug free. - Uses multiple strategies to help the individual stay sober, fight cravings, etc. • **Family education** - Explains effects of drug use on the family system. - Involves family members in treatment to offer support and monitor drug use, cravings, etc. • **Group therapy** - Involves individual with others who have drug-use and/or mental-health issues - Uses group dynamics to support the individual's strengths against using drugs. • **Self-help groups** - Based on the 12-Step philosophy. - Offers flexibility of availability, cost, etc.

Conclusion of PBL Session

Leave 15 minutes at the end of the session to give feedback to and receive it from the group. Remind students of the goals and LOs and review with them how well they did in achieving the goals. You could also address with the students this patient's discharge planning and followup. Give students feedback on their performance as a group. Ask the students to evaluate themselves. How do they think they did in fulfilling the LOs? How did the interdisciplinary clinical reasoning case process of self-directed learning work for them? Did they enjoy the process?

Student Handout Case 1: Diagnosis and Treatment of a Woman With an Acute Psychotic Presentation

Case 1 Part A
Session 1

A 30-year-old Hispanic woman is brought to the emergency department because of her agitated and restless behavior. The triage nurse tells you that the woman speaks little English. The history you obtain through a trained interpreter indicates the patient delivered a baby at your medical school's obstetrics and gynecology clinic last month. She had been attending the prenatal clinic on a regular basis. She gave birth to a healthy boy about 10 days previously. Her previous labs obtained from the medical record were as follows: blood type O+, antibody screen negative, VDRL negative, PPD negative, HIV negative, hepatitis B surface antigen negative, rubella immune, maternal serum triple screen WNL, glucose challenge test WNL, and hemoglobin electrophoresis 97% hemoglobin A.

The patient is not willing to stay in bed and is pushing staff members away. She is very agitated, loud, and swearing at people around her. She is afraid and looking behind herself constantly. She is refusing to allow the nurse to examine her or draw blood.

Student Handout Case 1: Diagnosis and Treatment of a Woman With an Acute Psychotic Presentation

Case 1 Part B
Session 1

With some effort, an interpreter is able to get contact information for the patient's mother, but the agitated patient forbids staff to make any contact with her family. When the interpreter asked her more information about her condition, she stopped talking. When the interpreter insisted, she became even more agitated. When she was offered medications to help her relax and calm down, she became even more agitated, screaming that she is not crazy and will not take any medications. She threatened to kill the medical staff and is thrashing around to the point where she is banging her head against the metal side rails of the bed.

Student Handout Case 1: Diagnosis and Treatment of a Woman With an Acute Psychotic Presentation

Case 1 Part C
Session 1

The patient's mother is contacted and able to provide the following history. This is a single mother with a history of "mood swings and anger problems." She had been on psychiatric medications in the past, but her medication adherence has been "sketchy." Her mother does not know what medications the patient has been prescribed in the past. She was following up with a psychiatrist in the past but it may have been a while since her last visit. She has had treatment at a local inpatient psychiatric hospital with similar agitated presentations; but according to her mother, the last time this happened was several years ago.

PMHx: She has had asthma since childhood, but no hospitalizations. There have been occasional visits to the emergency room. She has been prescribed inhalers and may have taken more than recommended. She was told that she got asthma because her mother was sick with a cold at the time of her birth. Her parents told her she could not exercise with other children because she had asthma and was sickly. She is about 1.5 week postpartum.

PSHx: Had Cesarean section in 2000 under epidural anesthesia.

Psych HX: See above.

Allergies: No known drug or food allergies.

Medications: Proventil multidose inhaler prn, multivitamins, iron.

Social Hx: Patient was born in the Dominican Republic. She has lived in the run-down part of town since the age of 15 years. She smokes about 1½ PPD, is ETOH dependent, has a history of IVDA for cocaine and methamphetamine, and smokes marijuana periodically. She has been in drug rehab in the past. She is currently unemployed, lives with her boyfriend and three children, ages 1½ weeks, 5, and 7. Her boyfriend may be abusive. He also has a history of drug dependence.

Family Hx: Mother 50, mild hypertension on medication. Father 55, heart disease, hypertension, has had multiple strokes, in public housing. Sister 26, brother 22, both with asthma, both abuse alcohol and drugs, both have been diagnosed with bipolar disorder and depression. Grandmother and grandfather on both sides have hypertension, heart disease CVA, and have been treated for depression.

Review of systems: Significantly positive for insomnia.

Student Handout Case 1: Diagnosis and Treatment of a Woman with an Acute Psychotic Presentation

Case 1 Part D
Session 1

Physical Exam

General: Anxious appearing woman very agitated.

Vitals: 160/90 mmHg

HR: 100 BPM

Temp: 40° C

RR: 24 BPM

Height: 165 cm

Weight: 65 kg

Skin: Several small skin excoriations noted on the cheeks and both forearms.

HEENT: Anicteric with mildly dry mucous membranes. Teeth with several caries.

Chest: Lungs clear to auscultation and percussion.

CV: Tachycardic, Normal S1, S2.

Abdomen: Soft, nontender, with active bowel sounds, no rebound or guarding.

Back: Within normal.

Pelvic: Not done.

Extremities: No clubbing or cyanosis.

Psych: Alert and oriented, but agitated

Neuro: Cranial nerves grossly intact. Full strength all extremities and sensation grossly intact. Deep tendon reflexes 3+.

MSE: Hispanic female, appears stated age, not cooperative, appears paranoid, may be responding to internal stimuli, agitated, is not talking to herself, does appear to be looking around and behind herself constantly as if she is afraid of something, speech is not spontaneous, does not speak English well. Unable to determine whether she is suicidal or homicidal; however, she appears to threaten staff and through the interpreter has said she does not want anyone to come close to her. A Folstein MMSE cannot be done due to her uncooperativeness.

Student Handout Case 1: Diagnosis and Treatment of a Woman With an Acute Psychotic Presentation

Case 1 Part E
Session 2

Studies: The patient is refusing to cooperate with further examination; therefore, she is administered IM lorazepam 4 mg. After 30 minutes the patient remains agitated, so haloperidol 10 mg is given. She calms down after about 30 minutes and goes to sleep. Blood is drawn at this point and IV fluid resuscitation is administered.

Lab Data

		SMA_7
Na	146 mmol/l	135–145
K	4.6 mmol/l	3.5–5.5
Cl	100 mmol/l	95–108
Bicarb	23 mmol/l	22–32
BUN	14 mg/dl	6–20
Cr	0.6 mg/dl	0.5–1.5
Glucose	72 mg/dl	60–115

		CBC
WBC	15,300/ul	4,800–11,000
Hemoglobin	10.9 gm/dl	11–15
Hematocrit	32.7%	35–47
Platelets	167 k/ul	150–500

		LFTs
Calcium	8.6 mg/dl	8.5–11
Total protein	6.5 gm/dl	6.0–8.5
Albumin	3.0 gm/dl	3.5–5
Alkaline phosphatase	480 u/l	35–125
CPK	950u/l	<150u/l
SGPT	40 u/l	5–65
SGOT	31 u/l	5–50
Total bilirubin	0.6 mg/dl	0.2–1.3
Direct bilirubin	0.1 mg/dl	0–0.4
Amylase	97 u/l	30–300
Lipase	134 u/l	23–300

Urinalysis: Spec. gravity 1.035

Urine gram stain: WNL

Urine C&S, cervical cultures: Pending

Urine drug screen: Pending

Student Handout Case 1: Diagnosis and Treatment of a Woman With an Acute Psychotic Presentation

Case 1 Part F
Session 2

A CT of head is generally WNL.

Abdominal ultrasound is WNL. No other abnormal findings.

Student Handout Case 1: Diagnosis and Treatment of a Woman With an Acute Psychotic Presentation

Case 1 Part G
Session 2

The patient receives a presumptive diagnosis of postpartum psychosis versus methamphetamine dependence and methamphetamine-induced psychosis. The patient was given IM haloperidol (10 mg) and lorazepam (4 mg) earlier; however, after 4 hours she is awake again and shows only partial improvement. She is getting agitated again and is disruptive. IV fluids are continued and a second dose of the haloperidol and lorazepam is given intravenously. Her fever is down to 38.1° C.

Physical exam: An agitated woman lying in bed on her right side.

$Temp_{max:}$ 38.2° C

BP: 130–140/70–84 mmHg

HR: 112 BPM

RR: 24 BPM

Chest: Lungs clear to auscultation and percussion.

CV: Tachycardic.

Abd: Nontender.

Back: CTA, WNL.

Student Handout Case 1: Diagnosis and Treatment of a Woman With an Acute Psychotic Presentation

Case 1 Part H
Session 2

Lab Data

		CBC
WBC	15,300/ul	4,800–11,000
Hemoglobin	10.2 gm/dl	11–15
Hematocrit	31.4%	35–47
Platelets	118 k/ul	150–500

Urine culture (from admission): WNL.

Cervical culture: Gonorrhea negative; chlamydia negative.

Abdominal-pelvic ultrasound: WNL.

Urine drug screen: + for methamphetamine.

Student Handout Case 1: Diagnosis and Treatment of a Woman with an Acute Psychotic Presentation

Case 1 Part I
Session 3

Based on the lab results, a presumptive diagnosis of methamphetamine dependence and methamphetamine-induced psychosis is made.

Student Handout Case 1: Diagnosis and Treatment of a Woman With an Acute Psychotic Presentation

Case 1 Part J
Session 3

The patient responds to the second dose of the haloperidol and lorazepam and is stabilized. Her agitation and psychotic symptoms are controlled. She is cooperative and willing to participate in treatment for her illness.

Student Handout Case 1: Diagnosis and Treatment of a Woman With an Acute Psychotic Presentation

Case 1 Part K
Session 3

The patient is put on a scheduled dose of ziprasidone (Geodon) 20 mg po BID and sent to the psychiatric unit for stabilization and further treatment of her drug use.

Facilitator Guide Case 2:
Diagnosis and Treatment of a Middle-Aged Man With Chest Pain

The main objective of this PBL is to use a realistic clinical scenario to explore with students the different causes of chest pain and to streamline the diagnosis and treatment of this condition.

Audience

This PBL has been developed for use with second- and third-year medical students as a way of integrating knowledge and raising awareness of important comorbidity.

Format

Case 2: *Diagnosis and Treatment of a Middle-Aged Man with Chest Pain* is comprised of nine narrative sections covered over two sessions, each lasting between 60 and 90 minutes. Each section is printed on a separate sheet of paper and students are to receive only one section at a time as directed by the Facilitator Guide (please note that students are not to be provided with PBL case materials prior to the first PBL session). Once a section has been reviewed in detail, students will be given the corresponding information on the teacher's notes and discuss why the case was managed as it was. During these sessions students are responsible for reading the case, identifying pertinent facts, and developing hypotheses. At the first session each group of students will also generate its own LOs. During the final "problem resolution" session students will also teach one another what they have learned by presenting relevant LO materials, preferably with the assistance of visual aids (e.g., computer images, slides, handouts). The resolution session concludes with a discussion of any major differences between the LOs generated by students and the LOs provided to the facilitator, which are to be distributed to students at this time.

To assist faculty facilitators in coaching the student-led discussions, notes and LOs are provided for each step of the case. The notes are suggestions for possible discussion of the major points presented in each section. Facilitators may expand on any portion of the case to pursue their interests or the interests of their students. It is important to not divulge any important information to the students prematurely, as this will prevent them from analyzing the data and reaching their own conclusions.

THE FACILITATOR NOTES SHOULD NEVER BE GIVEN TO THE STUDENTS. HANDOUTS FOR STUDENTS ARE PROVIDED.

PBL Case 2 Overview:
Diagnosis and Treatment of a Middle-Aged Man With Chest Pain

This PBL guide includes a case with nine narrative sections, detailed process guidelines (how to facilitate a PBL group), suggested student LOs, and substantial background information designed to make this case useful for faculty from any specialty. Topics include diagnosis and treatment of substance use disorders, in particular methamphetamine abuse, and the relationship between substance use disorders and other causes of acute chest pain such as anxiety, stress, etc. There is a significant amount of psychiatric diagnostic and treatment information given. However, the goals of this PBL case are to develop the medical student's understanding of the comorbidity and to prevent the student from assuming that a particular case is only a psychiatric presentation without developing an understanding of the case's nuances.

This PBL exercise allows the learners (second- and third-year students) to consolidate their educational experiences across clerkships and encourages multidisciplinary thinking in their clinical interactions. The case allows learners to integrate and apply collected data to problem solving. It also helps students develop the skills necessary for the interpretation and utilization of relevant historical, physical examination, and laboratory information in a patient who is acutely ill. Topics addressed in the exercise include symptom presentation/evolution, generation of a differential diagnosis, diagnostic testing, and patient management.

The exercise reiterates the clinical relevance of basic science topics, including physiology, pharmacology, and pathophysiology. It also allows students to address patient reluctance in talking about things that may be considered pejorative. The problem-based format fosters self-directed learning, reflection, and collaborative practice. The strength of the case is that students are required to think outside the context of a specific clerkship and integrate symptoms across organ systems.

A. Facilitator Notes––Introduction

This PBL, which evolves over two sessions, describes the course of a middle-aged man who comes to the emergency department with acute chest pain. The intent of the exercise is to encourage students to consider the impact of psychiatric "comorbidity" (history of anxiety) on the pathophysiology and prognosis of the patient and on the students' treatment decisions.

Because the patient has multiple concurrent conditions, students may reasonably deal with the medical, psychiatric, and substance use conditions separately. While such an approach is fine up to a point, the students must also attend to the potential interactions among the three conditions.

It is relatively new for students to consider interdisciplinary or comorbid issues in PBLs. Hence, interdisciplinary discussions should be encouraged. Comments to help further such discussions could include:

- What issues are involved? Is the presentation purely related to medicine or psychiatry?
- Where else may this patient present with a similar set of symptoms?
- Might his psychiatric problems be contributing to his presenting complaints? If so, how?

Another unusual facet of this PBL is that it raises cultural issues and questions that have not been completely answered by medical research. The issue of social stigma associated with drug use and the impact it has on the patients' honest reporting of their histories have not been adequately addressed in medical research.

B. Student Learning Objectives

LOs should describe actions or behaviors that students are expected to execute/perform by the end of the PBL. The following LOs are important for this PBL, but students should pick their own. LOs picked by students may be different from the list below. Feel free to share this list with the students after the resolution of the case.

LO 1	Explain the history taking for acute management of chest pain.
LO 2	Explain the diagnostic workup of a patient with acute chest pain.
LO 3	Explain the psychiatric factors that may impact the presentation of a patient with acute chest pain.
LO 4	Explain the impact of stimulants, in particular methamphetamine, on the presentation of acute chest pain.
LO 5	Explain the diagnostic criteria for methamphetamine abuse/dependence.
LO 6	Explain the symptoms of methamphetamine intoxication.
LO 7	Discuss the proper use of medications for the acute management of chest pain.
LO 8	Discuss treatments for methamphetamine dependence.
LO 9	Summarize the long-term goals of a patient who has serious medical complications because of his/her drug use.
LO 10	Discuss ways of overcoming barriers that prevent substance abuse patients from seeking appropriate care, such as severe social stigma.
LO 11	Summarize the key facts that support addiction as a medical disease, with a cause, effect, treatment, and response.

C. Goals

- To reintroduce basic science concepts and relate them to clinical scenarios.
- To think about cases in a multidisciplinary fashion, across specialty lines, and from a cultural perspective.
- To introduce self-directed and life-long learning using the tools of evidence-based medicine.

D. Session Objectives

- Integrate and apply collected data to problem solving, including the generation and prioritization of a differential diagnosis for acute chest pain.
- Develop the skills necessary for the interpretation and utilization of relevant historical, physical examination, and laboratory information in a patient who is acutely ill.
- Integrate the concepts of evidence-based medicine to develop an approach to an acutely ill patient.
- Assess the impact of culture/stigma on the diagnosis and management of acute medical conditions.
- Recognize the medical ramifications of addictive disorders.

E. Logistics

- Review goals/objectives.
- Appoint a group leader, reader, and scribe.
- Have students list facts, hypotheses, and learning objectives.
- Keep a copy of the LOs that are generated from each interdisciplinary clinical reasoning session.
- Ask questions only to stimulate discussion (e.g., guiding questions may be used to get the group back on track, but you should try to let students grasp the material on their own). Suggested guiding questions are italicized in this text. (You should refer to these questions if the group goes off on a tangent or is at an impasse. We suggest you refrain from using the questions too early in the process, as the students should be encouraged and given the time to formulate questions for themselves.)

Schedule

- Session 1, case parts A–D.
- Session 2, case parts E–I.

PBL Case 2:
Diagnosis and Treatment of a Middle-Aged Man With Chest Pain

Facilitator's Notes
Session 1: Case 2 Parts A–D

** (Student side)	** (Faculty side)
<u>Case 2 Part A</u> A 43-year-old white male comes to the emergency department with a 4- to 5-hour onset of nontraumatic chest pain.	**<u>Case 2 Part A</u>** ***Significant historical facts**:* The students need to know the right questions to ask to get a history that will help them rule in or rule out cardiac pathology. However, they should be aware of other differential diagnoses for this patient in order to fully understand and treat his illness. ***Differential diagnosis of chest pain includes:*** • Angina secondary to coronary artery disease. • Pulmonary pathology. • Vascular pathology. • Trauma. • GI disturbances. • Emotional/psychiatric conditions. • Substance use intoxication and withdrawals. This is by no means a complete list of differential diagnoses. ***What more do you want to know?*** • HPI: Timing, onset, and precipitating factors of chest pain? • Pain relieved by? Aggravated by? • Specific nature and degree of pain? • Associated symptoms that suggest underlying pathology? **Distribute Case 2 Part B Student Handout.**

** (Student side)	** (Faculty side)
<u>Case 2 Part B</u> **Presenting information:** • The patient's chest pain radiates to his left arm. • He has tingling sensations in his left arm. • He has difficulty breathing and feels short of breath. • On initial exam, the patient appears in moderate discomfort, describing "10 out of 10" substernal chest pressure. • He states that he was spending time with some friends and all of a sudden he noticed the pain. • He became anxious that it may be related to his heart. Because he is a "type A" personality, he wanted to make sure that he took care of it right away. • The patient also described a constant pain, which increased with exertion and was associated with radiation to his left arm, dyspnea, mild lightheadedness, nausea, and diaphoresis.	**<u>Case 2 Part B</u>** **Questions to Consider** ***How does your differential diagnosis change with this additional information?*** Not much, which is a major point of this case. ***This patient provides a history that is suggestive of chest pain from a cardiac origin. At this point, does the etiology of the chest pain matter?*** ***Is the management of this patient going to be different if the origin was noncardiac versus cardiac?*** Not much; this is a major point of this case. ***What more do you want to know?*** Additional history related to the case. **Distribute Case 2 Part C Student Handout.**

** (Student side)	** (Faculty side)
Case 2 Part C **Additional History** **PHX**: The patient does not have a previously diagnosed history of any cardiovascular condition. He does not give a previous history of chest pain (including chest pain from heart disease, heartburn, or anxiety). However, on previous visits to his doctor, he has been told he needs to "do more or he will get heart problems." He does not specify what was meant by this. **PSHX**: No history of any surgeries. **Psych HX**: He has a history of depression and anxiety. He has been prescribed medications for this; however, he is not taking these medications as prescribed. **Allergies**: No known drug or food allergies. **Medications**: None that he is taking. **Social Hx**: He is single, working full time as a car salesman and states that his job is stressful. He reported an approximately 25-pack	**Case 2 Part C** ***What are the most important points about this presentation?*** There does not appear to be any established history of cardiovascular problems, nor is there any previous history of chest pain from any other source. His previous history of anxiety and depression is important to note. Moreover, there is history of nonadherence to recommended treatment. He states that he has a high-stress job. He smokes and drinks, and he has a history of using drugs. He is also adamant that he has not used recently. However, research suggests the risk of relapse is always there, especially in the presence of stressors. His family history is positive for cardiac conditions. ***What possible diagnoses should be considered based on the history obtained?*** • MI. • Aortic dissection. ***What cues are present that suggest the patient may not be providing all the information that is relevant to this case?*** • The patient talks about having been told to "do more" to decrease his risk of cardiovascular problems, suggesting there is something else he has not shared in his

per year smoking history. He drinks alcohol socially on weekends. He also said he used drugs in the past, but swears he has not used recently. **Family MHX**: The patient's family history was significant for his father who had a myocardial infarction at age 50 and underwent coronary artery bypass graft (CABG) at age 60. The patient's sister suffered from a heart attack at age 24 and subsequently died of cancer. He stated that he has three healthy children from different relationships.	history. • O2 saturation. • The patient swears he has not used drugs recently. • He has a history of depression and anxiety but is not taking medication. ***What more do you want to know?*** A physical exam would be useful at this point, specifically: • **Vital signs:** Although high BP, high HR, and pulse may suggest cardiac distress, they are not specific, as these may be increased in any acute condition including medical and psychiatric conditions such as substance use or withdrawal. • **Chest:** Findings on percussion and/or auscultation of chest may help identify significant underlying pathology. • **Abdomen:** Findings on palpation, percussion, and/or auscultation of abdomen may help identify several abdominal causes of the acute presentations. • **Mental status examination:** For ruling out psychiatric symptoms, anxiety, and/or panic attacks that might help identify the underlying cause of the acute presentation. **Distribute Case 2 Part D Student Handout.**

** (Student side)	** (Faculty side)
Case 1 Part D **Physical Exam** **General**: Anxious and slightly agitated appearing middle-aged man in moderate distress secondary to pain. **Vitals**: 165/96 mmHg; HR: 102 BPM; temp: 36.1° C; RR: 20 BPM; O2 saturation of 90% on room air. **Height**: 165 cm **Weight**: 65 kg **Skin**: Several 5 to 8mm small areas of excoriation on left forearm. **HEENT**: Anicteric, dilated pupils bilaterally with dry mucous membranes, and jugular venous pressure of 6 cm. **Chest**: Lungs clear bilaterally, without any rales or rhonchi. **CV**: Normal S1, S2, no murmurs, rubs or gallops. **Abdomen**: Active bowel sounds; no rebound or guarding. **Back**: Within normal. **Rectal**: Heme-negative stools. **Extremities**: No clubbing or cyanosis.	**Case 1 Part D** ***How would you interpret the physical exam?*** • **Vital signs:** BP elevated; **Temperature** WNL; **HR:** elevated; **RR:** elevated, **Ht & Wt:** WNL; **O2 Saturation**: low. • **Skin:** several skin excoriations • **HEENT:** dilated pupils bilaterally. • **CV:** WNL. • **Chest:** WNL. • **Abdomen:** No abnormality. • **Extrem:** WNL. • **Neuro:** WNL. • **Psych:** Mood possibly consistent with anxiety, panic attacks. ***Do the results of the physical exam alter your differential diagnosis?*** Given this information, the focus of the differential diagnosis has not really changed. A further workup is required before noncardiac causes can be considered for the acute management of this condition. Even though with this patient's presentation a diagnosis of panic attacks and anxiety could be considered, one of the requirements of making this diagnosis is that the underlying medical conditions that could present with these symptoms be ruled out first. ***What laboratory tests would you like to order and why?*** Useful laboratory tests may include the following: complete metabolic panel, cardiac enzymes, and CBC (for infection); LFTs to assess

Psych:	Alert and oriented, hyper-verbal, slightly agitated, and anxious.	metabolic problems, alcohol use; urinalysis and culture; urine drug screen.
Neuro:	Cranial nerves grossly intact. Full strength in all extremities and sensation grossly intact.	

––SUGGESTED END POINT FOR SESSION 1––

MAKE SURE EACH STUDENT IS ASSIGNED AT LEAST ONE LEARNING OBJECTIVE TO RESEARCH AND PRESENT TO THE GROUP AT THE NEXT SESSION

Session 2: Case 2 Parts E–I

Examples of Learning Issues From Previous Session

- How do we diagnose acute chest pain?
- How do we manage acute chest pain?
- At what point can we start exploring psychiatric conditions that may be the cause of the presenting problems?
- Are blood/urine tests necessary for a diagnosis of acute chest pain?

Discussion of Learning Issues From Prior Session

Most of the learning issues will be of the diagnosis or etiology type. The facilitator should inquire of each student:

- Where did you look to find the answer to your learning issue? (e.g., textbook, UpToDate? If you went to PubMed, did you use a review article, case series, or a control trial?).
- How difficult was it to find the answer to your learning issue?
- If you found a diagnostic article, did it actually apply to our patient (i.e., a man with chest pain), or did it apply to making a general type of diagnosis in adults and we now have to decide whether we can apply it to a middle-aged man? Is that OK with the group? (Note this is common in medicine—extrapolating data to other patient populations: pediatrics, elderly, and the surgical patient).
- If looking at diagnostic tests, did the article mention the sensitivity and specificity of the test? Which one is more important to the group for the question they looked up?
- Is there a good gold standard for diagnosing these problems?

Session 2: Case 2 Parts E–I

** (Student side)	** (Faculty side)

Case 2 Part E

Additional Tests

EKG: Normal sinus rhythm with normal intervals. There were no ischemic ST-T wave changes.

Chest x ray: A portable chest x ray study showed clear lungs with no evidence of pulmonary edema or airspace disease.

Lab Data

SMA_7:

Na	136 mmol/l	135–145
K	3.9 mmol/l	3.5–5.5
Cl	100 mmol/l	95–108
Bicarb	23 mmol/l	22–32
BUN	14 mg/dl	6–20
Cr	0.6 mg/dl	0.5–1.5
Glucose	72 mg/dl	60–115

CBC:

WBC	9,300/ul	4,800–11,000
Hemoglobin	12.9 gm/dl	11–15
Hematocrit	36.7%	35–47
Platelets	167 k/ul	150–500

LFTs:

Calcium	9.6 mg/dl	8.5–11
Total protein	7.5 gm/dl	6.0–8.5
Albumin	4.0 gm/dl	3.5–5
Alkaline phosphatase	120 u/l	35–125
SGPT	40 u/l	5–65
SGOT	31 u/l	5–50
Total bilirubin	0.6 mg/dl	0.2–1.3

Case 2 Part E

Discussion of laboratory results:
Generally, the blood tests are within normal limits and do not help identify the specific underlying pathology that may be the cause of this patient's chest pain.

Urine drug screen: Results pending.

Do the results of these tests alter your differential diagnosis?
Not really.

What additional information and/or tests do you want?
The most important tests needed to rule out an underlying cardiac pathology are the cardiac enzymes, the EKG, and an echocardiogram. Only after these tests are complete could other pathology be considered as a cause of this patient's symptoms.

When would you begin treatment?
As the patient's condition is being worked up, it is important to presumptively start the treatment of this patient's chest pain. This is important to decrease the mortality and morbidity of this patient.

Direct bilirubin	0.1 mg/dl	0–0.4
Amylase	97 u/l	30–300
Lipase	134 u/l	23–300
CPK	96 ng/ml	52–200

Urinalysis: Spec. gravity 1.015

Urine drug screen: Pending.

Distribute Case 2 Part F Student Handout.

** (Student side)	** (Faculty side)
<u>Case 2 Part F</u> A presumptive diagnosis of Angina Pectoris is made. **Initial management**: The patient was initially treated with oxygen, IV lopressor, aspirin 325 mg, and three sublingual nitroglycerine tablets, which had no effect on his chest symptoms. He was then given 8 mg of IV morphine, which reduced his pain to “8 out of 10.”	**<u>Case 2 Part F</u>** ***It is important to stress that management should start before the diagnosis is made.*** While we have a list of differential diagnoses, patients’ treatment should start even before a definitive diagnosis is made. **Distribute Case 2 Part G Student Handout.**

** (Student side)	** (Faculty side)
Case 2 Part G **Cardiac enzymes**: Peak troponin I of 0.5 and a CK-MB of 470 with an MB fraction of 3. The patient eventually required IV nitroglycerine to control his pain, as well as additional morphine. A second EKG showed no significant change. Further management is being determined. Patient is being scheduled for an echocardiogram and a cardiology consultation. Following lopressor administration for his hypertension, his blood pressure was 178/110. **Urine drug screen**: Pending.	**Case 2 Part G** ***What is your differential diagnosis now?*** The results of the cardiac enzymes are not confirmatory for cardiac tissue damage. With these results, the origin of this chest pain is still not known. While further tests would confirm the etiology, treatment should already have begun to prevent possible MI and further damage. ***How would you re-evaluate this patient? What lab/imaging studies would you order and why?*** Cardiac catheterization and echocardiogram. **Distribute Case 2 Part H Student Handout.**

** (Student side)	** (Faculty side)
Case 2 Part H An echocardiogram was performed, which showed an ejection fraction of 78% with mild inferoseptal hypokinesis and mild mitral regurgitation.	**Case 2 Part H** Echocardiogram suggests hypokinesis of the inferior septal wall of the myocardium. Further workup should include admission to the hospital, a cardiology consult, and perhaps a cardiac catheterization if recommended by cardiology. ***What diagnosis ranks the highest on your differential now?*** Possible recurrence of anxiety disorder, possibility of gastrointestinal complaints, local inflammation, and substance use/intoxication may be reasons for the pain. Some substance use toxicity or withdrawal symptoms may also lead to autonomic arousal and could potentially cause chest pain. Stimulant substances can produce myocardial ischemia by one of the following mechanisms: (1) coronary artery vasospasm, (2) thrombus formation, (3) increased myocardial oxygen demand, or (4) direct myocardial toxicity. It is of interest that skeletal muscle necrosis (rhabdomyolysis) has been proposed as a mechanism of noncardiac chest pain after cocaine use, and this complication may be a factor in chest pain associated with methamphetamine use. The elevated vital signs suggest a possibility of a hyperadrenergic state and the possibility of substance use or toxicity should be entertained. The results of the urine drug screen would help resolve this possibility. **Distribute Case 2 Part I Student Handout.**

** (Student side)	** (Faculty side)
Case 2 Part I **Urine drug screen**: + for methamphetamine. The patient's cardiac workup is essentially within normal limits. The treating physician referred the patient to the substance use disorders program. The patient later acknowledged methamphetamine use and stated that he has struggled with methamphetamine use for a while and has tried to stop.	**Case 2 Part I** The results of the urine drug screen dispute the patient's response earlier in the assessment to the question about his drug use. This proves the importance of getting a urine drug screen as part of the assessment of an acute presentation. ***Several possible reasons that might explain the patient's reluctance to be honest:*** • The bias that is present in society against drug use and drug users might make it difficult for an individual to divulge information about his/her drug use. • The patient may want to hide the information from his/her significant other, family members, employers, or legal professionals. • Sometimes the patient may also be in denial about his/her own use and minimize it by saying it was "just a little bit," "it really isn't that much," "it isn't like I'm buying it myself," etc. ***How would you discuss a positive urine drug screen with the patient?*** • Present the results in a matter-of-fact way, in conjunction with other medically relevant information. • Re-administer the test if the patient believes the result showed a false positive. • If the second biological test results are positive, offer a brief intervention and referral for additional assessment and possible treatment. ***Diagnosing methamphetamine abuse versus dependence:*** For the patient in this case, ask the students to

	identify which of the criteria for abuse versus dependence are met (see Appendix A). • The patient reports that he has a problem with methamphetamine abuse and has been using repeatedly. There is not enough information to determine whether he has developed a tolerance to the drug or has increased the amount or duration of use. • He has tried to stop his drug use, which shows a desire or attempt to decrease or stop using. • He has had severe medical problems/effects from the drug use, but may not be aware that his drug use caused these problems. • There is not enough information about any consequences he has suffered resulting from his drug use. ***The limited information that is available is not enough to make a presumptive diagnosis. Screening for drug use may provide additional information as to the risk level of the patient.*** The NM ASSIST—NIDA-Modified Alcohol, Smoking, and Substance Involvement Screening Test (http://ww1.drugabuse.gov/nmassist/) is a Web-based interactive tool (modified from the WHO ASSIST questionnaire) that guides clinicians through a short series of screening questions that, based on the patient's responses, generates a substance involvement score that suggests the level of intervention needed. ***What are your next steps in treating this patient?*** • Use MET to encourage the patient's recognition of the problems he is having in his life due to drug use. • Refer the patient for further assessment and/or treatment, if indicated by the results of the NM ASSIST screen.

	Summary For the patient in this case, the chest pain required ruling out or treating underlying cardiac conditions Oral medications should be used before the use of intravenous or intramuscular medications as much as possible. This treatment should follow general treatment principles of using the smallest possible dose for the shortest possible time. Because there was insufficient information to make a diagnosis of abuse or dependence, additional questions were asked using the NM ASSIST to determine the patient's risk level and needed intervention.

Conclusion of PBL Session

Leave 15 minutes at the end of the session to give feedback to and receive it from the group. Remind students of the goals and LOs and review with them how well they did in achieving them. You could also address with the students this patient's discharge planning.

Student Handout Case 2: Diagnosis and Treatment of a Middle-Aged Man With Chest Pain

Case 2 Part A
Session 1

A 43-year-old white male comes to the emergency room with a 4- to 5-hour onset of nontraumatic chest pain.

Student Handout Case 2: Diagnosis and Treatment of a Middle-Aged Man With Chest Pain

Case 2 Part B
Session 1

Presenting Information

- His chest pain radiates to his left arm.
- He has tingling sensations in his left arm.
- He has difficulty breathing and feels short of breath.
- On initial exam, the patient appears in moderate discomfort, describing “10 out of 10” substernal chest pressure.
- He states he was spending time with some friends and all of a sudden he noticed the pain.
- He became anxious that it may be related to his heart. Because he is a “type A” personality, he wanted to make sure he took care of it right away.
- The patient also described a constant pain, which increased with exertion, and was associated with radiation to his left arm, dyspnea, mild lightheadedness, nausea, and diaphoresis.

Student Handout Case 2: Diagnosis and Treatment of a Middle-Aged Man With Chest Pain

Case 2 Part C
Session 1

Additional History

PHX: The patient does not have a previously diagnosed history of any cardiovascular condition, nor does he have chest pain from any other sources, such as heartburn or cardiac. However, on previous visits to his doctor, he has been told he needs to "do more or he will get heart problems." He does not specify what was meant by this.

PSHX: No history of any surgeries.

Psych HX: He has a history of depression and anxiety. He has been prescribed medications for this; however, he is not taking these medications as prescribed.

Allergies: No known drug or food allergies.

Medications: None that he is taking.

Social Hx: He is single, working full time as a car salesman and states that his job is stressful. He reported an approximately 25-pack per year smoking history. He drinks alcohol socially on weekends. He said he used drugs in the past, but swears he has not used recently.

Family MHX: The patient's family history was significant for his father, who had a myocardial infarction at age 50 and underwent CABG at age 60. The patient's sister suffered from a heart attack at age 24 and subsequently died of cancer. He stated that he has three healthy children from different relationships.

Student Handout Case 2: Diagnosis and Treatment of a Middle-Aged Man With Chest Pain

Case 2 Part D
Session 1

Physical Exam

General: Anxious and slightly agitated appearing middle-aged man in moderate distress secondary to pain.

Vitals: 165/96 mmHg, HR: 102 BPM, temp: 36.1° C, RR: 20 BPM, O2 Saturation of 90% on room air.

Height: 165 cm

Weight: 65 kg

Skin: Several 5 to 8mm small areas of excoriation on left forearm.

HEENT: Anicteric, dilated pupils bilaterally with dry mucous membranes, jugular venous pressure of 6 cm.

Chest: Lungs clear bilaterally, without any rales or rhonchi.

CV: Normal S1, S2, no murmurs, rubs, or gallops.

Abdomen: Active bowel sounds; no rebound or guarding.

Back: Within normal.

Rectal: Heme-negative stools.

Extremities: No clubbing or cyanosis.

Psych: Alert and oriented, hyper-verbal, slightly agitated, and anxious.

Neuro: Cranial nerves grossly intact. Full strength in all extremities and sensation grossly intact.

Student Handout Case 2: Diagnosis and Treatment of a Middle-Aged Man With Chest Pain

Case 2 Part E
Session 2

Additional Tests

EKG: Normal sinus rhythm with normal intervals. There were no ischemic ST-T wave changes.

Chest x ray: A portable chest x ray study showed clear lungs with no evidence of pulmonary edema or airspace disease.

Lab Data

		SMA_7
Na	136 mmol/l	135–145
K	3.9 mmol/l	3.5–5.5
Cl	100 mmol/l	95–108
Bicarb	23 mmol/l	22–32
BUN	14 mg/dl	6–20
Cr	0.6 mg/dl	0.5–1.5
Glucose	72 mg/dl	60–115

		CBC
WBC	9,300/ul	4,800–11,000
Hemoglobin	12.9 gm/dl	11–15
Hematocrit	36.7%	35–47
Platelets	167 k/ul	150–500

		LFTs
Calcium	9.6 mg/dl	8.5–11
Total protein	7.5 gm/dl	6.0–8.5
Albumin	4.0 gm/dl	3.5–5
Alkaline phosphatase	120 u/l	35–125
SGPT	40 u/l	5–65
SGOT	31 u/l	5–50
Total bilirubin	0.6 mg/dl	0.2–1.3
Direct bilirubin	0.1 mg/dl	0–0.4
Amylase	97 u/l	30–300
Lipase	134 u/l	23–300
CPK	96 ng/ml	52–200

Urinalysis: Spec. gravity 1.015

Urine drug screen Pending.

Student Handout Case 2: Diagnosis and Treatment of a Middle-Aged Man With Chest Pain

Case 2 Part F
Session 2

A presumptive diagnosis of Angina Pectoris is made.

Initial Management

The patient was initially treated with oxygen, IV lopressor, aspirin 325 mg, and three sublingual nitroglycerine tablets, which had no effect on his chest symptoms. He was then given 8 mg of IV morphine, which reduced his pain to “8 out of 10.”

Student Handout Case 2: Diagnosis and Treatment of a Middle-Aged Man With Chest Pain

Case 2 Part G
Session 2

Cardiac enzymes: Peak troponin I of 0.5 and a peak CK-MB of 470 with a MB fraction of 3.
The patient eventually required IV nitroglycerine to control his pain, as well as additional morphine. A second EKG showed no significant change.

Further management is being determined. Patient is being scheduled for an echocardiogram and a cardiology consultation.

Following lopressor administration for his hypertension, his blood pressure was 178/110.

Urine drug screen: Pending.

Student Handout Case 2: Diagnosis and Treatment of a Middle-Aged Man With Chest Pain

Case 2 Part H
Session 2

An echocardiogram was also performed, which showed an ejection fraction of 78% with mild inferoseptal hypokinesis and mild mitral regurgitation.

Student Handout Case 2: Diagnosis and Treatment of a Middle-Aged Man With Chest Pain

Case 2 Part I
Session 2

Urine drug screen: + for methamphetamine.

The patient's cardiac workup is essentially within normal limits. The treating physician referred the patient to the substance use disorders program. The patient later acknowledged his methamphetamine use and stated he has struggled with it for a while and has tried to stop.

PBL Session Evaluation

Please indicate your year: M2 M3

Please respond to the following items by using the scale provided:

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1. The case held my interest.	5	4	3	2	1
2. The case was realistic.	5	4	3	2	1
3. The case was targeted to my learning level.	5	4	3	2	1
4. The case provided me with new information about methamphetamine abuse and addiction.	5	4	3	2	1
5. The size of the group was appropriate.	5	4	3	2	1
6. The length of each case section was appropriate.	5	4	3	2	1

7. Please comment on aspects of the PBL session that worked well:

8. Please comment on aspects of the PBL session that could be improved or enhanced:

Learner Self-Assessment

Please indicate your year: M2 M3

As a result of this session, I am able to:

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1. Explain history taking for the acute management of chest pain.	5	4	3	2	1
2. Explain the diagnostic workup of a patient with acute chest pain.	5	4	3	2	1
3. Explain the psychiatric factors that might impact the presentation of the patient with acute chest pain.	5	4	3	2	1
4. Explain the impact of stimulants, in particular methamphetamine, on the presentation of acute chest pain.	5	4	3	2	1
5. Explain the diagnostic criteria for methamphetamine dependence.	5	4	3	2	1
6. Explain the symptoms of methamphetamine intoxication.	5	4	3	2	1
7. Discuss the proper use of medications for the acute management of chest pain.	5	4	3	2	1
8. List the major pharmacologic treatments of methamphetamine dependence.	5	4	3	2	1
9. List the major nonpharmacological treatments of methamphetamine dependence.	5	4	3	2	1
10. Summarize the long-term goals of a patient who has serious medical complications due to drug use and is facing severe social stigma for drug use that prevents him/her from seeking appropriate medical care.	5	4	3	2	1
11. Integrate and apply collected data to problem solving, including the generation and prioritization of a differential diagnosis for acute chest pain.	5	4	3	2	1
12. Integrate and utilize relevant historical, physical examination, and laboratory information in a patient who is acutely ill.	5	4	3	2	1
13. Integrate the concepts of evidence-based medicine to develop an approach to an acutely ill patient.	5	4	3	2	1
14. Assess the impact of culture/stigma on the diagnosis and management of acute medical conditions.	5	4	3	2	1

15. Comments (use the back if necessary):

PBL Facilitator Evaluation

Please indicate your year: M2 M3

My facilitator for this session:

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1. Encouraged critical thinking and inquiry.	5	4	3	2	1
2. Encouraged students to ask questions without fear of embarrassment.	5	4	3	2	1
3. Demonstrated sensitivity and respect for students.	5	4	3	2	1
4. Struck a balance between providing information and actively involving students.	5	4	3	2	1
5. Provided feedback when appropriate.	5	4	3	2	1
6. Facilitated participation of all members of the group.	5	4	3	2	1
7. Refocused the group when discussion was wandering.	5	4	3	2	1
8. Encouraged and valued contributions from students.	5	4	3	2	1
9. Encouraged student responsibility for the learning objectives.	5	4	3	2	1
10. Questioned and probed the reasoning process.	5	4	3	2	1
11. Encouraged critical appraisal of information.	5	4	3	2	1
12. Encouraged students to assume leadership responsibilities.	5	4	3	2	1
13. Overall, my facilitator was effective.	5	4	3	2	1

14. Comments about your facilitator (use the back if necessary):

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Pilot Information

Pilot Implementation: PBL Case 2: Facilitator's Guide Case 2: Diagnosis and Treatment of a Middle-Aged Man With Chest Pain.

Length of Session: This case requires two sessions, each approximately 60 to 90 minutes.

Results of Pilot Implementation: The Principal Investigator held a pilot PBL session on December 11, 2008. Six students participated in the session. The group included one first-year medical student, three second-year medical students, and two third-year medical students.

The session followed the case and guide closely, although due to the voluntary, pilot nature of the exercise, the case was discussed over a single 90-minute session rather than two sessions.

Problem-Based Learning:
Session Evaluation Summary Report
Pilot Session Delivered to M1s, M2s, and M3s on 12/11/2008

Demographics:

M1	M2	M3
1	3	2

Please respond to the following items by using the scale provided (*Strongly Agree = 5, Strongly Disagree = 1)*:

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	N	Mean	SD
The case held my interest.	3(50)*	2(33)	—	1(17)	—	6	4.17	1.17
The case was realistic.	1(17)	5(83)	—	—	—	6	4.17	.41
The case was targeted to my learning level.	3(50)	2(33)	1(17)	—	—	6	4.33	.82
The case provided me with new information about methamphetamine abuse and addiction.	—	1(17)	4(67)	1(17)	—	6	2.17	.98
The size of the group was appropriate.	3(50)	3(50)	—	—	—	6	4.50	.55
The length of each case section was appropriate.	3(50)	2(33)	1(17)	—	—	6	4.33	.82

*N(%)

Please comment on aspects of the PBL session that worked well:

- Could have teaching points on meth after case.
- The step-by-step approach to the case.
- I liked getting each set of new info separately because it made it more like solving a puzzle.
- Flow of info was good. Information was given as needed and not all at once.
- I enjoyed how each part was presented: Handed out at different times.

Please comment on aspects of the PBL session that could be improved or enhanced:

- The pace could have been faster in order to maximize time spent talking about the substance abuse (implications, treatments, etc.).

Appendix A

The DSM-IV-TR Criteria for Abuse

The DSM-IV-TR criteria for abuse require a maladaptive pattern of substance use leading to clinically significant impairment or distress, as manifested by one (or more) of the following, occurring within a 12-month period:

1. Recurrent substance use resulting in a failure to fulfill major role obligations at work, school, home (e.g., repeated absences or poor work performance related to substance use; substance-related absences, suspensions, or expulsions from school; neglect of children or household).
2. Recurrent substance use in situations in which it is physically hazardous (e.g., driving an automobile or operating a machine when impaired by substance use).
3. Recurrent substance-related legal problems (e.g., arrests for substance-related disorderly conduct).
4. Continued substance use despite having persistent or recurrent social or interpersonal problems caused or exacerbated by the effects of the substance (e.g., arguments with spouse about consequences of intoxication, physical fights).

The symptoms in this case never met the criteria for Substance Dependence for this class of substances.

The DSM-IV-TR Criteria for Dependence

The DSM-IV-TR criteria for dependence require any three of the following seven to be present in a 12-month period:

1. Tolerance, as defined by either of the following:
   a. A need for markedly increased amounts of the substance to achieve intoxication or desired effect.
   b. Markedly diminished effect with continued use of the same amount of substance.
2. Withdrawal, as manifested by either of the following:
   a. The characteristic withdrawal syndromes for the substance.
   b. The same (or a closely related) substance is taken to relieve or avoid withdrawal symptoms.
3. The substance is often taken in larger amounts or over a longer period than was intended.
4. There is a persistent desire or unsuccessful efforts to cut down or control substance use.
5. A great deal of time is spent in activities to obtain the substance, use the substance, or recover from its effects.
6. Important social, occupational, or recreational activities are given up or reduced because of substance use.
7. The substance use is continued despite knowledge of having a persistent or recurrent physical or psychological problem that is likely to have been caused or exacerbated by the substance (e.g., continued drinking despite recognition that an ulcer is made worse by alcohol consumption).