When Every Second Counts: 
Emergency Preparation

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In an emergency, time to treatment is the most critical factor in determining the difference between life and death. Being prepared for an emergency is key for successful outcomes. Adequate preparation includes having appropriate equipment and drugs easily available and having trained staff to triage and assist during the emergency. The crash cart is a key component in emergency preparation and can include both drugs and equipment.

Emergency Area
There should be an area designated for assessment and treatment of the emergent patient (Figure 1). The area should be equipped with all resuscitation equipment and necessary drugs. Lighting should be similar to that required in an operating room. Electrical outlets should be easily accessible for all equipment. A large sink or grate for wetting hyperthermic animals or removing topical poisons should be nearby. The emergency area should ideally be kept open and available at all times. Daily review of equipment, medical supplies, and drugs ensures that this area remains prepared.

Staff Preparation
Staff should be aware of the location of the emergency area, crash cart, and medical supplies. Personnel must know how to set up and use all resuscitation equipment, possess the skills to perform resuscitative procedures, and be able to identify potentially life-threatening situations. All staff should be trained to be a functional member of the resuscitation team. In smaller hospitals with few emergencies, having predesignated duties during the resuscitation effort may be beneficial.

Cart versus Box
Depending on the size of your hospital and the frequency of emergencies, the crash cart can be a large cart or a box such as a large toolbox or smaller fishing tackle box (Figures 2 and 3). Larger hospitals may need more than one crash cart. Regardless of size, the crash cart should be mobile in case the patient cannot be moved to the designated emergency area. Advantages of using a crash cart include more space for emergency supplies and monitoring equipment (although the larger size can also be a detriment) and that it is already adapted for medical equipment, such as oxygen supply and suction devices. Boxes may be adequate for small hospitals in which other equipment is easily accessible or when the designated emergency area has shelves and drawers to hold other supplies and equipment.

Organization
All drawers should be labeled on the outside as to the contents (e.g., drugs, ETTs). Drawers should be compartmentalized to expedite identification of the desired object. This can be done in one of the following ways:

- Insert foam padding to line the drawer and make cutouts for the drug bottles and other equipment (Figure 4).
- Insert a drawer organizer to subdivide the drawer (Figure 5).
- Keep supplies in labeled plastic bags.

Regardless of the method, each compartment should be labeled.

Emergency drugs should be alphabetized to facilitate location (Figure 6). ETTs should be placed in ascending or descending order of size (Figure 7), with the laryngoscope placed in the same drawer. The order of components varies with the size of the drawer—a deeper

**PROCEDURE PEARL**
Keep the crash cart in the area where emergency patients are received. Staff should be aware of the location of the emergency area, crash cart, and medical supplies.
A drawer is required for the drug bottles, whereas the ETTs do not need as much space. Syringes and needles should ideally be kept with the drugs.

**Emergency Drugs**

Emergency drugs should be alphabetized for quicker identification. The cart or box should contain a resuscitation sheet that includes emergency drugs and their doses to facilitate calculations and tracking. The resuscitation sheet should also include voltage doses for external and internal defibrillation, if indicated. Injectable drugs recommended to be kept on the crash cart are listed below.

Drugs should be inspected on a regular basis as well as after each resuscitation effort to ensure readiness for the next emergency situation.

**Medical Supplies**

Medical supplies and equipment are an integral part of being prepared for resuscitation. The amount of supplies located on the crash cart depends on space and accessibility of other supplies and equipment.

**Ventilation Supplies**

- Ambu-bag (ideally more than one size (Figure 8) OR
  Anesthetic machine with Y connector for positive-pressure ventilation
  - Oxygen source with humidifier
  - Facemask
  - Laryngoscope with multiple blade sizes
  - ETTS (multiple sizes)
  - ETT stylet
  - Tape or rolled gauze to secure ETT
  - Suction apparatus and suction tip catheters to remove secretions from the airways (Figure 9)
  - Emergency tracheotomy equipment (minor surgical pack, umbilical tape, temporary tracheostomy tubes)

The tracheostomy tube should be approximately two thirds the tracheal diameter. An ETT can be modified into a tracheostomy tube by making two longitudinal cuts equidistant from the oral end of the ETT to form two butterfly flanges (Figures 10). Make holes at the end of each flange for umbilical tape. Avoid cutting the “air” channel to the cuff.

**Fluids**

If fluids are not easily accessible in the designated emergency area, at least 1 liter of each fluid type should be included:

- Balanced electrolyte solution (Normosol R, lactated Ringer’s solution), 0.9% saline, or 5% dextrose in water
- Hypertonic saline (7%)
- Synthetic colloid (hetastarch, pentastarch)
- Infusion supplies: drip sets (macro and micro), pressure infusion bags (Figure 11), blood transfusion set and filters

**Drugs to Be Kept on the Crash Cart**

<table>
<thead>
<tr>
<th>MANDATORY</th>
<th>Strongly Recommended</th>
<th>Optional</th>
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<tbody>
<tr>
<td>Atropine</td>
<td>Calcium gluconate</td>
<td>Acepromazine</td>
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<tr>
<td>Epinephrine</td>
<td>Dexamethasone sodium</td>
<td>Amiodarone</td>
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<tr>
<td>Lidocaine</td>
<td>phosphate or methylprednisolone sodium succinate</td>
<td>Diltiazem</td>
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<tr>
<td>Sodium bicarbonate</td>
<td>50% dextrose</td>
<td>Heparin</td>
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<td></td>
<td>Diazepam</td>
<td>Insulin</td>
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<td></td>
<td>Dobutamine</td>
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<td></td>
<td>Dopamine</td>
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<td></td>
<td>Doxapram</td>
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<td></td>
<td>Esmolol</td>
<td>Propranolol</td>
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<td></td>
<td>Furosemide</td>
<td>Sodium nitroprusside</td>
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<td></td>
<td>Magnesium sulfate</td>
<td>Vasopressin</td>
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<td></td>
<td>Mannitol</td>
<td>Verapamil</td>
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Surgical Supplies
- Minor surgical pack: scalpel handle, curved hemostats, Metzenbaum scissors, tissue forceps, and suture scissors for vessel cut-down, chest tube placement, and emergency tracheotomy
- Major surgical pack: all components of minor but also curved Mayo scissors and Balfour retractor for open chest CPR
- Miscellaneous surgical supplies: sterile gloves, gauze, laparotomy pads, and no. 10 and no. 15 scalpel blades
- Basic bandaging material, including sterile and nonsterile nonadhesive material
- Ideally a Statinsky (atraumatic hemostat) for cross-clamping major vessels during life-threatening hemorrhage and resuscitation; an alternative is a tourniquet, which can be made by feeding umbilical tape through a red rubber catheter, around the vessel, and back through the red rubber catheter.

Catheters, Tubing, & Syringes
- Intravenous catheters (multiple sizes of 14- to 22-gauge)
- Over-the-needle or through-the-needle catheters for pericardiocentesis (14- to 16-gauge, 4-inch to 6-inch)
- Syringes (multiple sizes) with and without attached needles; multiple needle sizes
- Three-way stop cocks; extension sets
- 3.5- to 12-French polypropylene catheters for instilling emergency drugs via the ETT, urethral catheterization, nasal oxygenation, creating vascular loops, and chest tube placement
- Ideally premanufactured chest tubes and Foley catheters for urethral catheterization

Miscellaneous Equipment & Supplies
- Bilge pump
- Funnels
- Mouth gags
- Ophthalmoscope (direct and indirect)
- Orogastric tubes
- Otooscope
- Penlight

Monitoring Equipment
Monitoring equipment is important in guiding resuscitation efforts. This equipment can be on the crash cart or in the designated emergency area and includes the following:
- Capnograph
- Defibrillator
- Digital thermometer or rectal probe
- Electrocardiogram
- Indirect blood pressure measurement via Doppler or oscillometry
- Pulse oximeter

The electrocardiogram allows the clinician to identify arrhythmias that would benefit from defibrillation. The electrocardiogram is considered mandatory equipment in resuscitation, and it should be combined with an electrical defibrillator.

Conclusion
When a patient requires emergency resuscitation, every second counts. Having staff trained in triage, basic resuscitation techniques, and use of medical equipment is integral to success. Designating a well-equipped resuscitation area, having preassigned roles, and practicing responses to various life-threatening situations saves both time and lives.

See Aids & Resources, back page, for references, contacts, and appendices.