

Peer Reviewed

# Top 5 Emergency Room Mistakes

You have asked...

What are the most common errors made in the emergency room, and how can I avoid them?

The expert says...

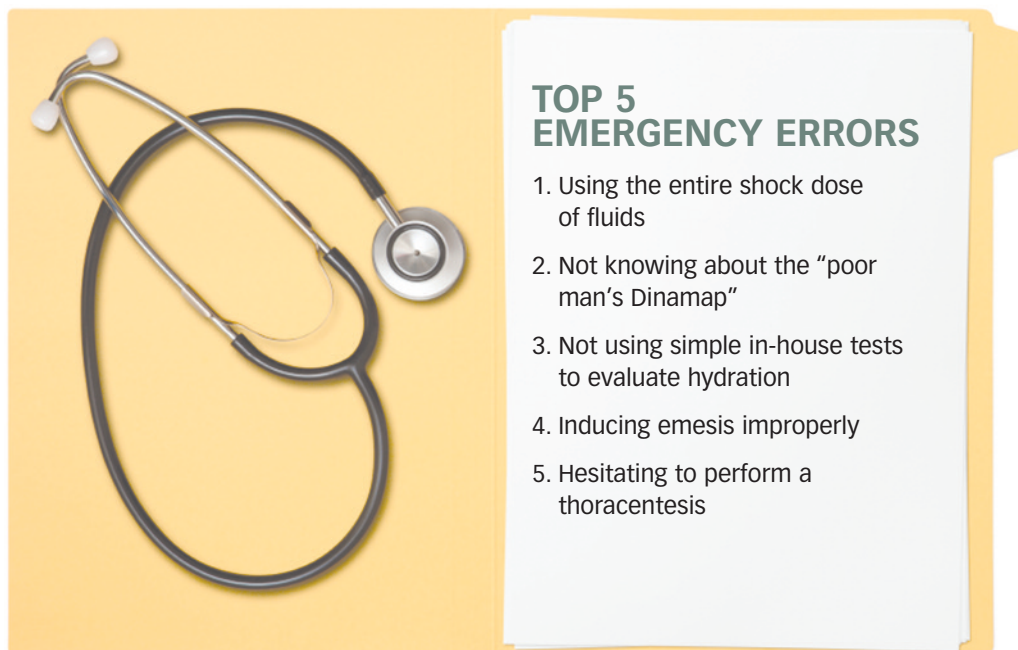
Emergencies are common daily occurrences seen in general, specialty, and emergency practice. Following are simple tips on how to avoid common clinical errors with emergent patients.

Using the entire shock dose of IV fluids in emergencies is no longer considered a standard of care.

## 1 USING THE ENTIRE SHOCK DOSE OF FLUIDS

Shock is defined as *cellular hypoxia*, regardless of shock type (ie, cardiogenic, hypovolemic, distributive, metabolic, hypoxemic). When practitioners are presented with a “shocky” patient (tachycardiac, hypotensive, poor perfusion), they need to rule out cardiogenic shock (eg, myocardial failure secondary to dilated cardiomyopathy), as the other types of shock generally require IV fluid therapy as part of the primary intervention to volume resuscitate the patient.

CONTINUES



Using the entire shock dose of IV fluids in emergency medicine is no longer considered a standard of care. Traditional shock dose is extrapolated from the total blood volume of the patient (dogs, 60–90 mL/kg; cats, 60 mL/kg). A patient rarely requires replacement of its entire blood volume with crystalloid fluids. Instead of immediately using a whole shock dose, using smaller, repeated aliquots of IV crystalloids (over 20–30 minutes) is recommended.

Hint: Simply adding 0 to the dog’s weight in pounds results in a conservative shock bolus, equating to a 22 mL/kg bolus (eg, 70 lb + 0 = 700 mL).

The use of one-quarter to one-third of a shock bolus of a balanced, maintenance crystalloid over 20 minutes can be implemented in shocky patients, followed by frequent reassessment of perfusion parameters: Has heart rate or mentation improved? Has capillary refill time or pulse quality improved?

If minimal to no clinical response is seen, repeated aliquots are indicated until appropriate volume resuscitation has occurred.

The “poor man’s Dinamap” acts as a simple tool that assesses response to volume resuscitation during shock.

**2 NOT KNOWING ABOUT THE “POOR MAN’S DINAMAP”**  
In the patient presenting with shock, pulse quality should be assessed by palpating the femoral pulse. Pulse palpation, quality, and duration are a gross estimate of blood pressure and stroke volume (indirectly).

If an animal appears healthy, pulses should be strong and synchronous with a palpable pulse for each heartbeat; therefore, one should auscultate the cardiopulmonary system while the femoral pulse quality is being palpated.

A palpable femoral pulse is consistent with systolic blood pressure of  $\geq 60$  mm Hg. A palpable dorsal metatarsal pulse is consistent with a systolic blood pressure of  $\geq 90$  mm Hg and can be used as a basic “poor man’s Dinamap.” This acts as a simple, easily repeatable tool to assess response to volume resuscitation during shock, particularly when blood pressure monitoring is not readily available.

Evaluating PCV, TS, and USG daily helps ensure appropriate hydration.

**3 NOT USING SIMPLE IN-HOUSE TESTS TO EVALUATE HYDRATION**  
When a patient is on IV fluids, blood work should be performed daily to assess hydration. Minimum database should include PCV, total solids (TS), blood glucose (BG), BUN, and sodium and potassium levels. Urine specific gravity (USG) measurement is an additional simple assessment of hydration in a normal, healthy patient (ie, excluding patients with underlying disease that may affect USG [renal disease, hyperthyroidism, diabetes mellitus]). Evaluating PCV, TS, and USG daily helps ensure appropriate hydration.

For example, if a clinically healthy patient on IV fluids still has normal PCV, TS, and USG (eg, PCV = 48%, TS = 7.4 g/dL, USG = 1.025) after 12 to 24 hours of IV fluids, the patient is still inappropriately hydrated (at sea level); more aggressive fluid therapy may be indicated to main-

BG = blood glucose, TS = total solids, USG = urine specific gravity

tain hemodilution. Ideally, the goal is to achieve a hemodiluted, hydrated state (eg, 35% PCV, 5 g/dL TS, <1.018 USG).

Electrolytes should be monitored daily in patients on IV fluids. Sodium should be evaluated to ensure that rapid shifts do not occur; changes of >0.5 mEq/kg/hr in sodium levels can result in cerebral edema or fluid shifts into the brain, particularly in chronically dehydrated patients. Potassium should be evaluated daily while patients are on IV fluids, as balanced, maintenance crystalloids are typically potassium poor and additional potassium supplementation is often necessary.

## 4 INDUCING EMESIS IMPROPERLY

Patients are often presented for accidental home poisoning. Two key mistakes commonly seen by Pet Poison Helpline (petpoisonhelpline.com) are 1) inducing emesis with the wrong emetic, and 2) being unfamiliar with emesis contraindications (see **Contraindications to Emesis Induction**).

Two key mistakes are using the wrong emetic and not knowing emesis contraindications.

Emesis should only be induced in asymptomatic patients with recent ingestion ( $\leq 1$  hour) of the toxicant. In clinic, apomorphine or hydrogen peroxide can be safely used; other emetic agents such as salt, syrup of ipecac, and mustard are no longer considered the standard of care. At home, the only emetic agent recommended for dogs is hydrogen peroxide.

For cats, there is no reliable or safe at-home emetic agent. In cats, routine use of apomorphine, salt, and hydrogen peroxide are not warranted, as they are ineffective and may result in adverse effects (eg, hypernatremia, hemorrhagic gastritis).  $\alpha_2$ -Adrenergic agonists can be used in the veterinary setting if the time frame is appropriate (eg, recent ingestion, asymptomatic patient).

CONTINUES



### CONTRAINDICATIONS TO EMESIS INDUCTION

- Symptomatic poisoned patient
- $\geq 1$  hour since ingestion
- Brachycephalic breed
- Decreased gag reflex or level of consciousness
- Ingestion of the following toxicants:
  - ▶ Salt (eg, table salt, paint balls, homemade play dough)
  - ▶ Corrosive or caustic agents
  - ▶ Hydrocarbons (eg, gasoline, kerosene, motor oil)
- Underlying medical problems predisposing the patient to aspiration:
  - ▶ Megaesophagus
  - ▶ Laryngeal paralysis
  - ▶ History of aspiration pneumonia

Thoracentesis is often life-saving and should be performed in a dyspneic patient suspected of having pleural space disease.

**5 HESITATING TO PERFORM THORACENTESIS**  
 Many clinicians are hesitant to perform thoracentesis because of its invasiveness. However, diagnostic and therapeutic thoracentesis is often life-saving and should be performed immediately in any dyspneic patient suspected of having pleural space disease (eg, pneumothorax, pleural effusion).

When performing thoracentesis, aseptic technique should be used. The patient should be shaved, scrubbed, and prepared for sterile technique. A 3-way stopcock, extension tubing, appropriately sized needle or catheter, and syringe should be used to collect air or fluid. Typically for cats, a 1-inch, 22-gauge needle or butterfly catheter can be used. For dogs, a 1.5-inch, 18- to 22-gauge needle can be used, depending on the dog's size. Appropriate sterile collection tubes should be available for sample collection for cytology and/or culture.

Thoracentesis should be performed with the patient in sternal or lateral recumbency at the 7th to 9th intercostal space (ICS) to avoid the heart (3rd–5th ICS) or liver (caudal to the 9th ICS) and should occur cranial to the rib (or within the ICS). If pleural effusion is present, the needle should be directed into the ventral third of the chest cavity; if pneumothorax is suspected, the dorsal third of the chest cavity should be used.

In an emergency, a simple way of identifying where to perform thoracentesis is to draw an imaginary line straight up the lateral body wall at the caudal aspect of the xiphoid. This is approximately the 8th ICS and is the general area where thoracentesis should be performed.

**CLOSING REMARKS**

While emergencies may be stressful, clinicians can improve the outcome in emergent patients by implementing newer modalities of emergency and critical care.

See *Aids & Resources*, back page, for references & suggested reading.

ICS = intercostal space

COMING SOON

to *Clinician's Brief*...

Special Emergency Medicine Focus Issue

- Emesis and activated charcoal
- Algorithm on acute abdominal pain
- Plus more!

**TRIFEXIS™**

(spinosad + milbemycin oxime)

**Chewable Tablets**

Before using TRIFEXIS chewable tablets, please consult the product insert, a summary of which follows:

**Caution:** Federal (USA) law restricts this drug to use by or on the order of a licensed veterinarian.

**Indications:**

TRIFEXIS is indicated for the prevention of heartworm disease (*Dirofilaria immitis*). TRIFEXIS kills fleas and is indicated for the prevention and treatment of flea infestations (*Ctenocephalides felis*), and the treatment and control of adult hookworm (*Ancylostoma caninum*), adult roundworm (*Toxocara canis* and *Toxascaris leonina*) and adult whipworm (*Trichuris vulpis*) infections in dogs and puppies 8 weeks of age or older and 5 pounds of body weight or greater.

**Contraindications:**

There are no known contraindications to the use of TRIFEXIS Chewable Tablets.

**Warnings:**

Not for human use. Keep this and all drugs out of the reach of children.

Serious adverse reactions have been reported following concomitant extra-label use of ivermectin with spinosad alone, one of the components of TRIFEXIS Chewable Tablets (see **ADVERSE REACTIONS**).

**Precautions:**

Treatment with fewer than 3 monthly doses after the last exposure to mosquitoes may not provide complete heartworm prevention (see **EFFECTIVENESS**).

Prior to administration of TRIFEXIS, dogs should be tested for existing heartworm infection. At the discretion of the veterinarian, infected dogs should be treated with an adulticide to remove adult heartworms. TRIFEXIS is not effective against adult *D. immitis*.

While the number of circulating microfilariae may decrease following treatment, TRIFEXIS is not indicated for microfilariae clearance. Mild, transient hypersensitivity reactions manifested as labored respiration, vomiting, salivation and lethargy, have been noted in some dogs treated with milbemycin oxime carrying a high number of circulating microfilariae. These reactions are presumably caused by release of protein from dead or dying microfilariae.

Use with caution in breeding females. The safe use of TRIFEXIS in breeding males has not been evaluated. Use with caution in dogs with pre-existing epilepsy. Puppies less than 14 weeks of age may experience a higher rate of vomiting.

**Adverse Reactions:**

In a well-controlled US field study, which included a total of 352 dogs (176 treated with TRIFEXIS chewable tablets and 176 treated with an active control), no serious adverse reactions were attributed to administration of TRIFEXIS chewable tablets. All reactions were regarded as mild.

Reactions that occurred at an incidence >2% (average monthly rate) within any of the 6 months of observation are presented in the following table:

Average Monthly Rate (%) of Dogs With Adverse Reactions

Adverse Reaction	TRIFEXIS Chewable Tablets*	Active Control Tablets*
Vomiting	6.13	3.08
Pruritus	4.00	4.91
Lethargy	2.63	1.54
Diarrhea	2.25	1.54

\*n=176 dogs

In the US field study, one dog administered TRIFEXIS experienced a single mild seizure 2½ hours after receiving the second monthly dose. The dog remained enrolled and received four additional monthly doses after the event and completed the study without further incident.

Following concomitant extra-label use of ivermectin with spinosad alone, a component of TRIFEXIS, some dogs have experienced the following clinical signs: trembling/twitching, salivation/drooling, seizures, ataxia, mydriasis, blindness and disorientation. Spinosad alone has been shown to be safe when administered concurrently with heartworm preventatives at label directions.

In US and European field studies, no dogs experienced seizures when dosed with spinosad alone at the therapeutic dose range of 13.5-27.3 mg/lb (30-60 mg/kg), including 4 dogs with pre-existing epilepsy. Four epileptic dogs that received higher than the maximum recommended dose of 27.3 mg/lb (60 mg/kg) experienced at least one seizure within the week following the second dose of spinosad, but no seizures following the first and third doses. The cause of the seizures observed in the field studies could not be determined.

For technical assistance or to report an adverse drug reaction, call 1-888-545-5973. Additional information can be found at www.TRIFEXIS.com.

**Effectiveness:**

**Heartworm Prevention:**

In a well-controlled laboratory study, TRIFEXIS was 100% effective against induced heartworm infections when administered for 3 consecutive monthly doses. Two consecutive monthly doses did not provide 100% effectiveness against heartworm infection. In another well-controlled laboratory study, a single dose of TRIFEXIS was 100% effective against induced heartworm infections. In a well-controlled six-month US field study conducted with TRIFEXIS, no dogs were positive for heartworm infection as determined by heartworm antigen testing performed at the end of the study and again three months later.

**Flea Treatment and Prevention:**

In a well-controlled laboratory study, TRIFEXIS demonstrated 100% effectiveness on the first day following treatment and 100% effectiveness on Day 30. In a well-controlled laboratory study, spinosad, a component of TRIFEXIS, began to kill fleas 30 minutes after administration and demonstrated 100% effectiveness within 4 hours. In field studies conducted in households with existing flea infestations of varying severity, flea reductions of 98.0% to 99.8% were observed over the course of 3 monthly treatments with spinosad alone. Dogs with signs of flea allergy dermatitis showed improvement in erythema, papules, scaling, alopecia, dermatitis/pyodermitis and pruritus as a direct result of eliminating the fleas.

**Treatment and Control of Intestinal Nematode Infections:**

In well-controlled laboratory studies, TRIFEXIS was 90% effective in removing naturally and experimentally induced adult roundworm, whipworm and hookworm infections.

NADA #141-321, Approved by the FDA

Manufactured for Elanco Animal Health

A Division of Eli Lilly & Co.

Lilly Corporate Center, Indianapolis, IN 46285

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