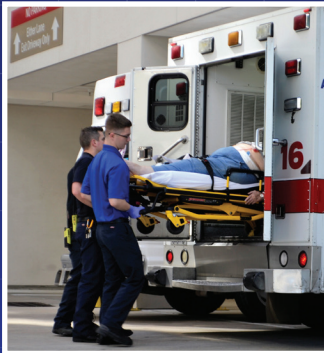


South Dakota BLS PATIENT CARE GUIDELINES



SD EMS Program

IMPROVE
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STRENGTHEN

<https://EMS.sd.gov>



Released: November 20, 2018
Updated: July 1, 2022

Adapted from the
National Model EMS
Clinical Guidelines

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Universal Care

Universal Care Guideline

Aliases

Patient assessment, patient history, physical assessment, primary survey, secondary survey

Patient Care Goals

Facilitate appropriate initial assessment and management of any EMS patient and link to appropriate specific guidelines as dictated by the findings within the **Universal Care** guideline.

Patient Presentation

Inclusion Criteria

All patient encounters with and care delivery by EMS personnel

Exclusion Criteria

None

Patient Management

Assessment

1. Assess scene safety
 - a. Evaluate for hazards to EMS personnel, patient, bystanders
 - b. Determine number of patients
 - c. Determine mechanism of injury
 - d. Request additional resources if needed, with the goal of minimizing scene time and expediting transport to definitive care
 - e. Consider declaration of mass casualty incident if needed
2. Use appropriate personal protective equipment (PPE)
3. Wear high-visibility, retro-reflective apparel when deemed appropriate (e.g. operations at night or in darkness, on or near roadways)
4. Consider cervical spine stabilization and/or spinal care if trauma
5. Primary survey
(**Airway, Breathing, Circulation** is cited below; although there are specific circumstances where **Circulation, Airway, Breathing** may be indicated such as cardiac arrest or major arterial bleeding)
 - a. Airway (assess for patency and open the airway as indicated)
 - i. Patient is unable to maintain airway patency—open airway
 1. Head tilt chin lift
 2. Jaw thrust
 3. Suction
 4. Oral airway
 5. Nasal airway
 6. Supraglottic airway device (EMT only)
 7. For patients with laryngectomies or tracheostomies, remove all objects or clothing that may obstruct the opening of these devices, maintain the flow of prescribed oxygen, and reposition the head and/or neck

- ii. Obstructed airway, laryngectomy, or tracheostomy – go to **Airway Management** guideline
 - b. Breathing
 - i. Evaluate rate, breath sounds, accessory muscle use, retractions, patient positioning
 - ii. Administer oxygen as appropriate with a target of achieving 94-98% saturation for most acutely ill patients
 - iii. Apnea (not breathing) – go to **Airway Management** guideline
 - c. Circulation
 - i. Control any major external bleeding [see **Extremity Trauma/External Hemorrhage Management** guideline]
 - ii. Assess pulse
 - 1. If none – go to **Cardiac Arrest** guideline
 - 2. Assess rate and quality of carotid and radial pulses
 - iii. Evaluate perfusion by assessing skin color and temperature
 - 1. Evaluate capillary refill for children under 6 years old
 - d. Disability
 - i. Evaluate patient responsiveness: AVPU scale (Alert, Verbal, Pain, Unresponsive)
 - ii. Evaluate gross motor and sensory function in all extremities
 - iii. Check blood glucose in patients with altered mental status (EMT only)
 - iv. If acute stroke suspected – go to **Suspected Stroke/Transient Ischemic Attack** guideline
 - e. Expose patient as appropriate to complaint
 - i. Be considerate of patient modesty
 - ii. Keep patient warm
- 6. Secondary survey

See also secondary survey specific to individual complaints in other protocols. Secondary surveys should be tailored to patient presentation and chief complaint. The following are suggested considerations for secondary survey assessment:

 - a. Head
 - i. Pupils
 - ii. Naso-oropharynx
 - iii. Skull and scalp
 - b. Neck
 - i. Jugular venous distension
 - ii. Tracheal position
 - iii. Spinal tenderness
 - c. Chest
 - i. Retractions
 - ii. Breath sounds
 - iii. Chest wall deformity
 - d. Abdomen/Back
 - i. Flank/abdominal tenderness or bruising
 - ii. Abdominal distension
 - e. Extremities
 - i. Edema
 - ii. Pulses
 - iii. Deformity

- f. Neurologic
- 7. Mental status/orientation
- 8. Motor/sensory
- 9. Obtain Baseline Vital Signs (An initial full set of vital signs is required: pulse, blood pressure, respiratory rate, neurologic status assessment)
 - a. Neurologic status assessment involves establishing a baseline and then trending any change in patient neurologic status
 - i. Glasgow Coma Score (GCS)
 - ii. AVPU (**A**lert, **V**erbal, **P**ainful, **U**nresponsive)
 - b. Patients with cardiac or respiratory complaints
 - i. Pulse oximetry (EMT only)
 - ii. 12-lead EKG should be obtained early in patients with cardiac or suspected cardiac complaints (EMT only)
 - iii. Consider waveform capnography (essential for patients who require invasive airway management) or digital capnometry (EMT only)
 - c. Patient with altered mental status
 - i. Check blood glucose (EMT only)
 - ii. Consider waveform capnography (essential for patients who require invasive airway management) or digital capnometry (EMT only)
 - d. Stable patients should have at least two sets of pertinent vital signs. Ideally, one set should be taken shortly before arrival at receiving facility
 - e. Critical patients should have pertinent vital signs frequently monitored
- 10. Obtain OPQRST history:
 - a. **O**nset of symptoms
 - b. **P**rovocation – location; any exacerbating or alleviating factors
 - c. **Q**uality of pain
 - d. **R**adiation of pain
 - e. **S**everity of symptoms – pain scale
 - f. **T**ime of onset and circumstances around onset
- 11. Obtain SAMPLE history:
 - a. **S**ymptoms
 - b. **A**llergies – medication, environmental, and foods
 - c. **M**edications – prescription and over-the-counter; bring containers to ED if possible
 - d. **P**ast medical history
 - i. look for medical alert tags, portable medical records, advance directives
 - ii. look for medical devices/implants (some common ones may be dialysis shunt, insulin pump, pacemaker, central venous access port, gastric tubes, urinary catheter)
 - e. **L**ast oral intake
 - f. **E**vents leading up to the 911 call
 - i. In patients with syncope, seizure, altered mental status, or acute stroke, consider bringing the witness to the hospital or obtain their contact phone number to provide to ED care team

Treatment and Interventions

1. Administer oxygen as appropriate with a target of achieving 94-98% saturation
2. Place appropriate monitoring equipment as dictated by assessment – these may include:
 - a. Continuous pulse oximetry (EMT only)
 - b. 12-lead EKG (EMT only)
 - c. Waveform capnography or digital capnometry (EMT only)
 - d. Carbon monoxide assessment
3. Monitor pain scale if appropriate
4. Reassess patient

Patient Safety Considerations

1. Routine use of lights and sirens is not warranted
2. Even when lights and sirens are in use, always limit speeds to level that is safe for the emergency vehicle being driven and road conditions on which it is being operated
3. Be aware of legal issues and patient rights as they pertain to and impact patient care (e.g. patients with functional needs or children with special healthcare needs)
4. Direct medical oversight should be contacted when mandated or as needed
5. Consider air medical transport, if available, for patients with time-critical conditions

Notes/Educational Pearls

Key Considerations

1. **Pediatrics**: use a weight-based assessment tool (length-based tape or other system) to estimate patient weight
 - a. The pediatric population is generally defined by those patients who weigh up to 40 kg or up to 14-years of age, whichever comes first
 - b. Consider using the pediatric assessment triangle (appearance, work of breathing, circulation) when first approaching a child to help with assessment.
2. **Geriatrics**: The geriatric population is generally defined as those patients who are 65 years old or more
3. **Vital Signs**:
 - a. Oxygen
 - i. Administer oxygen as appropriate with a target of achieving 94-98% saturation
 - ii. Supplemental oxygen administration is warranted to patients with oxygen saturations below this level and titrated based upon clinical condition, clinical response, and geographic location and altitude
 - b. Normal vital signs (see chart below)
 - i. Hypotension is considered a systolic blood pressure less than the lower limit on the chart
 - ii. Tachycardia is considered a pulse above the upper limit on the chart
 - iii. Bradycardia is considered a pulse below the lower limit on the chart
 - iv. Tachypnea is considered a respiratory rate above the upper limit on the chart
 - v. Bradypnea is considered a respiratory rate below the lower limit on the chart
 - c. Hypertension. Although abnormal, may be an expected finding in many patients
 - i. Unless an intervention is specifically suggested based on the patient's complaint or presentation, the hypertension should be documented, but otherwise, no intervention should be taken
 - ii. The occurrence of symptoms (e.g. chest pain, dyspnea, vision change, headache, focal weakness or change in sensation, altered mental status) in patients with

hypertension should be considered concerning, and care should be provided appropriate with the patient’s complaint or presentation

4. **Critical Patients:** proactive patient management should occur simultaneously with assessment
 - a. Ideally, one provider should be assigned to exclusively monitor and facilitate patient-focused care
 - b. Treatment and Interventions should be initiated as soon as practical, but should not impede extrication or delay transport to definitive care
5. **Air Medical Transport:** air transport of trauma patients should be reserved for higher acuity trauma patients where there is a significant times savings over ground transport, where the appropriate destination is not accessible by ground due to systemic or logistical issues, and for patients who meet high-acuity triage criteria

Pertinent Assessment Findings

This guideline is too broad to list all possible findings

Quality Improvement

Key Documentation Elements

- At least two full sets of vital signs should be documented for every patient
- All patient interventions should be documented

Performance Measures

- Abnormal vital signs should be addressed and reassessed
- Response to therapy provided should be documented, including pain scale reassessment
- Limit scene time for patients with time-critical illness or injury unless clinically indicated
- Appropriate utilization of air medical services
- Blood glucose level obtained when indicated

Normal Vital Signs

Age	Pulse	Respiratory Rate	Systolic BP
Preterm less than 1 kg	120-160	30-60	36-58
Preterm 1 kg	120-160	30-60	42-66
Preterm 2 kg	120-160	30-60	50-72
Newborn	120-160	30-60	60-70
Up to 1 year	100-140	30-60	70-80
1-3 years	100-140	20-40	76-90
4-6 years	80-120	20-30	80-100
7-9 years	80-120	16-24	84-110
10-12 years	60-100	16-20	90-120
13-14 years	60-90	16-20	90-120
15 years or older	60-90	14-20	90-130

Glasgow Coma Scale

ADULT GLASGOW COMA SCALE		PEDIATRIC GLASGOW COMA SCALE	
Eye Opening (4)		Eye Opening (4)	
Spontaneous	4	Spontaneous	4
To Speech	3	To Speech	3
To Pain	2	To Pain	2
None	1	None	1
Best Motor Response (6)		Best Motor Response (6)	
Obeys Commands	6	Spontaneous Movement	6
Localizes Pain	5	Withdraws to Touch	5
Withdraws from Pain	4	Withdraws from Pain	4
Abnormal Flexion	3	Abnormal Flexion	3
Abnormal Extension	2	Abnormal Extension	2
None	1	None	1
Verbal Response (5)		Verbal Response (5)	
Oriented	5	Coos, Babbles	5
Confused	4	Irritable Cry	4
Inappropriate	3	Cries to Pain	3
Incomprehensible	2	Moans to Pain	2
None	1	None	1
Total		Total	

Functional Needs

Aliases

Developmental delay, disabled, handicapped, impaired, mental illness, mental retardation, special needs

Patient Care Goals

To meet and maintain the additional support required for patients with functional needs during the delivery of prehospital care

Patient Presentation

Inclusion Criteria

Patients who are identified by the World Health Organization's International Classification of Functioning, Disability, and Health that have experienced a decrement in health resulting in some degree of disability. According to the U.S. Department of Health and Human Services, this includes, but is not limited to, individuals with physical, sensory, mental health, and cognitive and/or intellectual disabilities affecting their ability to function independently without assistance

Exclusion Criteria

None

Patient Management

Assessment

1. Identify the functional need by means of information from the patient, the patient's family, bystanders, medic alert bracelets or documents, or the patient's adjunct assistance devices
2. The physical examination should not be intentionally abbreviated, although the manner in which the exam is performed may need to be modified to accommodate the specific needs of the patient

Treatment and Interventions

EMR/EMT

Medical care should not intentionally be reduced or abbreviated during the triage, treatment, and transport of patients with functional needs, although the manner in which the care is provided may need to be modified to accommodate the specific needs of the patient.

Patient Safety Considerations

For patients with communication barriers (language or sensory), it may be desirable to obtain secondary confirmation of pertinent data (e.g. allergies) from the patient's family, interpreters, or written or electronic medical records. The family members can be an excellent source of information and the presence of a family member can have a calming influence on some of these patients.

Notes/Educational Pearls

Key Considerations

1. Communication Barriers

- a. Language Barriers:
 - i. Expressive and/or receptive aphasia
 - ii. Nonverbal
 - iii. Fluency in a different language than that of the EMS professional
 - iv. Examples of tools to overcome language barriers include:
 - 1. Transport of an individual who is fluent in the patient's language along with the patient to the hospital
 - 2. Medical translation cards
 - 3. Telephone-accessible services with live language interpreters
 - 4. Methods through which the patient augments his/her communication skills (e.g. eye blinking, nodding) should be noted, utilized as able, and communicated to the receiving facility
 - 5. Electronic applications for translation
- b. Sensory Barriers:
 - i. Visual impairment
 - ii. Auditory impairment
 - iii. Examples of tools to overcome sensory barriers include:
 - 1. Braille communication card
 - 2. Sign language
 - 3. Lip reading
 - 4. Hearing aids
 - 5. Written communication
- 2. Physical Barriers:
 - i. Ambulatory impairment (e.g. limb amputation, bariatric)
 - ii. Neuromuscular impairment
- 3. Cognitive Barriers:
 - i. Mental illness
 - ii. Developmental challenge or delay

Pertinent Assessment Findings

- 1. Assistance Adjuncts. Examples of devices that facilitate the activities of daily living for the patient with functional needs include, but are not limited to:
 - a. Extremity prostheses
 - b. Hearing aids
 - c. Magnifiers
 - d. Tracheostomy speaking valves
 - e. White or sensory canes
 - f. Wheelchairs or motorized scooters
- 2. Service Animals
 As defined by the American Disabilities Act, "any guide dog, signal dog, or other animal individually trained to do work or perform tasks for the benefit of an individual with a disability, including, but not limited to guiding individuals with impaired vision, alerting individuals with impaired hearing to intruders or sounds, providing minimal protection or rescue work, pulling a wheelchair, or fetching dropped items."
 - a. Services animals are not classified as a pet and should, by law, always be permitted to accompany the patient with the following exceptions:
 - i. A public entity may ask an individual with a disability to remove a service animal from the premises if:

1. The animal is out of control and the animal's handler does not take effective action to control it; or
 2. The animal is not housebroken
- b. Service animals are not required to wear a vest or a leash. It is illegal to make a request for special identification or documentation from the service animal's partner. EMS providers may only ask the patient if the service animal is required because of a disability and the form of assistance the animal has been trained to perform.
 - c. EMS providers are not responsible for the care of the service animal. If the patient is incapacitated and cannot personally care for the service animal, a decision can be made whether or not to transport the animal in this situation.
 - d. Animals that solely provide emotional support, comfort, or companionship do not qualify as service animals

Quality Improvement

Key Documentation Elements

- Document specific physical barriers in the appropriate exam elements (e.g. "blind" under Eye Assessment; or paralysis, weakness, or speech problems under Neurological Assessment)
- Document any of the following, as appropriate in the narrative:
 - Language barriers:
 - The patient's primary language of fluency
 - The identification of the person assisting with the communication
 - The methods through which the patient augments his/her communication skills
 - Sensory barriers:
 - The methods through which the patient augments his/her communication skills
 - Written communication between the patient and the EMS professional is part of the medical record, even if it is on a scrap sheet of paper, and it should be retained with the same collation, storage, and confidentiality policies and procedures that are applicable to the written or electronic patient care report
 - Assistance adjuncts (devices that facilitate the activities of life for the patient)

Performance Measure

- Accuracy of key data elements (chief complaint, past medical history, medication, allergies)
- Utilization of the appropriate adjuncts to overcome communication barriers
- Documentation of the patient's functional need and avenue exercised to support the patient
- Documentation of complete and accurate transfer of information regarding the functional need to the receiving facility

Patient Refusals

Aliases

Against medical advice, refusal of treatment, refusal of transport

Patient Care Goals/Patient Presentation (Overview)

If an individual (or the parent or legal guardian of the individual) refuses secondary care and/or ambulance transport to a hospital after prehospital providers have been called to the scene, providers should determine the patient's capacity to make decisions. Competency is generally a legal status of a person's ability to make decisions.

Patient Management

Assessment

1. Decision-Making Capacity
 - a. An individual who is alert, oriented, and has the ability to understand the circumstances surrounding his/her illness or impairment, as well as the possible risks associated with refusing treatment and/or transport, typically is considered to have decision-making capacity
 - b. The individual's judgment must also not be significantly impaired by illness, injury or drugs/alcohol intoxication. Individuals who have attempted suicide, verbalized suicidal intent, or have other factors that lead EMS providers to suspect suicidal intent, should not be regarded as having decision-making capacity and may not decline transport to a medical facility

Treatment and Interventions

EMR

1. Obtain a complete set of vital signs and complete an initial assessment, paying particular attention to the individual's neurologic and mental status

EMT

2. Determine the individual's capacity to make a valid judgment concerning the extent of his/her illness or injury; if the EMS provider has doubts about whether the individual has the mental capacity to refuse or if the patient lacks capacity, the EMS provider should contact direct medical oversight
3. If patient has capacity, clearly explain to the individual and all responsible parties the possible risks and overall concerns with regards to refusing care
4. Perform appropriate medical care with the consent of the individual
5. Complete the patient care report clearly documenting the initial assessment findings and the discussions with all involved individuals regarding the possible consequences of refusing additional prehospital care and/or transportation

Notes/Educational Pearls

Key Considerations

1. An adult or emancipated minor who has demonstrated possessing sufficient mental capacity for making decisions has the right to determine the course of his/her medical care, including the refusal of care. These individuals must be advised of the risks and consequences

- resulting from refusal of medical care
2. An individual determined to lack decision-making capacity by EMS providers should not be allowed to refuse care against medical advice or to be released at the scene. Mental illness, drugs, alcohol intoxication, or physical/mental impairment may significantly impair an individual's decision-making capacity. Individuals who have attempted suicide, verbalized suicidal intent, or have other factors that lead EMS providers to suspect suicidal intent, should not be regarded as having demonstrated sufficient decision-making capacity
 3. The determination of decision-making capacity may be challenged by communication barriers or cultural differences
 4. EMS providers should not put themselves in danger by attempting to treat and/or transport an individual who refuses care
 5. Always act in the best interest of the patient – EMS providers, with the support of direct medical oversight, must strike a balance between abandoning the patient and forcing care
 6. **Special Considerations – Minors**
It is preferable for minors to have a parent or legal guardian who can provide consent for treatment on behalf of the child
 - a. Healthcare providers may provide emergency treatment when a parent is not available to provide consent. This is known as the emergency exception rule or the doctrine of implied consent. For minors, this doctrine means that the prehospital professional can presume consent and proceed with appropriate treatment and transport if the following four conditions are met:
 - i. The child is suffering from an emergent condition that places his or her life or health in danger
 - ii. The child's legal guardian is unavailable or unable to provide consent for treatment or transport
 - iii. Treatment or transport cannot be safely delayed until consent can be obtained
 - iv. The prehospital professional administers only treatment for emergency conditions that pose an immediate threat to the child
 - b. As a general rule, when the prehospital professional's authority to act is in doubt, EMS providers should always do what they believe to be in the best interest of the minor
 - c. If a minor is injured or ill and no parent contact is possible, the provider may contact direct medical oversight for additional instructions

Quality Improvement

Key Documentation Elements

- Document patient capacity with:
 - Vitals for level of responsiveness and Glasgow Coma Scale
 - Alcohol and drug use indicators
 - Blood glucose level (as appropriate to situation and patient history)
- Patient Age
- Minors who are not emancipated and adults with a legal guardian: guardian name, contact, and relationship
- Any efforts made to contact guardians if contact could not be made
- What the patient's plan is after refusal of care and/or transport
- Who will be with the patient after EMS departs
- Patient was advised that they can change their mind and EMS can be contacted again at any

- time
- Patient was advised of possible risks to their health resulting from refusing care and/or transport
 - Patient voices understanding of risks. A quotation of the patient's actual words, stating they understand, is best
 - Reason for patient refusing care. A quotation of the patient's actual words, stating they understand, is best
 - Direct medical oversight contact
 - Any assessments and treatments performed

Performance Measures

- Patient decision-making capacity was determined and documented
- Direct medical oversight was contacted as indicated by EMS agency protocol
- Guardians contacted or efforts to contact the guardians for minor patients who are not or cannot be confirmed to be emancipated

Cardiovascular

Adult and Pediatric Syncope and Presyncope

Aliases

Loss of consciousness, passed out, fainted

Patient Care Goals

1. Stabilize and resuscitate when necessary
2. Initiate monitoring and diagnostic procedures
3. Transfer for further evaluation

Patient Presentation

Syncope is heralded by both the loss of consciousness and the loss of postural tone and resolves spontaneously without medical interventions. Syncope typically is abrupt in onset and resolves equally quickly. EMS providers may find the patient awake and alert on initial evaluation. Presyncope is defined as the prodromal symptoms of syncope. It usually lasts for seconds to minutes and may be described by the patient as “nearly blacking out” or “nearly fainting.”

Inclusion Criteria

1. Abrupt loss of consciousness with loss of postural tone
2. Prodromal symptoms of syncope

Exclusion Criteria

Conditions other than the above, including patients:

1. Patients with alternate and obvious cause of loss of consciousness (e.g. trauma – go to **Head Injury** guideline)
2. Patients with ongoing mental status changes or coma should be treated per the **Altered Mental Status** guideline

Patient Management

Assessment

1. Pertinent History
 - a. Review the patient’s past medical history, including a history of:
 - i. Cardiovascular disease (e.g. cardiac disease/stroke)
 - ii. Seizure
 - iii. Recent trauma
 - iv. Anticoagulation
 - v. Dysrhythmia
 - vi. Congestive heart failure (CHF)
 - vii. Syncope
 - b. History of Present Illness, including:
 - i. Conditions leading to the event
 - ii. Patient complaints before or after the event including prodromal symptoms
 - iii. Syncope that occurs during exercise often indicates an ominous cardiac cause. Patients should be evaluated in the emergency department

- iv. History from others on scene, including seizures or shaking, presence of pulse/breathing (if noted), duration of the event, events that lead to the resolution of the event
- c. Review of Systems:
 - i. Occult blood loss (GI/GU)
 - ii. Fluid losses (nausea/vomiting/diarrhea) and fluid intake
 - iii. Current Medications
- 2. Pertinent Physical Exam Including:
 - a. Attention to vital signs as well as evaluation for trauma
 - b. Detailed neurologic exam (including stroke screening and mental status)
 - c. Heart, lung, abdominal and extremity exam
 - d. Additional Evaluation:
 - i. Ongoing vital signs
 - ii. 12-lead EKG

Treatment and Interventions:

EMR

- 1. Should be directed at abnormalities discovered in the physical exam or on additional examination
 - a. Manage airway as indicated
 - b. Oxygen as appropriate
 - c. Evaluate for hemorrhage and treat for shock if indicated

EMT

- d. 12-lead EKG

Patient Safety Considerations:

- 1. Patients suffering syncope due to arrhythmia may suffer recurrent arrhythmia and should therefore be placed on a 12-Lead EKG
- 2. Geriatric patients suffering falls from standing may sustain significant injury and should be diligently screened for trauma – go to **General Trauma Management** guideline

Notes/Educational Pearls

Key Considerations

- 1. By being most proximate to the scene and to the patient’s presentation, EMS providers are commonly in a unique position to identify the cause of syncope. Consideration of potential causes, ongoing monitoring of vitals and 12-Lead EKG as well as detailed exam and history are essential pieces of information to pass onto hospital providers.
- 2. All patients suffering from syncope deserve hospital level evaluation, even if they appear normal with few complaints on scene
- 3. High risk causes of syncope include the following:
 - a. Cardiovascular
 - i. Myocardial infarction
 - ii. Aortic stenosis
 - iii. Hypertrophic cardiomyopathy
 - iv. Pulmonary embolus
 - v. Thoracic aortic dissection

- vi. Lethal dysrhythmia
- b. Neurovascular
 - i. Intracranial hemorrhage
 - ii. Transient ischemic attack or stroke

Pertinent Assessment Findings

1. Evidence of trauma
2. Evidence of cardiac dysfunction (e.g. evidence of CHF, arrhythmia)
3. Evidence of hemorrhage
4. Evidence of neurologic compromise
5. Evidence of alternate etiology, including seizure

Quality Improvement

Key Documentation Elements

- 12-lead EKG

Performance Measures

- Acquisition of 12-lead EKG

Chest Pain/Acute Coronary Syndrome (ACS)/ST-segment Elevation Myocardial Infarction (STEMI)

Aliases

Heart attack, myocardial infarction (MI)

Patient Care Goals

1. Identify STEMI quickly
2. Determine the time of symptom onset
3. Activate hospital-based STEMI system of care
4. Monitor vital signs and 12-lead EKG and be prepared to provide CPR and defibrillation if needed
5. Administer appropriate medications
6. Transport to appropriate facility

Patient Presentation

Inclusion Criteria

1. Chest pain or discomfort in other areas of the body (e.g. arm, jaw, epigastrium) of suspected cardiac origin, shortness of breath, sweating, nausea, vomiting, and dizziness. Atypical or unusual symptoms are more common in women, the elderly and diabetic patients. May also present with CHF, syncope and/or shock.
2. Some patients will present with likely non-cardiac chest pain and otherwise have a low likelihood of ACS (e.g. blunt trauma to the chest of a child). For these patients, defer the administration of aspirin and nitroglycerin.

Exclusion Criteria

None recommended

Patient Management

Assessment

1. Signs and symptoms
 - a. Chest pain
 - b. Congestive heart failure
 - c. Syncope
 - d. Shock
 - e. Symptoms similar to a patient's previous MI

Treatment, and Interventions

EMR

1. If the patient is dyspneic, hypoxemic, or has obvious signs of heart failure, EMS providers should administer oxygen as appropriate

EMT

2. If the patient is dyspneic, hypoxemic, or has obvious signs of heart failure, EMS providers should administer oxygen as appropriate with a target of achieving 94-98% saturation [see **Universal Care** guideline]

3. The 12-lead EKG is the primary diagnostic tool that identifies a STEMI; It is imperative that EMS providers routinely acquire a 12-lead EKG within 10 minutes for all patients exhibiting signs and symptoms of ACS
 - a. The EKG may be transmitted for remote interpretation
 - b. Performance of serial EKGs is suggested
4. Administer aspirin; chewable, non-enteric-coated aspirin preferred (162 to 325 mg)
5. Administer the patient's own nitroglycerin 0.4 mg SL, can repeat every 3-5 minutes as long as SBP greater than 90 mmHg, maximum of 3 doses
 - c. The use of nitrates should be avoided in any patient who has used a phosphodiesterase inhibitor (e.g. Viagra, Levitra, Cialis) within the past 48 hours
6. Transport and destination decisions should be based on local resources and system of care

Patient Safety Considerations

1. Observe for signs of clinical deterioration: dysrhythmias, CP, SOB, decreased LOC/syncope, or other signs of shock/hypotension
2. Perform serial 12-lead EKGs (especially any time clinical changes noted)

Notes/Educational Pearls

Key Considerations

Acute coronary syndrome may present with atypical pain, vague or only generalized complaints.

Pertinent Assessment Findings

A complete medication list should be obtained from each patient. It is especially important for the treating physician to be informed if the patient is taking beta-blockers, calcium channel blockers, clonidine, digoxin, blood thinners (anticoagulants), and medications for the treatment of erectile dysfunction or pulmonary hypertension.

Quality Improvement

Key Documentation Elements

- The time of symptom onset
- The time of patient contact by EMS to the time of 12-lead EKG acquisition
- The time ASA administered, or reason why not given

Performance Measures

- The time of patient contact by to the time of 12-lead EKG acquisition within 10 minutes
- Confirmation patient received aspirin (taken Prior To EMS Arrival, given by EMS, or substantiated by other pertinent negatives)
- The time of a STEMI patient's ultimate arrival to a receiving hospital

Implantable Ventricular Assist Devices

Aliases

Ventricular assist device (VAD), left ventricular assist device (LVAD), right ventricular assist device (RVAD), biventricular assist device (BiVAD)

Patient Care Goals

1. Rapid identification of, and interventions for, cardiovascular compromise in patients with VADs
2. Rapid identification of, and interventions for VAD-related malfunctions or complications

Patient Presentation

Inclusion Criteria

1. Adult patients that have had an implantable ventricular assist device (VAD), including a left ventricular assist device (LVAD), right ventricular assist device (RVAD), or biventricular-assist device (BiVAD), and have symptoms of cardiovascular compromise
2. Patients with VADs that are in cardiac arrest
3. Patients with VADs that are experiencing a medical or injury-related event not involving the cardiovascular system or VAD malfunction

Exclusion Criteria

Adult patients who do not have a VAD in place

Patient Management

Assessment

1. Assess for possible pump malfunction
 - a. Assess for alarms
 - b. Auscultate for pump sound “hum”
 - c. Signs of hypoperfusion including pallor, diaphoresis, altered mental status
2. If the VAD pump has malfunctioned:
 - a. Utilize available resources to troubleshoot potential VAD malfunctions and to determine appropriate corrective actions to restore normal VAD function:
 - i. Contact the patient’s VAD-trained companion, if available
 - ii. Contact the patient’s VAD coordinator, using the phone number on the device
 - iii. Check all the connections to system controller
 - iv. Change VAD batteries, and/or change system controller if indicated
 - v. Have patient stop all activity and assess for patient tolerance
 - vi. Follow appropriate cardiovascular condition-specific protocol(s) as indicated

Treatment and Interventions

EMR

1. Manage airway as indicated
2. If patient is in full cardiac arrest:
 - a. CPR should not be performed if there is any evidence the pump is still functioning, the decision whether to perform CPR should be made based upon best clinical judgment in consultation with the patient’s VAD-trained companion and the VAD coordinator (or

direct medical oversight if VAD coordinator unavailable)

- b. CPR may be initiated only where:
 - i. You have confirmed the pump has stopped and troubleshooting efforts to restart it have failed, and
 - ii. The patient is unresponsive and has no detectable signs of life

EMT

3. Acquire 12-lead EKG
4. If patient is experiencing VAD-related complications or cardiovascular problems, expedite transport to the medical facility where VAD was placed if patient's clinical condition and time allows
5. If patient has a functioning VAD and is experiencing a non-cardiovascular-related problem, transport to a facility that is appropriate for the patient's main presenting problem without manipulating the device

Notes/Educational Pearls

1. You do not need to disconnect the controller or batteries in order to:
 - a. Defibrillate
 - b. Acquire a 12-lead EKG
2. Automatic non-invasive cuff blood pressures may be difficult to obtain due to the narrow pulse pressure created by the continuous flow pump
3. Flow though many VAD devices is not pulsatile and patients may not have a palpable pulse or accurate pulse oximetry
4. The blood pressure, if measurable, may not be an accurate measure of perfusion.
5. Ventricular fibrillation, ventricular tachycardia, or asystole/PEA may be the patient's "normal" underlying rhythm. Evaluate clinical condition and provide care in consultation with VAD coordinator
6. The patient's travel bag should accompany them at all times with back-up controller and spare batteries
7. If feasible, bring the patient's power module, cable, and display module to the hospital
8. All patients should carry a spare pump controller with them
9. The most common cause for VAD alarms are low batteries or battery failures
10. Although automatic non-invasive blood pressure cuffs are often ineffective in measuring systolic and diastolic pressure, if they do obtain a measurement, the MAP is usually accurate
11. Other VAD complications:
 - a. Infection
 - b. Stroke/TIA
 - c. Bleeding
 - d. Arrhythmias
 - e. Cardiac tamponade
 - f. CHF
 - g. Aortic insufficiency

Quality Improvement

Key Documentation Elements

- Information gained from the VAD control box indicating any specific device malfunctions
- Interventions performed to restore a malfunctioning VAD to normal function
- Time of notification to and instructions from VAD-trained companion and/or VAD coordinator

Performance Measures

- Identify and mitigate any correctable VAD malfunctions
- Perform CPR for patients in cardiac arrest when indicated

Suspected Stroke/Transient Ischemic Attack

Aliases

Cerebrovascular accident (CVA), TIA

Patient Care Goals

1. Detect neurological deficits
2. Determine eligibility for transport to a stroke center

Patient Presentation

1. Neurologic deficit such as facial droop, localized weakness, gait disturbance, slurred speech, altered mentation
2. Hemiparesis or hemiplegia
3. Dysconjugate gaze, forced or crossed gaze (if patient is unable to voluntarily respond to exam, makes no discernible effort to respond, or is unresponsive)
4. Severe headache, neck pain/stiffness, difficulty seeing

Inclusion Criteria

1. Patient has signs and symptoms consistent with stroke or transient ischemic attack (TIA)

Exclusion Criteria

1. If glucose less than 60 mg/dL, treat per the **Hypoglycemia** guideline
2. If trauma and GCS less than or equal to 13, treat per the **Head Injury** and **General Trauma Management** guidelines

Patient Management

Assessment

1. Use a validated prehospital stroke scale that may include, but is not limited to:
 - a. Facial smile/grimace – ask patient to smile
 - b. Arm drift – close eyes and hold out arms for count of 10 seconds
 - c. Speech – “You can’t teach an old dog new tricks”
2. Pertinent historical data includes:
 - a. History – “last known well” and source of that information
 - b. Neurologic status assessment
 - c. Patient is taking warfarin or any anticoagulant medication
3. Evaluate for the presence of stroke mimics including:
 - a. Hypoglycemia
 - b. Seizure
 - c. Sepsis
 - d. Migraine
 - e. Intoxication

Treatment and Interventions

EMR

1. Determine “last known well” time
2. Administer oxygen as appropriate

3. If seizure activity present, treat per **Seizures** guideline

EMT

4. Administer oxygen as appropriate with a target of achieving 94-98% saturation
5. Check blood glucose level
 - a. Treat only if glucose less than 60 mg/dL
6. Acquire 12-lead EKG
7. Hospital notification per local stroke plan

Patient Safety Considerations

1. Prevent aspiration – elevate head of stretcher 15-30 degrees if systolic BP greater than 100 mm Hg
 - a. Maintain head and neck in neutral alignment, without flexing the neck
2. Protect paralyzed limbs from injury

Notes/Educational Pearls

Key Considerations

1. Transport and destination decisions should be based on local resources and stroke system of care
 - a. Destinations hospitals may include:
 - i. Stroke Ready
 - ii. Primary Stroke Center
 - iii. Comprehensive Stroke Center
2. Pediatrics:
 - a. Treatment principles remain the same
 - b. Although rare, pediatric patients can have strokes
 - c. Stroke scales are not validated for pediatric patients
 - d. The EMS crew should call ahead to make sure that the hospital can manage the patient

Quality Improvement

Key Documentation Elements

- “Last seen normal” must be specific
 - If the patient was last seen normal prior to bedtime the night before, this is the time to be documented (not time the patient woke up with symptoms present)
- Blood glucose results
- Specific validated stroke scale used and findings
- Time of notification to receiving hospital

Performance Measures

- Documentation of time “last seen normal”
- Use of validated stroke scale
- Blood glucose level obtained
- EMS scene time minimized (goal: less than 20 minutes)
- Hospital stroke team pre-arrival alert or activation occurred as early as possible after positive stroke assessment finding

General Medical

Abdominal Pain

Aliases

None

Patient Care Goals

1. Improve patient comfort
2. Identify life-threatening causes of abdominal pain

Patient Presentation

Inclusion Criteria

Abdominal pain or discomfort related to a non-traumatic cause

Exclusion Criteria

1. Abdominal pain due to trauma [see **General Trauma Management** guideline]
2. Abdominal pain due to or related to pregnancy [see **OB/GYN** guidelines]

Patient Management

Assessment

1. Perform airway assessment and management per the **Airway Management** guideline
2. Obtain vital signs including pulse, respiratory rate, pulse oximetry, and blood pressure
3. Provide evaluation and management of pain per the **Pain Management** guideline
4. Assess for life-threatening causes of abdominal pain, which may include:
 - a. Ischemic, necrotic, or perforated bowel
 - i. Severe tenderness
 - ii. Abdominal pain with motion or “jiggling” of the abdomen
 - iii. Fever
 - iv. Bloody stool
 - v. Nausea and vomiting
 - vi. Possible absence of passage of stool or gas
 - vii. Abdominal distention, with possible tympany to percussion
 - b. Dissecting or ruptured abdominal aortic aneurysm (AAA)
 - i. Unequal femoral or distal lower extremity pulses
 - ii. “Pulsatile” abdominal mass
 - iii. Associated back pain and/or chest pain
 - iv. Known history of abdominal aortic aneurysm
 - c. Ruptured ectopic pregnancy
 - i. Vaginal bleeding
 - ii. Recently diagnosed pregnancy
 - d. Recent missed period/menstrual cycle in women of childbearing age

- e. Appendicitis
 - i. Focal right lower quadrant tenderness, possibly with rebound and guarding
 - ii. Right lower quadrant tenderness noted during palpation of the left lower quadrant (positive Rovsing's sign)
 - iii. Peri-umbilical or diffuse abdominal tenderness with palpation or "jiggling" of the abdomen/pelvis
 - iv. Fever
 - v. Nausea, vomiting
 - vi. Lack of appetite
- f. Acute Cholecystitis (Gallbladder Inflammation)
 - i. Right upper quadrant or epigastric tenderness
 - ii. Fever
 - iii. Nausea and vomiting
 - iv. Possible history of gallstones
- g. Pyelonephritis (Kidney Infection)
 - i. Fever
 - ii. Nausea, vomiting
 - iii. Urinary frequency/urgency
 - iv. Dysuria
 - v. Hematuria
 - vi. Back/flank pain
 - vii. Costovertebral angle tenderness to percussion
- 5. Assess for signs of shock
 - a. If shock is present, provide treatment per appropriate **Shock** guideline
- 6. Assess for other non-life-threatening causes of abdominal pain
 - a. Kidney stone
 - i. Unilateral flank pain
 - ii. Nausea, vomiting
 - iii. Possible Hematuria

Treatment and Interventions

EMR

- 1. Manage airway as indicated
- 2. Oxygen as appropriate
- 3. Evaluate for hemorrhage and treat for shock if indicated

EMT

- 4. 12-lead EKG

Patient Safety Considerations

None recommended

Notes/Educational Pearls

Key Considerations

- 1. Assess for life-threatening causes of abdominal pain
- 2. Provide appropriate treatment for pain, vomiting, and shock
- 3. Consider transport to a trauma center if aortic aneurysm is suspected

Pertinent Assessment Findings

1. Rebound tenderness
2. Guarding
3. Abdominal distension
4. Abdominal tympany to percussion (hollow drum-like sound)
5. Tenderness focal to a specific abdominal quadrant
6. Presence of “pulsatile” abdominal mass
7. Absence of or significant inequality of femoral or distal arterial pulses in lower extremities
8. Hyper or hypothermia
9. Rectal bleeding, hematemesis (character), vaginal bleeding

Quality Improvement

Key Documentation Elements

- Assessment of abdomen to include findings on palpation/percussion including presence or absence of masses and presence and nature of tenderness/pain
- Treatment and response to treatment

Performance Measures

- Assessment for life-threatening etiology

Abuse and Maltreatment

Aliases

Maltreatment of vulnerable populations

Definitions

1. Abuse/Maltreatment: Any act or series of acts of commission or omission by a caregiver or person in a position of power over the patient that results in harm, potential for harm, or threat of harm to a patient
2. Child Maltreatment/Abuse: Child maltreatment includes any act or series of acts of commission or omission by a parent or other caregiver that results in harm, potential for harm, or threat of harm to a child. An act of commission (child abuse) is the physical, sexual or emotional maltreatment or neglect of a child or children. An act of omission (child neglect) includes, but is not limited to, failure to provide for the child's needs (e.g. physical, emotional, medical/dental, and educational neglect) and failure to supervise (e.g. inadequate supervision or safety precautions, lack of appropriate car seat use, and exposure to violent or dangerous environments)
3. Human Trafficking: when people are abducted or coerced into service and often transported across international borders. Signs may include, but are not limited to: patient with branding/tattoos and environmental clues such as padlocks and/or doorknobs removed on interior doors, and intact windows that are boarded up

Patient Care Goals

1. Recognize any act or series of acts of commission or omission by a caregiver or person in a position of power over the patient that results in harm, potential for harm, or threat of harm to a patient
2. Take appropriate steps to protect the safety of the responders as well as bystanders
3. Get the patient out of immediate danger
4. Assess any patient injuries that may be the result of acute or chronic events
5. Attempt to preserve evidence whenever possible; however, the overriding concern should be providing appropriate emergency care to the patient

Patient Presentation

1. Clues to abuse or maltreatment can vary with age group of the patient and type of abuse
2. Not all abuse or maltreatment is physical
3. EMS role is to:
 - a. Document concerns
 - b. Assess potentially serious injuries
 - c. Disclose concerns to appropriate authorities
 - d. Initiate help to get the patient into a safe situation
 - e. Not to investigate or intervene beyond the steps above
 - f. Leave further intervention to law enforcement personnel

Inclusion/Exclusion Criteria

Absolute inclusion/exclusion criteria are not possible in this area. Rather, clues consistent with different types of abuse/maltreatment should be sought:

1. Potential clues to abuse/maltreatment from caregivers or general environment:
 - a. Caregiver apathy about patient's current situation
 - b. Caregiver overreaction to questions about situation
 - c. Inconsistent histories from caregivers or bystanders regarding what happened
 - d. Information provided by caregivers or patient that is not consistent with injury patterns
 - e. Injuries not appropriate for patient's age or physical abilities (e.g. infants with injuries usually associated with ambulatory children, elders who have limited mobility with injury mechanisms inconsistent with their capabilities)
 - f. Caregiver not allowing adult patient to speak for themselves, or who appears controlling – pay special attention to patients who cannot communicate due to young age or language and/or cultural barriers
 - g. Inadequate safety precautions or facilities where the patient lives and/or evidence of security measures that appear to confine the patient inappropriately
2. Potential clues to abuse or maltreatment that can be obtained from the patient:
 - a. Multiple bruises in various stages of healing
 - b. Age-inappropriate behavior (e.g. adults who are submissive or fearful, children who act in a sexually inappropriate way)
 - c. Pattern burns, bruises, or scars suggestive of specific weaponry used
 - d. Evidence of medical neglect for injuries or infections
 - e. Unexplained trauma to genitourinary systems or frequent infections to this system
 - f. Evidence of malnourishment and/or serious dental problems
3. Have a high index of suspicion for abuse in children presenting with a Brief Resolved Unexplained Event (BRUE) [see **BRUE** guideline]

Patient Management

Assessment

1. Start with a primary survey and identify any potentially life-threatening issues
2. Document thorough secondary survey to identify clues of potential abuse/maltreatment:
 - a. Inability to communicate due to developmental age, language and/or cultural barrier
 - b. Multiple bruises in various stages of healing
 - c. Age- inappropriate behavior (e.g. adults who are submissive or fearful, children who act in a sexually inappropriate way)
 - d. Pattern burns, bruises, or scars suggestive of specific weaponry used
 - e. Evidence of medical neglect for injuries or infections
 - f. Unexplained trauma to genitourinary systems or frequent infections to this system
 - g. Evidence of malnourishment and/or serious dental problems
3. Assess physical issues and avoid extensive investigation of the specifics of abuse or maltreatment, but document any statements made spontaneously by patient
 - a. Avoid asking directed questions of a child

Treatment and Interventions

EMR

1. Address life-threatening issues
2. Remove the patient to a safe place even if no medical indication for transport
3. Report concerns about potential abuse/maltreatment to law enforcement immediately about:
 - a. Caregivers impeding your ability to assess/transport patient
 - b. Caregivers refusing care for the patient

EMT

4. For patients transported, report concerns to hospital and/or law enforcement personnel per mandatory reporting laws

Patient Safety Considerations

1. If no medical emergency exists, the next priority is safe patient disposition/removal from the potentially abusive situation
2. Do not confront suspected perpetrators of abuse/maltreatment. This can create an unsafe situation for EMS and for the patient

Notes/Educational Pearls

Key Considerations

1. SDCL 26-8A-3. Persons required to report child abuse or neglected child--Intentional failure as misdemeanor. Any physician, dentist, doctor of osteopathy, chiropractor, optometrist, emergency medical technician, paramedic, mental health professional or counselor, podiatrist, psychologist, religious healing practitioner, social worker, hospital intern or resident, parole or court services officer, law enforcement officer, teacher, school counselor, school official, nurse, licensed or registered child welfare provider, employee or volunteer of a domestic abuse shelter, employee or volunteer of a child advocacy organization or child welfare service provider, chemical dependency counselor, coroner, or any safety-sensitive position as defined in § 3-6C-1, who has reasonable cause to suspect that a child under the age of eighteen has been abused or neglected as defined in § 26-8A-2 shall report that information in accordance with §§ 26-8A-6, 26-8A-7, and 26-8A-8. Any person who intentionally fails to make the required report is guilty of a Class 1 misdemeanor. Any person who knows or has reason to suspect that a child has been abused or neglected as defined in § 26-8A-2 may report that information as provided in § 26-8A-8.
2. SDCL 22-46-9 : Mandatory reporting of abuse, neglect, or exploitation--Violation as misdemeanor. Any:
 - (1) Physician, dentist, doctor of osteopathy, chiropractor, optometrist, podiatrist, religious healing practitioner, hospital intern or resident, nurse, paramedic, emergency medical technician, social worker, or any health care professional;
 - (2) Psychologist, licensed mental health professional, or counselor engaged in professional counseling; or
 - (3) State, county, or municipal criminal justice employee or law enforcement officer; who knows, or has reasonable cause to suspect, that an elder or adult with a disability has been or is being abused, neglected, or exploited, shall, within twenty-four hours, report such knowledge or suspicion orally or in writing to the state's attorney of the county in which the elder or adult with a disability resides or is present, to the Department of Human Services, or to

a law enforcement officer. Any person who knowingly fails to make the required report is guilty of a Class 1 misdemeanor.

A person described in this section is not required to report the abuse, neglect, or exploitation of an elder or adult with a disability if the person knows that another person has already reported to a proper agency the same abuse, neglect, or exploitation that would have been the basis of the person's own report.

3. Clues to abuse or maltreatment can vary depending on the age group of the patient and on the nature of the abuse. Remember that not all abuse or maltreatment involves physical harm. It is important to realize that the job of EMS is to document their concerns, assess the patient for potentially serious injuries, make sure that their concerns are disclosed to the appropriate legal authorities, and work towards getting the patient into a safe situation. EMS personnel should not take it upon themselves to investigate, interview, or intervene above and beyond those concepts and should leave further intervention to the appropriate law enforcement personnel.
4. It is very important to have a high index of suspicion for abuse in children presenting with a Brief Resolved Unexplained Event (BRUE). Of the very serious causes of BRUE, child abuse has been found in as many as 11% of cases. One retrospective review noted that a call to 911 for BRUE was associated with an almost 5 times greater odds of abusive head trauma being diagnosed as the cause of the BRUE, clearly emphasizing the high index of suspicion EMS providers must have when responding to these calls.
5. Abuse and maltreatment can happen to patients of all ages
6. Patients may be unwilling or unable to disclose abuse or maltreatment so the responsibility falls on EMS personnel to assess the situation, document appropriately, and take appropriate action to secure a safe place for the patient.
7. Document findings by describing what you see and not ascribing possible causes (e.g. "0.5-inch round burn to back" as opposed to "burn consistent with cigarette burn").
8. Providers should be knowledgeable about mandatory reporting statutes in their area, especially regarding adults (domestic violence, elder abuse).

Pertinent Assessment Findings

As noted above

Quality Improvement

Key Documentation Elements

Meticulous documentation of any statements by the patient and any physical findings on the patient or the surroundings are critical in abuse or maltreatment cases

Performance Measures

No recommendations

Agitated or Violent Patient/Behavioral Emergency

Aliases

Acute psychosis, patient restraint

Patient Care Goals

1. Provision of emergency medical care to the agitated, violent, or uncooperative patient
2. Maximizing and maintaining safety for the patient, EMS personnel, and others

Patient Presentation

Inclusion Criteria

Patients of all ages who are exhibiting agitated, violent, or uncooperative behavior or who are a danger to self or others

Exclusion Criteria

1. Patients exhibiting agitated or violent behavior due to medical conditions including, but not limited to:
 - a. Head trauma
 - b. Metabolic disorders (e.g. hypoglycemia, hypoxia)

Patient Management

Assessment

1. Note medications/substances on scene that may contribute to the agitation, or may be relevant to the treatment of a contributing medical condition
2. Maintain and support airway
3. Note respiratory rate and effort – If possible, monitor pulse oximetry and/or capnography
4. Assess circulatory status:
 - a. Blood pressure (if possible)
 - b. Pulse rate
 - c. Capillary refill (as appropriate)
5. Assess mental status
 - a. Check blood glucose (if possible)
6. Obtain temperature (if possible)
7. Assess for evidence of traumatic injuries

Treatment and Interventions

EMR

1. Establish patient rapport
 - a. Attempt verbal reassurance and calm patient prior to use physical management devices
 - b. Engage family members/loved ones to encourage patient cooperation if their presence does not exacerbate the patient's agitation
 - c. Continued verbal reassurance and calming of patient following use of physical management devices

2. Physical Management Devices
 - a. Body
 - i. Stretcher straps should be applied as the standard procedure for all patients during transport
 - ii. Physical management devices, including stretcher straps, should never restrict the patient's chest wall motion
 - iii. If necessary, sheets may be used as improvised supplemental stretcher straps. Other forms of improvised physical management devices should be discouraged
 - iv. Supplemental straps or sheets may be necessary to prevent flexion/extension of torso, hips, legs by being placed around the lower lumbar region, below the buttocks, and over the thighs, knees, and legs
 - b. Extremities
 - i. Soft or leather devices should not require a key to release them
 - ii. Secure all four extremities to maximize safety for patient, staff, and others
 - iii. Secure all extremities to the stationary frame of the stretcher
 - iv. Multiple knots should not be used to secure a device

Patient Safety Considerations

The management of violent patients requires a constant reevaluation of the risk/benefit balance for the patient and bystanders in order to provide the safest care for all involved. These are complex and high-risk encounters. There is no one size fits all solution for addressing these patients.

1. Don PPE
2. Do not attempt to enter or control a scene where physical violence or weapons are present
3. Dispatch law enforcement immediately to secure and maintain scene safety
4. Urgent de-escalation of patient agitation is imperative in the interest of patient safety as well as for EMS personnel and others on scene
5. Uncontrolled or poorly controlled patient agitation and physical violence can place the patient at risk for sudden cardiopulmonary arrest due to the following etiologies:
 - a. Excited delirium/exhaustive mania: A postmortem diagnosis of exclusion for sudden death thought to result from metabolic acidosis (most likely from lactate) stemming from physical agitation or physical control measures and potentially exacerbated by stimulant drugs (e.g. cocaine) or alcohol withdrawal
 - b. Positional asphyxia: Sudden death from restriction of chest wall movement and/or obstruction of the airway secondary to restricted head or neck positioning resulting in hypercarbia and/or hypoxia
6. Placement of stretcher in sitting position prevents aspiration and reduces the patient's physical strength by placing the abdominal muscles in the flexed position
7. Patients who are more physically uncooperative should be physically secured with one arm above the head and the other arm below the waist, and both lower extremities individually secured
8. The following techniques should be expressly prohibited by EMS providers:
 - a. Secure or transport in a prone position with or without hands and feet behind the back (hobbling or "hog-tying")
 - b. "Sandwiching" patients between backboards
 - c. Techniques that constrict the neck or compromise the airway
 - d. EMS provider use of weapons as adjuncts in managing a patient

Notes/Educational Pearls

Key considerations

1. Direct medical oversight should be contacted at any time for advice, especially when patient's level of agitation is such that transport may place all parties at risk
2. Transport by air is not advised
3. Stretchers with adequate foam padding, particularly around the head, facilitates patient's ability to self-position the head and neck to maintain airway patency
4. For patients with key-locking devices, applied by another agency, consider the following options:
 - a. Remove device and replace it with a device that does not require a key
 - b. Transport patient, accompanied in patient compartment by person who has device key
 - c. Transport patient in vehicle of person with device key if medical condition of patient is deemed stable, direct medical oversight so authorizes, and law allows

Pertinent assessment findings

1. Continuous monitoring of:
 - a. Airway patency
 - b. Respiratory status with pulse oximetry and/or capnography
 - c. Circulatory status with frequent blood pressure measurements
 - d. Mental status and trends in level of patient cooperation
 - e. Cardiac status
 - f. Extremity perfusion with capillary refill in patients in physical management device

Quality Improvement

Key Documentation Elements

- Etiology of agitated or violent behavior if known
- Patient's medications, other medications or substances found on scene
- Patient's medical history or other historic factors reported by patient, family or bystanders
- Physical evidence or history of trauma
- Adequate oxygenation by pulse oximetry
- Blood glucose measurement
- Measures taken to establish patient rapport
- Number and physical sites of placement of physical management devices
- Duration of placement of physical management devices
- Repeated assessment of airway patency
- Repeated assessment of respiratory rate, effort, pulse oximetry/capnography
- Repeated assessment of circulatory status with blood pressure, capillary refill, cardiac monitoring
- Repeated assessment of mental status and trends in the level of patient cooperation
- Repeated assessment of capillary refill in patient with extremity securing devices
- Communications with EMS direct medical oversight
- Initiation and duration of engagement with law enforcement

Performance Measures

- Incidence of injuries to patient, EMS personnel, or others on scene
- Incidence of injuries to patient, EMS personnel, or others during transport

- Medical or physical complications (including sudden death) in patients
- Advance informational communication of EMS protocols for the management of agitated and violent patients to others within the emergency care system and law enforcement
- Initiation and engagement with EMS direct medical oversight
- Initiation and duration of engagement with law enforcement

Anaphylaxis and Allergic Reaction

Aliases

Anaphylactic Shock

Patient Care Goals

1. Provide timely therapy for potentially life-threatening reactions to known or suspected allergens to prevent cardiorespiratory collapse and shock
2. Provide symptomatic relief for symptoms due to known or suspected allergens

Patient Presentation

Inclusion Criteria

Patients of all ages with suspected allergic reaction and/or anaphylaxis

Exclusion Criteria

No recommendations

Patient Management

Assessment

1. Evaluate for patent airway and presence of oropharyngeal edema
2. Auscultate for wheezing and assess level of respiratory effort
3. Assess for adequacy of perfusion
4. Assess for presence of signs of anaphylaxis
 - a. Anaphylaxis – More severe and is characterized by an acute onset involving:
 - i. The skin (urticaria) and/or mucosa with either respiratory compromise or decreased BP or signs of end-organ dysfunction

OR

 - ii. Hypotension for that patient after exposure to a known allergen
 1. Adults: Systolic BP *less than* 90
 2. Pediatrics: see Vital Signs chart

OR

 - iii. Two or more of the following occurring rapidly after exposure to a likely allergen:
 1. Skin and/or mucosal involvement (urticaria, itchy, swollen tongue/lips)
 - a. Skin involvement may be ABSENT in up to 40% of cases of anaphylaxis
 2. Respiratory compromise (dyspnea, wheezing, stridor, hypoxemia)
 3. Persistent gastrointestinal symptoms (vomiting, abdominal pain, diarrhea)
 4. Hypotension or associated symptoms (syncope, hypotonia, incontinence)
- b. Non-anaphylactic Allergic Reaction
 - i. Signs involving only **one** organ system (e.g. localized angioedema that does not compromise the airway, or not associated with vomiting; hives alone)

Treatment and Interventions

EMR

1. Maintain airway
2. Administer oxygen as appropriate
 - a. Be prepared to assist ventilations
3. Remove allergen, if present
4. If signs of anaphylaxis, administer epinephrine at the following dose and route via auto-injector:
 - a. Adult (25kg or more) 0.3 mg IM in the anterolateral thigh
 - b. Pediatric (less than 25kg) 0.15 mg in the anterolateral thigh
5. If signs of anaphylaxis and hypoperfusion persist following the first dose of epinephrine, additional IM epinephrine can be repeated every 5-15 minutes at above noted doses

EMT

6. Epinephrine 1:1,000 (1mg/mL), drawn from a single-dose vial and injected IM (intramuscular) in the anterolateral thigh may be administered in place of the auto-injector method, if approved by your Medical Director
7. Call for ALS transport as soon as possible and perform ongoing assessment as indicated.

Patient Safety Considerations

1. Time to epinephrine delivery

Notes/Educational Pearls

Key Considerations

1. Allergic reactions and anaphylaxis are serious and potentially life-threatening medical emergencies. It is the body's adverse reaction to a foreign protein (e.g. food, medicine, pollen, insect sting or any ingested, inhaled, or injected substance). When anaphylaxis is suspected, EMS personnel should always consider epinephrine as first-line treatment. Cardiovascular collapse may occur abruptly, without the prior development of skin or respiratory symptoms. Constant monitoring of the patient's airway and breathing is essential.
2. Contrary to common belief that all cases of anaphylaxis present with cutaneous manifestations, such as urticaria or mucocutaneous swelling, a significant portion of anaphylactic episodes may not involve these signs and symptoms on initial presentation. Moreover, most fatal reactions to food-induced anaphylaxis in children were not associated with cutaneous manifestations.
3. A thorough assessment and a high index of suspicion are required for all potential allergic reaction patients – consider:
 - a. History of Present Illness
 - i. Onset and location
 - ii. Insect sting or bite
 - iii. Food allergy/exposure
 - iv. New clothing, soap, detergent
 - v. Past history of reactions
 - vi. Medication history
 - b. Signs and Symptoms
 - i. Itching or urticaria
 - ii. Coughing, wheezing, or respiratory distress

- iii. Chest tightness or throat constriction
- iv. Hypotension or shock
- v. Persistent gastrointestinal symptoms (nausea, vomiting, and diarrhea)
- vi. Altered mental status
- c. Other Considerations
 - i. Angioedema (drug-induced)
 - ii. Aspiration/airway obstruction
 - iii. Vasovagal event
 - iv. Asthma or COPD
 - v. Heart failure
- 4. Gastrointestinal symptoms occur most commonly in food-induced anaphylaxis, but can occur with other causes
 - a. Oral pruritus is often the first symptom observed in patients experiencing food-induced anaphylaxis
 - b. Abdominal cramping is also common, but nausea, vomiting, and diarrhea are frequently observed as well
- 5. Patients with asthma are at high risk for a severe allergic reaction

Pertinent Assessment Findings

1. Presence or absence of angioedema
2. Presence or absence of respiratory compromise
3. Presence or absence of circulatory compromise
4. Localized or generalized urticaria
5. Response to therapy

Key Documentation Elements

- Medications given
- Route of epinephrine administration
- Time of epinephrine administration
- Signs and symptoms of the patient

Performance Measures

- Percentage of patients with anaphylaxis that receive epinephrine for anaphylaxis
- Percentage of patients with anaphylaxis who receive:
 - Epinephrine within 10 minutes of arrival
 - The appropriate weight-based dose of epinephrine
- Percentage of patients that require airway management in the prehospital setting (and/or the emergency department)

Altered Mental Status

Aliases

Confusion, altered level of consciousness

Patient Care Goals

1. Identify treatable causes
2. Protect patient from harm

Patient Presentation

Inclusion Criteria

Impaired decision-making capacity

Exclusion Criteria

Traumatic brain injury

Patient Management

Assessment

Look for treatable causes of altered mental status:

1. Airway – Make sure airway remains patent; reposition patient as needed
2. Breathing – Look for respiratory depression; check SPO₂, ETCO₂, and CO detector readings
3. Circulation – Look for signs of shock
4. Glasgow Coma Score and/or AVPU
5. Pupils
6. Neck rigidity or pain with range of motion
7. Stroke tool
8. Blood glucose level
9. 12-lead EKG
10. Breath odor - Possible unusual odors include alcohol, acidosis, ammonia
11. Chest/Abdominal – Intra-thoracic hardware, assist devices, abdominal pain or distention
12. Extremities/skin – Track marks, hydration, edema, dialysis shunt, temperature to touch (or if able, use a thermometer)
13. Environment – Survey for pills, paraphernalia, ambient temperature

Treatment and Interventions

EMR

1. Oxygen [see **Universal Care** guideline]
2. Glucose [see **Hypoglycemia** or **Hyperglycemia** guidelines]
3. Naloxone [see **Opioid Poisoning/Overdose** guideline]

EMT

4. Restraint: physical [see **Agitated or Violent Patient/Behavioral Emergency** guideline]
5. Active cooling or warming [see **Hypothermia/Cold Exposure** or **Hyperthermia/Heat Exposure** guidelines]
6. 12-lead EKG

Patient Safety Considerations

1. With depressed mental status, initial focus is on airway protection, oxygenation, ventilation, and perfusion
2. The violent patient may need physical management to insure proper assessment and treatment
3. Hypoglycemic and hypoxic patients can be irritable and violent [see **Agitated or Violent Patient/Behavioral Emergency** guideline]

Notes/Educational Pearls

Key Considerations

1. History from bystanders
2. Age of the patient
3. Environment where patient found
4. Recent complaints (e.g. headache, chest pain, difficulty breathing, vomiting, fever)
5. Pill bottles/medications:
 - a. Anticoagulants
 - b. Anti-depressants
 - c. Narcotic pain relievers
 - d. Benzodiazepines
6. Medical alert tags and accessory medical devices
7. Evaluate for reduced PO intake and/or vomiting and/or diarrhea or dehydration as a cause of AMS in the pediatric and geriatric populations
8. Medications a child may have access to including but not limited to:
 - a. Antihypertensives
 - b. Oral hypoglycemic
 - c. Opioids
 - d. Benzodiazepines
 - e. Antiepileptics

Pertinent Assessment Findings

1. Track marks
2. Breath odor
3. Skin temperature
4. Location

Quality Improvement

Key Documentation Elements

- GCS or AVPU description
- Temperature was taken when able
- Patient and EMS provider safety were considered
- Pupil and neck exam were done

Performance Measure

- Hypoglycemia considered and treated appropriately
 - Blood glucose level obtained.
- Sepsis considered as a possible cause of hypotension
- Naloxone is used as therapeutic intervention, not a diagnostic tool
- CO detector is used when available

Back Pain

Aliases

None

Patient Care Goals

1. Improve patient discomfort
2. Identify life-threatening causes of back pain

Patient Presentation

Inclusion Criteria

Back pain or discomfort related to a non-traumatic cause or when pain was due to non-acute trauma (e.g. chronic pain conditions)

Exclusion Criteria

1. Back pain from spinal trauma [see **Trauma** guidelines]
2. Back pain due to sickle cell pain crisis [see **Sickle Cell Pain Crisis** guideline]
3. Back pain from suspected labor [see **OB/GYN** guidelines]

Patient Management

Assessment

1. Assess for life-threatening causes of back pain, which may include:
 - a. Spinal cord compression (e.g. from spinal epidural abscess, malignancy, spinal epidural hematoma for patients on anticoagulants)
 - i. Urinary and/or bowel incontinence
 - ii. Inability to walk due to weakness
 - iii. New neurologic deficits in extremities
 - iv. Loss of sensation in saddle distribution
 - b. Aortic dissection or ruptured abdominal aortic aneurysm
 - i. Unequal femoral or distal lower extremity pulses
 - ii. "Pulsatile" abdominal mass
 - iii. Associated abdominal pain and/or chest pain
 - iv. Known history of abdominal aortic aneurysm or dissection
 - c. Pyelonephritis
 - i. Fever
 - ii. Nausea, vomiting
 - iii. Urinary frequency/urgency
 - iv. Dysuria
 - v. Hematuria
 - vi. Abdominal pain
 - vii. Costovertebral angle tenderness to percussion

2. Assess for signs of shock. If shock is present, provide treatment per appropriate **Shock** guideline
3. Assess for other non-life threatening causes of abdominal pain
 - a. Kidney stone
 - i. Unilateral flank pain
 - ii. Nausea, vomiting
 - iii. Possible hematuria
 - iv. History of kidney stones

Treatment and Interventions

EMR

1. Perform airway assessment and management, per the **Airway Management** guideline
2. Provide evaluation and management of pain, per the **Pain Management** guideline

EMT

3. Provide transport to an appropriate receiving facility – Consider specialty destination centers for conditions such as suspected aortic emergency
4. Reassess vital signs and response to therapeutic interventions throughout transport

Patient Safety Considerations

No recommendations

Notes/Educational Pearls

Key Considerations

1. Assess for life-threatening causes of back pain
2. Provide appropriate treatment for pain, vomiting, and shock
3. Consider transport to appropriate specialty center if aortic emergency suspected
4. Back and abdominal pain can often coexist with similar disease processes
5. Identify patients on anticoagulants since they are higher risk for spinal epidural hematoma or retroperitoneal hemorrhage which can present as back pain
6. Identify patients with IVDA history and/or impaired immune system since they are higher risk for spinal epidural abscess
7. Identify patients with a history of cancer or with one suspicious for cancer – spinal metastases can cause spinal cord compression

Pertinent Assessment Findings

1. Midline back tenderness
2. Back erythema or swelling
3. Motor and/or sensory loss in arms or legs
4. Loss of perianal sensation
5. Absence of or significant inequality of femoral or distal arterial pulses in lower extremities
6. Hyper or hypothermia
7. Rectal bleeding or hematemesis

Quality Improvement

Key Documentation Elements

- Assessment of back and abdomen to include findings on palpation/percussion including

- presence or absence of masses and presence and nature of tenderness/pain
- Assesses initial and changes in neurologic status
- Assesses initial and changes in perfusion/pulses

Performance Measures

- Assessment for life-threatening etiology

End-of-Life Care/Palliative Care

Aliases

None noted

Patient Care Goals

1. When providing care for a patient near end-of-life:
 - a. Affirm dying as a normal process
 - b. Integrate psychological and spiritual aspects of patient care
 - c. Offer a support system to help the family cope during the patient's illness and in their own bereavement

Patient Presentation

Inclusion Criteria

Patient enrolled in hospice or palliative care, or who have advance care directives, experiencing complaints related to the illness for which the patient is receiving those services.

Exclusion Criteria

Complaints unrelated to the illness for which the patient is receiving those services.

Patient Management

Treatment and Interventions

EMR

1. Perform general patient management
2. If the patient is able to communicate and has the capacity to make decisions regarding treatment and transport, consult directly with the patient before treatment and/or transport
3. If the patient lacks the capacity to make decisions regarding treatment and/or transport, identify any advanced care planning in place for information relating to advanced care planning and consent for treatment
 - a. Advanced care directives
 - b. Guardian, power of attorney, or other accepted healthcare proxy
4. If the patient has excessive secretions, provide suctioning

EMT

5. If the patient appears dehydrated
 - a. Encourage PO fluid intake if patient is able to swallow
 - b. If available, offer ice chips and swabs soaked in ice water
6. In collaboration with hospice or palliative care provider, coordinate with guardian, power of attorney, or other accepted healthcare proxy if non-transport is considered

Patient Safety Considerations

1. Careful and thorough assessments should be performed to identify complaints not related to the illness for which the patient is receiving hospice or palliative care
2. Care should be delivered with the utmost patience and compassion

Notes/Educational Pearls

Key Considerations

1. Social interactions with family may affect end-of-life care
2. Scene safety should be considered when deciding on management

Pertinent Assessment Findings

1. Vital signs
2. Pain score
3. Neurologic exam
4. Lung sounds

Quality Improvement

Key Documentation Elements

- Interaction with hospice or palliative care provider
- Confirmation of advanced directive or other advanced care documentation
- Pain score if applicable

Performance Measures

- If patient is dehydrated, symptom relief or vital sign change

Hyperglycemia

Aliases

Diabetic ketoacidosis (DKA), hyperosmolar hyperglycemic state, hyperosmolar non-ketotic coma, diabetes

Patient Care Goals

1. Limit morbidity from hyperglycemia by appropriate use of glucose monitoring

Patient Presentation

Inclusion Criteria

1. Adult or pediatric patient with altered level of consciousness [see **Altered Mental Status** guideline]
2. Adult or pediatric patient with stroke symptoms (e.g. hemiparesis, dysarthria) [see **Suspected Stroke/Transient Ischemic Attack** guideline]
3. Adult or pediatric patient with seizure [see **Seizures** guideline]
4. Adult or pediatric patient with symptoms of hyperglycemia (e.g. polyuria, polydipsia, weakness, dizziness, abdominal pain, tachypnea)
5. Adult or pediatric patient with history of diabetes and other medical symptoms

Exclusion Criteria

Patient in cardiac arrest.

Patient Management

Assessment

1. Monitoring:
 - a. Check blood glucose level
2. Secondary survey pertinent to altered blood glucose level:
 - a. Constitutional: assess for tachycardia, hypotension, and tachypnea
 - b. Eyes: assess for sunken eyes from dehydration
 - c. Nose /mouth/ears: assess for dry mucus membranes or tongue bite from seizure
 - d. Neurologic:
 - i. Assess GCS and mental status
 - ii. Assess for focal neurologic deficit: motor and sensory
3. Evaluate for possible concomitant sepsis and septic shock [see

Shock guideline]

4. Obtain 12-lead EKG

Treatment and Interventions

EMR

1. If altered level of consciousness, stroke, or sepsis/septic shock, treat per **Altered Mental Status, Suspected Stroke/Transient Ischemic Attack, or Shock** guidelines accordingly

EMT

2. Check blood glucose level
3. Obtain 12-lead EKG

Patient Safety Considerations

1. Reassess and manage airway as needed
2. Asymptomatic hyperglycemia poses no risk to the patient while inappropriately aggressive interventions to manage blood sugar can harm patients

Notes/Educational Pearls

Key Considerations

1. New onset diabetic ketoacidosis in pediatric patients commonly presents with nausea, vomiting, abdominal pain, and/or urinary frequency
2. Consider causes for hyperglycemia by thinking about the 3 I's:
 - a. Insulin – this refers to any medication changes for insulin or oral medications including poor compliance or malfunctioning insulin pump
 - b. Ischemia – this refers to hyperglycemia sometimes being an indication of physiologic stress in a patient and can be a clue to myocardial ischemia in particular
 - c. Infection – underlying infection can cause derangements in glucose control

Pertinent Assessment Findings

1. Concomitant trauma
2. Abdominal pain, “fruity breath,” and rapid-deep respirations (Kussmaul’s respiration) may be associated with diabetic ketoacidosis

Quality Improvement

Key Documentation Elements

- Document glucose level

Performance Measures

- When in scope of practice, point of care blood glucose checked for all patients with symptoms of altered level of consciousness, seizure, stroke, or hyperglycemia
- 12-lead EKG obtained

Hypoglycemia

Aliases

Diabetic coma, insulin shock

Patient Care Goals

1. Limit morbidity from hypoglycemia by:
 - a. Describing appropriate use of glucose monitoring
 - b. Treating symptomatic hypoglycemia

Patient Presentation

Inclusion Criteria

1. Adult or pediatric patient with blood glucose less than 60 mg/dL with symptoms of hypoglycemia
2. Adult or pediatric patient with altered level of consciousness [see **Altered Mental Status** guideline]
3. Adult or pediatric patient with stroke symptoms (e.g. hemiparesis, dysarthria) [see **Suspected Stroke/Transient Ischemic Attack** guideline]
4. Adult or pediatric patient with seizure [see **Seizures** guideline]
5. Adult or pediatric patient with history of diabetes and other medical symptoms
6. Pediatric patient with suspected alcohol ingestion
7. Adult patient who appears to be intoxicated

Exclusion Criteria

Patient in cardiac arrest

Patient Management

Assessment

1. Monitoring:
 - a. Check blood glucose level
2. Secondary survey pertinent to altered blood glucose level:
 - a. Evaluate for presence of an automated external insulin delivery device (insulin pump)
 - b. Constitutional: assess for tachycardia and hypotension
 - c. Eyes: assess for sunken eyes from dehydration
 - d. Nose /mouth/ears: assess for dry mucus membranes or tongue bite from seizure
 - e. Neurologic:
 - i. Assess GCS and mental status
 - ii. Assess for focal neurologic deficit: motor and sensory

Treatment and Interventions

EMR

1. If altered level of consciousness or stroke, treat per **Altered Mental Status** or **Suspected Stroke/Transient Ischemic Attack** guidelines accordingly
2. Conscious patient with a patent airway:
 - a. Glucose, oral (in form of glucose tablets, glucose gel, tube of cake icing, etc.)
 - i. Adult Dosing: 25 g

ii. Pediatric Dosing: 0.5-1 g/kg

EMT

3. Check blood glucose level
4. Disposition
 - a. If hypoglycemia with continued symptoms, transport to closest appropriate receiving facility
 - b. Hypoglycemic patients who have had a seizure should be transported to the hospital regardless of their mental status and response to therapy
 - c. If symptoms of hypoglycemia resolve after treatment, release without transport should only be considered if **all** of the following are true:
 - i. Repeat glucose is greater than 80 mg/dL
 - ii. Patient takes insulin or metformin to control diabetes
 - iii. Patient returns to normal mental status, with no focal neurologic signs/symptoms after receiving glucose/dextrose
 - iv. Patient can promptly obtain and will eat a carbohydrate meal
 - v. Patient or legal guardian refuses transport and EMS providers agree transport not indicated
 - vi. A reliable adult will be staying with patient
 - vii. No major co-morbid symptoms exist, like chest pain, shortness of breath, seizures, intoxication
 - viii. A clear cause of the hypoglycemia is identified (e.g. missed meal)

Patient Safety Considerations

1. Sulfonylureas (e.g. glyburide, glipizide) have long half-lives ranging from 12-60 hours. Patients with corrected hypoglycemia who are taking these agents are at particular risk for recurrent symptoms and frequently require hospital admission

Notes/Educational Pearls

Key Considerations

1. Consider contribution of oral diabetic medications to hypoglycemia
2. If possible, have family/patient turn off insulin pumps
3. Consider potential for intentional overdose of hypoglycemic agents

Pertinent Assessment Findings

1. Concomitant trauma
2. Diaphoresis or hypothermia may be associated with hypoglycemia

Quality Improvement

Key Documentation Elements

- Document reassessment of vital signs and mental status after administration of glucose
- Document point of care glucose level

Performance Measures

- Blood glucose is checked for all patients with symptoms of altered level of consciousness, seizure, stroke, or hypoglycemia
- If patient released at scene, criteria documented for safe release

Pain Management

Aliases

Analgesia, pain control, acute pain, acute traumatic pain, acute atraumatic pain

Patient Presentation

Inclusion Criteria

Patients who are experiencing pain

Exclusion Criteria

1. Pregnancy with active labor
2. Dental pain

Patient Management

Assessment, Treatment, and Interventions

EMR

1. Determine patient's pain score assessment using standard pain scale.
 - a. Less than 4 yo: Observational scale (e.g. Faces, Legs, Arms, Cry, Consolability [FLACC] or Children's Hospital of Eastern Ontario Pain Scale [CHEOPS])
 - b. 4-12 yo: Self-report scale (e.g. Wong Baker Faces, Faces Pain Scale [FPS], Faces Pain Scale Revised [FPS-R])
 - c. Greater than 12 yo: Self-report scale (Numeric Rating Scale [NRS])
2. Consider use of non-pharmaceutical pain management techniques
 - a. Placement of the patient in a position of comfort
 - b. Application of ice packs and/or splints for pain secondary to trauma
 - c. Verbal reassurance to control anxiety

EMT

3. Transport in position of comfort and reassess as indicated

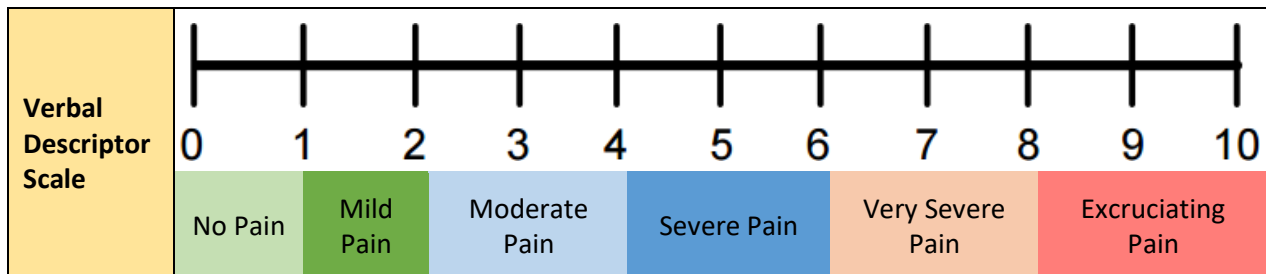
Adult nonverbal pain scale University of Rochester Medical Center			
Categories	0	1	2
Face	No particular expression or smile.	Occasional grimace, tearing, frowning, wrinkled forehead.	Frequent grimace, tearing, frowning, wrinkled forehead.
Activity (movement)	Lying quietly, normal position.	Seeking attention through movement or slow, cautious movement.	Restless, excessive activity and/or withdrawal reflexes.
Guarding	Lying quietly, no positioning of hands over areas of body.	Splinting areas of the body, tense.	Rigid, stiff.
Physiology (vital signs)	Stable vital signs	Change in any of the following: * SBP > 20 mm Hg. * HR > 20/minute.	Change in any of the following: * SBP > 30 mm Hg. * HR > 25/minute.
Respiratory	Baseline RR/SpO ₂ Compliant with ventilator	RR > 10 above baseline, or 5% ↓SpO ₂ mild asynchrony with ventilator	RR > 20 above baseline, or 10% ↓SpO ₂ severe asynchrony with ventilator

Abbreviations: HR, heart rate; RR, respiratory rate; SBP, systolic blood pressure; SpO₂, pulse oximetry.
 Instructions: Each of the 5 categories is scored from 0-2, which results in a total score between 0 and 10. Document total score by adding numbers from each of the 5 categories. Scores of 0-2 indicate no pain, 3-6 moderate pain, and 7-10 severe pain. Document assessment every 4 hours on nursing flow-sheet and complete assessment before and after intervention to maximize patient comfort. Sepsis, hypovolemia, hypoxia need to be excluded before interventions.

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From: Odhner M, Wegman D, Freeland N, Ingersoll G. Evaluation of a newly developed non-verbal pain scale (NVPS) for assessment of pain in sedated critically ill patients. Available at: <http://www.aacn.org/AACN/NTIPoster.nsf/vwdoc/2004NTI> Posters. Accessed July 18, 2017.

Universal Pain Assessment Tool



Wong-Baker FACES®

The Wong-Baker FACES® Foundation has permitted the use of the Wong-Baker FACES® Pain Rating Scale in this Guidelines publication. However, this diagram has been removed from this distribution version of the Guidelines, because NASEMSO does not have permission to allow others to reproduce it. If you wish to use the Scale in your guidelines/protocols publication, please go to www.wongbakerfaces.org where you will find instructions on the use of this diagram.

Descriptive Scale	Alert Smiling	No Humor Serious, Flat	Furrowed Brow Pursed Lips Breath Holding	Wrinkled Nose Raised Upper Lip Rapid Breathing	Slow Blink Open Mouth	Eyes Closed Moaning Crying
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Activity Tolerance Scale	No Pain	Can be Ignored	Interferes with Tasks	Interferes with Concentration	Interferes with Basic Needs	Bed Rest Required
Spanish	Nada de Dolor	Un Poquito de Dolor	Un Dolor Leve	Dolor Fuerte	Dolor Desmasiado Fuerte	Un Dolor Insoportable

Source: Hybrid of scales by authors. Reproduction of the Wong-Baker FACES® material requires licensing at www.wongbakerfaces.org.

Pediatric-Appropriate Pain Assessment Tools

Faces, Legs, Activity, Cry, Consolability (FLACC) Behavioral Scale

Appropriate age for use (per guideline): less than 4 years

Categories	Scoring		
	0	1	2
Face	No particular expression or smile	Occasional grimace or frown, withdrawn, disinterested	Frequent to constant frown, clenched jaw, quivering chin
Legs	Normal position or relaxed	Uneasy, restless, tense	Kicking, or legs drawn up
Activity	Lying quietly, normal position, moves easily	Squirming, shifting back and forth, tense	Arched, rigid, or jerking
Cry	No cry (awake or asleep)	Moans or whimpers, occasional complaint	Crying steadily, screams or sobs, frequent complaints
Consolability	Content, relaxed	Reassured by occasional touching, hugging, or being talked to, distractible	Difficult to console or comfort

Each of the five categories (F) Face; (L) Legs; (A) Activity; (C) Cry; (C) Consolability is scored from 0-2, which results in a total score between zero and ten.

Instructions:

- **Patients who are awake:** Observe for at least 1-2 minutes. Observe legs and body uncovered. Reposition patient or observe activity, assess body for tenseness and tone. Initiate consoling interventions if needed
- **Patients who are asleep:** Observe for at least 2 minutes or longer. Observe body and legs uncovered. If possible reposition the patient. Touch the body and assess for tenseness and tone.

Face

- Score 0 point if patient has a relaxed face, eye contact and interest in surroundings
- Score 1 point if patient has a worried look to face, with eyebrows lowered, eyes partially closed, cheeks raised, mouth pursed
- Score 2 points if patient has deep furrows in the forehead, with closed eyes, open mouth and deep lines around nose/lips

Legs

- Score 0 points if patient has usual tone and motion to limbs (legs and arms)
- Score 1 point if patient has increase tone, rigidity, tense, intermittent flexion/extension of limbs
- Score 2 points if patient has hyper tonicity, legs pulled tight, exaggerated flexion/extension of limbs, tremors

Activity

- Score 0 points if patient moves easily and freely, normal activity/restrictions
- Score 1 point if patient shifts positions, hesitant to move, guarding, tense torso, pressure on body part
- Score 2 points if patient is in fixed position, rocking, side-to-side head movement, rubbing body part

Cry

- Score 0 points if patient has no cry/moan awake or asleep
- Score 1 point if patient has occasional moans, cries, whimpers, sighs
- Score 2 points if patient has frequent/continuous moans, cries, grunts

Consolability

- Score 0 points if patient is calm and does not require consoling
- Score 1 point if patient responds to comfort by touch or talk in ½ - 1 minute
- Score 2 points if patient require constant consoling or is unconsolated after an extended time

Whenever feasible, behavioral measurement of pain should be used in conjunction with self-report. When self-report is not possible, interpretation of pain behaviors and decision-making regarding treatment of pain requires careful consideration of the context in which the pain behaviors were observed.

Each category is scored on a 0-2 scale, which results in a total score of 0-10

Assessment of Behavioral Score:

- 0 = Relaxed and comfortable
- 1-3 = Mild discomfort
- 4-6 = Moderate pain
- 7-10 = Severe discomfort/pain

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Source: *The FLACC: A behavioral scale for scoring postoperative pain in young children*, by S Merkel and others, 1997, *Pediatr Nurse* 23(3), p. 293–297.

Faces Pain Scale – Revised (FPS-R)

Diagram Removed for this Distribution Version of the Guidelines

The International Association for the Study of Pain® (IASP) has permitted NASEMSO to reproduce the Faces Pain Scale Revised (FPS-R) for the NASEMSO website PDF version of the Guidelines. However, this diagram has been removed from this distribution version of the Guidelines, because NASEMSO does not have permission to allow others to reproduce it. To obtain permission to reproduce this diagram for your guidelines/protocols, please write to: iaspdesk@iasp-pain.org

Patient Safety Considerations

1. Use of splinting techniques and application of ice should be done to reduce the total amount of medication used to keep the patient comfortable

Notes/Educational Pearls

Key Considerations

1. Pain severity (0 - 10) should be recorded

Pertinent Assessment Findings

1. Mental status (GCS and pain level)
2. Respiratory system (tidal volume, chest rigidity)
3. Gastrointestinal (assess for tenderness, rebound, guarding, and nausea)

Quality Improvement

Key Documentation Elements

- Documentation of patient vital signs with pulse oximetry
- Documentation of initial patient pain scale assessment
- Documentation of patient reassessment with repeat vital signs and patient pain scale assessment

Seizures

Aliases

Status epilepticus, febrile seizure, convulsions, eclampsia

Patient Care Goals

1. Prompt cessation of seizures in the prehospital setting
2. Minimizing adverse events in the treatment of seizures in the prehospital setting
3. Minimizing seizure recurrence during transport

Patient Presentation

Seizures due to trauma, pregnancy, hyperthermia, or toxic exposure should be managed according to those condition-specific guidelines

Inclusion Criteria

Seizure activity upon arrival of prehospital personnel or new/recurrent seizure activity lasting greater than 5 minutes

Exclusion Criteria

None

Patient Management

Assessment

1. History
 - a. Duration of current seizure
 - b. Prior history of seizures, diabetes, or hypoglycemia
 - c. Typical appearance of seizures
 - d. Baseline seizure frequency and duration
 - e. Focality of onset, direction of eye deviation
 - f. Concurrent symptoms of apnea, cyanosis, vomiting, bowel/bladder incontinence, or fever
 - g. Bystander administration of medications to stop the seizure
 - h. Current medications, including anticonvulsants
 - i. Recent dose changes or non-compliance with anticonvulsants
 - j. History of trauma, pregnancy, heat exposure, or toxin exposure
2. Exam
 - a. Air entry/airway patency
 - b. Breath sounds, respiratory rate and effectiveness of ventilation
 - c. Signs of perfusion (pulses, capillary refill, color)
 - d. Neurologic status (GCS, nystagmus, pupil size, focal neurologic deficit or signs of stroke)

Treatment and Interventions

EMR

1. If signs of airway obstruction are present and a chin-lift, jaw thrust, positioning, and/or suctioning does not alleviate it, place oropharyngeal airway (if gag reflex is absent) or

- nasopharyngeal airway
2. Administer oxygen as appropriate. Use bag-valve-mask ventilation if oxygenation/ventilation are compromised
 3. Assess perfusion
 4. Assess neurologic status
 7. For febrile seizures, consider the following interventions after the seizure, since the following interventions provide symptomatic relief for fevers but do not stop the seizure:
 - a. Removing excessive layers of clothing

AND/OR

 - b. Applying cool compresses to the body

EMT

8. Place pulse oximeter and/or waveform capnography to monitor oxygenation/ventilation
9. Check blood glucose level
 - a. If still actively seizing, check blood glucose level
 - b. If less than 60 mg/dL, treat per the **Hypoglycemia** guideline
10. Consider acquiring a 12-lead EKG following cessation of seizure in patients without a history of seizure to determine possible cardiac cause

Patient Safety Considerations

1. Hypoglycemic patients who are treated in the field for seizure should be transported to hospital, regardless of whether or not they return to baseline mental status after treatment

Notes/Educational Pearls

Key Considerations

1. Many airway/breathing issues in seizing patients can be managed placement of an advanced airway. Reserve these measures for patients that fail less invasive maneuvers as noted above
2. For new onset seizures or seizures that are refractory to treatment, consider other potential causes including, but not limited to, trauma, stroke, electrolyte abnormality, toxic ingestion, pregnancy with eclampsia, hyperthermia

Pertinent Assessment Findings

The presence of fever with seizure in children less than 6 months old and greater than 6 yo is **not** consistent with a simple febrile seizure, and should prompt evaluation for meningitis, encephalitis or other cause

Quality Improvement

Key Documentation Elements

- Actively seizing during transport and time of seizure onset/cessation
- Focality of onset, direction of eye deviation
- Concurrent symptoms of apnea, cyanosis, vomiting, bowel/bladder incontinence, or fever
- Neurologic status (GCS, nystagmus, pupil size, focal neurologic deficit or signs of stroke)
- Blood glucose level

Performance Measures

- Frequency of performing glucometry

- Rate of respiratory failure
- Rate of seizure recurrence

Shock

Aliases

None noted

Patient Care Goals

1. Differentiate between possible underlying causes of shock

Patient Presentation

Inclusion Criteria

1. Signs of poor perfusion (due to a medical cause) such as one or more of the following:
 - a. Altered mental status
 - b. Delayed/flash capillary refill
 - c. Hypoxia (pulse oximetry *less than* 94%)
 - d. Decreased urine output
 - e. Respiratory rate greater than 20 in adults or elevated in children (see normal vital signs table)
 - f. Hypotension for age (lowest acceptable systolic blood pressure in mm Hg):
 - i. Less than 1 yo: 60
 - ii. 1-10 yo: (age in years) (2)+70
 - iii. Greater than 10 yo: 90
 - g. Tachycardia for age, out of proportion to
 - h. Weak, decreased or bounding pulses
 - i. Cool/mottled or flushed/ruddy skin
2. Potential etiologies of shock:
 - a. Hypovolemia (poor fluid intake, excessive fluid loss (e.g. bleeding, SIADH, hyperglycemia, excessive diuretics, vomiting, diarrhea)
 - b. Sepsis
 - i. Temperature instability:
 1. Less than 36°C or 96.8°F
 2. Greater than 38.5°C or 101.3°F**and/or**
 3. Tachycardia, warm skin, tachypnea
 - c. Anaphylaxis (urticaria, nausea/vomiting, facial edema, wheezing)
 - d. Signs of heart failure (hepatomegaly, rales on pulmonary exam, extremity edema, JVD)

Exclusion Criteria

Shock due to suspected trauma [see **Trauma** section guidelines]

Patient Management

Assessment

1. History
 - a. History of GI bleeding
 - b. Cardiac problems
 - c. Stroke
 - d. Fever
 - e. Nausea/vomiting, diarrhea

- f. Frequent or no urination
 - g. Syncopal episode
 - h. Allergic reaction
 - i. Immunocompromise (malignancy, transplant, asplenia)
 - j. Adrenal insufficiency
 - k. Presence of a central line or port
 - l. Other risk of infection (spina bifida or other genitourinary anatomic abnormality)
2. Exam
 - a. Airway/breathing (airway edema, rales, wheezing, pulse oximetry, respiratory rate)
 - b. Circulation (heart rate, blood pressure, capillary refill)
 - c. Abdomen (hepatomegaly)
 - d. Mucous membrane hydration
 - e. Skin (turgor, rash)
 - f. Neurologic (GCS, sensorimotor deficits)
 3. Determination of type of shock
 - a. Cardiogenic
 - b. Distributive (neurogenic, septic, anaphylactic)
 - c. Hypovolemic
 - d. Obstructive (e.g. pulmonary embolism, cardiac tamponade, tension pneumothorax)

Treatment and Interventions

EMR

1. Check vital signs
2. Administer oxygen as appropriate
3. For anaphylactic shock, treat per the **Anaphylaxis and Allergic Reaction** guideline

EMT

4. Administer oxygen as appropriate with a target of achieving 94-98% saturation
5. Pulse oximetry and ETCO₂ (reading of less than 25 mmHg may be sign of poor perfusion)
6. Check blood sugar, and correct if less than 60 mg/dl
7. 12-lead EKG
8. Provide advanced notification to the hospital

Notes/Educational Pearls

Key Considerations

1. Patients predisposed to shock:
 - a. Immunocompromised (patients undergoing chemotherapy or with a primary or acquired immunodeficiency)
 - b. Adrenal insufficiency (Addison's disease, congenital adrenal hyperplasia, chronic or recent steroid use)
 - c. History of a solid organ or bone marrow transplant
 - d. Infants
 - e. Elderly
2. In most adults, tachycardia is the first sign of compensated shock, and may persist for hours. Tachycardia can be a late sign of shock in children and a tachycardic child may be close to cardiovascular collapse
3. Hypotension indicates uncompensated shock, which may progress to cardiopulmonary failure within minutes

Pertinent Assessment Findings

1. Decreased perfusion manifested by altered mental status, or abnormalities in capillary refill or pulses, decreased urine output (*less than 1 mL/kg/hr*):
 - a. Cardiogenic, hypovolemic, obstructive shock: capillary refill greater than 2 seconds, diminished peripheral pulses, mottled cool extremities
 - b. Distributive shock: flash capillary refill, bounding peripheral pulses

Quality Improvement

Key Documentation Elements

- Full vital signs with reassessment every 15 minutes or as appropriate
- Neurologic status assessment

Performance Measures

- Percentage of patients who have full vital signs (HR, RR, BP, T, O₂) documented
- Presence of a decision support tool (laminated card, a protocol, or electronic alert) to identify patients in shock
- Percentage of patients with suspected shock for whom advanced notification to the hospital was provided

Resuscitation

Cardiac Arrest

Aliases

Heart attack, arrest, full arrest

Patient Care Goals

1. Return of spontaneous circulation (ROSC)
2. Preservation of neurologic function
3. High-quality chest compressions/CPR with minimal interruption from recognition of cardiac arrest until confirmation of ROSC or field termination of care

Patient Presentation

Inclusion Criteria

Patients with cardiac arrest

Exclusion Criteria

1. Patients suffering cardiac arrest due to severe hypothermia [see **Hypothermia/Cold Exposure** guideline]
2. Patients with identifiable Do Not Resuscitate (or equivalent such as POLST) order [see **Do Not Resuscitate Status/Advance Directive/Healthcare Power of Attorney (POA) Status** guideline]
3. Patients in arrest due to traumatic etiology [see **General Trauma Management** guideline]

Patient Management

Assessment

1. The patient in cardiac arrest requires a prompt balance of treatment and assessment
2. In cases of cardiac arrest, assessments should be focused and limited to obtaining enough information to reveal the patient is pulseless
3. Once pulselessness is discovered, treatment should be initiated immediately and any further history must be obtained by bystanders while treatment is ongoing

Treatment and Interventions

EMR

The most important therapies for patients suffering from cardiac arrest are prompt cardiac defibrillation and minimally interrupted effective chest compressions

1. Initiate chest compressions in cases with no bystander chest compressions or take over compressions from bystanders while a second rescuer is setting up the AED or defibrillator
 - a. If adequate, uninterrupted bystander CPR has been performed or if the patient arrests in front of the EMS providers, immediately proceed with rhythm analysis and defibrillation, if appropriate
 - b. It is realistic for EMS providers to tailor the sequence of rescue actions to the most likely cause of arrest

- c. For adults and children with unmonitored cardiac arrest or for whom an AED is not immediately available, it is reasonable that CPR be initiated while the defibrillator equipment is being retrieved and applied and that defibrillation, if indicated, be attempted as soon as the device is ready for use
- 2. The maximum setting on the defibrillator should be used for initial and subsequent defibrillation attempts. Defibrillation dosing should follow manufacturer's recommendation in the case of biphasic defibrillators. If the manufacturer's recommendation is unknown, use highest setting possible. In the case of monophasic devices, the setting should be 360 J (or 4 J/kg for children)
- 3. Chest compressions should resume immediately after defibrillation attempts with no pauses for pulse checks for 2 minutes regardless of the rhythm displayed on the cardiac monitor
- 4. Apply mechanical CPR assist device when available
- 5. All attempts should be made to prevent avoidable interruptions in chest compressions
- 6. Continue the cycle of chest compressions for 2 minutes, followed by rhythm analysis and defibrillation of shockable rhythms; during this period of time, the proper strategy of airway management is currently not defined and many options for airway management exist – Regardless of the airway management and ventilation strategy, consider the following principles:
 - a. The airway management strategy should not interrupt compressions
 - b. Successful resuscitation from cardiac arrest depends primarily on effective, minimally-interrupted chest compressions and prompt defibrillation; airway management is of secondary importance and should not interfere with compressions and defibrillation – Options for airway management include:
 - i. Passive ventilation:
 - 1. High flow oxygen is applied via a non-rebreather mask with an oropharyngeal airway
 - 2. Some oxygen will be entrained with each decompression of the chest
 - 3. This may be applied for the first 3-4 compression cycles (6-8 minutes), after which one may consider BVM ventilation or placement of an advanced airway (as below).
 - ii. BVM ventilation at 10 breaths per minute (1 breath every 10 compressions), applied during the upstroke between compressions, without interrupting the compressions
 - iii. BVM ventilation with 30:2 ventilation to compression ratio: Each 30 compressions, the compressions are paused briefly to allow 2 BVM ventilations, then compressions immediately resumed
 - 1. **Pediatric Consideration:** For multiple rescuer CPR in children, 15:2 is the recommended compression to ventilation ratio. (30:2 for single rescuer).
 - 2. **Pediatric Consideration:** For neonates, 3:1 is the recommended compression to ventilation ratio.

EMT

- iv. Advanced airway placement:
 - 1. A supraglottic airway may be placed without interruption of compressions
 - 2. Ventilations are provided at 10 breaths/minute for adults

3. **Pediatric Consideration:** for children, 1 breath every 3-5 seconds is recommended (12-20 breaths/minute)
7. Consider causes of cardiac arrest which include the following:
 - a. Hypothermia – additions to care include attempts at active rewarming [see **Hypothermia/Cold Exposure** guideline]
 - b. The dialysis patient/known hyperkalemic patient
 - c. Tricyclic antidepressant overdose
 - d. Hypovolemia
8. If at any time during this period of resuscitation the patient regains return of spontaneous circulation, treat per **Adult Post-ROSC Care** guideline
9. If resuscitation remains ineffective, consider termination of resuscitation [see **Termination of Resuscitative Efforts** guideline]

Patient Safety Considerations

1. Performing manual chest compressions in a moving vehicle may pose a provider safety concern
2. In addition, manual chest compressions during patient movement are less effective in regards to hands on time, depth, recoil and rate
3. Ideally, patients should be resuscitated as close to the scene as operationally possible
4. Risks and benefits should be considered before patient movement in cardiac arrest situations.

Notes/Educational Pearls

Key Considerations

1. Effective chest compressions and defibrillation are the most important therapies to the patient in cardiac arrest. Effective chest compressions are defined as:
 - a. A rate of greater than 100 and less than 120 compressions/minute
 - b. Depth of at least 2 inches (5 cm) and less than 2.4 inches (6cm) for adults and children or 1.5 inches (4 cm) for infants; adolescents who have entered puberty should receive the same depth of chest compressions as an adult
 - c. Allow for complete chest recoil (avoid leaning)
 - d. Minimize interruptions in compressions
 - e. Avoid rescuer fatigue by rotating rescuers at least every 2 minutes. Some EMS pit crew approaches use a provider on either side of the chest, alternating compressions every minute or every 100 compressions to avoid fatigue
2. Avoid excessive ventilation and consider delayed airway management – If no advanced airway, consider:
 - a. Passive ventilation using an NRB with 3-4 cycles of uninterrupted chest compressions (for arrests of suspected cardiac etiology). Consider BVM ventilation or advanced airway after 3-4 cycles
 - b. BVM ventilation every 10-15 compressions with cycles of uninterrupted chest compressions. Upstroke ventilation between compressions. 30:2 ventilation to compression ratio for adults, and 15:2 for children when 2 rescuers are present
 - c. If an advanced airway is placed, ventilations should not exceed 10 breaths/minute (1 breath every 6 seconds or 1 breath every 10 compressions) in adults. **Pediatric Consideration:** For children with an advanced airway, 1 breath every 3-5 seconds is recommended (equivalent to 12-20 breaths/minute)
3. Quantitative end-tidal CO₂ should be used to monitor effectiveness of chest compressions

- a. If ETCO_2 less than 10 mmHg during the initial phases of resuscitation, attempt to improve chest compression quality
4. Chest compressions are usually the most rapidly applied therapy for the patient in cardiac arrest and should be applied as soon as the patient is noted to be pulseless. If there is any delay in defibrillation (for instance, in order to place pads), chest compressions should be initiated while the defibrillator is being applied.
5. Chest compressions should be reinitiated immediately after defibrillation as pulses, if present, are often difficult to detect and rhythm and pulse checks interrupt compressions
6. Continue chest compressions between completion of AED analysis and AED charging
7. Effectiveness of chest compressions decreases with any movements
 - a. Patients should therefore be resuscitated as close to the point at which they are first encountered and should only be moved if the conditions on scene are unsafe or do not operationally allow for resuscitation
 - b. Chest compressions are also less effective in a moving vehicle
 - c. It is also dangerous to EMS providers, patients, pedestrians, and other motorists to perform chest compressions in a moving ambulance
8. The maximum setting on the defibrillator should be used for initial and subsequent defibrillation attempts. Defibrillation dosing should follow manufacturer's recommendation in the case of biphasic defibrillators. If the manufacturer's recommendation is unknown, use highest setting possible. In the case of monophasic devices, the setting should be 360 J (or 4 J/kg for children)
9. At present, the most effective mechanism of airway management is uncertain due to some systems managing the airway aggressively and others managing the airway with basic measures and both types of systems finding excellent outcomes. Regardless of the airway management style, consider the following principles:
 - a. Airway management should not interrupt chest compressions
 - b. Carefully follow ventilation rate and prevent hyperventilation
 - c. Consider limited tidal volumes
 - d. There is uncertainty regarding the proper goals for oxygenation during resuscitation
 - i. Current recommendations suggest using the highest flow rate possible through NRB or BVM
 - ii. This should not be continued into the post-resuscitation phase in which the goal should be an oxygen saturation of 94-98%
 - e. **Pediatric Considerations:** Special attention should be applied to the pediatric population and airway management/respiratory support. Given that the most likely cause of cardiac arrest is respiratory, airway management may be considered early in the patient's care
 - i. However, the order of Circulation-Airway-Breathing is still recommended as the order of priority by the American Heart Association for pediatric resuscitation in order to ensure timely initiation of chest compressions to maintain perfusion, regardless of the underlying cause of the arrest

- ii. In addition, conventional CPR is preferred in children, since it is associated with better outcomes when compared to compression-only CPR
10. Special Circumstances in Cardiac Arrest
- a. Trauma, treat per the **General Trauma Management** guideline
 - b. Pregnancy
 - i. The best hope for fetal survival is maternal survival
 - ii. Position the patient in the supine position with a second rescuer performing manual uterine displacement to the left in an effort to displace the gravid uterus and increase venous return by avoiding aorto-caval compression
 - iii. If manual displacement is unsuccessful, the patient may be placed in the left lateral tilt position at 30°. This position is less desirable than the manual uterine displacement as chest compressions are more difficult to perform in this position
 - iv. Chest compressions should be performed slightly higher on the sternum than in the non-pregnant patient to account for elevation of the diaphragm and abdominal contents in the obviously gravid patient
 - v. Defibrillation should be performed as in non-pregnant patients
 - c. Arrests of respiratory etiology (including drowning) – In addition to the above, consider early management of the patient’s airway. Passive ventilation with a NRB is not indicated for these patients.
11. Application of the “pit crew” model of resuscitation
- a. Ideally, providers in each EMS agency will use a “pit crew” approach when using this protocol to ensure the most effective and efficient cardiac arrest care. Training should include teamwork simulations integrating first responders, BLS, and ALS crewmembers who regularly work together. High-performance systems should practice teamwork using “pit crew” techniques with predefined roles and crew resource management principles. For example (the Pennsylvania State EMS Model for Pit Crew):
 - i. Rescuer 1 and 2 set up on opposite sides of patient’s chest and perform continuous chest compressions, alternating after every 100 compressions to avoid fatigue
 - ii. Use a metronome or CPR feedback device to ensure that compression rate is 100-120/minute
 - iii. Chest compressions are only interrupted during rhythm check (AED analysis or manual) and defibrillation shocks – Continue compressions when AED/defibrillator is charging
 - iv. During the first four cycles of compressions/defibrillation (approximately 10 minutes) avoid advanced airway placement
 - v. One responding provider assumes code leader position overseeing the entire response
 - vi. Use a CPR checklist to ensure that all best practices are followed during CPR
 - b. For efficient “pit crew” style care, the EMS agency medical director should establish the options that will be used by providers functioning within the EMS agency. Options include establishing:
 - i. The airway/ventilation management, if any, that will be used

12. The EMS agency must perform a QI review of care and outcome, overseen by the agency medical director, for every patient that receives CPR
 - a. The QI should be coordinated with local receiving hospitals to include hospital admission, discharge, and condition information. This EMS agency QI can be accomplished by participation an organized cardiac arrest registry
 - b. The QI should be coordinated with local PSAP/dispatch centers to review opportunities to assure optimal recognition of possible cardiac arrest cases and provision of dispatch-assisted CPR (including hands-only CPR when appropriate)

Quality Improvement

Key Documentation Elements

- Should be tailored to any locally utilized data registry but may include as a minimum the following elements:
 - Resuscitation attempted and all interventions performed
 - Arrest witnessed
 - Location of arrest
 - First monitored rhythm
 - CPR before EMS arrival
 - Outcome
 - Any ROSC
 - Presumed etiology
 - Presumed cardiac
 - Trauma
 - Submersion
 - Respiratory
 - Other non-cardiac
 - Unknown

Performance Measures

- Time to scene
- Time to patient
- Time to first CPR
- Time to first shock
- Time of ROSC
- Review of CPR Quality
 - Compression Fraction
 - Average and longest peri-shock pause
 - Rate and depth of compressions

Adult Post-ROSC (Return of Spontaneous Circulation) Care

Aliases

None noted

Patient Care Goals

Out-of-hospital cardiac arrest in the U.S. has a mortality rate greater than 90% and results in excess of 300,000 deaths per year. Many of those who do survive suffer significant neurologic morbidity. Current research has demonstrated that care of patients with return of spontaneous circulation (ROSC) at specialized centers is associated with both decreased mortality and improved neurologic outcomes.

The goal is therefore to optimize neurologic and other function following a return of spontaneous circulation following resuscitated cardiac arrest.

Patient Presentation

Inclusion Criteria

Patient returned to spontaneous circulation following cardiac arrest resuscitation

Exclusion Criteria

None recommended

Patient Management

Treatment and Interventions

EMR

1. Perform general patient management
2. Support life-threatening problems associated with airway, breathing, and circulation. Monitor closely for reoccurrence of cardiac arrest
3. Administer oxygen as appropriate
4. Do not hyperventilate. Maintain a ventilation rate of 6-8 per minute
5. If patient seizes, treat per **Seizures** guideline
6. Do not allow patient to become hyperthermic

EMT

7. Administer oxygen as appropriate with a target of achieving 94-98% saturation. Do not hyperoxygenate
8. Do not hyperventilate. Maintain a ventilation rate of 6-8 per minute and ET_{CO}₂ of 30-40 mmHg
9. Check blood glucose
 - a. If hypoglycemic, treat per **Hypoglycemia** guideline
 - b. If hyperglycemic, notify hospital on arrival
10. Perform 12-lead EKG
11. Consider transport patients to facility which offers specialized post-resuscitative care

Patient Safety Considerations

1. Avoid hyperthermia
2. Prehospital initiation of therapeutic hypothermia is not routinely recommended

Notes/Educational Pearls

Key Considerations

1. Hyperventilation is a significant cause of hypotension and recurrence of cardiac arrest in the post resuscitation phase and must be avoided
2. Most patients immediately post resuscitation will require ventilatory assistance
3. The condition of post-resuscitation patients fluctuates rapidly and continuously, and they require close monitoring. A significant percentage of post-OSC patients will re-arrest
4. Common causes of post-resuscitation hypotension include hyperventilation, hypovolemia, and pneumothorax

Pertinent Assessment Findings

Assess post-ROSC rhythm, lung sounds, and for signs of hypoperfusion

Quality Improvement

Key Documentation Elements

- Immediate post-arrest rhythms, vital signs, oxygen saturation, neurologic status assessment
- Post-ROSC 12-lead EKG

Performance Measures

- Percent of ROSC patients transported to appropriate facility as defined by the EMS system

Determination of Death/Withholding Resuscitative Efforts

Aliases

None noted

Patient Care Goals

All clinically dead patients will receive all available resuscitative efforts including cardiopulmonary resuscitation (CPR) unless contraindicated by one of the exceptions defined below.

Patient Presentation

A clinically dead patient is defined as any unresponsive patient found without respirations and without a palpable carotid pulse.

Inclusion/Exclusion Criteria:

1. Resuscitation should be started on all patients who are found apneic and pulseless unless the following conditions exist (does not apply to victims of lightning strikes, drowning, or hypothermia):
 - a. Medical cause or traumatic injury or body condition clearly indicating biological death (irreversible brain death), limited to:
 - i. Decapitation: the complete severing of the head from the remainder of the patient's body
 - ii. Decomposition or putrefaction: the skin is bloated or ruptured, with or without soft tissue sloughed off. The presence of at least one of these signs indicated death occurred at least 24 hours previously
 - iii. Transection of the torso: the body is completely cut across below the shoulders and above the hips through all major organs and vessels. The spinal column may or may not be severed
 - iv. Incineration: 90% of body surface area with full thickness burns as exhibited by ash rather than clothing and complete absence of body hair with charred skin
 - v. Injuries incompatible with life (such as massive crush injury, complete exsanguination, severe displacement of brain matter)
 - vi. Futile and inhuman attempts as determined by agency policy/protocol related to "compelling reasons" for withholding resuscitation
 - vii. In blunt and penetrating trauma, if the patient is apneic, pulseless, and without other signs of life upon EMS arrival including, but not limited to spontaneous movement, EKG activity, or pupillary response
 - viii. Nontraumatic arrest with obvious signs of death including dependent lividity or rigor mortis
- OR**
- a. A valid DNR order (form, card, bracelet) or other actionable medical order (e.g. POLST/MOLST form) present, when it:
 - i. Conforms to the state specifications for color and construction
 - ii. Is intact: it has not been cut, broken or shows signs of being repaired
 - iii. Displays the patient's name and the physician's name

Patient Management

Assessment

Assess for dependent lividity with rigor mortis and/or other inclusion criteria

Treatment and Interventions

EMR

1. If all the components above are confirmed, no CPR is required
2. If any of the findings are different than those described above, clinical death is not confirmed and resuscitative measures should be immediately initiated or continued. The **Termination of Resuscitative Efforts** guideline should then be implemented

EMT

3. If CPR has been initiated but all the components above have been subsequently confirmed, CPR may be discontinued and direct medical oversight contacted as needed
4. To request permission to withhold treatment under these conditions for any reason, obtain direct medical oversight
5. Do Not Resuscitate order (DNR/MOLST/POLST) with signs of life:
 - a. If there is a DNR bracelet or DNR transfer form and there are signs of life (pulse and respirations), provide standard appropriate treatment under existing protocols matching the patient's condition
 - b. If there is documentation of a Do Not Intubate (DNI/MOLST/POLST) advanced directive, the patient should receive full treatment per protocols with the exception of any intervention specifically prohibited in the patient's advanced directive
 - c. If for any reason an intervention that is prohibited by an advanced directive is being considered, direct medical oversight should be obtained

Patient Safety Considerations

In cases where the patient's status is unclear and the appropriateness of withholding resuscitation efforts is questioned, EMS personnel should initiate CPR immediately and then contact direct medical oversight.

Notes/Educational Pearls

Key Considerations

1. For scene safety and/or family wishes, provider may decide to implement CPR even if all the criteria for death are met
2. At a likely crime scene, disturb as little potential evidence as possible

Pertinent Assessment Findings

No recommendations

Quality improvement

Key Documentation Elements

- Clinical/situational details that may be available from bystanders/caregivers
- Documentation of details surrounding decision to determine death
 - Time of contact with direct medical oversight

- Time of death determination
- Names/contact information for significant bystanders

Performance Measures

None recommended

Do Not Resuscitate Status/Advance Directives/Healthcare Power of Attorney (POA) Status

Aliases

DNR, comfort care

Patient Care Goals

To acknowledge and maintain the variety of ways that patients can express their wishes about cardiopulmonary resuscitation or end of life decision making.

Patient Presentation

Inclusion/Exclusion Criteria

1. Patients must have one of the following documents or a valid alternative (such as identification bracelet indicating wishes) immediately available.
 - a. Physician Orders for Life Sustaining Treatment (POLST) or Medical Orders for Life Sustaining Treatment (MOLST) – explicitly describes acceptable interventions for the patient in the form of medical orders, must be signed by a physician or other empowered medical provider to be valid
 - b. Do Not Resuscitate (DNR) order – identifies that CPR and advanced airways are not to be initiated if the patient is in arrest or peri-arrest. The interventions covered by this order and the details around when to implement them can vary widely
 - c. Advance directives – document that describes acceptable treatments under a variable number of clinical situations including some or all of the following: what to do for cardiac arrest, whether artificial nutrition is acceptable, organ donation wishes, dialysis, and other parameters. The directives frequently do not apply to emergent or potentially transient medical conditions
2. One of the documents above is valid when it meets all of the following criteria:
 - a. Conforms to the state specifications for color and construction
 - b. Is intact: it has not been cut, broken or shows signs of being repaired
 - c. Displays the patient's name and the physician's name
3. If there is question about the validity of the form/instrument, the best course of action is to proceed with the resuscitation until additional information can be obtained to clarify the best course of action
4. If a patient has a valid version of one of the above documents, it will be referred to as a "valid exclusion to resuscitation" for the purposes of this protocol

Patient Management

Assessment

1. If the patient has a valid exclusion to resuscitation then no CPR or airway management should be attempted, however this does not exclude comfort measures
2. If CPR has been initiated and a valid exclusion to resuscitation has been subsequently verified, CPR may be discontinued and direct medical oversight contacted as needed

Treatment and Interventions

EMR/EMT

1. If there is a valid exclusion to resuscitation and there are signs of life (pulse and

respirations), EMS providers should provide standard appropriate treatment under existing protocols according to the patient's condition

- a. If the patient has a MOLST or POLST, it may provide specific guidance on how to proceed in this situation
 - b. Directives should be followed as closely as possible and direct medical oversight contacted as needed
2. The patient should receive full treatment per protocols with the exception of any intervention specifically prohibited in the patient's valid exclusion to resuscitation
 3. If for any reason an intervention that is prohibited by an advanced directive is being considered, direct medical oversight should be obtained

Patient Safety Considerations

In cases where the patient's status is unclear and the appropriateness of withholding resuscitation efforts is questioned, EMS personnel should initiate CPR immediately and contact direct medical oversight.

Notes/Educational Pearls

Key Considerations

1. If there is a personal physician present at the scene who has an ongoing relationship with the patient, that physician may decide if resuscitation is to be initiated
2. If there is a registered nurse from a home healthcare or hospice agency present at the scene who has an ongoing relationship with the patient, and who is operating under orders from the patient's private physician, that nurse (authorized nurse) may decide if resuscitation is to be initiated
3. If the physician or nurse decides resuscitation is to be initiated, usual direct medical oversight procedures will be followed
4. Special Consideration: For scene safety and/or family wishes, provider may decide to implement CPR even if all the criteria for death are met

Pertinent Assessment Findings

No recommendations

Quality Improvement

Key Documentation Elements

- Detailed description of the valid exclusion to resuscitation documentation used to guide resuscitation including a copy of the document if possible
- Names/contact information for significant bystanders

Performance Measures

None recommended

Termination of Resuscitative Efforts

Aliases

Call the code

Patient Care Goals

1. When there is no response to prehospital cardiac arrest treatment, it is acceptable and often preferable to cease futile resuscitation efforts in the field.
2. In patients with cardiac arrest, prehospital resuscitation is initiated with the goal of returning spontaneous circulation before permanent neurologic damage occurs.
3. CPR that is performed during patient packaging and transport is much less effective than CPR done at the scene. Additionally, EMS providers risk physical injury while attempting to perform CPR in a moving ambulance while unrestrained. In addition, continuing resuscitation in futile cases places other motorists and pedestrians at risk, increases the time that EMS crews are not available for another call, impedes emergency department care of other patients, and incurs unnecessary hospital charges. Lastly, return of spontaneous circulation is dependent on a focused, timely resuscitation. The patient in arrest should be treated as expeditiously as possible, including quality, uninterrupted CPR and timely defibrillation as indicated.
4. When cardiac arrest resuscitation becomes futile, the patient's family should become the focus of the EMS providers. Families need to be informed of what is being done, and transporting all cardiac arrest patients to the hospital is not supported by evidence and inconveniences the family by requiring a trip to the hospital where they must begin grieving in an unfamiliar setting. Most families understand the futility of the situation and are accepting of ceasing resuscitation efforts in the field.

Patient Presentation

Patient in cardiac arrest.

Inclusion Criteria

1. Any cardiac arrest patient that has received resuscitation in the field but has not responded to treatment
2. When resuscitation has begun and it is found that the patient has a DNR order or other actionable medical order (e.g. POLST/MOLST form)

Exclusion Criteria

Consider continuing resuscitation for patients in cardiac arrest associated with medical conditions that may have a better outcome despite prolonged resuscitation, including hypothermia (although under certain circumstances, direct medical oversight may order termination of resuscitation in these conditions)

Patient Management

EMT

Resuscitation may be terminated under the following circumstances:

1. Non-traumatic arrest
 - a. Patient is at least 18 years of age
 - b. Arrest was not witnessed by EMS provider or first responder
 - c. No return of spontaneous circulation (ROSC) after 3 full rounds of CPR and automated external defibrillator (AED) analysis
 - d. No AED shocks were delivered
 - e. No evidence of neurological function (non- reactive pupils, no response to pain, no spontaneous movement)
 - f. No evidence or suspicion of hypothermia
 - g. All EMS personnel involved in the patient's care agree that discontinuation of the resuscitation is appropriate
 - h. Contact direct medical oversight before termination of resuscitative efforts
2. Traumatic arrest
 - a. Patient is at least 18 years of age
 - b. Resuscitation efforts may be terminated in any blunt trauma patient who, based on thorough primary assessment, is found apneic and pulseless upon arrival of emergency medical services at the scene
 - c. Victims of penetrating trauma found apneic and pulseless by EMS should be rapidly assessed for the presence of other signs of life, such as pupillary reflexes, spontaneous movement, and response to pain
 - i. Resuscitation may be terminated with direct medical oversight if these signs of life are absent
 - ii. If resuscitation is not terminated, transport is indicated
 - d. Cardiopulmonary arrest patients in whom mechanism of injury does not correlate with clinical condition, suggesting a non-traumatic cause of arrest, should have standard resuscitation initiated
 - e. All EMS personnel involved in the patient's care agree that discontinuation of the resuscitation is appropriate
 - f. Contact direct medical oversight before termination of resuscitative efforts

Assessment

1. Pulse
2. Respirations
3. Neurologic status assessment [purposeful movement, pupillary response]
4. Cardiac activity/AED analysis
5. Quantitative capnography

Treatment and Interventions

1. Focus on continuous, quality CPR that is initiated as soon as possible
2. Focus attention on the family and/or bystanders. Explain the rationale for termination
3. Consider support for family members such as other family, friends, clergy, faith leaders, or chaplains
4. For patients that are less than 18 yo, consultation with direct medical oversight is recommended

Patient Safety Considerations

All patients who have a shockable rhythm at any time should have full resuscitation.

Notes/Educational Pearls

Key Considerations and Pertinent Assessment Findings

1. Recent evidence has shown that, in order to capture over 99% of potential survivors from medical cardiac arrest (especially VF and pulseless VT arrests), resuscitation should be continued for approximately 40 minutes. This does not imply, however, that all resuscitations should continue this long (e.g. asystolic rhythms)
2. In remote or wilderness situations, EMS providers should make every effort to contact direct medical oversight, but resuscitation may be terminated in the field without direct medical oversight when the following have occurred:
 - a. There has been no return of pulse despite greater than 30 minutes of CPR (this does not apply in the case of hypothermia)
 - b. Transport to an emergency department will take greater than 30 minutes (this does not apply in the case of hypothermia)
 - c. EMS providers are exhausted and it is physically impossible to continue the resuscitation
3. Logistical factors should be considered, such as collapse in a public place, family wishes, and safety of the crew and public
4. Survival and functional neurologic outcomes are unlikely if ROSC is not obtained by EMS. It is dangerous to crew, pedestrians, and other motorists to attempt to resuscitate a patient during ambulance transport
5. Quantitative end-tidal carbon dioxide measurements of less than 10 mmHg or falling greater than 25% despite resuscitation indicates a poor prognosis and provide additional support for termination

Quality Improvement

Key Documentation Elements

- All items listed under patient management must be clearly documented in the EMS patient care report in addition to the assessment findings supporting this medical decision making
- If resuscitation is continued for special circumstance or despite satisfying the criteria in this guideline, the rationale for such decision making must be documented

Performance Measures

- Time to CPR
- Time to AED application if applicable
- Review of CPR quality
- Duration of resuscitative efforts
- Review of biometric data/CPR quality if available
- Appropriateness of termination
- Review of every patient transport from scene with patient in arrest

Pediatric-Specific Guidelines

Brief Resolved Unexplained Event (BRUE)

Aliases

Apparent Life-Threatening Event, ALTE

Patient Care Goals

1. Recognize patient characteristics and symptoms consistent with a BRUE
2. Promptly identify and intervene for patients who require escalation of care
3. Choose proper destination for patient transport

Patient Presentation

Inclusion Criteria

1. Suspected BRUE: An event in an infant less than 1 yo reported by a bystander as sudden, brief (less than 1 min), completely resolved upon EMS arrival that includes one or more of the following:
 - a. Absent, decreased, or irregular breathing
 - b. Color change (central cyanosis or pallor)
 - c. Marked change in muscle tone (hyper- or hypotonia)
 - d. Altered level of responsiveness

Exclusion Criteria

1. Any of the following present upon EMS evaluation:
 - a. Abnormal vitals signs for age (including fever)
 - b. Vomiting
 - c. Signs of trauma
 - d. Noisy breathing
2. Identifiable cause for the event, which may include:
 - a. Gastric reflux (spitting up)
 - b. Swallowing dysfunction
 - c. Nasal congestion
 - d. Periodic breathing of the newborn
 - e. Breath-holding spell
 - f. Change in tone associated with choking, gagging, crying, feeding
 - g. Seizure (eye deviation, nystagmus, tonic-clonic activity)
3. History or exam concerning for child abuse or neglect
4. Color change that involved only redness (e.g. in the face) or isolated perioral or hand/feet cyanosis

Patient Management

Assessment

1. History
 - a. History of circumstances and symptoms before, during, and after the event, including duration, interventions done, and patient color, tone, breathing, feeding, position, location, activity, level of consciousness
 - b. Other concurrent symptoms (fever, congestion, cough, rhinorrhea, vomiting, diarrhea, rash, labored breathing, fussy, less active, poor sleep, poor feeding)
 - c. Prior history of BRUE
 - d. Past medical history (prematurity, prenatal/birth complications, gastric reflux, congenital heart disease, developmental delay, airway abnormalities, breathing problems, prior hospitalizations, surgeries, or injuries)
 - e. Family history of sudden unexplained death or cardiac arrhythmia in other children or young adults
 - f. Social history: who lives at home, recent household stressors, exposure to toxins/drugs, sick contacts)
 - g. Considerations for possible child abuse (multiple/changing versions of the story; reported mechanism of injury does not seem plausible, especially for child's developmental stage)
2. Exam
 - a. Full set of vital signs (per **Universal Care** guideline, includes: T, P, RR, BP, O₂ sat)
 - b. General assessment:
 - i. Signs of respiratory distress (grunting, nasal flaring, retracting)
 - ii. Color (pallor, cyanosis, normal)
 - iii. Mental status (alert, tired, lethargic, unresponsive, irritability)
 - a. Head to toe exam, including:
 - i. Physical exam for signs of trauma or neglect
 - ii. Pupillary response

Treatment and Interventions

EMR

1. Airway
 - a. Give supplemental oxygen for signs of respiratory distress or hypoxemia - Escalate from a nasal cannula to a simple face mask to a non-rebreather mask as needed [see **Airway Management** guideline]
 - b. Suction the nose and/or mouth (via bulb, suction catheter) if excessive secretions are present

EMT

2. Monitoring
 - a. Continuous pulse oximetry
 - b. Check blood glucose
 - c. Serial observations during transport for change in condition

Patient Safety Considerations

1. Regardless of patient appearance, all patients with a history of signs or symptoms of BRUE should be transported for further evaluation
2. Destination considerations
 - a. Consider transport to a facility with pediatric critical care capability for patients with high risk criteria present:
 - i. Less than 2 months of age
 - ii. History of prematurity (less than or equal to 32 weeks gestation or corrected gestational age less than or equal to 45 weeks)
 - iii. More than 1 BRUE, now or in the past
 - b. All patients should be transported to facilities with baseline readiness to care for children

Notes/Educational Pearls

Key Considerations

1. BRUE is a group of symptoms, not a disease process
2. High risk BRUE patients may require ED or hospital intervention
3. All patients should be transported to an ED
4. Contact direct medical oversight if parent/guardian is refusing medical care and/or transport, especially if any high-risk criteria are present (see above)

Quality Improvement

Key Documentation Elements

- Document key aspect of history
 - Color change
 - Apnea
 - Change in muscle tone
 - Caregiver resuscitation efforts
 - History of prematurity
 - Prior BRUE events
 - Past medical history
- Document key aspects of the exam to assess for a change after each intervention:
 - Full set of vitals signs (T, RR, BP, P, O₂ sat)
 - Respiratory effort
 - Mental status
 - Color
 - Presence of signs of trauma or neglect

Performance Measures

- Complete set of vital signs recorded
- Appropriate transport destination relative to risk criteria

Pediatric Respiratory Distress

Aliases

None noted

Patient Care Goals

1. Alleviate respiratory distress
2. Promptly identify respiratory distress, failure, and/or arrest, and intervene for patients who require escalation of therapy

Patient Management

Assessment Assessment

1. History
 - a. Onset of symptoms (history of choking)
 - b. Concurrent symptoms (fever, cough, rhinorrhea, tongue/lip swelling, rash, labored breathing, foreign body aspiration)
 - c. Contact with anyone sick
 - d. Treatments given
 - e. Personal history of asthma, wheezing, or croup in past
 - Number of emergency department visits and hospital admissions in the past year
 - f. History of prematurity
2. Exam
 - a. Full set of vital signs (T, BP, RR, P, O₂ sat)
 - b. Presence of stridor at rest or when agitated
 - c. Description of cough Breath sounds (wheezes, crackles, rales, rhonchi, diminished, clear)
 - d. Other signs of distress (grunting, nasal flaring, retracting)
 - e. Color (pallor, cyanosis, normal)
 - f. Mental status (alert, tired, lethargic, unresponsive)
 - g. Weak cry or inability to speak full sentences (sign of shortness of breath)
 - h. Hydration status (+/- sunken eyes, delayed capillary refill, mucus membranes moist vs. tacky, fontanel flat vs. sunken)

Treatment and Interventions

EMR

1. Airway
 - a. Give supplemental oxygen – escalate from a nasal cannula to a simple face mask to a non-breather mask as needed, in order to maintain normal oxygenation
 - b. Suction the nose and/or mouth (via bulb, Yankauer®, or suction catheter) if excessive secretions are present
2. Improvement of oxygenation and/or respiratory distress with non-invasive airway adjuncts
 - a. Bag-valve-mask ventilation should be utilized in children with respiratory failure

EMT

3. Pulse oximetry and end-tidal CO₂ (ETCO₂) should be routinely used as an adjunct to other forms of respiratory monitoring
4. Supraglottic devices

- a. Supraglottic devices should be utilized only if bag-valve-mask ventilation fails
- b. The airway should be managed in the least invasive way possible

Patient Safety Considerations

Routine use of lights and sirens is not recommended during transport.

Notes/Educational Pearls

Key Considerations

1. Suctioning can be a very effective intervention to alleviate distress, since infants are obligate nose breathers
2. Upper airway obstruction can have inspiratory, expiratory, or biphasic stridor
3. Foreign bodies can mimic croup, it is important to ask about a possible choking event
4. Impending respiratory failure is indicated by:
 - Change in mental status such as fatigue and listlessness
 - Pallor
 - Dusky appearance
 - Decreased retractions
 - Decreased breath sounds with decreasing stridor

Pertinent Assessment Findings

Frequent reassessment is necessary

Quality Improvement

Key Documentation Elements

Document key aspects of the exam to assess for a change after each intervention:

1. Respiratory rate
2. Oxygen saturation
3. Use of accessory muscles or tracheal tugging
4. Breath sounds
5. Air entry
6. Mental status
7. Color

Performance Measures

1. Change in vital signs (heart rate, blood pressure, temperature, respiratory rate, pulse oximeter, capnography values)

Neonatal Resuscitation

Aliases

None noted

Patient Care Goals

1. Provide routine care to the newly born infant
2. Perform a neonatal assessment
3. Rapidly identify newly born infants requiring resuscitative efforts
4. Provide appropriate interventions to minimize distress in the newly born infant
5. Recognize the need for additional resources based on patient condition and/or environmental factors

Patient Presentation

Inclusion Criteria

Newly born infants

Exclusion Criteria

Documented gestational age less than 20 weeks (usually calculated by date of last menstrual period). If any doubt about accuracy of gestational age, initiate resuscitation.

Patient Management

Assessment

1. History
 - a. Date and time of birth
 - b. Onset of symptoms
 - c. Prenatal history (prenatal care, substance abuse, multiple gestation, maternal illness)
 - d. Birth history (maternal fever, presence of meconium, prolapsed or nuchal cord, maternal bleeding)
 - e. Estimated gestational age (may be based on last menstrual period)
2. Exam
 - a. Respiratory rate and effort (strong, weak, or absent; regular or irregular)
 - b. Signs of respiratory distress (grunting, nasal flaring, retractions, gasping, apnea)
 - c. Heart rate (fast, slow, or absent)
 - i. Precordium, umbilical stump or brachial pulse may be used
 - ii. Auscultation of chest is preferred since palpation of umbilical stump is less accurate
 - d. Muscle tone (poor or strong)
 - e. Color/Appearance (central cyanosis, acrocyanosis, pallor, normal)
 - f. APGAR score (appearance, pulse, grimace, activity, respiratory effort) - may be calculated for documentation, but not necessary to guide resuscitative efforts
 - g. Estimated gestational age (term, late preterm, premature)
 - h. Pulse oximetry should be considered if prolonged resuscitative efforts or if supplemental oxygen is administered - goal: oxygen saturation at 10 minutes is 85-95%

Treatment and Interventions

EMR

1. If immediate resuscitation is required and the newborn is still attached to the mother, clamp the cord in two places and cut between the clamps. If no resuscitation is required, warm/dry/stimulate the newborn and then cut/clamp the cord after 60 seconds or the cord stops pulsating
2. Warm, dry, and stimulate
 - a. Wrap infant in dry towel or thermal blanket to keep infant as warm as possible during resuscitation; keep head covered if possible
 - b. If strong cry, regular respiratory effort, good tone, and term gestation, infant should be placed skin-to-skin with mother and covered with dry linen
3. If weak cry, signs of respiratory distress, poor tone, or preterm gestation then position airway (sniffing position) and clear airway as needed - if thick meconium or secretions present and signs of respiratory distress, suction mouth then nose
4. If heart rate greater than 100 beats per minute
 - a. Monitor for central cyanosis - provide blow-by oxygen as needed
 - b. Monitor for signs of respiratory distress. If apneic or in significant respiratory distress:
 - i. Initiate bag-valve-mask ventilation with room air at 40-60 breaths per minute
5. If heart rate less than 100 beats per minute
 - a. Initiate bag-valve-mask ventilation 40-60 breaths per minute
 - i. Primary indicator of effective ventilation is improvement in heart rate
 - ii. Rates and volumes of ventilation required can be variable, only use the minimum necessary rate and volume to achieve chest rise and a change in heart rate
6. If heart rate less than 60 beats per minute
 - a. Ensure effective ventilations with supplementary oxygen and adequate chest rise
 - b. If no improvement after 30 seconds, initiate chest compressions - two-thumb-encircling-hands technique is preferred
 - c. Coordinate chest compressions with positive pressure ventilation (3:1 ratio, 90 compressions and 30 breaths per minute)

EMT

7. Consider checking a blood glucose for ongoing resuscitation, maternal history of diabetes, ill appearing or unable to feed

Patient Safety Considerations

1. Hypothermia is common in newborns and worsens outcomes of nearly all post-natal complications
 - a. Ensure heat retention by drying the infant thoroughly, covering the head, and wrapping the baby in dry cloth

- b. When it does not encumber necessary assessment or required interventions, “kangaroo care” (i.e. placing the infant skin-to-skin directly against mother’s chest and wrapping them together) is an effective warming technique
 - c. Newborn infants are prone to hypothermia which may lead to hypoglycemia, hypoxia and lethargy. Aggressive warming techniques should be initiated including drying, swaddling, and warm blankets covering body and head. Check blood glucose and follow **Hypoglycemia** guideline as appropriate.
2. During transport, neonate should be appropriately secured in seat or isolette and mother should be appropriately secured

Notes/Educational Pearls

Key Considerations

1. Approximately 10% of newly born infants require some assistance to begin breathing
2. Deliveries complicated by maternal bleeding (placenta previa, vas previa, or placental abruption) place the infant at risk for hypovolemia secondary to blood loss
3. Low birth weight infants are at high risk for hypothermia due to heat loss
4. If pulse oximetry is used as an adjunct, the preferred placement place of the probe is the right arm, preferably wrist or medial surface of the palm. Normalization of blood oxygen levels (SaO₂ 85-95%) will not be achieved until approximately 10 minutes following birth
5. Both hypoxia and excess oxygen administration can result in harm to the infant. If prolonged oxygen use is required, titrate to maintain an oxygen saturation of 85-95%
6. While not ideal, a larger facemask than indicated for patient size may be used to provide bag-valve-mask ventilation if an appropriately sized mask is not available - avoid pressure over the eyes as this may result in bradycardia
7. Increase in heart rate is the most reliable indicator of effective resuscitative efforts
8. A multiple gestation delivery may require additional resources and/or providers

Pertinent Assessment Findings

1. It is difficult to determine gestational age in the field – if there is any doubt as to viability, resuscitation efforts should be initiated
2. Acrocyanosis, a blue discoloration of the distal extremities, is a common finding in the newly born infant transitioning to extrauterine life – this must be differentiated from central cyanosis

Quality Improvement

Key Documentation Elements

- Historical elements
 - Prenatal complications
 - Delivery complications
 - Date and time of birth
 - Estimated gestational age

- Physical exam findings
 - Heart rate
 - Respiratory rate
 - Respiratory effort
 - Appearance
 - APGAR score at 1 and 5 minutes

Performance Measures

- Prehospital on-scene time
- Call time for additional resources
- Arrival time of additional unit
- Time to initiation of interventions
- Use of oxygen during resuscitation
- ROSC and/or normalization of heart rate

OB/GYN

Childbirth

Aliases

Labor, delivery, birth

Patient Care Goals

1. Recognize imminent birth
2. Assist with uncomplicated delivery of term newborn
3. Recognize complicated delivery situations
4. Apply appropriate techniques when delivery complication exists

Patient Presentation

Inclusion Criteria

Imminent delivery with crowning

Exclusion Criteria

1. Vaginal bleeding in any stage of pregnancy [see **Obstetrical/Gynecological Conditions** guideline]
2. Emergencies in first or second trimester of pregnancy [see **Obstetrical/Gynecological Conditions** guideline]
3. Seizure from eclampsia [see **Obstetrical/Gynecological Conditions** and **Eclampsia/Pre-Eclampsia** guidelines]

Patient Management

Assessment:

1. Signs of imminent delivery:
 - a. Contractions
 - b. Crowning
 - c. Urge to push
 - d. Urge to move bowels
 - e. Membrane rupture
 - f. Bloody show

Treatment and Interventions

EMR/EMT

1. If patient in labor but no signs of impending delivery, transport to appropriate receiving facility
2. Delivery should be controlled so as to allow a slow controlled delivery of infant – This will prevent injury to mother
 - a. Support the infant's head as needed
3. Check for cord around the baby's neck
 - a. If present, slip it over the head
 - b. If unable to free the cord from the neck, double clamp the cord and cut between the

clamps

4. Do not routinely suction the infant's airway (even with a bulb syringe) during delivery
5. Grasping the head with hand over the ears, gently guide head down to allow delivery of the anterior shoulder
6. Gently guide the head up to allow delivery of the posterior shoulder
7. Slowly deliver the remainder of the infant
8. After 1-3 minutes, clamp cord about 6 inches from the abdomen with 2 clamps; cut the cord between the clamps
 - a. If resuscitation is needed, clamp cord and cut as soon as possible
9. Record APGAR scores at 1 and 5 minutes
 - a. After delivery of infant, suctioning (including suctioning with a bulb syringe) should be reserved for infants who have obvious obstruction to the airway or require positive pressure ventilation (follow **Neonatal Resuscitation** guideline for further care of the infant)
10. Dry and warm infant, wrap in towel and place on maternal chest unless resuscitation needed
11. The placenta will deliver spontaneously, often within 5-15 minutes of the infant
 - a. Do not force the placenta to deliver; do not pull on umbilical cord
 - b. Contain all tissue in plastic bag and transport
12. After delivery, massaging the uterus and allowing the infant to nurse will promote uterine contraction and help control bleeding
 - a. Estimate maternal blood loss
 - b. Treat for hypovolemia as needed
13. Transport infant secured in seat or isolette unless resuscitation needed
14. Keep infant warm during transport
15. Most deliveries proceed without complications – If complications of delivery occur, the following are recommended:
 - a. Shoulder dystocia – if delivery fails to progress after head delivers, quickly attempt the following
 - i. Hyperflex mother's hips to severe supine knee-chest position
 - ii. Apply firm suprapubic pressure to attempt to dislodge shoulder
 - iii. Apply high-flow oxygen to mother
 - iv. Transport as soon as possible
 - v. Contact direct medical oversight and/or closest appropriate receiving facility for direct medical oversight and to prepare team
 - b. Prolapsed umbilical cord
 - i. Placed gloved hand into vagina and gently lift head/body off of cord
 1. Assess for pulsations in cord
 2. Maintain until relieved by hospital staff.
 - i. Consider placing mother in prone knee-chest position or extreme Trendelenburg
 - ii. Apply high-flow oxygen to mother
 - iii. Transport as soon as possible
 - iv. Contact/transport to closest appropriate receiving facility for direct medical oversight and to prepare team
 - c. Breech birth
 - i. Place mother supine, allow the buttocks and trunk to deliver spontaneously, then support the body while the head is delivered

- ii. If head fails to deliver, place gloved hand into vagina with fingers between infant's face and uterine wall to create an open airway
- iii. Apply high-flow oxygen to mother
- iv. Transport as soon as possible
- v. Contact direct medical oversight and/or closest appropriate receiving facility for direct medical oversight and to prepare team
- vi. The presentation of an arm or leg through the vagina is an indication for immediate transport to hospital
- vii. Assess for presence of prolapsed cord and treat as above
- d. Excessive bleeding during active labor may occur with placenta previa
 - i. Obtain history from patient
 - ii. Placenta previa may prevent delivery of infant vaginally
 - iii. C-Section needed – transport urgently
- e. Maternal cardiac arrest
 - i. Apply manual pressure to displace uterus from right to left
 - ii. Treat per the **Cardiac Arrest** guideline for resuscitation care (defibrillation should be performed as if non-pregnant patient)
 - iii. Transport as soon as possible if infant is estimated to be over 24 weeks gestation (perimortem Cesarean section at receiving facility is most successful if done within 5 minutes of maternal cardiac arrest)
 - iv. Contact direct medical oversight and/or closest appropriate receiving facility for direct medical oversight and to prepare team

Patient Safety Considerations

1. Supine Hypotension Syndrome:
 - a. If mother has hypotension before delivery, place patient in left lateral recumbent position or manually displace gravid uterus to the left if supine position necessary
 - b. Knee-chest position may create safety issues during rapid ambulance transport
2. Do not routinely suction the infant's airway (even with a bulb syringe) during delivery
3. Newborns are very slippery, take care not to drop the infant
4. Do not pull on the umbilical cord while the placenta is delivering
5. If possible, transport between deliveries if mother is expecting twins

Notes/Educational Pearls

1. OB assessment:
 - a. Length of pregnancy
 - b. Number of pregnancies
 - c. Number of viable births
 - d. Number of non-viable births
 - e. Last menstrual period
 - f. Due date (gestational age)
 - g. Prenatal care
 - h. Number of expected babies (multiple gestations)
 - i. Drug use and maternal medication use
2. Notify direct medical oversight if:
 - a. Prepartum hemorrhage
 - b. Postpartum hemorrhage
 - c. Breech presentation

- d. Limb presentation
 - e. Nuchal cord (around neck)
 - f. Prolapsed cord
3. Some bleeding is normal with any childbirth
- a. Large quantities of blood or free bleeding are abnormal

APGAR Score

Sign	0	1	2
Appearance:	Blue, Pale	Body pink, Extremities blue	Completely pink
Pulse:	Absent	Slow (less than 100)	≥ 100
Grimace:	No response	Grimace	Cough or Sneeze
Activity:	Limp	Some flexion	Active motion of extremities
Respirations:	Absent	Slow, Irregular	Good, Crying

Key Documentation Elements

- Document all times (delivery, contraction frequency and length)

Performance Measures

- Recognition of complications
- Documentation of APGAR scores
- Maternal reassessment

Eclampsia/Pre-Eclampsia

Aliases

Pregnant seizures, toxemia of pregnancy

Patient Care Goals

1. Recognize serious conditions associated with pregnancy and hypertension
2. Prevention of eclampsia-related seizures
3. Provide adequate treatment for eclampsia-related seizures

Patient Presentation

Inclusion Criteria

1. Female patient, more than 20-weeks gestation, presenting with hypertension and evidence of end organ dysfunction, including renal insufficiency, liver involvement, neurological, or hematological involvement
2. May occur up to 4-weeks post-partum but is rare after 48 hours post-delivery.
3. Severe features of pre-eclampsia include:
 - a. Severe hypertension (SBP *greater than* 160, DBP *greater than* 110)
 - b. Headache
 - c. Mental confusion
 - d. Vision changes
 - e. Right upper quadrant or epigastric pain
 - f. Pulmonary edema
4. Eclampsia
 - a. Pre-eclampsia symptoms plus seizures
5. Eclampsia/pre-eclampsia associated with abruptio placenta and fetal loss

Exclusion Criteria

Chronic hypertension without end organ dysfunction.

Patient Management

Assessment

1. Obtain history
 - a. Gestational age or recent post-partum
 - b. Symptoms suggestive of end organ involvement such as headache, confusion, visual disturbances, seizure, epigastric pain, right upper quadrant pain, nausea, and vomiting
 - c. Previous history of hypertension or known pre-eclampsia
2. Monitoring
 - a. Vital signs including repeat blood pressures every 10 min
3. Secondary survey pertinent to obstetric issues:
 - a. Constitutional: vital signs, orthostatic vital signs, skin color
 - b. Abdomen: distention, tenderness
 - c. Genitourinary: visible bleeding
 - d. Neurologic: mental status

Treatment and Interventions

EMR

1. Administer oxygen as needed
2. Treat seizures (see **Seizure** guideline)

EMT

3. Disposition
 - a. Transport to closest appropriate receiving facility
 - b. Patients in second or third trimester of pregnancy should be transported on left side or with uterus manually displaced to left if hypotensive

Notes/Educational Pearls

Key Considerations

1. Delivery of the placenta is the only definitive management for pre-eclampsia and eclampsia

Pertinent Assessment Findings

1. Vital signs assessment with repeat blood pressure monitoring before and after treatment
2. Examination for end organ involvement
3. Evaluate fundal height

Quality Improvement

Key Documentation Elements

Document full vital signs and physical exam findings.

Performance Measures

- Patients with signs of hypertension and *greater than* 20-weeks gestation or recent post-partum should be assessed for signs of pre-eclampsia
- Recognition and appropriate treatment of eclampsia

Obstetrical and Gynecological Conditions

Aliases

None noted

Patient Care Goals

1. Recognize serious conditions associated with hemorrhage during pregnancy even when hemorrhage or pregnancy is not apparent (e.g. ectopic pregnancy, abruptio placenta, placenta previa)
2. Provide adequate resuscitation for hypovolemia

Patient Presentation

Inclusion Criteria

1. Female patient with vaginal bleeding in any trimester
2. Female patient with pelvic pain or possible ectopic pregnancy
3. Maternal age at pregnancy may range from 10 to 60 years of age

Exclusion Criteria

1. Childbirth and active labor [see **Childbirth** guideline]
2. Post-partum hemorrhage [see **Childbirth** guideline]

Differential Diagnosis

1. Abruptio placenta: Occurs in third trimester of pregnancy; placenta prematurely separates from the uterus causing intrauterine bleeding
 - a. Lower abdominal pain and uterine rigidity
 - b. Shock, with minimal or no vaginal bleeding
2. Placenta previa: placenta covers part or all of the cervical opening
 - a. Generally, late second or third trimester
 - b. Painless vaginal bleeding, unless in active labor
 - c. For management during active labor [See **Childbirth** guideline]
3. Ectopic pregnancy (ruptured)
 - a. First trimester
 - b. Abdominal/pelvic pain with or without minimal bleeding.
4. Spontaneous abortion (miscarriage)
 - a. Generally first trimester
 - b. Intermittent pelvic pain (uterine contractions) with vaginal bleeding

Patient Management

Assessment

1. Obtain history
 - a. Obstetrical history [see **Childbirth** guideline]
 - b. Abdominal pain – onset, duration, quality, radiation, provoking or relieving factors
 - c. Vaginal bleeding – onset, duration, quantity (pads saturated)
 - d. Syncope/lightheadedness
 - e. Nausea/vomiting
 - f. Fever

2. Monitoring
 - a. Monitor pulse oximetry if signs of hypotension or respiratory symptoms
3. Secondary survey pertinent to obstetric issues
 - a. Constitutional: vital signs, orthostatic vital signs, skin color
 - b. Abdomen: distention, tenderness, peritoneal signs
 - c. Genitourinary: visible bleeding
 - d. Neurologic: mental status

Treatment and Interventions

EMR

1. If signs of shock or orthostasis:
 - a. Position patient supine and keep patient warm

EMT

2. Disposition - transport to closest appropriate receiving facility

Patient Safety Considerations

1. Patients in third trimester of pregnancy should be transported on left side or with uterus manually displaced to left if hypotensive
2. Do not place hand/fingers into vagina of bleeding patient except in cases of prolapsed cord or breech birth that is not progressing

Notes/Educational Pearls

Key Considerations

Syncope can be a presenting symptom of hemorrhage from ectopic pregnancy or causes of vaginal bleeding.

Pertinent Assessment Findings

1. Vital signs to assess for signs of shock (e.g. tachycardia, hypotension)
2. Abdominal exam (e.g. distension, rigidity, guarding)
3. If pregnant, evaluate fundal height

Quality Improvement

Key Documentation Elements

Document full vital signs and physical exam findings.

Performance Measures

- Patients with signs of hypoperfusion or shock should not be ambulated to stretcher
- Recognition and appropriate treatment of shock

Respiratory

Airway Management

Aliases

Asthma, upper airway obstruction, respiratory distress, respiratory failure, hypoxemia, hypoxia, hypoventilation, foreign body aspiration, croup, stridor, tracheitis, epiglottitis

Patient Care Goals

1. Provide effective oxygenation and ventilation
2. Recognize and alleviate respiratory distress
3. Provide necessary interventions quickly and safely to patients with the need for respiratory support
4. Identify a potentially difficult airway in a timely fashion

Patient Presentation

Inclusion Criteria

1. Children and adults with signs of severe respiratory distress/respiratory failure
2. Patients with evidence of hypoxemia or hypoventilation

Exclusion Criteria

1. Patients with tracheostomies
2. Chronically ventilated patients
3. Newborn patients
4. Patients in whom oxygenation and ventilation is adequate with supplemental oxygen alone, via simple nasal cannula or face mask

Patient Management

Assessment

1. History – Assess for:
 - a. Time of onset of symptoms
 - b. Associated symptoms
 - c. History of asthma or other breathing disorders
 - d. Choking or other evidence of upper airway obstruction
 - e. History of trauma
2. Physical Examination – Assess for:
 - a. Shortness of breath
 - b. Abnormal respiratory rate and/or effort
 - c. Use of accessory muscles
 - d. Quality of air exchange, including depth and equality of breath sounds
 - e. Wheezing, rhonchi, rales, or stridor
 - f. Cough
 - g. Abnormal color (cyanosis or pallor)

- h. Abnormal mental status
- i. Evidence of hypoxemia
- j. Signs of a difficult airway (short jaw or limited jaw thrust, small thyromental space, upper airway obstruction, large tongue, obesity, large tonsils, large neck, craniofacial abnormalities, excessive facial hair)

Treatment and Interventions

EMR

1. Maintain airway and administer oxygen as appropriate
2. Use bag-valve mask (BVM) ventilation in the setting of respiratory failure or arrest. Two-person BVM ventilation is more effective than one-person technique and should be used when additional providers are available
 - i. Tidal volume
 1. Ventilate with minimal volume to see chest rise, approximately 6-7 mL/kg ideal body weight
 2. Over-inflation may be detrimental
 - ii. Rate
 1. Adult: 10-12 breaths/minute
 2. Child: 20 breaths/minute
 3. Infant: 30 breaths/minute
3. Oropharyngeal airways (OPA) and nasopharyngeal airways (NPA) - Consider the addition of an OPA and/or NPA to make BVM ventilation more effective for patients with altered mental status

EMT

4. Maintain airway and administer oxygen as appropriate with a target of achieving 94-98% saturation
5. Continuously monitor ETCO₂ to maintain ETCO₂ of 35-40 mmHg - in head injury with signs of herniation (unilateral dilated pupil or decerebrate posturing), modestly hyperventilate to ETCO₂ 30-35 mmHg
6. For severe respiratory distress or impending respiratory failure, use continuous positive airway pressure (CPAP)
7. Supraglottic airways (SGA) - Consider the use of a SGA for patients without a gag reflex
 - a. Confirm placement of advanced airway with waveform capnography, absent gastric sounds, and bilateral breath sounds
 - b. Continuously monitor placement with waveform capnography during treatment and transport
 - c. Continuously secure tube manually until tube secured with tape, or commercial device
 - i. Cervical collar and/or cervical immobilization device may help reduce neck movement and risk of tube displacement
8. Transport to the closest appropriate hospital for airway stabilization when respiratory failure cannot be successfully managed in the prehospital setting

Patient Safety Considerations

1. Avoid excessive pressures or volumes during BVM
2. Once a successful SGA placement has been performed, obstruction or displacement of the tube can have further deleterious effects on patient outcome

- a. Tubes should be secured with either a commercial tube holder or tape

Notes/Educational Pearls

Key Considerations

1. Use continuous waveform capnography to detect end-tidal carbon dioxide (ETCO₂). This is an important adjunct in the monitoring of patients with respiratory distress, respiratory failure, and those treated with positive pressure ventilation. It should be used as the standard to confirm SGA placement.
2. CPAP
 - a. Contraindications to these non-invasive ventilator techniques include intolerance of the device, severely impaired consciousness, increased secretions inhibiting a proper seal, or recent gastrointestinal and/or airway surgery
3. Bag-valve-mask:
 - a. Appropriately-sized masks should completely cover the nose and mouth and maintain an effective seal around the cheeks and chin
 - b. Ventilation should be delivered with only sufficient volume to achieve chest rise
4. Consideration should be made to dispatch the highest-level provider for an EMS system given the potential need for advanced airway placement for patients with severe respiratory distress or failure

Pertinent Assessment Findings

1. Ongoing assessment is critical when an airway device is in place
2. Acute worsening of respiratory status or evidence of hypoxemia can be secondary to displacement or obstruction of the airway device, pneumothorax or equipment failure

Quality Improvement

Key Documentation Elements

- Initial vital signs and physical exam
- Interventions attempted including the method of airway intervention, the size of equipment used, and the number of attempts to achieve a successful result
- Subsequent vital signs and physical exam to assess for change after the interventions
- After placement of SGA, document ETCO₂ value and record capnograph wave initially after intubation, with each set of vital signs, when patient is moved, and at the time of patient transfer in the ED

Performance Measures

- Respiratory rate and oxygen saturation are both measured and documented
- Percentage of patients with advanced airway who have waveform capnography used for both initial confirmation and continuous monitoring during transport

Bronchospasm (due to Asthma and Obstructive Lung Disease)

Aliases

Asthma, respiratory distress, wheezing, respiratory failure, bronchospasm, obstructive lung disease, albuterol, levalbuterol, duoneb, nebulizer, inhaler

Patient Care Goals

1. Alleviate respiratory distress due to bronchospasm
2. Promptly identify and intervene for patients who require escalation of therapy
3. Deliver appropriate therapy by differentiating other causes of respiratory distress

Patient Presentation

Inclusion Criteria

1. Respiratory distress with wheezing or decreased air entry in patients 2 yo or older, presumed to be due to bronchospasm from reactive airway disease, asthma, or obstructive lung disease – These patients may have a history of recurrent wheezing that improves with beta-agonist inhalers/nebulizers such as albuterol or levalbuterol
 - a. Symptoms/signs may include:
 - i. Wheezing - will have expiratory wheezing unless they are unable to move adequate air to generate wheezes
 - ii. May have signs of respiratory infection (e.g. fever, nasal congestion, cough, sore throat)
 - iii. May have acute onset after inhaling irritant
 - b. This includes:
 - i. Asthma exacerbation
 - ii. Chronic obstructive pulmonary disease (COPD) exacerbation
 - iii. Wheezing from suspected pulmonary infection (e.g. pneumonia, acute bronchitis)

Exclusion Criteria

1. Respiratory distress due to a presumed underlying cause that includes one of the following:
 - a. Anaphylaxis
 - b. Bronchiolitis (wheezing less than 2 yo)
 - c. Croup
 - d. Epiglottitis
 - e. Foreign body aspiration
 - f. Submersion/drowning
 - g. Congestive heart failure
 - h. Trauma

Patient Management

Assessment

1. History
 - a. Onset of symptoms
 - b. Concurrent symptoms (fever, cough, rhinorrhea, tongue/lip swelling, rash, labored breathing, foreign body aspiration)
 - c. Usual triggers of symptoms (cigarette smoke, change in weather, upper respiratory infections)
 - d. Contact with people who have been sick
 - e. Treatments given
 - f. Previously intubated
 - g. Number of emergency department visits in the past year
 - h. Number of admissions in the past year
 - i. Number of ICU admissions
 - j. Family history of asthma, eczema, or allergies
2. Exam
 - a. Full set of vital signs (T, BP, RR, P, O₂ sat) - waveform capnography is a useful adjunct and will show a “sharkfin” waveform in the setting of obstructive physiology
 - b. Air entry (normal vs. diminished, prolonged expiratory phase)
 - c. Breath sounds (wheezes, crackles, rales, rhonchi, diminished, clear)
 - d. Signs of distress (grunting, nasal flaring, retracting, stridor)
 - e. Inability to speak full sentences (sign of shortness of breath)
 - f. Color (pallor, cyanosis, normal)
 - g. Mental status (alert, tired, lethargic, unresponsive)
 - h. Signs of distress include:
 - i. Apprehension, anxiety, combativeness
 - ii. Hypoxia
 - iii. Intercostal/subcostal/supraclavicular retractions
 - iv. Nasal flaring
 - v. Cyanosis

Treatment and Interventions

EMR

1. Airway
 - a. Give supplemental oxygen. Escalate from a nasal cannula to a non-rebreather mask as needed, in order to maintain normal oxygenation
 - b. Suction the nose and/or mouth (via bulb, Yankauer, suction catheter) if excessive secretions are present

EMT

2. Pulse oximetry and end-tidal CO₂ (ETCO₂) should be routinely used as an adjunct to other forms of respiratory monitoring
3. Assist patient with their own inhaler
4. Non-invasive positive pressure ventilation via continuous positive airway pressure (CPAP) should be administered for severe respiratory distress
5. Bag-valve-mask ventilation should be utilized with respiratory failure
6. Supraglottic devices – should be utilized if patient becomes unresponsive with no gag

reflex

Patient Safety Considerations

1. Giving positive pressure in the setting of bronchoconstriction increases the risk of air trapping which can lead to pneumothorax and cardiovascular collapse. These interventions should be reserved for situations of respiratory failure

Notes/Educational Pearls

Key Considerations

1. COPD patients not in respiratory distress should be given oxygen to maintain adequate oxygen saturation above 90%

Pertinent Assessment Findings

In the setting of severe bronchoconstriction, wheezing might not be heard. Patients with known asthma who complain of chest pain or shortness of breath should be empirically treated, even if wheezing is absent.

Quality Improvement

Key Documentation Elements

Document key aspects of the exam to assess for a change after each intervention:

- Respiratory rate
- Oxygen saturation
- Use of accessory muscles
- Breath sounds
- Air entry
- Mental status
- Color

Performance Measures

- CPAP utilization
- Time to administration of specified interventions in the protocol
- Change in vital signs (heart rate, blood pressure, temperature, respiratory rate, pulse oximeter, capnography values)

Pulmonary Edema

Aliases

Congestive heart failure, respiratory distress, respiratory failure, acute respiratory distress syndrome, myocardial infarct, pulmonary embolism, COPD, asthma, anaphylaxis

Patient Care Goals

1. Decrease respiratory distress and work of breathing
2. Maintaining adequate oxygenation and perfusion
3. Direct supportive efforts towards decreasing afterload and increasing preload

Patient Presentation

Inclusion Criteria

1. Respiratory distress with presence of rales
2. Clinical impression consistent with congestive heart failure

Exclusion Criteria

1. Clinical impression consistent with infection (e.g. fever)
2. Clinical impression consistent with asthma/COPD

Patient Management

Assessment

1. History
 - a. Use of diuretics and compliance
 - b. Weight gain
 - c. Leg swelling
 - d. Orthopnea
2. Exam
 - a. Breath sounds – crackles/rales
 - b. Lower extremity edema
 - c. JVD
 - d. Cough and/or productive cough with pink/frothy sputum
 - e. Diaphoresis
 - f. Chest discomfort
 - g. Hypotension
 - h. Shock
 - i. Respiratory distress, assess:
 - i. Patient's ability to speak in full sentences
 - ii. Respiratory accessory muscle use

Treatment and Interventions

EMR

1. Airway
 - a. Give supplemental oxygen. Escalate from a nasal cannula to a non-rebreather mask as needed, in order to maintain normal oxygenation

- b. Suction the nose and/or mouth (via bulb, Yankauer, suction catheter) if excessive secretions are present

EMT

2. Pulse oximetry and end-tidal CO₂ (ETCO₂) should be routinely used as an adjunct to other forms of respiratory monitoring
3. Non-invasive positive pressure ventilation via continuous positive airway pressure (CPAP) should be administered for severe respiratory distress
4. Bag-valve-mask ventilation should be utilized with respiratory failure
5. Supraglottic devices – should be utilized if patient becomes unresponsive with no gag reflex

Patient Safety Considerations

No recommendations

Notes/Educational Pearls

Key Considerations

1. Differential:
 - a. MI
 - b. CHF
 - c. Asthma
 - d. Anaphylaxis
 - e. Aspiration
 - f. COPD
 - g. Pleural effusion
 - h. Pneumonia
 - i. PE
 - j. Pericardial tamponade
 - k. Toxin exposure
2. Non-invasive positive pressure ventilation:
 - a. Contraindications:
 - i. Hypoventilation
 - ii. Altered level of consciousness
 - iii. Airway compromise
 - iv. Aspiration risk
 - v. Pneumothorax
 - vi. Facial trauma/burns
 - vii. Systolic BP less than 90 mmHg
 - viii. Recent oropharyngeal/tracheal/bronchial surgery
 - b. Benefits:
 - i. Increased oxygenation and perfusion by reducing work of breathing
 - ii. Maintaining inflation of atelectatic alveoli
 - iii. Improving pulmonary compliance
 - iv. Decreases respiratory rate and the work of breathing, HR, and SBP
 - v. Reduces preload and afterload, improving cardiac output
 - c. Complications:
 - i. Most common is anxiety
 - ii. Theoretical risk of hypotension and pneumothorax as non-invasive positive pressure ventilation increases intrathoracic pressure which decreases venous return and cardiac output

- iii. Sinusitis
 - iv. Skin abrasions
 - v. Conjunctivitis – minimized with proper size mask
 - vi. Potential for barotrauma – pneumothorax or pneumomediastinum (rare)
3. Allow patient to remain in position of comfort - patients may decompensate if forced to lie down
 4. CHF is a common cause of pulmonary edema – Other causes include:
 - a. Medications
 - b. High altitude exposure
 - c. Kidney failure
 - d. Lung damage caused by gases or severe infection
 - e. Major injury

Quality Improvement

Key Documentation Elements

- Vital signs
- Oxygen saturation
- Time of intervention
- Response to interventions

Performance Measures

- Time to initiation of non-invasive positive pressure ventilation
- Time to clinical improvement
- Assessment/auscultation of lung sounds before and after each intervention

Trauma

General Trauma Management

Aliases

None noted

Patient Care Goals

1. Rapid assessment and management of life-threatening injuries
2. Safe movement of patient to prevent worsening injury severity
3. Rapid and safe transport to the appropriate level of trauma care

Patient Presentation

Inclusion Criteria

1. Patients of all ages who have sustained an injury as a result of mechanical trauma, including:
 - a. Blunt injury
 - b. Penetrating injury
 - c. Burns

Exclusion Criteria

No recommendations

Patient Management

Assessment

1. Primary survey
 - a. Hemorrhage control
 - i. Assess for and stop severe hemorrhage [see **Extremity Trauma/External Hemorrhage Management** guideline]
 - b. Airway
 - i. Assess airway patency by asking the patient to talk to assess stridor and ease of air movement
 - ii. Look for injuries that may lead to airway obstruction including unstable facial fractures, expanding neck hematoma, blood or vomitus in the airway, facial burns/inhalation injury
 - iii. Evaluate mental status for ability to protect airway
 - c. Breathing
 - i. Assess respiratory rate and pattern
 - ii. Assess symmetry of chest wall movement
 - iii. Listen bilaterally on lateral chest wall for breath sounds
 - d. Circulation
 - i. Assess blood pressure and heart rate
 - ii. Signs of hemorrhagic shock include: tachycardia, hypotension, pale, cool clammy skin, capillary refill *greater than 2* seconds for children under 6 years old
 - e. Disability
 - i. Perform neurologic status assessment

- ii. Assess gross motor movement of extremities
 - iii. Evaluate for clinical signs of traumatic brain injury with herniation including:
 - 1. Unequal pupils
 - 2. Posturing
- f. Exposure
 - i. Rapid evaluation of entire body to identify sites of penetrating wounds or other blunt injuries. Be sure to roll patient and examine the back
 - ii. Prevent hypothermia
- 2. Obtain medical history from patient or family including:
 - i. Allergies
 - ii. Medications
 - iii. Past medical and surgical history
 - iv. Events leading up to the injury
- 3. Secondary survey: Head to toe physical exam
 - a. Head
 - i. Palpate head and scalp and face and evaluate for soft tissue injury or bony crepitus
 - ii. Assess pupils
 - b. Neck
 - i. Check for:
 - 1. Contusions
 - 2. Abrasions
 - 3. Hematomas
 - 4. JVD
 - 5. Tracheal deviation
 - ii. Palpate for crepitus
 - iii. Spinal assessment per the **Spinal Care** guideline
 - c. Chest
 - i. Palpate for instability/crepitus
 - ii. Listen to breath sounds
 - iii. Inspect for penetrating or soft tissue injuries
 - d. Abdomen
 - i. Palpate for tenderness
 - ii. Inspect for penetrating or soft tissue injuries
 - e. Pelvis
 - i. Inspect for penetrating or soft tissue injuries
 - ii. Palpate once for instability by applying medial pressure on the iliac crests bilaterally
 - f. Back
 - i. Maintain spinal alignment. Refer to **Spinal Care** guideline
 - ii. Inspect for penetrating or soft tissue injuries
 - g. Neurologic status assessment
 - i. Serial assessment of mental status
 - ii. Gross exam of motor strength and sensation in all four extremities
 - h. Extremities
 - i. Assess for fracture/deformity
 - ii. Assess peripheral pulses/capillary refill

Treatment and Interventions

EMR

1. Hemorrhage control
 - a. Stop severe hemorrhage [see **Extremity Trauma/External Hemorrhage Management** guideline]
2. Airway/Breathing
 - a. Establish patent airway with cervical spine precautions, per the **Airway Management** and **Spinal Care** guidelines
 - b. If indicated, provide supplemental oxygen
 - c. If respiratory efforts are inadequate, assist with bag-mask ventilation and consider airway adjuncts. If patient is unable to maintain airway, consider oral airway (nasal airway should not be used with significant facial injury or possible basilar skull fracture)
 - d. For open chest wound, place semi-occlusive dressing
3. Disability
 - a. If clinical signs of traumatic brain injury [see **Head Injury** guideline]
4. Exposure
 - a. Avoid hypothermia
 - i. Remove wet clothing
 - ii. Cover patient to prevent further heat loss
 - iii. Turn up heat in ambulance
5. Additional treatment considerations
 - a. Maintain spine precautions per the **Spinal Care** guideline
 - b. Splint obvious extremity fractures per the **Extremity Trauma/External Hemorrhage Management** guideline

EMT

6. Monitor oxygen saturation and, if indicated, provide supplemental oxygen
7. If absent or diminished breath sounds in a hypotensive patient, consider tension pneumothorax
8. If pelvis is unstable and patient is hypotensive, place pelvic binder or sheet to stabilize pelvis
9. **NOTE:** Patients with major hemorrhage, hemodynamic instability, penetrating torso trauma, or signs of traumatic brain injury often require rapid surgical intervention. Minimize scene time (goal is under 10 minutes) and initiate rapid transport to the highest level of care within the trauma system.

Patient Safety Considerations

1. Life-threatening injuries identified should be managed immediately with rapid transport to a trauma center
2. Monitor patient for deterioration over time with serial vital signs and repeat neurologic status assessment
 - a. Patients with compensated shock may not manifest hypotension until severe blood loss has occurred
 - b. Patients with traumatic brain injury may deteriorate as intracranial swelling and hemorrhage increase
3. Anticipate potential for progressive airway compromise in patients with trauma to head and neck

Notes/Educational Pearls

Key Considerations

1. Optimal trauma care requires a structured approach to the patient emphasizing ABCDE (Airway, Breathing, Circulation, Disability, Exposure)
2. Target scene time less than 10 minutes for unstable patients or those likely to need surgical intervention
3. Frequent reassessment of the patient is important
 - a. If patient develops difficulty with ventilation, reassess breath sounds for development of tension pneumothorax
 - b. If extremity hemorrhage is controlled with pressure dressing or tourniquet, reassess for evidence of continued hemorrhage
 - c. If mental status declines, reassess ABCs and repeat neurologic status assessment

Traumatic Arrest: Withholding and Termination of Resuscitative Efforts

Resuscitative efforts should be withheld for trauma patients with the following:

1. Decapitation
2. Hemicoectomy
3. Signs of rigor mortis or dependent lividity
4. Blunt trauma: apneic, pulseless, no organized cardiac activity on monitor
 - a. Note – Adult and Pediatric: Resuscitative efforts may be terminated in patients with traumatic arrest who have no return of spontaneous circulation after 15-30 minutes of resuscitative efforts, including airway management, evaluation/treatment for possible tension pneumothorax, fluid bolus, and minimally interrupted CPR

Quality Improvement

Key Documentation Elements

- Mechanism of injury
- Primary and secondary survey
- Serial vital signs and neurologic status assessments
- Scene time
- Procedures performed and patient response

Performance Measures

- Monitor scene time for unstable patients
- Monitor appropriateness of procedures
- Monitor appropriate airway management

Definition of a Trauma Team Alert Patient:

South Dakota Trauma System

Strong degree of suspicion should be used for the following patients, but this does not constitute an automatic categorization of a severe trauma patient:

- Pelvic Fractures
- Falls from 2 times the height of the patient
- Patients involved in high energy MVA's
- Death of an occupant in the same compartment
- Auto-Pedestrian or Auto-Bicycle with impact of greater than 5 MPH
- Pedestrian that was thrown or run-over
- Significant recreational vehicle or farm equipment incident
- Significant injury associated with a large animal

Anatomic Absolutes:

- Penetrating injury to chest, abdomen, head, neck
- Limb Paralysis (associated with Trauma)
- Flail Chest
- Amputation proximal to wrist or ankle

The following co-morbidities should also offer a high degree of suspicion

- Age < 5 or > 55
- Pregnancy
- Chronic medical illness

Physiological Absolutes:

- Adult:
 - GCS < 10
 - BP < 90
 - Pulse > 120
 - Respirations < 10 or > 29, or airway obstruction or respiratory compromise requiring use of advanced airway
- Child:
 - The Pediatric Assessment Triangle should be the basis for all pediatric emergencies

Blast Injuries

Aliases

None noted

Patient Care Goals

1. Maintain patient and provider safety by identifying ongoing threats at the scene of an explosion
2. Identify multi-system injuries which may result from a blast, including possible toxic contamination
3. Prioritize treatment of multi-system injuries to minimize patient morbidity

Patient Presentation

Inclusion Criteria

1. Patients exposed to explosive force. Injuries may include any or all of the following:
 - a. Blunt trauma
 - b. Penetrating trauma
 - c. Burns
 - d. Pressure-related injuries (barotrauma)
 - e. Toxic chemical contamination

Exclusion Criteria

No recommendations

Patient Management

Assessment

1. Hemorrhage Control
 - a. Assess for and stop severe hemorrhage [see **Extremity Trauma/External Hemorrhage Management** guideline]
2. Airway
 - a. Assess airway patency
 - b. Consider possible thermal or chemical burns to airway
3. Breathing
 - a. Evaluate adequacy of respiratory effort, oxygenation, quality of lung sounds, and chest wall integrity
 - b. Consider possible pneumothorax or tension pneumothorax (as a result of penetrating/blunt trauma or barotrauma)
4. Circulation
 - a. Look for evidence of external hemorrhage
 - b. Assess BP, pulse, skin color/character for signs of shock
5. Disability
 - a. Assess patient responsiveness (AVPU) and level of consciousness (GCS)
 - b. Assess pupils
 - c. Assess gross motor movement and sensation of extremities

6. Exposure
 - a. Rapid evaluation of entire skin surface, including back (log roll), to identify blunt or penetrating injuries

Treatment and Interventions

EMR/EMT

1. Hemorrhage control:
 - a. Control any severe external hemorrhage [see **Extremity Trauma/External Hemorrhage Management** guideline]
2. Airway:
 - a. Secure airway [see **Airway Management** guideline]
 - b. If thermal or chemical burn to airway is suspected, early airway control is vital
3. Breathing:
 - a. Administer oxygen as appropriate
 - b. Assist respirations as needed
4. Disability:
 - a. If evidence of head injury, treat per the **Head Injury** guideline
 - b. Apply spinal precautions, per the **Spinal Care** guideline
5. Exposure:
 - a. Keep patient warm to prevent hypothermia

Patient Safety Considerations

1. Ensuring scene safety is especially important at the scene of an explosion.
 - a. Consider possibility of subsequent explosions, structural safety, possible toxic chemical contamination, the presence of noxious gasses, and other hazards
 - b. In a possible terrorist event, consider the possibility of secondary explosive devices
2. Remove patient from the scene as soon as is practical and safe
3. If the patient has sustained burns (thermal, chemical, or airway), consider transport to specialized burn center

Notes/Educational Pearls

Key Considerations

1. Scene safety is of paramount importance when responding to an explosion or blast injury
2. Patients sustaining blast injury may sustain complex, multi-system injuries including: blunt and penetrating trauma, shrapnel, barotrauma, burns, and toxic chemical exposure
3. Consideration of airway injury, particularly airway burns, should prompt early and aggressive airway management
4. Consider injuries due to barotrauma
 - a. Tension pneumothorax
 - i. Hypotension or other signs of shock associated with decreased or absent breath sounds, jugular venous distension, and/or tracheal deviation
 - b. Tympanic membrane perforation resulting in deafness which may complicate the evaluation of their mental status and their ability to follow commands
5. Primary transport to a trauma or burn center is preferable, whenever possible

Pertinent Assessment Findings

1. Evidence of multi-system trauma, especially:
 - a. Airway injury/burn
 - b. Barotrauma to lungs
 - c. Toxic chemical contamination

Quality Improvement

Key Documentation Elements

- Airway status and intervention
- Breathing status:
 - Quality of breath sounds (equal bilaterally)
 - Adequacy of respiratory effort
 - Oxygenation
- Documentation of burns, including Total Burn Surface Area (TBSA) [see **Burns** guideline]
- Documentation of possible toxic chemical contamination

Performance Measures

- Airway assessment and early and aggressive management
- Transport to trauma or burn center

Burns

Aliases

None noted

Patient Care Goals

Minimize tissue damage and patient morbidity from burns

Patient Presentation

1. Patient may present with:
 - a. Airway – stridor, hoarse voice
 - b. Mouth and nares – redness, blisters, soot, singed hairs
 - c. Breathing – rapid, shallow, wheezes, rales
 - d. Skin – Estimate Total Burn Surface Area (TBSA) and depth (partial vs. full thickness)
 - e. Associated trauma – blast, fall, assault

Inclusion Criteria

Patients sustaining thermal burns

Exclusion Criteria

Electrical, chemical, and radiation burns [see **Toxins and Environmental** section]

Special Transport Considerations

1. Transport to most appropriate trauma center when there is airway or respiratory involvement, or when significant trauma or blast injury is suspected
2. Consider air ambulance transportation for long transport times or airway management needs beyond the scope of local resources
3. Consider transport directly to burn center if partial or full thickness burns (TBSA) greater than 10%, involvement of hands/feet, genitalia, face, and/or circumferential burns

Scene Management

1. Assure crew safety:
 - a. Power off
 - b. Electrical lines secure
 - c. Gas off
 - d. No secondary devices
 - e. Hazmat determinations made
 - f. Proper protective attire including breathing apparatus may be required

Patient Management

Assessment

1. Circumstances of event – Consider:
 - a. Related trauma in addition to the burns
 - b. Inhalation exposures such as CO and cyanide (CN)
 - c. Pediatric or elder abuse

2. Follow ABCs of resuscitation per the **General Trauma Management** guideline
3. Consider spinal precautions for those that qualify per the **Spinal Care** guideline
4. Estimate TBSA burned and depth of burn
 - a. Use “Rule of 9’s”
 - b. First- degree burns (skin erythema only) are not included in TBSA calculations
5. Document pain scale

Treatments and interventions

EMR

1. Stop the burning
 - a. Remove wet clothing (if not stuck to the patient)
 - b. Remove jewelry
 - c. Leave blisters intact
2. Minimize burn wound contamination
 - a. Cover burns with dry dressing or clean sheet
 - b. Do not apply gels or ointments
3. High flow supplemental oxygen for all burn patients rescued from an enclosed space
4. Evaluate distal circulation in circumferentially burned extremities
5. Prevent systemic heat loss and keep the patient warm

EMT

6. Monitor SPO₂ and ETCO₂– Consider SPCO monitoring, if available

Special Treatment Considerations

1. If blast mechanism, treat per the **Blast Injury** guideline
2. Airway burns can rapidly lead to upper airway obstruction and respiratory failure
3. Have a high index of suspicion for cyanide poisoning in a patient with depressed GCS, respiratory difficulty and cardiovascular collapse in the setting of an enclosed-space fire.
4. Particularly in enclosed-space fires, carbon monoxide toxicity is a consideration and pulse oximetry may not be accurate [see **Carbon Monoxide/Smoke Inhalation** guideline]
5. For specific chemical exposures (cyanide, hydrofluoric acid, other acids and alkali) [see **Topical Chemical Burn** guideline]
6. Consider decontamination and notification of receiving facility of potentially contaminated patient (e.g. methamphetamine (meth) lab incident)

Notes/Educational Pearls

1. Onset of stridor and change in voice are sentinel signs of potentially significant airway burns, which may rapidly lead to airway obstruction or respiratory failure
2. If the patient is in shock within one hour of burn, it is not from the burn. Evaluate the patient carefully for associated trauma or cyanide toxicity.
3. TBSA is calculated only based on percent of second and third degree burns – First degree burns are not included in this calculation

Quality Improvement

Key Documentation Elements

- Initial airway status
- Body surface area of second and third degree burns (TBSA)

- Pulse and capillary refill exam distally on any circumferentially burned extremity
- Pain scale documentation

Performance Measures

- Patient transported to most appropriate hospital, preferably a burn center
- Pain scale documented
- Airway assessment and management appropriately documented

Extremity Trauma/External Hemorrhage Management

Aliases

None noted

Patient Care Goals

1. Minimize blood loss from extremity hemorrhage
2. Avoid hemorrhagic shock as a result of extremity hemorrhage
3. Minimize pain and further injury as a result of potential fractures or dislocations

Patient Presentation

Inclusion Criteria

1. Traumatic extremity hemorrhage (external hemorrhage)
2. Potential extremity fractures or dislocations

Exclusion Criteria

No recommendations

Patient Management

Assessment

1. Evaluate for obvious deformity, shortening, rotation, or instability
2. Neurologic status of extremity
 - a. Sensation to light touch
 - b. Distal movement of extremity
3. Vascular status of extremity
 - a. Pallor
 - b. Pulse
 - c. Capillary refill
 - d. Degree of bleeding/blood loss with assessment of the color of the blood (venous or arterial) and whether it is pulsatile or not

Treatments and Interventions

EMR/EMT

1. Manage bleeding
 - a. Apply direct pressure to bleeding site followed by pressure dressing.
 - b. If direct pressure/pressure dressing is ineffective or impractical:
 - i. If the bleeding site is amenable to tourniquet placement, apply tourniquet to extremity
 1. Tourniquet should be placed 2-3 inches proximal to wound, not over a joint, and tightened until bleeding stops and distal pulse is eliminated
 2. If bleeding continues, place a second tourniquet proximal to the first
 3. For thigh wounds, consider placement of two tourniquets, side-by-side, and tighten sequentially to eliminate distal pulse

- ii. If the bleeding site is not amenable to tourniquet placement (i.e. junctional injury), apply direct pressure
- 2. Stabilize suspected fractures/dislocations
 - a. If distal vascular function is compromised, gently attempt to restore normal anatomic position
 - b. Use splints as appropriate to limit movement of suspected fracture
 - c. Elevate extremity fractures above heart level whenever possible to limit swelling
 - d. Apply ice/cool packs to limit swelling in suspected fractures or soft tissue injury - do not apply ice directly to skin
 - e. Reassess distal neurovascular status after any manipulation or splinting of fractures/dislocations

Patient Safety Considerations

1. If tourniquet use:
 - a. Ensure that it is sufficiently tight to occlude the distal pulse, in order to avoid compartment syndrome
 - b. Ensure that it is well marked and visible and that all subsequent providers are aware of the presence of the tourniquet
 - c. Do not cover with clothing or dressings
2. Mark time of tourniquet placement prominently on the patient
3. If pressure dressing or tourniquet used, frequently re-check to determine if bleeding has restarted. Check for blood soaking through the dressing or continued bleeding distal to the tourniquet. Do not remove tourniquet or dressing in order to assess bleeding

Notes/Educational Pearls

Key Considerations

1. Tourniquet may be placed initially to stop obvious severe hemorrhage, then replaced later with pressure dressing after stabilization of ABCs and packaging of patient. Tourniquet should not be removed if:
 - a. Transport time short (less than 30 minutes)
 - b. Amputation or near-amputation
 - c. Unstable or complex multiple-trauma patient
 - d. Unstable clinical or tactical situation
2. If tourniquet is replaced with pressure dressing, leave loose tourniquet in place so it may be retightened if bleeding resumes
3. Survival is markedly improved when a tourniquet is placed *before* shock ensues
4. Commercial/properly tested tourniquets are preferred over improvised tourniquets
5. Arterial pressure points are not effective in controlling hemorrhage
6. Amputated body parts should be transported with patient for possible re-implantation
 - a. It should remain cool but dry
 - b. Place the amputated part in a plastic bag
 - c. Place the bag with the amputated part on ice in a second bag
 - d. Do not let the amputated part come into direct contact with the ice

Quality Improvement

Key Documentation Elements

- Vital signs and vascular status of extremity after placement of tourniquet, pressure dressing,

- or splint
- Documentation of elimination of distal pulse after tourniquet placement
- Time of tourniquet placement

Performance Measures

- Proper placement of tourniquet (location, elimination of distal pulse)
- Proper marking and timing of tourniquet placement and notification of subsequent providers of tourniquet placement
- Appropriate splinting of fractures

Facial/Dental Trauma

Aliases

None noted

Patient Care Goals

1. Preservation of a patent airway
2. Preservation of vision
3. Preservation of dentition

Patient Presentation

Inclusion Criteria

Isolated facial injury, including trauma to the eyes, nose, ears, midface, mandible, dentition

Exclusion Criteria

1. General Trauma [see **General Trauma Management** guideline]
2. Burn trauma [see **Burns** guideline]

Patient Management

Assessment

1. Patient medications with focus on blood thinners/anti-platelet agents
2. ABCs with particular focus on ability to keep airway patent
 - a. Stable midface
 - b. Stable mandible
 - c. Stable dentition (poorly anchored teeth require vigilance for possible aspiration)
3. Bleeding (which may be severe – epistaxis, oral trauma, facial lacerations)
4. Cervical spine pain or tenderness [see **Spinal Care** guideline]
5. Mental status assessment for possible traumatic brain injury [see **Head Injury** guideline]
6. Gross vision assessment
7. Dental avulsions
8. Any tissue or teeth avulsed should to be collected
9. Lost teeth not recovered on scene may be in the airway
10. Overall trauma assessment
11. Specific re-examination geared toward airway and ability to ventilate adequately

Treatment and Interventions

EMR/EMT

1. Administer oxygen as appropriate
2. Avulsed tooth:
 - a. Avoid touching the root of the avulsed tooth. Do not wipe off tooth
 - b. Pick up at crown end. If dirty, rinse off under cold water for 10 seconds
 - c. Place in milk or saline as the storage medium. Alternatively, an alert and cooperative patient can hold tooth in mouth using own saliva as storage medium

3. Eye trauma:
 - a. Place eye shield for any significant eye trauma
 - b. If globe is avulsed, do not put back into socket. Cover with moist saline dressings and then place cup over it
4. Mandible unstable:
 - a. Expect patient cannot spit/swallow effectively and have suction readily available
 - b. Preferentially transport sitting up with emesis basin/suction available (in the absence of a suspected spinal injury, see **Spinal Care** guideline)
5. Epistaxis - squeeze nose (or have patient do so) for 10-15 minutes continuously
6. Nose/ear avulsion:
 - a. Recover tissue if it does not waste scene time
 - b. Transport with tissue wrapped in dry sterile gauze in a plastic bag placed on ice
 - c. Severe ear and nose lacerations can be addressed with a protective moist sterile dressing

Patient Safety Considerations

1. Frequent reassessment of airway
2. Maintenance of a patent airway is the highest priority; therefore, conduct cervical spine assessment for field clearance (per **Spinal Care** guideline) to enable transport sitting up for difficulty with bleeding, swallowing, or handling secretions

Notes/Educational Pearls

Key Considerations

1. Airway may be compromised because of fractures or bleeding
2. After nasal fractures, epistaxis may be posterior and may not respond to direct pressure over the nares with bleeding running down posterior pharynx, potentially compromising airway
3. Protect avulsed tissue and teeth
 - a. Avulsed teeth may be successfully re-implanted if done so in a very short period after injury
 - b. Use sterile dressing for ear and nose cartilage

Pertinent Assessment Findings

1. Unstable facial fractures that can abruptly compromise airway
2. Loose teeth and retro-pharynx bleeding

Quality Improvement

Key Documentation Elements

- Airway patency and reassessment
- Degree and location of hemorrhage
- Mental status (GCS or AVPU)
- Technique used to transport tissue or teeth
- Eye exam documented, when applicable
- Assessment and management of cervical spine
- Patient use of anticoagulant medications

Performance Measures

- Appropriate airway management and satisfactory oxygenation
- Eye shield applied to eye trauma

Head Injury

Aliases

None noted

Patient Care Goals

1. Limit disability and mortality from head injury by:
 - a. Promoting adequate oxygenation
 - b. Promoting adequate cerebral perfusion
 - c. Limiting development of increased intracranial pressure
 - d. Limiting secondary brain injury

Patient Presentation

Inclusion Criteria

Adult or pediatric patient with blunt or penetrating head injury - LOC or amnesia not required

Exclusion Criteria

No recommendations

Patient Management

Assessment

1. Maintain cervical stabilization [see **Spinal Care** guideline]
2. Primary survey per the **General Trauma Management** guideline
3. Monitoring:
 - a. Continuous pulse oximetry
 - b. Frequent systolic and diastolic blood pressure measurement
 - c. Initial neurologic status assessment and reassessment with any change in mentation
 - d. Moderate/severe head injury - apply continuous waveform ETCO₂, if available
4. Secondary survey pertinent to isolated head injury:
 - a. Head - Gently palpate skull to evaluate for depressed or open skull fracture
 - b. Eyes:
 - i. Evaluate pupil size and reaction to light to establish baseline
 - ii. Reassess pupils if decrease in mentation
 - c. Nose/mouth/ears - evaluate for blood/fluid drainage
 - d. Face - evaluate for bony stability
 - e. Neck - palpate for cervical spine tenderness or deformity
 - f. Neurologic:
 - i. Perform neurologic status assessment (GCS or AVPU)
 - ii. Evaluate for focal neurologic deficit: motor and sensory

Treatment and Interventions

EMR

1. Airway/Breathing
 - a. Administer oxygen as appropriate
 - b. If patient unable to maintain airway, consider oral airway (nasal airway should not be used with significant facial injury or possible basilar skull fracture)
2. Circulation:
 - a. Wound care
 - i. Control bleeding with direct pressure if no suspected open skull injury
 - ii. Moist sterile dressing to any potential open skull wound
 - iii. Cover an injured eye with moist saline dressing and place cup over it
3. Disability:
 - a. Evaluate for other causes of altered mental status
 - b. Spinal assessment and management, per **Spinal Care** guideline
 - c. Perform and trend neurologic status assessment

EMT

4. Airway/Breathing
 - a. Administer oxygen as appropriate with a target of achieving 94-98% saturation
 - b. Supraglottic airway insertion can be used if patient is unresponsive with no gag reflex
 - c. For patients with a moderate or/severe head injury who are unable to maintain their airway: use continuous waveform capnography, and EtCO₂ measurement if available, with a target EtCO₂ of 35-40 mmHg
 - d. For patients with a severe head injury with signs of herniation: hyperventilate to a target EtCO₂ of 30-35 mmHg as a short-term option, and only for severe head injury with signs of herniation
5. Disability:
 - a. Check blood glucose
 - b. Perform and trend neurologic status assessment (moderate/severe: GCS 3-13, P {pain} or U {unresponsive} on AVPU scale)
 - i. Early signs of deterioration:
 1. Confusion
 2. Agitation
 3. Drowsiness
 4. Vomiting
 5. Severe headache
 - ii. Monitor for signs of herniation
6. Transport destination specific to head trauma
 - a. Preferential transport to highest level of care within trauma system:
 - iii. GCS 3-13, P (pain) or U (unresponsive) on AVPU scale
 - iv. Penetrating head trauma
 - v. Open or depressed skull fracture

Patient Safety Considerations

1. Do not hyperventilate patient unless signs of herniation
2. Assume concomitant cervical spine injury in patients with moderate/severe head injury
3. **Geriatric Consideration:** Elderly patients with ankylosing spondylitis or severe kyphosis

should be padded and immobilized in a position of comfort and may not tolerate a cervical collar

Notes/Educational Pearls

Key Considerations

1. Head injury severity guideline:
 - a. Mild: GCS 13-15 / AVPU = (A)
 - b. Moderate: GCS 9-12 / AVPU = (V)
 - c. Severe: GCS 3-8 / AVPU = (P) or (U)
2. Important that providers be specifically trained in accurate neurologic status assessment
3. Signs of herniation
 - a. Decreasing mental status
 - b. Abnormal respiratory pattern
 - c. Asymmetric/unreactive pupils
 - d. Decorticate posturing
 - e. Cushing's response (bradycardia and hypertension)
 - f. Decerebrate posturing

Pertinent Assessment Findings

1. Neurologic status assessment findings
2. Pupils
3. Trauma findings on physical exam

Quality Improvement

Key Documentation Elements

- Adequate oxygenation
- Airway status and management
- EtCO₂ monitored and documented for moderate/severe head injury (avoidance of inappropriate hyperventilation)
- Neurological status with vitals: AVPU, GCS
- Exams: Neurological and Mental Status Assessment

Performance Measures

- No oxygen desaturation *less than* 90%
- No EtCO₂ lower than 35 for mild head injury, 30 if severe head injury with signs of herniation
- Appropriate triage to trauma center

High Threat Considerations/Active Shooter Scenario

Aliases

None noted

Definitions

- Hot Zone/Direct Threat Zone: an area within the inner perimeter where active threat and active hazards exists.
- Warm Zone/Indirect Threat Zone: an area within the inner perimeter where security and safety measures are in place. This zone may have potential hazards, but no active danger exists.

Patient Care Goals

1. Assess scene
2. Mitigating further harm
3. Accomplish goal with minimal additional injuries

Patient Presentation

Inclusion Criteria

High threat environment – when greater than normal conditions exist that are likely to cause damage or danger to provider or patient

Exclusion Criteria

No significant threat exists to provider and patient allowing for the performance of routine care

Patient Management

Treatment and Interventions

EMR/EMT

1. Hot Zone/Direct Threat care considerations:
 - a. Defer in depth medical interventions if engaged in ongoing direct threat (e.g. active shooter, unstable building collapse, improvised explosive device, hazardous material threat)
 - b. Threat mitigation techniques will minimize risk to patients and providers
 - c. Triage should be deferred to a later phase of care
 - d. Prioritization for extraction is based on resources available and the situation
 - e. Minimal interventions are warranted
 - f. Encourage patients to provide self-first aid or instruct aid from uninjured bystander
 - g. Consider hemorrhage control:
 - i. Tourniquet application is the primary “medical” intervention to be considered in Hot Zone/Direct Threat
 - ii. Consider instructing patient to apply direct pressure to the wound if no tourniquet available (or application is not feasible)
 - iii. Consider quickly placing or directing patient to be placed in position to protect airway, if not immediately moving patient
2. Warm Zone/Indirect Threat care considerations:

- a. Maintain situational awareness
- b. Ensure safety of both responders and patients by rendering equipment and environment safe (firearms, vehicle ignition)
- c. Conduct primary survey, per the **General Trauma Management** guideline, and initiate appropriate life-saving interventions
- d. Maintain airway and support ventilation [see **Airway Management** guideline]
- e. Do not delay patient extraction and evacuation for non-life-saving interventions
- f. Consider establishing a casualty collection point if multiple patients are encountered
- g. Unless in a fixed casualty collection point, triage in this phase of care should be limited to the following categories:
 - i. Uninjured and/or capable of self-extraction
 - ii. Deceased/expectant
 - iii. All others

Patient Safety Considerations

1. Anticipate unique threats based on situation
2. During high threat situations, provider safety should be considered in balancing the risks and benefits of patient treatment

Notes/Educational Pearls

Key Considerations

1. In high threat situations, novel risk assessment should be considered. Provider and patient safety will need to be simultaneously considered
2. During high threat situations, an integrated response with other public safety entities may be warranted
3. Depending on the situation, a little risk may reap significant benefits to patient safety and outcome
4. During these situations, maintaining communications and incident management concepts may be crucial to maximizing efficiency and mitigating dangers

Quality Improvement

Key Documentation Elements

- Traditional documentation may not be appropriate during Hot Zone/Direct Threat and Warm Zone/Indirect Threat care
- Documentation of key intervention should be relayed:
 - Time of tourniquet application
 - GCS

Spinal Care

Aliases

None noted

Patient Care Goals

1. Select patients for whom spinal motion restriction (SMR) is indicated
2. Minimize secondary injury to spine in patients who have, or may have, an unstable spinal injury
3. Minimize patient morbidity from the use of immobilization devices

Patient Presentation

Inclusion criteria

Traumatic mechanism of injury

Exclusion criteria

No recommendations

Patient Management

Assessment

1. Assess the scene to determine the mechanism of injury
 - a. Mechanism alone should not determine if a patient requires spinal motion restriction – however, mechanisms that have been associated with a higher risk of injury are:
 - i. Motor vehicle crashes (including automobiles, all-terrain vehicles, and snowmobiles)
 - ii. Axial loading injuries to the spine
 - iii. Falls greater than 10 feet
2. Assess the patient in the position found for findings associated with spine injury:
 - a. Mental status
 - b. Neurologic deficits
 - c. Spinal pain or tenderness
 - d. Any evidence of intoxication
 - e. Other severe injuries, particularly associated torso injuries

Treatment and Interventions

EMR/EMT

1. Place patient in cervical collar if there are any of the following:
 - a. Patient complains of midline neck or spine pain
 - b. Any midline neck or spinal tenderness with palpation
 - c. Any abnormal mental status (including extreme agitation)
 - d. Focal or neurologic deficit
 - e. Any evidence of alcohol or drug intoxication
 - f. Another severe or painful distracting injury is present
 - g. A communication barrier that prevents accurate assessment
 - h. If none of the above apply, patient may be managed without a cervical collar

2. Patients with penetrating injury to the neck should not be placed in a cervical collar or other spinal precautions regardless of whether they are exhibiting neurologic symptoms or not. Doing so can lead to delayed identification of injury or airway compromise, and has been associated with increased mortality
3. If extrication is required:
 - a. From a vehicle: After placing a cervical collar, if indicated, children in a booster seat and adults should be allowed to self-extricate. For infants and toddlers already strapped in a car seat with a built-in harness, extricate the child while strapped in his/her car seat
 - b. Other situations requiring extrication: A padded long board may be used for extrication, using the lift and slide (rather than a logroll) technique
4. Helmet removal
 - a. If a football helmet needs to be removed, it is recommended to remove the face mask followed by manual removal (rather than the use of automated devices) of the helmet while keeping the neck manually immobilized - occipital and shoulder padding should be applied, as needed, with the patient in a supine position, in order to maintain neutral cervical spine positioning
 - b. Evidence is lacking to provide guidance about other types of helmet removal
5. Do not transport patients on rigid long boards, unless the clinical situation warrants long board use. An example of this may be facilitation of immobilization of multiple extremity injuries or an unstable patient where removal of a board will delay transport and/or other treatment priorities. In these situations, long boards should ideally be padded or have a vacuum mattress applied to minimize secondary injury to the patient
6. Patients with severe kyphosis or ankylosing spondylitis may not tolerate a cervical collar. These patients should be immobilized in a position of comfort using towel rolls or sand bags

Patient Safety Considerations

1. Be aware of potential airway compromise or aspiration in immobilized patient with nausea/vomiting, or with facial/oral bleeding
2. Excessively tight immobilization straps can limit chest excursion and cause hypoventilation
3. Prolonged immobilization on spine board can lead to ischemic pressure injuries to skin
4. Prolonged immobilization on spine board can be very uncomfortable for patient
5. Children are abdominal breathers, so immobilization straps should go across chest and pelvis and not across the abdomen, when possible
6. Children have disproportionately larger heads. When securing pediatric patients to a spine board, the board should have a recess for the head, or the body should be elevated approximately 1-2 cm to accommodate the larger head size and avoid neck flexion when immobilized
7. In an uncooperative patient, avoid interventions that may promote increased spinal movement

Notes/Educational Pearls

Key Considerations

1. Certain populations with musculoskeletal instability may be predisposed to cervical spine injury. However, evidence does not support or refute that these patients should be treated differently than those who do not have these conditions. These patients should be treated according to the **Spinal Care** guideline like other patients without these conditions
2. Age alone should not be a factor in decision-making for prehospital spine care, yet the patient's ability to reliably be assessed at the extremes of age should be considered. Communication barriers with infants/toddlers or elderly patients with dementia may prevent the provider from accurately assessing the patient
3. Spinal precautions should be considered a treatment or preventive therapy
4. Patients who are likely to benefit from immobilization should undergo this treatment
5. Patients who are not likely to benefit from immobilization, who have a low likelihood of spinal injury, should not be immobilized
6. Ambulatory patients may be safely immobilized on gurney with cervical collar and straps and will not generally require a spine board
7. Reserve long spine board use for the movement of patients whose injuries limit ambulation and who meet criteria for the use of spinal precautions. Remove from the long board as soon as is practical

Pertinent Assessment Findings

1. Mental status
2. Normal neurologic examination
3. Evidence of intoxication
4. Evidence of multiple trauma with other severe injuries

Quality Improvement

Key Documentation Elements

- Patient complaint of neck or spine pain
- Spinal tenderness
- Mental status/GCS
- Neurologic examination
- Evidence of intoxication
- Documentation of multiple trauma
- Documentation of mechanism of injury

Performance Measures

- Percentage of patients with high risk mechanisms of injury and/or signs or symptoms of cervical spine injury who are placed in a cervical collar
- Percentage of patients without known trauma who have a cervical immobilization device placed (higher percentage creates a negative aspect of care)
- Percentage of trauma patients who are transported on a long backboard (target is a low percentage)
- Percentage of patients with a cervical spinal cord injury or unstable cervical fracture who did not receive cervical collar

Toxins and Environmental

Poisoning/Overdose Universal Care

Aliases

Toxin, overdose, poison, exposure

Patient Care Goals

1. Remove patient from hazardous material environment. Decontaminate to remove continued sources of absorption, ingestion, inhalation, or injection
2. Identify intoxicating agent by toxidrome or appropriate environmental testing
3. Assess risk for organ impairments (heart, brain, kidney)
4. Identify antidote or mitigating agent
5. Treat signs and symptoms in effort to stabilize patient

Patient Presentation

Inclusion (Suspect Exposure) Criteria

1. Presentation may vary depending on the concentration and duration of exposure. Signs and symptoms may include, but are not limited to, the following:
 - a. Absorption:
 - i. Nausea
 - ii. Vomiting
 - iii. Diarrhea
 - iv. Altered mental status
 - v. Abdominal pain
 - vi. Rapid heart rate
 - vii. Dyspnea
 - viii. Wheezing
 - ix. Seizures
 - x. Arrhythmias
 - xi. Respiratory depression
 - xii. Sweating
 - xiii. Tearing
 - xiv. Defecation
 - xv. Constricted/dilated pupils
 - xvi. Rash
 - xvii. Burns to the skin
 - b. Ingestion:
 - i. Nausea
 - ii. Vomiting
 - iii. Diarrhea
 - iv. Altered mental status
 - v. Abdominal pain
 - vi. Rapid or slow heart rate
 - vii. Dyspnea
 - viii. Seizures

- ix. Arrhythmias
 - x. Respiratory depression
 - xi. Chemical burns around or inside the mouth
 - xii. Abnormal breath odors
- c. Inhalation:
- i. Nausea
 - ii. Vomiting
 - iii. Diarrhea
 - iv. Altered mental status
 - v. Abnormal skin color
 - vi. Dyspnea
 - vii. Seizures
 - viii. Burns to the respiratory tract
 - ix. Stridor
 - x. Sooty sputum
 - xi. Known exposure to toxic or irritating gas
 - xii. Respiratory depression
 - xiii. Sweating
 - xiv. Tearing
 - xv. Constricted/dilated pupils
 - xvi. Dizziness
- d. Injection:
- i. Local pain
 - ii. Puncture wounds
 - iii. Reddening skin
 - iv. Local edema
 - v. Numbness
 - vi. Tingling
 - vii. Nausea
 - viii. Vomiting
 - ix. Diarrhea
 - x. Altered mental status
 - xi. Abdominal pain
 - xii. Seizures
 - xiii. Muscle twitching
 - xiv. Hypoperfusion
 - xv. Respiratory depression
 - xvi. Metallic or rubbery taste
1. **Toxidromes** (constellations of signs and symptoms that add in the identification of certain classes of medications and their toxic manifestations). These toxidrome constellations may be masked or obscured in poly pharmacy events
- a. Anticholinergic
- i. Red as a beet (Flushed skin)
 - ii. Dry as a bone (Dry skin)
 - iii. Mad as a hatter (Altered mental status)
 - iv. Blind as a bat (Mydriasis)
 - v. Hot as a pistol (Hyperthermia)
 - vi. Full as a flask (urinary retention)

- vii. “Tachy” like a pink flamingo (tachycardia and hypertension)
- b. Cholinergic (DUMBELS)
 - DUMBELS** is a mnemonic used to describe the signs and symptoms of acetylcholinesterase inhibitor agent poisoning – all patient age groups are included where the signs and symptoms exhibited are consistent with the toxidrome of DUMBELS
 - i. **D**iarrhea
 - ii. **U**rination
 - iii. **M**iosis/**M**uscle weakness
 - iv. **B**ronchospasm/**B**ronchorrhea/**B**radycardia (the killer Bs)
 - v. **E**mesis
 - vi. **L**acrimation
 - vii. **S**alivation/**S**weating
- c. Opioids
 - i. Respiratory depression
 - ii. Miosis (pinpoint pupils)
 - iii. Altered mental status
 - iv. Decreased bowel sounds
- d. Sedative Hypnotic
 - i. Central nervous system depression
 - ii. Ataxia (unstable gait or balance)
 - iii. Slurred speech
 - iv. Normal or depressed vital signs (pulse, respirations, blood pressure)
- e. Stimulants (Sympathomimetic)
 - i. Tachycardia, tachydysrhythmias
 - ii. Hypertension
 - iii. Diaphoresis
 - iv. Delusions/paranoia
 - v. Seizures
 - vi. Hyperthermia
 - vii. Mydriasis (dilated pupils)
- f. Serotonin Syndrome (presentation with at least three of the following)
 - i. Agitation
 - ii. Ataxia,
 - iii. Diaphoresis
 - iv. Diarrhea
 - v. Hyperreflexia
 - vi. Mental status changes
 - vii. Myoclonus
 - viii. Shivering
 - ix. Tremor
 - x. Hyperthermia
 - xi. Tachycardia

Exclusion Criteria

No recommendations

Patient Management

Assessment

1. Make sure the scene is safe. Use environmental Carbon Monoxide (CO) detector on “first in” bag if possible
2. Consider body substance isolation (BSI) or appropriate PPE
3. Assess ABCD and, if indicated, expose patient for assessment, and then re-cover to assure retention of body heat
4. Vital signs including temperature
5. Check blood glucose level
6. Monitor pulse oximetry and ETCO₂ for respiratory decompensation
7. Perform carboxyhemoglobin device assessment, if available
8. When indicated, identify specific medication taken (including immediate release vs sustained release), time of ingestion, dose, and quantity. When appropriate, bring all medications (prescribed and not prescribed) in the environment
9. Obtain an accurate ingestion history (as patient may become unconscious before arrival at ED):
 - a. Time of ingestion
 - b. Route of exposure
 - c. Quantity of medication or toxin taken (safely collect all possible medications or agents)
 - d. Alcohol or other intoxicant taken
10. If bringing in exposure agent, consider the threat to yourself and the destination facility
11. Obtain pertinent cardiovascular history and other prescribed medications
12. Check for needle marks, paraphernalia, bites, bottles, or evidence of agent involved in exposure, self-inflicted injury, or trauma
13. Law enforcement should have checked for weapons and drugs, but you may decide to re-check
14. Obtain pertinent patient history
15. Perform physical examination

Treatment and Interventions

EMR

1. Assure a patent airway
2. Administer oxygen as appropriate
3. Opiate overdose, treat per the **Opioid Poisoning/Overdose** guideline
4. For seizures, treat per **Seizures** guideline

EMT

5. Consider activated charcoal without sorbitol (1 g/kg) PO
 - a. If altered mental status or risk of rapid decreasing mental status from polypharmacy, do not administer oral agents including activated charcoal

Patient Safety Considerations

1. Scene/environmental safety for patient and provider
 - a. Consider environmental carbon monoxide monitor use
2. Monitor patient airway, breathing, pulse oximetry, ETCO₂ for adequate ventilation as they may change over time
3. Repeat vital signs often

4. Monitor level of consciousness
5. Maintain or normalize patient temperature
6. The regional poison center should be engaged as early as reasonably possible to aid in appropriate therapy and to track patient outcomes to improve knowledge of toxic effects. The national 24-hour toll-free telephone number to poison control centers is (800) 222-1222, and it is a resource for free, confidential expert advice from anywhere in the United States

Notes/Educational Pearls

Key Considerations

1. Each toxin or overdose has unique characteristics
2. Activated charcoal (which does not bind to all medications or agents) is still a useful adjunct as long as the patient does not have the potential for rapid alteration of mental status or airway/ aspiration risk - precautions should be taken to avoid or reduce the risk of aspiration
3. Ipecac is no longer recommended for any poisoning or toxic ingestion – the manufacturer has stopped production of this medication

Pertinent Assessment Findings

Frequent reassessment is essential as patient deterioration can be rapid and catastrophic.

Quality Improvement

Key Documentation Elements

- Repeat evaluation and documentation of signs and symptoms as patient clinical conditions may deteriorate rapidly
- Identification of possible etiology of poisoning
- Initiating measures on scene to prevent exposure of bystanders when appropriate/indicated
- Time of symptoms onset and time of initiation of exposure-specific treatments

Performance Measures

- Early airway management in the rapidly deteriorating patient.
- Accurate exposure history
 - Time of ingestion/exposure
 - Route of exposure
 - Quantity of medication or toxin taken (safely collect all possible medications or agents)
 - Alcohol or other intoxicant taken
- Multiple frequent documented reassessments.

Acetylcholinesterase Inhibitors (Carbamates, Nerve Agents, Organophosphates) Exposure

Aliases

Acetylcholinesterase inhibitor, ATNAA®, carbamate, Duodote®, insecticide, nerve agent, organophosphate, pesticide, weapons of mass destruction, WMD

Patient Care Goals

1. Rapid recognition of the signs and symptoms of confirmed or suspected acetylcholinesterase inhibitor (AChEI) agents such as carbamates, nerve agents, or organophosphates exposure followed by expeditious and repeated administration of atropine, the primary antidote
2. Carbamates and organophosphates are commonly active agents in over-the-counter insecticides
3. Accidental carbamate exposure rarely requires treatment

Patient Presentation

Inclusion Criteria

1. **DUMBELS** is a mnemonic used to describe the signs and symptoms of acetylcholinesterase inhibitor agent poisoning. All patient age groups are included where the signs and symptoms exhibited are consistent with the toxidrome of DUMBELS
 - a. **D**iarrhea
 - b. **U**rination
 - c. **M**iosis/**M**uscle weakness
 - d. **B**ronchospasm/**B**ronchorrhea/**B**radycardia (the killer B's)
 - e. **E**mesis
 - f. **L**acrimation
 - g. **S**alivation/**S**weating

Exclusion Criteria

No recommendations

Patient Management

1. Don the appropriate PPE
2. Remove the patient's clothing and wash the skin with soap and water
 - a. Acetylcholinesterase inhibitor agents can be absorbed through the skin
 - b. Contaminated clothing can provide a source of continued exposure to the toxin
3. Rapidly assess the patient's respiratory status, mental status, and pupillary status
4. Administer the antidote immediately for confirmed or suspected acetylcholinesterase inhibitor agent exposure
5. Administer oxygen as appropriate with a target of achieving 94-98% saturation and provide airway management
6. Establish intravenous access (if possible)
7. Apply a cardiac monitor (if available)
8. The heart rate may be normal, bradycardic, or tachycardic
9. Clinical improvement should be based upon the drying of secretions and easing of respiratory effort rather than heart rate or pupillary response.

10. Continuous and ongoing patient reassessment is critical

Assessment

1. Acetylcholinesterase inhibitor agents are highly toxic chemical agents and can rapidly be fatal
2. Patients with low-dose chronic exposures may have a more delayed presentation of symptoms
3. Antidotes (atropine and pralidoxime) are effective if administered before circulation fails
4. The patient may develop:
 - a. Miosis (pinpoint pupils)
 - b. Bronchospasm
 - c. Bradycardia
 - d. Vomiting
 - e. Excessive secretions in the form of:
 - i. Tearing
 - ii. Salivation
 - iii. Rhinorrhea
 - iv. Diarrhea
 - v. Urination
 - vi. Bronchorrhea
5. Penetration of an acetylcholinesterase inhibitor agent into the central nervous system (CNS) will cause:
 - a. Headache
 - b. Confusion
 - c. Generalized muscle weakness
 - d. Seizures
 - e. Lethargy or unresponsiveness
6. Estimated level of exposure based upon signs and symptoms
 - a. Mild
 - i. Miosis alone (while this is a primary sign in vapor exposure, it may not be present in all exposures)
 - ii. Miosis and severe rhinorrhea
 - b. Mild to moderate (in addition to symptoms of mild exposure)
 - i. Localized swelling
 - ii. Muscle fasciculations
 - iii. Nausea and vomiting
 - iv. Weakness
 - v. Shortness of breath
 - c. Severe (in addition to symptoms of mild to moderate exposure)
 - i. Unconsciousness
 - ii. Convulsions
 - iii. Apnea or severe respiratory distress requiring assisted ventilation
 - iv. Flaccid paralysis
7. Onset of symptoms can be immediate with an exposure to a large amount of the acetylcholinesterase inhibitor
 - a. There is usually an asymptomatic interval of minutes after liquid exposure before these symptoms occur
 - b. Effects from vapor exposure occur almost immediately

8. Signs and symptoms with large acetylcholinesterase inhibitor agent exposures (regardless of route)
 - a. Sudden loss of consciousness
 - b. Seizures
 - c. Copious secretions
 - d. Apnea
 - e. Death
9. Obtain an accurate ingestion history (as patient may become unconscious before arrival at ED):
 - a. Time of ingestion or exposure
 - b. Route of exposure
 - c. Quantity of medication or toxin taken (safely collect all possible medications or agents)
 - d. Alcohol or other intoxicant taken
 - e. Pertinent cardiovascular history or other prescribed medications for underlying disease
10. The patient can manifest any or all of the signs and symptoms of the toxidrome based on the route of exposure, agent involved, and concentration of the agent:
 - a. Vapor exposures will have a direct effect on the eyes and pupils causing miosis
 - b. Patients with isolated skin exposures will have normally reactive pupils
 - c. Certain acetylcholinesterase inhibitor agents can place the patient at risk for both a vapor and skin exposure

Treatment and Interventions

EMR/EMT

1. Administer oxygen as appropriate
2. Administer antidote auto-injector
 - a. Mark I® Kits
 - i. A commercially available kit of nerve agent/organophosphate antidote auto-injectors. These are being phased out and replaced with Duodote by the CDC
 - ii. A Mark I® kit consists of one auto-injector containing 2 milligrams of atropine and a second auto-injector containing 600 milligrams of pralidoxime chloride
 - b. Duodote®
 - i. A commercially available auto-injector of nerve agent/organophosphate antidote
 - ii. Duodote® is one auto-injector that contains 2.1 milligrams of atropine and 600 milligrams of pralidoxime chloride
 - iii. Due to the fact that Duodote® auto-injectors contain pralidoxime chloride, they should not be used for additional dosing of atropine beyond the recommended administered dose of pralidoxime chloride

Patient Safety Considerations

1. Continuous and ongoing patient reassessment is critical
2. Clinical response to treatment is demonstrated by the drying of secretion and the easing of respiratory effort
3. Initiation of and ongoing treatment should not be based upon heart rate or pupillary response
4. Considerations during the use of auto-injectors
 - a. Mark I® kits and Duodote® have not been approved for pediatric use by the Food

and Drug Administration (FDA), but they can be considered for the initial treatment for children of any age with severe symptoms of an Acetylcholinesterase inhibitor agent poisoning especially if other formulations of atropine are unavailable

Notes/Educational Pearls

Key Considerations

1. Clinical effects of acetylcholinesterase inhibitor agents
 - a. The clinical effects are caused by the inhibition of the enzyme acetylcholinesterase which allows excess acetylcholine to accumulate in the nervous system
 - b. The excess accumulated acetylcholine causes hyperactivity in muscles, glands, and nerves
2. Organophosphates (certain Insecticides)
 - a. Can be legally purchased by the general public
 - b. Organophosphates (e.g. pesticides) penetrate tissues and bind to the patient's body fat producing a prolonged period of illness and ongoing toxicity even during aggressive treatment
3. Nerve agents
 - a. Traditionally classified as weapons of mass destruction (WMD)
 - b. Not readily accessible to the general public
 - c. Extremely toxic and rapidly fatal with any route of exposure
 - d. GA (tabun), GB (sarin), GD (soman), GF, and VX are types of nerve agents and are WMDs
 - e. Nerve agents can persist in the environment and remain chemically toxic for a prolonged period of time

Pertinent Assessment Findings

The signs and symptoms exhibited with the toxidrome of DUMBELS [see **Patient Presentation – Inclusion Criteria** above]

Quality Improvement

Key Documentation Elements

- Time to recognize initial signs and symptoms
- Patient reassessments
- Patient responses to therapeutic interventions
- Measures taken to decontaminate the patient
- Measures taken to protect clean environments from contamination

Performance Measures

- Ability of the EMS system to rapidly locate additional and adequate antidote assets
- Ability of the EMS system to rapidly deploy additional and adequate antidote assets
- Complication rates from the toxin
- Complication rates from the antidotes

Radiation Exposure

Aliases

None noted

Patient Care Goals

1. Prioritize identification and treatment of immediately life-threatening medical conditions and traumatic injuries above any radiation-associated injury
2. Identify and appropriately treat acute radiation Injury
3. Reduce risk for contamination of personnel while caring for patients potentially or known to be contaminated with radioactive material

Patient Presentation

Inclusion Criteria

1. Patients who have been acutely exposed to ionizing radiation from accidental environmental release of a radioactive source
2. Patients who have been acutely exposed to ionizing radiation from a non-accidental environmental release of a radioactive source
3. Patients who have been contaminated with material emitting ionizing radiation

Exclusion Criteria

1. Patients exposed to normal doses of ionizing radiation from medical imaging studies
2. Patients exposed to normal doses of ionizing radiation from therapeutic medical procedures

Patient Management

Assessment

1. Identification and treatment of life-threatening injuries and medical problems takes priority over decontamination
2. Don standard PPE capable of preventing skin exposure to liquids and solids (gown and gloves), mucous membrane exposure to liquids and particles (face mask and eye protection), and inhalational exposure to particles (N95 face mask or respirator)
3. Do not eat or drink any food or beverages while caring for patients with radiation injuries until screening completed for contamination and appropriate decontamination if needed
4. Use caution to avoid dispersing contaminated materials
5. Provide appropriate condition-specific care for any immediately life-threatening injuries or medical problems

Treatment and Interventions

EMR/EMT

1. Administer oxygen as appropriate
2. If seizure occurs:
 - a. Consider a primary medical cause or exposure to possible chemical agents unless indicators for a large whole body radiation dose (greater than 20Gy), such as rapid onset of vomiting, are present
 - b. Treat per **Seizures** guideline

Patient Safety Considerations

Treat life-threatening medical problems and traumatic injuries prior to assessing for and treating radiation injuries or performing decontamination

Notes/Educational Pearls

Key Considerations

1. Irradiated patients pose no threat to medical providers
2. Contaminated patients pose very little threat to medical providers who use appropriate PPE including N95 masks or respirators, gloves, gowns, and face and eye protection
3. Sources of radiation
 - a. Legal
 - i. Industrial plants
 - ii. Healthcare facilities that provide radiologic services
 - iii. Nuclear power plants
 - iv. Mobile engineering sources (e.g. construction sites that are installing cement)
 - b. Illegal
 - i. Weapons of mass destruction
 - ii. "Dirty bomb" design to contaminate widespread areas
4. Physiology of radiation poisoning
 - a. Contamination – Poisoning from direct exposure to a radioactive source, contaminated debris, liquids, or clothing where radiation continues to be emitted from particles on surface
 - b. Exposure – Poisoning from radioactivity, in the form of ionizing rays, penetrating through the bodily tissues of the patient
5. Common types of radioactivity that cause poisoning
 - a. Gamma rays
 - i. Highest frequency of ionizing rays
 - ii. Penetrates the skin deeply
 - iii. Causes the most severe radiation toxicity
 - b. Beta rays - can penetrate up to 1 cm of the skin's thickness
 - c. Alpha rays
 - i. Lowest frequency of ionizing rays
 - ii. Short range of absorption
 - iii. Dangerous only if ingested or inhaled
 - d. Radioactive daughters
 - i. Products of decay of the original radioactive substance
 - ii. Can produce gamma and beta rays (e.g. uranium decays into a series of radon daughters)
6. In general, trauma patients who have been exposed to or contaminated by radiation should be triaged and treated on the basis of the severity of their conventional injuries
7. A patient who is contaminated with radioactive material (e.g. flecks of radioactive material embedded in their clothing and skin) generally poses a minimal exposure risk to medical personnel
8. EMS providers may be asked to assist public health agencies in the distribution and administration of potassium iodide in a mass casualty incident involving radiation release or exposure

Pertinent Assessment Findings

1. Treatment of life-threatening injuries or medical conditions takes priority over assessment for contamination or initiation of decontamination
2. Time to nausea and vomiting is a reliable indicator of the received dose of ionizing radiation. The more rapid the onset of vomiting, the higher the whole-body dose of radiation
3. Tissue burns are a late finding (weeks following exposure) of ionizing radiation injury. If burns are present acutely, they are from a thermal or chemical mechanism
4. Seizures may suggest acute radiation syndrome if accompanied by early vomiting. If other clinical indicators do not suggest a whole-body dose of greater than 20Gy, consider other causes of seizure
5. Delayed symptoms (days to weeks after exposure or contamination)
 - a. Skin burns with direct contact with radioactive source
 - b. Skin burns or erythema from ionizing rays
 - c. Fever
 - d. Bone marrow suppression presenting as:
 - i. Immunosuppression
 - ii. Petechiae
 - e. Spontaneous internal and external bleeding

Quality Improvement

Key Documentation Elements

- Duration of exposure to the radioactive source or environment
- Distance (if able to be determined) from the radioactive source (if known)
- Time of onset of vomiting

Performance Measures

- Use of appropriate PPE
- Scene measurements of radioactivity

Topical Chemical Burn

Aliases

Chemical Burn

Patient Care Goals

1. Rapid recognition of a topical chemical burn
2. Initiation of emergent and appropriate intervention and patient transport

Patient Presentation

Inclusion Criteria

1. Patients of all ages who have sustained exposure to a chemical that can cause a topical chemical burn may develop immediate or in some cases a delayed clinical presentation
2. Agents that are known to cause chemical burns include alkali, acids, mustard agent, and lewisite

Exclusion criteria

None recommended

Patient Management

1. Don the appropriate PPE
2. Remove the patient's clothing, if necessary
3. Contaminated clothing should preferably be placed in double bags
4. If deemed necessary and manpower resources permit, the patient should be transported by EMS providers who did not participate in the decontamination process, and in an emergency response vehicle that has not been exposed to the chemical
5. Information regarding the chemical should be gathered while on scene including materials safety data sheet if available
6. Communicate all data regarding the chemical to the receiving facility

Assessment

1. Clinical effects and severity of a topical chemical burn is dependent upon:
 - a. Class of agent (alkali injury or acid injury)
 - b. Concentration of the chemical the (higher the concentration, the greater the risk of injury)
 - c. pH of the chemical
 - i. Alkali-increased risk with pH greater than or equal to 11
 - ii. Acid-increased risk with pH less than or equal to 3
 - d. Onset of burn
 - i. Immediate
 - ii. Delayed (e.g. hydrofluoric acid)
2. Calculate the estimated total body surface area that is involved
3. Prevent further contamination
4. Special attention to assessment of ocular or oropharyngeal exposure - evaluate for airway compromise secondary to spasm or direct injury associated with oropharyngeal burns
5. Some acid and alkali agents may manifest systemic effects

Treatment and Interventions

EMR/EMT

1. If dry chemical contamination, carefully brush off solid chemical prior to flushing the site as the irrigating solution may activate a chemical reaction
2. If wet chemical contamination, flush the patient's skin (and eyes, if involved) with copious amounts of water or normal saline
3. Early airway intervention for airway compromise or spasm associated with oropharyngeal burns
4. Take measures to minimize hypothermia
5. Consult the Emergency Response Guidebook or Material Safety Data Sheet for further information

Patient Safety Considerations

1. Don PPE
2. Take measures to prevent the patient from further contamination through decontamination
3. Take measures to protect the EMS provider and others from contamination
4. Do not attempt to neutralize an acid with an alkali or an alkali with an acid as an exothermic reaction will occur and cause serious thermal injury to the patient
5. Expeditious transport or transfer to a designated burn center should be considered for burns that involve a significant percentage of total body surface area or burns that involve the eyes, face, hands, feet or genitals

Notes/Educational Pearls

Key Considerations

1. Since the severity of topical chemical burns is largely dependent upon the type, concentration, and pH of the chemical involved as well as the body site and surface area involved, it is imperative to obtain as much information as possible while on scene about the chemical substance by which the patient was exposed. The information gathering process will often include:
 - a. Transport of the "sealed" container of the chemical to the receiving facility
 - b. Transport of the original or a copy of the Material Safety Data Sheet (MSDS) of the substance to the receiving facility
 - c. Contacting the reference agency to identify the chemical agent and assist in management (e.g. CHEMTREC®)
2. Decontamination is critical for both acid and alkali agents to reduce injury - removal of chemicals with a low pH (acids) is more easily accomplished than chemicals with a high pH (alkalis) because alkalis tend to penetrate and bind to deeper tissues
3. Some chemicals will also manifest local and systemic signs, symptoms, and bodily damage

Pertinent Assessment Findings

1. An estimate of the total body surface area that is involved
2. Patient response to therapeutic interventions

Quality Improvement

Key Documentation Elements

- Burn site
- Body surface area involved
- Identification of the chemical
- Reported or measured pH of the chemical
- Acquisition and transfer of MSDS, chemical container, or other pertinent substance information to the receiving the facility

Performance Measures

- Accurate (overtriage/undertriage) triage of patients to designated burn centers
- Early recognition of a topical chemical burn with appropriate treatment
- Measures taken to prevent further contamination

Bites and Envenomation

Aliases

Stings

Patient Care Goals

Bites, stings, and envenomations can come from a variety of insects, marine and terrestrial animals. There is a spectrum of toxins or envenomations with very limited EMS interventions.

1. Assure adequate ventilation, oxygenation and correction of hypoperfusion
2. Pain control which also includes limited external interventions to reduce pain

Patient Presentation

Inclusion Criteria

1. Bites, stings, and envenomations can come from a variety of marine and terrestrial animals and insects causing local or systemic effects
2. Patients may present with toxin specific reactions which may include:
 - a. Site pain
 - b. Swelling
 - c. Muscle pain (hallmark of black widow spider bites)
 - d. Erythema (superficial reddening of the skin)
 - e. Discoloration
 - f. Bleeding
 - g. Nausea
 - h. Abdominal pain
 - i. Hypotension
 - j. Tachycardia
 - k. Tachypnea
 - l. Muscle incoordination
 - m. Confusion
 - n. Anaphylaxis/allergic reactions
3. There is a spectrum of toxins or envenomations and limited EMS interventions that will have any mitigating effect on the patient in the field
 - a. The critical intervention is to get the patient to a hospital that has access to the antivenin if applicable.

Exclusion Criteria

None

Patient Management

Assessment

1. Assess ABCDs and if indicated expose and then cover to assure retention of body heat
2. Vital signs which include temperature
3. Monitor pulse oximetry and ETCO₂ for respiratory decompensation
4. Patient pertinent history
5. Physical exam with special consideration to area of envenomation

Treatment and Interventions

EMR

1. Administer oxygen as appropriate
2. Removal stinger without squeezing the toxin delivery apparatus
3. Remove jewelry from affected limb
4. Immobilize limb and keep patient still
5. If seizure, treat per **Seizures** guideline

EMT

6. Check blood glucose
7. Obtain 12-lead ECG
8. Consider transport to hospital that has access to antivenom, if feasible

Patient Safety Considerations

1. Do not:
 - a. Apply tourniquets, tight Ace®/crepe bandage, or constricting bands above or below the site of the envenomation
 - b. Incision and/or suction wound to remove toxin
 - c. Apply cold packs or immerse the affected extremity in ice water (cryotherapy)
2. EMS providers should not try to capture the offending animal or insect
3. If the offending organism has been killed, beware that many dead insects or animals can continue to bite or sting with venom and should be safely placed in a hard sided and closed container for future identification
4. Patient may still have an imbedded stinger, tooth, nematocyst, or barb which may continue to deliver toxin if left imbedded. Consider safe removal without squeezing the toxin delivery apparatus

Notes/Educational Pearls

Pertinent Assessment Findings

1. Assess for signs and symptoms of local and systematic impact of the suspected toxin
2. Patient may still have an imbedded stinger, tooth, nematocysts, or barb which may continue to deliver toxin if left imbedded

Quality Improvement

Key Documentation Elements

- It is helpful to accurately describe the suspect bite or sting source without risking patient or EMS provider
- Only transport source animal or insect if can be done safely in a hard-sided container
- Repeat evaluation and documentation of signs and symptoms as patient clinical conditions may deteriorate rapidly
- Time of symptoms onset and time of initiation of exposure-specific treatments
- Therapy and response to therapy

Performance Measures

- Offending organism was managed appropriately without secondary exposure

- Appropriate and timely definitive treatment was provided

Carbon Monoxide/Smoke Inhalation

Aliases

CO

Patient Care Goals

1. Remove patient from toxic environment.
2. Assure adequate ventilation, oxygenation and correction of hypoperfusion.
3. Consider use of environmental carbon monoxide (CO) monitors on “first in” bags to assist in detection of occult CO toxicity.

Patient Presentation

Carbon monoxide is a colorless, odorless gas which has a high affinity for binding to red cell hemoglobin, thus preventing the binding of oxygen to the hemoglobin, leading to hypoxia (pulse oximetry less than 94%). A significant reduction in oxygen delivery to tissues and organs occurs with carbon monoxide poisoning. Carbon monoxide is also a cellular toxin which can result in delayed or persistent neurologic sequelae in significant exposures. With any form of combustion (fire/smoke [e.g. propane, kerosene, or charcoal stoves or heaters], combustion engines [e.g. generators, lawn mowers, motor vehicles, home heating systems]), carbon monoxide will be generated. People in a fire may also be exposed to cyanide from the combustion of some synthetic materials. Cyanide toxicity may need to be considered in the hemodynamically unstable patient removed from a fire.

Inclusion Criteria

1. Patients exposed to carbon monoxide may present with a spectrum of symptoms:
 - a. Mild intoxication:
 - i. Nausea
 - ii. Fatigue
 - iii. Headache
 - iv. Vertigo
 - v. Lightheadedness
 - b. Moderate to severe:
 - i. Altered mental status
 - ii. Tachypnea
 - iii. Tachycardia
 - iv. Convulsion
 - v. Cardiopulmonary arrest

Exclusion Criteria

No recommendations

Patient Management

Assessment

1. Remove patient from toxic environment
2. Assess ABCDs and, if indicated, expose patient and re-cover to assure retention of body heat
3. Vital signs including pulse oximetry, temperature, and ETCO₂ if available
4. Monitor pulse oximetry and ETCO₂ for respiratory decompensation
5. Patient pertinent history

6. Patient physical examination

Treatment and Interventions

EMR

1. 100% oxygen via non-rebreather mask or bag valve mask
2. If seizure, treat per **Seizures** guideline

EMT

3. Obtain a 12-lead EKG
4. Check blood glucose level
5. Consider transporting patients with severe carbon monoxide poisoning directly to a facility with hyperbaric oxygen capabilities if feasible and patient does not meet criteria for other specialty care (e.g. trauma or burn)

Patient Safety Considerations

1. Consider affixing a carbon monoxide detector to an equipment bag that is routinely taken into scene (if it signals alarm, don appropriate respiratory protection and exit scene) to assist with detection of occult CO toxicity
2. Remove patient and response personnel from potentially hazardous environment as soon as possible
3. Provide instruction to the patient, the patient's family, and other appropriate bystanders to not enter the environment (e.g. building, car) where the carbon monoxide exposure occurred until the source of the poisoning has been eliminated
4. Do not look for cherry red skin coloration as an indication of carbon monoxide poisoning, as this is an unusual finding
5. CO oximeter devices may yield inaccurate low/normal results for patients with CO poisoning. All patients with probable or suspected CO poisoning should be transported to the nearest appropriate hospital based on their presenting signs and symptoms

Notes/Educational Pearls

Key Considerations

1. Pulse oximetry is inaccurate due to the carbon monoxide binding with hemoglobin
2. As maternal carboxyhemoglobin levels do not accurately reflect fetal carboxyhemoglobin levels, pregnant patients are more likely to be treated with hyperbaric oxygen
3. Consider cyanide toxicity if carbon monoxide poisoning is from a fire
4. A patient light wavelength analysis device to detect carboxyhemoglobin is useful to indicate if there is a carbon monoxide exposure in a non-arrested patient - do not anticipate an immediate change in readings with oxygen administration.

Pertinent Assessment Findings

1. Early and repeat assessment of patient's mental status and motor function are extremely useful in determining response to therapy and the need for hyperbaric therapy
2. Identification of possible etiology of poisoning
3. Time of symptom onset and time of initiation of exposure-specific treatment
4. Response to therapy

Quality Improvement

Key Documentation Elements

- If using an environmental carbon monoxide detector, record the level detected
- Evidence of soot or burns around the face, nares or pharynx
- Early and repeat assessment of patient's mental status and motor function are extremely useful in determining response to therapy and the need for hyperbaric therapy
- Accurate exposure history
 - Time of ingestion/exposure
 - Route of exposure
 - Quantity of medication or toxin taken (safely collect all possible medications or agents)
 - Alcohol or other intoxicant taken
- Signs and symptoms of other patients encountered at same location, if present

Performance Measures

- Early airway management in the rapidly deteriorating patient.
- Accurate exposure history
 - Time of ingestion/exposure
 - Route of exposure
 - Quantity of medication or toxin taken (safely collect all possible medications or agents)
 - Alcohol or other intoxicant taken
- Appropriate protocol selection and management
- Multiple frequent documented reassessments

Opioid Poisoning/Overdose

Aliases

Carfentanil, Dilaudid®, drug abuse, EVZIO®, fentanyl, heroin, hydrocodone, hydromorphone, methadone, morphine, naloxone, Narcan®, opiate, opioid, overdose, oxycodone, Oxycontin®, Percocet®, Percodan®, Suboxone, U-47700, Vicodin®

Patient Care Goals

1. Rapid recognition and intervention of a clinically significant opioid poisoning or overdose
2. Prevention of respiratory and/or cardiac arrest

Patient Presentation

Inclusion Criteria

Patients exhibiting miosis (pinpoint pupils), decreased mental status, and respiratory depression of all age groups with known or suspected opioid use or abuse.

Exclusion Criteria:

Patients with altered mental status exclusively from other causes (e.g. head injury, or hypoglycemia).

Patient Management

1. Don the appropriate PPE
2. Therapeutic interventions to support the patient's airway, breathing, and circulation should be initiated prior to the administration of naloxone
3. If possible, identify specific medication taken (including immediate release versus sustained release) time of ingestion, and quantity
4. Obtain and document pertinent cardiovascular history or other prescribed medications for underlying disease
5. Be aware that unsecured hypodermic needles may be on scene if the intravenous route may have been used by the patient, and that there is a higher risk of needle sticks during the management of this patient population which may also have an increased incidence of blood-borne pathogens
6. Naloxone, an opioid antagonist, should be considered for administration to patients with respiratory depression in a confirmed or suspected opioid overdose
7. If naloxone was administered to the patient prior to the arrival of EMS, obtain the dose and route through which it was administered and, if possible, bring the devices containing the dispensed naloxone with the patient along with all other medications on scene

Assessment

1. Assess the patient's airway, breathing, circulation, and mental status
2. Support the patient's airway by positioning, oxygen administration, and ventilator assistance with a bag valve mask if necessary

3. Assess the patient for other etiologies of altered mental status including hypoxia (pulse oximetry less than 94%), hypoglycemia, hypotension, and traumatic head injury
4. Legally prescribed opioids are also manufactured as an adhesive patch for transdermal absorption, and if found, should be removed from the skin

Treatments and Interventions

EMR/EMT

1. Critical resuscitation (opening and/or maintaining the airway, provision of oxygen, ensuring adequate circulation) should be performed prior to naloxone administration
2. If the patient has respiratory depression from a confirmed or suspected opioid overdose, consider naloxone administration
3. Naloxone can be administered via the IM or IN routes
 - a. Adults: The typical initial adult dose ranges between 0.4-2 mg IM or up to a dose of 4 mg IN
 - b. Pediatrics: The pediatric dose of naloxone is 0.1 mg/kg IM or IN
 - i. Maximum dose of 2 mg IM
 - ii. Maximum dose of 4 mg IN
 - c. Naloxone provided to laypersons and non-medical first responders via public access programs or prescriptions may be provided as a pre-measured dose in an auto-injector or nasal spray or as a pre-measured, but variable, dose and/or concentration in a needleless syringe with a mucosal atomization device (MAD) on the hub
 - d. Naloxone auto-injectors contain 0.4 mg/0.4 mL or 2 mg/0.4 mL
 - i. The cartons of naloxone auto-injectors prescribed to laypersons contain two naloxone auto-injectors and one trainer
 - e. Naloxone nasal spray is manufactured in a single-use bottle that contains 4 mg/0.1 mL
 - f. For the intranasal route when naloxone is administered via a needleless syringe (preferably with MAD on the hub), divide administration of the dose equally between the nostrils to a maximum of 1 mL per nostril
 - g. The administration of naloxone can be titrated until adequate respiratory effort is achieved
4. High-potency opioids [see **Key Considerations**] may require higher and/or more frequently administered doses of naloxone to reverse respiratory depression and/or to maintain adequate respirations
5. Regardless of the doses of naloxone administered, airway management with provision of adequate oxygenation and ventilation is the primary goal in patients with confirmed or suspected opioid overdose

Patient Safety Considerations

1. Clinical duration of naloxone
 - a. The clinical opioid reversal effect of naloxone is limited and may end within an hour whereas opioids often have a duration of 4 hours or longer
 - b. Monitor the patient for recurrent respiratory depression and decreased mental status
2. Opioid withdrawal
 - a. Patients with altered mental status secondary to an opioid overdose may become agitated or violent following naloxone administration due to opioid withdrawal therefore the goal is to use the lowest dose as possible to avoid precipitating withdrawal

- b. Be prepared for this potential scenario and take the appropriate measures in advance to ensure and maintain scene safety
- 3. EMS providers should be prepared to initiate airway management before, during, and after naloxone administration and to provide appropriate airway support until the patient has adequate respiratory effort

Notes /Educational Pearls

Key Considerations

1. The essential feature of opioid overdose requiring EMS intervention is respiratory depression or apnea
2. Some opioids have additional toxic effects
3. Overuse and abuse of prescribed and illegal opioids has led to an increase in accidental and intentional opioid overdoses
4. DEA and Opioids:
 - a. Legally prescribed opioids are controlled under the Drug Enforcement Administration (DEA)
 - b. Opioids have a high potential for abuse, but have an accepted medical use in patient treatment and can be prescribed by a physician
 - c. Frequent legally prescribed opioids include codeine, fentanyl, hydrocodone, morphine, hydromorphone, methadone, morphine, oxycodone, and oxymorphone
 - d. Opioid derivatives, such as heroin, are illegal in the United States
5. Opioid combinations:
 - a. Some opioids are manufactured as a combination of analgesics with acetaminophen, acetylsalicylic acid (aspirin), or other substances
 - b. In the scenario of an overdose, there is a potential for multiple drug toxicities
 - c. Examples of opioid combination analgesics:
 - i. Vicodin® is a combination of acetaminophen and hydrocodone
 - ii. Percocet® is a combination of acetaminophen and oxycodone
 - iii. Percodan® is a combination of aspirin and oxycodone
 - iv. Suboxone® is a combination of buprenorphine and naloxone
6. High-potency opioids:
 - a. Fentanyl is 50-100 times more potent than morphine - it is legally manufactured in an injectable and oral liquid, tablet, and transdermal (worn as a patch) forms however much of the fentanyl adulterating the heroin supply are illegal fentanyl analogs such as acetyl fentanyl
 - b. Carfentanil is 10,000 times more potent than morphine
 - i. It is legally manufactured in a liquid form – however, a powder or tablet is the most common form of this drug that is illegally produced
 - ii. In the concentration in which it is legally manufactured (3 mg/mL), an intramuscular dose of 2 mL of carfentanil will sedate an elephant
 - c. Synthetic opioids (e.g. W-18, are 10,000 times more potent than morphine) – many synthetic opioids are not detectable by routine toxicology screening assays
7. The IN route has the benefit of no risk of needle stick to the provider
8. Patients with opioid overdose from fentanyl or fentanyl analogs may rapidly exhibit chest wall rigidity and require positive end expiratory pressure (PEEP), in addition to multiple and/or larger doses of naloxone, to achieve adequate ventilation

9. PPE that provides additional cutaneous, respiratory, or ocular protection may be considered when providing care in jurisdictions experiencing an increased incidence of overdose from high potency opioids

Pertinent Assessment Findings

1. The primary clinical indication for the use of opioid medications is analgesia
2. In the opioid overdose scenario, signs and symptoms include:
 - a. Miosis (pinpoint pupils)
 - b. Respiratory depression
 - c. Decreased mental status
3. Additional assessment precautions:
 - a. The risk of respiratory arrest with subsequent cardiac arrest from an opioid overdose as well as hypoxia (pulse oximetry *less than 94%*), hypercarbia, and aspiration may be increased when other substances such as alcohol, benzodiazepines, or other medications have also been taken by the patient
 - b. **Pediatric Considerations:** The signs and symptoms of an opioid overdose may also be seen in newborns who have been delivered from a mother with recent or chronic opioid use. Neonates who have been administered naloxone for respiratory depression due to presumed intrauterine opioid exposure may be narcotic dependent and should be monitored closely for seizures

Quality Improvement

Key Documentation Elements

- Rapid and accurate identification of signs and symptoms of opioid poisoning
- Pulse oximetry (oxygen saturation) and, if available, capnometry or capnography
- Blood glucose assessment
- Naloxone dose and route of administration
- Clinical response to medication administration
- Number of doses of naloxone to achieve a clinical response

Performance Measures

- Clinical improvement after prehospital administration of naloxone
- Frequency of patients who develop adverse effects or complications (recurrent respiratory depression or decreased mental status, aspiration pneumonia or pulmonary edema)
- Number of patients who refuse transport following naloxone administration
- EMS providers injured while managing these incidents

Riot Control Agents

Aliases

CN (Mace[®]), CS, OC (pepper spray), tear gas, harassing agents, incapacitating agents, chemical crowd control agents, lacrimators

Patient Care Goals

1. Address side effects of exposed individuals
2. Decontamination of affected individuals
3. Minimize effect to provider

Patient Presentation

Inclusion Criteria

1. Exposure to identifiable agents that are not intended to cause significant injury or fatality

Exclusion Criteria

1. Exposure to chlorine, phosgene, ammonia or other agents that are intended to cause significant injury or fatality
2. Exposure to an unknown agent

Patient Management

Assessment

1. Assess scene safety: evaluate for hazards to EMS personnel, patient, bystanders
 - a. Determine riot control agent being used
 - b. Don appropriate PPE
 - c. Determine number of patients
2. Note symptoms exhibited by the exposed individual
3. Examine as appropriate to complaints

Treatment and Interventions

EMR/EMT

1. Move affected individuals from contaminated environment into fresh air if possible
2. Remove contaminated clothing as able
3. Have patient remove contact lenses if appropriate
4. Irrigation with water or saline may facilitate resolution of symptoms and is recommended for decontamination of dermal and ocular exposure
5. If patient is in respiratory distress, go to **Respiratory** section
6. If patient is wheezing, go to **Bronchospasm** guideline
7. For persistent pain of the eye or skin, go to **Topical Chemical Burn** guideline
8. Exposed individuals who are persistently symptomatic warrant further evaluation and treatment

Patient Safety Considerations

1. Toxicity is related to duration of exposure and concentration of agent used (exposure in non-ventilated space)
2. Patients with pre-existing pulmonary conditions (e.g. asthma, COPD) may be prone to more

severe respiratory effects

3. Traumatic injury may result when exposed individuals are in proximity to the device used to disperse the riot control agent (e.g hose/stream under pressure, riot control agent projectile, grenade)

Notes/Educational Pearls

Key Considerations

1. CN, CS, and OC are the most commonly encountered riot control agents
2. CN, CS and OC have a high safety ratio
3. Toxicity is related to time of exposure and concentration of agent used (exposure in non-ventilated space).
4. Symptoms that may be experienced after exposure:
 - a. Eyes: tearing, pain, conjunctivitis, blurred vision
 - b. Nose/mouth/throat: rhinorrhea, burning/pain, trouble swallowing, drooling
 - c. Lungs: chest tightness, coughing, choking sensation, wheezing, dyspnea
 - d. Skin: burning, redness, dermatitis
 - e. GI: nausea and vomiting are rare and may be posttussive
5. Symptoms begin within seconds of exposure, are self-limited and are best treated by removing patient from ongoing exposure. Symptoms frequently decrease over time (15-45 minutes) after exposure ends.

Pertinent Assessment Findings

1. Riot control agent used
2. Symptoms of exposed
3. Lung sounds
4. Evidence of other traumatic injuries

Quality Improvement

Key Documentation Elements

- Type of riot control agent if known
- Symptoms being treated
- Treatment provided
- Response to treatment

Performance Measures

- Riot control agent identified before making patient contact and providing treatment
- PPE used by responders
- Affected individuals removed from ongoing exposure
- Contaminated clothing and contact lenses removed as able

Hyperthermia/Heat Exposure

Aliases

Hyperthermia, heat cramps, heat exhaustion, heat syncope, heat edema, heat stroke

Definitions

1. Heat Cramps: are minor muscle cramps usually in the legs and abdominal wall. Patient temperature is normal
2. Heat Exhaustion: has both salt and water depletion usually of a gradual onset. As it progresses tachycardia, hypotension, elevated temperature, and very painful cramps occur. Symptoms of headache, nausea and vomiting occur. Heat exhaustion can progress to heat stroke
3. Heat Stroke: occurs when the cooling mechanism of the body (sweating) ceases due to temperature overload and/or electrolyte imbalances. Patient temperature is usually *greater than* 104°F. When no thermometer is available, it is distinguished from heat exhaustion by altered level of consciousness
4. Heat Syncope: is a transient loss of consciousness with spontaneous return to normal mentation attributable to heat exposure
5. Heat Edema: is dependent extremity swelling caused by interstitial fluid pooling

Patient Care Goals

1. Cooling and rehydration
2. Mitigate high risk for decompensation
3. Mitigate high risk for agitation and uncooperative behavior

Patient Presentation

Inclusion Criteria

1. Heat cramps
2. Heat exhaustion
3. Heat stroke
4. Heat syncope
5. Heat edema
6. Stimulant drug abuse
7. Excited delirium [see **Agitated or Violent Patient/Behavioral Emergency** guideline]

Exclusion Criteria

1. Fever from infectious or inflammatory conditions
2. Malignant hyperthermia
3. Serotonin syndrome
4. Neuroleptic malignant syndrome

Patient Management

Assessment

1. Patient Assessment:
 - a. Age
 - b. Oral intake
 - c. Medications
 - d. Alcohol
 - e. Illicit drugs
 - f. Overdose
 - g. Withdrawal risk
2. Environmental Assessment:
 - a. Ambient temperature and humidity
 - b. Exertion level
 - c. Length of time at risk
 - d. Attire (clothing worn)
 - e. Confined space
 - i. **Pediatric Considerations:** Children left in cars who show signs of altered mental status and elevated body temperature should be presumed to have hyperthermia
3. Associated Symptoms:
 - a. Cramps
 - b. Headache
 - c. Orthostatic symptoms
 - d. Nausea
 - e. Weakness
 - f. Mental status changes, including
 - i. Confusion
 - ii. Coma
 - iii. Seizures
 - iv. Psychosis
4. Vital signs:
 - a. Temperature - usually 104°F or greater (if thermometer available)
 - b. Skin:
 - i. Flushed and hot
 - ii. Dry or sweaty
 - iii. Signs of first or second degree burns from sun exposure
 - c. Other signs of poor perfusion/shock

Treatment and Interventions

EMR

1. Move victim to a cool area and shield from the sun or any external heat source
2. Remove as much clothing as is practical and loosen any restrictive garments
3. Manage airway as indicated
4. If alert and oriented, give small sips of cool liquids. If temperature is greater than 104°F (40°C) or if altered mental status is present, begin active cooling by:
 - a. Ice bath immersion provides the most rapid cooling mechanism but may not be

- available to EMS
- b. Continually misting the exposed skin with tepid water while fanning the victim (most effective)
- c. Truncal ice packs may be used, but are less effective than evaporation
- d. DO NOT apply wet cloths or wet clothing, as they may trap heat and prevent evaporative cooling
- 5. Cooling efforts should continue until the patient's temperature is less than 102.2°F (39°C) and the patient demonstrates improvement in mental status
- 6. Treat seizures, per the **Seizures** guideline

EMT

- 7. If altered mental status, check blood glucose level
- 8. All patients suffering from life threatening heat illness (including heat stroke) should be transported to the hospital

Notes/Educational Pearls

Key Considerations

1. Patients at risk for heat emergencies include neonates, infants, geriatric patients, and patients with mental illness
2. Contributory risk factors may come from:
 - a. Prescription and over-the-counter herbal supplements
 - b. Cold medications
 - c. Heart medications
 - d. Diuretics
 - e. Psychiatric medications
 - f. Drug abuse
 - g. Accidental or intentional drug overdose
3. Heat exposure can occur either due to increased environmental temperatures or prolonged exercise or a combination of both
 - a. Environments with temperature *greater than* 90°F and humidity *greater than* 60% present the most risk
4. Heat stroke is associated with cardiac arrhythmias independent of drug ingestion/overdose. Heat stroke has also been associated with cerebral edema
5. Do not forget to look for other causes of altered mental status such as low blood glucose level, or, in the proper circumstances (e.g. endurance exercise events), consider exercise associated hyponatremia (EAH), especially in the patient with altered mental status, normal blood glucose, and normal temperature
6. *Controversy*: shivering may occur while treating heat stroke
 - a. It is uncertain how harmful shivering is to heat stroke patients
 - b. Cooling should be continued until the above temperature and mental status goals are met
7. Hyperthermia not from environmental factors has a differential that includes the following:
 - a. Fever and delirium
 - b. Hyperthyroid storm
 - c. Delirium tremens (DTs)
 - d. CNS lesion or tumor
 - e. Adverse drug event: neuroleptic malignant syndrome, malignant hyperthermia
 - f. Mental status changes without hyperthermia in the correct circumstances could be exercise associated hyponatremia

8. There is no evidence supporting EMS utilizing orthostatic vital signs

Pertinent Assessment Findings

1. Warning signs: fever, altered mental status
2. Blood glucose level for AMS

Quality Improvement

Key Documentation Elements

- Patient assessment includes all types of medication/drug use and detailed past medical history
- Environmental assessment performed
- Cooling interventions considered and implemented
- Decision-making regarding monitoring ABCs

Performance Measures

- Blood glucose level obtained.
- Attempts to reduce core temperature
- All decompensations during EMS care reviewed

Hypothermia/Cold Exposure

Aliases

Hypothermia, frost bite, cold induced injuries

Patient Care Goals

1. Maintain hemodynamic stability
2. Prevent further heat loss
3. Rewarm the patient in a safe manner
4. Appropriate management of hypothermia induced cardiac arrest
5. Prevent loss of limbs

Patient Presentation

1. Patients may suffer from hypothermia due to exposure to a cold environment (increased heat loss) or may suffer from a primary illness or injury that, in combination with cold exposure (heat loss in combination with decreased heat production), leads to hypothermia
2. Patients may suffer systemic effects from cold (hypothermia) or localized effects (e.g. frostbite)
3. Patients with mild hypothermia will have normal mental status, shivering, and may have normal vital signs while patients with moderate to severe hypothermia will manifest mental status changes, eventual loss of shivering and progressive bradycardia, hypotension, and decreased respiratory status
4. Patients with frostbite will develop numbness involving the affected body part along with a “clumsy” feeling along with areas of blanched skin - later findings include a “woody” sensation, decreased or loss of sensation, bruising or blister formation, or a white and waxy appearance to affected tissue

Inclusion Criteria

Patients suffering systemic or localized cold injuries.

Exclusion Criteria

1. Patients without cold exposure
- OR**
2. Patients with cold exposure but no symptoms referable to hypothermia or frostbite

Patient Management

Assessment

1. Patient assessment should begin with looking for evidence of circulatory collapse and ensuring effective respirations
 - a. The patient suffering from moderate or severe hypothermia may have severe alterations in vital signs including weak and extremely slow pulses, profound hypotension and decreased respirations
 - b. The rescuer may need to evaluate the hypothermic patient for longer than the normothermic patient (up to 60 seconds)

2. History – Along with standard SAMPLE-type history, additional patient history should include:
 - a. Attention to any associated injury or illness
 - b. Duration of cold exposure
 - c. Ambient temperature
 - d. Treatments initiated before EMS arrival
3. There are several means to categorize the severity of hypothermia based on either core body temperature readings or clinical evaluation – If possible and reliable, EMS providers should perform core body temperature measurements and categorize patients into one of the three follow levels of hypothermia:
 - a. Mild: normal body temperature 35-32.1°C/95-89.8°F
 - b. Moderate: 32°-28°C – 89.7°-82.5°F
 - c. Severe: 28°-24°C – 82.4°- 75.2°F
 - d. Profound: less than 24°C (75.2°F)
4. Equally important is the patient’s clinical presentation and the signs or symptoms the patient is experiencing – the above temperature based categorization should be balanced against these clinical findings
 - a. Mild: vital signs not depressed normal mental status, shivering is preserved; body maintains ability to control temperature
 - b. Moderate/Severe: – progressive bradycardia, hypotension, and decreased respirations, alterations in mental status with eventual coma, shivering will be lost in moderate hypothermia (generally between 31-30° C), and general slowing of bodily functions; the body loses ability to thermo-regulate

Treatment and Interventions

EMR

1. Maintain patient and rescuer safety - the patient has fallen victim to cold injury and rescuers have likely had to enter the same environment. Maintain rescuer safety by preventing cold injury to rescuers
2. Manage airway per the **Airway Management** guideline
3. Mild hypothermia:
 - a. Remove the patient from the environment and prevent further heat loss by removing wet clothes and drying skin, insulate from the ground, shelter the patient from wind and wet conditions, and insulate the patient with dry clothing or a hypothermia wrap/blanket. Cover the patient with a vapor barrier and, if available, move the patient to a warm environment
 - b. Hypothermic patients have decreased oxygen needs and may not require supplemental oxygen
 - c. Provide beverages or foods containing glucose if feasible and patient is awake and able to manage airway independently
 - d. Vigorous shivering can substantially increase heat production - shivering should be fueled by caloric replacement
 - e. Consider field-rewarming methods such as placement of large heat packs or heat blankets (chemical or electric if feasible) to the anterior chest or wrapped around the patient’s thorax if large enough - forced air warming blankets (e.g. Bair Hugger®) can be an effective field rewarming method if available
 - f. Monitor frequently - if temperature or level of consciousness decreases, refer to **Severe**

Hypothermia, below

4. Moderate or severe hypothermia:
 - a. Perform ABCs, pulse checks for patients suffering hypothermia should be performed for 60 seconds, and obtain core temperature if possible for patients exhibiting signs or symptoms of moderate/severe hypothermia
 - i. Rectal temperatures may be used, but only once the patient is in a warm environment - rectal temperatures are not reliable or suitable for taking temperatures in the field and should only be done in a warm environment (such as a heated ambulance)
 - b. Manage airway and breathing as needed
 - i. Care must be taken not to hyperventilate the patient as hypocarbia may reduce the threshold for ventricular fibrillation in the cold patient
 - c. Prevent further heat loss by removing the patient from the environment and removing wet clothes and drying skin, insulate from the ground, shelter the patient from wind and wet conditions, and insulate the patient with dry clothing or a hypothermia wrap/blanket. Cover the patient with a vapor barrier and, if available, move the patient to a warm environment
 - d. Handle the patient gently
 - i. Attempt to keep the patient in the horizontal position, especially limiting motion of the extremities to avoid increasing return of cold blood to the heart
 - ii. Once in a warm environment, clothing should be cut off (rather than removed by manipulating the extremities)
 - iii. Move the patient only when necessary such as to remove the patient from the elements
5. Frostbite:
 - a. If the patient has evidence of frostbite, and ambulation/travel is necessary for evacuation or safety, avoid rewarming of extremities until definitive treatment is possible. Additive injury occurs when the area of frostbite is rewarmed then inadvertently refrozen. Only initiate rewarming if refreezing is absolutely preventable.
 - i. If rewarming is feasible and refreezing can be prevented use circulating warm water (37 - 39°C /98.6 - 102°F) to rewarm effected body part, thaw injury completely. If warm water is not available, rewarm frostbitten parts by contact with non-affected body surfaces. Do not rub or cause physical trauma.
 - ii. After rewarming, cover injured parts with loose sterile dressing. Do not allow injury to refreeze.

EMT

6. If oxygen is deemed necessary, it should be warmed, to a maximum temperature between 104-108°F (40-42°C) and humidified if possible
7. Indications and contraindications for advanced airway devices are similar in the hypothermic patient as in the normothermic patient
8. If alterations in mental status, consider measuring blood glucose and treat as indicated (treat per **Hypoglycemia** or **Hyperglycemia** guidelines) and assess for other causes of alterations of mentation
9. Transport to a hospital capable of rewarming the patient
10. Warm the patient compartment of the ambulance to 24°C (75.2°F) during transport

Patient Safety Considerations

1. Given the additive effects of additional cold stress, the patient should be removed from the cold environment as soon as operationally feasible
2. In patients suffering from moderate to severe hypothermia, it is critical to not allow these patients to stand or exercise as this may cause circulatory collapse
3. Devices that self-generate heat (e.g. heat packs) that are being utilized during the rewarming process should be wrapped in a barrier to avoid direct contact with the skin and to prevent burns. Available evidence suggests that heat packs with peak temperatures above 45°C (113°F) are most likely to cause burns.

Notes/Educational Pearls

Key Considerations

Considerations in cardiac arrest

1. The following are contraindications for initiation of resuscitation in the hypothermic patient:
 - a. Obvious fatal injuries (such as decapitation)
 - b. The patient exhibits signs of being frozen (such as ice formation in the airway)
 - c. Chest wall rigidity such that compressions are impossible
 - d. Danger to rescuers or rescuer exhaustion
 - e. Avalanche victims buried for 35 minutes or longer with airway obstruction by ice or snow
2. Fixed and dilated pupils, apparent rigor mortis, and dependent lividity may not be contraindication for resuscitation in the severely hypothermic patient
3. The mainstay of therapy in severe hypothermia and cardiac arrest should be effective chest compressions and attempts at rewarming.
 - a. Chest compressions should be provided at the same rate as in normothermic patients
4. The temperature at which defibrillation should first be attempted in the severely hypothermic cardiac arrest victim and the number of defibrillation attempts is unclear. There are different approaches regarding resuscitation of the hypothermic arrest patient.
 - a. Per the American Heart Association (AHA), if the patient has a shockable rhythm (VF/VT), defibrillation should be attempted – It is reasonable to continue defibrillation attempts per AHA protocols concurrently with rewarming strategies
 - b. If defibrillation is unsuccessful and the patient's core temperature is greater than 30°C (86°F), follow guidelines for normothermic patients
5. Manage the airway per standard care in cardiac arrest victims [see **Cardiac Arrest** guideline]
 - a. In the absence of advanced airways, ventilate the patient at the same rate as a normothermic patient
 - b. If the patient has an advanced airway, ventilate at half the rate recommended for a normothermic patient to prevent hyperventilation. If ETCO₂ is available, ventilate to maintain normal ETCO₂ levels
6. Upon ROSC, treat per **Adult Post-ROSC** guideline
7. Patients with severe hypothermia and arrest may benefit from resuscitation even after prolonged downtime, and survival with intact neurologic function has been observed even after prolonged resuscitation
 - a. Patients should not be considered deceased until rewarming has been attempted
8. If a hypothermic patient clearly suffered cardiac arrest and subsequently became hypothermic afterward with prolonged down time between arrest and rescue, there is no rationale for initiating resuscitation and warming the patient

Pertinent Assessment Findings

1. Identification of associated traumatic injuries (when present)
2. Identification of localized freezing injuries
3. Patient core temperature (when available)

Quality Improvement

Key Documentation Elements

- Duration of cold exposure
- Ambient temperature and recent range of temperatures
- Rewarming attempts or other therapies performed prior to EMS arrival
- Patient use of alcohol/drugs

Performance Measures

- Patient core temperature and means of measurement (when available)
- Documentation of associated trauma (when present)
- Blood glucose level obtained

Drowning

Aliases

Near-drowning, non-fatal drowning, fatal drowning, submersion, immersion

Patient Care Goals

1. Rapid assessment and management of life-threatening injuries
2. Rescue from the water-based environment
3. Transport all patients suffering from drowning for hospital evaluation

Patient Presentation

Inclusion Criteria

Patients suffering from drowning or drowning events independent of presence or absence of symptoms.

Exclusion Criteria

Patients without history of drowning.

Patient Management

Assessment

1. Follow **Universal Care** guideline
2. History should include circumstances leading to the submersion, details of mechanism of injury, time under water, and water temperature (if available)
3. Primary survey should include aggressive airway management and restoration of adequate oxygenation and ventilation - unlike the CAB strategy used in standard cardiac arrest, patients suffering cardiac arrest from drowning require an ABC approach with prompt airway management and supplemental breathing
4. History, mechanism of injury and exam should include consideration of possible c-spine injury - if evaluation suggests injury to the cervical spine, manage c-spine
5. Assess for other associated injury such as injury to the head or dive-related emergency

Treatment and Interventions

EMR

1. Ensure scene safety for patient and rescuers. Remove patient from water as soon as possible
 - a. Practice the safest water rescue technique possible, given circumstances on scene
 - b. Evacuate to land or a water craft as soon as possible
 - c. If there is a delay to accessing shore or a rescue boat, initiate in-water basic life support consisting of ventilation only
2. Manage airway per the **Airway Management** guideline
3. Follow **Cardiac Arrest** guideline as indicated with consideration of ABC strategy for drowning victims in cardiac arrest
 - a. Consider 5 rescue breaths followed by 30 chest compressions
 - b. After the initial 5 breaths, use a 2 breaths to 30 compression ratio
4. If mechanism or history suggest cervical spine injury, manage c-spine, per the **Spinal Care**

guideline

5. Administer oxygen as appropriate. Consider positive pressure ventilation in patients with signs or symptoms of respiratory difficulty
6. Consider hypothermia, treat per **Hypothermia/Cold Exposure** guideline

EMT

7. Supraglottic airway as indicated
8. Monitor oxygen saturation
9. Consider CPAP in awake patients with respiratory distress
10. If the victim was involved in underwater diving and uncertainty exists regarding the most appropriate therapy, consider contacting direct medical oversight and discussing need for hyperbaric treatment. Include discussion regarding:
 - a. Submersion time
 - b. Greatest depth achieved
 - c. Ascent rate
 - d. Gas mix

Patient Safety Considerations

1. Avoidance of hyperoxygenation of the drowning victim
2. Rescuer safety considerations

Notes/Educational Pearls

Key Considerations

1. The World Health Organization definition of drowning is “the process of experiencing respiratory impairment from submersion/immersion in liquid”
2. Drowning is further defined in the following categories:
 - a. Non-fatal drowning – patients rescued from drowning
 - b. Fatal drowning – any death, acutely or subacutely, resultant from drowning
3. Submersion refers to situations in which the patient’s airway is underwater. Immersion refers to situations in which the patient’s body is in water but the patient’s airway remains out of the water
4. **Pediatric Considerations:**
 - a. Drowning is a common cause of death in children
 - b. Risk factors for drowning include male gender, age less than 14 yo, alcohol use, lack of supervision, and risky behavior
5. Rescue efforts should be coordinated between all responding agencies to ensure patient is rapidly accessed and removed from the water
6. Initiation of in-water ventilations may increase survival – In-water chest compressions are futile
7. The European Resuscitation Council recommends 5 initial breaths be provided to the drowning victim
 - a. The initial ventilations may be more difficult to achieve as water in the airways may impede alveolar expansion
 - b. After the initial 5 breaths and 30 compressions, the standard ratio of 2 breaths to 30 compressions may be resumed

8. Active efforts to expel water from the airway (by abdominal thrusts or other means) should be avoided as they delay resuscitative efforts and increase the potential for vomiting and aspiration
9. Long-standing teaching has suggested that rescuers should always assume c-spine injury in victims of drowning
 - a. The 2010 American Heart Association update on special circumstances in cardiac arrest notes that routine c-spine precautions in all victims of drowning is likely unnecessary unless the mechanism or injury, history, or physical exam suggests a cervical spine injury
 - b. Mechanisms of injury highly suggestive of cervical spine injury include diving, water skiing, surfing or watercraft accidents
10. Uncertainty exists regarding survival in cold water drowning, however, recent literature suggests the following:
 - a. If water temperature is less than 43°F (6°C) and the patient is submerged with evidence of cardiac arrest:
 - i. Survival is possible for submersion time less than 90 minutes and resuscitative efforts should be initiated
 - ii. Survival is not likely for submersion time greater than 90 minutes and providers may consider not initiating resuscitation or termination of resuscitation on scene
 - b. If water temperature is greater than 43°F (6°C) and the patient is submerged with evidence of cardiac arrest:
 - i. Survival is possible for submersion time less than 30 minutes and resuscitative efforts should be initiated
 - ii. Survival is not likely for submersion time greater than 30 minutes and providers may consider not initiating resuscitation or termination of resuscitation on scene
11. Patients may develop subacute respiratory difficulty after drowning and therefore all victims of drowning should be transported for observation

Quality Improvement

Key Documentation Elements

- Mechanism of injury or history suggesting cervical spine injury
- Submersion time
- Water temperature
- Activities leading to drowning
- Consider a standardized data collection metrics such as the Utstein drowning data reporting elements

Performance Measures

- Recognition and appropriate care of pulmonary/respiratory complaints
- Cervical spine management when appropriate
- Adherence to **Cardiac Arrest** guideline

Dive (SCUBA) Injury/Accidents

Aliases

Barotrauma, bends, squeeze

Patient Care Goals

1. Rapid assessment and management of life-threatening injuries
2. Rescue from the water-based environment
3. Transport patients suffering from self-contained underwater breathing apparatus (SCUBA) diving injury/illness for hospital evaluation and consideration of repressurization/hyperbaric oxygen therapy (HBOT)

Patient Presentation

Inclusion Criteria

Patients with history of recent (within 48 hours) SCUBA diving activity who are exhibiting potential signs and/or symptoms of dive related illness/injury, regardless of dive table compliance. NOTE: SCUBA-related complications may occur anywhere, particularly when divers travel by air within 24-hours of diving

Exclusion Criteria

Patients without history of recent (within 48 hours) SCUBA diving exposure.

Patient Management

Assessment

1. Follow **Universal Care** guideline
2. History should include circumstances leading to the complaint, details of mechanism of injury, time under water, depth of dive, compliance with dive tables/decompression stops, gas mixture used, and water temperature (if available)
3. Be alert for signs of barotrauma (pulmonary barotrauma, arterial gas embolism, pneumothorax, ear/sinus/dental barotrauma etc.) and/or decompression sickness (joint pain, mental status change, other neurologic symptoms including paralysis) or nitrogen narcosis (confusion, intoxication).
4. Assess for other associated injury such as injury to the head or spine (if mechanism and symptoms suggest), marine envenomation, hypothermia, or other injury

Treatment and Interventions

EMR

1. If a SCUBA accident includes associated drowning/near-drowning [see **Drowning** guideline]
2. Manage airway as indicated
3. If air embolism suspected, place in left lateral recumbent position (patient lying with the left side down, knees drawn upward, and flat)
 - a. Trendelenburg position is sometimes recommended to help trap the air in the dependent right ventricle, but this position may increase cerebral edema
4. Patients with symptoms suspicious for decompression illness, should be placed on supplemental oxygen regardless of saturations to enhance washout of inert gasses

5. Assess for hypothermia, treat per **Hypothermia/Cold Exposure** guideline

EMT

6. Use positive pressure ventilation (e.g. CPAP) carefully in patients for whom pulmonary barotrauma is a consideration [see **Airway Management** guideline]
7. Monitor oxygen saturation
8. Consider contacting direct medical oversight and discussing need for hyperbaric treatment and primary transport to facility with HBOT capability - include discussion regarding factors such as submersion time, greatest depth achieved, ascent rate, and gas mix

Patient Safety Considerations

1. If the patient is still in the water, seek safest and most rapid means of removal safe (within your scope of training) while minimizing risk of further injury
2. Seek assistance early for special rescue/extrication and transportation needs
3. Check for multiple patients (e.g. group dive table calculation error(s) or contaminated dive gases)

Notes/Educational Pearls

Key Considerations

1. Rescue efforts should be coordinated between all responding agencies to ensure that the patient is rapidly accessed and safely removed from the water if diver unable to do so themselves
2. Decompression illness may have a variety of presentations depending on system affected (e.g. skin, joint(s), pulmonary, neurologic)
3. SCUBA accidents/incidents can result in a variety of issues, including barotrauma, air embolism and decompression illness

Pertinent Assessment Findings

1. Vital signs findings
2. Neurologic status assessment findings
3. Respiratory assessment findings (e.g. oxygen saturation, respiratory rate)
4. Subcutaneous emphysema

Quality Improvement

Key Documentation Elements

- Water temperature, if available
- Dive history
 - Number of dives in recent history (days)
 - "Bottom time" in dives
 - Dive profiles
 - Maximum depth
 - Rate of ascent
 - Safety stops utilized, if any
 - Dive gas (e.g. air vs. mixed gases such as Nitrox, Heliox or Trimix)
- Timing of onset of symptoms
- History of altitude exposure after diving (air travel)
- Any associated injuries or exposures

Performance Measures

- Recognition and appropriate care of pulmonary/respiratory complaints
- Patient transported to nearest appropriate facility (HBOT if available and indicated)
- Need for HBOT recognized and communicated to receiving facility if indicated

Conducted Electrical Weapon Injury (e.g. TASER®)

Aliases

Tased

Patient Care Goals

1. Manage the condition that triggered the application of the conducted electrical weapon with special attention to patients meeting criterion for excited delirium [see **Agitated or Violent Patient/Behavioral Emergency** guideline]
2. Make sure patient is appropriately secured or restrained with assistance of law enforcement to protect the patient and staff [see **Agitated or Violent Patient/Behavioral Emergency** guideline]
3. Perform comprehensive trauma and medical assessment as patients who have received conducted electrical weapon may have already been involved in physical confrontation
4. If discharged from a distance, two single barbed darts (13mm length) should be located
 - a. Do not remove barbed dart from sensitive areas (head, neck, hands, feet or genitals)

Patient Presentation

Inclusion Criteria

1. Patient received either the direct contact discharge or the distance two barbed dart discharge of the conducted electrical weapon
2. Patient may have sustained fall or physical confrontation trauma
3. Patient may be under the influence of toxic substances and or may have underlying medical or psychiatric disorder

Exclusion Criteria

No recommendations

Patient Management

Assessment

1. Once patient has been appropriately secured or restrained with assistance of law enforcement, perform primary and secondary assessment including pulse oximeter, and consider 12-lead EKG
2. Evaluate patient for evidence of excited delirium manifested by varied combination of agitation, reduced pain sensitivity, elevated temperature, persistent struggling, or hallucinosis

Treatment and Interventions

EMT

1. Make sure patient is appropriately secured with assistance of law enforcement to protect the patient and staff.
2. Treat all barbed darts as a foreign body and leave them for physician removal
3. Treat medical and traumatic injury
4. Consider 12-Lead EKG

Patient Safety Considerations

1. Patient should not be restrained in the prone, face down, or hog-tied position as respiratory compromise is a significant risk
2. The patient may have underlying pathology before being tased (refer to appropriate guidelines for managing the underlying medical/traumatic pathology)
3. Perform a comprehensive assessment with special attention looking for to signs and symptoms that may indicate agitated delirium
4. Transport the patient to the hospital if they have concerning signs or symptoms
5. EMS providers who respond for a conducted electrical weapon patient should not perform a “medical clearance” for law enforcement

Notes/Educational Pearls

Key Considerations

1. Conducted electrical weapon can be discharged in three fashions:
 - a. Direct contact without the use of the darts
 - b. A single dart with addition contact by direct contact of weapon
 - c. From a distance up to 35 feet with two darts
2. The device delivers 19 pulses per second with an average current per pulse of 2.1 milliamps which in combination with toxins/drugs, patient’s underlying diseases, excessive physical exertion, and trauma may precipitate arrhythmias, thus consider EKG monitoring and 12-lead EKG assessment
3. Drive Stun is a direct weapon two-point contact which is designed to generate pain and not incapacitate the subject. Only local muscle groups are stimulated with the Drive Stun technique

Pertinent Assessment Findings

1. Thoroughly assess the tased patient for trauma as the patient may have fallen from standing or higher
2. Ascertain if more than one TASER® cartridge was used (by one or more officers, in effort to identify total number of possible darts and contacts)

Quality Improvement

Key Documentation Elements

- If darts removed, document the removal location in the patient care report
- Physical exam trauma findings
- Neurologic status assessment findings

Performance Measures

- Comprehensive patient documentation as this is a complex patient
- Abnormal findings or vital signs were addressed
- Patient received 12-lead EKG evaluation
- If indicated, review for appropriate securing technique

Electrical Injuries

Aliases

Electrical burns, electrocution

Patient Care Goals

1. Prevent additional harm to patient
2. Identify life threatening issues such as dysrhythmias and cardiac arrest
3. Identify characteristics of electrical source to communicate to receiving facility (voltage, amperage, alternating current [AC] versus direct current [DC])
4. Understand that deep tissue injury can be far greater than external appearance
5. Have high index of suspicion for associated trauma due to patient being thrown
6. Determine most appropriate disposition for the patient as many will require burn center care and some may require trauma center care

Patient Presentation

Inclusion Criteria

Exposure to electrical current (AC or DC).

Exclusion Criteria

None

Patient Management

Assessment

1. Verify scene is secure. The electrical source must be disabled prior to assessment
2. Assess patient with specific focus on dysrhythmias or cardiac arrest
3. Identify all sites of burn injury – If the patient became part of the circuit, there will be an additional site near the contact with ground - electrical burns are often full thickness and involve significant deep tissue damage
4. Assess for potential associated trauma and note if the patient was thrown from contact point - if patient has altered mental status, assume trauma was involved and treat accordingly
5. Assess for potential compartment syndrome from significant extremity tissue damage
6. Determine characteristics of source if possible – AC or DC, voltage, amperage, and also time of injury

Treatment and Interventions

EMR

1. Identify cardiac arrest – even patients who appear dead (particularly dilated pupils) may have good outcomes with prompt intervention [see appropriate guideline for additional information and patient assessment/treatment]
2. Immobilize if associated trauma suspected [see **Trauma** section guidelines]
3. Apply dry dressing to any wounds
4. Remove constricting clothing and jewelry since additional swelling is possible

5. Obtain 12-Lead EKG
6. Electrical injury patients should be taken to a burn center whenever possible since these injuries can involve considerable tissue damage
7. When there is significant associated trauma, this takes priority, if local trauma resources and burn resources are not in the same facility

Patient Safety Considerations

1. Verify no additional threat to patient
2. Shut off electrical power
3. Move patient to shelter if electrical storm activity still in area

Notes/Educational Pearls

Key Considerations

1. Electrical current causes injury through three main mechanisms:
 - a. Direct tissue damage, altering cell membrane resting potential, and eliciting tetany in skeletal and/or cardiac muscles
 - b. Conversion of electrical energy into thermal energy, causing massive tissue destruction and coagulative necrosis
 - c. Mechanical injury with direct trauma resulting from falls or violent muscle contraction
2. Anticipate dysrhythmias as well as cardiac arrest
3. The mortality related to electrical injuries is impacted by several factors:
 - a. Route current takes through the body – current traversing the heart has higher mortality
 - b. Type of current – AC vs. DC
 - i. AC is more likely to cause cardiac dysrhythmias while DC is more likely to cause deep tissue burns however either type of current can cause any injury
 - ii. DC typically causes one muscle contraction while AC can cause repeated contractions
 - iii. Both types of current can cause involuntary muscle contractions that do not allow the victim to let go of the electrical source
 - iv. AC is more likely to cause ventricular fibrillation while DC is more likely to cause asystole
 - c. The amount of current impacts mortality more than the voltage

Pertinent Assessment Findings

1. Identification of potential trauma concomitant with electrical injury
2. Presence of cardiac dysrhythmias

Quality Improvement

Key Documentation Elements

- Characteristics of electrical current
- Downtime if found in cardiac arrest
- Positioning of the patient with respect to the electrical source
- Accurate description of external injuries
- Document presence or absence of associated trauma

Performance Measures

- Confirmation of scene safety
- Documentation of electrical source and voltage if known
- Documentation of 12-Lead EKG
- Documentation of appropriate care of associated traumatic injuries

Lightning/Lightning Strike Injury

Aliases

Lightning burn

Patient Care Goals

1. Identify patient(s) as lightning strike victim(s)
2. Move to safe area
3. Initiate immediate resuscitation of cardiac arrest victim(s), within limits of mass casualty care, also known as “reverse triage”
4. Treat associated traumatic injuries

Patient Presentation

1. Lightning strikes may happen in a variety of environmental conditions
 - a. Most commonly they occur in outdoor or wilderness circumstances
 - b. Golf courses, exposed mountains or ledges and farms/fields all present conditions that increase risk of lightning strike, when hazardous meteorological conditions exist
2. Lacking bystander observations or history, it is not always immediately apparent that patient has been the victim of a lightning strike. Subtle findings such as injury patterns might suggest lightning injury

Inclusion Criteria

Patients of all ages who have been the victim of lightning strike injury

Exclusion Criteria

No recommendations

Patient Management

Assessment

1. Respiratory
 - a. Apnea
 - b. Agonal respirations
 - c. Respiratory paralysis
2. Cardiovascular
 - a. Dysrhythmias
 - b. Transient hypertension
3. Neurologic
 - a. Seizures
 - b. Confusion
 - c. Paralysis
 - d. Paraplegia
 - e. Vertigo/dizziness
 - f. Parasthesias
 - g. Amnesia
 - h. Memory deficits

- i. Anxiety
- j. Fixed/dilated pupils possible (autonomic dysfunction)
- 4. Skin
 - a. Ferning or fern-like superficial skin burn (“Lichtenberg figures”)
 - b. Vascular instability may result in cool, mottled extremities
 - c. Frequent first and/or second degree burns
 - d. Third degree burns less common
- 5. Patient may be in full cardiopulmonary arrest or have only respiratory arrest, as injury is a result of DC current
- 6. May have stroke-like findings as a result of neurologic insult
- 7. May have secondary traumatic injury as a result of overpressurization, blast or missile injury
- 8. Fixed/dilated pupils may be a sign of neurologic insult, rather than a sign of death/impending death – Should not be used as a solitary, independent sign of death for the purpose of discontinuing resuscitation in this patient population

Treatment and Interventions

EMR

1. Assure patent airway - if in respiratory arrest only, manage airway and breathing as appropriate
2. If in cardiopulmonary arrest, treat per **Cardiac Arrest** guideline

EMT

3. Obtain 12-lead EKG

Patient Safety Considerations

1. Recognize that repeat strike is a risk. Patient and rescuer safety is paramount
2. Victims do not carry or discharge a current, so the patient is safe to touch and treat

Notes/Educational Pearls

Key Considerations

1. Lightning strike cardiopulmonary arrest patients have a high rate of successful resuscitation, if initiated early, in contrast to general cardiac arrest statistics
2. There may be multiple victims
3. If multiple victims, cardiac arrest patients whose injury was witnessed or thought to be recent should be treated first and aggressively (reverse from traditional triage practices)
 - a. Patients suffering cardiac arrest from lightning strike initially suffer a combined cardiac and respiratory arrest
 - b. Return of spontaneous circulation may precede resolution of respiratory arrest
 - c. Patients may be successfully resuscitated if provided proper cardiac and respiratory support, highlighting the value of “reverse triage”
4. It may not be immediately apparent that the patient is a lightning strike victim
5. Injury pattern and secondary physical exam findings may be key in identifying patient as a victim of lightning strike
6. Lightning strike is a result of very high voltage, very short duration DC current exposure

Pertinent Assessment Findings

1. Presence of thermal or non-thermal burns
2. Evidence of trauma
3. Evidence of focal neurologic deficits

Quality Improvement

Key Documentation Elements

- Initial airway status
- 12-Lead EKG
- Neurologic exam (initial and repeat)
- Associated/secondary injuries
- Pain scale documentation

Performance Measures

- Cardiopulmonary issues addressed early and documented appropriately
- Patient transported to closest appropriate facility
- Pain scale documented and treated per guidelines (when appropriate)