



**SCHOOL OF THOUGHT**  
Critical thinking skills are vital to delivering safe, effective patient care.



**MEET THE AUTHOR**

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## Critical Thinking in Trauma Care

**T**rauma is a common event in veterinary hospitals and can result from a number of sources. Not every trauma patient is the same and the veterinary nursing team must be ready to anticipate patient changes and treatment orders. At presentation and throughout hospitalization, quick reactions are required of the veterinary nursing team to respond properly to the patient. Rapid decision making can save lives. This quick and accurate response requires critical thinking skills.

Megan graduated in 2000 with a BS degree in Veterinary Technology. She has enjoyed working in emergency and critical care since 2000 and is currently the Small Animal Veterinary Nursing Manager at the Purdue University Veterinary Teaching Hospital in West Lafayette, Indiana, where she oversees the technician supervisors as well as teaches and trains technicians and students on the hospital floor. She loves the opportunity to travel and lecture, sharing her knowledge with veterinary nurses and technicians around the world.

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## WHAT IS CRITICAL THINKING?

In human health care, critical thinking in nursing has been defined this way: “Critical thinkers in nursing exhibit these habits of the mind: confidence, contextual perspective, creativity, flexibility, inquisitiveness, intellectual integrity, intuition, open-mindedness, perseverance, and reflection. Critical thinkers in nursing practice the cognitive skills of analyzing, applying standards, discriminating, information seeking, logical reasoning, predicting, and transforming knowledge.”<sup>1</sup>

That’s a lot for a veterinary nurse to apply in a trauma care situation, but a veterinary nurse with critical thinking skills can adapt to new situations and determine solutions even when faced with unfamiliar information. In school, the emphasis is on memorizing facts and reciting them back on a test. With real patients, the answer is never that simple. In the veterinary hospital, multidimensional critical thinking is a vital skill that veterinary nurses should be practicing and perfecting every day. Developing these skills involves having a solid base in academic knowledge, asking intelligent questions of those more experienced, and benefiting from the lessons learned during past trauma care events.

## FIRST STEPS

When a critical trauma patient presents to the hospital, the veterinary nursing team must quickly assess the patient and determine first steps. Acute traumatic coagulopathy (ATC) in severe trauma patients can be the result of loss of clotting factors due to bleeding, dysfunction of clotting factors, or hemodilution of clotting factors resulting from fluid resuscitation. The “trauma triad of death”—coagulopathy, hypothermia, and acidosis resulting from hemorrhage—can cause mortality in trauma patients.<sup>2</sup> This triad of conditions can occur in polytrauma patients and contributes to a more severe disease process. The key to the patient’s survival is quick recognition of these factors and mitigating the effects on the patient. Acidosis can result from hypoperfusion and elevated lactate, respiratory malfunction leading to respiratory acidosis, and decreased cardiac output. We know that hypothermia decreases platelet function and white blood cell function, decreases cardiac output, decreases oxygen delivery to tissues, and causes a decreased response to catecholamines. Trauma patients must be kept warm, and veterinary nurses should consider covering and warming normothermic trauma patients as they present



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to the hospital, knowing that treatment with fluids and pain management can reduce body temperature.

Systemic inflammation, metabolic acidosis, hypothermia, and hemodilution from fluid resuscitation are all factors that will hinder therapeutic efforts to treat trauma patients. While veterinary team members cannot determine whether a patient presents with acidosis or systemic inflammation, these are important factors to remember and mitigate as much as possible in the treatment phase.<sup>2</sup>

With any trauma patient that presents to the hospital with uncontrolled bleeding, the first step in treatment must be to control hemostasis. Compress what can be compressed on the distal limbs and tail using bandages and tourniquets if necessary. If the source of bleeding is internal, as is common in vehicular trauma, intervene with therapy specific to controlling the bleeding. Abdominal wraps can be helpful to not only control hemoabdomen, but also to improve venous return and blood pressure. If the patient is not responding to treatment attempts to control bleeding, surgery must be considered before bleeding truly cannot be controlled.<sup>3</sup>

## NEXT STEPS

The next step in treating bleeding trauma patients is fluid resuscitation, but choosing the appropriate fluid therapy requires assessing the clinical signs and needs of the patient balanced with the knowledge of different fluid types. Being prepared for complications will allow the patient the best prognosis. With trauma, large volume resuscitation during uncontrolled bleeding can worsen symptoms. Crystalloid fluids and even blood components like packed red blood cells (PRBC) will work against the body’s ability to perform normal coagulation. It is important to understand the controversy currently surrounding the use of synthetic colloids in veterinary medicine related to kidney



function; they are known to interfere with platelet function and coagulation. Our idea of large volume resuscitation comes from studies done on animals that suffered from controlled single source bleeding, and large volumes of fluids successfully treated these animals.<sup>3</sup> We know that large volumes of crystalloid fluids can lead to increased gut permeability, an increased inflammatory response, and increased incidence of coagulopathy. Fluids should be administered with thought and not always to a full 90 mL/kg shock dose. Large volumes of crystalloid fluids administered over a short period of time will result in increased cardiac output, but remember that a vast percentage of fluids will shift from the intravascular space into the interstitial space after about 30 minutes, necessitating the need for more volume, leading to further hemodilution and possibly hemorrhage.<sup>3</sup>

Human studies, especially battlefield trauma studies, have led to guidelines for damage control resuscitation.<sup>4</sup> Less fluid resuscitation can lead to reduced hemorrhage, less acidemia, and less cellular injury. In cases of uncontrolled hemorrhage as the result of trauma, regardless of a diagnosis or suspicion of ATC, damage control resuscitation (also known as hypotensive resuscitation) should be utilized and the entire medical team be aware of the treatment goals. Hypotensive resuscitation requires that patients only receive fluids to minimally acceptable blood pressure parameters. Fluids are administered to a blood pressure target of 80-90 mm Hg systolic, and/or a mean arterial pressure (MAP) of 60 mm Hg. In controlled studies of dogs, a MAP of under 50 mm Hg and a systolic reading under 80 mm Hg for less than 60 to 90 minutes may not cause permanent damage, which tells us that careful fluid administration can be achieved. During resuscitation, pulse quality can be palpated and pulse quality compared over time as fluids are administered. It is worth noting that pulse pressure does not equal blood pressure, and standard of care dictates that if at all possible, blood pressure monitoring is performed. Veterinary nurses must be aware of the reasons for hypotensive resuscitation and monitor patients closely for blood pressure changes. With close monitoring, patients can have fluids titrated to exact effect.<sup>3</sup>

Blood products can and should be utilized in damage control resuscitation. Warm, fresh, whole blood is the best choice for ideal results, but it is not readily available in most veterinary settings. Packed red blood cells and fresh frozen plasma (FFP) can be used, and

best results are gained if the FFP:PRBC ratio is 1:2 or 1:3. If the patient is bleeding into the chest or abdomen, autotransfusion is a viable option for resuscitation. While this option does run the risk of infusing bacteria or urine in the case of bowel or bladder rupture with hemoabdomen, the patient is not at risk for suffering a hypersensitivity reaction to the transfusion. All blood removed for the purpose of autotransfusion must be run back to the patient utilizing an appropriate blood filter.<sup>3</sup>

## MONITORING THE PATIENT

In the clinical setting, veterinary nurses are expected to closely monitor patients and alert the veterinarian to any change, and should also be aware of complex disease processes and know the signs of change. Understanding the dangerous development of coagulopathies post-trauma can direct veterinary nurses to monitor closely for signs of bleeding. Understanding systemic inflammatory response syndrome (SIRS) can help a veterinary nurse look for signs of early respiratory compromise of a coagulopathy. Critical thinking involves planning ahead for procedures and keeping one step ahead of changing disease processes in critical trauma patients.

## CONCLUSION

Veterinary nursing requires more than simply checking off boxes on treatment sheets; it involves thinking through the reasons for and the expectations from each treatment performed. Veterinary nurses must learn to think critically with every patient interaction. They must identify patient needs, prioritize competing tasks, and avoid errors in order to save patients' lives. **TVN**

## References

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## Suggested Reading

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