CURRICULUM

Novel Emergency Medicine Curriculum Utilizing Self-Directed Learning and the Flipped Classroom Method: Psychiatric Emergencies Small Group Module

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ABSTRACT:

Audience: This curriculum created and implemented at The Ohio State University Wexner Medical Center was designed to educate our emergency medicine (EM) residents, PGY-1 to PGY-3, as well as medical students and attending physicians.

Introduction: In 2007, there were 12 million adult emergency department visits for mental health and substance abuse complaints. This represents 12.5% of all adult emergency department visits.[1] Residents must be proficient in the differential diagnosis and management of the wide variety of psychiatric emergencies. The flipped classroom curricular model emphasizes self-directed learning activities completed by learners, followed by small group discussions pertaining to the topic reviewed. The active learning fostered by this curriculum increases faculty and learner engagement and interaction time typically absent in traditional lecture-based formats.[2-4] Studies have revealed that the application of knowledge through case studies, personal interaction with content experts, and integrated questions are effective learning strategies for emergency medicine residents.[4-6] The Ohio State University EM Residency didactic curriculum recently transitioned to a "flipped classroom" approach.[7-10] We created this innovative curriculum aimed to improve our residency education program and to share educational resources with other EM residency programs. Our curriculum utilizes an 18-month curricular cycle to cover the defined emergency medicine content. The flipped classroom curriculum maximizes didactic time and resident engagement, fosters intellectual curiosity and active learning, and meets the needs of today's learners. [3,6,11]

Objectives: We aim to teach the presentation and management of psychiatric emergencies through the

creation of a flipped classroom design. This unique, innovative curriculum utilizes resources chosen by education faculty and resident learners, study questions, real-life experiences, and small group discussions in place of traditional lectures. In doing so, a goal of the curriculum is to encourage self-directed learning, improve understanding and knowledge retention, and improve the educational experience of our residents.

Methods: The educational strategies used in this curriculum include: small group modules authored by education faculty and content experts based on the core emergency medicine content. This program also includes resident submitted questions that were developed during review of the content. The Socratic method, used during small group sessions, encourages active participation; small groups also focus on the synthesis and application of knowledge through the discussion of real-life experiences. The use of free open access medical education (FOAM) resources allows learners to work at their own pace and maximize autonomy.

Topics: Emergency medicine, flipped classroom, medical education, psychiatric emergencies, pedagogy, teaching.

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List of Resources:

Learner Audience:
Medical students, interns, junior residents, senior residents, attending physicians and faculty members

Length of Curriculum:
The entire didactic curriculum was developed to utilize an 18-month curricular cycle; therefore, resident learners experience each curricular topic twice in the course of their residency training. The psychiatric emergencies module consists of seven 45-60 minute small group sessions.

Topics:
Emergency medicine, flipped classroom, medical education, psychiatric emergencies, pedagogy, teaching.

Objectives:
Each chapter within our curriculum has individual objectives; however, educational objectives for the curriculum and more specifically, the Psychiatric Emergencies Module include:

1. Resident learners will learn the core content of emergency medicine in an 18-month curriculum utilizing self-directed learning and small group discussions based on the flipped classroom model.
2. After completing the Psychiatric Emergencies Module, resident learners will exhibit mastery within this content area and will critically discuss the pathophysiology, diagnosis, and treatment of various pediatric and adult psychiatric emergencies including:
    a. Substance Abuse Disorders
    b. Delirium and Dementia
    c. Alcohol Abuse and Nutritional Deficiencies
    d. Excited Delirium
    e. Mood, Factitious, and Neurotic Disorders
    f. Sexual Assault
    g. Violence, Abuse, and Neglect

Brief introduction:
The flipped classroom learning approach is becoming more commonly recognized as a preferred curricular model for mature learners, specifically those in medical education. This particular model is a natural fit for the hands-on, experiential emergency medicine learner.[4] The active learning fostered by this curriculum increases faculty and learner engagement and interaction time, which is typically absent in traditional lecture-based formats.[5,12] Education literature shows that resident learners prefer learning activities that involve small group discussion, are case/skill based, and emphasize the application of newly obtained knowledge.[3,4] This educational model also provides a clear channel for the incorporation of evidence-based medicine and increases opportunities for educator-learner conversations. A successful flipped classroom curriculum fosters learner accountability and provides robust opportunities for formal assessment in various emergency medicine milestones.[4,9, 12] For these reasons, we developed a flipped classroom curriculum at The Ohio State University. The psychiatric emergencies curriculum is one of several topics in our overall didactic curriculum.

Problem identification, general and targeted needs assessment:
Traditional lecture-based didactics may not be the most effective or preferred method for emergency medicine resident education.[6] Previously, we used a traditional lecture format in our residency curriculum despite overwhelming evidence for a more hands-on, "flipped classroom" approach.[8,9] From the perspective of resident learners, the chance to remain fully engaged through the asking of questions developed from personal experiences, and also by learning from the experiences of others, provides a manner of learning that makes a topic more difficult to forget.[5]

As current literature reveals, both educators and learners benefit from an interactive and collaborative classroom, leading to the creation and implementation of this proposed curricular model at our emergency medicine residency program.[10] This weekly small group curriculum has now replaced three hours of traditional lecture-based didactics. Since implementation, residents and educators are engaging in new, valuable flipped classroom learning communities at The Ohio State University. Through the curriculum, we continually seek to foster self-directed learning and increased collaboration between resident learners and education faculty members. This ensures that resident time will be maximized and learning will be more efficient and effective, therefore providing a potential positive impact on patient care and physician wellness. Currently, minimal flipped classroom curricular materials dedicated to the core content of emergency medicine exist.

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Goals of the curriculum:
This curricular innovation was developed and implemented to promote self-directed/active learning and an environment of intellectual curiosity and learner accountability. This flipped classroom curriculum is specifically designed to cover the core content of emergency medicine; this module promotes the mastery of psychiatric emergencies. Secondary goals include the increased interaction between educators and learners, and the evaluation of resident small group teaching skills.

Objectives of the curriculum:
Each chapter within our curriculum has individual objectives; however, educational objectives for the curriculum and more specifically, the Psychiatric Emergencies Module include:

1. Resident learners will learn the core content of emergency medicine in an 18-month curriculum utilizing self-directed learning and small group discussions based on the flipped classroom model.
2. After completing the Psychiatric Emergencies Module, resident learners will exhibit mastery within this content area and will critically discuss the pathophysiology, diagnosis, and treatment of various pediatric and adult psychiatric emergencies including:
    a. Substance Abuse Disorders
    b. Delirium and Dementia
    c. Alcohol Abuse and Nutritional Deficiencies
    d. Excited Delirium
    e. Mood, Factitious, and Neurotic Disorders
    f. Sexual Assault
    g. Violence, Abuse, and Neglect

Educational Strategies: (See curriculum chart)
Please refer to the curriculum chart of linked objectives and educational strategies.

Evaluation and Feedback:
This innovative curriculum was literature-based and specifically designed to maximize active learning using the flipped classroom learning model. We overcame initial challenges and skepticism from both educators and learners to execute a successful, novel curricular model. Both resident learners and faculty educators provided an overwhelming amount of positive feedback. Additionally, a survey was administered to each resident prior to initiation of the curricular innovation, and repeated at the conclusion of the first 18-month cycle. Learners and educators were enthusiastic about the conference structure and expressed a preference for it rather than the previous, lecture-based didactics. Resident learner attendance at weekly emergency medicine didactics increased, presumably as a result of our curricular innovation and the associated increase in faculty engagement, active discussions, and learner perceived value of the sessions. The curriculum is critically evaluated and updated by education faculty members in order to ensure educational material remains current and consistent with the emergency medicine core content.

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Additional Resources:
Educational resources are available within each individual chapter of this psychiatric emergencies curricular module; however, a complete list of resources and educational materials are listed below.

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Sexual Assault and Domestic Violence Prevention. Ohio Department of Health. http://www.odh.ohio.gov/health/sadv/sadv.aspx. Published September 11, 2015. Accessed February 16, 2017.

DIDACTICS AND HANDS-ON CURRICULUM

Topic	Recommended Educational Strategy	Educational Content	Objectives	Learners	Timing, resources Needed (Space, Instructors, Equipment, citations of JETem pubs or other literature)	Recommended Assessment, Milestones Addressed
Addictive Behavior	-"Flipped" Classroom Discussion of Pre-reading Material, Case Discussions, and Discussion Questions -Encourage Participants to Share Clinical Experiences to Enhance Discussion -15 Minutes for Brief Topic Review and 30-45 Minutes for Case and Content Discussion	-Pathophysiology, Diagnosis, and Management of alcohol addiction and withdrawal -Pathophysiology, Diagnosis, and Management of opioid addiction and withdrawal -Presentation, Diagnosis, and Management of eating disorders and their potential complications.	By the end of this session, learners will: Review pathophysiology, diagnosis and treatment of alcohol withdrawal. Review pathophysiology, diagnosis and treatment of opioid withdrawal. Review diagnosis and treatment of eating disorders and their potential complications. Discuss questions posed by residents in their pre-work assignments. Critically discuss strategies to identify and address substance abuse in the emergency department setting. Summarize key learning points.	PGY-1 PGY-2 PGY-3 Medical Students Faculty	Equipment: Projector and Screen Preferable (instructor can pull up web images during session). Tables and Space Promoting Small Group Discussion. Instructors: 2 Faculty Members or Content Experts. Pre-Determined Senior Resident Discussion Leader. Timing: Small Group Discussions Involve No More than 15 Learners and Last 45-60 Minutes.	Milestone: MK Assessment: -Learner Preparation and Participation -Senior Resident Teaching Skills Evaluation: Post-test created using a purchased question bank

DIDACTICS AND HANDS-ON CURRICULUM

Topic	Recommended Educational Strategy	Educational Content	Objectives	Learners	Timing, resources Needed (Space, Instructors, Equipment, citations of JETem pubs or other literature)	Recommended Assessment, Milestones Addressed
Delirium and Dementia	-"Flipped" Classroom Discussion of Pre-reading Material, Case Discussions, and Discussion Questions -Encourage Participants to Share Clinical Experiences to Enhance Discussion -15 Minutes for Brief Topic Review and 30-45 Minutes for Case and Content Discussion	-Diagnosis and Management of Delirium in the Emergency Department -Diagnosis and Management of Dementia in the Emergency Department	By the end of this session, learners will: Review diagnosis and treatment of dementia and delirium. Compare and contrast the features of delirium and dementia. Describe the associated conditions and prognosis of dementia and delirium relevant to the emergency department patient population. Discuss questions posed by residents in their pre-work assignments. Summarize key learning points.	PGY-1 PGY-2 PGY-3 Medical Students Faculty	Equipment: Projector and Screen Preferable. Tables and Space Promoting Small Group Discussion. Instructors: 2 Education Faculty Members or Content Experts. Pre-Determined Senior Resident Discussion Leader. Timing: Small Group Discussions Involve No More than 15 Learners and Last 45-60 Minutes.	Milestone: MK Assessment: -Learner Preparation and Participation -Senior Resident Teaching Skills Evaluation: Post-test created using a purchased question bank

DIDACTICS AND HANDS-ON CURRICULUM

Topic	Recommended Educational Strategy	Educational Content	Objectives	Learners	Timing, resources Needed (Space, Instructors, Equipment, citations of JETem pubs or other literature)	Recommended Assessment, Milestones Addressed
Alcohol and Nutritional Deficiencies	-"Flipped" Classroom Discussion of Pre-reading Material, Case Discussions, and Discussion Questions -Encourage Participants to Share Clinical Experiences to Enhance Discussion -15 Minutes for Brief Topic Review and 30-45 Minutes for Case and Content Discussion	-Pathophysiology, Diagnosis, and Management of alcohol related nutritional deficiencies -Pathophysiology, Diagnosis, and Management of Wernicke Encephalopathy and Korsakoff Syndrome -Pathophysiology, Diagnosis, and Management of alcohol withdrawal	By the end of this session, learners will: -Discuss questions posed by residents in their pre-work assignments. -Review common nutritional deficiencies associated with alcohol abuse. -Discuss the presentation and management of Wernicke Encephalopathy and Korsakoff Syndrome. -Identify symptoms of and patients at risk for alcohol withdrawal.	PGY-1 PGY-2 PGY-3 Medical Students Faculty	Equipment: Projector and Screen Preferable. Tables and Space Promoting Small Group Discussion. Instructors: 2 Education Faculty Members or Content Experts. Pre-Determined Senior Resident Discussion Leader. Timing: Small Group Discussions Involve No More than 15 Learners and Last 45-60 Minutes.	Milestone: MK Assessment: -Learner Preparation and Participation -Senior Resident Teaching Skills Evaluation: Post-test created using a purchased question bank
Excited Delirium	-"Flipped" Classroom Discussion of Pre-reading Material, Case Discussions, and Discussion Questions -Encourage Participants to Share Clinical Experiences to Enhance Discussion -15 Minutes for Brief Topic Review and 30-45 Minutes for Case and Content Discussion	-Pathophysiology, Diagnosis, and Management of Excited Delirium	By the end of this session, learners will: -Review pathophysiology, diagnosis and treatment of excited delirium. -Compare and contrast various treatment options for excited delirium. -Discuss risk factors for morbidity and mortality in excited delirium.	PGY-1 PGY-2 PGY-3 Medical Students Faculty	Equipment: Projector and Screen Preferable. Tables and Space Promoting Small Group Discussion. Instructors: 2 Education Faculty Members or Content Experts. Pre-Determined Senior Resident Discussion Leader. Timing: Small Group Discussions Involve No More than 15 Learners and Last 45-60 Minutes.	Milestone: MK Assessment: -Learner Preparation and Participation -Senior Resident Teaching Skills Evaluation: Post-test created using a purchased question bank

DIDACTICS AND HANDS-ON CURRICULUM

Topic	Recommended Educational Strategy	Educational Content	Objectives	Learners	Timing, resources Needed (Space, Instructors, Equipment, citations of JETem pubs or other literature)	Recommended Assessment, Milestones Addressed
Mood, Factitious, and Neurotic Disorders	-"Flipped" Classroom Discussion of Pre-reading Material, Case Discussions, and Discussion Questions -Encourage Participants to Share Clinical Experiences to Enhance Discussion -15 Minutes for Brief Topic Review and 30-45 Minutes for Case and Content Discussion	-Pathophysiology, Diagnosis, and Management of Depression -Differential Diagnosis for Depression, Mania, and Psychosis -Pathophysiology, Diagnosis, and Management of Bipolar Disorder -Diagnosis and Management of Generalized Anxiety Disorder and Panic Disorders	By the end of this session, learners will: -Review pathophysiology, diagnosis and treatment of Depression. -Discuss the assessment of Suicidality in the Emergency Department and Indications for Emergent Psychiatric Evaluation. -Discuss Strategies for Addressing Malingering and Agitation. -Review Differential Diagnosis of Depression, Mania, and Psychosis. -Discuss questions posed by residents in their pre-work assignments. -Summarize key learning points.	PGY-1 PGY-2 PGY-3 Medical Students Faculty	Equipment: Projector and Screen Preferable. Tables and Space Promoting Small Group Discussion. Instructors: 2 Education Faculty Members or Content Experts. Pre-Determined Senior Resident Discussion Leader. Timing: Small Group Discussions Involve No More than 15 Learners and Last 45-60 Minutes.	Milestone: MK Assessment: -Learner Preparation and Participation -Senior Resident Teaching Skills Evaluation: Post-test created using a purchased question bank

DIDACTICS AND HANDS-ON CURRICULUM

Topic	Recommended Educational Strategy	Educational Content	Objectives	Learners	Timing, resources Needed (Space, Instructors, Equipment, citations of JETem pubs or other literature)	Recommended Assessment, Milestones Addressed
Sexual Assault	-"Flipped" Classroom Discussion of Pre-reading Material, Case Discussions, and Discussion Questions -Encourage Participants to Share Clinical Experiences to Enhance Discussion -15 Minutes for Brief Topic Review and 30-45 Minutes for Case and Content Discussion	-Diagnosis and Complications of Sexual Assault Related Injuries -Components of Post-Exposure Prophylaxis -Statistics and Demographics of Sexual Assault	By the end of this session, learners will: -Review Management and Diagnosis of Sexual Assault Related Injuries. -Describe the Statistics of Sexual Assault and Identify at risk Demographic Groups. -Develop Strategies for Discussing Post Exposure Prophylaxis Options with this Patient Population. -Discuss Special Needs of this Patient Population. -Summarize key learning points.	PGY-1 PGY-2 PGY-3 Medical Students Faculty	Equipment: Projector and Screen Preferable. Tables and Space Promoting Small Group Discussion. Instructors: 2 Education Faculty Members or Content Experts. Pre-Determined Senior Resident Discussion Leader. Timing: Small Group Discussions Involve No More than 15 Learners and Last 45-60 Minutes.	Milestone: MK Assessment: -Learner Preparation and Participation -Senior Resident Teaching Skills Evaluation: Post-test created using a purchased question bank

DIDACTICS AND HANDS-ON CURRICULUM

Topic	Recommended Educational Strategy	Educational Content	Objectives	Learners	Timing, resources Needed (Space, Instructors, Equipment, citations of JETem pubs or other literature)	Recommended Assessment, Milestones Addressed
Abuse	-"Flipped" Classroom Discussion of Pre-reading Material, Case Discussions, and Discussion Questions -Encourage Participants to Share Clinical Experiences to Enhance Discussion -15 Minutes for Brief Topic Review and 30-45 Minutes for Case and Content Discussion	-Common Presentations and Physical Exam Findings of Child Abuse, Elder Abuse, and Intimate Partner Violence -Risk Factors for Child Abuse, Elder Abuse, and Intimate Partner Violence	By the end of this session, learners will: -Review "Red Flags" for Child Abuse, Elder Abuse, and Intimate Partner Violence. -Discuss Risk Factors Child Abuse, Elder Abuse, and Intimate Partner Violence. -Review Mandatory Reporting Requirements. -Critically discuss the appropriate ED management for these patient populations. -Summarize key learning points.	PGY-1 PGY-2 PGY-3 Medical Students Faculty	Equipment: Projector and Screen Preferable. Tables and Space Promoting Small Group Discussion. Instructors: 2 Education Faculty Members or Content Experts. Pre-Determined Senior Resident Discussion Leader. Timing: Small Group Discussions Involve No More than 15 Learners and Last 45-60 Minutes.	Milestone: MK Assessment: -Learner Preparation and Participation -Senior Resident Teaching Skills Evaluation: Post-test created using a purchased question bank

Appendix A:
Addictive Behavior

Author: Michael Prats, MD, and Sarah Greenberger, MD

Objectives

1. Critically discuss strategies to identify and address substance abuse in the emergency department setting.
2. Review pathophysiology, diagnosis, and management of alcohol addiction and withdrawal.
3. Review the pathophysiology, diagnosis and management of opioid addiction and withdrawal.
4. Review the presentation, diagnosis and management of eating disorders and their potential complications.

Case Studies

Case 1: A 45-year-old woman presents to the emergency department complaining of back pain. When you enter the room, you see a well-developed woman dressed neatly in business attire. After obtaining further history and performing an exam, you diagnose the pain as an uncomplicated lumbar strain likely related to carrying heavy boxes when the patient moved into a new office a few days ago. When you recommend non-steroidal anti-inflammatory medications, she asks you for something stronger. She suggests "Perc-10s," which have worked for her in the past. When you decline and start to exit the room, she pleads, "Please? If you won't give them to me, I know how to buy them on the street." She admits that she has cravings for oxycodone and is experiencing myalgias, vomiting and crampy abdominal pain because she cannot obtain any.

Question Prompts:

1. Describe the pathophysiology of this diagnosis.
    a. This patient is exhibiting evidence of opioid substance use disorder. This is due to the physiologic and psychological addictive properties of opioids. Opioids act on neurotransmitter receptors located in central and peripheral nervous systems. Stimulation of these receptors triggers reward centers in the brain as well as pathways for analgesia. When the body is exposed to exogenous opioids, the central nervous system produces an increased amount of stimulant neurotransmitters, mostly noradrenaline, in an attempt to balance out the effects of the opioids. When exogenous opioids are no longer introduced into the system, the increased amount of unopposed noradrenaline results in the signs of symptoms of opioid withdrawal discussed below.
2. What physiologic signs and symptoms can be expected as the patient goes through withdrawal?
    a. Signs and symptoms include mydriasis, tearing, sneezing, rhinorrhea, nausea, vomiting, diarrhea, abdominal cramping, yawning, piloerection, and myalgias. The onset and duration of these symptoms is dependent upon the specific pharmacologic properties of the opioid

of abuse.

3. What treatment can you offer this patient?
    a. Unlike benzodiazepine or alcohol withdrawal, opioid withdrawal is rarely life-threatening and does not generally require admission, though supportive care may be offered. Treatment options should target the patient's symptoms and can include muscle relaxants, benzodiazepines, antispasmodics, anti-emetics, anti-diarrheals, and clonidine. Altered cognition is not associated with opioid withdrawal and should prompt consideration of another diagnosis. Caution should be utilized when selecting treatment medications, as many of these also have abuse potential. After emergency department management, the patient should be referred to resources for further support in addiction management.

Case 2: A 15-year-old girl is brought to the emergency department by her parents after a syncopal episode during a ballet class. She has no past medical history aside from undergoing recent dental work. Her last menstrual period was 11 months ago. She appears to be a young, thin female in no acute distress. She appears comfortable and unconcerned by the syncope. Her exam is notable for bradycardia, mild pretibial edema, and generally dry skin with calluses over her knuckles.

Question Prompts:

1. List potential causes of this patient's condition.
    a. This patient has evidence of an eating disorder and malnutrition. These disorders include anorexia nervosa, bulimia nervosa, and binge eating disorder. Anorexia is overall restriction of caloric intake. Bulimia is recurrent binge eating with compensatory behaviors to prevent weight gain. This patient has signs of malnutrition and vitamin deficiency (dry skin, pretibial edema) and signs of induced emesis (calluses on knuckles, dental erosion). The pathophysiology of these disorders may involve structural brain differences or differences in chemical modulators that regulate eating behavior.
2. What diagnostic studies are indicated for this patient?
    a. Serum tests include electrolyte panel, renal function, glucose, complete blood count, serum albumin, thyroid-stimulating hormone, lipase, hepatic function panel. In addition, an electrocardiogram and beta-HCG should be obtained. Consider screening patients for depression and suicidality as there is a high correlation between some eating disorders and suicide.
3. What is the management algorithm for this patient, and what complications are associated with this diagnosis?
    a. Assess for medical conditions that require emergent stabilization. Perform appropriate diagnostics as discussed above. Electrolyte, nutritional, and volume deficiencies should be corrected and additional medical issues found on work up should be addressed. The next step is to assess whether the patient requires inpatient treatment or can be safely discharged with outpatient follow up. Criteria for admission include medial instability,

weight less than 75% of ideal body weight, cardiac dysrhythmia, seizure, syncope, end

organ damage, failure of outpatient management, concurrent psychiatric disease, or lack of outpatient follow up options. Bulimia is treated with cognitive behavioral therapy combined with antidepressants. Pharmacotherapy has not been demonstrated to be effective for treatment of anorexia. Refeeding syndrome can occur in eating disorder patients after severe weight loss or starvation when refeeding is initiated. Refeeding syndrome is characterized by electrolyte abnormalities (hypokalemia, hypomagnesemia, hypophosphatemia) and reduced cardiac contractility (with risk of heart failure). Patients at risk for refeeding syndrome require aggressive electrolyte replacement and continuous cardiac monitoring. Total parenteral nutrition increases risk of refeeding syndrome in patients with anorexia.

Case 3: A 23-year -old man presents to the emergency department with a lip laceration. He states that thinks he must have fallen over the weekend while intoxicated at a party. Upon further questioning, he states that he generally has four or five 12-ounce beers every evening and more than that each weekend. He has not had a drink since the aforementioned party and says that he has noticed a headache and mild tremor in his hands.

Question Prompts:

1. What constitutes unhealthy alcohol use?
    a. Hazardous drinking is defined as:
        i. For males, >14 drinks per week or >4 drinks per 2 hour occasion for men
        ii. For females, >7 drinks per week or >3 drinks per occasion
        iii. For patients over 65 years of age, >7 drinks per week or >1 drink per occasion.
        iv. Consider initiating withdrawal precautions or watching for withdrawal symptoms in patients who screen positive for alcohol dependence or hazardous drinking.
2. What is the pathophysiology of alcohol withdrawal and how does this manifest in symptoms?
    a. Alcohol withdrawal is a result of reduced gamma-aminobutyric acid (GABA) transmission which is generally an inhibitory neurotransmitter, and enhanced glutamate transmission, generally an excitatory neurotransmitter. Minor alcohol withdrawal occurs as early as 6 hours and peaks at 24-36 hours after decrease or cessation of alcohol intake; major alcohol withdrawal occurs after 24 hours and peaks at 50 hrs. Delirium tremens usually develop on or after the third abstinent day. Signs and symptoms of withdrawal include hand tremors, headache, loss of appetite, nausea, vomiting, diaphoresis, insomnia, tachycardia, hypertension, fever, psychomotor agitation, hyperarousal, craving, and anxiety. More severe symptoms are seizures, hallucinations, and delirium which constitute delirium tremens.
3. What is the treatment for this condition?
    a. Benzodiazepines are the mainstay of treatment for alcohol withdrawal. Dilantin has no benefit over placebo in preventing recurrence of uncomplicated alcohol withdrawal

seizures. Dosing of benzodiazepines for alcohol withdrawal is best done in response to repeated withdrawal assessments such as the Clinical Institute Withdrawal Assessment of Alcohol Scale (CIWA; https://www.mdcalc.com/ciwa-ar-alcohol-withdrawal). Prior to discharging a patient who is either experiencing withdrawal or at risk for withdrawal, there should be a discussion regarding the patient's intention and interest in continuing ethanol use. Patients will often return to drinking ethanol, thereby reducing their risk for serious withdrawal. Benzodiazepine tapers can be prescribed to a select group of patients for outpatient management if close follow up can be obtained and the risks of treatment (abuse, noncompliance) do not outweigh the benefits (avoiding otherwise unnecessary hospitalization).

Suggested Readings:

Long DA, Long B. Drug withdrawal: pearls and pitfalls. emDocs. http://www.emdocs.net/drug-withdrawal-pearls-pitfalls/. Published September 10, 2016. Accessed February 15, 2017.

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Minns AB, Clark RF. Substance abuse. In: Marx JA, Hockberger RS, Walls RM, et al. eds. *Rosen's Emergency Medicine: Concepts and Clinical Practice*. 8th ed. Philadelphia, PA: Elsevier Saunders; 2014:2395-2399.

Ogbu U, Lotfipour S, Chakravarthy B. Polysubstance abuse: Alcohol, opioids and benzodiazepines require coordinated engagement by society, patients, and physicians. *West J Emerg Med*. 2015;16(1):76-79. doi: 10.5811/westjem.2014.11.24720

Trent SA, Moreira ME, Colwell CB, Mehler PS. ED Management of patients with eating disorders. *Am J Emerg Med*. 2013 31(5):859-865.

Facilitator Notes:

1. DSM-V Diagnosis of substance use disorder requires two of the following criteria : tolerance, withdrawal, recurrent use in increasing quantities or for greater time than intended, failed attempts to cut back or stop, spending large portions of time involved in obtaining, using or recovering from the substance, continued use despite consequences, ceasing important activities due to use, inability to fulfill responsibilities such as work, school, or home obligations due to use, recurrent use resulting in dangerous behavior, persistent use despite social or interpersonal problems, and cravings for the substance. Presence of 2 or 3 criteria is considered mild. Presence of 4 or 5 criteria is considered moderate. A severe diagnosis is defined as 6 or more of these criteria.
2. Substance abuse is underdiagnosed in the ED.
3. Unhealthy alcohol use includes a spectrum from high-risk usage (no consequences experienced), to harmful (consequences), to an alcohol use disorder.
4. Greatest risk factor for developing delirium tremens (DT) is prior DT.
5. Mimics of alcohol withdrawal can be hyponatremia, hypoglycemia, hypomagnesemia, diabetic ketoacidosis, Wernicke's encephalopathy, toxic alcohol ingestions, other substance ingestions, primary seizure disorders, traumatic head injuries, and sepsis.
6. Although not discussed specifically in this module, benzodiazepine withdrawal also warrants attention as an easily missed but life threatening diagnosis. Symptoms usually develop 7-10 days after stopping chronic benzodiazepine use and can be similar to alcohol withdrawal. Seizures, hypertension, tachycardia, tachypnea, tremor, anxiety, insomnia, altered mental status, delirium, and hallucinations may be present.
7. Anorexia has two subtypes – restrictive and binge/purge. Up to 50% of patients with anorexia eventually develop bulimia. Anorexia and bulimia are more common in women than in men.
8. Symptoms of eating disorders can be vague and include weakness, fatigue, near-syncope, syncope, or edema. The results of these disorders can also lead to other medical conditions such as Mallory-Weiss tears, electrolyte disturbances, dysmenorrhea, osteoporosis.
9. Complications of eating disorders can include cardiac complications such as decreased cardiac

contractility, mitral valve prolapse, pericardial effusion, and arrhythmias from electrolyte disturbance. In addition they can develop nutritional disorders (Wernicke-Korsakoff encephalopathy, wet beriberi, scurvy, anemia, pellagra), gastrointestinal disorders (reflux, rectal prolapse), and endocrine complications (amenorrhea, euthyroid sick syndrome).

Appendix B:
Delirium and Dementia

Author: Michael Prats, MD and Laura Thompson, MD

Objectives

1. Review differential and diagnostic strategies in diagnosing delirium and dementia in the emergency department. Compare and contrast the features of delirium and dementia.
2. Describe the associated conditions and prognosis of delirium and dementia relevant to the emergency department patient population.
3. Discuss the management of patients with delirium and dementia in the emergency department.

Case Studies

Case 1: A 78-year-old man presents to the emergency department as a trauma. He fell from standing, and is on a backboard with a c-collar applied by EMS. He is given 100 mcg of fentanyl, and initially requires stimulation to maintain his respiratory status, but then becomes agitated and difficult to manage. He is diagnosed with a C2 fracture. His CT head is unremarkable. The patient receives multiple doses of lorazepam and fentanyl, and continues to have intermittent agitation. His wife arrives and tells you that the patient has dementia and is being treated for a urinary tract infection by his PCP. He normally is mildly confused, but since yesterday he has been much worse than usual.

Question Prompts:

1. How can delirium be assessed in this patient?
    a. Delirium is a diagnosis of exclusion and must be differentiated from other causes of altered mental status. Organic causes include intracranial hemorrhage, intracranial mass, traumatic brain injury, central nervous system infections, normal pressure hydrocephalus, hypoglycemia, electrolyte disorders, metabolic encephalopathy, toxic exposures, hypoxia, endocrine disorders, and sepsis. The differential can also include worsening dementia or other psychiatric causes. These disorders can present similarly, but there are key distinguishing factors. Delirium has onset over days, has a fluctuating course, a change in level of consciousness, and impaired attention. In contrast, dementia typically has a gradual onset, does not have acute fluctuations in symptoms, and generally does not impair the patient's level of alertness or attention. Psychiatric disease has a variable presentation with some symptoms that can be found in both dementia and delirium. Diagnosis of psychiatric disease may rely on prior history; in the event of new onset symptoms, this is often a diagnosis of exclusion in the emergency department. In the diagnostic algorithm, consider organic causes first. Once those causes are ruled out, consider delirium. Once delirium is ruled out consider dementia and psychiatric causes. Delirium evaluation can be assisted by

the use of assessment scales and scores such as mental status examination, the confusion assessment method (CAM), or CAM-intensive care unit.

2. What is the emergency department diagnostic work up for this patient?
    a. The patient's presentation is consistent with delirium. The work up is focused on excluding organic causes of mental status changes as well as diagnosing underlying causes of delirium. As always, assess the ABC's first. Considering the undifferentiated change in mental status, it is necessary to first ensure that the patient is not at risk of losing their airway in the near future. Keep in mind that hypoxia, hypercapnia, and shock can all cause changes in mentation. Get a full set of vital signs. One of the first tests ordered should be a point-of-care glucose. Subsequent tests can include electrocardiogram, complete blood count, metabolic panel, urinalysis, thyroid-stimulating hormone, and chest x-ray. Further tests to consider based on history and exam are CT brain, troponin, lumbar puncture, and blood gas.

Case 2: An 85-year-old woman presents to the emergency department from her extended care facility. She has a history of dementia, and over the last six months has been admitted to the hospital twice for pneumonia. Placement of a feeding tube was discussed during the last admission due to concerns for aspiration. Her two children are both present (son and daughter) in the emergency department and her husband has passed away. At this point, the patient is not eating and is only drinking minimal fluids. The family members ask you what they should do for their mother.

Question Prompts:

1. Discuss the clinical progression of dementia, and the end-stage complications of the disease.
    a. Dementia has an insidious onset resulting in progressive cognitive decline. Eventually this can become "end-stage" where the patient is no longer able to function. Dementia is associated with complications that include infection, aspiration, decreased oral intake, failure to thrive, and falls. It is common for patients with dementia to have multiple admissions in the end stages.
2. List the most common types of dementia.
    a. The most common cause of dementia is Alzheimer's disease. Other causes include vascular, Parkinson's disease, Lewy Body, frontotemporal, traumatic brain injury, and Creutzfeldt-Jakob disease.
3. How does dementia change a patient's prognosis?
    a. Up to 12% of patients who are admitted from the emergency department have severe dementia. Prognosis for ill or injured patients with dementia is worse than for age-matched controls with the same illnesses or injuries.

Case 3: A 58-year-old man has been in an extended care facility following a recent motor vehicle collision that resulted in bilateral femur fractures and multiple rib fractures. He was sent to the emergency department with reports that he has been having drastic changes in his mood and behavior beginning yesterday. His course has been fairly uncomplicated with the exception of poorly controlled pain. He has not obtained new glasses since they were broken in the accident. He was diagnosed with a urinary tract infection two days ago. Since

yesterday, the patent has had episodes of agitation and appears to be swinging arms at imaginary objects. He is not eating or drinking much. At other times, he is somnolent and stares for hours at a time. They report that two days ago he was alert and oriented, friendly and conversational. The staff denies any trauma or falls. On exam, the patient appears sleepy but responds to verbal stimuli. No focal neurologic deficits are noted on neurologic exam.

Question Prompts:

1. What are this patient's risk factors for delirium and why is the diagnosis important?
    a. Delirium is common and an emergency provider should be able to recognize who has or is at risk to develop this diagnosis. Risk factors for delirium include decreased vision or hearing, decreased cognitive ability (including dementia), severe illness, and dehydration. Almost any medical process can lead to delirium, including infection, pain, medications, withdrawal syndromes, trauma, seizure, endocrine dysfunction, electrolyte abnormalities, respiratory or ventilator insufficiency, substance abuse, reduced sensory input, urinary retention, fecal impaction, myocardial infarction. Six month mortality rate is approximately double that of aged-matched patients.
2. What is the treatment and disposition for this condition?
    a. Treatment of delirium includes two general aspects: 1) Targeted treatment of the possible cause and 2) general strategies to prevent worsening. If a cause is identified, treat as appropriate. Other important treatments include pain control, optimizing the medical environment, and controlling agitation. For pain control, avoid opioids when possible but do not withhold if patient has a painful condition that is not responding to non-opioid interventions. Optimizing the environment includes giving the patient any glasses or hearing aids they require, orienting them to the situation and time, allowing access to family and caregivers, avoiding invasive procedures (such as bladder catheterization), and attempting to provide normal sleep cycle. Medications such as benzodiazepines, anticholinergics, and other sedating medications should be used sparingly when possible. For agitation, attempt verbal de-escalation and decreased stimuli before medications. Haloperidol is recommended over lorazepam for acute agitation. Most patients with delirium will require admission. Possible exceptions are when a clear cause for the delirium is determined, the patient has returned to baseline mental status, and there is a reliable caregiver who is able to observe and assess the patient and return to the ED if necessary.

Suggested Readings:

American College of Emergency Physicians, American Geriatrics Society, Emergency Nurses Association, Society for Academic Emergency Medicine, Geriatric Emergency Department Guidelines Task Force. Geriatric emergency department guidelines. *Ann Emerg Med*. 2014;63(5). doi: 10.1016/j.annemergmed.2014.02.008

Badowski M. Medical concept: delirium tips and tools. CanadiEM. https://canadiem.org/medical-concept-delirium-tips-and-tools/. Published December 17, 2015. Accessed February 28, 2017.

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Facilitator Notes:

1. Delirium Definition: A disturbance in attention and awareness that is accompanied by a change in cognition that cannot be better accounted for by a preexisting or evolving neurocognitive disorder. The disturbance develops over a short period of time and tends to fluctuate during the course of the day.
2. Psychomotor types of Delirium: hyperactive, hypoactive, mixed, no psychomotor abnormality. Hypoactive and mixed are the most common and easily missed in the emergency department.

3. Dementia definition: a disturbance in cognitive function without a change in level of consciousness. Areas that can be affected include memory, judgment, personality, and language. DSM-IV diagnosis includes memory loss with the addition of aphasia, apraxia, agnosia, or disturbance in executive functioning.
4. Types of Dementia: Alzheimer's – primarily affects memory, also affects personality and visual-spatial abilities. Vascular dementia – sudden or step wise, deficits correlate with ischemic insults. Lewy body dementia - gradual onset, memory deficits, hallucinations, and parkinsonian features. Avoid typical antipsychotics. Frontotemporal dementia – can be < 60 years old. Associated with change in behavior, disinhibition, and language difficulties.
5. Dementia, delirium, and depression can present similarly, be coexistent in the same patient, and all lead to increased mortality in the elderly.
6. Visual hallucinations are common in delirium.
7. Consider if patients with dementia or delirium would benefit from a geriatrics consultation in the emergency department or an observation unit.
8. Overall the diagnosis of delirium is missed in 57-83% of cases. Diagnosis in the ED is important for further management.
9. Cholinesterase inhibitors are main treatment for dementia. Side effects to be aware of include abdominal cramping, anorexia, GI upset, urinary incontinence, bradycardia, and dizziness.

Appendix C:
Alcohol and Nutritional Deficiencies

Author: Michael Prats, MD and Nick Kman, MD

Objectives

1. Review pathophysiology, diagnosis and treatment of alcohol-related nutrition deficiencies.
2. Review pathophysiology, diagnosis and treatment of Wernicke Encephalopathy and Korsakoff Syndrome.
3. Review pathophysiology, diagnosis and treatment of ethanol withdrawal.

Case Studies

Case 1: A 46-year-old male with a history of alcohol abuse presents to the emergency department with altered mental status. On exam he has slurred speech, appears disoriented and confused. You note that he has an unsteady gait and appears ataxic.

Question Prompts:

1. What is the most appropriate diagnostic evaluation for this patient?
    a. The diagnostic evaluation begins with an appropriately focused physical exam. This would include historical factors including trauma, ingestions, infectious symptoms, and other accompanying neurologic symptoms. In addition to a typical exam, a more comprehensive neurologic exam would include tests of gait, Romberg test, nystagmus, or any focal motor and sensory deficits. Further diagnostics are guided by initial findings but initially may include point of care glucose, chemistries and electrolytes, and computed tomography of the brain. Classically, Wernicke encephalopathy is a clinical diagnosis and consists of the following: ocular abnormalities such as nystagmus and motor palsies, ataxia, and mental status change. In fact, nystagmus is the most common ocular abnormality, not complete ophthalmoplegia. Presentations with this classic triad are rare.
2. Describe the management algorithm for this patient's presentation.
    a. As always, assess the ABC's and intervene where necessary. Once the diagnosis of Wernicke encephalopathy is made, the recommended treatment is 500 mg of intravenous thiamine. This will need to be continued for several more days. In addition, replace electrolytes and dextrose as necessary. Traditional teaching was that thiamine needed to be replaced prior to administration of glucose in hypoglycemia for fear that increased glucose load would precipitate Wernicke encephalopathy. This does not to appear to occur after a single dose of dextrose, and therefore glucose treatment should not be delayed for this reason.
3. This patient re-presents to the emergency department several weeks later. He no longer appears altered, but is somewhat apathetic with a flat affect. When you ask the patient if he remembers

seeing you in the past, he states, "Of course, we worked together at Starbucks." What explains this specific type of memory problem?

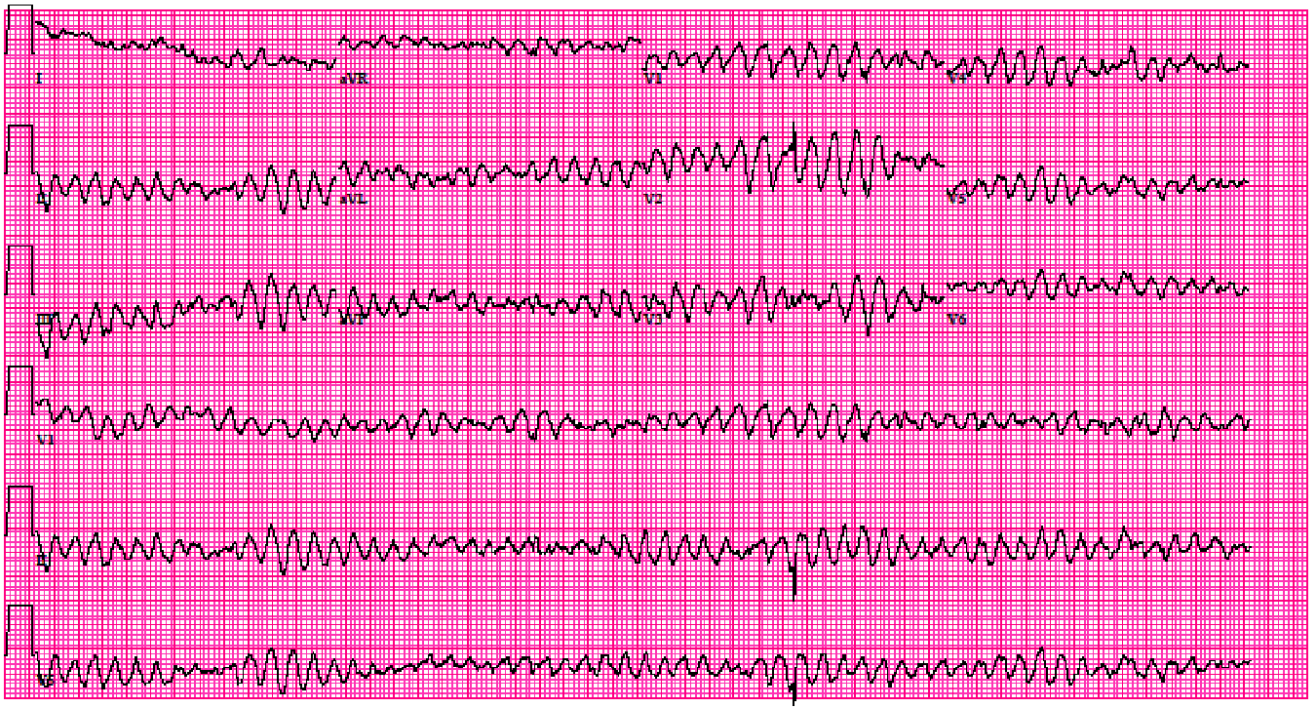
a. The patient is displaying confabulation or the creation of false memories to fill the gaps in the patient's actual memory. This is commonly seen in patients with Korsakoff's syndrome, caused by chronic thiamine deficiency. Other symptoms include amnesia, apathy, and lack of insight. Korsakoff's syndrome is often preceded by an episode of Wernicke's encephalopathy.

Case 2: A 39-year-old male presents after falling off a ladder. He appears to have minimal injuries on exam. Computed tomography reveals an "age indeterminate lumbar fracture". The trauma team is consulted and while the patient remains in the ED he develops disorientation, hallucinations, tachycardia, hypertension, agitation, fever, and tremulousness in the setting of profound confusion. Repeat imaging remains negative for traumatic injuries. The patient then has a witnessed seizure.

Question Prompts:

1. What is the diagnosis of this patient?
   a. This patient is showing signs and symptoms of alcohol withdrawal delirium, also known as Delirium Tremens.
2. What is the next best treatment?
   a. Assess the ABCs in this patient and intervene accordingly. First line treatment for delirium tremens is benzodiazepines. Most treatment recommendations include escalating or doubling doses until symptoms are improved. While these patients may require and can tolerate very large cumulative doses, airway must be closely monitored. Some patients may require intubation for airway protection. Barbiturates such as phenobarbital can also be used. There is also limited evidence to suggest dexmedetomidine (Precedex) can be used.
3. What is the disposition?
   a. Patients with Delirium Tremens require admission to an intensive care unit for close monitoring and treatment of withdrawal.

Case 3: A patient with known history of alcohol abuse presents to the emergency department by EMS. After assessment, he appears to be intoxicated and he is placed in the corner of the department until he is clinically sober and can be discharged. Later in your shift, he wakes up and starts throwing punches at one of the nurses. He is chemically sedated with 10mg of haloperidol IV. He calms down and then is noticed to be apneic. No pulse is palpable. During the subsequent resuscitation, you obtain this ECG.



Question Prompts:

1. Describe the pathophysiology of this patient's diagnosis.
    a. Magnesium losses are further increased in chronic alcoholics because of alcohol's diuretic effects. Approximately 50% of patients with hypokalemia also have concomitant magnesium deficiency. Increasing degrees of hypokalemia are correlated with an increasing likelihood of a magnesium deficit. These disturbances can be associated with prolonged QT interval and Torsade de pointes, a type of polymorphic ventricular tachycardia. Torsade occurs when a prolonged repolarization period (long QT interval) leads to early after depolarizations. When a premature ventricular contraction occurs on a T wave (R on T phenomenon), this can initiate Torsade. Often this will terminate spontaneously, but there is the risk of degeneration into ventricular fibrillation.
2. What is the treatment?
    a. Evaluate and treat the ABCs. If pulseless, begin chest compressions and defibrillate as soon as possible. If unstable but with pulses, synchronized cardioversion is appropriate. Magnesium sulfate is generally the drug of choice in this scenario. Other options are isoproterenol and overdrive pacing.

Suggested Readings:

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Facilitator Notes:

1. Full treatment for Wernicke's is 500 mg thiamine intravenously over 30 minutes, three times daily for two to three days, then 250 mg intravenously or intramuscularly daily for another five days. Patients will need other vitamins and electrolytes replenished.
2. Most organ systems in the body can be affected by ethanol consumption. Important associated disease states are electrolyte disturbances, traumatic injuries, infectious diseases, and primary central nervous system, gastrointestinal, and cardiovascular complications.
3. Alcohol withdrawal is a spectrum of diseases ranging from minor signs and symptoms, such as anxiety and mild tremor, to severe withdrawal, including autonomic instability and delirium.

4. For admitted patients, underlying liver disease, need for intubation, hyperthermia, persistent tachycardia, and use of physical restraints are all associated with increased risk of death in alcohol withdrawal.
5. Patients who have a history of major withdrawal and are currently in withdrawal or have significant associated disease states should be admitted for further treatment.
6. Ethanol use is associated with many disease states affecting many organ systems in the body. The Wernicke-Korsakoff syndrome is composed of two disease processes, Wernicke encephalopathy and the Korsakoff amnestic state, which can manifest individually or concomitantly. The Korsakoff amnestic state refers to the syndrome of memory deficits found in long-term alcohol abusers. Anterograde and retrograde amnesia is present, and confabulation is common. Thiamine deficiency is the cause, and ataxia and memory loss may persist despite treatment.

Appendix D:
Excited Delirium

Author: Michael Prats, MD and Cynthia Leung, MD, PhD

Objectives

1. Describe the epidemiology, clinical and behavioral characteristics of Excited Delirium Syndrome.
2. Review common etiologies and proposed pathophysiology of Excited Delirium Syndrome.
3. Critically discuss the rationale and methods for the rapid sedation of patients with Excited Delirium Syndrome.

Case Studies

Case 1: A 45-year-old male patient presents to the emergency department via police escort after bystanders called for agitation and violent behavior. His neighbors report that patient may have a history of mental illness and has been drinking alcohol and using cocaine. Five large male officers are currently required to restrain the patient. The patient is extremely agitated, diaphoretic, screaming incoherently, and charging at staff.

Question Prompts:

1. Describe the most appropriate initial management for this patient and justification.
    a. Ideally, verbal de-escalation should be attempted first but do not delay chemical sedation when the patient or staff are in danger. Physical struggle is thought to worsen excited delirium by increasing catecholamines. Cardiac arrest can occur precipitously and unexpectedly in young and previously healthy individuals who violently struggle against physical restraints. Chemical restraint (sedation +/- muscular paralysis) is often required and preferred to prolonged violent struggling in physical restraints. The benefit of rapid chemical restraint, while physiologically and intuitively attractive, has not been proven to alter outcome.
2. What are the preferred agents for chemical restraint? What patient characteristics need to be taken into account with choice of medication?
    a. When choosing medication consider the patient's known allergies, past medication history, psychiatric history, reported alcohol or intoxicant use, cardiac history or history of prolonged QT interval. In addition, consider, the rapidity of onset required and what medications are most available at your institution. Preferred agents are benzodiazepines, ketamine, and antipsychotics.
        i. Benzodiazepines (midazolam, lorazepam, diazepam)
            1. Pros: no cardiac toxicity, generally drug of choice for sympathomimetic states, familiarity of use. No real maximum dose. Midazolam has fastest intramuscular (IM) onset in this class.

2. Cons: risk of respiratory suppression, risk of hypotension, relatively slow onset IM

ii. Typical antipsychotics (Butyrophenones - haloperidol, droperidol)
1. Pros: reliable, physician familiarity.
2. Cons: potential QT prolongation including potential deaths associated with arrhythmia, slower onset compared to benzodiazepines, anticholinergic effects.

iii. Atypical Antipsychotics (ziprasidone, olanzapine)
1. Pros: Potentially less anticholinergic effects.
2. Cons: Similar to typical antipsychotics. Intravenous (IV) use is off-label. Olanzapine also carries a black box warning for QT prolongation. Of note, there have been reports of sudden cardiac death when olanzapine is administered IM in combination with parenteral benzodiazepines.

iv. Ketamine
1. Pros: rapid onset especially compared to other IM medications, less respiratory suppression and hypotension, less cardiac effects, large safety range.
2. Cons: increased oral secretions, laryngospasm, hypertension, emergence phenomena

v. Combinations: Pros: theoretically lower doses with fewer side effects. Cons: could potentiate negative synergistic effects (respiratory depression).

3. What is the differential diagnosis for this patient?
   a. Intoxication – drug or alcohol, sympathomimetic toxidrome, alcohol withdrawal, hypoglycemia, heat stroke, serotonin syndrome, neuroleptic malignant syndrome, hypoxia, psychosis, cerebral vascular accident, intracranial hemorrhage, central nervous system infection, metabolic encephalopathy, intracranial mass, seizure (post-ictal state), anticholinergic toxicity, and thyrotoxicosis. For sudden cardiac death consider Brugada syndrome, long QT syndrome, electrolyte disturbance, myocarditis, and hypertrophic obstructive cardiomyopathy.

Case 2: A 23-year-old male presents via EMS, restrained and chemically sedated. The patient was observed running through the streets naked and screaming. Law enforcement was called and chased the patient down, culminating with the patient running through a glass storm door. Several officers were finally able to wrestle the patient to the ground. EMS was called, and they rapidly sedated the patient and transported him to the emergency department. On initial presentation, the patient is unresponsive to verbal stimuli. His upper chest and extremities are covered with multiple lacerations and abrasions of varying sizes. Vital signs are as follows: Pulse 132, respiratory rate 32, and blood pressure 158/98.

Question Prompts:

1. What diagnostic evaluation would you perform for this patient's presentation?
   a. Patients with excited delirium were historically identified with the classic history of extreme

agitation, struggle with law enforcement, followed by sudden death unexplained by autopsy. The goal of emergency care is to identify these patients, sedate to minimize harm, exclude alternative causes of their presentation, and manage associated conditions. Excited delirium is associated with hyperthermia, metabolic acidosis, and rhabdomyolysis. Metabolic derangements can occur pre-restraint or be secondary to drug effect, but they can be exacerbated by continuing violent struggle against physical restraints. Hyperthermia and rhabdomyolysis are common findings after prolonged struggling while restrained. Therefore considering these possible conditions and the differential above, diagnostics may include electrocardiogram, point of care glucose, core temperature measurement, serum chemistry, creatine kinase, venous or arterial blood gas, lactate, CT brain, and thyroid-stimulating hormone level.

2. Describe the proposed pathophysiology of this patient's diagnosis, risk factors, and common presenting signs and symptoms.
    a. The pathology for this process is not well understood. One hypothesis involves disturbance of the central dopamine transmission possibly related to an abnormality in the dopamine transporter. Risk factors or at least commonalities in the published reports, include stimulant drug use, PCP use, male sex, young age (mean age 36), psychiatric illness, and abrupt discontinuation of antipsychotic medications. A significant number of individuals who die during excited delirium are found at autopsy to have underlying cardiac disease; however, the death is still considered unexpected because of a lack of known history or young age. Presenting symptoms include pain tolerance, tachypnea, sweating, agitation, tactile hyperthermia, police noncompliance, lack of tiring, unusual strength, inappropriately clothed, and a mirror/glass attraction. In patients with Excited Delirium Syndrome, the spontaneous, rapid cessation of a violent struggle may be a sign of impending death.
3. What additional medical management is indicated?
    a. Excited delirium is associated with hyperthermia, acidemia, and rhabdomyolysis. External cooling can consist of misting of water, ice packs in groin and axilla, cooled IV fluids, or ice bath. Acidemia may be improved by intravenous IV fluids with limited evidence on the benefit of IV sodium bicarbonate. Do not correct or inhibit the patient's compensatory hyperventilation. If the patient requires intubation, ventilatory settings must be adjusted to match pre-intubation minute ventilation. Rhabdomyolysis is treated by IV fluid administration and urine alkalization with sodium bicarbonate. Assess for and treat associated hyperkalemia.

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Stratton SJ, Rogers C, Brickett K, Gruzinski G. Factors associated with sudden death of individuals requiring restraint for excited delirium. *Am J Emerg Med*. 2001;19(3):187-191. doi: 10.1053/ajem.2001.22665

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Facilitator Notes:

1. Mortality among patients with excited delirium is estimated between 8-10%.
2. Factors associated with death in excited delirium are hobble restraint (wrists and ankles bound behind back), prone position, struggle against restraint, stimulant drug use, obesity, and known chronic cocaine use.
3. Much of the evidence regarding excited delirium is based on case series.
4. The cardiac arrhythmias of fatal excited delirium are usually bradycardia which degenerates to asystole or PEA, as opposed to ventricular dysrhythmias.

Appendix E:
Mood, Factitious, and Neurotic Disorders

Author: Sarah Greenberger, MD; Michael Prats, MD

Objectives

1. Review presentation, diagnosis and management of depression.
2. Discuss assessment of suicide risk and indications for emergent psychiatric evaluation.
3. Review the differential diagnosis for depression, mania, and psychosis.
4. Discuss emergency department management of acute agitation.
5. Review the presentation, diagnosis and management of bipolar disorder.
6. Review the diagnosis of generalized anxiety disorder and panic disorder.
7. Critically discuss strategies to identify and address malingering.

Case Studies

Case 1: A 66-year-old man presents to the emergency department complaining of depression, which has been progressively worsening since his brother killed himself two years ago. He reports that he sleeps all the time because he doesn't feel like engaging in any of the hobbies—like hunting and woodworking-- that he used to enjoy and he has no friends or family locally. Even though he sleeps 10 or more hours each night, he feels so tired and has so much difficulty focusing on his work that he's afraid he might be fired from his job soon, though he says he's not sure he really contributes much to society anyway. He says he feels even worse now than he did when he had to stay in the hospital in his 20s, but he apologizes for coming in today, saying, "You probably can't help me anyway. I'm not sure anyone can help."

Question Prompts:

1. What is the differential for this patient? How do you diagnose depression?
    a. The differential includes major depressive disorder, CNS infection, cerebrovascular accident, endocrine abnormalities, and drug toxicities or abuse. Consider further work up if new onset symptoms, elderly patient, or those with complex medical history at risk for non-psychiatric etiologies. The diagnosis of depression requires depressed mood and lack of interest or pleasure plus 4 more of the following: anhedonia, suicidal ideation, weight loss or gain, insomnia or hypersomnia, restlessness, agitation, or psychomotor retardation. Symptoms must be present for at least 2 weeks and not related to substance abuse or medical condition. Symptoms must also cause impairment of normal functioning.
2. How would you assess suicide risk in this patient?
    a. Red flags for suicide risk include advanced age, male gender, ethnicity (Caucasian and Hispanic particularly), single marital status, presence of a firearm in the home, prior history of mental illness/suicide attempts, chronic or terminal illness, family history of suicide,

substance abuse, and family violence. Presence of these should prompt consideration of emergent psychiatric evaluation. Risk factors for developing depression include many of the same factors (isolation, lack of support, stressful life events, and substance abuse).

b. In addition to his symptoms, high-risk features for this patient include his age, a first-degree relative who successfully committed suicide and the possession of a firearm.

3. What treatment modalities are available for this condition? How do they work?
    a. Major categories of antidepressants are heterocyclic antidepressants (HCAs, ex. amitriptyline), monoamine oxidase inhibitors (MAOIs), selective serotonin reuptake inhibitors (SSRIs, ex. citalopram, fluoxetine), selective serotonin norepinephrine reuptake inhibitors (SNRIs, ex. venlafaxine), and atypical antidepressants (ex. bupropion). SSRIs and SNRIs work by increasing serotonin and norepinephrine in the brain, respectively. Both of these drug classes have become mainstays of pharmacologic antidepressant therapy. These can produce a withdrawal syndrome when stopped abruptly. Serotonin syndrome can occur when combined with other agents with serotonergic activity. Antidepressant therapy typically takes 2-3 weeks to have demonstrable effect. These medications are seldom initiated in the emergency department unless in conjunction with the patient's primary care or psychiatric provider.

Case 2: A 32-year-old woman presents to the emergency department, brought by her roommate, with a complaint of bizarre behavior. The roommate, who is standing just outside the exam room curtain, reports that over the past two weeks she has returned to their apartment most evenings to find the patient having sex, each time with a different man. After the men leave, the patient stays up all night, typing pages and pages of elaborate plans to run for various elected office positions. When the roommate tried to have lunch with her yesterday to try to discuss these concerns, the roommate had to pay for the patient's lunch after all of the patient's credit cards were declined; the patient stomped out of the restaurant midway through lunch, saying that the roommate's accusations were crazy. When you enter the room, you find the patient completely naked, propositioning the male tech who is trying to coax her to put on a gown. After you ask her to put on the gown and sit down, she starts pacing around the room and yelling that she is going to leave because you're treating a future presidential candidate with disrespect.

Question Prompts:

1. What are the potential causes of this patient's presentation?
    a. The patient's symptoms are consistent with mania. The differential is similar to considerations for new onset depression. These would include hyperthyroidism, central nervous system infection, toxic ingestion or drug abuse, drug withdrawal, bipolar disorder, and schizophrenia. Other causes of psychotic episodes to consider would be epilepsy, Huntington's disease, Wilson's disease, porphyria, vitamin B12 deficiency, cerebral neoplasm, stroke, neurosyphilis, and HIV.
2. What diagnostic evaluation would be appropriate for this patient?
    a. New presentation of a psychiatric disorder should prompt consideration of workup for other general medical conditions. This includes a thorough history and exam with attention

to neurologic findings. Additional work up should be guided by your history and exam and can involve laboratory work, CT/MRI of the brain, and CSF analysis.

3. What management would you initiate in the emergency department for this uncooperative patient?
    a. Treatment of acute psychiatric agitation includes verbal redirection, physical restraint, or chemical restraint. The least restrictive method that permits patient and staff safety should be chosen. Pharmacologic treatment of acute agitation includes anxiolytics (benzodiazepines), antipsychotics, and ketamine. Of note, there is limited evidence that ketamine can improve depression and suicidality. On the other hand, ketamine can also worsen symptoms of schizophrenia. Formal face-to-face evaluation by a physician (or other practitioner) must occur within 1 hour of a sedative being used to manage "violent or self-destructive behavior." In general, mood stabilizers such as lithium, valproic acid, or carbamazepine are not initiated in the emergency department without consultation with psychiatrist or patient's primary care physician.

Case 3: A 22-year-old female presents to the emergency department with a chief complaint of intermittent palpitations and dyspnea. Just before you enter the room, the registration clerk comments to you that the same patient has been here three times in the past two weeks. Vital signs and cardiopulmonary exams are unremarkable. When you examine her hands, she has a mild tremor that seems to resolve when you observe her texting later. She appears tearful and reports that she is so stressed about breaking up with her boyfriend recently and a tense relationship with her boss at work that she can barely leave her house. She says that thinking about her stressors seems to bring on the episodes of palpitations. She says she was prescribed medication for her symptoms by a psychiatrist in the past, but she is out of medicine now. She suggests that she read online about "something called Xanax?" When you suggest checking labs and a chest x-ray, she declines and says she doesn't think those tests are necessary. As you leave the room, she asks again, "You'll give me a prescription for something, right?" While sitting at your desk, you can hear her laughing loudly as she talks on the phone, discussing plans to go out with friends that evening.

Question Prompts:

1. Consider the differential diagnosis for a patient with this presentation. How do you diagnose anxiety?
    a. Anxiety and malingering are both always a diagnosis of exclusion. The differential is based on the patient presenting symptoms but should include pathology causing the patient symptoms as well as psychiatric disorders. Generalized anxiety disorder is defined as excessive anxiety occurring during the majority of days over the past six months. Associated with restlessness, irritability, muscle tension, fatigue, difficulty concentrating, and sleep disturbance. Panic disorder is a chronic illness characterized by recurrent spontaneous short-lived episodes of anxiety or intense fear that can be accompanied by symptoms such as chest pain, shortness of breath, nausea, vomiting, and palpitations. To diagnose panic attacks, episodes must be followed by one month of concern about having attacks or worrying about them (and the attacks cannot be otherwise explained).

2. What is an appropriate management and disposition plan for this patient?
    a. A medical cause for the symptoms must be excluded first. This may include laboratory and radiologic testing depending on the symptoms. A review of prior visits and diagnostics performed can be helpful. Once there is confidence that there is no medical or psychiatric emergency, patients can usually be discharged from the emergency department.
3. What characteristics of this case distinguish it from factitious disorder?
    a. Malingering involves presentation of symptoms (by intentional invention or exaggeration of physical or psychological symptoms) for known external gain. Factitious disorder involves a need for the sick role without external incentives. Munchausen syndrome is an extreme form of factitious disorder.

Suggested Readings:

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Facilitator Notes:

1. The role of the ED in managing medical illness: stabilize the agitated patient, manage behavioral disturbances, evaluate medical complaints, exclude medical causes for psychiatric presentation, determine the need for psychiatric admission, provide access to outpatient resources.
2. SIG E CAPS is a mnemonic for symptoms of depression: Sleep disturbance, Interest (specifically *lack* of interest and depressed mood), Guilt, Energy loss, Concentration, Appetite (weight gain or loss), Psychomotor (agitation or slowing), Suicidal ideation
3. SAD PERSONS is a suicide risk assessment tool: Sex (male > female), Age (older white males have higher risk), Depression, Previous attempt, Ethanol/substance abuse, Rational thinking loss, Social support lacking, Organized suicide plan, No spouse, Sickness (medical or psychiatric comorbidities).
4. Treatment options for generalized anxiety disorder or panic disorder include cognitive behavioral therapy (CBT) and pharmacotherapy. Anti-depressant medications and CBT can take at least 4 weeks for effect in most patients so benzodiazepines may be helpful for short-term relief while long-term therapy is being initiated.

Appendix F:
Sexual Assault

Author: Michael Prats, MD and Creagh Boulger, MD

Objectives

1. Review statistics and demographics of sexual assault.
2. Discuss special needs of this patient population.
3. Review diagnosis and complications of sexual assault related injuries.
4. Develop a strategy for discussing treatments options with patients.

Case Studies

Case 1: A 23-year-old female presents to the emergency department with chief complaint of headache. She is withdrawn, quiet, and tearful. She states that two nights ago she was physically assaulted by a former boyfriend who punched and kicked her, causing her to fall and strike the back of her head. She denies loss of consciousness, vision changes, nausea, vomiting, or neck pain. After further questioning, she admits the he also forced her to have sexual intercourse against her will.

Question Prompts:

1. What populations are at risk for sexual assault?
    a. Both men and women are at risk; however, women represent a higher risk. About half of those assaulted have genital or rectal trauma. Minorities are often reluctant to report rape and sometimes support services are limited for ethnically diverse patients. For black women survivors of sexual assault, poverty is associated with an increased risk of depression and posttraumatic stress disorder.
2. What different aspects of this patient's care need to be addressed while in the emergency department?
    a. Patients can present to the emergency department with chief complaints unrelated to sexual assault. They may feel guilty or responsible for the assault. Responsibilities of the team in the emergency department may include: medical history, physical exam, and treatment for concomitant nonsexual injuries or conditions, forensic history and exam for sexual injuries, collecting forensic evidence, documenting medical exam, treatment for sexually transmitted infections, addressing pregnancy risk, referral for crisis intervention, coordinating care with sexual assault advocates, and if necessary testifying in court.
3. What is the role of a SANE practitioner if available?
    a. Sexual assault nurse examiners (SANEs) are certified through the commission for forensic nursing certification. They are trained to perform detailed and precise exams, and preserve the evidence to be used by appropriate authorities. If they are not available, the

responsibility may fall to the emergency physician. When they are available, they participate in the forensic history, exam, and handling of evidence. In these cases, the physician should limit history and exam in order to avoid repetition of sensitive aspects of the encounter.

Case 2: A 34-year-old female with a history of alcohol abuse presents to your emergency department with ethanol intoxication. She is alert and cooperative, well known to the department, readily admits to heavy alcohol use today, and denies any recent trauma or falls. She does state that she lost consciousness while at a party four days ago and woke up undressed on someone's bed. She is concerned that she may have been raped and would like to be evaluated.

Question Prompts:

1. What timelines are important for sexual assault cases?
    a. A forensic exam is usually not necessary >72 hours from the assault because there is low chance of finding evidence. Some states may specify collection up to 96 hours. If >72 hours, history and physical should still be performed along with pregnancy and STI prophylaxis, and follow up for medical care and counseling. Emergency contraception is generally recommended within 5 days of sexual assault.
2. Does this patient require specific testing or prophylaxis, and if so for what?
    a. Yes – even if this is not a forensic case, the Emergency Physician should still have a discussion with the patient regarding prophylaxis. Testing to consider includes: gonorrhea, chlamydia, trichomonas, syphilis, hepatitis B and C, and HIV. The Centers for Disease Control and Prevention make the following recommendations for treatment: Hepatitis B vaccination if not vaccinated, antibiotics for chlamydia, gonorrhea, and trichomonas, tetanus immunization if needed. If receiving HIV prophylaxis, obtain chemistry, liver function, and CBC. Options for emergency contraception include: Levonorgestrel (Plan B), Ulipristal acetate (Ella), or combined estrogen-progestin.
3. Would management change if she was an inmate? If she was a minor or pediatric patient?
    a. This will vary by state. In Ohio, the Ohio State Highway Patrol investigates prisoner assaults. Minors are allowed to consent for their own SANE exam without a parent present. Suspected abuse of any kind in a pediatric patient requires mandatory reporting to the appropriate authorities. Children especially should be given the benefit of the doubt when they report sexual abuse. It is common to have a normal physical exam and this does not exclude abuse. Remember labial adhesions, vaginal discharge, genital bumps and ulcers, lichen sclerosus are conditions that do not necessarily indicate abuse. Consider sexually transmitted infection (STI) prophylaxis in pubertal patients who disclose contact that could transmit STI. Consider emergency contraception in female patients past menarche or Tanner stage 4 and 5.

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Facilitator Notes:

1. Sexual assault cases involve assessing and treating the physical, sexual, and psychosocial injuries of the patient.
2. Information to collect: who, what, where, when, how.
    a. Who – Who was the assailant? Document the name if provided. In some states, this disclosure is

admissible in court as a hearsay exception if provided to a health care provider caring for the patient.
   b. What – document details of the assault including other physical injuries.
   c. Where – a location may provide evidence.
   d. When – a timeline is important for forensic and contraceptive options. What has the patient done since then (patients should not undress, wash, drink, or rinse mouth prior to forensic evaluation).
   e. How – was force used or were drugs employed?
3. Forensic exam may include use of topical dyes to highlight microtrauma, colposcopy, Woods lamp (for traces of semen).
4. Any workup outside of the SANE exam (extra labs, x-rays, tests, consultants) will likely be billed to the patient, not captured by the hospital.
5. HIV prophylaxis should be considered in high risk patients presenting within 72 hours of assault and any of the following; signs of vaginal/rectal/oral trauma or mucosal breaks, rectal penetration, male on male assault, multiple assailants, prolonged assault, known HIV positive assailant, known intravenous drug abuse by assailant.
6. Sexual assault kits can be collected within 96 hours of assault.
7. Sexual Assaults vary by state, but are a felony in Ohio and fall under mandatory reporting. It is important to familiarize yourself with local regulations.
8. Physicians and other health care workers can receive certification as Sexual Assault Forensic Examiners (SAFE). SAFEs can operative similarly to SANEs.