2022 STATE PROTOCOL REVIEW

COVER SHEET

The last revision and release for state protocols was 2017, although the process had begun in 2020, COVID-19 greatly impacted the resources needed to carry out the task. Each of the ten sections of protocols will be released for 60-day public comment on a staggered schedule throughout the spring and summer of 2022. The entire suite will be released for adoption upon conclusion of public comment and applicable revisions.

Sections released for public comment will include:

- Cover sheet including dates of recent past revisions and the date of QATF approval for the proposed version (or an indication that no revision was deemed necessary).
- A clean copy of the protocol followed by a track changes version (if revised).
- Public Comment Sheet with the deadline for comments and instructions for submission.

KEY

 EMT-Basic

 EMT-Specialist

 Paramedic

No Icon = all licensure levels

 Medical Control

 Pediatric

Released	Due		
		Section 1	General Treatment
		Section 2	Trauma and Environmental Emergencies
		Section 3	Adult Treatment
		Section 4	Obstetrics and Pediatrics
4/26/2022	6/27/2022	Section 5	Adult Cardiac
		Section 6	Pediatric Cardiac
		Section 7	Procedures
		Section 8	Systems
		Section 9	Medications
		Section 10	Special Operations

				Section 5: Adult Cardiac	**Proposed Version**
Initial Date	**Recent Past Revisions**			**Table of Contents**	**QATF Approval**
11/15/2012	10/25/2017		5.1	General Cardiac Arrest	3/25/2022
11/15/2012	10/25/2017		5.2	Bradycardia	3/25/2022
11/15/2012	10/25/2017		5.3	Tachycardia	3/25/2022
11/15/2012	10/25/2017		5.4	Pulmonary Edema/CHF	3/25/2022
11/15/2012	10/25/2017	11/14/2017	5.5	Chest Pain/Acute Coronary Syndrome	3/25/2022
5/31/2012	10/25/2017		5.6	Nitroglycerin Supplement (MCA Optional)	3/25/2022

Cardiac Arrest – General

This protocol should be followed for adult cardiac arrests. Medical cardiac arrest patients undergoing attempted resuscitation should not be transported unless return of spontaneous circulation (ROSC) is achieved, transport is ordered by medical control, or otherwise specified in protocol.

- If an arrest is of a known traumatic origin, refer to the **Traumatic Arrest Protocol**.
- If it is unknown whether the arrest is traumatic or medical, continue with this protocol.
- If patient is hypothermic (temperature <86° F):
  - Protect against heat loss
  - Apply heat packs to axillae, groin, and neck.
  - If available administer warmed humidified oxygen and warmed IV fluids.
- Patients displaying a Do Not Resuscitate order or bracelet or valid MI POST – follow **DNR Procedure Protocol or Michigan Physician Orders for Scope of Treatment (MI-POST) Protocol** accordingly.
- Initiate ALS response if available.
- Continuously measure ETCO2 during ACLS resuscitation.
- CPR and electrical therapy should be consistent with current guidelines established by the American Heart Association.
- Focus should be on prompt defibrillation and effective chest compressions.
- Cardiac arrest patients undergoing resuscitation should only be moved if the scene is unsafe, the physical location of the patient does not permit appropriate treatment, or under a direct medical control order.

1. Confirm Arrest
   a. Assess breathing (Cardiac arrest patients may have gasping or agonal breathing).
   b. Check a carotid/femoral pulse for not more than 10 seconds.
2. Initiate CPR or continue CPR; apply and use AED/defibrillator (per **Electrical Therapy Procedure**) as soon as available.
3. Ensure high quality CPR
   a. Chest compression rate is 100 to 120/min.
   b. Chest compression depth for adults is 2 inches (5 cm) but not greater than 2.4 inches (6 cm).
   c. Allow complete chest recoil after each compression.
   d. Minimize interruptions in compressions.
   e. Avoid excessive ventilation.
   f. Restart CPR immediately after any defibrillation attempts.
   g. Keep pauses in CPR to a minimum. Immediately after AED recommends shock resume compressions until AED is fully charged, then immediately after shock, resume compressions without checking pulse or rhythm. Avoid pauses in CPR during airway management.
   h. CPR sequence is CAB (Compressions, Airway, Breathing) for all ages, except the ABC sequence should be used in drowning.

i. For pregnant patients, a rescuer should manually displace the uterus to the patient's left during CPR.
j. Change rescuer doing compressions every 1-2 minutes (100-200 compressions) to avoid fatigue.

4. Establish a patent airway, maintaining C-Spine precaution if indicated, using appropriate airway adjuncts and high flow oxygen. See **Emergency Airway Procedure.**
5. Reassess ABC's as indicated by rhythm or patient condition change. Pulse checks should take no more than 10 seconds. If no pulse after 10 seconds, assume pulselessness, continue CPR.
6. If ROSC has not been achieved and ALS is not available or is delayed, contact medical control after 20 minutes of high-quality CPR for further direction.
    a. Continue high quality CPR unless directed otherwise by medical control
7. Start an IV/IO NS KVO. If IV is attempted and is unsuccessful, after 2 attempts start an IO line per **Vascular Access & IV Fluid Therapy Procedure.**
8. If hypovolemia suspected: Give one liter crystalloid bolus, may repeat as necessary.
9. If $ETCO_2$ is < 10 mm Hg, attempt to improve CPR quality.
10. Administer Epinephrine 1 mg/10 ml, 1 mg IV/IO every 3 to 5 minutes
11. Prior to advanced airway placement, utilize ventilation periods to visualize the ECG rhythm without compression artifact, this will allow you to plan ahead for the assessment period at the end of the two-minute CPR cycle.
12. Administer antidysrhythmic according to rhythm check
    a. For Ventricular Fibrillation (VF) or pulseless Ventricular Tachycardia (VT), per MCA selection, administer Amiodarone 300 mg IV/IO OR Lidocaine 100mg IV/IO

Per MCA Selection
☐ Amiodarone 300mg IV/IO (May repeat once 150 mg IV/IO)
or
☐ Lidocaine 100mg IV/IO (May repeat, every 5-10 minutes, 0.5 mg/kg, up to total dose of 3 mg/kg)

    b. For suspected torsades de pointes administer Magnesium Sulfate 2 g IV/IO
13. Consider and treat reversible causes of cardiac arrest.
    a. If known or highly suspected tricyclic antidepressant overdose, administer:
        i. Sodium Bicarbonate 1mEq/kg IV/IO
    b. If known or highly suspected hyperkalemia in dialysis patient administer:
        i. Calcium Chloride (10%) 1gm/10 mL IV/IO
        ii. Sodium Bicarbonate 1mEq/kg IV/IO
    c. Assess for tension pneumothorax or misplaced ETT:
        i. If tension pneumothorax suspected, perform needle decompression per **Pleural Decompression Procedure**.
    d. If known or highly suspected opioid overdose
        i. Patent airway and adequate ventilation takes precedence over pharmacological interventions.
        ii. Consider naloxone 2 mg IV/IO or 2-4 mg IN

14. After insertion of supraglottic airway or endotracheal tube:
    a. Monitor capnography to confirm appropriate tube placement and deliver continuous CPR, without pauses for ventilation.
    b. Ventilations delivered at 10 breaths per minute or 1 breath every 6 seconds.
15. .Additional basic and/or advanced life support care as appropriate.
16. Continue resuscitation while contacting medical control for consideration of termination of resuscitation per **Termination of Resuscitation Protocol**.

Notes:

1. Excellent CPR is a priority:
    A. 30 compressions: 2 ventilations in groups of 5 cycles, over 2 minutes.
    B. Compression depth should be 2 inches or 1/3 the depth of the chest and at a rate of 100-120/min, allowing full recoil of chest between compressions.
    C. Change rescuer doing compressions every 2 minutes to avoid fatigue.
    D. Restart CPR immediately after any defibrillation attempts.
    E. Keep pauses in CPR to a minimum by checking rhythm when rotating rescuer doing compressions and by avoiding pauses in CPR during airway management and other interventions.
    F. If AED has been applied by BLS personnel, skip to appropriate place in protocol that incorporates previous care. ALS personnel should switch to manual defibrillator after initial AED shock or place AED in manual mode.
    G. For biphasic devices shock with energy levels following manufacturers' recommendations (120 – 200 J). If unknown use the maximum available. For monophasic devices use 360 J.
    H. Confirm and document tube placement by physical exam, measurement of exhaled CO2 and/or use of other MCA approved secondary confirmation device.
    I. Treat reversible causes.
    J. Manual chest compressions remain the standard of care for the treatment of cardiac arrest. Mechanical chest compression devices may be a reasonable alternative to conventional CPR in specific settings where the delivery of high-quality manual compressions may be challenging or dangerous for the provider (e.g., limited rescuers available, prolonged CPR, CPR during hypothermic cardiac arrest, CPR in a moving ambulance).
    K. Supraglottic airways are the preferred airway device for patients in cardiac arrest.
    L. An impedance threshold device may be utilized during CPR, if available. Device should be discontinued immediately upon return of spontaneous circulation.
    M. Indiscriminate use of Sodium Bicarbonate and Calcium Chloride in cardiac arrest is not indicated.

Cardiac Arrest – General

This protocol should be followed for adult cardiac arrests. Medical cardiac arrest patients undergoing attempted resuscitation should not be transported unless return of spontaneous circulation (ROSC) is achieved, transport is ordered by medical control, or otherwise specified in protocol.

- If an arrest is of a known traumatic origin, refer to the **Traumatic Arrest Protocol**.
- If it is unknown whether the arrest is traumatic or medical, continue with this protocol.
- If patient is hypothermic (temperature <86° F):
  - Protect against heat loss
  - Apply heat packs to axillae, groin, and neck.
  - If available administer warmed humidified oxygen and warmed IV fluids.
- Patients displaying a Do Not Resuscitate order or bracelet or valid MI POST – follow **DNR Procedure Protocol or Michigan Physician Orders for Scope of Treatment (MI-POST) Protocol** accordingly.
- Initiate ALS response if available.
- Continuously measure ETCO2 during ACLS resuscitation.
- CPR and electrical therapy should be consistent with current guidelines established by the American Heart Association.
- Focus should be on prompt defibrillation and effective chest compressions.
- Cardiac arrest patients undergoing resuscitation should only be moved if the scene is unsafe, the physical location of the patient does not permit appropriate treatment, or under a direct medical control order.

1. Confirm Arrest
   a. Assess breathing (Cardiac arrest patients may have gasping or agonal breathing).
   b. Check a carotid/femoral pulse for not more than 10 seconds.
2. Initiate CPR or continue CPR; apply and use AED/defibrillator (per **Electrical Therapy Procedure**) as soon as available.
3. Ensure high quality CPR
   a. Chest compression rate is 100 to 120/min.
   b. Chest compression depth for adults is 2 inches (5 cm) but not greater than 2.4 inches (6 cm).
   c. Allow complete chest recoil after each compression.
   d. Minimize interruptions in compressions.
   e. Avoid excessive ventilation.
   f. Restart CPR immediately after any defibrillation attempts.
   g. Keep pauses in CPR to a minimum. Immediately after AED recommends shock resume compressions until AED is fully charged, then immediately after shock, resume compressions without checking pulse or rhythm. Avoid pauses in CPR during airway management.
   h. CPR sequence is CAB (Compressions, Airway, Breathing) for all ages, except the ABC sequence should be used in drowning.

Deleted: or

Deleted: , Ventilation

Deleted: 2015

Deleted: page 5, NASEMSO 2017

i. For pregnant patients, a rescuer should manually displace the uterus to the patient's left during CPR.
j. Change rescuer doing compressions every 1-2 minutes (100-200 compressions) to avoid fatigue.

4. Establish a patent airway, maintaining C-Spine precaution if indicated, using appropriate airway adjuncts and high flow oxygen. See **Emergency Airway Procedure.**
5. Reassess ABC's as indicated by rhythm or patient condition change. Pulse checks should take no more than 10 seconds. If no pulse after 10 seconds, assume pulselessness, continue CPR.
6. If ROSC has not been achieved and ALS is not available or is delayed, contact medical control after 20 minutes of high-quality CPR for further direction.
   a. Continue high quality CPR unless directed otherwise by medical control
7. Start an IV/IO NS KVO. If IV is attempted and is unsuccessful, after 2 attempts start an IO line per **Vascular Access & IV Fluid Therapy Procedure.**
8. If hypovolemia suspected: Give one liter crystalloid bolus, may repeat as necessary.
9. If $ETCO_2$ is < 10 mm Hg, attempt to improve CPR quality.
10. Administer Epinephrine 1 mg/10 ml, 1 mg IV/IO every 3 to 5 minutes
11. Prior to advanced airway placement, utilize ventilation periods to visualize the ECG rhythm without compression artifact, this will allow you to plan ahead for the assessment period at the end of the two-minute CPR cycle.
12. Administer antidysrhythmic according to rhythm check
    a. For Ventricular Fibrillation (VF) or pulseless Ventricular Tachycardia (VT), per MCA selection, administer Amiodarone 300 mg IV/IO OR Lidocaine 100mg IV/IO

Per MCA Selection
☐ Amiodarone 300mg IV/IO (May repeat once 150 mg IV/IO)
or
☐ Lidocaine 100mg IV/IO (May repeat, every 5-10 minutes, 0.5 mg/kg, up to total dose of 3 mg/kg)

    b. For suspected torsades de pointes administer Magnesium Sulfate 2 g IV/IO
13. Consider and treat reversible causes of cardiac arrest.
    a. If known or highly suspected tricyclic antidepressant overdose, administer:
       i. Sodium Bicarbonate 1mEq/kg IV/IO
    b. If known or highly suspected hyperkalemia in dialysis patient administer:
       i. Calcium Chloride (10%) 1gm/10 mL IV/IO
       ii. Sodium Bicarbonate 1mEq/kg IV/IO
    c. Assess for tension pneumothorax or misplaced ETT:
       i. If tension pneumothorax suspected, perform needle decompression per **Pleural Decompression Procedure**.
    d. If known or highly suspected opioid overdose
       i. Patent airway and adequate ventilation takes precedence over pharmacological interventions.
       ii. Consider naloxone 2 mg IV/IO or 2-4 mg IN

Deleted: Return of Spontaneous Circulation (ROSC) has not been achieved after three, two minute cycles of CPR and ALS is not available or delayed, contact medical control, initiate transport.¶
Deleted: IO may be first line choice.
Deleted: , Normal Saline Solution
Deleted: quantitative waveform capnography is available and
Deleted: two minute
Deleted: hyperkalemia or
Deleted: suspected
Deleted: plus sodium bicarbonate.
Deleted: procedure for pleural decompression
Deleted: suspected
Deleted: 2015
Deleted: page 5, NASEMSO 2017

14. After insertion of supraglottic airway or endotracheal tube:
    a. Monitor capnography to confirm appropriate tube placement and deliver continuous CPR, without pauses for ventilation.
    b. Ventilations delivered at 10 breaths per minute or 1 breath every 6 seconds.
15. Additional basic and/or advanced life support care as appropriate.
16. Continue resuscitation while contacting medical control for consideration of termination of resuscitation per **Termination of Resuscitation Protocol**.

Notes:

1. Excellent CPR is a priority:
    A. 30 compressions: 2 ventilations in groups of 5 cycles, over 2 minutes.
    B. Compression depth should be 2 inches or 1/3 the depth of the chest and at a rate of 100-120/min, allowing full recoil of chest between compressions.
    C. Change rescuer doing compressions every 2 minutes to avoid fatigue.
    D. Restart CPR immediately after any defibrillation attempts.
    E. Keep pauses in CPR to a minimum by checking rhythm when rotating rescuer doing compressions and by avoiding pauses in CPR during airway management and other interventions.
    F. If AED has been applied by BLS personnel, skip to appropriate place in protocol that incorporates previous care. ALS personnel should switch to manual defibrillator after initial AED shock or place AED in manual mode.
    G. For biphasic devices shock with energy levels following manufacturers' recommendations (120 – 200 J). If unknown use the maximum available. For monophasic devices use 360 J.
    H. Confirm and document tube placement by physical exam, measurement of exhaled CO2 and/or use of other MCA approved secondary confirmation device.
    I. Treat reversible causes.
    J. Manual chest compressions remain the standard of care for the treatment of cardiac arrest. Mechanical chest compression devices may be a reasonable alternative to conventional CPR in specific settings where the delivery of high-quality manual compressions may be challenging or dangerous for the provider (e.g., limited rescuers available, prolonged CPR, CPR during hypothermic cardiac arrest, CPR in a moving ambulance).
    K. Supraglottic airways are the preferred airway device for patients in cardiac arrest.
    L. An impedance threshold device may be utilized during CPR, if available. Device should be discontinued immediately upon return of spontaneous circulation.
    M. Indiscriminate use of Sodium Bicarbonate and Calcium Chloride in cardiac arrest is not indicated.

NOTE: ALGORITHM REMOVED

Deleted: ¶

Deleted: Hypothermia, follow **Hypothermia Cardiac Arrest Protocol**.¶

Deleted: insertion of advanced airway,

Deleted: Ventilations delivered at 8-10 breaths per minute or 1 breath every 6 - 8 seconds

Deleted: Push hard ≥

Deleted: fast

Deleted: (≥

Deleted:)

Deleted: and

Deleted: during

Deleted: or utilize automated mechanical CPR devices, if available.

Deleted: <#>If possible, contact medical control prior to moving or transporting patient. ¶
Continue resuscitation attempts and initiate transport, unless field termination is ordered by Medical Control.¶

Deleted: eg.

Deleted: an acceptable alternative for endotracheal intubation

Deleted: <#>Patients with ROSC, should be transported to an interventional cardiac facility. The exception to this is if the Paramedic is not comfortable bypassing the nearest facility or in the event of a compromised airway. Notify receiving hospital as soon as possible, of impending arrival of the patient and give ETA. ¶
Pregnant patients are prone to hypoxia. Airway management should be prioritized for these patients.

Deleted: 2015

Deleted: page 5, NASEMSO 2017

Bradycardia

This is a protocol for patients with serious symptomatic bradycardia, defined as patients with heart rate less than 60 bpm and hypotension, or shock. Titrate treatments to a heart rate above 60 bpm. If the patient remains hypotensive, refer to the **Shock Protocol**.

1. Follow the **General Pre-Hospital Care Protocol**.

2. Administer Atropine 1.0 mg IV/IO rapid push repeating every 3-5 minutes to a total dose of 3 mg IV/IO, until a heart rate of greater than 60/minute is reached.
3. Transcutaneous pacing (TCP) when available may be initiated prior to establishment of IV access and/or before Atropine begins to take effect. Pacing is the treatment of choice for high degree A-V block. For patients with high degree A-V block, apply pacer pads. Follow the **Electrical Therapy Procedure.**
4. Per MCA selection, provide sedation per **Patient Procedure Sedation Protocol**.
5. For patients with persistent symptomatic bradycardia, administer Epinephrine by push dose (dilute boluses)
    a. Prepare (10 mcg/mL) by adding 1mL of 1mg/10mL Epinephrine in 9mL NS, then
    b. Administer 1-2 mL
    c. Repeat every 3 to 5 minutes
    d. Titrate SBP greater than 90 mm/Hg

Notes:

1. Some patients may not tolerate the pacing stimulus to the skin and chest wall that occurs with transcutaneous pacing. In these cases, consider sedation if SBP > 90. (See **Patient Procedure Sedation Protocol**)
2. Consider possible etiologies:
    A. Hyper/hypokalemia, other metabolic disorders
    B. Hypothermia
    C. Hypovolemia (including vomiting/diarrhea)
    D. Hypoxia
    E. Toxins/ overdose (e.g., beta-blocker or calcium channel-blocker)
    F. Tamponade
    G. Tension pneumothorax
3. Transcutaneous pacemaker electrode pads may be applied to these patients without initiating pacing so that the pacemaker is ready if patient condition deteriorates.
4. For symptomatic high-degree (second-degree Type II, or third-degree) AV block, begin pacing without delay.
5. Atropine is ineffective and should be avoided in heart transplant patients.

Deleted: 10/25/2017

Bradycardia

This is a protocol for patients with serious symptomatic bradycardia, defined as patients with heart rate less than 60 bpm and hypotension, or shock. Titrate treatments to a heart rate above 60 bpm. If the patient remains hypotensive, refer to the **Shock Protocol**.

1. Follow the **General Pre-Hospital Care Protocol**.
2. Administer Atropine 1.0 mg IV/IO rapid push repeating every 3-5 minutes to a total dose of 3 mg IV/IO, until a heart rate of greater than 60/minute is reached.
3. Transcutaneous pacing (TCP) when available may be initiated prior to establishment of IV access and/or before Atropine begins to take effect. Pacing is the treatment of choice for high degree A-V block. For patients with high degree A-V block, apply pacer pads. Follow the **Electrical Therapy Procedure.**
4. Per MCA selection, provide sedation per **Patient Procedure Sedation Protocol**.
5. For patients with persistent symptomatic bradycardia, administer Epinephrine by push dose (dilute boluses)
   a. Prepare (10 mcg/mL) by adding 1mL of 1mg/10mL Epinephrine in 9mL NS, then
   b. Administer 1-2 mL
   c. Repeat every 3 to 5 minutes
   d. Titrate SBP greater than 90 mm/Hg

Deleted: 0.5

Deleted: Dopamine 2-20 mcg/min

Notes:

1. Some patients may not tolerate the pacing stimulus to the skin and chest wall that occurs with transcutaneous pacing. In these cases, consider sedation if SBP > 90. (See **Patient Procedure Sedation Protocol**)
2. Consider possible etiologies:
   A. Hyper/hypokalemia, other metabolic disorders
   B. Hypothermia
   C. Hypovolemia (including vomiting/diarrhea)
   D. Hypoxia
   E. Toxins/ overdose (e.g., beta-blocker or calcium channel-blocker)
   F. Tamponade
   G. Tension pneumothorax
3. Transcutaneous pacemaker electrode pads may be applied to these patients without initiating pacing so that the pacemaker is ready if patient condition deteriorates.
4. For symptomatic high-degree (second-degree Type II, or third-degree) AV block, begin pacing without delay.
5. Atropine is ineffective and should be avoided in heart transplant patients.

Deleted: e.g.

Deleted: second-degree,

Deleted: Atropine 0.51.0 mg should be administered by rapid IV/IO push and may be repeated every 3-5 minutes, to a maximum dose of 3 mg.

Deleted: <#>Atropine 1 mg should be administered by rapid IV/IO push and may be repeated every 3-5 minutes, to a maximum dose of 3 mg. Atropine is ineffective and should be avoided in heart transplants. ¶

Tachycardia

This protocol is for paramedic use only

Aliases: SVT, V-tach, Supraventricular tachycardia, Ventricular Tachycardia, Uncontrolled Atrial Fibrillation, A-fib

This protocol is used for the care of patients with persistent tachycardia (ventricular rate greater than or equal to 150/minute) where the tachycardia is believed to be the primary cause of the patient's symptoms. It is not intended to treat tachycardia that is secondary to underlying conditions (i.e., dehydration, trauma, sepsis, or toxins). Consultation with online medical control should be considered for complex patients in whom the cause of the arrhythmia is not obvious. SYNCHRONIZED CARDIOVERSION PRECEDES DRUG THERAPY FOR UNSTABLE PATIENTS. Unstable patients may be defined as those suffering a tachycardia with hypotension, acutely altered mental status, signs of shock, significant ischemic chest discomfort, shortness of breath, or pulmonary edema that is likely due to the arrhythmia. Adenosine is only used for regular monomorphic rhythm tachycardia.

1. Follow the **General Pre-Hospital Care Protocol**.
2. Identify and treat reversible causes.
3. Determine if patient is stable or unstable.

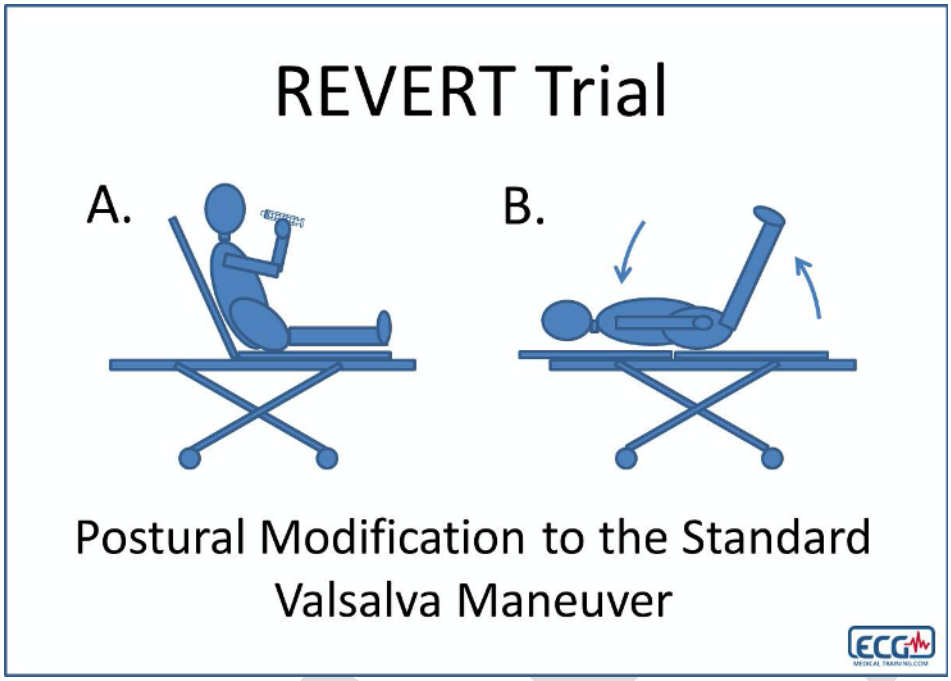
UNSTABLE

4. If time and condition allow prior to cardioversion, sedate per MCA selection. Refer to **Patient Procedure Sedation Protocol**.
5. Perform synchronized cardioversion beginning at 100 J, increasing to 200 J, 300 J, 360 J (or devices maximum energy dose), until the rhythm converts.
6. If the patient does not convert at maximum energy, contact medical control for possible medication orders and direction.

STABLE

7. Attempt Vagal Maneuvers
    a. Ensure the patient is on oxygen and on a cardiac monitor. (See picture below)
    b. Run ECG strip during the procedure.
    c. Place the patient in a semi-fowlers position
    d. Instruct the patient to blow into a 10 mL syringe for 15 seconds and then rapidly elevate the patient's legs to the knee chest position for 60 seconds.
    e. DO NOT USE CAROTID MASSAGE.

Protocol Source/References: PICTURE FROM from https://www.ecgmedicaltraining.com/wp-content/uploads/2016/06/REVERT-Trial-SVT.jpg



8. Start an IV NS KVO. A large bore antecubital IV should be secured whenever possible.
9. Obtain 12 lead ECG
10. If the rhythm is regular and narrow (i.e., supraventricular tachycardia),
    a. Consider Adenosine 6 mg rapid IV push through the most proximal injection site. This should be followed immediately with 20 ml NS flush. If conversion does not occur, administer Adenosine 12 mg IV using the same technique as stated above.
11. If the rhythm is irregular and narrow (i.e., atrial fibrillation/flutter), contact medical control for administration of MCA selection medication:

Medication Options
(Choose One)

☐Diltiazem 15-20 mg (0.25 mg/kg) IV/IO slowly

OR

☐ Verapamil 5 mg IV/IO

OR

☐ Amiodarone 150 mg IV over 10 minutes

OR

☐ No medication, supportive therapy only

12. If arrhythmia continues and is stable with narrow QRS contact medical control for possible orders.
13. If rhythm is stable with wide QRS contact medical control for administration of Amiodarone ***OR*** Lidocaine per MCA Selection.

Protocol Source/References: PICTURE FROM from https://www.ecgmedicaltraining.com/wp-content/uploads/2016/06/REVERT-Trial-SVT.jpg

Medication Options
(Choose One)
☐Amiodarone - 150 mg IV over 10 minutes
OR
☐Lidocaine - 1 mg/kg IV

14. If at any point a patient becomes unstable, perform synchronized cardioversion.
15. Suspected torsades de pointes contact medical control for administration of Magnesium Sulfate 2 gm IV/IO.

16. Contact medical control and per MCA selection, administer additional Amiodarone 150 mg IV over 10 minutes as needed to a maximum of 450 mg OR Lidocaine 0.5 -1.0 mg/kg IV push every 5 - 10 minutes to a maximum of 3 mg/kg.

NOTES:
1. Administration of Amiodarone is best accomplished by adding Amiodarone 150 mg to 100 or 250 ml of NS and infusing over approximately 10 minutes.
2. Administration of Magnesium Sulfate is best accomplished by adding Magnesium Sulfate 2gm to 100 or 250 ml of NS and infusing over approximately 10 minutes.

Protocol Source/References: PICTURE FROM from https://www.ecgmedicaltraining.com/wp-content/uploads/2016/06/REVERT-Trial-SVT.jpg

Deleted: 10/25/2017

Tachycardia

This protocol is for paramedic use only

Aliases: SVT, V-tach, Supraventricular tachycardia, Ventricular Tachycardia, Uncontrolled Atrial Fibrillation, A-fib

This protocol is used for the care of patients with persistent tachycardia (ventricular rate greater than or equal to 150/minute) where the tachycardia is believed to be the primary cause of the patient's symptoms. It is not intended to treat tachycardia that is secondary to underlying conditions (i.e., dehydration, trauma, sepsis, or toxins). Consultation with online medical control should be considered for complex patients in whom the cause of the arrhythmia is not obvious. SYNCHRONIZED CARDIOVERSION PRECEDES DRUG THERAPY FOR UNSTABLE PATIENTS. Unstable patients may be defined as those suffering a tachycardia with hypotension, acutely altered mental status, signs of shock, significant ischemic chest discomfort, shortness of breath, or pulmonary edema that is likely due to the arrhythmia. Adenosine is only used for regular monomorphic rhythm tachycardia.

Deleted: with:

1. Follow the **General Pre-Hospital Care Protocol**.
2. Identify and treat reversible causes.
3. Determine if patient is stable or unstable.

UNSTABLE

4. If time and condition allow prior to cardioversion, sedate per MCA selection. Refer to **Patient Procedure Sedation Protocol**.
5. Perform synchronized cardioversion beginning at 100 J, increasing to 200 J, 300 J, 360 J (or devices maximum energy dose), until the rhythm converts.
6. If the patient does not convert at maximum energy, contact medical control for possible medication orders and direction.

Deleted: For unstable patients with a **REGULAR NARROW OR WIDE** rhythm, p

Deleted: (Use manufacturers suggested biphasic energy dose, 100 J).

STABLE

7. Attempt Vagal Maneuvers
    a. Ensure the patient is on oxygen and on a cardiac monitor. (See picture below))
    b. Run ECG strip during the procedure.
    c. Place the patient in a semi-fowlers position
    d. Instruct the patient to blow into a 10 mL syringe for 15 seconds and then rapidly elevate the patient's legs to the knee chest position for 60 seconds.
    e. DO NOT USE CAROTID MASSAGE.

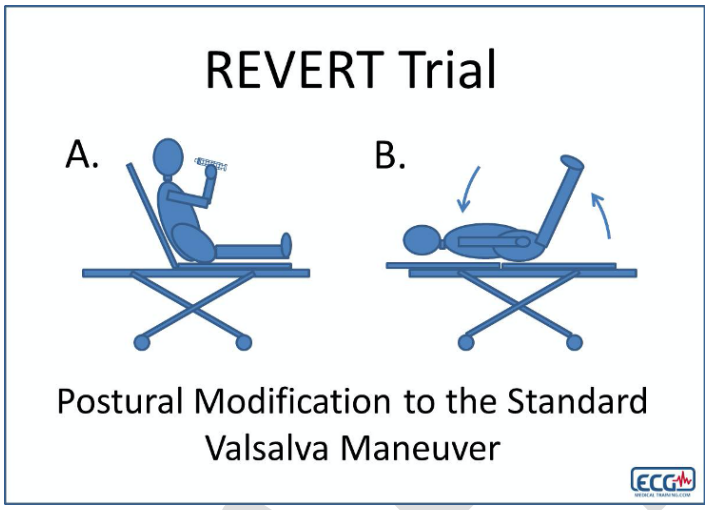
Deleted: <#>For unstable patients with an **IRREGULAR NARROW** rhythm, perform synchronized cardioversion beginning at 200 J, increasing to 300 J, 360 J. (Use manufacturers suggested biphasic energy dose, 120 – 200 J). For patients that are unstable with an **IRREGULAR WIDE** rhythm, perform defibrillation beginning at 200 J, increasing to 300 J, 360 J. (Use manufacturers suggested biphasic energy dose 150 – 200 J).¶

Deleted: tient to cough forcefully several times or

Deleted: <#>Have the patient take a deep breath and bear down.¶

Protocol Source/References: PICTURE FROM from https://www.ecgmedicaltraining.com/wp-content/uploads/2016/06/REVERT-Trial-SVT.jpg

Deleted: 10/25/2017



8. Start an IV NS KVO. A large bore antecubital IV should be secured whenever possible.
9. Obtain 12 lead ECG, if immediately available.
10. If the rhythm is regular and narrow (i.e., supraventricular tachycardia),
    a. Consider Adenosine 6 mg rapid IV push through the most proximal injection site. This should be followed immediately with 20 ml NS flush. If conversion does not occur, administer Adenosine 12 mg IV using the same technique as stated above.
11. If the rhythm is irregular and narrow (i.e., atrial fibrillation/flutter), contact medical control for administration of MCA selection medication:

Medication Options
(Choose One)

☐ Diltiazem 15-20 mg (0.25 mg/kg) IV/IO slowly
OR
☐ Verapamil 5 mg IV/IO
OR
☐ Amiodarone 150 mg IV over 10 minutes
OR
☐ No medication, supportive therapy only

Deleted: Amiodarone - 150 mg IV over 10 minutes
Deleted: Lidocaine - 1 mg/kg IV
Deleted: Lidocaine - 1 mg/kg IV
Deleted: No medication, supportive therapy only

12. If arrhythmia continues and is stable with narrow QRS contact medical control for possible orders.
13. If rhythm is stable with wide QRS contact medical control for administration of Amiodarone ***OR*** Lidocaine per MCA Selection.

Protocol Source/References: PICTURE FROM from https://www.ecgmedicaltraining.com/wp-content/uploads/2016/06/REVERT-Trial-SVT.jpg

Medication Options
(Choose One)
☐Amiodarone - 150 mg IV over 10 minutes
OR
☐Lidocaine - 1 mg/kg IV

14. If at any point a patient becomes unstable, perform synchronized cardioversion.
15. Suspected torsades de pointes contact medical control for administration of Magnesium Sulfate 2 gm IV/IO.

16. Contact medical control and per MCA selection, administer additional Amiodarone 150 mg IV over 10 minutes as needed to a maximum of 450 mg OR Lidocaine 0.5 -1.0 mg/kg IV push every 5 - 10 minutes to a maximum of 3 mg/kg.

NOTES:
1. Administration of Amiodarone is best accomplished by adding Amiodarone 150 mg to 100 or 250 ml of NS and infusing over approximately 10 minutes.
2. Administration of Magnesium Sulfate is best accomplished by adding Magnesium Sulfate 2gm to 100 or 250 ml of NS and infusing over approximately 10 minutes.

NOTE: ALGORITHM REMOVED.

Pulmonary Edema / CHF

This protocol is to be followed for patients in respiratory distress due to pulmonary edema. Patients in acute respiratory distress from hypertensive heart failure benefit from high doses of nitroglycerin. Nitroglycerin should be utilized in conjunction with CPAP/BiPAP.

1. Follow **General Pre-Hospital Care Protocol**.
2. Initiate supplemental oxygen by non-rebreather mask.
3. Position patient upright with legs dependent, if possible.

4. Consider CPAP (if available) per **CPAP/BiPAP Procedure.**
   a.

BLS Nebulized Treatment Included
☐ **Yes** ☐ **No**

1. **If wheezing, administer Albuterol 2.5 mg/3ml NS nebulized**

5. Inquire of all patients (male and female) if they have taken an erectile dysfunction medication or medications used to treat pulmonary hypertension in the last 48 hours. If yes, DO NOT ADMINISTER NITROGLYCERIN AND CONTACT MEDICAL CONTROL.
6. If SBP above 100 mmHg, administer Nitroglycerin 0.4 mg SL. Repeat every 5 minutes if SBP remains above 100 mmHg. Nitroglycerin may be administered prior to IV placement if the SBP is above 120 mmHg. Continue administration in the presence of CPAP
7. If wheezing, administer nebulized Albuterol 2.5 mg/3 ml NS and nebulized Ipratropium 500 mcg/ 3 ml NS
8. If indicated, consider an advanced airway.
9. Obtain 12-lead ECG. Follow local MCA transport protocol if ECG is positive for ST segment elevation myocardial infarction (STEMI) and alert hospital as soon as possible. (May be a BLS skill, per MCA selection, see **12 Lead ECG Procedure**)

10. If SBP is less than 100 mmHg and signs/symptoms of shock, administer Epinephrine by push dose (dilute boluses) per **Epinephrine Protocol**.
    a. Prepare (10 mcg/mL) by adding 1mL of 1mg/10mL Epinephrine in 9mL NS, then
    b. Administer 1-2 mL every 2 to 5 minutes and titrate SBP greater than 90 mm/Hg.

Deleted: 10/25/2017

Pulmonary Edema / CHF

This protocol is to be followed for patients in respiratory distress due to pulmonary edema. Patients in acute respiratory distress from hypertensive heart failure benefit from high doses of nitroglycerin. Nitroglycerin should be utilized in conjunction with CPAP/BiPAP.

Deleted: This protocol is to be followed for patients in acute respiratory distress situations, not chronic.

Deleted: CHF.

1. Follow **General Pre-Hospital Care Protocol**.
2. Initiate supplemental oxygen by non-rebreather mask.
3. Position patient upright with legs dependent, if possible.
4. Consider CPAP (if available) per **CPAP/BiPAP Procedure.**

a.

BLS Nebulized Treatment Included
☐ Yes ☐ No

1. **If wheezing, administer Albuterol 2.5 mg/3ml NS nebulized**

Formatted: Font: Not Bold, No underline

Deleted: If wheezing, administer Albuterol 2.5 mg/3ml NS nebulized if approved by MCA (INSERT CHECK BOX)¶

5. Inquire of all patients (male and female) if they have taken an erectile dysfunction medication or medications used to treat pulmonary hypertension in the last 48 hours. If yes, DO NOT ADMINISTER NITROGLYCERIN AND CONTACT MEDICAL CONTROL.

Deleted: Viagra (sildenafil citrate) or similar

6. If SBP above 100 mmHg, administer Nitroglycerin 0.4 mg SL. Repeat every 5 minutes if SBP remains above 100 mmHg. Nitroglycerin may be administered prior to IV placement if the SBP is above 120 mmHg. Continue administration in the presence of CPAP

Deleted: 3-

7. If wheezing, administer nebulized Albuterol 2.5 mg/3 ml NS and nebulized Ipratropium 500 mcg/ 3 ml NS
8. If indicated, consider an advanced airway.
9. Obtain 12-lead ECG. Follow local MCA transport protocol if ECG is positive for ST segment elevation myocardial infarction (STEMI) and alert hospital as soon as possible. (May be a BLS skill, per MCA selection, see **12 Lead ECG Procedure**)

Deleted: <#>¶
<*object*>If wheezing, administer nebulized Albuterol 2.5 mg/3 ml NS nebulized and Ipratropium 500 mcg/3 ml NS. (KK FIX THIS).If wheezing, administer nebulized Albuterol 2.5 mg/3ml.¶
¶

Deleted: if available

10. If SBP is less than 100 mmHg and signs/symptoms of shock, administer Epinephrine by push dose (dilute boluses) per **Epinephrine Protocol**.
    a. Prepare (10 mcg/mL) by adding 1mL of 1mg/10mL Epinephrine in 9mL NS, then
    b. Administer 1-2 mL every 2 to 5 minutes and titrate SBP greater than 90 mm/Hg.

NOTE: ALGORITHM REMOVED

Chest Pain/Acute Coronary Syndrome

The goal is to reduce cardiac workload and to maximize myocardial oxygen delivery by reducing anxiety, appropriately oxygenating, and relieving pain. For non-cardiac causes of chest pain, refer to appropriate protocol which may include **Pain Management Procedure.**

1. Follow **General Pre-Hospital Care Protocol.**
2. Administer oxygen 4 L/min per nasal cannula if pulse oximetry SaO2 < 94%.
3. Assist patient in the use of their own aspirin
4. If MCA approved, and patient not allergic to aspirin, administer aspirin up to 325 mg. Aspirin should be chewed and swallowed.

☐ MCA selection for MFR ☐ MCA selection for EMT

5. Inquire of all patients (male and female) if they have taken Viagra (sildenafil citrate) or similar erectile dysfunction medications or medications used to treat pulmonary hypertension in the last 48 hours. If yes, DO NOT ADMINISTER NITROGLYCERIN AND CONTACT MEDICAL CONTROL.
6. Assist patient in the use of their own Nitroglycerin sublingual tabs (check expiration date), if available, and if the patient's systolic BP is above 120 mmHg, for a maximum of 3 doses.

7. Administer aspirin up to 325 mg PO, chew and swallow if no aspirin or suspected insufficient dose since the onset of chest pain.
8. Start an IV NS KVO. If the patient has a BP of less than 100 mmHg, administer an IV/IO NS fluid bolus up to 1 liter wide open, in 250 ml increments and reassess.
9. If no erectile dysfunction medication, administer nitroglycerin 0.4 mg sublingual if BP is above 100 mmHg. Dose may be repeated at 3 to 5 minute intervals if chest pain persists and BP remains above 100 mmHg. Nitroglycerin may be administered prior to IV placement if the BP is above 120 mmHg.

10. Obtain 12-lead ECG if available. Follow local MCA transport protocol if ECG is positive for acute ST Elevation Myocardial Infarction (STEMI) and alert the hospital as soon as possible. (Per MCA selection, may be a BLS procedure, follow **12 Lead ECG Procedure**).
11. For patients with suspected cardiac chest pain refractory to Nitroglycerin, consider Fentanyl 1 mcg/kg IV/IO (IN, if available). Maximum single dose 100 mcg may repeat one time. Total dose may not exceed 200 mcg.

Deleted: 11/14/2017

Chest Pain/Acute Coronary Syndrome

The goal is to reduce cardiac workload and to maximize myocardial oxygen delivery by reducing anxiety, appropriately oxygenating, and relieving pain. For non-cardiac causes of chest pain, refer to appropriate protocol which may include **Pain Management Procedure.**

1. Follow **General Pre-Hospital Care Protocol.**
2. Administer oxygen 4 L/min per nasal cannula if pulse oximetry SaO2 < 94%.
3. Assist patient in the use of their own aspirin
4. If MCA approved, and patient not allergic to aspirin, administer aspirin up to 325 mg. Aspirin should be chewed and swallowed.

☐ MCA selection for MFR ☐ MCA selection for EMT

5. Inquire of all patients (male and female) if they have taken Viagra (sildenafil citrate) or similar erectile dysfunction medications or medications used to treat pulmonary hypertension in the last 48 hours. If yes, DO NOT ADMINISTER NITROGLYCERIN AND CONTACT MEDICAL CONTROL.
6. Assist patient in the use of their own Nitroglycerin sublingual tabs (check expiration date), if available, and if the patient's systolic BP is above 120 mmHg, for a maximum of 3 doses.
7. Administer aspirin up to 325 mg PO, chew and swallow if no aspirin or suspected insufficient dose since the onset of chest pain.
8. Start an IV NS KVO. If the patient has a BP of less than 100 mmHg, administer an IV/IO NS fluid bolus up to 1 liter wide open, in 250 ml increments and reassess.
9. If no erectile dysfunction medication, administer nitroglycerin 0.4 mg sublingual if BP is above 100 mmHg. Dose may be repeated at 3 to 5 minute intervals if chest pain persists and BP remains above 100 mmHg. Nitroglycerin may be administered prior to IV placement if the BP is above 120 mmHg.
10. Obtain 12-lead ECG if available. Follow local MCA transport protocol if ECG is positive for acute ST Elevation Myocardial Infarction (STEMI) and alert the hospital as soon as possible. (Per MCA selection, may be a BLS procedure, follow **12 Lead ECG Procedure**).
11. For patients with suspected cardiac chest pain refractory to Nitroglycerin, consider Fentanyl 1 mcg/kg IV/IO (IN, if available). Maximum single dose 100 mcg may repeat one time. Total dose may not exceed 200 mcg.

NOTE: ALGORITHM REMOVED.

Deleted: <#><object>Inquire of all patients (male and female) if they have taken Viagra (sildenafil citrate) or similar erectile dysfunction medications or medications used to treat pulmonary hypertension in the last 48 hours. If yes, DO NOT ADMINISTER NITROGLYCERIN AND CONTACT MEDICAL CONTROL.¶

Deleted: Patients with a STEMI on the 12 lead should be transported to an interventional cardiac facility. Notify receiving hospital, as soon as possible, of impending arrival of a "STEMI ALERT" patient and give ETA. ¶

Nitroglycerin Drip Supplement (MCA Optional Protocol)

This protocol is for paramedic use only

☐ Medical Control Authorities choosing to adopt this supplement may do so by selecting this check box. Adopting this supplement changes or clarifies the referenced protocol or procedure in some way. This supplement supersedes, clarifies, or has authority over the referenced protocol.

This protocol provides for the use of a Nitroglycerin Drip in the pre-hospital setting for systems that can justify the use based on long transport times. Implementation of the protocol requires additional paramedic training approved by the Medical Control Authority and Department. A suggested training outline is included in this protocol.

Indications for Nitroglycerin Drip

1. Chest pain secondary to presumed cardiac ischemia, acute coronary syndrome, or acute myocardial infarction. The nitroglycerin drip may be used after failure of SL nitroglycerin and narcotic administration to relieve cardiac chest pain treated using the **Chest Pain / Acute Coronary Syndrome** protocol.
2. Acute pulmonary edema / CHF. The nitroglycerin drip may be used as a supplement to SL nitroglycerin treatment using the **Acute Pulmonary Edema / CHF** protocol.

Equipment

1. At least one functioning IV. A second IV preferable to allow additional IV fluid or medication administration.
2. Infusion pump and proper vented tubing are required.

Administrations Guidelines

1. Dosing
   A. Nitroglycerin is mixed in NS. Dosing chart: see Table I
   B. For pre-hospital use, begin the nitroglycerin drip at 10 mcg/min and increase by 10 mcg/min at 5-minute intervals if chest pain persists and systolic blood pressure remains above 100 mmHg. Maximum dose is 200 mcg/min.
   C. If titrating nitroglycerin for Pulmonary Edema/CHF, titrate until systolic BP is 120 or below.
2. Patient monitoring
   A. If pain resolves completely, maintain drip at current rate of administration.
   B. If pain continues, increase the drip rate by 10 mcg/min every 5 minutes until pain resolves or systolic BP falls below 100 mmHg.
   C. If systolic BP falls below 90 mmHg during titration, decrease the drip rate by 10 mcg/min and give a NS IV/IO fluid bolus up to 1 liter, wide open. If BP remains below 90 mmHg, discontinue drip.

Table I. Dosing Chart for Nitroglycerin

	Amount to infuse in ml/hr	
Dose (mcg/min)	50 mg/250 ml 100 mg/500 ml (200 mcg/ml)	100 mg/250 ml 200 mg/500 ml (400 mcg/ml)
10	3	1.5
20	6	3
30	9	5
40	12	6
50	15	8
60	18	9
70	21	10
80	24	12
90	27	14
100	30	15
110	33	17
120	36	18
130	39	19
140	42	21
150	45	23
160	48	24
170	51	26
180	54	27
190	57	29
200	60	30

Deleted: (OPTIONAL)

Deleted: 10/25/2017

Deleted: *OPTIONAL*

Nitroglycerin Drip Supplement (MCA Optional Protocol)

This protocol is for paramedic use only

☐ Medical Control Authorities choosing to adopt this supplement may do so by selecting this check box. Adopting this supplement changes or clarifies the referenced protocol or procedure in some way. This supplement supersedes, clarifies, or has authority over the referenced protocol.

This protocol provides for the use of a Nitroglycerin Drip in the pre-hospital setting for systems that can justify the use based on long transport times. Implementation of the protocol requires additional paramedic training approved by the Medical Control Authority and Department. A suggested training outline is included in this protocol.

Indications for Nitroglycerin Drip

1. Chest pain secondary to presumed cardiac ischemia, acute coronary syndrome, or acute myocardial infarction. The nitroglycerin drip may be used after failure of SL nitroglycerin and narcotic administration to relieve cardiac chest pain treated using the **Chest Pain / Acute Coronary Syndrome** protocol.
2. Acute pulmonary edema / CHF. The nitroglycerin drip may be used as a supplement to SL nitroglycerin treatment using the **Acute Pulmonary Edema / CHF** protocol.

Equipment

1. At least one functioning IV. A second IV preferable to allow additional IV fluid or medication administration.
2. Infusion pump and proper vented tubing are required.

Administrations Guidelines

1. Dosing
   A. Nitroglycerin is mixed in NS. Dosing chart: see Table I
   B. For pre-hospital use, begin the nitroglycerin drip at 10 mcg/min and increase by 10 mcg/min at 5-minute intervals if chest pain persists and systolic blood pressure remains above 100 mmHg. Maximum dose is 200 mcg/min.
   C. If titrating nitroglycerin for Pulmonary Edema/CHF, titrate until systolic BP is 120 or below.
2. Patient monitoring
   A. If pain resolves completely, maintain drip at current rate of administration.
   B. If pain continues, increase the drip rate by 10 mcg/min every 5 minutes until pain resolves or systolic BP falls below 100 mmHg.
   C. If systolic BP falls below 90 mmHg during titration, decrease the drip rate by 10 mcg/min and give a NS IV/IO fluid bolus up to 1 liter, wide open. If BP remains below 90 mmHg, discontinue drip.

Deleted: (OPTIONAL)

Deleted: 10/25/2017

Table I. Dosing Chart for Nitroglycerin

	Amount to infuse in ml/hr	
Dose (mcg/min)	50 mg/250 ml 100 mg/500 ml (200 mcg/ml)	100 mg/250 ml 200 mg/500 ml (400 mcg/ml)
10	3	1.5
20	6	3
30	9	5
40	12	6
50	15	8
60	18	9
70	21	10
80	24	12
90	27	14
100	30	15
110	33	17
120	36	18
130	39	19
140	42	21
150	45	23
160	48	24
170	51	26
180	54	27
190	57	29
200	60	30

Deleted: (OPTIONAL)

Deleted: 10/25/2017

Deleted: ***Nitroglycerin Drip Training Guidelines***¶
¶
Suggested Training Requirements for Paramedics¶
Training requirements for paramedics = 2 hours¶
Nitroglycerin training = 1 hour¶
Infusion pump training = 1 hour¶
¶
Pharmacology and actions of nitroglycerin¶
Cardiovascular effects¶
Decreases preload: reduces venous tone, decreasing venous load on the heart.¶
Decreases afterload: reduces peripheral vascular resistance.¶
Increases myocardial oxygen supply: causes dilatation of coronary arteries and relief of coronary artery spasm.¶
Generalized effect: causes generalized smooth muscle relaxation¶
¶
Administrations Guidelines¶
Dosing¶
Nitroglycerin is mixed in NS. Dosing chart: see Table I.¶
For pre-hospital use begin the nitroglycerin drip at 10 mcg/min and increase by 10 mcg/min at 5 minute intervals if chest pain persists and systolic blood pressure remains above 100 mmHg.¶
If titrating nitroglycerin for Pulmonary Edema / CHF, titrate until systolic BP is 120 mmHg or below.¶
For inter-hospital patient transfers a nitroglycerin drip may be continued at the rate begun at the transferring hospital. Titrate the drip as above to relieve chest pain or per sending facility orders.¶
¶
Patient monitoring and titration of nitroglycerin drip¶
Patient should have continuous cardiac rhythm monitoring and frequent blood pressure monitoring. Blood pressure should be rechecked after each dosing change.¶
If pain resolves completely, maintain drip at current rate of administration.¶
If pain continues, increase the drip rate by 10 mcg/min every 5 minutes until pain resolves or systolic BP falls below 100 mmHg.¶
Maximum dose is 200 mcg/min.¶
If systolic BP falls below 90 mmHg during titration, decrease the drip rate by 10 mcg/min and give a NS IV/IO fluid bolus up to 1 liter, wide open. If BP remains below 90 mmHg, discontinue drip.¶
¶
5. Side effects and special notes¶
Peripheral vasodilatation can cause profound hypotension and reflex tachycardia.¶
Common side effects: throbbing headaches, flushing, dizziness¶
Less common: orthostatic hypotension, sometimes marked. Nitroglycerin does not provide controlled hypotension.¶
Because nitroglycerin causes generalized smooth muscle relaxation, it may be effective in relieving chest pain caused by esophageal spasm.¶
¶
¶