Tucson Medical Center
Base Hospital
Medications / Devices / Tools

Joseph Liu, D.O.
TMC EMS Program Medical Director
joseph.liu@tmcaz.com

Martin F. Samaniego, BSEM, NRP, FP-C
TMC EMS Program Coordinator
martin.samaniego@tmcaz.com

Andy Shanks
TMC EMS Program Director
andy.shanks@tmcaz.com

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Tucson Medical Center Base Hospital
Medications / Devices / Tools

Medications:

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Introduction

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Tucson Medical Center (TMC) Base Hospital Medications, Devices, and Tools policies and protocols are offline procedures approved by TMC Base Hospital Medical Director. Each set will be reviewed by all EMCTs working under TMC Medical Direction. These evidence-based guidelines will be used to provide the care to the best of their education, experience and within their full scope of practice. TMC Base Hospital members will receive the full support of the Medical Director when providing care to this level.

Protocol Deviation Statement

It is not reasonable to expect any single document to cover all situations where providers may make an assessment that indicates a deviation from these protocols may be necessary. These guidelines are not meant to be absolute treatment doctrines nor are they a substitute for the judgment and experience of the provider. Providers are expected to utilize their best clinical judgment and deliver care and procedures according to what is reasonable and prudent for specific situations. Under rare circumstances deviation may be necessary.

In circumstance where it would not cause further harm and the provider believes a patient may clinically benefit from an intervention, or that following the protocol would be harmful or not in the best interest of the patient, the following procedure should be followed:

1. The EMCT on scene is responsible for performing a complete assessment and determining if a protocol deviation is warranted. Providers must be able to demonstrate they were aware of, and considered the guidance provided with TMC protocols, and understand the risks associated with deviating from protocol.
2. When considering a protocol deviation, a peer with the appropriate level of expertise should be consulted (if available) or call medical direction.
3. ONLY if a provider is comfortable performing the deviation and treatment is consistent with their level of training, may they proceed with the deviation. Documentation must include the reasons for the deviation, all clinical data validating safety, mitigating risk, and the response/effects. The provide must advise the receiving physician of the deviation and document it clearly on the PCR. In all cases providers are expected to deliver care within the scope of practice for their certification.
4. Any protocol deviations will be reported to their Supervisor, Agency EMS Coordinator and Base Hospital Manager within 24 hours. This serves as a safeguard to remind providers that protocol deviations are considered a rare necessity. All deviations are subject to review to determine whether or not it was appropriate.

MEDICATIONS

Table 1: EMCT Drug Box

EMCT's are authorized to administer and monitor medications through their administrative medical director's delegated authority. The Medical Direction Commission periodically reviews the following list of medications and will make recommendations for changes that the Director of the Arizona Department of Health Services must then approve.

The following list represents the most recent iteration of the Director-approved medication list. Administrative Medical Directors may authorize EMCTs operating under their delegated medical authority to administer any or all medications from this list. The administrative medical directors MUST ensure that every EMCT operating under their delegated medical authority has access to the MINIMUM SUPPLY of agents required in the table below consistent with the EMCT's certification level.

Key:
A = Authorized to administer the agent
SVN = Agent shall be administered by small volume nebulizer
MDI = Agent shall be administered by metered dose inhaler
***** = Authorized to assist in patient self-administration (Note: only on hydrocortisone sodium succinate line)
[ ] = Minimum supply required if an EMS provider chooses to make the optional agent available for EMCT administration
IP = Agent shall be administered with an infusion pump
****** = Immunization agents are the list of medications approved by the CDC Advisory Committee on Immunization Practices
IV = Intravenous formulation

Agent	Minimum Supply	EMR	EMT	AEMT	EMT-I (99)	Para medic	Paramedic with Critical Care Endorsement
Adenosine	18 mg	-	-	-	A	A	A
Albuterol Sulfate SVN or MDI (sulfite free)	10 mg	-	-	A	A	A	A
Albuterol Sulfate SVN or MDI (sulfite free)	Optional [10 mg]	-	A	-	-	-	-
Amiodarone or Lidocaine	300 mg or 3 prefilled syringes, total of 300 mg and 1 g vials or premixed infusion, total of 2 g	- -	- -	- -	- A	A A	A A
Antibiotics	Optional	-	-	-	-	-	A
Aspirin	324 mg	-	-	A	A	A	A
Aspirin	Optional [324 mg]	-	A	-	-	-	-

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Approved by ADHS Interim Director Sjolander September 25, 2025

Agent	Minimum Supply	EMR	EMT	AEMT	EMT-I (99)	Para medic	Paramedic with Critical Care Endorsement
Atropine Sulfate	1 prefilled syringe, total of 1 mg	-	-	-	A	A	A
Atropine Sulfate	Optional [8 mg multidose vial (1)]	-	-	-	A	A	A
Atropine Sulfate Auto-Injector	None	-	A	A	A	A	A
Atropine Sulfate and Pralidoxime (Combined) Auto-Injector	None	-	A	A	A	A	A
Blood products	Optional	-	-	-	-	-	A
Calcium Chloride or Calcium Gluconate	1 g 2 g	-	-	-	-	A	A
Calcium Gluconate, 2.5% topical gel	Optional [50 g]	-	A	A	A	A	A
Crotalidae Immune F(ab')2 (equine)	Optional	-	-	-	-	-	A
Dexamethasone or Methylprednisolone	8 mg 125 mg	-	-	-	-	A	A
Dextrose	50 g	-	-	A	A	A	A
Dextrose, 5% in H2O	Optional [250 mL bag (1)]	-	-	A	A	A	A
Diazepam or Lorazepam or Midazolam	20 mg 8 mg 10 mg	-	-	-	A	A	A
Diazepam Rectal Delivery Gel	Optional [20 mg]	-	-	-	A	A	A
Diltiazem	Optional [25 mg]	-	-	-	-	A	A
Diphenhydramine	50 mg	-	-	-	A	A	A
Droperidol or Haloperidol	Optional	-	-	-	-	-	A
Epinephrine Auto-Injector	Optional [1 adult auto-injectors 1 pediatric auto-injectors]	A	A	A	A	A	A
Epinephrine, 1 mg/1 mL For IM use in anaphylaxis only	Optional [1 mg]	-	A	A	A	A	A
Epinephrine, 1 mg/1 mL	2 mg	-	-	A	A	A	A

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Agent	Minimum Supply	EMR	EMT	AEMT	EMT-I (99)	Para medic	Paramedic with Critical Care Endorsement
Epinephrine, 1 mg/1 mL	Optional [30 mg multidose vial (1)]	-	-	A	A	A	A
Epinephrine, 0.1 mg/1 mL	5 mg	-	-	-	A	A	A
Esmolol	Optional	-	-	-	-	-	A
Etomidate	Optional [40 mg]	-	-	-	-	A	A
Glucagon	1 mg	-	-	A	A	A	A
Glucose, oral	Optional [30 gm]	-	A	A	A	A	A
Hemostatic Agents	Optional	-	A	A	A	A	A
Hydralazine	Optional	-	-	-	-	-	A
Hydrocortisone Sodium Succinate	Optional	-	-	*	*	*	A
Hydromorphone	Optional	-	-	-	-	-	A
Hydroxocobalamin	Optional [5 g]	-	-	-	-	A	A
Immunizing Agent**	Optional	-	-	-	A	A	A
Ipratropium Bromide 0.02% SVN or MDI	5 mL	-	-	-	A	A	A
Ipratropium Bromide 0.02% SVN or MDI	Optional [5 mL]	-	A	A	-	-	-
Ketamine	Optional [200 mg]	-	-	-	-	A	A
Labetalol	Optional	-	-	-	-	A	A
Lactated Ringers	1 L bag (2)	-	-	A	A	A	A
Lactated Ringers	Optional [1 L bag]	-	A	-	-	-	-
Levetiracetam	Optional	-	-	-	-	-	A
Lidocaine 2% preservative-free (IO insertion)	Optional [100 mg]	-	-	A	A	A	A
Magnesium Sulfate	5 g	-	-	-	-	A	A
Mannitol	Optional	-	-	-	-	-	A
Metoprolol	Optional	-	-	-	-	-	A
Morphine Sulfate or Fentanyl	20 mg 200 mcg	- -	- -	A -	A A	A A	A A
Naloxone	10 mg	-	-	A	A	A	A
Naloxone	Optional [prefilled atomizers or auto-injectors] 2 doses	A	A	A	A	A	A
Nicardipine	Optional	-	-	-	-	-	A
Nifedipine	Optional	-	-	-	-	A	A
Nitroglycerin Sublingual Spray or Nitroglycerin Tablets	1 bottle 6 tablets	-	-	A	A	A	A
Nitroglycerin IV	Optional	-	-	-	-	-	A

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Agent	Minimum Supply	EMR	EMT	AEMT	EMT-I (99)	Para medic	Paramedic with Critical Care Endorsement
Normal saline	1 L bag (2) Optional [250 mL bag (1)] Optional [50 mL bag (2)]	-	-	A	A	A	A
Normal saline	Optional [1 L bag]	-	A	-	-	-	-
Saline 3% (hypertonic)	Optional	-	-	-	-	-	A
Norepinephrine IP or Dopamine	Optional [4 mg] Optional [400 mg]	-	-	-	-	A	A
Ondansetron	Optional [4 mg]	-	-	-	A	A	A
Over the counter (OTC) analgesics for pain or fever	Optional	-	A	A	A	A	A
Oxygen	13 cubic feet	A	A	A	A	A	A
Oxytocin	Optional [10 units]	-	-	-	A	A	A
Phenylephrine IV	Optional	-	-	-	-	-	A
Phenylephrine Nasal Spray 0.5%	Optional [1 bottle]	-	-	-	A	A	A
Pralidoxime Auto-Injector	None	-	A	A	A	A	A
Proparacaine Ophthalmic or Tetracaine	Optional [1 bottle] Optional [1 bottle]	-	-	-	A	A	A
Rocuronium	Optional [100 mg]	-	-	-	-	A	A
Sodium Bicarbonate 7.5%–8.4%	Optional [100 mEq]	-	-	-	A	A	A
Succinylcholine	Optional [400 mg]	-	-	-	-	A	A
Thiamine	Optional [100 mg]	-	-	-	A	A	A
Thrombolytics	Optional	-	-	-	-	-	A
Tranexamic acid (TXA)	Optional [1 g]	-	-	-	-	A	A
Vasopressin	Optional	-	-	-	-	-	A

* * *

Narcan Protocol

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Audience
- EMT-Basic
- Paramedic

Purpose
Use protocol on patients with known or suspected opioid overdose.

Indications
- Altered Level of Consciousness (LOC)
- Respiratory depression or apnea (not breathing)
  - Shallow, slow respirations – less than 8 to 10 breaths per minute
  - Inadequate respirations
- Unable to wake up with painful stimuli
- Constricted pupils (miosis)
- Needle track marks
- Profuse sweating (diaphoresis)
- Cardiac arrest

Procedure
1. Recognize opiate overdose
   a. Decreased Level of Consciousness (LOC)
   b. Decreased or no breathing
   c. In setting of likely opioid ingestion
2. Give sternal rub/stimulate
3. If no response, administer Naloxone
4. Place patient on side (recovery position)

Medication Dosage
- Auto-injector (IM)
  - 0.4 mg IM dose in lateral thigh
  - If no response after 2 minutes, may repeat as necessary
  - Onset of Action: 2-5 minutes
  - Duration: 30-45 minutes
- Intranasal (IN)
  - 4 mg IN dose
  - If no response after 2 minutes, may repeat as necessary
  - Onset of action: 1-2 minutes
  - Duration: 30-90 minutes

Pearls/Pitfalls/Conclusion
- Use caution when administering Naloxone to narcotic-dependent patients
- Rapid opioid withdrawal may cause nausea/vomiting and may cause combativeness
- Roll patient on their side after administration to keep airway clear
- If patient does not respond within 3 to 5 minutes, administer second dose, if available
- Other disease processes may mimic opioid overdose; be aware of possible low blood sugar, head injury, stroke, shock, or hypoxia

Over-The-Counter (OTC) Protocol

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Audience
- EMT-Basic
- Paramedic

Purpose
Protocol for administration of Over-the-Counter (OTC) medications to patients who have fevers in the prehospital setting with suspected infection, illness or febrile seizure.

Indications
- Fever is defined as greater than 100.4° F or 38.0°C

Contraindications
- Less than three months of age (Acetaminophen)
- Less than six months of age (Ibuprofen)
- Known allergy
- Inability to tolerate PO intake
- Dose given previously within 4 hours

Procedure
1. If patient is alert and not vomiting, give all medications orally (if age appropriate).
   a. Medications can be administered in a variety of formats (tablets, chewable tabs, syrup). EMCTs must be familiar with all formats and concentrations carried by individual departments.
2. **[Paramedic Only]** If patient has decreased level of consciousness or is vomiting, consider using suppository.
   a. Put gloves on and gently push the lubricated suppository into the rectum.

Medication Dosage
- **Acetaminophen** Administration (one-time dose)
  - Approved for ≥ 3 months of age
  - Oral (PO):
    - Acetaminophen 15 mg/kg PO (max 1 g)
    - Onset of Action: 30-45 minutes
    - Duration of Action: 4-6 hours
  - **[Paramedic Only]** Suppository (PR):
    - Pediatric ≤ 2 years of age
      - ≤ 10 kg = 120 mg suppository
      - 10-20 kg = 160 mg suppository
      - ≥ 20 kg 325 mg suppository
    - Onset of Action: 1 hour
    - Duration of Action: 2-5 hours
- **Ibuprofen** Administration (one-time dose)
  - Approved for ≥ 6 months of age
  - Oral (PO):
    - Ibuprofen 10 mg/kg PO (max 400 mg)
    - Onset of Action: 30-60 minutes
    - Duration of Action: 4-6 hours

Pearls/Pitfalls/Conclusion
- Common Side Effects
  - Nausea/Vomiting
  - Stomach Cramps
  - Diarrhea
  - Increased sweating

Sedation Protocol

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Audience
- Paramedic

Purpose
Sedation should only be administered when indicated in specific SO for controlled reduction of environmental awareness during painful procedures.

Indications
- Procedures
  - Transcutaneous Pacing
  - Synchronized Cardioversion
  - CPAP

Contraindications
- Patients that meet the **Behavioral Emergency SO** - refer to specific guideline instead.

Procedure
1. Follow appropriate SO alongside this protocol
2. Place patient on Continuous ECG, ETCO2, and Pulse Oximetry monitoring when available prior to start of sedation.
3. Administer medications at appropriate dosage.
4. Monitor vital signs every 5 minutes.
   a. If patient becomes hypotensive, administer **NS/LR 20 mL/kg IV bolus**
5. Closely monitor patients' respiratory effort and effectiveness as indicated.

Medication Dosage
- Intravenous (IV) / Intraosseous (IO)
  - Adult:
    - **Midazolam 2.5 mg IV/IO**, may repeat x 1 (max total dose 5mg)
  - Peds:
    - **Midazolam 0.1 mg/kg IV/IO (max dose 2.5mg)**, may repeat x 1 (max total dose 5mg)

Pearls/Pitfalls/Conclusion
- Use once hemodynamically stable; DO NOT give if patient is hypotensive, as Midazolam can cause worsening hypotension.
- Contraindications:
  - Allergy
- Side Effects:
  - Respiratory depression
  - Respiratory failure
  - Apnea
  - Hypotension
  - Syncope

DEVICES

Auto-Injector Protocol

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Audience
- EMT-Basic
- Paramedic

Purpose
Protocol for usage of auto-injector delivery system. The auto-injector delivers a predetermined dose of medication via the intramuscular (IM) route. Use of an auto-injector is indicated as directed or recommended by protocol and when other administration routes are unavailable. The use of an auto-injector is highly recommended for the administration of some high risk medications like epinephrine. Risk of error is greatly decreased by the use of an auto-injector as there is no need to calculate or draw up a dose of medication. Medications commonly administered via auto-injector include epinephrine, and naloxone.

Indications
- Epinephrine Auto-Injector for Anaphylaxis
- Narcan Auto-Injector for Opioid Poisoning / Overdose

Contraindications
- None

Procedure
1. Check the label and expiration date on the auto-injector.
2. Confirm the Five "Rs": Right patient, Right medication, Right dose, Right route, and Right time.
3. If applicable, explain the procedure to the patient.
4. Locate the injection site (vastus lateralis located on the lateral aspect of the thigh. Injection is given at the mid-thigh level).
5. If time permits, expose the site and clean the injected are with alcohol or chlorhexidine in a circular motion starting from the selected site outward.
    a. If no time, Auto-Injector may be administered through clothing
6. Remove the auto-injector from its storage container.
7. Form a fist around the auto-injector with the black tip facing down.
    a. ***Do NOT place your thumb over either end of the auto-injector.***
8. Remove the safety cap from the auto-injector with your other hand.
9. Position the auto-injector at a 90° angle with the black or orange "needle end" cap against the desired injection site and press very firmly listening for an audible click indicating the needle has been deployed.
10. Hold the auto-injector in place for 10 seconds to allow for complete delivery of medication.
11. Remove the auto-injector and dispose of it properly.
12. Massage the injection site for 10 seconds to enhance medication delivery.
13. Observe the patient for response to the medication.
14. Initiate transport to the hospital for further evaluation and observation.
    a. ***All patients receiving medication via auto-injector should be transported to the hospital***

Central Line Protocol (1/2)

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Audience
- Paramedic

Purpose
Protocol for appropriate assessment, maintenance, and access of central indwelling vascular catheters. Paramedics may maintain these lines and use them for vascular access only in emergencies. Follow the patient's pre-existing care regimen for flushing and access whenever possible.

Indications
- Emergency access in decompensating patient

Contraindications
- Overlying cellulitis

Procedure
1. Follow Standard Precautions
    - Use strict aseptic techniques
    - Do not use lines if their distal termination is in an uncertain location
    - Do not use scissors near the indwelling catheter site
    - Use Huber (non-coring) needles to access Porta-Cath ports
    - Long catheters have low flow rates and may not be useful for fluid resuscitation
2. Ensure patient is on a monitor
3. Don clean gloves for all handling of catheters
4. Prepare equipment in advance
5. Identify if catheter is accessible by standard prehospital equipment (Implanted ports, should be accessed by special, non-coring [Huber-type] needles.)
6. Identify shut-off, clamps, caps, heparin/saline lock, etc., and clamp line if disconnecting or opening
7. Accessing Broviac, Hickman, Leonard, and PICC Lines
    a. Clamp off the hub line you intend to use.
    b. Once the line is clamped off, expose the end of the hub (it may have a cap or be taped over) clean it well with an alcohol prep and put an Intermittent Needle Therapy (INT) hub on it.
    c. With the INT hub in place, unclamp the tubing and let the INT hub seal out air.
    d. Clean the INT hub and attach an empty 10-20 ml syringe to the INT hub and aspirate about 5ml of blood and heparin to confirm the line is in place.
    e. There should be no resistance to aspiration. If there is resistance, NEVER force flushes.
        i. Trouble Shooting:
            1. Gently flush with NS/LR and then try to aspirate again
            2. Have the patient cough
            3. Change the position of the patient
            4. Turn the head/neck to the opposite site of the catheter
    f. Discard the syringe and contents as biohazard waste.
    g. Site may be functional without return. Only use venous access devices that have a blood return unless the patient or family can verify that the device is functional despite the lack of blood return
    h. Attach prime ready NS/LR bag and run it into the line at a TKO rate.
    i. Use the y-sites on the IV tubing to give meds as needed; make sure to clean the y-site correctly and flush with the NS/LR IV line after each med.
    j. Secure connections with Luer lock or tape.
    k. Multi-lumen catheters; it is preferable to leave unused ports/ lumens sterile.
    l. Establish online medical direction as needed for infrequently used medications or complex situations.

Central Line Protocol (2/2)

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Procedure (cont.)

7. Accessing Port-a-Caths and Bard Ports
    a. Use "Huber" needle, an empty 10-20ml syringe, alcohol preps, INT hub, a saline flush and a primed ready NS/LR IV setup.
    b. Locate the port beneath the patient's skin.
    c. Clean the skin with LOTS of betadine, giving plenty of sterile field to work in.
    d. If the port location is going to be re-palpated, betadine your glove fingers to prevent re-introducing gremage.
    e. Clean the INT hub with alcohol prep and attach an empty 10-20 ml syringe. Aspirate about 5 ml of blood and heparin from the port and line.
    f. Discard the syringe and contents as biohazard waste.
    g. Place tegaderm over the wings of the needle to keep it sterile.
    h. Attach primed ready NS/LR IV running at a TKO rate.
    i. Use the y-sites on the IV tubing to give meds as needed; make sure to clean the y-site correctly and flush with the saline IV line after each med.
    j. Establish online medical direction as needed for infrequently used medications or complex situations

Documentation

1. Type of central line, PICC, or Port-a-Cath
2. Location
3. Followed policy for access
4. Fluid use and total amount of infusion during transport
5. All medications giving and how
6. Document any transferring physician orders and medical direction orders in PCR
7. Note any adverse effects and interventions provided

Troubleshooting

1. **Infection**
    a. S&S: fever, pus, visibly soiled line
    b. Steps: Contact Medical Control Authority
2. **Infiltration/Extravasation**
    a. S&S: pain/stinging at or near insertion site; swollen neck or arm; swelling proximal to or distal to insertion site; puffiness of dependent part of limb/body; taut, rigid skin around insertion site; blanching/coolness of skin around insertion site; damp or wet dressing; slowed infusion rate or infusion stops running
    b. Steps: stop infusion, elevate affected limb, apply cold compress, Contact Medical Control Authority
3. **Dislodgment of Catheter**
    a. S&S: leakage from central line site; increase or decrease in external catheter length
    b. Steps: secure in place
4. **Damaged Catheter**
    a. S&S: leakage from external catheter; broken hub; broken bifurcation; pockets of swelling along catheter path; visibly damaged line
    b. Steps: cover broken part with sterile gauze and secure in place, clamp between skin exit site and damaged area
5. **Catheter Occlusion/Thrombus**
    a. S&S: unable to administer IV fluids; no flow; unable to aspirate; persistent high pressure alarms on infusion pumps; visible precipitate or blood in external segment or leaking of fluid from insertion site; tenderness and edema of neck, shoulder, and/or arm on catheter side; impaired movement of neck and jaw
    b. Steps: rule out mechanical obstruction, do NOT flush or use force to clear catheter, Contact Medical Control Authority
6. **Air Embolus**
    a. S&S: chest pain, cyanosis, increased BP and/or HR
    b. Steps: clamp line, place patient in supine position, start high flow O2, Contact Medical Control Authority

Devices in Place Protocol

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Audience
- EMT-Basic
- Paramedic

Purpose
To ensure the patient will receive the most appropriate care possible for their condition in the management of devices in place for either 911 calls or interfacility transports.

Approved Devices for EMT to Monitor
- Central Venous Catheters (Capped)
- Feeding tubes (clamped)
- Foley Catheters
- Heimlich Valve (Prior Insertion)
- Jackson Pratt Drains (other surgical drains and devices)
- Medication Infusion Pumps (family or patient in control)
- Nasogastric Tubes
- Other tubes (nasoduodenal, nasojejunal, gastrostomy, jejunostomy, percutaneous endoscopic gastrostomy (PEG), Percutaneous endoscopic jejunostomy (PEJ))
- Tracheostomy Tube
- Ventricular Assist Devices

Approved Devices for Paramedic to Monitor
- Central Venous Catheters
- Chest Tubes (Management)
- External Pacemaker Devices
- Feeding tubes (clamped)
- Femoral Lines (not in use)
- Foley Catheters
- Heimlich Valve
- Internal Pace Maker Wires (not in use)
- Jackson Pratt Drains(other surgical drains and devices)
- Medication Infusion Pumps
- Nasogastric Tubes
- Other tubes (nasoduodenal, nasojejunal, gastrostomy, jejunostomy, percutaneous endoscopic gastrostomy (PEG), Percutaneous endoscopic jejunostomy (PEJ))
- Tracheostomy Tube
- Ventilators if trained
- Ventricular Assist Devices

EMT ECG Acquisition Policy

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Audience
- EMT-Basic

Purpose
Provide clinical guidelines for acquiring and transmitting 12-lead ECG for indicated conditions

Indications
- Possible STEMI
- Post-cardiac arrest
- Overdose

Contraindications
- None

Policy
The following clinical guidelines will be met by EMTs and agencies utilizing 12 lead ECGs in the prehospital setting.

1. EMTs may acquire prehospital 12 lead ECGs as listed in their SOs as per the ADHS Scope of Practice Skills (Table 5.1)
2. Before the Base Hospital Administrative Medical Director will authorize an EMT to perform this skill, all of the following must be satisfied:
   a. EMT has completed training specific to this skill, consistent with the knowledge, skills, and competencies of the EMTs scope of practice.
   b. EMT is reassessed every two years of this skill to ensure continued competency.
   c. EMT must NOT interpret the results of the ECG
   d. EMT must NOT monitor “3-Lead” ECG or make treatment decisions independently based on ECG results (i.e. to transport or not transport the patient, give ASA and/or assist with the patient’s nitroglycerine based on the results of the ECG).
   e. EMT should fax ECG to the hospital prior to their arrival, if no ALS unit is available for transport.

TMC EMS PROGRAM

Intraosseous (IO) Protocol

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Audience
- Paramedic

Purpose
Provide guidelines for obtaining IO access in patients with inability to obtain IV access.

Indications
- Emergent need for access for fluids or medications (e.g. shock, cardiac arrest)
- Unable to obtain intravenous access in two attempts or 90 seconds AND the patient exhibits one or more of the following:
  - Altered mental status (GCS ≤ 8)
  - Respiratory failure
  - Hemodynamic instability (SBP < 90)
  - Need for emergent drugs for cardiac issues
  - Need for emergent drugs for hypoglycemic issues

Contraindications
- Fracture of bone assessed for placement
- Prior orthopedic procedure in extremity (e.g. Knee replacement)
- Previous IO or attempt in same extremity within 24 hours.
- Splint or cast in place proximal/distal to site.
- Infection or burn at insertion site
- Preexisting condition involving that extremity (e.g. tumor, peripheral vascular disease)
- Inability to locate landmarks due to significant edema or adipose tissue

Procedure
1. Assemble needed equipment.
2. Locate and prepare the appropriate insertion site: Non-traumatized proximal tibia. Locate the landmarks 2-3 cm below the tibial tuberosity on the anteromedial flat bony surface of the proximal tibia.
   a. Consider Humerus Insertion (only if trained): 1 cm above the surgical neck/notch in the greater tubercle. To locate the head, run thumb up humeral shaft, will feel slight outward protrusion at surgical neck. The greater tubercle is above that and the site of insertion. Confirm the site by pronating and supinating the hand and feeling the greater tubercle rotate under your finger.
3. Place appropriate size needle on the drill and remove safety cap
4. Insert the IO needle at a 90-degree angle into the skin until you meet resistance (bone).
5. Drill into bone with gentle, constant pressure until you feel a “give”
6. Remove stylet from catheter and place in shuttle or approved sharps container
7. Attach tubing, with or without stopcock, and aspirate to confirm placement (blood/marrow)
8. Consider local anesthetic with **lidocaine 2% (preservative free) through IO access**
   a. Adult: 40 mg IO over 120 seconds
   b. Peds: 0.5 mg/kg (max 40 mg) IO over 120 seconds
9. Infuse fluids and/or medications. Watch carefully for extravasation and swelling.
   a. Infusion should be performed using pressure bag, manual injection, or infusion pump. Administration of medications should be followed with 5-10cc IVF flush.
   b. If infiltration occurs or needle removed: stop infusion, remove the needle, and apply a pressure bandage to the IO site. If another IO will be attempted, use a different bone.
10. Secure the needle in place.

Documentation:
1. Document each IO attempt (successful or unsuccessful) on patient care report.
2. Include details about procedures used for site preparation, placement, methods for securing the device and assessment of patency.
3. Document neurovascular exam in extremities before and after IO procedure.

Morgan Lens Protocol

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Audience
- Paramedic

Purpose
Provide guidelines for hands-free irrigation using sterile eye irrigation device. The Morgan Lens© is a sterile plastic device resembling a contact lens that fits over the eye similar to a contact lens. The device connects to irrigation tubing. The device allows for copious irrigation of the eye(s).

Indications
- Ocular irrigation after chemical exposure/thermal injury
- Facilitate removal of non-embedded foreign material from the eye

Contraindications
- ≤ 8 y.o.

Procedure
1. Instill topical ophthalmic anesthetic in to the affected eye(s).
2. Prepare Lactated Ringer Solution 1 L
3. Attach the Morgan Lens© to a delivery set equipped with a macro drip chamber and open the flow control to start flow.
4. Instruct the patient to look down and insert the upper portion of the lens under the upper eye lid.
5. Instruct the patient to look up and retract the lower lid allowing placement of the lower portion of the lens under the lower lid.
6. Continue irrigation of the affected eye(s) using caution to ensure run off does not enter the unaffected eye. ***Do not allow the irrigation solution to run dry.***
7. Tape the tubing to the patient's face to prevent inadvertent removal.
8. Consider additional pain management as indicated.
9. Repeat Step 2-8 until arrival at receiving facility as tolerated.
10. To remove the lens, continue the flow of irrigation solution while instructing the patient to look up. Retract the lower lid and slide the lens from the upper lid.
11. All patients should be transported for evaluation of corneal injury

Left Ventricular Assist Device (LVAD) Protocol (1/2)

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Audience
- EMT-Basic
- Paramedic

Purpose
To provide an overview of how LVAD works and how EMS provider assessment and treatment differs for a patient with an LVAD. The LVAD is a mechanical device that takes over some or all of the pumping function of the heart's left ventricle. This device is used for patients of any age or gender with advanced heart failure who would not otherwise survive without this device. Heart failure can result from chronic/long-term hypertension and heart disease, congenital heart defects, mechanical damage to the heart, infection, postpartum complications and many other reasons. Some patients will have an LVAD while awaiting heart transplant (called Bridge-to-Transplant). Other LVAD patients, who are not eligible for a heart transplant for some reason, will live with the device for the rest of their lives (called Destination Therapy, or Lifetime use)

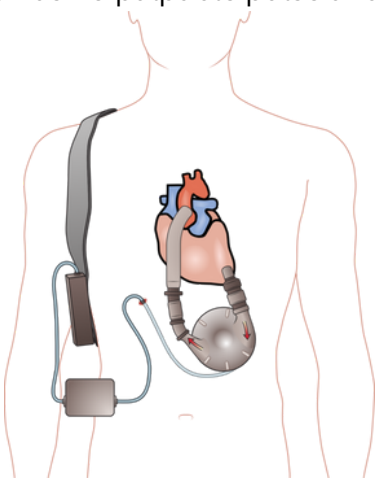
Indications
- Left ventricular assist device (LVAD) (Note: General procedure applicable to patients with right ventricular assist device (RVAD) or biventricular assist device (BiVAD))

Contraindications
- Total Artificial Heart (TAH)

Physiology
The normal pumping function of the heart is achieved by the contraction of the left ventricular muscle, which pushes a bolus of blood forward in the cardiovascular system with each contraction. This contraction is what we feel when checking a pulse, and what we hear when taking a blood pressure. If the heart is not contracting, blood is not moving forward in the system, and we don't feel or hear a pulse. The LVAD, in contrast, flows constantly and therefore creates no "pulse" to feel or hear. The LVAD is a tube that is about ½ -1 inch in diameter with a pump in the middle. One end of the tube (inflow) is surgically inserted into the left ventricle, and the other end (outflow) is sewn into the aorta, just above where it exits the heart.

The **pump** on the LVAD spins constantly. The right side of the heart still pushes blood through the lungs and back to the left atria, but then the LVAD pump pulls the blood out of the left ventricle and pumps it out to the body, taking over most or all of the failed pumping action of the left ventricle.

The **drive unit** for the pump, which includes the power source and programming controls, is outside of the body and connects to the LVAD by a cord that exits the body through the abdomen, usually in the right upper quadrant. NOTE The important part to us as EMS providers is that the pump is a constant flow pump. There is no rhythmic pumping as there is with the ventricle, and therefore there is little to no pulse. This means you can have a perfectly stable and healthy looking person who has no palpable pulse and whom you may or may not be able to take a blood pressure!



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Left Ventricular Assist Device (LVAD) Protocol (2/2)

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Procedure

1. **Recognize** you have an LVAD patient. LVAD has a control unit attached to the patient's waist, or in a shoulder bag. The control unit is attached to a power cord exiting from the patients' abdomen. The control unit will be attached to batteries mounted to the belt, in shoulder holsters, or in a shoulder bag. At home, it could be attached to a long cord that connects to a large power unit.
2. **Decide** if you have a patient with an LVAD problem, or a patient with a medical problem who just happens to have an LVAD.
3. **Look:** Alarms on the control unit will most likely indicate an LVAD problem. Be sure to expose the patient the allow visualization of LVAD lines to ensure they are not disrupted or inadvertently cut
4. **Listen:** Listen over the LVAD pump location to make sure you can hear it running. This will be just to the left of the epigastrium, immediately below the base of the heart. You should hear a low hum with a stethoscope if the pump is running. Don't assume the pump is running just because the control unit looks OK. The patient and their family are experts on this device. Listen to what they have to say about any problems with the LVAD.
5. **Feel:** Feel the control unit. A hot control unit could indicate the pump is working harder than it should and often indicates a pump problem such as a thrombosis (clot) in the pump.
6. **Assess:** Check for signs of hypoperfusion including pallor, diaphoresis, or AMS.
7. **Obtain Vitals:**
   - Pulse: generally, you will be unable to feel a pulse.
   - BP: you may or may not be able to obtain one, standard readings are unreliable and may vary from attempt to attempt. If NIBP machine can detect a blood pressure, adjust it to display Mean Arterial Pressure (MAP). This is a more reliable measure of perfusion and the calculation for MAP can overcome variations in standard readings. A MAP of 60-70 is normal. If family or caregiver is present, they may be a good resource in best way to obtain a BP reading on-scene.
   - Pulse-oximetry: readings seem to be fairly accurate and consistent, according to data, despite the manufacturer stating that pulse oximetry often doesn't work.
   - EtCO2: This should remain accurate, as it relies on respiration, not pulse. Normal (printed) waveform shape with a normal respiratory rate and low CO2 readings (<30) can indicate low perfusion = poor pump function.
   - Temperature: Infection and sepsis are common. Check temperature if able.
8. **Contact** the patient's VAD-trained companion or VAD center. In Tucson, the number to call is 520-694-6000. Ask for the Artificial Heart Clinician On-Call and stay on the line. This is a 24/7/365 service that can assist in directing care.
9. **Treat [Paramedic only]:**
   - Obtain IV/IO access
   - Obtain 12-lead ECG
   - If signs of inadequate perfusion, administer **NS/LR 30 mL/kg (max 1 L) IV/IO fluid bolus** over 15 min, may repeat up to 3 times (max total 3 L)
10. **If unresponsive with signs of inadequate perfusion,** assess for LVAD function. If not functioning with EtCO2 < 20 mmHg or MAP < 50 mmHg, initiate compressions - refer to **Cardiac Arrest SO**
11. **Transport:** If VAD-related complication or cardiovascular problems, transport destination preference is 1) their VAD program, 2) nearest VAD-trained facility (In Tucson, this will be BUMC-Tucson Campus) , 3) nearest appropriate facility
    - **For Interfacility Transports**, request from the transferring facility, specific guidelines in the event of cardiac arrest. With some VAD it is inadvisable to perform CPR. Treatment of arrhythmias either pharmacologically or with defibrillation is typically attempted before consideration of CPR.

TOOLS

Table 5.1. Arizona Scope of Practice Skills

KEY:

✓ = Arizona Scope of Practice skill

STR = Special Training Required skill

* = With training in R9-25-505

A.	**Airway/Ventilation/Oxygenation**	**EMR**	**EMT**	**AEMT**	**EMT-I (99)**	**Paramedic**	**Paramedic with Critical Care Endorsement**
1.	Airway - nasal	-	✓	✓	✓	✓	✓
2.	Airway - oral	✓	✓	✓	✓	✓	✓
3.	Airway - supraglottic		STR	✓	✓	✓	✓
4.	Airway obstruction - dislodgement by direct laryngoscopy	-	-	-	✓	✓	✓
5.	Airway obstruction - manual dislodgement techniques	✓	✓	✓	✓	✓	✓
6.	Automated transport ventilator	-	-	STR	✓	✓	✓
7.	Transport ventilator with advanced modes	-	-	-	-	-	✓
8.	Bag-valve-mask (BVM)	✓	✓	✓	✓	✓	✓
9.	BiPAP	-	-	-	-	✓	✓
10.	CPAP	-	STR	✓	✓	✓	✓
11.	Chest decompression - needle	-	-	-	✓	✓	✓
12.	Chest tube placement - assist only	-	-	-	-	✓	✓
13.	Chest tube monitoring and management	-	-	-	-	✓	✓
14.	Chest tube placement and management	-	-	-	-	-	✓
15.	Finger thoracostomy	-	-	-	-	-	✓
16.	Cricothyrotomy	-	-	-	-	✓	✓
17.	End tidal CO2 monitoring and interpretation of waveform capnography	-	STR	✓	✓	✓	✓
18.	Gastric decompression - NG tube	-	-	-	✓	✓	✓
19.	Gastric decompression - OG tube	-	-	-	✓	✓	✓
20.	Head-tilt chin lift	✓	✓	✓	✓	✓	✓
21.	Intubation - endotracheal	-	-	-	✓	✓	✓
22.	Intubation - nasotracheal	-	-	-	-	✓	✓
23.	Jaw-thrust	✓	✓	✓	✓	✓	✓
24.	Medication Assisted Intubation (paralytics)	-	-	-	-	STR	✓
25.	Mouth-to-barrier	✓	✓	✓	✓	✓	✓
26.	Mouth-to-mask	✓	✓	✓	✓	✓	✓
27.	Mouth-to-mouth	✓	✓	✓	✓	✓	✓
28.	Mouth-to-nose	✓	✓	✓	✓	✓	✓
29.	Mouth-to-stoma	✓	✓	✓	✓	✓	✓
30.	Oxygen therapy - high flow nasal cannula	-	-	-	-	✓	✓
31.	Oxygen therapy - humidifiers	-	✓	✓	✓	✓	✓
32.	Oxygen therapy - nasal cannula	✓	✓	✓	✓	✓	✓
33.	Oxygen therapy - non-rebreather mask	✓	✓	✓	✓	✓	✓
34.	Oxygen therapy - partial rebreather mask	-	✓	✓	✓	✓	✓
35.	Oxygen therapy - simple face mask	-	✓	✓	✓	✓	✓
36.	Oxygen therapy - Venturi mask	-	✓	✓	✓	✓	✓
37.	Pulse oximetry	-	✓	✓	✓	✓	✓
38.	Suctioning - upper airway	✓	✓	✓	✓	✓	✓
39.	Suctioning - tracheobronchial of an intubated patient	-	-	✓	✓	✓	✓
B.	**Cardiovascular/Circulation**	**EMR**	**EMT**	**AEMT**	**EMT-I (99)**	**Paramedic**	**Paramedic with Critical Care Endorsement**
1.	Cardiac monitoring - 12-lead ECG (interpretive)	-	-	-	✓	✓	✓
2.	Cardiac monitoring - 12-lead ECG acquisition and transmission	-	✓	✓	✓	✓	✓
3.	Cardiopulmonary resuscitation	✓	✓	✓	✓	✓	✓
4.	Cardioversion - electrical	-	-	-	✓	✓	✓
5.	Defibrillation - automated/semi-automated	✓	✓	✓	✓	✓	✓
6.	Defibrillation - manual	-	-	-	✓	✓	✓
7.	Hemorrhage control - direct pressure	✓	✓	✓	✓	✓	✓
8.	Hemorrhage control - tourniquet	✓	✓	✓	✓	✓	✓

9.	Hemorrhage control - wound packing	✓	✓	✓	✓	✓	✓
10.	Mechanical CPR device	✓	✓	✓	✓	✓	✓
11.	Telemetric monitoring devices and transmission of clinical data, including video data	-	✓	✓	✓	✓	✓
12.	Transcutaneous pacing	-	-	-	✓	✓	✓
13.	Transvenous cardiac pacing - monitoring and maintenance	-	-	-	✓	✓	✓
14.	Hemodynamic monitoring - invasive (central and arterial)	-	-	-	-	-	✓
15.	ICP (Increased Intracranial Pressure) monitoring	-	-	-	-	-	✓
16.	Circulatory augmentation device monitoring and management (Intra-arterial balloon pump, Impella, etc.)	-	-	-	-	-	✓
17.	Ventricular Assist Device (VAD) - monitoring and management	-	-	-	-	-	✓
C.	**Splinting/Spinal Motion Restriction/Patient Restraint**	**EMR**	**EMT**	**AEMT**	**EMT-I (99)**	**Paramedic**	**Paramedic with Critical Care Endorsement**
1.	Cervical collar	✓	✓	✓	✓	✓	✓
2.	Long spine board	-	✓	✓	✓	✓	✓
3.	Manual cervical stabilization	✓	✓	✓	✓	✓	✓
4.	Seated spinal motion restriction (KED, etc.)	-	✓	✓	✓	✓	✓
5.	Extremity stabilization - manual	✓	✓	✓	✓	✓	✓
6.	Extremity splinting	✓	✓	✓	✓	✓	✓
7.	Splint-traction	-	✓	✓	✓	✓	✓
8.	Mechanical patient restraint	-	✓	✓	✓	✓	✓
9.	Emergency moves for endangered patients	✓	✓	✓	✓	✓	✓
D.	**Medication Administration - routes/agent types**	**EMR**	**EMT**	**AEMT**	**EMT-I (99)**	**Paramedic**	**Paramedic with Critical Care Endorsement**
1.	Aerosolized/nebulized	-	✓	✓	✓	✓	✓
2.	Endotracheal tube	-	-	-	✓	✓	✓
3.	Inhaled	-	✓	✓	✓	✓	✓
4.	Intradermal	-	-	-	-	✓	✓
5.	Intramuscular		STR	✓	✓	✓	✓
6.	Intramuscular - autoinjector	✓	✓	✓	✓	✓	✓
7.	Intranasal	-	✓	✓	✓	✓	✓
8.	Intranasal - unit dose, premeasured	✓	✓	✓	✓	✓	✓
9.	Intraosseous - initiation, pediatric or adult	-	-	✓	✓	✓	✓
10.	Intravenous	-	-	✓	✓	✓	✓
11.	Mucosal/Sublingual	-	✓	✓	✓	✓	✓
12.	Nasogastric	-	-	-	-	✓	✓
13.	Oral	-	✓	✓	✓	✓	✓
14.	Rectal	-	-	-	-	✓	✓
15.	Subcutaneous	-	-	✓	✓	✓	✓
16.	Topical	-	-	-	-	✓	✓
17.	Transdermal	-	-	-	-	✓	✓
18.	Use/monitoring of infusion pump for agent administration during interfacility transports	-	-	-	STR	STR	✓
19.	Use/monitoring of agents specified in *Table 3-Special Agents Eligible for Administration and Monitoring*, established according to A.R.S. § 36-2204 and available through the Department at www.azdhs.gov/ems-regulatory-references	-	-	-	STR	STR	✓
20.	Epinephrine anaphylaxis-prepared kit; only for anaphylaxis when no auto-injector is available	-	STR	✓	✓	✓	✓
21.	Immunizations	-	-	-	✓*	✓*	✓*
22.	Thrombolytics	-	-	-	-	-	✓
E.	**IV Initiation/Maintenance Fluids**	**EMR**	**EMT**	**AEMT**	**EMT-I (99)**	**Paramedic**	**Paramedic with Critical Care Endorsement**
1.	Access indwelling catheters and implanted central IV ports	-	-	-	-	✓	✓
2.	Central line - monitoring	-	-	-	-	✓	✓
3.	Intraosseous - initiation, pediatric or adult	-	-	✓	✓	✓	✓

4.	Intravenous access	-	STR	✓	✓	✓	✓
5.	Intravenous initiation - peripheral	-	STR	✓	✓	✓	✓
6.	Intravenous- maintenance of medicated IV fluids	-	-	-	✓	✓	✓
7.	Intravenous- maintenance of nonmedicated IV fluids	-	STR	✓	✓	✓	✓
8.	Initiation and maintenance of blood product transfusion	-	-	-	-	-	✓
9.	Intravenous initiation - ultrasound guided IV in a hospital setting	-	-	-	-	STR	✓
F.	**Miscellaneous**	**EMR**	**EMT**	**AEMT**	**EMT-I (99)**	**Paramedic**	**Paramedic with Critical Care Endorsement**
1.	Assisted delivery (childbirth)	✓	✓	✓	✓	✓	✓
2.	Assisted complicated delivery (childbirth)	-	✓	✓	✓	✓	✓
3.	Blood chemistry analysis	-	-	-	-	✓	✓
4.	Blood glucose monitoring	-	✓	✓	✓	✓	✓
5.	Blood pressure - automated	-	✓	✓	✓	✓	✓
6.	Blood pressure - manual	✓	✓	✓	✓	✓	✓
7.	Eye irrigation	✓	✓	✓	✓	✓	✓
8.	Eye irrigation hands-free irrigation using sterile eye irrigation device	-	-	-	-	✓	✓
9.	Urinary catheterization	-	STR	STR	STR	STR	✓
10.	Venous blood sampling	-	STR	✓	✓	✓	✓
11.	Arterial blood sampling	-	-	-	-	-	✓
12.	Point of care and laboratory sampling and interpretation	-	-	-	-	-	✓
13.	External fetal monitoring	-	-	-	-	-	✓
14.	Neonatal Isolette monitoring	-	-	-	-	-	✓
15.	Ultrasound	-	-	-	-	-	✓

Historical Note

Table 5.1 made by exempt rulemaking at 19 A.A.R. 282, effective January 28, 2013 (Supp. 13-1). Amended by exempt rulemaking at 19 A.A.R. 4032, effective December 1, 2013 (Supp. 13-4). Amended by final exempt rulemaking, pursuant to Laws 2014, Ch. 233, § 5 at 20 A.A.R. 3554, effective January 1, 2015 (Supp. 14-4). Amended by final exempt rulemaking, pursuant to Laws 2015, Ch. 222, § 3, at 21 A.A.R. 3241, effective November 24, 2015 (Supp. 15-4). Amended by final exempt rulemaking at 23 A.A.R. 1161, effective April 19, 2017 (Supp. 17-2). Amended by exempt rulemaking at 24 A.A.R. 2955, effective September 27, 2018 (Supp. 18-3). Amended by exempt rulemaking at 27 A.A.R. 1385, with an immediate effective date of August 9, 2021 (Supp. 21-3). Amended by exempt rulemaking at 28 A.A.R. 3321 (October 14, 2022), with an immediate effective date of September 22, 2022 (Supp. 22-3). Subsection (B)(10) question marks corrected to check marks as published at 28 A.A.R. 3321 (Supp. 24-1). Amended by exempt rulemaking at 30 A.A.R. 3009 (October 11, 2024), with a delayed effective date of December 31, 2024 (Supp. 24-3).

Table 5.2. Repealed

Historical Note

Table 5.2 made by exempt rulemaking at 19 A.A.R. 4032, effective December 1, 2013 (Supp. 13-4). Amended by final exempt rulemaking, pursuant to Laws 2014, Ch. 233, § 5 at 20 A.A.R. 3554, effective January 1, 2015 (Supp. 14-4). Amended by final exempt rulemaking, pursuant to Laws 2015, Ch. 222, § 3, at 21 A.A.R. 3241, effective November 24, 2015 (Supp. 15-4). Amended by final exempt rulemaking at 23 A.A.R. 1161, effective April 19, 2017 (Supp. 17-2). Amended by final exempt rulemaking at 23 A.A.R. 1161, effective April 19, 2017 (Supp. 17-2). Repealed by exempt rulemaking at 24 A.A.R. 2955, effective September 27, 2018 (Supp. 18-3).

Table 5.3. Repealed

Historical Note

Table 5.3 made by exempt rulemaking at 19 A.A.R. 4032, effective December 1, 2013 (Supp. 13-4). Repealed by exempt rulemaking at 24 A.A.R. 2955, effective September 27, 2018 (Supp. 18-3).

Table 5.4. Repealed

Historical Note

Table 5.4 made by exempt rulemaking at 19 A.A.R. 4032, effective December 1, 2013 (Supp. 13-4). Repealed by exempt rulemaking at 24 A.A.R. 2955, effective September 27, 2018 (Supp. 18-3).

R9-25-503. Testing of Medical Treatments, Procedures, Medications, and Techniques that May Be Administered or Performed by an EMCT

A. Under A.R.S. § 36-2205, the Department may authorize the testing and evaluation of a medical treatment, procedure, technique, practice, medication, or piece of equipment for possible use by an EMCT or an emergency medical services provider.

B. Before authorizing any test and evaluation according to subsection (A), the Department director shall approve the test and evaluation according to subsections (C), (D), (E).

C. The Department director shall consider approval of a test and evaluation conducted according to subsection (A), only if a written request for testing and evaluation:

1. Is submitted to the Department director from:
   a. The Department,
   b. A state agency other than the Department,
   c. A political subdivision of this state,
   d. An EMCT,

Pediatric APGAR Score

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Directions: Neonate should be scored using the APGAR scoring system at 1-minute and 5-minutes after birth. These number should be recorded and provided to receiving facility and are used to identify need for resuscitative interventions.

SCORE	0 Points	1 Point	2 Points
Appearance (skin color)	Central cyanosis / Pale / Blue	Peripheral cyanosis	Pink
Pulse (heart rate)	0	<100	> 100
Grimace (reflex irritability)	No response when stimulated	Grimace or weak cry when stimulation	Cry when stimulated
Activity (tone)	Limp	Some flexion	Active motion
Respiration	Apneic	Slow, irregular	Good, Crying

Scoring Definition	
7-10 Points	Reassuring
4-6 Points	Moderately Abnormal
0-3 Points	Abnormal

TMC EMS PROGRAM

Pediatric Vital Signs

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Normal Heart Rate by Age (beats/minute) **Reference: PALS Guidelines, 2025**			
Age	**Awake Rate**	**Sleeping Rate**	
Neonate (<28 days)	100 - 205	90 - 160	
Infant (1 - 12 months)	100 - 180	90 - 160	
Toddler (1 - 2 years)	98 - 140	80 - 120	
Preschool (3 - 5 years)	80 - 120	65 - 100	
School-age child (6 - 11 years)	75 - 118	58 - 90	
Adolescent (12 - 15 years)	60 - 100	50 - 90	

Normal Respiratory Rate by Age (breaths/minute) **Reference: PALS Guidelines, 2025**			
Age	**Rate**		
Infant (1 - 12 months)	30 - 53		
Toddler (1 - 2 years)	22 - 37		
Preschool (3 - 5 years)	20 - 28		
School-age child (6 - 11 years)	18 - 25		
Adolescent (12 - 15 years)	12 - 20		

Normal Blood Pressures by Age
Reference: PALS Guidelines, 2025

Age	**Systolic Pressure (mmHg)**	**Diastolic Pressure (mmHg)**	**Mean Arterial Pressure (mmHg)**
Birth (12 hr, <1000 g)	39 - 59	16 - 36	28 - 42
Birth (12 hr, 3 kg)	60 - 76	31 - 45	48 - 57
Neonate (96 hr)	67 - 84	35 - 53	45 - 60
Infant (1 - 12 months)	72 - 104	37 - 56	50 - 62
Toddler (1 - 2 years)	86 - 106	42 - 63	49 - 62
Preschooler (3 - 5 years)	89 - 112	46 - 72	58 - 69
School-age child (6 - 9 years)	97 - 115	57 - 76	66 - 72
Pre-adolescent (10 - 12 years)	102 - 120	61 - 80	71 - 79
Adolescent (12 - 15 years)	110 - 131	64 - 83	73 - 84