Proposed Changes to 2021 Prehospital Care Manual

To submit public comment please send feedback at:
https://cchealth.org/ems/tg-update.php

CONTRA COSTA
EMERGENCY MEDICAL SERVICES
A Division of Contra Costa Health Services

Treatment Guideline Updates

FTG	Change	Rationale	Evidence
AC04 Post Resuscitation (ROSC)	In patients with ROSC, administer 5 mcg (0.5 ml) of diluted cardiac epinephrine. Which concentration should be used to dilute for appropriate Epi dosing for ROSC? Should only one concentration (1:10,000 or 1:1000) be used for the dilution. Recommend 1ml syringe, draw 0.5ml from preload admixture.	Push dose vasopressors can provide additional cardiovascular support with the added benefit of ease of use. Most ROSC patients do not maintain ROSC to ED arrival.	Holler JG, Bech CN, Henriksen DP, et al. Nontraumatic hypotension and shock in the emergency department and the prehospital setting, prevalence, etiology, and mortality: A systematic review. *PloS One*. 2015;10(3):e0119331. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4366173/ De Backer D, Biston P, Devriendt J, et al. Comparison of dopamine and norepinephrine in the treatment of shock. *N Engl J Med*. 2010;362(9):779–789. https://www.nejm.org/doi/full/10.1056/NEJMoa0907118 De Backer D, Aldecoa C, Njimi H, et al. Dopamine versus norepinephrine in the treatment of septic shock: A meta-analysis. *Crit Care Med*. 2012;40(3):725–730. https://pubmed.ncbi.nlm.nih.gov/22036860/ Tilton LJ, Eginger KH. Utility of push-dose vasopressors for temporary treatment of hypotension in the emergency department. *J Emerg Nurs*. 2016;42(3):279–281. https://emcrit.org/wp-content/uploads/2009/07/Push-Dose-Nursing.pdf
A13 Overdose and Toxic Ingestion	Add new field treatment guideline to address Opiate Overdose. A13A created.	Removed Opioid Overdose treatment direction.	New Field Treatment Guideline specific to opioid overdose created to align with Pilot Study for EMS field administration of Bupenorphine.

Treatment Guideline Updates

FTG	Change	Rationale	Evidence
A16 Seizure	Increase initial dose of Midazolam to 10mg IM/IN for adult patients in status epilepticus. If patient continues to actively seize, contact Base.	Administering 10mg of Midazolam has shown to be more effective at stopping status epilepticus without any added respiratory complications.	**RAMPART (Rapid Anticonvulsant Medication Prior to Arrival Trial): a double-blind randomized clinical trial of the efficacy of intramuscular midazolam versus intravenous lorazepam in the prehospital treatment of status epilepticus by paramedics.** Epilepsia. 2011 October ; 52(Suppl 8): 45–47. doi:10.1111/j.1528-1167.2011.03235.x. https://pubmed.ncbi.nlm.nih.gov/21967361/ **Prehospital Care of the Adult and Pediatric Seizure Patient: Current Evidence Based Recomendations** https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5391892/
A18 Suspected Sepsis	Comprensive update on Sepsis Field Treatment Guideline: Focus on fluid delivery Reintroduction to SIRS criteria. SIRs criteria: Temperature higher than 100.4 or lower than 96.8, HR greater than 90, RR greater than 20. Determining and managing severe cases of sepsis. Add in call Base for push EPI orders.	Goal in EMS is to identify patients with potential sepsis and notify hospital early. Fluid delivery suboptimal.	qSOFA Has Poor Sensitivity for Prehospital Identification of Severe Sepis and Septic Shock https://www.tandfonline.com/doi/full/10.1080/10903127.2016.1274348 Sepsis: Early recognition and treatment in the Prehospital setting. https://www.jems.com/2016/08/31/sepsis-early-recognition-and-treatment-in-prehopsital-setting-vital-for-patient-outcomes/

Treatment Guideline Updates

FTG	Change	Rationale	Evidence
P12 Pediatric Seizure	Increase initial dose of midazolam to 0.2mg/kg in pediatric patients in status epilepticus. Max dose 5mg if less than or equal to 40kg and 10mg if greater than 40kg.	Recognition and Treatment of Status Epilepticus These doses have been shown to be more effective in stopping status epilepticus without the additional airway events.	**Prehospital Care of the Adult and Pediatric Seizure Patient: Current Evidence Based Reccomendations** https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5391892/
T05 Head Trauma	1. Pre-emptive IV fluids for severe head injury for patients at risk for hypotention 2. Pre-emptive supplemental O_2 for all severe head injury patients	Emphasis on aggressively preventing hypoxia and hypotension in severe head injury patients	Excellence in Prehospital Injury Care https://pubmed.ncbi.nlm.nih.gov/31066879/
Pediatric Midazolam Dosing Guide	2 Dosing Guides 1. Status Epilepticus 2. Cardioversion/ Behavioral Removed airway/ behavioral dosing For pediatric patients greater than or equal to 40kg, 10mg	Single dosing guide did not address appropriate dose for Seizures based on RAMPART Study	See P12 update and A6 updates for info

FTG	Rationale	Change
Multiple Guideline Changes	Feedback from public forums and internal clinical review. Mostly clean up and clarification of language and intent	A01 – Abdominal Pain • Pearl 2, change to “For Chronic Abdominal Pain, consider non-narcotic Ketamine/Acetaminophen for pain” • Pearl 7 – Remove, add to Pearl 2 • Move signs/symptoms suggestive cardiac etiology underneath “assess symptom severity,” exit to Cardiac TG as indicated • Add “YES” to down arrow under improving • Change “Exit to Hypotensive/Shock TG” to “Low BP, s/s of shock, exit to…”

Treatment Guideline Updates

FTG	Rationale	Change
Multiple Guideline Changes	Feedback from public forums and internal clinical review. Mostly clean up and clarification of language and intent	A07 – Diabetic • Oral glucose remove "Tubes" • Return to baseline mental status (Y/N), remove line "No" A14 – Adult Pain Control • Add "Single dose only – repeat doses require Base Hospital Order" AC08 – Chest Pain: Suspected Cardiac or STEMI • Change ASA dose to 324mg P10 – Pediatric Pain Control • Remove Ketamine from last bullet T04 – Extremity Trauma • Remove "Consider Fentanyl" T06 – Multi-System Trauma • Remove "Consider Fentanyl" FP03 – Airway: Bougie Device • PEARL 6 – Change to "or use i-Gel" FP09 – Cardiac Arrest Management • Change to "Each and every adult out-of-hospital…." Drug Reference Guide • Acetaminophen – Change Indication to "Moderate to Severe pain" • Aspirin – Change the does to 324mg • Epinephrine 1:100,000 (push dose epi)– Add to drug reference • Added a page and shifted to accommodate • Ketamine – Max Dose, Ketamine dosing • Update Ketamine to match FTG Ketamine Adult Dosing Guide • Remove from FTGs

Contra Costa County Emergency Medical Services

Post Resuscitation (ROSC)

History
- Respiratory arrest
- Cardiac arrest

Signs and Symptoms
- Return of spontaneous circulation

Differential
- Continue to address specific differentials associated with the original dysrhythmia

Worsening bradycardia in ROSC patients may indicate impending rearrest

E	Repeat primary assessment
E	**Optimize ventilation and oxygenation** • Maintain SpO_2 ≥ 94% • Maintain respiratory rate between 6 – 10/minute for EtCO2 35 – 45 • DO NOT HYPERVENTILATE
E	Monitor vital signs
P	Advanced airway placement, ***if indicated***
P	Obtain 12-Lead ECG
P	Establish IO/IV
P	**Normal Saline bolus 500ml IV/IO** May repeat as needed if lungs are clear
P	*Systolic BP < 90* **Push Dose Epi 0.5ml (5 mcg) IV/IO every 3 min** Titrate to a Systolic BP > 90
P	Cycle Blood Pressure every 3 minutes

↓

Transport to STEMI Receiving Center

↓

Notify receiving facility. Contact Base Hospital for medical direction, as needed.

Approved STEMI Receiving Centers

John Muir – Concord
John Muir – Walnut Creek
Kaiser – Walnut Creek
San Ramon Regional
Sutter Delta
Highland – Oakland
Kaiser - Oakland
Kaiser – Vallejo
Marin General
Summit – Oakland
Valley Care - Pleasanton

1:1000 Epinephrine Mixing Instructions

NEED:
1:1000 Epineprhine ampule
tuberculin syringe
10ml Normal Saline flush

1. Draw up 0.1ml (1 ml/mg) of 1:1000 Epi in the tuberculin syringe
2. Add the 1:1000 Epi from the tuberculin syringe into the Normal Saline flush - mix gently
3. Now you have 10mL of Epinephrine at a 0.01mg/mL (10mcg/mL) concentration
4. Label the syringe

1:10,000 Epinephrine Mixing Instructions

NEED:
1:10000 Epinephrine pre-load
10 ml Normal Saline flush

1. Waste 1 ml from Normal Saline Flush
2. Draw 1ml of 0.1mg/mL (Epi 1:10000) from pre-load into Normal Saline Flush – mix gently
3. Now you have 10mL of Epinephrine at a 0.01mg/mL (10mcg/mL) concentration
4. Label the syringe

Adult Cardiac Treatment Guidelines

Overdose/Toxic Ingestion

History
- Ingestion or suspected ingestion of a potentially toxic substance
- Substance ingested, route, and quantity
- Time of ingestion
- Reason (suicidal, accidental or criminal)
- Available medications in home
- Past medical history and medications

Signs and Symptoms
- Mental status changes
- Hypo or hypertension
- Decreased respiratory rate
- Tachycardia or dysrhythmias
- Seizures
- S.L.U.D.G.E.

Differential
- Tricyclic antidepressants (TCAs)
- Acetaminophen (Tylenol)
- Aspirin
- Depressants
- Stimulants
- Anticholinergics
- Cardiac medications
- Solvents, alcohols or cleaning agents
- Insecticides (organophosphates)

California Poison Control Center
(800) 222-1222

Adequate respirations (> 8) and oxygenation?
- No → Exit to Opioid Overdose TG *as indicated*
- Yes →

P
- 12-Lead ECG
- IV/IO procedure
- Cardiac monitor

Altered mental status?
- Yes → E Blood glucose analysis → Exit to Diabetic/Behavioral TGs *as indicated*
- No →

Systolic BP < 90
- Yes → Exit to Hypotension/Shock TG *as indicated*
- No →

If bradycardic and symptomatic
→ Exit to Symptomatic Bradycardia TG *as indicated*

Tricyclic Antidepressant OD
→ QRS ≥ 0.12 sec *and* BP < 90?
- Yes → P **Sodium Bicarbonate 1mEq/kg IV/IO**

Organophosphate OD
→ P **Atropine 1-2mg IV/IO** Repeat every 3-5 minutes until relief of symptoms achieved

Hydrofluoric Acid Exposure
→ P
- **Calcium Chloride 500mg IV/IO** (5ml of 10% solution) For tetany or cardiac arrest
- Consider **Fentanyl 50-200mcg IV** Titrated in 25-50mcg increments to pain relief
- OR
- **Fentanyl 100mcg IN/IM** if no IV access

May repeat once in 15 minutes

Notify receiving facility. Contact Base Hospital for medical direction, as needed.

MD Contact Base Hospital Physician for treatment or additional Fentanyl orders

Adult Medical Treatment Guidelines

CONTRA COSTA EMERGENCY MEDICAL SERVICES
A Division of Contra Costa Health Services
Effective Jan. 2021

Overdose/Toxic Ingestion

Pearls

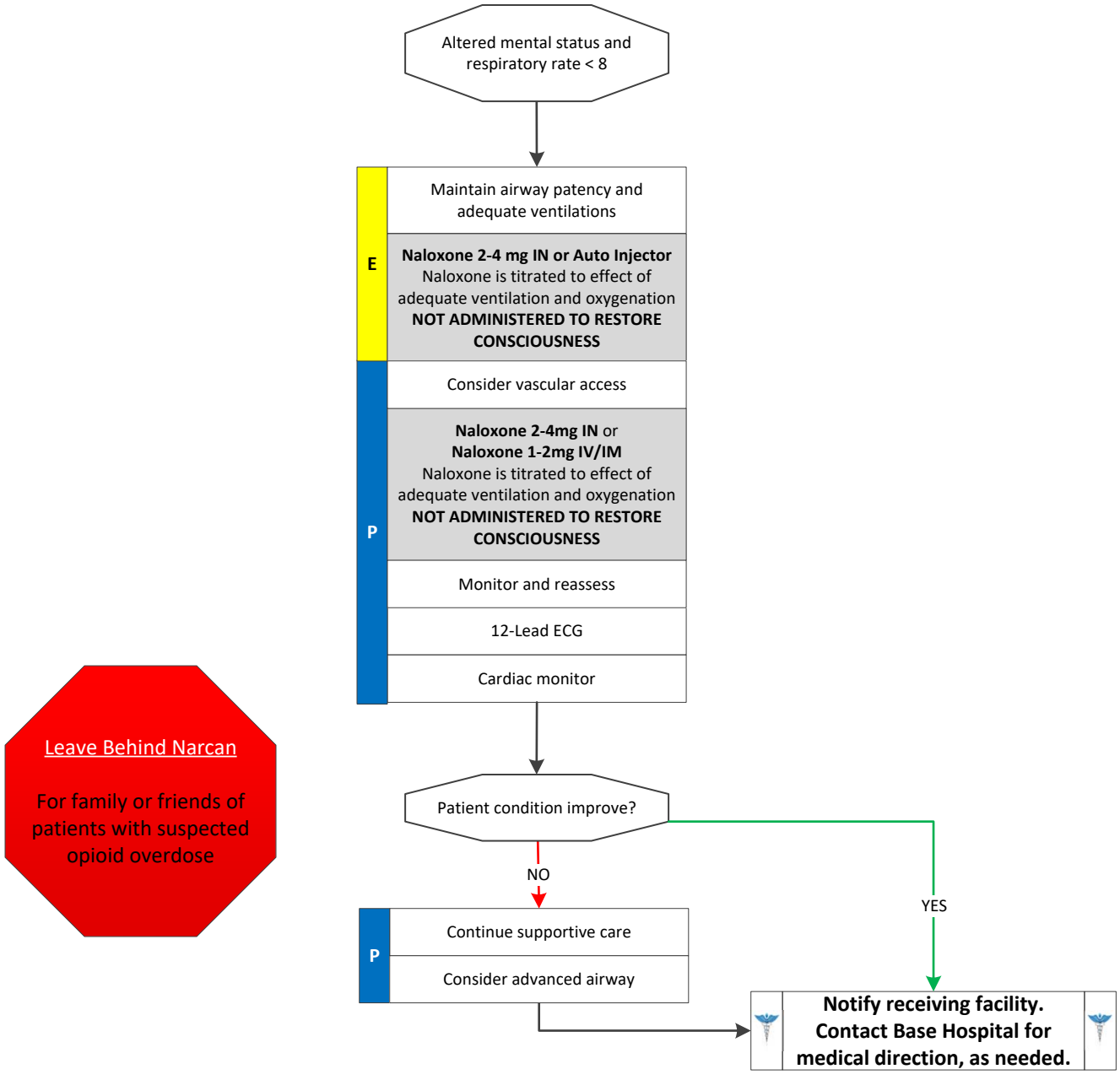
- **Overdose or toxic ingestion patients with significant ingestion/exposures should be monitored very closely and aggressively treated as indicated. Do not hesitate to contact the Base Hospital for advice as certain critically ill overdose patients may quickly overwhelm medication supplies. For example, a tricyclic overdose with a wide QRS and altered mental status may need to receive multiple Sodium Bicarbonate boluses until QRS narrowing and clinical improvement; patients with organophosphate toxicity with SLUDGE syndrome may require more Atropine than is usually available on an ambulance.**
- Do not rely on patient history of ingestion, especially in suicide attempts. Make sure patient is still not carrying other medications or has any weapons.
- Bring medication bottles, contents, and emesis to the Emergency Department.
- S.L.U.D.G.E.: Salivation, Lacrimation, Urination, Defecation, GI distress, and Emesis
- Tricyclic: 4 major areas of toxicity include decreased mental status, dysrythmias, seizures, hypotension then coma and death.
- Acetaminophen: Initially normal or with nausea/vomiting. If not detected and treated, causes irreversible liver failure.
- Aspirin: Early sign consist of abdominal pain and vomiting. Tachypnea and altered mental status may occur later. Renal dysfunction, liver failure or cerebral edema among other things can present later.
- Depressants: Decreased heart rate, blood pressure or temperature, decreased respirations, and non-specific pupils.
- Stimulants: Increased heart rate, blood pressure or temperature, dilated pupils, and seizures.
- Anticholinergics: Increased heart rate or temperature, dilated pupils, and mental status changes.
- Cardiac medications: Dysrhythmias and mental status changes.
- Solvents: Nausea, vomiting, coughing, and mental status changes.
- Insecticides: Increased or decreased heart rate, increased secretions, nausea, vomiting, diarrhea, and pinpoint pupils. Consider restraints if necessary for patient's or personnel's protection per Restraint Procedure.
- Consider contacting the California Poison Control Center for Guidance.

Suspected Opioid Overdose

History
- Hx of recent opioid drug use
- Hx of chronic opioid drug use
- Narcotic prescriptions in the household
- Evidence of illicit drug use (needles, paraphernalia)
- Hx of chronic medical conditions requiring opioid medication

Signs and Symptoms
- Altered mental status
- Depressed respiratory drive
- Pin point pupils
- Track marks
- Unconsciousness

Differential
- Diabetic emergency
- Stroke
- Neurologic disorder
- Non-opioid overdose
- Traumatic injury



Leave Behind Narcan

For family or friends of patients with suspected opioid overdose

Adult Medical Treatment Guidelines

Seizure

History
- Reported or witnessed seizure
- Previous seizure history
- Medical alert tag
- Seizure medications
- History of trauma
- History of diabetes
- History of pregnancy
- Time of seizure onset
- Document number of seizures
- Alcohol use, abuse, or abrupt cessation
- Fever

Signs and Symptoms
- Altered mental status
- Sleepiness
- Incontinence
- Observed seizure activity
- Evidence of trauma
- Unconscious
- Incontinence

Differential
- Head trauma
- Metabolic, hepatic or renal failure
- Tumor
- Hypoxia
- Electrolyte abnormality
- Drugs or medication non-compliance
- Infection or sepsis
- Alcohol withdrawal
- Eclampsia
- Stroke
- Hyperthermia
- Hypoglycemia

Status Epilepticus
- 2 or more seizures in ≤ 5 minutes

Or
- Any seizure lasting > 5 minutes

If duration cannot be confirmed, patient should be assumed to be in status if actively seizing when you arrived.

E
- Ensure scene safety
- Loosen any constrictive clothing
- Assess and manage ABCs
- Cardiac monitor

Status Epilepticus?
(Confirmed or Suspected)

YES

E
- Apply high flow O_2 via NRB
- Initiate BVM ventilation for apnea or ongoing hypoxia

P

Midazolam
IM: 10mg (preferred route)
IN: 10mg (5mg in each nare)
IV/IO*(if already established)*: **6mg – 8mg**

If patient continues to seize, consider additional Midazolam with base contact

NO

E
- Monitor and reassess
- Check blood glucose
- SMR if indicated
- Manage any traumatic injuries

If BGL ≤ 60mg/dl
Exit to Diabetic TG

Notify receiving facility. Contact Base Hospital for medical direction, as needed.

Adult Medical Treatment Guidelines

Seizure

Pearls

- Status Epilepticus is defined as two or more seizures without a period of consciousness or recovery, or one prolonged seizure lasting longer than 5 minutes. If patient is seizing upon EMS arrival this is likely status epilepticus. This is a true emergency requiring rapid airway control, treatment, and transport.
- Midazolam 10mg IM is effective in the termination of status epileptic. Do not delay IM administration to obtain IV or IO access in an actively seizing patient.
- Limit IN administrations to ½ dose in each nare.
- Be prepared to assist ventilations or manage the airway, especially if Midazolam is used.
- For a seizure that begins in the presence of EMS, if the patient was previously conscious, alert and oriented, take the time to assess and protect the patient and providers and CONSIDER THE CAUSE. The seizure may stop, especially in patients who have prior history of self-limiting seizures. However, do not hesitate to treat recurrent or prolonged (> 1 minute) seizure activity.
- Assess the possibility of occult trauma and substance abuse.
- Grand Mal seizures (generalized) are associated with a loss of consciousness, incontinence, and oral trauma.
- Focal seizures (Petit Mal) affect only a part of the body and are not associated with a loss of consciousness.

Suspected Sepsis

History
- Age (common in elderly and very young)
- Presence and duration of fever
- Previously documented infection or illness (UTI, pneumonia, meningitis, encephalitis, cellulitis, or abscess)
- Recent surgery or invasive procedure
- Immunocompromised
- Bedridden or immobile patients
- Prosthetic or indwelling devices
- Immunization status

Signs and Symptoms
- Hyper or hypothermia
- Rash or excessive bruising
- Chills
- Myalgia
- Markedly decreased urine output
- AMS
- Delayed capillary refill
- Elevated blood glucose (unless diabetic)

Differential
- Shock (hypovolemic or cardiogenic)
- Dehydration
- Hyperthyroidism
- Medication or drug interaction
- Non-septic infection
- Allergic reaction or anaphylaxis
- Toxicological emergency

E	Universal Patient Care TG
	Consider appropriate PPE and infection control measures
P	Establish IV/IO
	Cardiac monitor
	$EtCO_2$ monitoring

Obvious or suspected infection ***AND*** any ***TWO*** of the following criteria:
- Respiratory rate ≥ 20
- Temperature > 100.4° or < 96.8°
- Heart Rate > 90

Systolic BP < 90/ Shock?

NO

P — Start **Normal Saline 500mL bolus IV/IO**
Repeat 500 mL bolus to **Maximum of 1L**
Discontinue if signs of Fluid Overload develop
See Pearls

YES

P — Start **Normal Saline 500mL bolus IV/IO**
Repeat 500 mL bolus to **Maximum of 2L**
Discontinue if signs of Fluid Overload develop
See Pearls

MD — ***Consider Base contact for Push Dose Epi***
See drug reference

Declare a Sepsis Alert

Notify receiving facility. Contact Base Hospital for medical direction, as needed.

Adult Medical Treatment Guidelines

Suspected Sepsis

Pearls

- Early recognition of sepsis allows for attentive care and early administration of antibiotics.
- Aggressive IV fluid therapy is the most important prehospital treatment for sepsis. Suspected sepsis patients should receive repeated fluid boluses **(to a Maximum of 2L)** while being checked frequently for signs of pulmonary edema, especially in patients with a known history of CHF or ESRD on dialysis. STOP fluid administration in the setting of pulmonary edema.
- Septic patients are especially susceptible to traumatic lung injury and ARDS. If artificial ventilation is necessary, avoid ventilating with excessive tidal volumes. Use only enough tidal volume to see the chest rise. **If CPAP is utilized, airway pressure should be limited to 7.5cm H_2O if using a rate adjustable device.**
- Attempt to identify source of infection (e.g. skin, respiratory, etc.) and relay previous treatments and related history to receiving ED physician.
- Disseminated Intravascular Coagulation (DIC) is an ominous, late stage manifestation of sepsis characterized by frank, extensive bruising, bleeding from multiple sites, and finally tissue death.

Contra Costa County Emergency Medical Services

Pediatric Seizure

History
- Reported or witnessed seizure
- Previous seizure history
- Medical alert tag
- Seizure medications
- History of trauma
- History of diabetes
- History of pregnancy
- Time of seizure onset
- Document number of seizures
- Alcohol use, abuse, or abrupt cessation
- Fever

Signs and Symptoms
- Altered mental status
- Sleepiness
- Incontinence
- Observed seizure activity
- Evidence of trauma
- Unconscious
- Incontinence

Differential
- Head trauma
- Metabolic, hepatic or renal failure
- Tumor
- Hypoxia
- Electrolyte abnormality
- Drugs or medication non-compliance
- Infection or sepsis
- Alcohol withdrawal
- Eclampsia
- Stroke
- Hyperthermia
- Hypoglycemia

Status Epilepticus
- 2 or more seizures in ≤ 5 minutes
Or
- Any seizure lasting > 5 minutes

If duration cannot be confirmed, patient should be assumed to be in status if actively seizing when you arrived.

E
- Ensure scene safety
- Loosen any constrictive clothing
- Assess and manage ABCs
- Cardiac monitor

Status Epilepticus? (Confirmed or Suspected)

YES

P **Midazolam**
IN (preferred) or IM
Use Pediatape and refer to dosing guide
Max dose:
5 mg (≤ 40kg)
10 mg (> 40kg)

Continues to seize?

NO

YES

E If febrile, initiate cooling measures

E Check blood glucose → If BGL ≤ 60mg/dl Exit to Diabetic TG

MD *Consider additional* **Midazolam** *with base contact*

E
- Monitor and reassess
- SMR if indicated
- Manage any traumatic injuries

Notify receiving facility. Contact Base Hospital for medical direction, as needed.

Pediatric Treatment Guidelines

CONTRA COSTA EMERGENCY MEDICAL SERVICES
A Division of Contra Costa Health Services

Effective Jan. 2021

Pediatric Seizure

Pearls

- **<u>Simple febrile seizures are most common in ages 6 months to 5 years of age. They are, by definition, generalized seizures with no seizure history in the setting of any grade of fever, with an otherwise normal neurologic and physical exam. Any seizure confirmed to last for more than five (5) minutes should be treated with medication.</u>**
- Be prepared to assist ventilations, especially if Midazolam is used. Avoiding hypoxemia is extremely important.
- In an infant, a seizure may be the only evidence of a closed head injury.
- Status epilepticus is defined as two or more successive seizures without a period of consciousness or recovery OR seizures lasting greater than 5 minutes. This is a true emergency requiring rapid airway control, treatment and transport.
- Assess for the possibility of occult trauma and substance abuse, overdose, or ingestion/toxins.

Head Trauma

History
- Time of injury
- Mechanism (blunt vs. penetrating)
- Loss of consciousness
- Bleeding
- Past medical history
- Medications (anticoagulants)

Signs and Symptoms
- Evidence of trauma
- Pain, swelling, or bleeding
- AMS
- Unconscious
- Respiratory distress or failure
- Vomiting
- Seizure

Differential
- Skull fracture
- Spinal injury
- Abuse

E
- Spinal Motion Restriction ***if indicated***
- Secure airway and support respiratory rate
- Elevate head 30 degrees unless contraindicated. Position patient on left side if needed for vomiting
- Hemorrhage Control
  - Direct Pressure
  - Pressure Bandage
  - Consider Hemostatic Gauze

→ Exit to Airway TG ***if indicated***

P
- Establish IV/IO
- Cardiac monitor
- $EtCO_2$ monitoring

POTENTIAL SEVERE HEAD INJURY?
Any one of these:
- LOC at any point
- GCS ≤ 14
- Any post-traumatic seizure
- Multisystem trauma requiring intubation?

YES →

Limit scene time – Transport early

E
High flow O_2 via NRB
Maintain SPO_2 as close to 100% as possible
If unable to maintain SPO_2 with NRB & BLS maneuvers – Proceed with BVM
AVOID HYPERVENTILATION

P
If SBP approaching 90 or rapidly dropping in adults
Normal Saline bolus 1000ml IV/IO
Reassess patient for criteria above
May give additional **500ml IV/IO**
as long as criteria above exists

If poor perfusion or shock in peds
Normal Saline bolus IV/IO
Use PEDIATAPE and refer to PEARLS
Repeat to age dependent goal SBP
*May repeat to a **Maximum 1L***
as long as criteria above exists

NO →

E Manage ABCs

P
For Nausea/Vomiting Consider
Adults - **Ondansetron 4mg IV/IO/IM/ODT**
*(May repeat every 10 minutes to a **Maximum 12mg**)*

Pediatric ≥ 4 years - **Ondansetron IV/IO/IM/ODT**
Use PEDIATAPE and refer to dosing guide
(May repeat x1 for peds > 40kg)

Age Dependent Signs of Shock
- Neonate: < 60mmHg or weak pulses
- Infant: < 70mmHg or weak pulses
- 1-10 years: < 70mmHg + (age in years x2)
- Over 10 years: <90mmHg
- Over 65 years: <110mmHg

Notify receiving facility. Contact Base Hospital for medical direction, as needed.

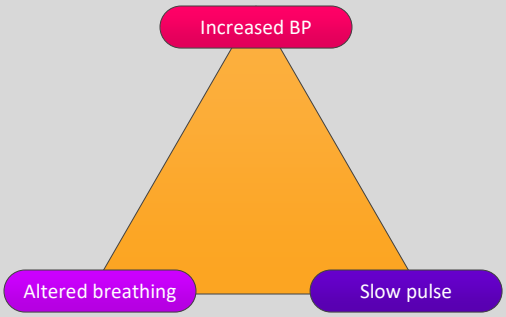
Adult and Pediatric Trauma/Environmental Treatment Guidelines

Head Trauma

Increased Intracranial Pressure

Changes in LOC
Papilledema
Impaired eye movement
↓ sensory/motor function

Infants
Bulging fontanels
Cranial suture separation
↑ head circumference
High-pitched cry



Cushing's Triad

Headache
Pupillary changes
Vomiting
Changes in vital signs
↑ Blood pressure
↓ Pulse
Changes in respiratory pattern

Pearls

- Aggressively prevent and treat the "**Three H-Bombs**" of TBI:
  - Hypoxemia — Early signs include confusion and restlessness.
  - Hypotension — Usually indicates injury or shock unrelated to head Injury and should be treated aggressively.
  - Hyperventilation — Causes vasoconstriction which can lead to decreased blood supply.
- All potential TBI patients should receive continuous oxygen via NRM. Threshold ≥ 90% O2 saturation with optimal 92-98% readings.
- Basic airway management is preferred unless unable to effectively manage with BLS maneuvers. Utilize jaw thrust technique to open the airway. Do not delay scene time to intubate.
- If patient shows any sign of inadequate oxygenation, ventilate using BVM. Use of two-finger bag valve technique is critical. Ventilation rates: Adults 15+ 10 BPM; Peds 2-14 20 BPM; Infants 25 BPM
- IV Crystalloids if SBP approaching 90 or dropping rapidly in average adult.
- Hypotension is age dependent. This is not always reliable and should be interpreted in context with patients normal BP, if known. Shock may be present with a seemingly normal blood pressure:
  - Neonate: < 60mmHg or weak pulses
  - Infant: < 70 mmHg or weak pulses
  - 1-10 years: < 70 + (age in years x 2)
  - Over 10 years: < 90 mmHg
  - Over 65 years: < 110 mmHg
- Target ETCO2 of 40 (range 35-45). ETCO2 may be unreliable if the patient was subject to multisystem trauma or poor perfusion.
- Initial documentation of GCS is a vital step in the assessment process. Aggressively monitor and document for changes by repeat examination.
- Perform modest hyperventilation to maintain an EtCO2 of 30-35 for significant signs of increased intercranial pressure or signs of brainstem herniation (dilated pupil on one side or posturing).
- In cases of traumatic arrest, the use of Epi is not indicated.
- Scalp hemorrhage can be life threatening. Treat with direct pressure and pressure dressing. If bleeding is not controlled apply hemostatic agent topically.
- Consider possibility of domestic violence or abuse.

Midazolam – Status Epilepticus

Indication: Status Epilepticus
Concentration = 5 mg/ml

		IN (preferred)/IM
COLOR	**Doses (mg)**	**Give (ml)**
Gray	**1 mg**	**0.2 ml**
Pink	1.4 mg	0.26 ml
Red	**1.8 mg**	**0.34 ml**
Purple	**2.2 mg**	**0.42 ml**
Yellow	2.8 mg	0.52 ml
White	3.6 mg	0.66 ml
Blue	4.6 mg	0.84 ml
Orange	5 mg	1 ml
Green	5 mg	1 ml
≥ 40kg	10 mg	2 ml

Note: Additional doses may be given every 3-5 minutes until seizure cessation OR up to a **maximum dose** of 5mg (≤ 40 kg) OR 10mg (> 40 kg)

Midazolam – Non Seizure

Indication: Behavioral/ Sedation for Cardioversion

Concentration = 5 mg/ml

Single dose only – Repeat doses require Base Hospital order

COLOR	Doses (mg)	Give (ml)
Gray	0.5 mg	0.1 ml
Pink	0.75 mg	0.15 ml
Red	0.85 mg	0.17 ml
Purple	1 mg	0.2 ml
Yellow	1.25 mg	0.25 ml
White	1.75 mg	0.35 ml
Blue	2 mg	0.4 ml
Orange	2.75 mg	0.55 ml
Green	3.25 mg	0.65 ml
40kg	4 mg	0.8 ml
50kg	4.5 mg	0.9 ml
≥ 60kg	5 mg	1 ml

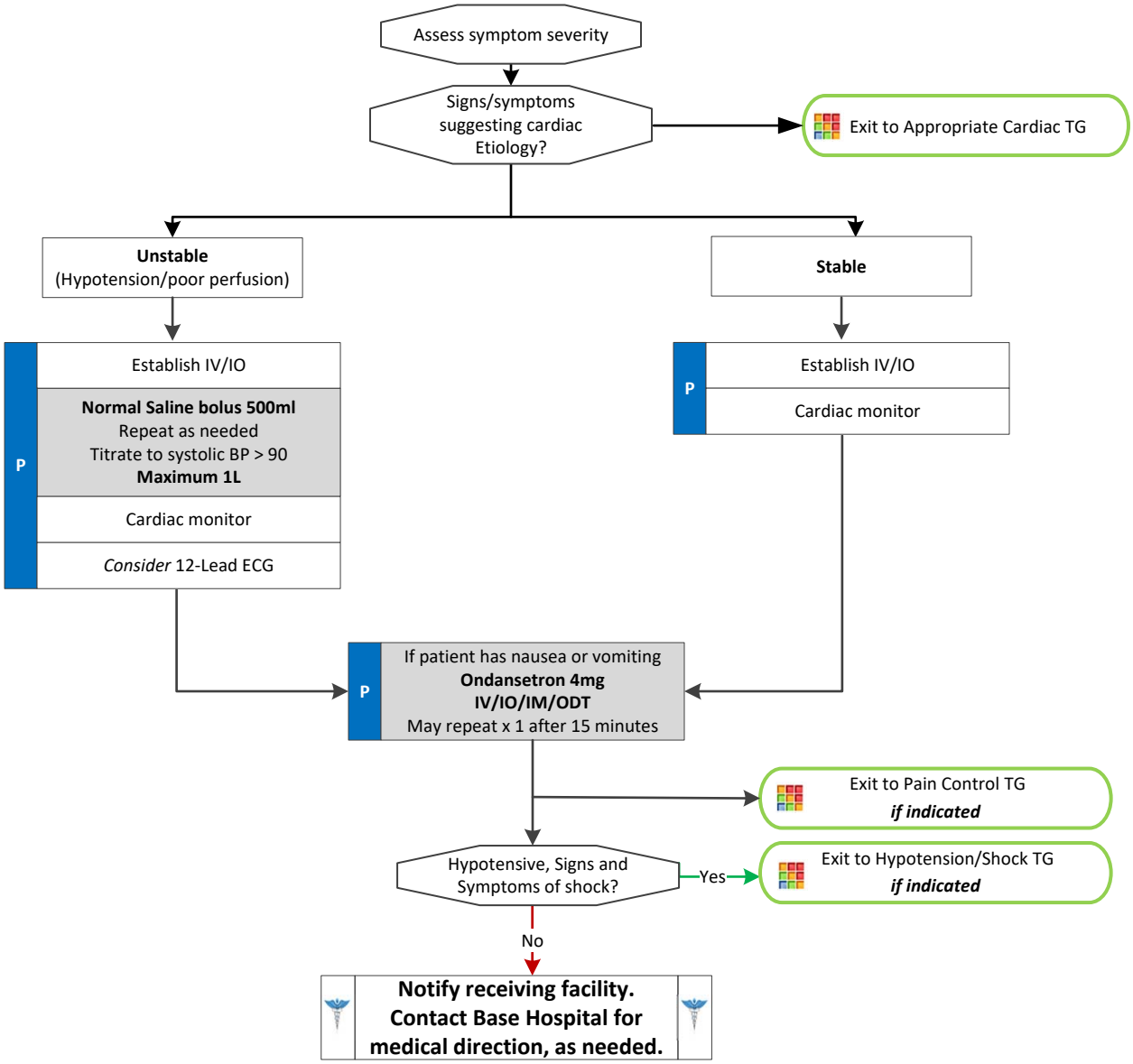
Abdominal Pain

History
- Age
- Past medical/surgical history
- Medications
- **O**nset
- **P**rovocation
- **Q**uality (e.g. crampy, constant, sharp, dull, etc.)
- **R**egion / radiation/referred
- **S**everity (0 – 10 scale)
- **T**ime (duration/repetition)
- Fever
- Last meal eaten
- Last bowel movement/emesis
- Menstrual history (pregnancy)

Signs and Symptoms
- Pain (location/migration)
- Tenderness
- Nausea
- Vomiting
- Diarrhea
- Dysuria (painful or difficult urination)
- Constipation
- Vaginal bleeding/discharge
- Pregnancy

Associated symptoms: (Helpful to localize source)
Fever, headache, weakness, malaise, myalgia, cough, headache, mental status change, or rash

Differential
- Pneumonia or pulmonary embolus
- Liver (hepatitis)
- Peptic ulcer disease/gastritis
- Gallbladder
- MI
- Pancreatitis
- Kidney stone
- Abdominal aneurysm
- Appendicitis
- Bladder/prostate disorder
- Pelvic (PID, ectopic pregnancy, or ovarian cyst)
- Spleen enlargement
- Diverticulitis
- Bowel obstruction
- Gastroenteritis (infectious)
- Ovarian or testicular torsion



Adult Medical Treatment Guidelines

Abdominal Pain

Pearls

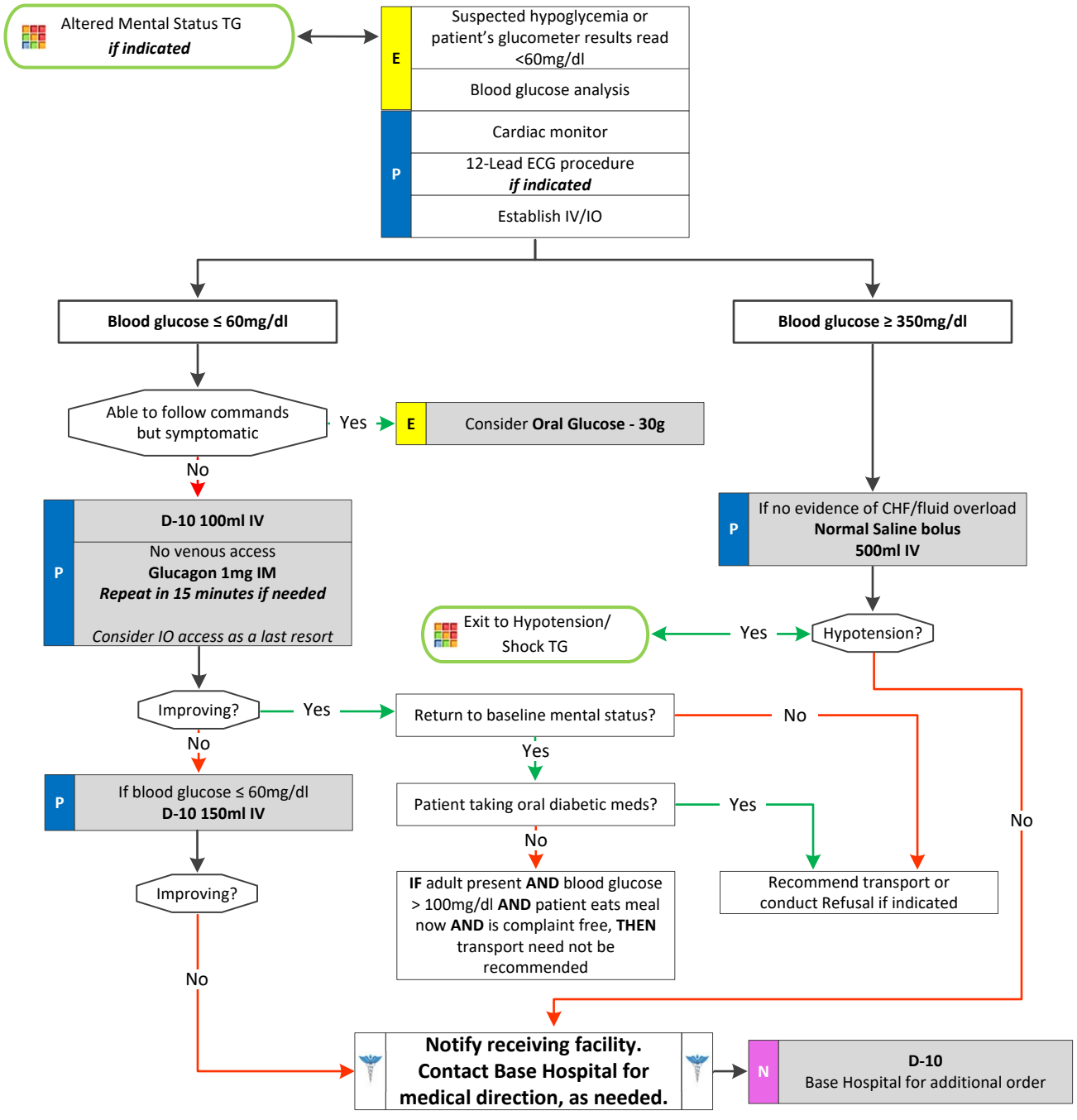
- Diabetic, females, and geriatric patients often have atypical pain, or only generalized complaints. Suspect cardiac etiology in these patients, perform a 12-Lead ECG, and investigate until proven otherwise.
- For chronic abdominal pain, consider non-narcotic pain control.
- Zofran is not indicated or useful for motion sickness.
- Document the mental status and vital signs prior to administration of anti-emetics.
- Abdominal pain in women of childbearing age should be treated as pregnancy-related until proven otherwise.
- An impression of abdominal aneurysm should be considered with severe abdominal or non-traumatic back pain, especially in patients > 50 years of age or patients with shock/poor perfusion.

Diabetic

History
- Past medical history
- Medications
- Recent blood glucose check
- Last meal

Signs and Symptoms
- Altered mental status
- Combative or irritable
- Diaphoresis
- Seizure
- Abdominal pain
- Nausea or vomiting
- Weakness
- Dehydration
- Deep or rapid breathing

Differential
- Alcohol or drug use
- Toxic ingestion
- Trauma or head injury
- Seizure
- Stroke
- Altered baseline mental status



Adult Medical Treatment Guidelines

Diabetic

Pearls

- It is safer to assume hypoglycemia than hyperglycemia if doubt exists.
- Recheck BGL after each D-10 or Glucagon administration.
- Patients with prolonged hypoglycemia may not respond to Glucagon.
- Response to Glucagon can take 15-20 minutes. Consider the entire clinical picture when treating hypoglycemia, including a patient's overall clinical condition and other vital signs. It may be safe to wait for some time for Glucagon to work instead of pursing the more aggressive course of performing IO access to give faster acting D-10 solution. Diabetics may have poor wound healing capabilities, and IO access may present a greater risk for infection or complicate the patient's long-term condition due to poor wound healing. IO access may also present a greater risk for infection. On the other hand, consider IO access to give D-10 solution early in patients who are critically ill or peri-arrest and hypoglycemic.
- Do not administer oral glucose to patients that are not able to swallow or protect their airway.
- Quality control checks should be maintained per manufacturer's recommendation for all glucometers.
- Patients refusing transport to a hospital after treatment of hypoglycemia:
  - Oral agents: Patients taking oral diabetic medications should be strongly encouraged to allow ambulance transportation to a hospital. They are at risk of recurrent hypoglycemia that can be delayed for hours and require close monitoring even after a prehospital blood glucose level of greater than 60mg/dl has been achieved. Patients who meet criteria to refuse care should be instructed to contact their physician immediately and consume a meal with complex carbohydrates and protein now.
  - Insulin agents: Many forms of Insulin now exist. Longer acting Insulin places the patient at risk of recurrent hypoglycemia even after a prehospital blood glucose level of greater than 60mg/dl has been achieved. Patient who meet criteria to refuse care should be instructed to contact their physician immediately and consume a meal with complex carbohydrates and protein now.

Chest Pain: Suspected Cardiac or STEMI

History
- Age
- Medications (e.g. Viagra, Sildenafil, Levitra, Vardenafil, Cialis or Tadalafil)
- Past medical history (e.g. MI, angina, diabetes, or post menopausal)
- Allergies
- Recent physical exertion
- **P**rovocation
- **Q**uality (e.g. pressure, constant, sharp, dull, etc.)
- **R**egion/Radiation/Referred
- **S**everity (0 – 10 scale)
- **T**ime (onset/duration/repetition)

Signs and Symptoms
- Heart rate < 60 with associated hypotension, acute altered mental status, chest pain, acute CHF, seizures, syncope, or shock secondary to bradycardia
- Chest pain
- Respiratory distress
- Hypotension or shock
- Altered mental status
- Syncope

Differential
- Acute myocardial infarction
- Hypoxia
- Pacemaker failure
- Hypothermia
- Sinus bradycardia
- Athletes
- Head injury (elevated ICP) or stroke
- Spinal cord lesion
- Sick sinus syndrome
- AV blocks (e.g. 1°, 2°, or 3°)
- Overdose

Chest pain?
Signs/symptoms consistent with cardiac etiology?

Yes

P
- Cardiac monitor
- 12-Lead ECG
- **Aspirin 324mg PO**

Acute MI/STEMI
(STEMI = 1mm ST segment elevation ≥ 2 contiguous leads; See 12-Lead Procedure)

No

P
- Establish IV/IO
- **Nitroglycerin 0.4mg sublingual** if systolic BP is > 90 May repeat ever 5 minutes until pain subsides. **Max 3 doses**
- *Consider* **Fentanyl 25 – 200mcg IV titrated in 25 – 50mcg increments** for pain relief if BP > 90 systolic
- ***If indicated,*** **Normal Saline bolus 500ml IV/IO** May repeat as needed **Maximum 1L**

Yes

Declare a STEMI Alert

P
- Establish IV/IO
- *Consider* **Fentanyl 25 – 200mcg IV titrated in 25 – 50mcg increments** for pain relief if BP > 90 systolic
- ***If indicated,*** **Normal Saline bolus 500ml IV/IO** May repeat as needed **Maximum 1L**

Notify receiving facility. Contact Base Hospital for medical direction, as needed.

N
- **Fentanyl** Contact Base Hospital for additional order

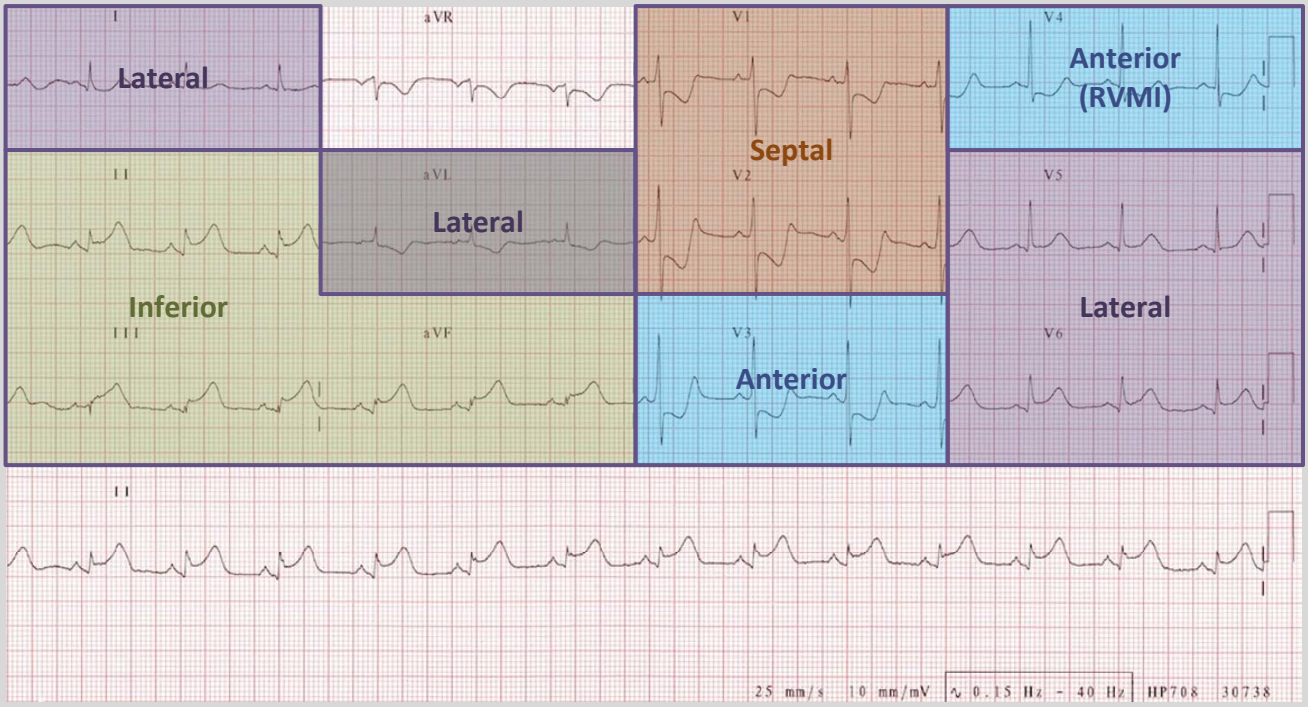
Approved STEMI Receiving Centers

John Muir – Concord
John Muir – Walnut Creek
Kaiser – Walnut Creek
San Ramon Regional
Sutter Delta
Highland – Oakland
Kaiser – Vallejo
Marin General
Summit – Oakland
Kaiser – Oakland
Valley Care – Pleasanton

Adult Cardiac Treatment Guidelines

CONTRA COSTA EMERGENCY MEDICAL SERVICES
A Division of Contra Costa Health Services
Effective Jan. 2021

Chest Pain: Suspected Cardiac or STEMI



ST Elevation in 2 or more leads: Leads II, III, aVF → Inferior wall MI (vessel likely RCA or LCx)
ST Elevation in 2 or more leads: Leads I, aVL, V_5, V_6 → Lateral wall MI (vessel likely LCx or LAD branch)
ST Elevation in 2 or more leads: Leads V_1, V_2 → Septal wall MI (vessel likely LCx or LAD branch)
ST Elevation in 2 or more leads: Leads V_3, V_4 → Anterior wall MI (vessel likely LCx or LAD branch)

**Look for ST DEPRESSION in reciprocal leads (opposite wall) to confirm diagnosis.
**Isolated ST elevation in aVR with ST depression in all other leads should raise suspicion for a proximal LAD Artery injury or Left Main Coronary Artery abnormality. This is not STEMI criteria, but the 12-Lead ECG should be transmitted to the ED for consultation. Consider transport to a STEMI receiving center.

Adult Cardiac Treatment Guidelines

Pearls

- Avoid Nitroglycerin in any patient who has used Viagra (Sildenafil) or Levitra (Vardenafil) in the past 24 hours or Cialis (Tadalafil) in the past 36 hours due to the potential of severe hypotension.
- Patients with a STEMI should be transported to the closest most appropriate STEMI receiving center.
- Many STEMIs evolve during prehospital care and may not be noted on the initial 12-Lead ECG.
- An ECG should be obtained prior to treatment for bradycardia if patient condition permits.
- Transmit all 12-Lead ECGs whether STEMI is detected or not.
- If a patient has taken their own Nitroglycerin without relief, consider potency of medication. Provider maximum doses do not include patient administered doses.
- Monitor for hypotension after administration of nitroglycerin and opioids.
- Diabetics, geriatric, and female patients often have atypical pain, or only generalized complaints. Suspect cardiac etiology in these patients, and perform a 12-Lead ECG.
- Document the time of the 12-Lead ECG in the EHR as a procedure along with the interpretation.

Chest Pain: Suspected Cardiac or STEMI

History
- Age
- Medications (e.g. Viagra, Sildenafil, Levitra, Vardenafil, Cialis or Tadalafil)
- Past medical history (e.g. MI, angina, diabetes, or post menopausal)
- Allergies
- Recent physical exertion
- **P**rovocation
- **Q**uality (e.g. pressure, constant, sharp, dull, etc.)
- **R**egion/Radiation/Referred
- **S**everity (0 – 10 scale)
- **T**ime (onset/duration/repetition)

Signs and Symptoms
- Heart rate < 60 with associated hypotension, acute altered mental status, chest pain, acute CHF, seizures, syncope, or shock secondary to bradycardia
- Chest pain
- Respiratory distress
- Hypotension or shock
- Altered mental status
- Syncope

Differential
- Acute myocardial infarction
- Hypoxia
- Pacemaker failure
- Hypothermia
- Sinus bradycardia
- Athletes
- Head injury (elevated ICP) or stroke
- Spinal cord lesion
- Sick sinus syndrome
- AV blocks (e.g. 1°, 2°, or 3°)
- Overdose

Chest pain?
Signs/symptoms consistent with cardiac etiology?

Yes

P
- Cardiac monitor
- 12-Lead ECG
- **Aspirin 324mg PO**

Acute MI/STEMI
(STEMI = 1mm ST segment elevation ≥ 2 contiguous leads; See 12-Lead Procedure)

No

P
- Establish IV/IO
- **Nitroglycerin 0.4mg sublingual** if systolic BP is > 90 May repeat ever 5 minutes until pain subsides. **Max 3 doses**
- *Consider* **Fentanyl 25 – 200mcg IV titrated in 25 – 50mcg increments** for pain relief if BP > 90 systolic
- ***If indicated,*** **Normal Saline bolus 500ml IV/IO** May repeat as needed **Maximum 1L**

Yes

Declare a STEMI Alert

P
- Establish IV/IO
- *Consider* **Fentanyl 25 – 200mcg IV titrated in 25 – 50mcg increments** for pain relief if BP > 90 systolic
- ***If indicated,*** **Normal Saline bolus 500ml IV/IO** May repeat as needed **Maximum 1L**

Notify receiving facility. Contact Base Hospital for medical direction, as needed.

N
- **Fentanyl** Contact Base Hospital for additional order

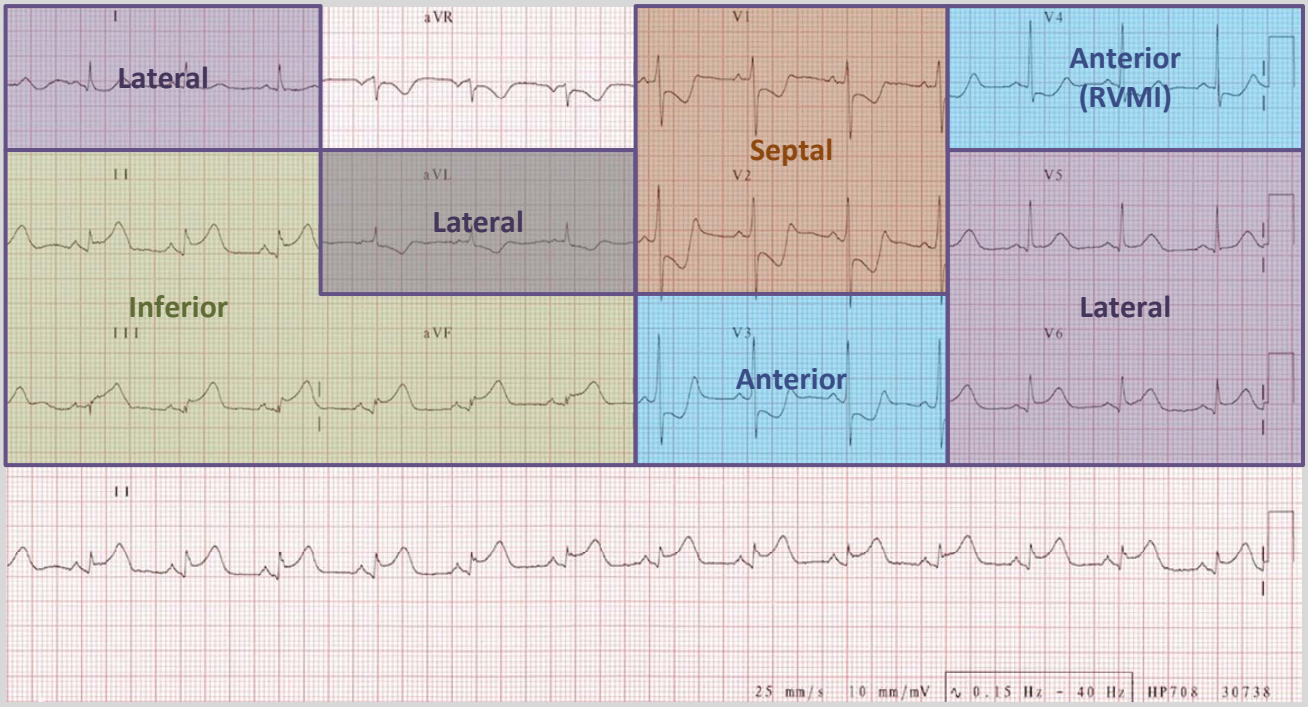
Approved STEMI Receiving Centers

John Muir – Concord
John Muir – Walnut Creek
Kaiser – Walnut Creek
San Ramon Regional
Sutter Delta
Highland – Oakland
Kaiser – Vallejo
Marin General
Summit – Oakland
Kaiser – Oakland
Valley Care – Pleasanton

Adult Cardiac Treatment Guidelines

CONTRA COSTA EMERGENCY MEDICAL SERVICES
A Division of Contra Costa Health Services
Effective Jan. 2021

Chest Pain: Suspected Cardiac or STEMI



ST Elevation in 2 or more leads: Leads II, III, aVF → Inferior wall MI (vessel likely RCA or LCx)
ST Elevation in 2 or more leads: Leads I, aVL, V_5, V_6 → Lateral wall MI (vessel likely LCx or LAD branch)
ST Elevation in 2 or more leads: Leads V_1, V_2 → Septal wall MI (vessel likely LCx or LAD branch)
ST Elevation in 2 or more leads: Leads V_3, V_4 → Anterior wall MI (vessel likely LCx or LAD branch)

**Look for ST DEPRESSION in reciprocal leads (opposite wall) to confirm diagnosis.
**Isolated ST elevation in aVR with ST depression in all other leads should raise suspicion for a proximal LAD Artery injury or Left Main Coronary Artery abnormality. This is not STEMI criteria, but the 12-Lead ECG should be transmitted to the ED for consultation. Consider transport to a STEMI receiving center.

Adult Cardiac Treatment Guidelines

Pearls

- Avoid Nitroglycerin in any patient who has used Viagra (Sildenafil) or Levitra (Vardenafil) in the past 24 hours or Cialis (Tadalafil) in the past 36 hours due to the potential of severe hypotension.
- Patients with a STEMI should be transported to the closest most appropriate STEMI receiving center.
- Many STEMIs evolve during prehospital care and may not be noted on the initial 12-Lead ECG.
- An ECG should be obtained prior to treatment for bradycardia if patient condition permits.
- Transmit all 12-Lead ECGs whether STEMI is detected or not.
- If a patient has taken their own Nitroglycerin without relief, consider potency of medication. Provider maximum doses do not include patient administered doses.
- Monitor for hypotension after administration of nitroglycerin and opioids.
- Diabetics, geriatric, and female patients often have atypical pain, or only generalized complaints. Suspect cardiac etiology in these patients, and perform a 12-Lead ECG.
- Document the time of the 12-Lead ECG in the EHR as a procedure along with the interpretation.

Pediatric Pain Control

History
- Age
- Location and duration
- Severity (0 – 10 scale or Wong-Baker faces scale)
- Past medical history
- Medications
- Drug allergies

Signs and Symptoms
- Severity (pain scale)
- Quality (e.g. sharp, dull, or stabbing)
- Radiation
- Relation to movement or respiration
- Increased with palpation of area

Differential
- Per the specific TG
- Musculoskeletal
- Visceral (abdominal)
- Cardiac
- Pleural / respiratory
- Neurogenic
- Renal (colic)

Assess pain severity
Use combination of pain scale, circumstances, MOI, injury, or illness severity

E
- Position of comfort
- Apply cold pack, ***if applicable***
- Monitor and reassess

P
- ***Consider*** IV/ IO procedure
- Assess and monitor respiratory status
- Monitor continuous $EtCO_2$
- Apply and monitor cardiac rhythm

Moderate to severe pain

P
Fentanyl IV/IO/IM
Use Pediatape and refer to dosing guide
or
Fentanyl IN
Use Pediatape and refer to dosing guide

Single dose only

Monitor and reassess every 5 minutes following administration

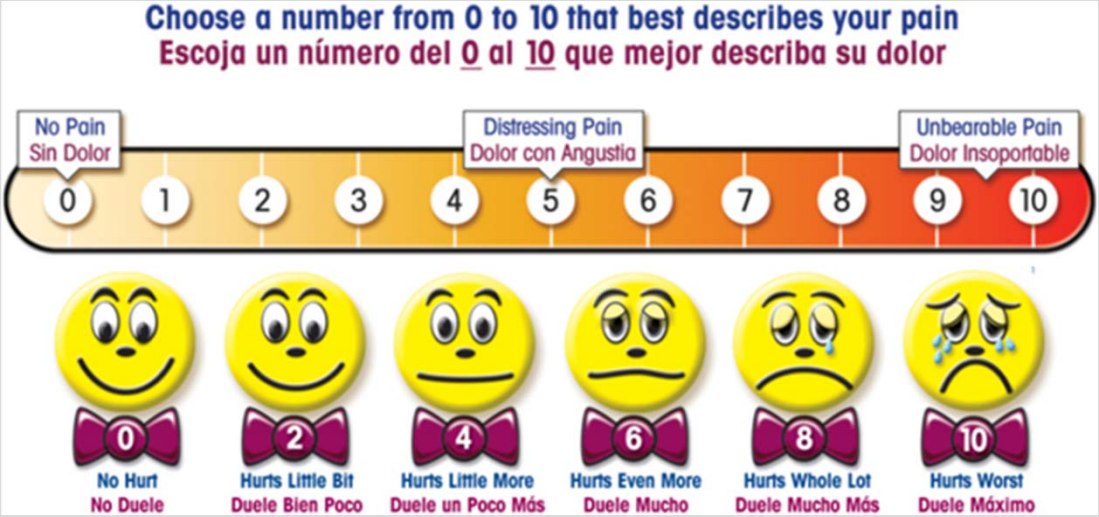
Refer to contraindications and cautions

Notify receiving facility. Contact Base Hospital for medical direction as needed

N
Fentanyl
Contact Base Hospital for additional orders

Pediatric Treatment Guidelines

Pediatric Pain Control



Pearls

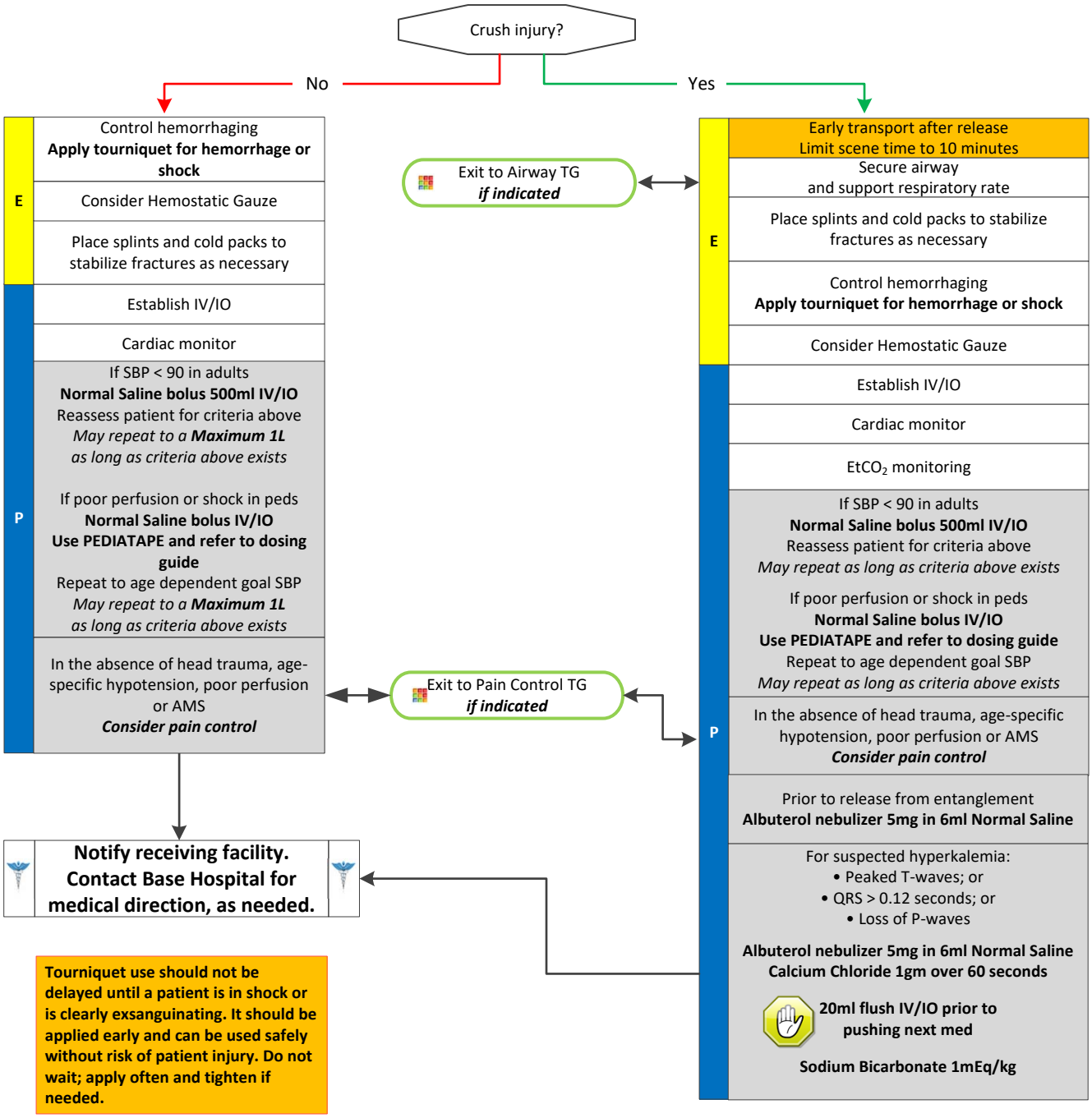
- Use EXTREME CAUTION in administering pain medication to patients less than 10kg.
- This treatment guideline applies to patients < 15 years of age and who can be measured on a PediaTape. If a patient is larger than a PediaTape, you may use the Adult Pain Control Treatment Guideline.
- Pain severity (0 – 10 scale or Wong-Baker faces scale) is a vital sign to be recorded before and after all BLS pain control measures and ALS pain medication delivery. Monitor blood pressure and respirations closely as pain control medications may cause hypotension or respiratory distress.
- Contraindications of Fentanyl include:
  - Closed head injury
  - Altered level of consciousness
  - Headache
  - Hypotension
  - Respiratory failure/worsening status
  - Childbirth/suspected active labor
    - Neonate: < 60mmHg or weak pulses
    - Infant: < 70mmHg or weak pulses
    - 1-10 years: < 70mmHg + (age in years x2)
    - Over 10 years: <90mmHg
- Have Naloxone available to reverse respiratory depression should it occur.
- Burn patients may require higher than usual opioid doses to achieve adequate pain control. IF A PATIENT HAS SUFFERED BURNS THAT REQUIRE TRANSPORT TO A BURN CENTER, THE PATIENT MAY REQUIRE MORE THAN THE MAXIMUM TOTAL DOSE OF FENTANYL TO ACHIEVE PAIN CONTROL. CONTACT THE BASE HOSPITAL FOR ADDITIONAL ORDERS.

Extremity Trauma

History
- Type and time of injury
- Mechanism (crush, penetrating, blunt, or amputation)
- Open vs. closed wound/fracture
- Past medical history
- Medications

Signs and Symptoms
- Evidence of trauma
- Pain, swelling, deformity, or bleeding
- Altered sensation or motor function
- Diminished pulse or capillary refill
- Decreased extremity temperature

Differential
- Abrasion
- Contusion
- Laceration
- Sprain
- Dislocation
- Fracture
- Amputation



Adult and Pediatric Trauma/Environmental Treatment Guidelines

Extremity Trauma

Pearls

- For partial amputations, splint affected extremity in anatomic location and elevate extremity.
- For complete amputations, place amputated part in a dry container or bag and place on ice. Seal or tie off bag and place in second container or bag. DO NOT place amputated extremity directly on ice or in water. Elevate extremity and dress with dry gauze.
- Penetrating trauma to an extremity may hide significant vascular injury and hemorrhage. Early application of a tourniquet should be considered.
- In cases of clear-cut traumatic arrest, epinephrine is not indicated in PEA or asystole. Epinephrine will not correct arrest caused by a tension pneumothorax, cardiac tamponade, or hemorrhagic shock. If there is any doubt as to the cause of arrest, treat as a non-traumatic arrest.
- Hypotension is age dependent. This is not always reliable and should be interpreted in context with the patient's typical BP, if known. Shock may be present with a seemingly normal blood pressure initially.
  - Neonate: < 60mmHg or weak pulses
  - Infant: < 70mmHg or weak pulses
  - 1-10 years: < 70mmHg + (age in years x2)
  - Over 10 years: <90mmHg
  - Over 65 years: <110mmHg
- If vigorous hemorrhage is not controlled with elevation and direct pressure on wound, apply a tourniquet. Tourniquets may be used in pediatric patients.
- Tourniquets and hemostatic gauze may also be appropriate for hemorrhage control in multi-casualty incidents.
- Consider the use of hemostatic gauze to pack the wound. More than hemostatic agent may be needed. Secure hemostatic gauze in place with a compression bandage.
- Crush Injury Syndrome is caused by muscle crush injury and cell death. Most patients have an extensive area of involvement such as a large muscle mass in a lower extremity or the pelvis. May develop after one (1) hour in the presence of a severe crush, but usually requires at least four (4) hours of compression. Hypovolemia and hyperkalemia may occur, particularly in extended entrapments.
- Avoid hyperventilation. Maintain an $EtCO_2$ of 35 or greater, which may be unreliable if the patient was subject to multisystem trauma or poor perfusion.
- Hypotension usually indicates injury or shock and should be treated aggressively.
- An important item to monitor and document is a change in the level of consciousness by repeat examination.
- Do not overlook the possibility of associated domestic violence or abuse.

Multi-System Trauma

History
- Time of injury
- Mechanism (blunt vs. penetrating)
- Damage to structure or vehicle
- Location of patient in structure or vehicle
- Restraints or protective equipment use
- Past medical history
- Medications

Signs and Symptoms
- Evidence of trauma
- Pain, swelling, deformity, lesions, or bleeding
- AMS
- Unconscious
- Respiratory distress or failure
- Hypotension or shock
- Arrest

Differential
- Chest:
  - Tension pneumothorax
  - Flail chest
  - Pericardial tamponade
  - Open chest wound
  - Hemothorax
- Intra-abdominal bleeding
- Pelvis or femur fracture
- Spinal injury
- Head injury
- Hypothermia

E

Early transport
Limit scene time to 10 minutes

Spinal Motion Restriction
if indicated

Secure airway
and support respiratory rate

↔ Exit to Airway TG ***if indicated***

Place splints and cold packs to stabilize fractures as necessary

Control hemorrhage

Do not delay transport

P

Establish IV/IO

Cardiac monitor

$EtCO_2$ monitoring

Needle Thoracostomy
if indicated

If SBP < 90 in adults
Normal Saline bolus 500ml IV/IO
Reassess patient for criteria above
May repeat to a ***Maximum 1L***
as long as criteria above exists

If poor perfusion or shock in peds
Normal Saline bolus IV/IO
Use PEDIATAPE and refer to dosing guide
Repeat to age dependent goal SBP
May repeat to a ***Maximum 1L***
as long as criteria above exists

In the absence of head trauma, age-specific hypotension, poor perfusion or AMS
Consider
Fentanyl for pain control

↔ Exit to Pain Control TG ***if indicated***

↓

Notify receiving facility. Contact Base Hospital for medical direction, as needed.

Adult and Pediatric Trauma/Environmental Treatment Guidelines

Multi-System Trauma

Pearls

- ALS procedures in the field do not significantly improve patient outcome in critical trauma patients.
- Basic airway management is preferred unless unable to effectively manage with BLS maneuvers. Utilize jaw thrust technique to open the airway.
- Intubation of head injury patients is best addressed at the hospital. Advanced Airways should not be used in traumatic arrest.
- In cases of clear-cut traumatic arrest, epinephrine is not indicated in PEA or asystole. Epinephrine will not correct arrest caused by a tension pneumothorax, cardiac tamponade, or hemorrhagic shock. If there is any doubt as to the cause of arrest, treat as a non-traumatic arrest.
- Hypotension is age dependent. This is not always reliable and should be interpreted in context with the patient's typical BP, if known. Shock may be present with a seemingly normal blood pressure initially.
    - Neonate: < 60mmHg or weak pulses
    - Infant: < 70mmHg or weak pulses
    - 1-10 years: < 70mmHg + (age in years x2)
    - Over 10 years: <90mmHg
    - Over 65 years: <110mmHg
- Avoid hyperventilation. Maintain an $EtCO_2$ of 35 or greater, which may be unreliable if the patient was subject to multisystem trauma or poor perfusion.
- Hypotension usually indicates injury or shock and should be treated aggressively.
- An important item to monitor and document is a change in the level of consciousness by repeat examination.
- Do not overlook the possibility of associated domestic violence or abuse.

Airway: Bougie Device

Applies to:
P Paramedic

Clinical Indications:

1. Patients meet clinical indications for oral intubation.

Contraindications:

1 Two attempts at intubation.

2. Age less than eight (8) or ETT size less than 6.5 mm.

Procedure:

1. Prepare, position, and oxygenate the patient with 100% oxygen.
2. Select the proper ET tube and remove stylette; test cuff and prepare suction.
3. Lubricate the distal end and cuff of the endotracheal tube (ETT) with a water-based lubricant and the distal 1/2 of the Bougie device. (Note: Failure to lubricate the Bougie and the ETT may result in being unable to pass the ETT).
4. Using the laryngoscope, visualize the vocal cords, if possible, using the BURP maneuver as needed.
5. Introduce the Bougie with the curved tip anteriorly and visualize the tip passing the vocal cords or above the arytenoids if the cords cannot be visualized.
6. Once inserted, gently advance the Bougie until you meet resistance; feel for the tracheal rings. If you do not meet resistance, you have a probable esophageal intubation and insertion should be reattempted or use a i-Gel.
7. Withdraw the Bougie ONLY to a depth sufficient to allow loading of the ETT while maintaining proximal control of the Bougie.
8. Gently advance the Bougie and loaded ETT until you have feel resistance again, thereby assuring tracheal placement and minimizing the risk of accidental displacement of the Bougie.
9. While maintaining a firm grasp on the proximal Bougie, introduce the ETT over the Bougie passing the tube to its appropriate depth.
10. If you are unable to advance the ETT into the trachea and the Bougie and ETT are adequately lubricated, withdraw the ETT slightly and rotate the ETT 90 degrees COUNTER clockwise to turn the bevel of the ETT posteriorly. If this technique fails to facilitate passing of the ETT you may attempt direct laryngoscopy while advancing the ETT (this will require an assistant to maintain the position of the Bougie and, if so desired, advance the ETT).
11. Once the ETT is correctly placed, hold the ETT securely and remove the Bougie.
12. Confirm tracheal placement according to the intubation protocol, inflate the cuff with 3 – 10cc of air, auscultate for equal breath sounds, and reposition accordingly.
13. When final position is determined secure the ETT, reassess breath sounds, apply $EtCO_2$ monitoring, and record and monitor readings to assure continued tracheal intubation.

Cardiac Arrest Management

	Applies to:
E	EMT
P	Paramedic

Clinical Indications:

Each and every out-of-hospital adult cardiac arrest (OHCA) which results in the activation of the EMS System shall be managed using CPR-Highly Defined (CPR-HD). CPR-HD is the expected standard of care for cardiac arrest in Contra Costa County.

Purpose:

The purpose of CPR-HD is to provide a structured, standardized and choreographed approach to cardiac arrest management. The CPR-HD 'Script' is time driven and serves as the 'CODE' leader.

Principles:

1. Resuscitation is based on proper planning and organized execution. Procedures require space and patient access. Make room to work. Utilize a team focused approach assigning responders to predetermined tasks.
2. The unit first on scene shall establish and follow the CPR-HD Script. Efforts should be dispensed to ensure adequate timekeeping occurs throughout the resuscitation.
3. Cardiac arrest management efforts should be directed at high quality and continuous chest compressions with limited interruptions. Our goal is to provide two (2) minutes of straight continuous compressions with a less than ten (<10) second pause.
4. In cardiac arrest, drugs are of limited usefulness. High quality compressions and defibrillation are far more important.
5. Conduct resuscitation with goal of preserving cerebral function through meticulous attention to procedure.
6. Passive ventilation for the first three cycles (6 minutes) of CPR. After that time, the patient should be ventilated using a BLS airway and BVM at a rate of 6 ventilations/minute (1:10 seconds) with continuous CPR. Placement of an advanced airway should be deferred unless a provider is unable to ventilate the patient with a BLS airway and BVM.
7. Once transport is deemed appropriate and the patient has experienced a return of spontaneous circulation (ROSC) at any time throughout the resuscitation; transport to a STEMI receiving Center.

Drug Reference

Drug	Indication	Dosing	Cautions	Comments
Acetaminophen	Moderate to severe pain	1 gm over 15 minutes for patients greater than 50 kg	Active liver disease, history of transplant, patients currently taking Acetaminophen containing products such as cold/cough medicine, percocet or vicodin	Should not be directly administered into IV site. Set up as piggyback. Not for use in patients with chest pain of cardiac origin.
Adenosine	Narrow complex tachycardia	Initial – 6mg rapid IV Repeat – 12mg rapid IV Follow each dose with 20ml NS rapid IV Refer to pediatric dosing guide	May cause transient heart block or asystole. Use caution when patient is taking carmbamazepine, dipyramidole, or methylxanthines. Do not administer if patient is experiencing acute asthma exacerbation.	Side effects include: chest pressure/pain, palpitations, hypotension, dyspnea, or feeling of impending doom.
Albuterol	Bronchospasm	5mg nebulized Repeat as needed 5mg nebulized Repeat as needed	Use caution in patients taking MAOIs (antidepressants Nardil and Parnate)	None
	Crush injury - hyperkalemia	5mg nebulized continuously		
Amiodarone	V-Fib Pulseless V-Tach	Initial – 300mg IV/IO Repeat – 150mg IV/IO if rhythm persists Refer to pediatric dosing guide	In patients with pulses, may cause hypotension. Do not administer if patient is hypotensive. Do not use filter needle.	When creating infusion, careful mixing is needed to avoid foaming of medication.
	Symptomatic stable V-Tach	Initial – 150mg IV/IO drip over 10 minutes Repeat – 150mg IV/IO if needed		

Drug Reference

Drug	Indication	Dosing	Cautions	Comments
Aspirin	Chest pain – suspected cardiac or STEMI	324mg PO	Contraindicated in aspirin or salicylate allergy.	Blood thinner use is not a contraindication.
Atropine	Organophosphate overdose	Refer to pediatric dosing guide	Doses less than 0.5mg can cause paradoxical bradycardia.	Can dilate pupils, aggravate glaucoma, cause urinary retention, confusion, and dysrhythmias including V-Tach and V-Fib. Increases myocardial oxygen consumption. Bradycardia in children is primarily related to respiratory issues – assure adequate ventilation first.
Calcium Chloride	Hydrofluoric acid exposure	500mg IV/IO for tetany or cardiac arrest	Use cautiously or not at all in patients on digitalis. Avoid extravasation. Rapid administration can cause dysrhythmias or arrest.	Administer 20ml flush IV/IO when delivering in conjunction with Sodium Bicarbonate.
	Crush injury Suspected hyperkalemia	1g IV/IO over 60 seconds		
Dextrose 10%	Hypoglycemia	Initial - 100ml IV Repeat – 150ml if glucose remains ≤ 60mg/dl	Can cause tissue necrosis if IV is infiltrated	Recheck blood glucose after administration.
		Refer to pediatric dosing guide		
Diphenhydramine	Allergic reaction	50mg IV/IO/IM	None	None
		Refer to pediatric dosing guide		
	Dystonic reaction	25-50mg IV/IO or 50mg IM		

Drug Reference

Drug	Indication	Dosing	Cautions	Comments
Epi 1:100,000 Push Dose Epi	Adult post resuscitation (ROSC) with systolic BP < 90mmHg	5mcg (0.5ml) IV/IO every 3 minutes to a systolic BP > 90 mmHg	Use caution when mixing to make the correct concentration of EPI (1:100,000). Dose should be provided by drawing up only what will be administered to prevent possible overdosing.	**With Base contact**, Push Dose EPI can be administered in patients with hypotension (systolic BP <90mmHg) in Sepsis after fluid administration. LP15 Monitor should be set to cycle BP every 3 minutes.
Epi 1:10,000	Cardiac arrest	1mg IV/IO every 3-5 minutes	May cause serious dysrhythmias or exacerbate angina. In adult anaphylactic patients, should be used if patient is hypotensive or no improvement after Epi 1:1,000 IM dose. In pediatric anaphylactic patients, should only be administered if Epi 1:1,000 IM dose is ineffective.	Alpha and beta sympathomimetic. Use ½ dose for patients: • with history of CAD; or • > 50 years of age
	Cardiac arrest/ Bradycardia	Refer to pediatric dosing guide		
	Anaphylactic shock	0.1mg slow IV/IO increments titrated to effect to a max of 0.5mg		
		Refer to pediatric dosing guide		
Epi 1:1,000	Anaphylactic shock	0.3mg IM	Never administer IV/IO. Use with caution in asthma patients with a history of hypertension or coronary artery disease. May cause serious dysrhythmias or exacerbate angina.	Use ½ dose for patients: • with history of CAD; or • > 50 years of age
		Refer to pediatric dosing guide		
	Asthma/COPD or Pediatric respiratory distress	0.3mg IM		
		Refer to pediatric dosing guide		
EpiPen EpiPen Jr.	Allergic reaction/ Anaphylaxis	1 auto-injector	See Epinephrine 1:1,000 and Epinephrine 1:10,000	See Epinephrine 1:1,000 and Epinephrine 1:10,000
		1 auto-injector		

Drug Reference

Drug	Indication	Dosing	Cautions	Comments
Fentanyl	Pain control	Initial - 25-50mcg IV/IO or 50-100mcg IM or 100mcg IN May repeat to max of 200mcg Refer to pediatric dosing guide	Can cause hypotension or respiratory depression.	Recheck vital signs between each dose. Hypotension is more common in patients with low cardiac output or volume depletion. Respiratory depression is reversible with naloxone. Additional IV/IO doses can be administered every 5 minutes. IM and IN doses can be repeated once in 15 minutes.
Glucagon	Hypoglycemia	1mg IM Refer to pediatric dosing guide	None	Effect may be delayed 15-20 minutes
Ketamine	Mild to Moderate Pain	50-69 kg – 15mg IV 70-89 kg – 20 mg IV ≥ 90 kg – 30 mg IV	Contraindicated in patients with multisystem trauma, ALOC and pregnancy	Not for use in patients with chest pain of cardiac origin
Lidocaine	IO anesthetic	Initial – 40mg IO Repeat dose – 20mg if painful Refer to pediatric dosing guide	None	Effect may be delayed 15-20 minutes
Midazolam	Seizure	5mg IV/IO/IM/IN May repeat to a max of 10mg Refer to pediatric dosing guide	Use caution in patients over 60 years of age.	Observe respiratory status after administration.

Drug Reference

Drug	Indication	Dosing	Cautions	Comments
Midazolam	Behavioral emergency	Initial - 5mg IM/IN *or* 1-3mg IV in 1mg increments May repeat to a max of 5mg For excited delirium Initial – 5mg IM/IN May repeat to a max of 10mg For patients ≥ 12 years of age only. Refer to pediatric dosing guide	Use caution in patients over 60 years of age.	Observe respiratory status after administration. For pediatric patients, repeat orders require Base Hospital orders.
	Sedation for pacing or cardioversion	1mg IV/IO Titrate in 1-2mg increments to a max of 5mg Refer to pediatric dosing guide		
	Sedation of patient with an advanced airway	2-5mg IV/IO May repeat to a max of 5mg Refer to pediatric dosing guide		
Naloxone	Respiratory depression or apnea	2mg IN or 1-2mg IV/IM Refer to pediatric dosing guide	Abrupt withdrawal symptoms and combative behavior may occur.	IN administration preferred unless patient is in shock or has copious secretions/blood in nares. Shorter duration of action than that of narcotics. Titrate to effect of normal respirations; it is not necessary to fully wake the patient.
Naloxone	Overdose	1 preload syringe	See Naloxone	See Naloxone

Drug Reference

Drug	Indication	Dosing	Cautions	Comments
Nitroglycerin	Chest pain	0.4mg SL May repeat to a max of 3 doses	Do not administer if STEMI is detected. Can cause hypotension and headache. Do not administer if systolic BP < 90mmHg or heart rate < 50. Do not administer if patient has taken Viagra, Levitra, Staxyn, or Stendra within past 24 hours or Cialis if taken within 36 past hours.	Perform 12-Lead ECG prior to administration.
	Pulmonary edema	0.4mg SL if systolic BP > 90mmHg 0.8mg SL if systolic BP > 150mmHg May repeat appropriate dose every 5 minutes		
Ondansetron	Vomiting or severe nausea	4mg IV/IO/IM/ODT May repeat after 15 minutes Refer to pediatric dosing guide	Administer IV/IO dose over 1 minute as rapid administration may cause syncope.	None
Sodium Bicarbonate	Tricyclic antidepressant overdose	1mEq/kg IV/IO	Can precipitate with or inactivate other drugs.	Use only if life-threatening or in the presence of hemodynamically significant dysrhythmias. Administer 20ml flush IV/IO when delivering in conjunction Calcium Chloride.
	Crush injury			
	Hyperkalemia	50mEq IV/IO		