

Critical decisions

in emergency medicine

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Trade Secrets

Acute care providers are uniquely positioned to identify and manage the escalating number of human trafficking victims, an estimated 63% of whom will inevitably visit an emergency department. Modern day slavery comes in many forms, including sex, labor, and organ trafficking, and can ensnare victims of any age, gender, nationality, or sexual orientation. Clinicians must not only be prepared to recognize red flags, they must understand how to manage these patients with sensitivity, employ appropriate victim resources, and thoroughly document these potentially dangerous cases.

Critical Loss

Acute blood loss, the leading cause of trauma-associated mortality, frequently results in a rapid and precipitous decline. Although time is of the essence when managing such cases, hemorrhagic shock can be particularly difficult to diagnose and treat. Emergency physicians must be prepared to achieve homeostasis by considering the complete clinical picture; identifying the source of the bleeding; initiating lifesaving treatments, including massive transfusion protocols; and carefully controlling resuscitation efforts.



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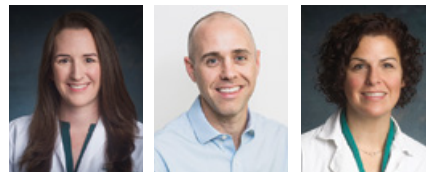
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Trade Secrets

Human Sex Trafficking

LESSON 23



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OBJECTIVES

On completion of this lesson, you should be able to:

1. Define what constitutes human sex trafficking (HST).
2. Recognize the behavioral and physical red flags of HST.
3. Describe the acute and chronic medical issues commonly seen in HST victims.
4. Determine how to best approach suspected victims of HST in the emergency department.
5. List the national resources available for HST victims and the clinicians who treat them.

FROM THE EM MODEL

14.0 Psychobehavioral Disorders

14.6 Patterns of Violence/Abuse/Neglect

CRITICAL DECISIONS

- What behavioral and physical signs and symptoms should raise suspicion for HST?
- What is the best approach when managing a suspected victim of HST?
- How should patient confidentiality be addressed?
- What resources are available for HST victims and the clinicians who treat them?

Human sex trafficking has enslaved more victims, to date, than the 350-year African slave trade.¹ Blind and unbiased, this form of modern-day slavery ensnares an estimated 4.5 million victims worldwide, without regard to age, gender, nationality, or sexual orientation.² Emergency medicine clinicians are uniquely positioned to identify and treat victims of human sex trafficking (HST), defined by the US Department of State as the "recruitment, harboring, transportation, provision, or obtaining of a person."³

CASE PRESENTATIONS

■ CASE ONE

A 16-year-old girl presents with forearm pain. During triage, her mother explains that the patient injured herself while running outside. Once settled into an examination room, the woman accompanying the patient identifies herself again — only this time, as the girl's aunt. The nurse documents the discrepancy and contacts social work, citing concerns about inconsistencies in the caregiver's reported identity.

■ CASE TWO

A 2-month-old boy presents with shortness of breath and a cough. Although his mother does not speak English, a man who identifies himself as the father offers to act as an interpreter. During the initial interview, the man provides historical details, including the number of wet diapers the child produced that day. However, he does not look at or engage the mother, who remains quiet. After explaining that the child requires a chest x-ray, the concerned physician accompanies the

mother and child to radiology. He requests an interpreter and uses the opportunity to speak with the mother privately.

■ CASE THREE

A 20-year-old woman presents with agitation. She says that she is being followed and insists that someone has “put a tracker” in her stomach. During the initial examination, a scar is noted on her right lower abdomen. While the clinician prepares the patient for transfer to the psychiatry unit, he initiates a bedside abdominal ultrasound.

Indeed, an estimated 63% of HST victims will visit a US emergency department, often accompanied by their trafficker.^{2,4,5} As such, emergency clinicians must be prepared to screen for red flags, address confidentiality concerns, provide appropriate resources, and protect and manage these vulnerable patients with sensitivity and respect.

CRITICAL DECISION

What behavioral and physical signs and symptoms should raise suspicion for HST?

Nearly 50% of human sex trafficking victims are adult women, 21% are minor girls, 21% are adult males, and 12% are minor boys.² According to the United States Department of Justice, 87% of trafficking victims are younger than 25 years, and 79% are under the age of 18 years.^{1,6} No community — whether rural, urban, poor, or affluent — is exempt from HST (*Figure 1*).⁷

Risk Factors

While HST does not discriminate, certain populations are more vulnerable than others. High-risk patients include children in foster care or the juvenile justice system; runaway and homeless youth; American Indians and Alaskan natives; patients with disabilities; those with limited English proficiency; and members of the lesbian, gay, bisexual, transgender, and queer community.²

Between 10% and 50% of runaway or homeless Americans report engaging in

“survival sex” (ie, sexual acts performed for the provision of food, shelter, drugs, or money).² Approximately 10% of minors who live in shelters and 28% of homeless youth report trading sex for basic necessities.⁶ Psychosocial characteristics that increase the likelihood of exploitation include a history of physical, sexual, or emotional abuse; poverty; low education; and substance misuse.² Among the mentioned risk factors, runaway behavior and a history of trauma or maltreatment in childhood have the highest predictive values for HST.⁸

Common Red Flags

Most victims present to the emergency department with a companion, often their trafficker. Traffickers seldom fit preconceived stereotypes; much like their victims, these predators represent a broad spectrum of social backgrounds and nationalities. Although 72% of traffickers are male, a significant number of female traffickers also exist. It is important to note that victims may present with a female associate, acting as a representative of the trafficker.

Disturbingly, traffickers can be close relatives or immediate family members of their victims.^{2,9} Control behaviors commonly exhibited by traffickers in the emergency department include a reluctance to leave the patient alone or a desire to speak on behalf of the victim.^{2,9,10} It is common for traffickers

to complete medical paperwork for the patient or offer to act as an interpreter.⁴

During intake, triage, or registration, victims might have trouble recalling their home address or indicate that they don't know how to get home from the hospital; they might excuse their uncertainty with statements like “I just moved to the area.” Most traffickers confiscate identifying documents, so many victims carry no form of identification and few personal items.² Female patients who present to the emergency department for primary obstetrical care, especially if delayed, should be assessed as potential victims.⁶

In addition, there are a number of verbal queues that should raise suspicion for HST, most notably when interviewing patients about their reproductive history, mental health, and history of substance abuse.¹¹ Potential chief complaints can include general somatic symptoms, including headaches, abdominal pain, or other unexplained illnesses caused by extreme psychological stressors.^{2,9} Some victims may provide a vague or inconsistent medical history, or their description of an injury may be inconsistent with the trauma pattern.²

Many victims have a long history of sexually transmitted infections (STIs), multiple pregnancies, or abortions.¹² These patients also may show signs of depression, anxiety, post-traumatic stress disorder, suicidal ideation, self-injurious behavior, memory loss, or dissociation.^{1,2,8,9} Substance use and

misuse, which is common among victims of HST, can serve as a coping mechanism; in some cases, these behaviors are forced by the trafficker.^{2,8,9,13,14}

It is important to understand that victims can exhibit a spectrum of demeanors. Some may be irritable, anxious, or aggressive; alternatively, others may have a flat, detached affect and avoid eye contact with the provider.² Any mention of law enforcement can result in increased aggression or displays of fear or apprehension.^{2,10}

Physical Examination

Initial signs of hardship can be broad and may include evidence of malnutrition, starvation, dehydration, exhaustion, or gastrointestinal illness.^{2,14} Victims may have dental problems due to malnutrition and poor access to care.⁹ Chronic diseases such as asthma, diabetes, and cardiac disease can worsen due to a lack of maintenance medications.^{2,14} Pediatric patients may show developmental delays or growth retardation from malnutrition.⁹

Emergency physicians should be attuned to signs of physical abuse,

including head injuries, lacerations, fractures, and hearing loss.¹⁴ HST victims are in danger of developing urinary tract infections, STIs, and pelvic inflammatory disease. Female victims are at risk for unwanted pregnancy from forced, unprotected sex; acute or chronic pain with sex; and vaginal or cervical injuries caused by forced or unsafe abortions.^{2,9} It is common for female victims to insert cotton sponges or other materials into their vagina to hide menstruation. Retained or impacted material can trigger complications such as chronic vaginal or cervical infections.⁹

Clinicians should carefully examine the patient's skin for burns, bruises, bite marks, ligature wounds, traumatic alopecia, scars, and unhealed injuries.² Tattoos are sometimes used by traffickers as a sign of ownership; such marks can include numbers, symbols, or even the trafficker's name or nickname. These tattoos may be found in unusual locations, including the hairline on the back of the patient's neck, underarm, breast, or inner thigh.^{2,9}

Unsurprisingly, mental health problems are common in the HST population. Psychological sequelae can last a lifetime, even in those who successfully escape exploitation. Survivors may be burdened by a deep sense of shame and can struggle with significant issues related to trust and self-esteem. Damaged by their prior isolation, forced dependency, and emotional manipulation, former victims may struggle to form and maintain "normal" relationships.²

Substance misuse can, of course, result in acute complications, such as intoxication or drug overdose, as well as the long-term sequelae of addiction, including cirrhosis, hepatitis, HIV/AIDs, and endocarditis.^{2,14}

CRITICAL DECISION

What is the best approach when managing a suspected victim of HST?

A trauma-informed care (TIC) approach is a treatment framework that acknowledges that emergency department patients, in general — and HST victims, in particular — may have a history of traumatic life events that make them emotionally vulnerable.¹⁵ Chronic trauma

and its mental health sequelae can cause victims to distrust medical providers. As such, many have difficulty developing therapeutic relationships, especially in the acute care setting.¹⁴

A TIC approach acknowledges the widespread impact of trauma and enables the provider to actively seek ways to avoid retraumatization. Key principles include building rapport while addressing the patient's need to be respected, informed, and involved in the decision-making process. Interactions with potential victims should be honest and nonjudgmental, with the goal of creating a safe environment.

This approach also helps clinicians manage their own response to a patient's traumatic stress reaction, including exasperation and anger, and enables them to project patience and compassion, even when faced with seemingly "negative" coping mechanisms. Clinicians who lack an appropriate understanding of survivors' needs are inclined to label these patients as "difficult."² Finally, TIC can help empower victims to use their assets and capabilities to persevere in the face of formidable adversity.

Patient Interview

The first step to a successful encounter with a possible HST victim entails interviewing the patient alone. Separating the victim from the trafficker or representative can be achieved naturally during the clinical examination, when the patient is undergoing tests, or by having the accompanying individual(s) fill out paperwork in another area.²

When interviewing a child or adolescent who is accompanied by an adult or other caregiver, the clinician can emphasize to the chaperone that it is standard practice to speak to pediatric patients alone. In addition, the accompanying adult should be escorted to a place well away from the examination room.¹¹

The World Health Organization (WHO) has published a list of suggested questions that can foster trust and open communication when interviewing suspected sex trafficking victims (*Table 1*).

TABLE 1. WHO Tips for Interviewing Suspected Victims of HST

- Sit at eye level with the patient.
- Take time to build rapport and establish trust.
- Maintain an open-minded, nonjudgmental attitude.
- Demonstrate empathy, rather than pity.
- Demonstrate respect for the victim's position.
- Show your concern and interest in the patient and what he/she has to say.
- Ask open-ended questions when possible; avoid leading questions.
- Avoid interrupting the patient; circle back and ask for clarification/details when needed.
- Avoid critical or derogatory comments.
- Monitor body language.
- Avoid power struggles.
- Remember that patients may not view themselves as victims, and may even resent that implication.
- Control your emotions, and avoid showing frustration or irritation.
- Avoid making promises you can't keep.
- Avoid playing the role of "friend" or surrogate parent.

Initial Screening

As with any emergency department patient, the comprehensive medical evaluation of a suspected victim of HST should begin with a thorough history. While clinicians should attempt to gather the information required to make medical and safety decisions, it is also important to understand that full disclosure might not occur during the initial encounter. Victims may lack self-awareness or be unprepared to provide details about their situation. In such cases, it is not only important to protect the patient, but also to consider the safety of the health care team and other emergency department patients, as these situations can quickly become volatile. Early notification of hospital security, particularly in instances where the victim will require in-patient care, is recommended.

The initial interview should include detailed questions about sexual history (eg, types of sexual activity, previous STIs, use of condoms or other forms of contraception, and prior pregnancies or miscarriages/abortions), injuries/abuse (past or current), substance use/misuse, and mental health history (eg, anxiety, depression, PTSD, or suicidal ideation).

Currently, no validated screening tools for the identification of victims exist; however, the modified HEADSS questionnaire (Table 2) can be useful when inquiring about a pediatric patient's home life, school, personal activities, drug use, mental health, and sexual activity, including questions specific to trafficking.¹⁶ A similar "script" can be used with adult patients to facilitate communication and encourage transparency between the patient and provider. Many studies suggest asking questions about a patient's work history, living conditions, or forfeiture of personal property.¹ These simple steps to incorporate social, work, and home history as well as domestic violence screening questions during intake can help identify patients at risk for HST.⁴

Clinicians should avoid the use of technical jargon that the patient may not understand and loaded words like "prostitution" or "hooker," which imply culpability.¹⁶ It is imperative that the provider use culturally sensitive

TABLE 2. Modified HEADSS Screening Questions for At-Risk Youth

Home Life

- Who do you live with?
- Who can you talk to about things?
- What are the people you live with like?
- Do you get along with your family?
- What would you change about them?
- Are you allowed to come and go as you please?
- Have you ever been kicked out, run away, or been without a place to stay?

Education

- What grade are you in?
- Do you ever skip school?
- What are your grades like?
- What do you want to do when you are done with school?
- Do you have a job?
- How do you make your money?

Activities

- Help me understand what a day in your life is like.
- What kinds of activities do you do throughout the day?
- What do you do on weekends?
- Do you have a boyfriend/girlfriend?
- If so, how old is your boyfriend/girlfriend, and how did you meet?

Substance Abuse

- Do you smoke cigarettes or weed?
- Have you ever tried drugs? If so, what kind?
- Do you drink alcohol? If so, how much and how do you get it?
- Do you ever get sick, pass out, or have a hangover?
- Do you ever use drugs or alcohol to escape from reality?
- Have you ever done anything you didn't want to do when you were high, drunk, or passed out?

Suicide/Safety

- Do you ever feel sad or lonely?
- Have you ever had thoughts of suicide?
- Do you ever get into fights with friends or with your boyfriend/girlfriend?
- What is it like when you fight?
- Have you ever experienced violence or physical abuse?

Sexual History

- How many people have you had sex with in your lifetime?
- When was the last time you had sex?
- Have you ever been pregnant or had an STD?
- Do you use protection?
- Have you ever been pressured into doing sexual things you didn't want to do?
- We know that some young people turn to the streets to make money for themselves or for others. They often tell us that they've had to trade sexual activities for money, clothes, drugs, or a place to stay. Do you know anyone like that?
- Has anyone ever asked you to do sexual things for money, or suggested that it would be a good way to get the things you want?
- Sometimes people feel like they don't have any other options but to trade sex for money or survival. Has that ever happened to you?

and age-appropriate language during the interview process.¹⁷ In the presence of language barriers, the use of official interpretive services is strongly recommended to ensure accurate communication.²

The emergency physician's role in providing support and anticipatory guidance during an interview with these vulnerable patients cannot be overemphasized, even if the interaction does not lead the victim to escape the "life." Regardless of the conversation's

outcome, it is important to reassure potential victims that sexual exploitation is common and that help is available.

Acute Management

As when approaching any case, the emergency physician's first obligation is to address the patient's chief complaint and appropriately manage any life- or limb-threatening presentations. A clinically relevant yet thorough physical examination is crucial, and any injuries caused by physical abuse should be

treated per standard protocol. The evaluation should be guided by the patient's stated needs and only progress with his or her permission at each stage.

If clinically appropriate and the patient consents, a medical forensic sexual assault examination can be useful. Ideally, evidence should be collected within 72 hours of an assault; in some cases, evidence gathered within 2 weeks may still be viable.¹⁶ Emergency physicians should consider performing a sexual assault examination, or providing a referral for one, if the event occurred less than 120 hours prior to the visit, the victim has a medically urgent complaint (eg, symptoms of an STI), or the patient has sustained genital trauma or other suspicious injuries that require forensic documentation (Table 3).

When treating bleeding, severe trauma, injuries that warrant surgical intervention, or other unrelated medical problems that require emergent attention, the examination should be performed in the emergency department with the aid of a staff chaperone or victim advocate. An advocate can be a friend or family member selected by the patient.¹¹ When appropriate, specially trained clinicians at specific sites (eg, a rape crisis or child advocacy center) can conduct a more thorough evaluation.

Clinicians should be familiar with their individual state laws prior to conducting a physical examination or obtaining a sexual assault evidence kit without the explicit permission of the patient and/or guardian. In most states, providers are permitted to conduct examinations and tests without guardian consent in cases of suspected child abuse or neglect. However, shared decision-making and informed consent remains the goal when managing any adult or pediatric patient; whenever possible, clinicians should obtain the victim's consent prior to initiating treatment.

Patients who report significant psychological distress or symptoms may require a psychiatric referral or assessment, or in-patient psychiatric care. Any HST victim should be evaluated for the medical and psychiatric comorbidities of substance abuse, depression, anxiety, PTSD, and

suicidal ideation.¹³ Social work or case management should be consulted when managing these patients.

Any patient who reports sexual assault should undergo testing for HIV, hepatitis B and C, syphilis, and pregnancy.¹⁶ Emergency contraception and the empiric treatment of STIs, including chlamydia, gonorrhea, and trichomonas, should be provided. Unimmunized patients should be vaccinated for hepatitis B.^{2,11} HIV prophylaxis can be considered, depending on the nature of the assault; however, treatment for hepatitis C is only indicated after a positive test result.¹¹ A urine drug screen may be indicated in patients with a history of amnesia or altered mental status.¹⁶

Follow-Up Care

Follow-up and compliance with medical treatment are particularly difficult to ensure in victims of human trafficking, who frequently relocate and are often under the control of their traffickers. If possible, discharged patients should be reevaluated in 2 weeks for pregnancy, STIs, and any assault-related injuries.¹⁶ Hospital admission should be considered for potentially serious illnesses that require close follow-up care. Adult patients who require hospitalization for medical stabilization and treatment should be encouraged to stay. Again, it is important to communicate the situation to hospital security to ensure the safety

of both the patient and hospital staff.²

Once medical clearance has been obtained, the emergency physician's next step is to develop a safety plan. In addition to medical care, the patient's immediate needs may include shelter, substance abuse treatment, legal services, and law enforcement assistance. Survivor-centered protocols that encourage patient participation can involve social workers, local service or crisis organizations, and/or law enforcement. In some instances, help may simply involve discreetly providing the patient with a list of victim resources, including hotline phone numbers.¹⁶

CRITICAL DECISION

How should patient confidentiality be addressed?

Confidentiality is one of the greatest privileges and responsibilities held by medical professionals. There are, however, several legitimate exceptions to this rule. Providers are required to report to child protective services and/or law enforcement any *reasonable* suspicion that a child seen within their course of practice may be, or will be, a victim of sexual abuse, including sex trafficking.^{7,16} Medical providers must comply with mandatory child abuse reporting laws, and should take all appropriate actions to ensure no further harm to the victim.¹¹ Any form of sexual exploitation is considered an exception to adolescent confidentiality laws.

TABLE 3. Triage Decisions for the SANE Examination

1. An urgent sexual assault evaluation is indicated in any of the following circumstances:

- The victim presents with a recent history of acute sexual assault (<120 hours prior to presentation).
- The patient has medically urgent complaints (eg, symptoms of a possible STI).
- The patient has a possible genital injury or suspicious injuries that require forensic documentation (eg, photo-documented, photo-colposcopy, or digital camera).
- The patient is a minor with prominent mental health or safety concerns that prompt the provider to request further evaluation and investigation.

2. An urgent evaluation is required for victims with any of the following symptoms:

- Severe anogenital bleeding
- An injury that requires acute or urgent surgical intervention
- Other unrelated medical problems requiring emergent attention

3. A nonurgent (scheduled) sexual assault medical evaluation should be considered for the following cases:

- The last episode of sexual assault is remote (>120 hours).
- There are no urgent mental health or safety concerns.
- Follow-up care can be ensured.

When interviewing and interacting with any minor who may be involved in HST, a transparent discussion of the clinician's lawful obligations prior to obtaining the patient disclosure is recommended. Lying or obscuring this information can provoke additional misgivings and noncompliance in a child who has already amassed a certain amount of distrust for authority figures. Many pediatric patients are unprepared to divulge details about their lives. In such circumstances, the decision to report the case to law enforcement and child protective services may be based on the patient's history or red flags discovered during the screening process.

A close review of individual state laws can provide more specific guidance, especially when managing cases that involve vulnerable populations or weapons. In some states, both adults and minors can be arrested and prosecuted for prostitution and other related charges (versus safe harbor laws in other jurisdictions). The threat or fear of deportation may be a significant

barrier to disclosure when managing undocumented immigrants; however, the US Department of Justice has created a trafficking visa (T visa) that allows undocumented victims to remain in the US legally under specific circumstances.¹⁸

It is critical to allow adult patients to make decisions about disclosures to service organizations and legal authorities. As such, clinicians must avoid buying into "rescue fantasies." It is important to understand that a variety of factors can prevent an adult victim from disclosing or escaping their current situation; in some cases, doing so can be quite dangerous.

Medical Documentation

Medical documentation is an important consideration when managing any suspected victim of human trafficking. In some cases, the clinical record may provide subsequent caregivers with the only clue that a patient is at risk. Because the report may be used in future legal proceedings, it is important to record

only the medically relevant facts and supporting details, including the patient's own words in quotations, when appropriate. It also is important to thoroughly document scars, surgical incisions, birthmarks, skin lesions, tattoos, and piercings. Even if a patient denies being trafficked, documentation can and should include a diagnostic statement similar to "suspected human trafficking."²²

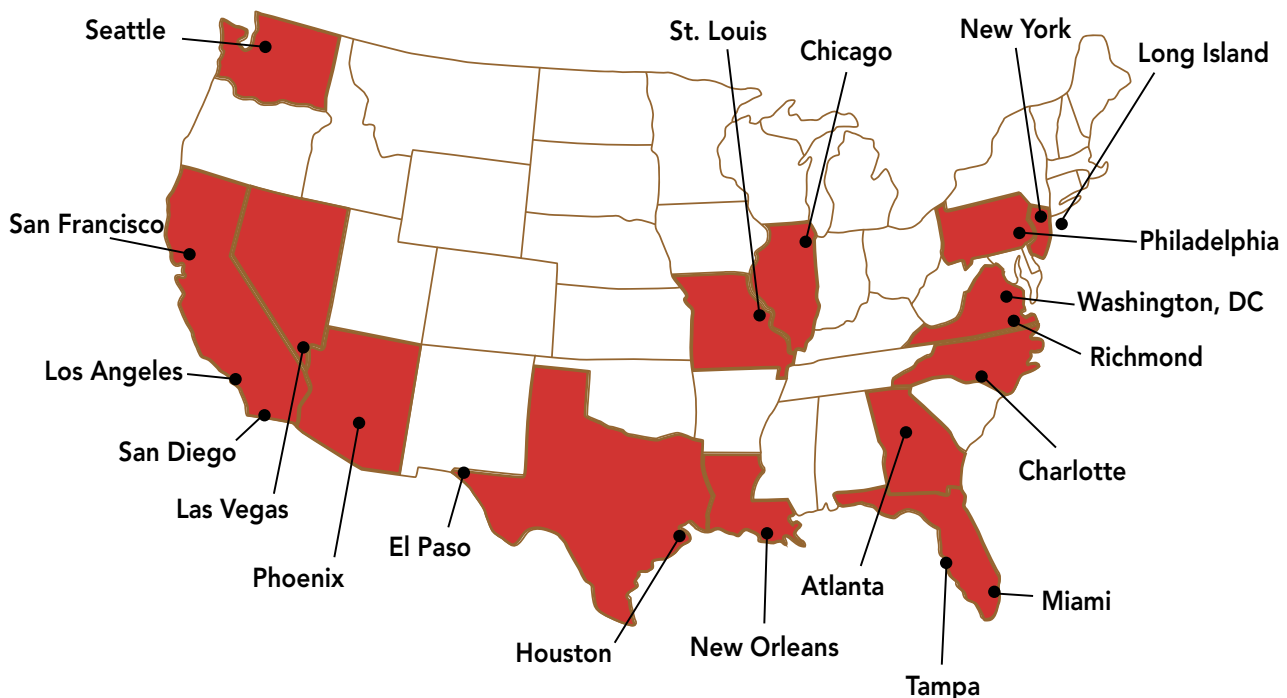
CRITICAL DECISION

What resources are available for HST victims and the clinicians who treat them?

While it is crucial to screen patients for sex trafficking, identification alone does not conclude the care of this vulnerable population. It is vital to understand, and be prepared to share, the benefits and limitations of available victim resources. First and foremost, calling 911 is an inappropriate approach when managing a potential victim of HST. The clinician's initial point of contact should be a national

FIGURE 1. Human Trafficking in the US

The Department of Justice has identified the **TOP 20** human trafficking jurisdictions in the country.



Source: US Department of Justice, National Center for Missing and Exploited Children

Pearls

- Employ the entire team, including registration staff, nurses, and technicians, to catch signs and symptoms of human sex trafficking.
- Use professional translators, if needed. Do not rely on “family members” to circumvent language barriers.
- Find a way to interview the patient alone.
- Remember that many victims refuse to self-identify as such. Clinicians should not dismiss their own suspicions simply because a patient denies abuse.



help line, such as the National Human Trafficking Hotline (NHTH) (1-888-373-7888, humantraffickinghotline.org).

All communications with the NHTH are confidential unless the caller consents to law enforcement involvement, threatens to self-harm or harm others, or is experiencing a life-threatening emergency.¹⁹ Other confidential options for victims and providers include texting HELP to 233733, or starting a live online chat session at humantraffickinghotline.org. Both resources are available 24 hours a day, 7 days a week.²⁰

More information about these and other HST victim resources is provided by Polaris (polarisproject.org), a national, nonprofit access point for trauma-informed support.²¹

National Anti-Trafficking Laws

The Trafficking Victims Protection Act (TVPA) of 2000 was the first comprehensive federal law designed to address, prevent, and prosecute cases of human trafficking.³ Subsequent reauthorization acts in 2003, 2005, 2008, and 2013 provided even greater protection for US victims, enhanced human trafficking laws, improved victim service provisions, and strengthened the role of the Trafficking in Persons Office within the US State Department.

The Justice for Victims of Trafficking Act (JVTA) of 2015 contains a number of amendments that further strengthen services for victims, including the creation of a survivor-led advisory council and domestic trafficking victims' fund. JVTA 2015 also amended the Child Abuse Prevention and Treatment

Act (CAPTA) by including human trafficking and child pornography as forms of abuse.

The Preventing Sex Trafficking and Strengthening Families Act of 2014 seeks to reduce the incidence of sex trafficking among youth in the foster care system by requiring child welfare systems to identify children at risk. Currently, 34 states have adopted safe harbor laws, which are intended to address the inconsistent treatment of trafficked minors, offer them immunity from prosecution, and provide access to specialized survivor services, including medical treatment and social support.

Most states provide a variety of resources for victims of HST. These programs include, but are not limited to, social work, counseling, sexual assault crisis centers, faith-based organizations, and legal aid. In particular, Health Professional Education, Advocacy, and Linkage (HEAL) is a network of interdisciplinary health professionals

working to provide training, advocacy, and resources for trafficked victims.²²

Emergency physicians should be aware of *Services Available to Victims of Human Trafficking*, a guide published by the Department of Health and Human Services (HHS). The booklet describes the ongoing care many of these victims require, including food, shelter, clothing and goods, medical and legal support, job placement, and educational training.

Clinical Training for HST

Multiple surveys indicate that health care providers often feel ill-equipped and unprepared to identify and ultimately protect victims of trafficking. The US federal government has responded to these concerns with the Stop, Observe, Ask, and Respond (SOAR) to Health and Wellness Program. Administered through the HHS, the program is part of a 5-year Federal Strategic Action Plan on Services for Victims of Human Trafficking in the United States.²³

SOAR offers countless online resources for clinicians with various levels of training and provides access to both virtual and in-person educational opportunities throughout the US. Many other US-based organizations provide additional HST courses, many of which can be accessed through the HEAL website (healtrafficking.org). In many cases, continuing medical education (CME) credit can be earned through these programs.²⁴



Pitfalls

- Failing to treat a possible HST victim with sensitivity and respect.
- Making assumptions about which patients are at risk of HST based on superficial criteria. It is important to remember that victims can be any age, gender, or ethnicity.
- Being afraid to ask questions about a patient's potential involvement in human sex trafficking.
- Neglecting to obtain an adult patient's consent prior to contacting law enforcement.

CASE RESOLUTIONS

■ CASE ONE

The teenager with the injured arm remained quiet during the visit and seemed anxious when addressed directly. Due to inconsistencies in the reported relationship between the patient and her chaperone, the clinician contacted the NHTH and pulled the patient aside for a solo interview.

Once she was alone with the physician, the girl provided her real name and admitted that the woman who had accompanied her was, in fact, an associate of her presumed trafficker. With the help of law enforcement, the patient was determined to be a runaway, who had been reported missing 8 months earlier. She was treated

for a contusion to her right forearm and eventually was reunited with her family. The accompanying woman was detained.

■ CASE TWO

Once the mother was separated from her male companion, she reported that she had been transported from her home in Central America 5 years ago for sex trafficking purposes. The infant was treated for bronchiolitis, and the mother agreed to seek help with guidance from the emergency physician and a social worker. She was placed in a women's shelter, where she was provided with psychiatric counseling and legal assistance.

■ CASE THREE

While performing the bedside abdominal ultrasound, the emergency physician noticed a small, hyperechoic object within the soft tissue, just below the young woman's skin. With her consent, an incision was made at the bedside, and the object was extracted. The object was revealed to be a microchip, much like the implantable tracking devices frequently used for pets.

Law enforcement was called, and the patient was discovered to have approximately 20 separate forms of identification, each with a different alias. She rebuffed the clinical team's efforts to devise a safety plan, and left the emergency department against medical advice.

Summary

It is important for emergency providers to be adept at recognizing the social and physical warning signs of HST, and know how to approach both adult and pediatric victims with sensitivity. Because every case is unique, clinicians must understand when and how to initiate a sexual assault examination, document forensic findings, and report a case to law enforcement.

All staff members, from registration personnel to physicians, should seek training to identify human trafficking in the emergency department. From there, social services can be deployed to care for, and ultimately rehabilitate, these victims.

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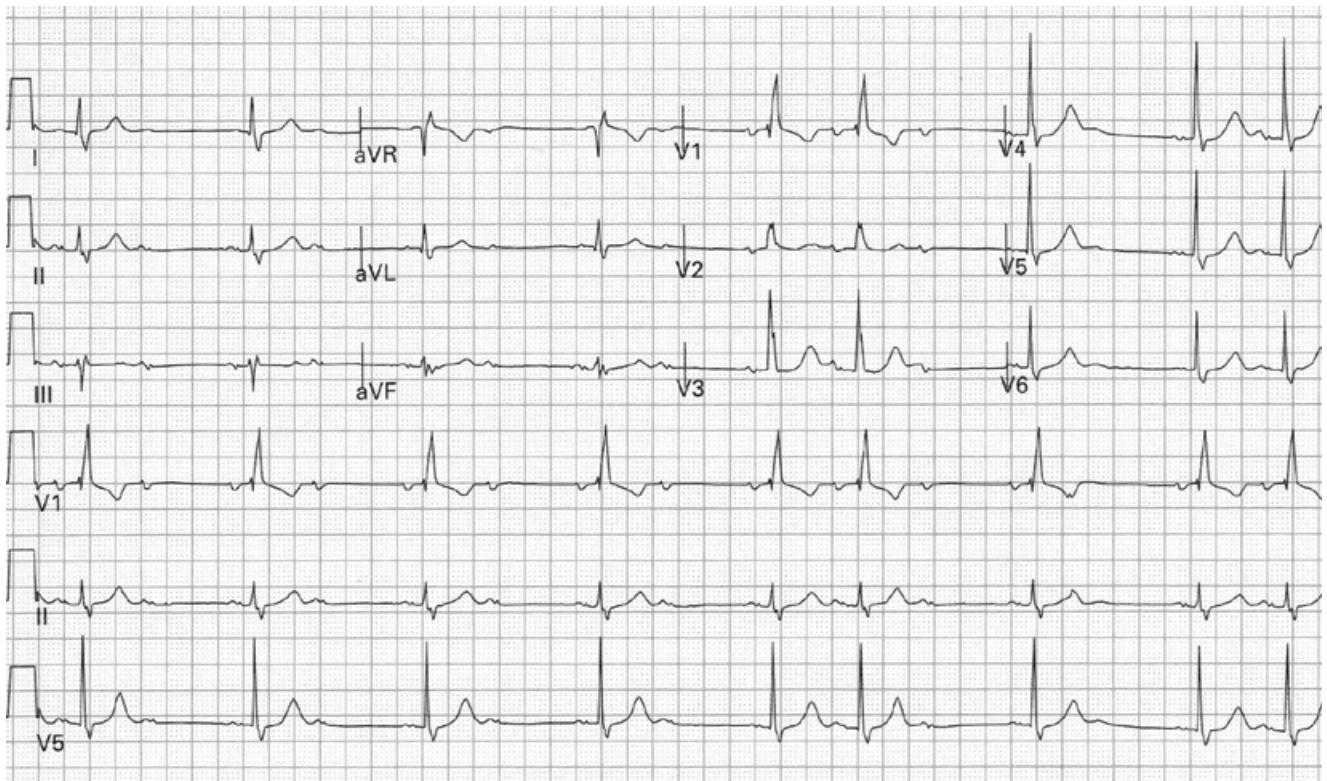
HUMAN TRAFFICKING COUNSELING AND INFORMATION RESOURCES

National Human Trafficking Hotline

1-888-373-7888

Polaris Project

polarisproject.org



A 74-year-old man presents after a syncopal episode.

The Critical ECG

Sinus rhythm with second-degree atrioventricular (AV) block type 1 (Wenckebach, Mobitz I), rate 50, right bundle branch block. The atrial rate is approximately 88, and there are frequent nonconducted P waves that result in an overall ventricular rate of 50. A second-degree AV block is present mostly with a 2:1 conduction ratio (two P waves for every one QRS). When 2:1 conduction occurs, it is impossible to determine with certainty whether the rhythm is Mobitz I or Mobitz II. In this case, however, 3:2 conduction occurs in two portions of the rhythm strip: in the fifth and sixth ventricular beats. In these two areas, the PR interval increases. This confirms the diagnosis of Mobitz I.



By Amal Mattu, MD, FACEP
Dr. Mattu is a professor, vice chair, and director of the Emergency Cardiology Fellowship in the Department of Emergency Medicine at the University of Maryland School of Medicine in Baltimore.

From Mattu A, Brady W. *ECGs for the Emergency Physician 2*. London: BMJ Publishing; 2008. Reprinted with permission.



The Critical Procedure

Unruptured Globe Reduction

By **Steven Warrington, MD, MEd**

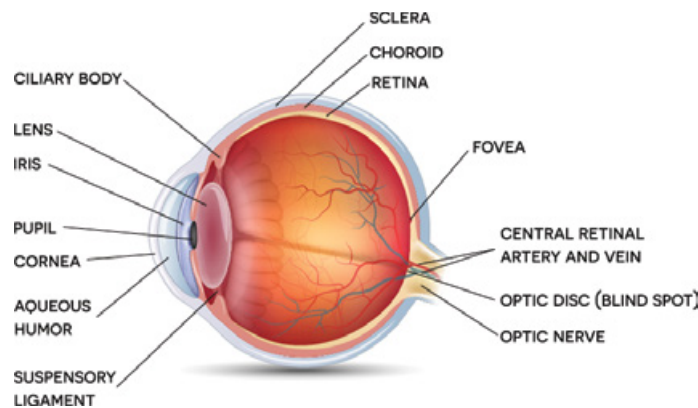
Dr. Warrington is the director of the Emergency Medicine Residency Program and academic chair of the Department of Emergency Medicine at Orange Park Medical Center in Orange Park, Florida.

Globe luxation is a general term that describes the anterior dislocation of the bulbus oculi, an uncommon but dramatic presentation that most often results from trauma. In addition, involuntary luxation has been seen following events as innocuous as the attempted placement of a contact lens. These events can create tension on the optic nerve and/or retinal vessels, assuming these structures are still intact, and can cause complications such as blurred vision, exposure keratopathy, corneal abrasion, blepharospasm, and traumatic optic neuropathy. When managing an acute luxation, immediate reduction of the globe is paramount, as delays in treatment can increase the risk of ischemia and further trauma.

Benefits and Risks

Patients who undergo successful globe reductions seldom experience visual sequelae; however, a complete return of function can be delayed. The procedure can result in preferable cosmetic outcomes compared with a prosthesis, even in patients with damaged optic nerves and/or vessels.

The primary risks of emergent reduction are direct trauma to the globe and procedure failure. The development of post-procedure keratitis also has been reported. The primary complication associated with surgical reduction is procedure intolerance. There also is a documented case of a patient with ongoing pain, who ultimately required evisceration of the eye and a prosthesis.



Alternatives

Surgical management may be required for facial fractures that involve nearby structures, or if globe reduction cannot be achieved in the emergency department.

In such cases, eye drops and an eye shield can be applied while the patient awaits transfer to the operating room. It is important that these elements do not come in direct contact with the

globe. If the reduction fails, enucleation or evisceration of the eye with a transition to prosthesis should be considered.

Reducing Side Effects

The procedure is contraindicated for *ruptured* globes. It is important to examine the patient thoroughly for additional injuries (eg, retrobulbar hemorrhage) sustained during or following the

precipitating event. The presence of lashes or other foreign bodies under the eyelid or in the fornices also can cause irritation and further complications.

Topical anesthetic drops can moisten an eye that has become dry due to exposure, allowing the physician to more easily maneuver the globe back into place. It also may be helpful to lean the patient back in a chair.

Imaging may be warranted prior to reduction, especially in cases of trauma. Globe luxation can induce high anxiety in patients; treatment with anxiolytic agents should be considered and can help reduce the risk of procedure failure.

Special Considerations

The procedural technique outlined below is designed for situations in which the eyelashes are hidden; however, any eyelashes that can be visualized may be used for traction on the eyelid.

Patients with underlying conditions such as thyroid orbitopathy should seek

treatment for their disease. Those at risk for atraumatic or involuntary luxation can be taught how to reposition the globe themselves should dislocation recur (*Figure 1*). In such cases, emphasize that pressure should be applied only to the scleral surface, not directly to the cornea.

TECHNIQUE

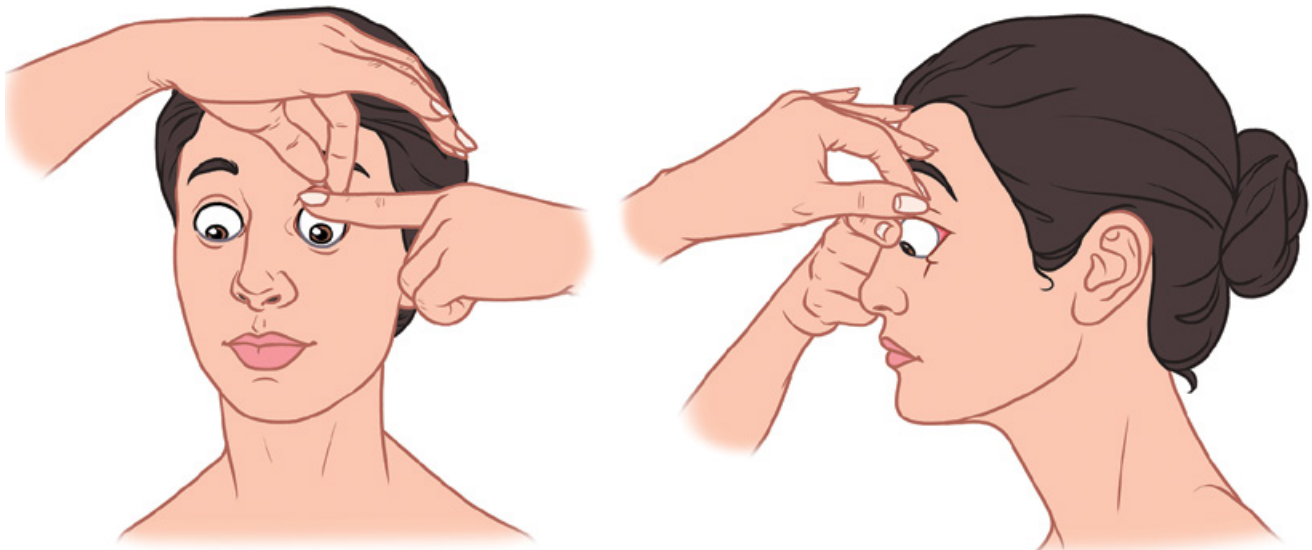
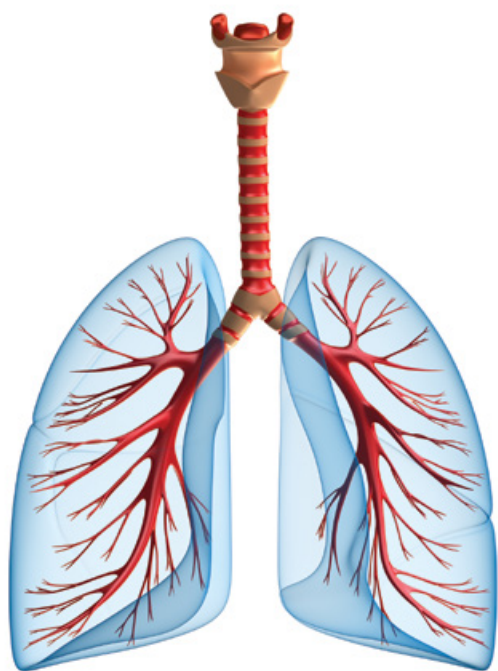


FIGURE 1. While the patient maintains a constant downward gaze, the skin of the upper eyelid is pulled upward with the fingers of one hand, and the globe is simultaneously depressed with the index finger of the other hand. The importance of contacting only the scleral surface should be emphasized. This technique allows the retracted upper eyelid to ascend the posterior scleral surface and arch over the equator.

1. **Evaluate** the patient for a ruptured globe and other injuries to nearby structures that may warrant initial imaging or an ophthalmology consultation. If possible, the patient should undergo a thorough eye examination, including assessments of visual acuity and light perception.
2. **Consider** the early initiation of anxiolytic agents.
3. **Attempt** reduction without sedation.
 - a. Ask the patient to look downward, while maintaining the head in an upright position.
 - b. With the patient gazing downward, pinch the skin of the upper eyelid and lift it up as much as possible.
 - c. Apply gentle pressure at an angle (downward and backward), lightly pressing a finger to the upper scleral surface. The goal is to move the upper lid past the equator.
 - d. Once the lid is past the equator, ask the patient to look upward while still holding the upper lid as before. This movement should allow the globe to rotate back into position under the upper lid. After addressing any residual lower-lid misplacement, the globe should be in place.
4. **Consider** sedating the patient.
5. **Obtain** lid retractors, if the lashes cannot be visualized. In the absence of a lid retractor, a suture can be placed in the affected lid to provide a point for traction. Alternatively, a retractor can be fashioned from a paper clip that has been bent into position.
6. **Apply** an ocular anesthetic.
7. **Instruct** an assistant to maintain traction by holding the upper and lower lids.
8. **Apply** pressure to the scleral surface using your fingers while digitally manipulating the globe back into place.
9. **Examine** the surface and fornices for a possible retained lash or foreign body.
10. **Perform** a complete post-procedure ocular examination, testing for visual acuity, range of motion, etc.
11. **Instruct** the patient on follow-up care prior to discharge.



The LLSA Literature Review

Managing Initial Mechanical Ventilation

By Travis W. Murphy, MD; and Nicholas G. Maldonado, MD, FACEP
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Reviewed by Andrew J. Eyre, MD, MHPEd

Weingart SD. Managing initial mechanical ventilation in the emergency department. *Ann Emerg Med.* 2016 Nov;68(5):614-617.

The boarding of intubated, ICU-bound patients is an ever-growing challenge for emergency physicians, who are increasingly responsible for the initial management of these cases. This article summarizes two important ventilator strategies that can be readily incorporated into the care of these critically ill patients.

LUNG PROTECTIVE STRATEGY

The lung protective strategy focuses on low-tidal volume ventilation for the prevention of ventilator-induced lung injury and subsequent acute respiratory distress syndrome. This can be accomplished by considering that the volume of useful lung parenchyma is diminished in patients with respiratory failure. Although appropriate for any intubated patient, this strategy is specifically indicated for high-risk patients and those with signs of acute lung injury.

Mode — Volume assist-control

Tidal volume — Start with a tidal volume (V_T) of 8 mL/kg of predicted body weight (PBW) or below, as tolerated, and reduce by 1 mL/kg at intervals of 2 hours or less until $V_T = 6$ mL/kg PBW. V_T can be adjusted to manage acidosis and CO_2 retention but should not be increased by more than 8 mL/kg.

Inspiratory flow rate — An initial setting of 60 L per minute usually leads to adequate flow and can be titrated up, as needed, for comfort. Ignoring this parameter can lead to increased sedation/analgesia requirements.

Respiratory rate — An initial rate of 15 to 16 breaths per minute can be used to achieve normocapnia in most patients. A blood gas measurement should be obtained 20 to 30 minutes later to titrate PaCO_2 to the patient's acid-base status. Rates as high as 30 to 40 breaths per minute may be required. Permissive hypercapnia should be considered if PaCO_2 goals cannot be safely achieved with rapid respiratory rates.

PEEP — Initial levels should be set to 5 cm H_2O to provide an “air stent.” This setting can prevent the collapse and shearing of small airways while helping the patient overcome the resistance of the ventilator tubing.

PEEP and FiO_2 — Set the lowest possible FiO_2 (usually 30%-40%) to maintain a goal oxygen saturation between 88% and 95% to prevent hyperoxia. The NIH-NHLBI ARDS Network recommends increasing FiO_2 and PEEP in tandem to facilitate alveolar recruitment.

Plateau pressure — Assess every 30 to 60 minutes by pressing the inspiratory hold button at the end of a breath. A plateau pressure of 30 cm H_2O or more can cause alveolar injury. This risk can be avoided by decreasing V_T by 1 mL/kg (minimum = 4 mL/kg PBW) until a value of less than 30 cm H_2O is achieved. Permissive hypercapnia may be required.

Summary of the Two Ventilator Strategies

	Lung Protective Strategy	Obstructive Strategy
Mode	Volume assist-control	Volume assist-control
Tidal volume	Start at 8 mL/kg PBW; adjust for plateau pressure goal.	8 mL/kg PBW
Inspiratory flow rate	Start at 60 L/min; adjust for comfort.	60-80 L/min
Respiratory rate	Start at 16 breaths/min; adjust for PaCO ₂ goal.	Start at 10 breaths/min; adjust to allow full expiration.
PEEP	Start at 5 cm H ₂ O; adjust according to the table.	0 cm H ₂ O (Some may treat the patient with PEEP 5 cm H ₂ O.)
FiO ₂	Start at 40%; adjust according to the table.	Start at 40%; adjust for SpO ₂ 88%.
Check for safety	Measure plateau pressure. If 30 cm H ₂ O, decrease the tidal volume by 1 mL/kg.	Measure the plateau pressure or observe the flow/time graph. If the plateau pressure reaches 30 cm H ₂ O or the flow/time graph shows incomplete expiration, decrease the respiratory rate.

FiO₂ and PEEP Scale from ARDSnet ARMA Trial

FiO ₂	0.3	0.4	0.4	0.5	0.5	0.6	0.7	0.7	0.7	0.8	0.9	0.9	0.9	1.0	1.0	1.0
PEEP	5	5	8	8	10	10	10	12	14	14	14	16	18	20	22	24

OBSTRUCTIVE STRATEGY

The obstructive strategy is used for patients with reactive airways, typically from asthma or COPD. Because these patients experience air trapping and barotrauma when exposed to the rapid respiratory rates and lower tidal volumes of the lung protective strategy, a different approach is required. In such cases, the primary goal is to allow the patient time to exhale, primarily by reducing the respiratory rate and allowing for permissive hypercapnia.

Mode — Volume assist-control

Tidal volume — Set the initial levels to 8 mL/kg PBW.

Inspiratory flow rate — Set to 60 to 80 L per minute. Shorter inhalation times theoretically can be used to allow for even longer exhalation. However, this approach often results in higher peak pressures with limited added benefit.

Respiratory rate — Set to 8 to 10 breaths per minute to allow time for exhalation. Permissive hypercapnia can help limit the effects of air trapping and barotrauma.

PEEP — Set the PEEP between 0 and 5 cm H₂O.

FiO₂ — Set the lowest possible FiO₂ (usually 30%-40%) to maintain a goal oxygen saturation between 88% and 95%.

Plateau pressure — Measure the patient's plateau pressure or observe the flow/time graph. Decrease the respiratory rate if the plateau pressure is greater than 30 cm H₂O, or the flow/time graph shows incomplete expiration (ie, expiratory flow does not return to baseline before the subsequent inspiration is initiated).

KEY POINTS

- Volume assist-control mode ventilation allows for patient-initiated breaths and greater control of pertinent parameters.
- Ventilator mode, tidal volume, inspiratory flow rate, respiratory rate, PEEP, FiO₂, and plateau pressure are key ventilator parameters for managing mechanically ventilated patients.
- A lung protective strategy of ventilation, which focuses on low-tidal volume ventilation (≤8 mL/kg PBW), should be used when managing any intubated patient.
- An obstructive strategy of ventilation focuses on reducing the respiratory rate to allow patients with obstructive lung diseases time to exhale, thereby reducing the danger of air trapping.
- Plateau pressure is measured by pressing the inspiratory hold button at the end of a breath (inspiratory pause). It should be maintained at levels below 30 cm H₂O to reduce the risk of alveolar injury.

Critical Decisions in Emergency Medicine's series of LLSA reviews features articles from ABEM's 2019 Lifelong Learning and Self-Assessment Reading List. Available online at acep.org/llsa and on the ABEM website.

The Critical Image

A 15-year-old girl with a history of mild asthma presents via ambulance. She began to vomit 3 hours earlier after eating chicken at a farmers market. The patient's parents took her to a local urgent care center, where she was noted to be in respiratory distress. Anaphylaxis was suspected, given the combination of respiratory and gastrointestinal symptoms, and the clinic called 911.

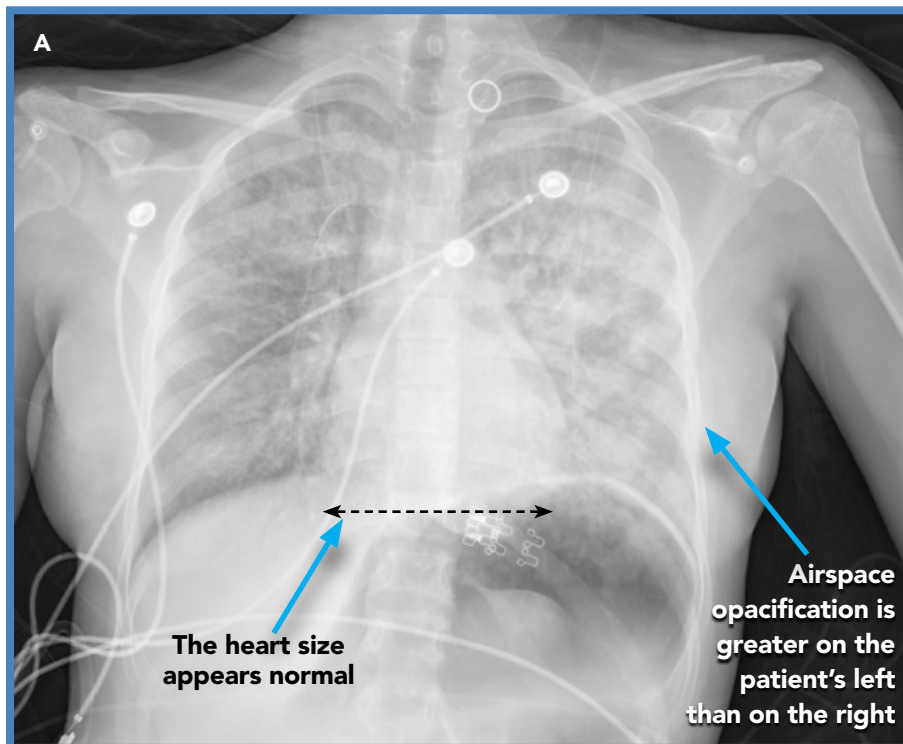


By Joshua S. Broder, MD, FACEP
Dr. Broder is an associate professor and the residency program director in the Division of Emergency Medicine at Duke University Medical Center in Durham, North Carolina.

EMS was unable to obtain intravenous (IV) access but administered intramuscular epinephrine during transport. On arrival, the patient's vital signs are blood pressure 60/palpable, heart rate 166, respiratory rate 40, temperature 36.8°C (98.2°F), and oxygen saturation 70% on a 100% nonrebreather mask.

Her skin is cool and pale, and she appears lethargic. Pulses are faintly palpable in the distal extremities, and the patient is tachycardic, without accessory heart sounds. She is tachypneic, with rales in both lungs. Her abdomen is nontender, and she has no peripheral edema. She follows simple commands intermittently and has no focal neurological deficits.

A second oxygen source is placed, and the patient is given a second dose of intramuscular epinephrine and a fluid bolus via peripheral IV. Her urine human chorionic gonadotropin (hCG) test is negative. An ECG reveals sinus tachycardia. A chest x-ray is performed while preparations are made for intubation.

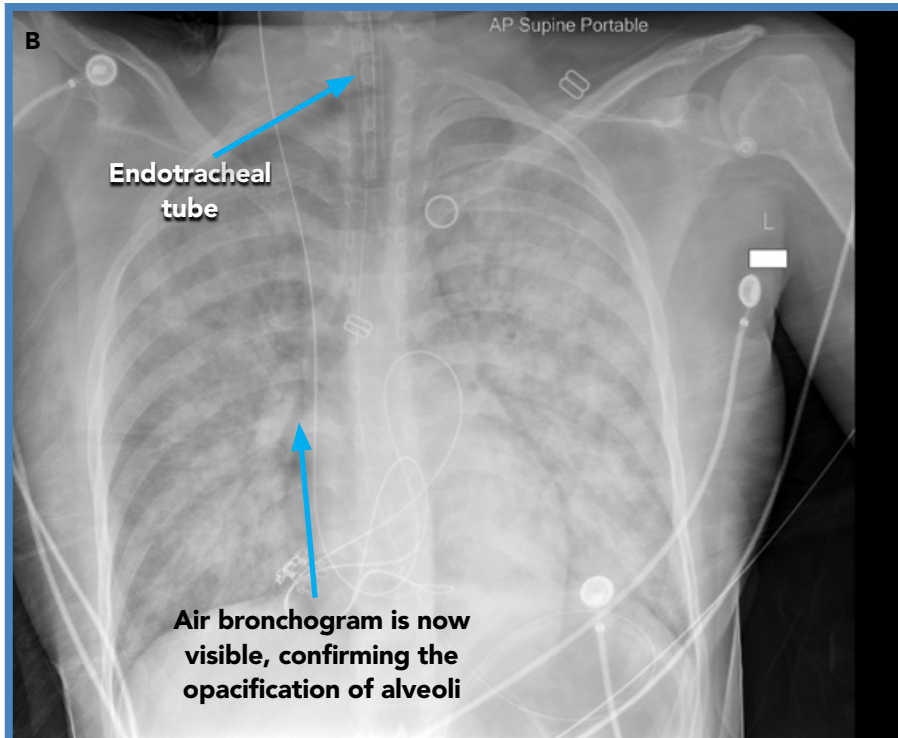


A. Initial chest x-ray demonstrating bilateral pulmonary opacities (greater on the left side than on the right). The initial asymmetry might suggest aspiration, but the opacification is not restricted to a single lung lobe. The differential diagnosis includes any potential cause of airspace consolidation, including cardiogenic pulmonary edema, noncardiogenic pulmonary edema, infectious consolidation, hemorrhage, or aspiration. The patient's heart size is normal.

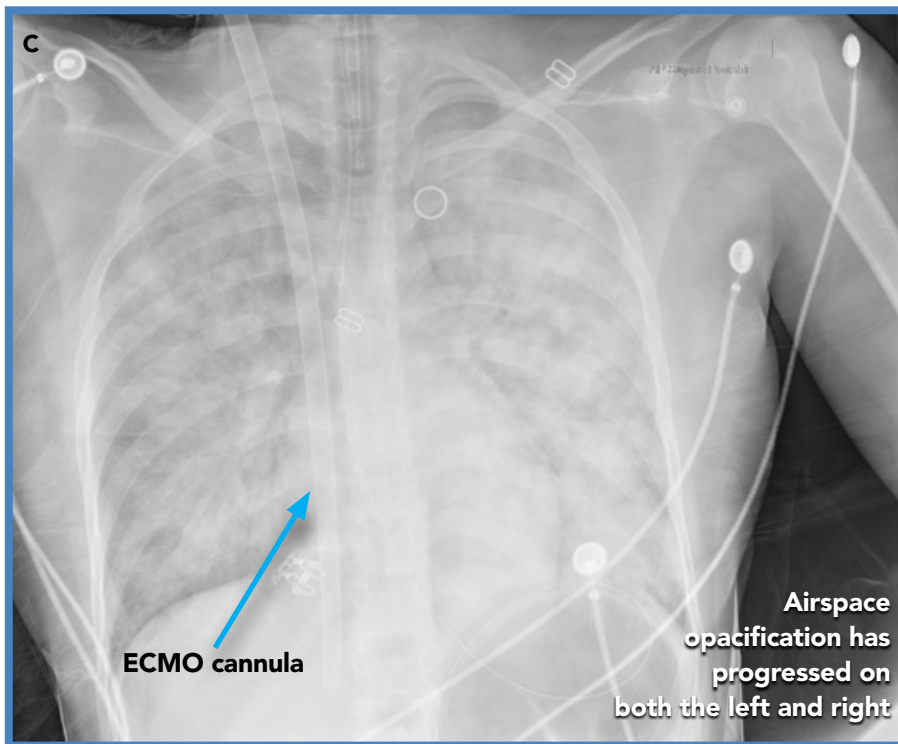
CASE RESOLUTION

Bedside echocardiography showed a severely depressed ejection fraction. The patient suffered bradycardic cardiac arrest and obtained return of spontaneous circulation after brief chest compressions. She was placed on extracorporeal membrane oxygenation (ECMO) in the emergency department and recovered fully after a month-long stay in the pediatric ICU.

ECMO is increasingly used in adult and pediatric populations as a bridge to recovery from acute critical illness. According to the Extracorporeal Life Support Organization, more than 23,000 pediatric patients were placed on ECMO in 2018, with a survival rate of more than 50%.



B. Increased airspace consolidation seen minutes after intubation. The right lung appears more opacified than on the initial chest radiograph. An air bronchogram is now visible, confirming alveolar opacification in the adjacent lung parenchyma.



C. A chest x-ray taken approximately 1 hour later, following ECMO cannulation in the emergency department. Dense bilateral airspace consolidation is present.

KEY POINTS

- This patient presented in respiratory distress and shock. The differential diagnosis included anaphylactic shock from food ingestion, aspiration and hypovolemic shock from vomiting, severe asthma, pneumonia with septic shock, and cardiogenic shock. The chest x-ray

demonstrated bilateral pulmonary opacities, which are unlikely to represent aspiration, given their diffuse distribution.

- In cases of sudden pulmonary edema from nonischemic cardiomyopathy, the radiographic appearance of the heart may be normal. This differs from x-ray

findings associated with dilated cardiomyopathy, in which the heart is visibly enlarged, and can distract from the correct diagnosis.

- Asymmetrical edema seen on chest radiography also can mislead clinicians who encounter the patient early in the clinical course.



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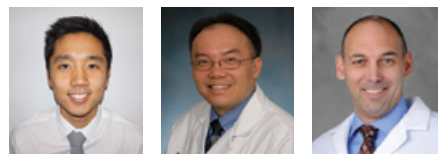
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Critical Loss

Resuscitation of the Patient in Hemorrhagic Shock

LESSON 24



By Jeremy L. Kim, MD; Quincy K. Tran, MD, PhD; and Peter P. Lopez, MD, FACS

Dr. Kim is an emergency physician with TeamHealth at St. David's South Austin Medical Center in Austin, Texas. Dr. Tran is an assistant professor in the Department of Emergency Medicine and the R Adams Cowley Shock Trauma Center at the University of Maryland School of Medicine. Dr. Lopez is a clinical assistant professor of surgery at Michigan State University School of Medicine and the medical director of the trauma program at Providence Hospital in Southfield, Michigan.

Reviewed by George Sternbach, MD, FACEP

OBJECTIVES

On completion of this lesson, you should be able to:

1. Identify the key clinical features of hemorrhagic shock.
2. Detail appropriate laboratory and radiology tests to aid in the diagnosis and management of hemorrhagic shock.
3. Explain the principles of damage control resuscitation.
4. Describe the initial management of hemorrhagic shock and the components of a massive transfusion.
5. Detail the appropriate disposition for patients in hemorrhagic shock.

FROM THE EM MODEL

- 1.0 Signs, Symptoms, and Presentations
 - 1.3 General
 - 1.3.42 Shock

CRITICAL DECISIONS

- How is hemorrhagic shock diagnosed?
- What laboratory and radiology tests are useful when managing hemorrhagic shock?
- How should patients in hemorrhagic shock be resuscitated?
- What treatment should be initiated immediately?
- What are the components of a massive transfusion protocol?
- What is the appropriate disposition for patients in hemorrhagic shock?

Patients in hemorrhagic shock are faced with an immediately life-threatening condition. Emergency physicians must be able to recognize this critical presentation early in the course, be prepared to provide optimal resuscitation, and arrange for definitive and expeditious care.

CASE PRESENTATIONS

■ CASE ONE

A 24-year-old woman arrives via ambulance after a high-speed motor vehicle collision in which she was the unrestrained driver. Her vital signs are blood pressure 70/30, heart rate 140, respiratory rate 36, and temperature 35.8°C (96.4°F). She has a Glasgow Coma Scale (GCS) score of 7, a scalp laceration, and obvious trauma to her face. She has bilateral breath sounds, bruising and abrasions to her left abdomen and flank, and an obvious deformity of her left lower leg.

■ CASE TWO

A 63-year-old man with a medical history of hypertension and hepatitis C presents with

epigastric pain, nausea, and three episodes of emesis. His vital signs are blood pressure 88/54, heart rate 106, respiratory rate 18, temperature 37.3°C (99.1°F), and oxygen saturation 98% on room air. He is ill-appearing, diaphoretic, and sitting upright while actively retching into a plastic bag. He produces about 100 mL of coffee-ground emesis that contains dark red streaks. His abdomen is moderately distended with epigastric tenderness, and a fluid wave is present. A rectal examination reveals melena without frank red blood.

■ CASE THREE

A 68-year-old man with a history of hypertension arrives via ambulance with a complaint of abdominal pain. He says the pain started suddenly 2 hours ago without any triggering events and describes it as diffuse, sharp, and

severe. He denies fever, chills, chest pain, shortness of breath, nausea, vomiting, and diarrhea. The paramedics recorded a blood pressure of 75/45 and a heart rate of 130 en route.

The patient had a brief syncopal episode while being transferred onto the stretcher. His vital signs are now blood pressure 79/43 and pulse rate 136. He appears to be in significant distress and is moaning and diaphoretic. He is tachycardic and has palpable but diminished femoral and dorsalis pedis pulses. He is tachypneic with the use of supraclavicular and intercostal accessory muscles. The abdominal examination is notable for distention, dullness to percussion, and a pulsating mass palpable at the umbilicus.

Shock is a condition characterized by inadequate organ perfusion due to an imbalance between the delivery and consumption of oxygen and metabolic substrates.¹ The causes of shock are divided into four categories: *hypovolemic*, *cardiogenic* (eg, myocardial infarction), *distributive* (eg, sepsis, neurogenic, anaphylactic), and *obstructive* (eg, tension pneumothorax, cardiac tamponade).

Hemorrhagic shock, a type of hypovolemic shock that is caused by acute blood loss, most commonly occurs with trauma. Every year, more than 5 million people worldwide die from trauma, which is the fifth leading cause of death in the United States.^{2,3} Hemorrhage is the leading cause of trauma-associated death, and the majority of these patients die within a few hours of presentation.³

When the body loses a significant amount of blood volume, oxygen delivery is impaired, and cellular metabolism proceeds with anaerobic glycolysis, ultimately leading to lactate production and metabolic acidosis.³ The proinflammatory mediators that are released by cells in a shock state damage endothelial cells, inducing tissue swelling

and cellular death. The body further compensates by releasing endogenous catecholamines that increase the heart rate and cardiac output, a cascade that leads to peripheral vasoconstriction. As inadequate organ perfusion persists, acidosis and hypoxemia worsen, impairing peripheral vasoconstriction and eventually leading to cardiovascular collapse.

CRITICAL DECISION

How is hemorrhagic shock diagnosed?

Hemorrhagic shock is a clinical diagnosis that incorporates key historical information, examination findings, and laboratory data. The hallmark red flag is an acute precipitating event in which a large amount of blood loss occurs. The diagnosis is most commonly the result of blunt or penetrating trauma; however, it can also arise from disorders that cause symptoms such as hematemesis, hemoptysis, rectal bleeding or melena, vaginal bleeding, epistaxis, or easy bruising (Table 1).

Other concerning presentations include generalized weakness, syncope,

confusion, and lethargy. The patient's vital signs can signal severe shock or be an early harbinger of developing shock. It is also important to gather as much information as possible about the patient's medical and surgical history, pregnancy status, use of anticoagulants or antiplatelet agents, and any history of bleeding diathesis.

Vital signs are largely dependent on the quantity of blood loss, classically divided into four classes of hemorrhagic shock.³ Although tachycardia typically develops after 15% to 30% of blood volume has been lost, blood pressure remains normal due to physiological compensation. Therefore, any tachycardic trauma patient is in shock until proven otherwise.³ However, the heart rate may remain normal due to certain medications (eg, beta-blockers, calcium channel blockers), an excellent baseline physiological status, or vagal stimulation from significant intra-abdominal hemorrhage.

Hypotension is a late sign of significant hemorrhage that occurs after 30% to 40% of blood volume has been lost. A narrowed pulse pressure is a more sensitive finding, as early

sympathetic responses cause peripheral vasoconstriction to increase the diastolic pressure. Despite their widespread teaching, hemorrhage classifications are unreliable due to a variety of variables, such as the patient's age, comorbidities, medication use, and level of physiological compensation, all of which can differ based on the injuries sustained.

Data from a large trauma registry show that the interrelationship between vital sign derangements seen in the Advanced Trauma Life Support (ATLS) classifications occurs to a much lesser degree (Table 2).⁴ Research suggests that the shock index (SI), defined as the ratio of heart rate to systolic blood pressure, may be a more reliable diagnostic variable. SI can be used to better risk-stratify patients for increased transfusion requirements and early mortality when using a cutoff score above 0.9.^{5,6}

While the early recognition of hemorrhagic shock is important, emergency physicians must concurrently consider other etiologies that can cause or contribute to the patient's state of shock. For example, shock in a pedestrian struck by a motor vehicle is most likely due to hemorrhage caused by a high-grade splenic laceration. However, the patient may also have

concomitant cardiac tamponade, a tension pneumothorax, a myocardial contusion, a spinal cord injury, or even sepsis (if presenting late).

Clinicians must remain vigilant for signs of shock when managing any patient with trauma or a history suggestive of hemorrhage. A physical examination and repeat vital sign measurements play crucial roles in diagnosing shock. In cases of trauma, the examination should be focused on any evidence of hemorrhage in the chest, abdomen, retroperitoneum, pelvis, long bones, or external compartments (Table 3).

The patient must be fully exposed when evaluating for areas of bleeding. Clinicians should be careful to assess patients for scalp lacerations, epistaxis, flank ecchymoses, scrotal enlargement, extremity deformities, a pulsatile abdominal mass, or an unstable pelvis. Decreased cerebral perfusion can present as weakness, syncope, or altered mental status. An examination of the skin may reveal diaphoresis, bruising, petechiae, cyanosis, delayed capillary refill, pallor, or a mottled appearance.

The complete clinical picture must be considered when evaluating for shock, the diagnosis of which depends on a combination of hemodynamic

factors and evidence of vital organ hypoperfusion (eg, altered mental status or decreased urine output).

CRITICAL DECISION

What laboratory and radiology tests are useful when managing hemorrhagic shock?

Laboratory testing should include a complete blood count, arterial or venous blood gas measurements, chemistries, coagulation studies, type and crossmatching, and a urine or serum pregnancy test. While a normal hemoglobin level is un reassuring in patients with ongoing bleeding, it provides a baseline level to trend against throughout the evaluation. Acidosis seen on blood gas measurements can indicate the severity of the shock state. When available, thromboelastography can guide the transfusion strategy for a bleeding patient by measuring the viscoelastic properties of blood.⁷ An electrocardiogram (ECG) also should be obtained in patients with tachycardia or when there is concern for cardiac contusions or myocardial ischemia. Patients who are in a prolonged shock state may show ischemic signs on an ECG, a finding commonly described as *demand* ischemia.

Radiology testing, when the patient's condition allows, can help pinpoint the location of the hemorrhage; however, it is crucial to exclude other etiologies of shock. Initial images include chest and pelvis x-rays to evaluate for fractures and hemopneumothoraces. An immediate extended Focused Assessment with Sonography for Trauma (eFAST) should be performed to identify intra-abdominal or pelvic free fluid, pericardial effusion, pleural effusion, or a pneumothorax. A Rapid Ultrasound in Shock (RUSH) examination can also aid in diagnosing other causes of shock by adding views of the inferior vena cava (to assess volume status) and the abdominal aorta (to assess for the presence of an aneurysm).^{8,9} Diagnostic peritoneal lavage (DPL) has fallen out of favor due to the utility of ultrasound; however, it remains an option when evaluating for the presence of intraperitoneal hemorrhage.³

TABLE 1. Causes of Atraumatic Hemorrhagic Shock

Abdominal aortic aneurysm rupture
Pulmonary hemorrhage (eg, malignancy, bronchiectasis, tuberculosis)
Upper GI bleed (eg, esophageal or gastric varices, peptic ulcer disease, Mallory-Weiss syndrome)
Lower GI bleed (eg, diverticula, arteriovenous malformation, mass, aortoenteric fistula)
Pregnancy complications (eg, ruptured ectopic pregnancy, placental abruption/previa)

TABLE 2. ATLS Classes of Hemorrhagic Shock (for a 70-kg man)²

	Class I	Class II	Class III	Class IV
Blood loss (mL)	<750	750-1,500	1,500-2,000	>2,000
Blood loss (% blood volume)	<15%	15-30%	30-40%	>40%
Heart rate	<100	100-120	120-140	>140
Systolic blood pressure	Normal	Normal	Decreased	Decreased
Pulse pressure	Normal or increased	Decreased	Decreased	Decreased
Respiratory rate	14-20	20-30	30-40	>35
Urine output (mL/hr)	>30	20-30	5-15	Negligible
Mental status	Slightly anxious	Mildly anxious	Anxious, confused	Confused, lethargic

TABLE 3. Blood Loss Compartments in Trauma

External/Scalp
Chest
Abdomen
Retroperitoneum
Pelvis
Long bones

If the patient is stable enough for imaging, computed tomography (CT) is the most practical modality for evaluating hemorrhage in the setting of trauma.¹⁰ CT of the spine, when indicated, is useful to evaluate for injuries that may cause spinal cord injury and neurogenic shock. In addition, CT angiography has diagnostic value for identifying vascular injuries, which may warrant surgical or interventional endovascular hemorrhage control. Plain films of the extremities should be obtained to evaluate for fractures, particularly of the femur, where a significant volume of blood can accumulate.

CRITICAL DECISION

How should patients in hemorrhagic shock be resuscitated?

While resuscitation protocols for patients in hemorrhagic shock continue to evolve, the process has yet to be fully established or standardized across hospitals or even countries.^{10,11} The former practice of early aggressive fluid resuscitation with crystalloid solutions (eg, normal saline or lactated Ringer's solution) is believed to worsen hemorrhage by dislodging potential clots and causing dilutional coagulopathy, hypothermia, and metabolic acidosis. Perioperative aggressive hydration has been shown to increase the risk of death associated with certain conditions, including ruptured abdominal aortic aneurysms.¹²

The current practice of “damage control resuscitation,” which developed as the result of military advancements, is now widely accepted.¹³ This management paradigm incorporates permissive hypotension, hemostatic resuscitation with a fixed-ratio blood

transfusion, and damage control surgery.¹⁴ The goal is to prevent and reverse hemorrhagic shock and to avoid the lethal triad of trauma: coagulopathy, hypothermia, and acidosis.

Permissive Hypotension

In most patients, permissive hypotension is recommended with a lower systolic blood pressure goal between 80 and 100 mm Hg. Although vital signs are readily accessible, other end points that can guide ongoing resuscitation include changes in mental status, urine output, vital signs, lactate levels, and base excess. Research is mixed regarding the mortality benefits of hypotensive resuscitation, but in one specific subset of penetrating torso injuries, improved mortality was found when aggressive fluid resuscitation was delayed until hemostasis had been achieved definitively.¹⁵⁻¹⁷

Which subset of patients would benefit most from permissive hypotension has not been clearly established. However, hypotension is associated with worse clinical outcomes in those with severe traumatic brain injury (TBI). Therefore, early control of any bleeding allows the clinician to maintain a blood pressure that promotes cerebral perfusion and prevents a secondary brain insult.¹⁸

In the hypotensive patient, ATLS recommends initiating resuscitation with 1 to 2 L of fluids.² While numerous studies have compared the various types of fluids, crystalloid solutions are recommended when beginning any resuscitation. No clear benefits are seen with the administration of colloid solutions.^{19,20} Nevertheless, crystalloid solutions are not ideal for providing intravascular volume during continued resuscitation and can contribute to fluid accumulation and metabolic acidosis.

Hemostatic Resuscitation

Patients in hemorrhagic shock are at increased risk for developing trauma-associated coagulopathy; resuscitation must aim to reverse coagulopathy, hypothermia, and acidosis.²¹ In addition to packed red blood cells, emergency physicians must provide fresh frozen plasma and platelets to mitigate coagulopathy and consider other products (eg, prothrombin complex concentrates, factor replacement, protamine) to reverse the use of any anticoagulant or antiplatelet agents. It may be necessary to initiate a massive transfusion protocol for patients with ongoing hemorrhage who require a significant blood product transfusion. By activating the massive transfusion protocol, the clinician is notifying the blood bank and other care providers that large amounts of blood products will be

TABLE 4. Four Stages of Damage Control^{22,23}

Stage 0 – “ground zero”	Initiate a rapid transfer to a trauma center. Priority one: Stop the hemorrhage before beginning resuscitation. Prevent hypothermia. Measure blood gas. Initiate a rapid transfer to the operating room.
Stage 1 – Initial operation	Control hemorrhage. Control contamination. Use abdominal packing judiciously. Perform a rapid temporary abdominal closure. Prevent hypothermia.
Stage 2 – ICU resuscitation	Monitor perfusion and resuscitate in the ICU. Correct acidosis and coagulopathy. Rewarm the patient. Optimize oxygenation and ventilation. Measure intra-abdominal pressure.
Stage 3 – Definitive repair	Consider early reoperation if bleeding continues. Plan for reoperation once physiology has been restored. Perform definitive surgery. Consider an abdominal closure or staged closure.

needed emergently. In addition, fluids and blood products should be warmed prior to administration to prevent hypothermia.

Damage Control Surgery

The main goal of early damage control is patient survival. Damage control surgery aims to control hemorrhage and to minimize contamination and complications such as ongoing shock or abdominal compartment syndrome. Damage control surgery consists of four stages (Table 4).²²⁻²⁴ It begins at “ground-zero,” the prehospital phase, in which injured patients who require damage control are identified. In such cases, resuscitation is continued in the emergency department. *Stage 1* entails the immediate control of life-threatening hemorrhage and gross contamination, the use of intraluminal shunts, and the packing and temporary closure of any wounds.

In *Stage 2*, the focus is on correcting the patient’s metabolic disorders, including acidosis, coagulopathy, and hypothermia. *Stage 3* involves early reoperation, in cases of ongoing bleeding. In all four phases, the patient continually receives timely and aggressive resuscitation to correct the altered physiological state. Damage control remains a vital tool in the management of the exsanguinating patient and should be carried out before the patient has reached physiological exhaustion.

CRITICAL DECISION

What treatment should be initiated immediately?

The underlying principle in treating hemorrhagic shock is to optimize tissue perfusion through source control and adequate resuscitation. Particularly in cases of trauma-related shock, treatment is targeted at preventing and treating the lethal triad of hypothermia, coagulopathy, and acidosis. This is accomplished by stopping the bleeding and reversing hypoperfusion.

The initial care of all critically ill patients should focus on stabilizing the airway, breathing, and circulation, and identifying any nonhemorrhagic causes of shock that require immediate

intervention (eg, tension pneumothorax or cardiac tamponade). Patients should be placed on a cardiac monitor and undergo frequent blood pressure and pulse oximetry measurements. Intravenous (IV) access must consist of at least two large-bore peripheral lines; unstable patients should receive a large sheath introducer. Local hemostasis can be obtained with a blood pressure tourniquet, direct pressure, or wound repair with sutures or staples.

Any suspected unstable pelvic fractures should be bound with a commercial pelvic binder or with bedsheets. Any obvious extremity deformities should be reduced and stabilized. Pregnant patients can be turned to the left lateral decubitus position to relieve the compression of the inferior vena cava by the gravid uterus and to improve venous return.² Unless a urethral injury is suspected, a urinary catheter should be placed to monitor hourly urine output and assess for hematuria.²

Based on the mechanism of injury or the hemorrhage source, emergency physicians should involve consultants as early as possible to facilitate the definitive arrest of bleeding and repair of the injured organ. In cases of post-traumatic hemorrhagic shock, trauma surgery should be involved early, even if the source of bleeding has not yet been identified. Other consultants, including interventional

radiologists and orthopedic surgeons, should be involved, as needed. In other nontrauma-related situations, the definitive repair and cessation of hemorrhage require the expertise of consultants such as obstetricians, general surgeons, vascular surgeons, orthopedic surgeons, interventional radiologists, or gastroenterologists.

Evidence has not yet been established for the safety and efficacy of using temporizing measures such as balloon tamponade for esophageal varices (eg, a Sengstaken-Blakemore tube) or resuscitative endovascular balloon occlusion of the aorta (REBOA) in the emergency department before definitive care can be performed.^{25,26}

CRITICAL DECISION

What are the components of a massive transfusion protocol?

A massive transfusion, defined as more than 10 units of packed red blood cells within the first 24 hours, incorporates the transfusion of plasma and platelets.²¹ The potential dangers of these protocols are well established. In addition, massive transfusions consume significant hospital resources, so patients who are most likely to benefit should be identified early and carefully. Several scoring systems were developed to recognize patients who are likely to require a massive transfusion (Table 5). The assessment of blood consumption (ABC) score is a practical tool for assessing these cases, as the data

TABLE 5. Massive Transfusion Scoring Systems

Scoring System	Factors
Trauma-associated severe hemorrhage (TASH) ²⁷	SBP HR Gender Hemoglobin FAST Base excess Pelvic/femur fractures
McLaughlin score ²⁸	HR >105 bpm SBP <110 mm Hg pH <7.25 Hematocrit <32%
ABC ²⁹	Penetrating mechanism ED SBP <90 mm Hg ED HR ≥120 bpm Positive FAST

SBP = systolic blood pressure; HR = heart rate; FAST = focused assessment with sonography in trauma; ED = emergency department

Pearls

- While recognizing hemorrhagic shock is important, the emergency physician must concurrently consider other etiologies that can cause or contribute to the patient's state of shock.
- Early overly aggressive resuscitation with crystalloids should be avoided.
- The administration of tranexamic acid within 3 hours of injury is associated with improved outcomes.
- A massive transfusion of blood products can cause hypocalcemia and hypothermia.
- A tachycardic patient who presents with trauma is in shock until proven otherwise.



points are available immediately. The trauma-associated severe hemorrhage (TASH) and McLaughlin scores require laboratory tests and/or diagnostic imaging.²⁷⁻²⁹

Hemostatic resuscitation relies on packed red blood cells, plasma, and platelets, but the precise ratio of these products remains a subject of investigation. In a large multicenter study, the PROPPR trial compared a 1:1:1 ratio of plasma, platelets, and red blood cells to a 1:1:2 ratio.³⁰ Although there were no differences in all-cause mortality (24-hour or 30-day), the 1:1:1 group experienced greater rates of hemostasis and fewer deaths due to exsanguination within 24 hours. The development of massive transfusion protocols at most trauma centers has provided an expedited process for mobilizing resources and minimizing the time required to access blood products.

In addition to blood products, tranexamic acid (TXA) is an antifibrinolytic agent that should be given as early as possible (within 3 hours of trauma).^{31,32} TXA is administered as a loading dose of 1 g over 10 minutes, then as an infusion of 1 g over 8 hours. When administered early, the drug appears to safely reduce mortality in trauma patients with bleeding. Other potentially beneficial products include recombinant factor VIIa, which may reduce blood transfusion requirements in cases of blunt trauma, and cryoprecipitate, which can be used to treat fibrinogen deficiency.^{33,34}

Throughout any resuscitation, emergency physicians should continue to monitor for hypothermia, acid-base imbalance, and electrolyte

disturbances. Calcium chelation by ethylenediaminetetraacetic acid (EDTA), a preservative in stored blood, can cause hypocalcemia. A Level 1 rapid transfuser or autologous transfuser device can rapidly deliver products at normothermic levels.

CRITICAL DECISION

What is the appropriate disposition for patients in hemorrhagic shock?

Definitive repair must be performed in patients with ongoing hemorrhage. Depending on the type of injury sustained, hemostasis can be achieved in the operating room or during angiography or endoscopy. If these resources are unavailable, the patient should be stabilized and transferred to a center that offers specialty services and a higher level of care. For certain hemorrhagic shock disease states, including a ruptured aortic abdominal aneurysm, delays in transfer and surgical repair are associated with a higher mortality.^{35,36}



Pitfalls

- Being reassured by "normal" vital signs after the administration of several liters of crystalloid fluids, and failing to recognize subtle clinical signs that the patient is in shock.
- Waiting for the patient to be stabilized before calling a consultant who can control the hemorrhage.
- Allowing an unstable patient to proceed to CT imaging in order to obtain a diagnosis.

If the hemorrhage can be stabilized and does not require immediate repair, the patient should be admitted and monitored in the ICU. Despite advances in resuscitation, the risk of death for patients in hemorrhagic shock remains high; such cases require the highest level of care.^{37,21}

Summary

When diagnosing hemorrhagic shock, emergency physicians must consider the complete clinical picture, including the patient's medical history, vital signs, examination findings, and laboratory data. Immediate management efforts must aim to control the source of the bleeding and achieve hemostasis. Resuscitation can begin with crystalloid solutions but ultimately necessitates the replacement of blood volume with blood products. Hospitals that have an established massive transfusion protocol can rapidly provide red blood cells, plasma, and platelets to critically ill patients. Although the exact ratio of transfusion (plasma:platelets:red blood cells) is not yet established, most patients require as close to a 1:1:1 ratio as possible. The addition of tranexamic acid within 3 hours of life-threatening hemorrhage may also be beneficial.

The appropriate discharge disposition for patients in hemorrhagic shock depends on whether the bleeding is ongoing or stabilized. In ongoing hemorrhage, damage control should be started early to prevent metabolic exhaustion. Definitive surgical repair should be initiated only after the patient has been stabilized and any physiological derangements have been corrected. Patients with a stabilized hemorrhage should be monitored closely in an intensive care setting.

CASE RESOLUTIONS

■ CASE ONE

The young driver with multisystem blunt trauma was determined to be in hemorrhagic shock. She was intubated immediately upon arrival, and a massive transfusion protocol was activated (1:1:1 ratio). The patient received 1 L of normal saline, 4 units of packed red blood cells, 2 units of fresh frozen plasma, and 1 unit of platelets. She was taken to the operating room for repair of a significant hemoperitoneum, which was noted on ultrasound. The patient underwent a damage-control laparotomy, which included a partial bowel resection; a splenectomy; and abdominal packing.

■ CASE TWO

Three large-bore IVs were placed immediately in the patient with an upper-GI bleed, and he was placed on a monitor. Due to

persistent hypotension and a large volume of hematemesis, he underwent an endotracheal intubation for airway protection, and a massive transfusion protocol was initiated. His laboratory results were notable for a hemoglobin level of 7.4 g/dL, a platelet level of 86,000 mm³, and an INR of 1.7.

After being transfused with 4 units of packed red blood cells, 3 units of platelets, and 3 units of fresh frozen plasma, the patient's blood pressure improved to 92/61, and his heart rate increased to 102. He was transferred to the medical ICU, where an esophagogastroduodenoscopy revealed esophageal varices.

■ CASE THREE

The elderly man was suspected of having a ruptured abdominal aortic aneurysm. He received two large-bore IVs and 1 L of normal saline. The blood bank was notified immediately

to type and crossmatch for 2 units of type O-negative blood. A bedside ultrasound confirmed an abdominal aortic aneurysm measuring 8.1 cm and a small amount of free fluid in the right upper quadrant.

After consulting vascular surgery, the emergency physician decided to transfer the patient to a nearby quaternary care center. Upon arrival, the patient's systolic blood pressure was 82. He was taken to the operating room for repair of his aortic aneurysm rupture. His abdomen was left open, and he was transferred to a surgical ICU for further monitoring. Without evidence of further bleeding, he underwent closure of his abdomen. He was discharged to a rehabilitation hospital 20 days later.

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CME QUESTIONS

Reviewed by Lynn Roppolo, MD, FACEP

Qualified, paid subscribers to *Critical Decisions in Emergency Medicine* may receive CME certificates for up to 5 ACEP Category I credits, 5 AMA PRA Category 1 Credits™, and 5 AOA Category 2-B credits for completing this activity in its entirety. Submit your answers online at acep.org/cdem; a score of 75% or better is required. You may receive credit for completing the CME activity any time within 3 years of its publication date. Answers to this month's questions will be published in next month's issue.

- 1** Which of the following factors can most reliably predict a patient's risk of becoming a victim of human sex trafficking?
 - A. Gender
 - B. Poor education
 - C. Runaway behavior
 - D. Sexual orientation
- 2** What percentage of homeless youth in the United States engage in "survival sex"?
 - A. 3%
 - B. 28%
 - C. 38%
 - D. 50%
- 3** A 12-year-old girl presents with a man who identifies himself as the child's father. Several red flags indicate that the patient may be a victim of human sex trafficking. What immediate step should you take?
 - A. Call 911
 - B. Confront the patient's caregiver and explain your suspicions
 - C. Refer the patient for a sexual assault examination
 - D. Separate the child from her caregiver as soon as possible, so she can be interviewed privately
- 4** What referral is required for a patient who has been identified as a victim of human sex trafficking?
 - A. Dentistry
 - B. Gynecology
 - C. Law enforcement
 - D. Social work
- 5** Which of the following most accurately describes the trauma-informed care approach?
 - A. Being aware of the previous physical injuries a patient has sustained, both intentional and accidental
 - B. Correcting the negative coping mechanisms and/or behaviors that patients exhibit in response to personal stressors
 - C. Obtaining a detailed domestic abuse history on all patients
 - D. Recognizing that all patients may have experienced traumatic life events and deserve to be treated respectfully in a safe environment
- 6** What infectious disease should be treated only after the diagnosis has been confirmed by test results?
 - A. Bacterial vaginosis
 - B. Chlamydia
 - C. Hepatitis C
 - D. HIV
- 7** Victims of sexual assault should be tested for which of the following?
 - A. HIV, hepatitis B and C, syphilis, and pregnancy
 - B. Post-traumatic stress disorder
 - C. Pregnancy only
 - D. Pubic lice, chlamydia, and HIV
- 8** Which of the following agencies should be contacted first when managing suspected victims of human sex trafficking?
 - A. 911
 - B. The Department of Health and Human Services
 - C. The National Human Trafficking Hotline
 - D. Your local hospital risk management team
- 9** Which of the following accurately characterizes victims of human sex trafficking?
 - A. Personal questions can make victims defensive; avoid "going there" unless the patient volunteers information
 - B. The vast majority of victims are non-English speakers
 - C. Victims are eager to escape and will readily admit to being held captive if the appropriate questions are asked
 - D. Victims commonly refuse to self-identify as such, and may even resent the implication
- 10** Which US federal government training program provides additional resources for clinicians who may encounter victims of human sex trafficking?
 - A. AMA
 - B. CMDA
 - C. HEAL
 - D. SOAR

11 A 78-year-old man with hypertension presents after a syncopal episode with a complaint of abdominal pain. His initial blood pressure is 75/44, but it improves to 89/60 following the administration of 1 L of fluid. Which diagnostic study should be performed first?

A. Abdominal angiography
 B. Bedside ultrasound
 C. Computed tomography with intravenous contrast
 D. Portable x-ray

12 Which of the following electrolyte laboratory abnormalities is most common following the massive transfusion of blood products?

A. Hypercalcemia
 B. Hyperkalemia
 C. Hypocalcemia
 D. Hypomagnesemia

13 A 65-year-old man with hypertension and cirrhosis presents following several episodes of coffee-ground emesis. His vital signs are blood pressure 92/48, heart rate 95, and respiratory rate 28. He becomes increasingly somnolent. What should be your first step?

A. Administer a proton pump inhibitor
 B. Perform a rectal examination
 C. Perform rapid-sequence intubation
 D. Transfer the patient to the endoscopy suite for an esophagogastroduodenoscopy

14 Tranexamic acid (TXA) has been shown to safely reduce mortality in bleeding patients when administered within 3 hours of trauma. By what mechanism does TXA achieve this benefit?

A. It acts as a chelating agent by binding calcium
 B. It acts as an antifibrinolytic agent
 C. It replaces iron levels
 D. It replaces fibrinogen levels

15 Which finding is the most reliable indicator of hemorrhagic shock?

A. Diminished strength in all four extremities
 B. Hemoglobin level <11 g/dL
 C. Large base deficit
 D. Metabolic alkalosis

16 Which of the following should be considered when resuscitating a patient in hemorrhagic shock?

A. A massive transfusion protocol should be initiated before the airway is protected
 B. Permissive hypotension is beneficial for patients with significant traumatic brain injuries
 C. Resuscitation should begin with 1 to 2 L of colloid solutions
 D. Thromboelastography measures the viscoelastic properties of blood and can guide the transfusion strategy

17 What is the most important early predictor of hemorrhagic shock?

A. Altered mental status
 B. An acute precipitating event in which a large amount of blood loss occurs
 C. Hypotension
 D. Signs of ischemia on ECG

18 Which of the following should be considered during the initial management of hemorrhagic shock?

A. A Foley catheter can be safely placed in any trauma patient to assess for gross hematuria
 B. A triple-lumen central venous catheter is the most desirable way to achieve venous access when resuscitating a trauma patient
 C. Any long-bone fractures should be reduced and stabilized in the emergency department
 D. Attempts to achieve local hemostasis with a tourniquet or direct pressure are futile and should be avoided

19 Which of the following treatments is indicated during the first stage of damage control resuscitation (Stage 0) when managing a patient in hemorrhagic shock?

A. Correct acidosis and coagulopathy
 B. Monitor perfusion
 C. Prevent hypothermia
 D. Rewarm the patient

20 Which of the following should be considered when initiating damage control resuscitation?

A. Coagulopathy is rare in patients with major trauma
 B. Core temperature monitoring is important to prevent hyperthermia
 C. Hemostatic resuscitation involves the transfusion of red blood cells, plasma, and platelets
 D. The benefit of TXA is unproven for the treatment of hemorrhagic shock

ANSWER KEY FOR NOVEMBER 2018, VOLUME 32, NUMBER 11

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
B	B	D	B	B	B	D	D	A	D	B	D	A	B	B	A	A	D	D	B



Drug Box

LEVETIRACETAM

By Frank LoVecchio, DO, MPH, FACEP; and Jessica Pringle, DO, Maricopa Medical Center, Phoenix, AZ

Levetiracetam (LEV) is a broad-spectrum anticonvulsant drug approved as an adjunctive treatment for focal-onset seizures in children and adults with epilepsy, myoclonic seizures in patients ≥ 12 years with juvenile myoclonic epilepsy, and primary generalized tonic-clonic seizures in patients ≥ 6 years with idiopathic generalized epilepsy. LEV also is commonly used as a first-line treatment for seizure disorder and status epilepticus.

Mechanism of Action

Although its mechanism of action is unknown, LEV binds to the synaptic vesicle glycoprotein 2A, a process that may modulate synaptic transmission by altering vesicle fusion. There is also evidence that LEV indirectly modulates gamma-aminobutyric acid.

Adult Dosing

Initiate treatment with 1,000 mg/day (500 mg twice daily). Increase the dose by 1,000 mg/day every 2 weeks until the recommended daily dose of 3,000 mg is reached.

An IV formulation has been approved for patients who are temporarily unable to take oral medications. An IV infusion of LEV is bioequivalent to oral tablets.

For status epilepticus, administer 2.5 gm over 5 min, or 1-4 gm IV over 15 min (maximum 4.5 gm).

Precautions

LEV is relatively well-tolerated. The most common adverse effects include fatigue, somnolence, dizziness, and infection (eg, upper respiratory). Other complications include agitation, anxiety, irritability, and depression. Most adverse effects occur early in the course and are mild to moderate in intensity. Neuropsychiatric side effects are the most common reason for drug discontinuation.

LEV appears to be safe for pediatric patients. It is a pregnancy category C drug.



Tox Box

SSRI AND SNRI OVERDOSE

By Matthew Riddle, MD; and Christian A. Tomaszewski, MD, MS, MBA, FACEP, University of California, San Diego

Selective serotonin reuptake inhibitors (SSRIs) and serotonin-norepinephrine reuptake inhibitors (SNRIs) are frequently used to treat depression and other psychiatric conditions. SSRIs increase synaptic serotonin levels in the central nervous system by inhibiting the presynaptic reuptake of serotonin. SNRIs function similarly for both serotonin and norepinephrine.

Mechanism of Toxicity

Both agents can cause serotonin toxicity, although rarely seen in acute overdoses. Selected SSRIs (eg, citalopram, escitalopram) and SNRIs cause sodium-channel blockade in overdoses, with QRS widening and QTc prolongation.

Clinical Presentation

- SSRIs are exceptionally safe in acute overdoses; $>50\%$ of patients are completely asymptomatic. The most common complaints are tachycardia, sleepiness, nausea, and vomiting.
- Citalopram and escitalopram have a higher incidence of seizures and QRS/QTc prolongation in acute overdoses.
- SNRIs (especially venlafaxine) have a higher rate of seizures, QRS/QTc prolongation, and serotonin toxicity in acute overdoses.
- Serotonin toxicity can cause tachycardia, hypertension, hyperthermia, agitation, delirium, tremor, hyperreflexia, and clonus.

Diagnostic Evaluation

- Administer an ECG and, if appropriate, a pregnancy test.
- Measure acetaminophen and salicylate levels.
- Measure electrolytes and kidney function in those with cardiac effects.

Management

- Control seizures and agitation with benzodiazepines.
- Treat QRS prolongation >120 ms with 2-3 amps of sodium bicarbonate.
- Optimize electrolytes to treat QTc prolongation; provide chemical or electrical overdrive pacing for Torsades de pointes.
- Manage serotonin toxicity with supportive care and oral cyproheptadine (≤ 12 mg).

Disposition

- Asymptomatic patients can be observed for ~ 6 hours post ingestion, and medically cleared in the absence of severe effects.
- Patients with seizures, QRS/QTc abnormalities, or signs of serotonin toxicity require hospital admission.