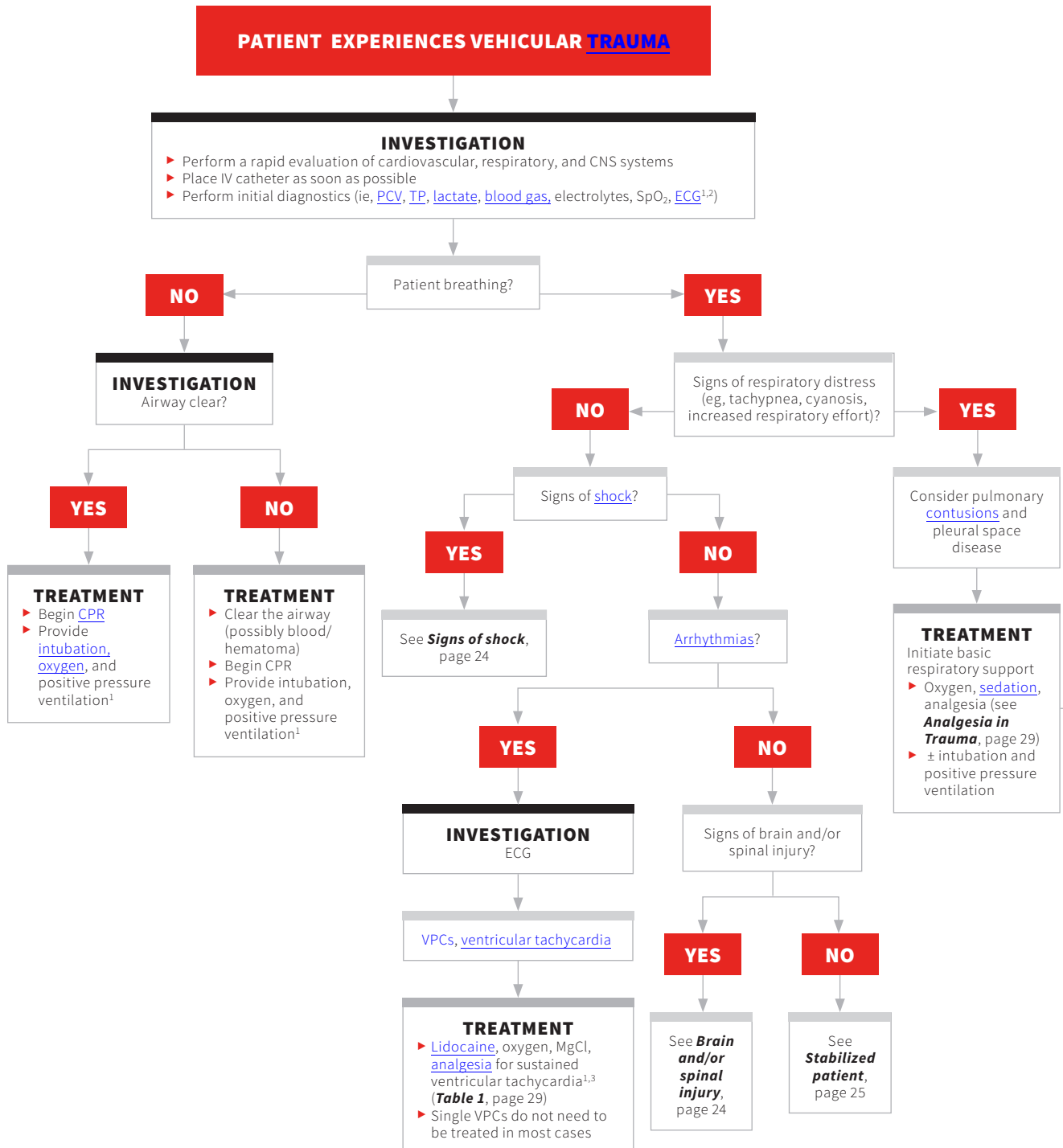
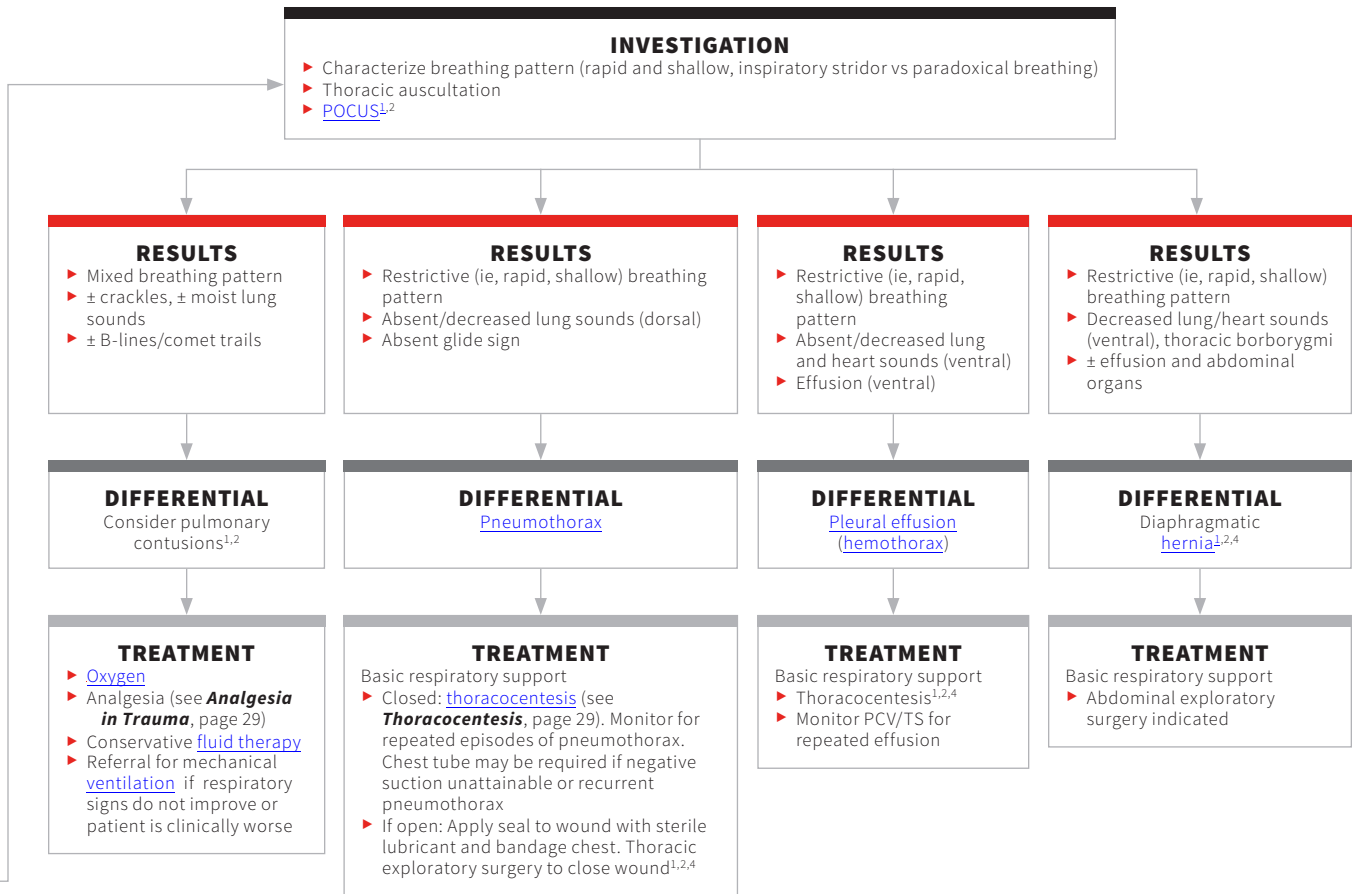


VEHICULAR TRAUMA

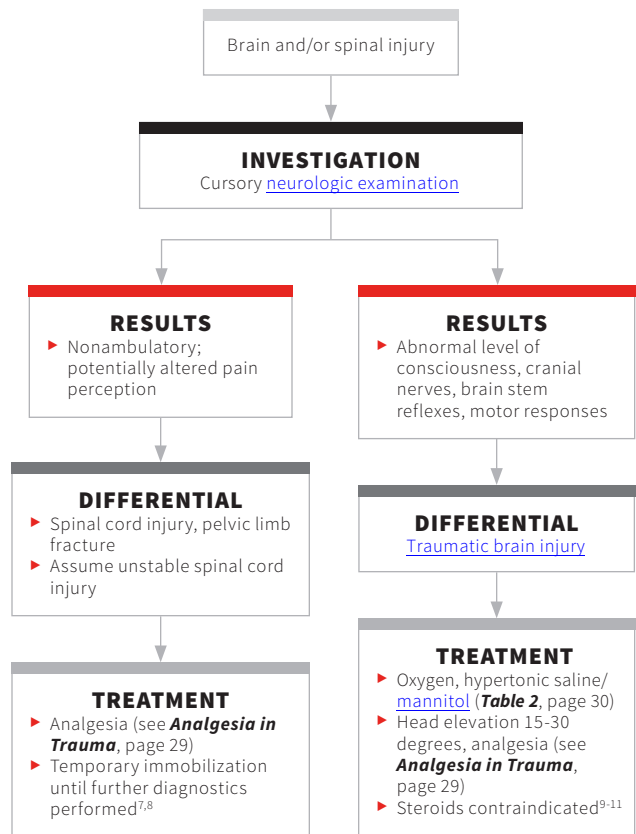
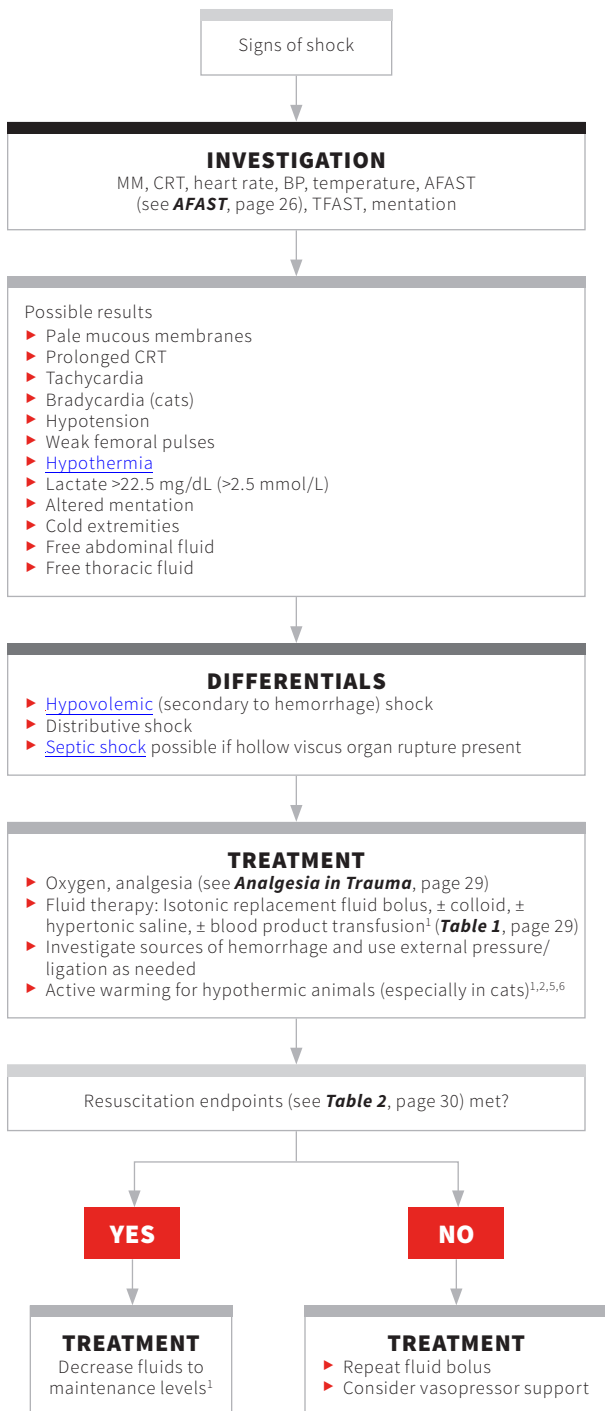
Cassandra Gilday, DVM
 Adesola Odunayo, DVM, MS, DACVECC
 University of Tennessee





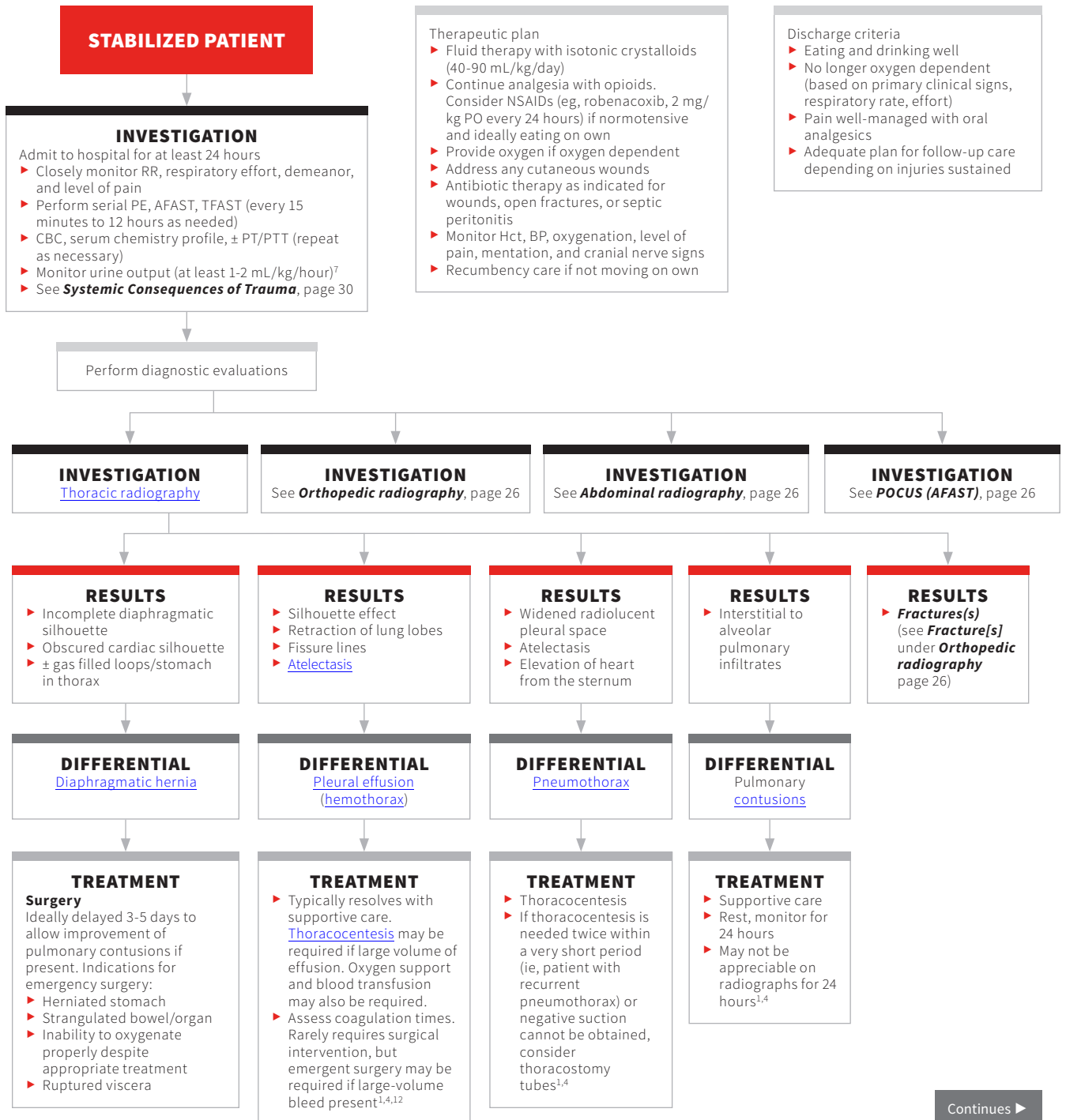
CPR = cardiopulmonary resuscitation
MgCl = magnesium chloride
PCV = packed cell volume
POCUS = point-of-care ultrasound
SpO₂ = oxygen saturation
TS = total solids
VPC = ventricular premature contraction

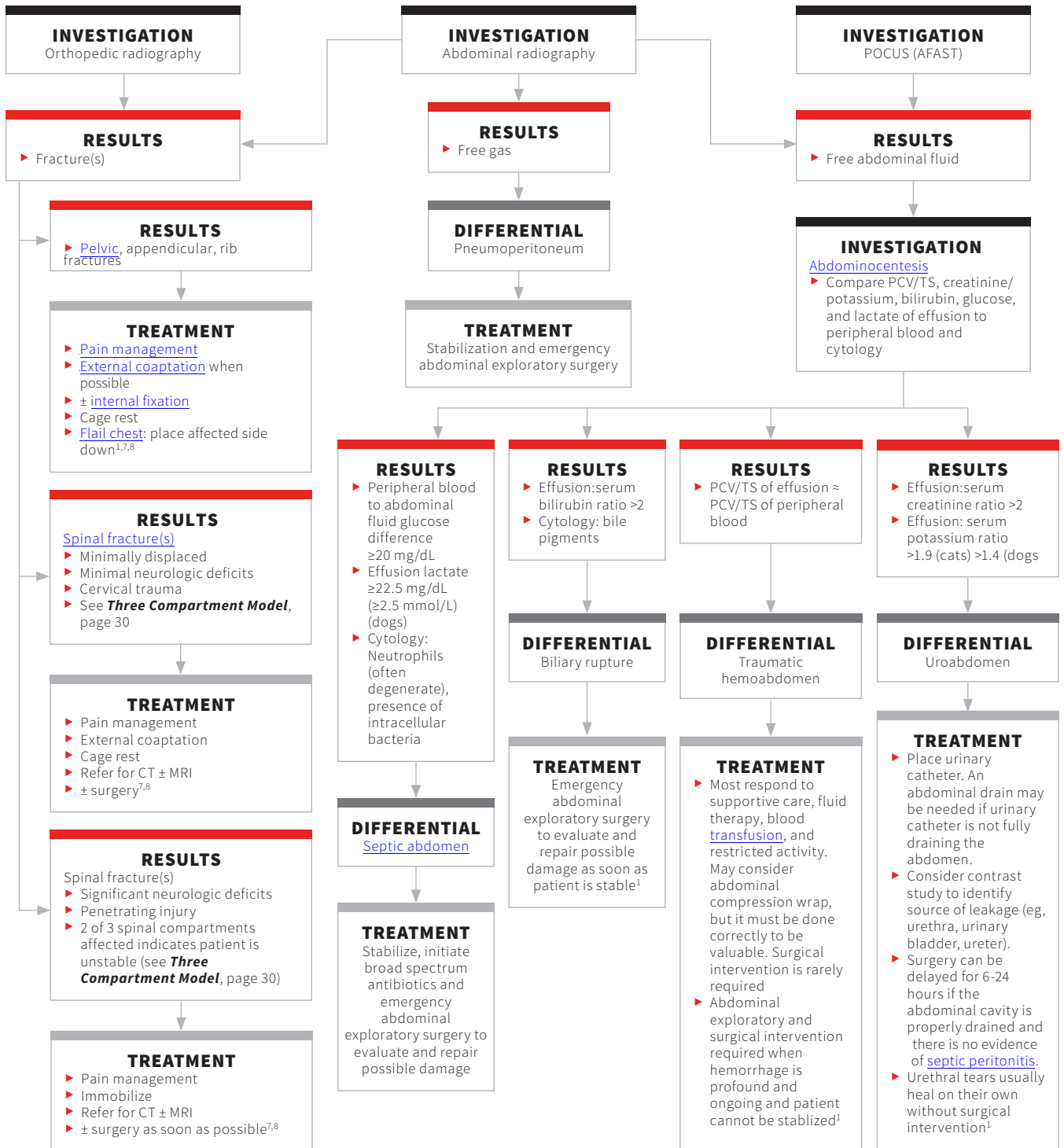
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AFAST = abdominal focused assessment with sonography for trauma
 BP = blood pressure
 CK = creatine kinase
 CRT = capillary refill time
 Hct = hematocrit
 LRS = lactated Ringer's solution
 MAP = mean arterial pressure
 MM = mucous membrane
 MODS = multiple organ dysfunction
 PE = pericardial effusion

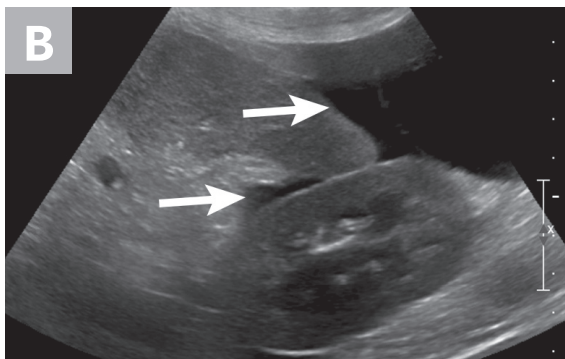
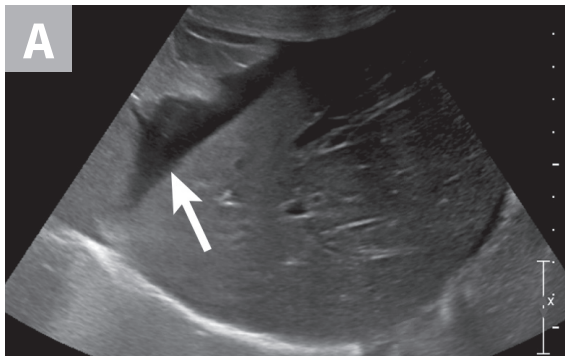
POCUS = point of care ultrasound
 PT = prothrombin time
 PTT = partial thromboplastin time
 RR = respiratory rate
 SAP = serum alkaline phosphatase
 SIRS = systemic inflammatory response syndrome
 TFAST = thoracic focused assessment with sonography for trauma
 TP = total protein



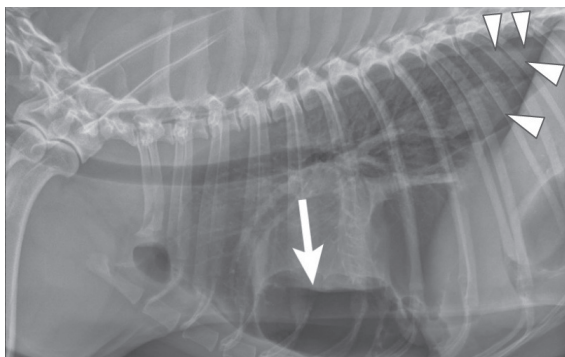


ANCILLARY MATERIAL TO VEHICULAR TRAUMA

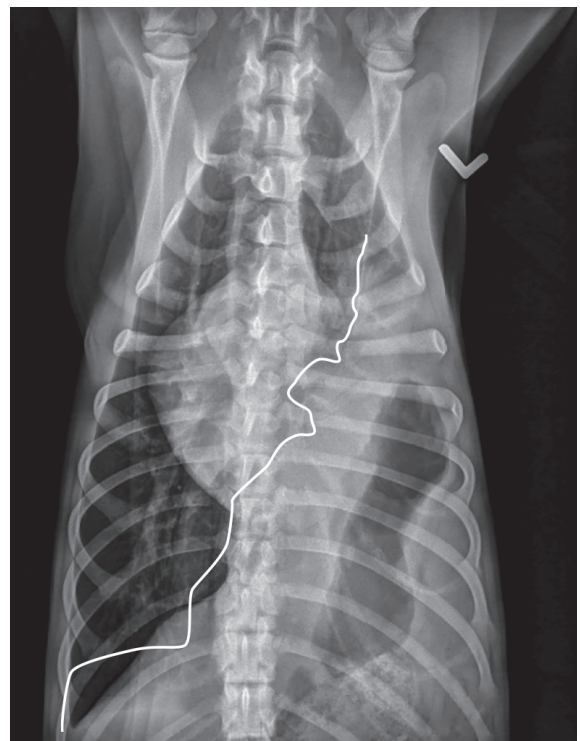
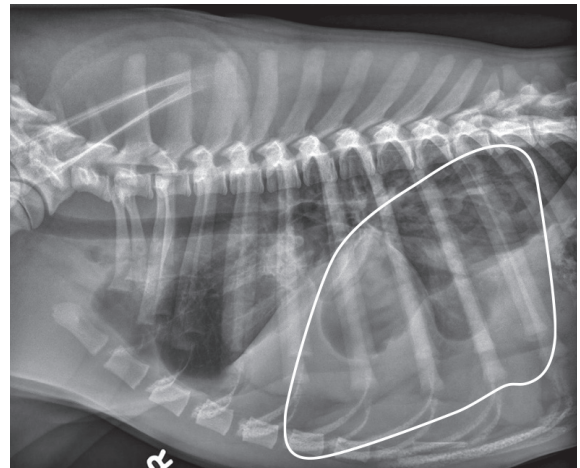
Cassandra Gilday, DVM
Adesola Odunayo, DVM, MS, DACVECC
University of Tennessee



▲ **FIGURE 1** AFAST: Anechoic free abdominal fluid (**arrows**) at the diaphragmatico-hepatic view (**A**) and splenorenal site (**B**). Images courtesy of Silke Hecht, DACVR, DECVDI



▲ **FIGURE 2** Lateral thoracic radiograph of the pneumothorax in a dog. Increased gas opacity in the pleural space, retraction of the lung lobes from the thoracic wall and diaphragm (**arrowheads**), separation of the cardiac silhouette from the sternum (**arrow**), and diffusely increased opacity of the lungs due to atelectasis can be seen. Image courtesy of Silke Hecht, DACVR, DECVDI



▲ **FIGURE 3** Thoracic radiographs of diaphragmatic hernia in a dog. Cranial displacement of abdominal viscera (**circle**), loss of normal diaphragm outline (**line**), and displacement of thoracic structures can be seen. Images courtesy of Silke Hecht, DACVR, DECVDI

TABLE 1

GENERAL GUIDELINES FOR FLUID RESUSCITATION & BLOOD TRANSFUSION IN PATIENTS WITH TRAUMA

Perfusion Parameters	Normal Endpoints
Whole blood ⁵	Dogs: 20-30 mL/kg given over 30 minutes to 4 hours, depending on how critical the patient is Cats: 50-60 mL/cat (NOT mL/kg) given over same time period as for dogs
Packed RBCs ⁵	Dogs: 15 mL/kg given over same time frame as whole blood Cats: 30-40 mL/cat (NOT mL/kg) given over same time frame as for dogs
Synthetic colloid (controversial) ⁵	1-5 mL/kg given over 15 minutes
Fresh frozen plasma ⁵	15-30 mL/kg for patients with coagulopathy and active hemorrhage
Isotonic fluid shock bolus (LRS, Norm-R, 0.9% sodium chloride, Plasma-Lyte) ^{5,9}	10-25 mL/kg given over 15 minutes. End goals should be reassessed; may be repeated until entire shock dose administered. Dog shock dose: 90 mL/kg/hour; cat shock dose: 50-60 mL/kg/hour
Hypertonic saline ^{5,9}	4-6 mL/kg given over 15 minutes; may be repeated 2-3 times in 24 hours
Mannitol ⁹	0.5-1.5 g/kg IV given over 15 minutes, may be repeated 2-3 times in 24 hours
Lidocaine ³	2 mg/kg IV bolus, followed by 50-80 µg/kg/minute if rhythm converts

THORACOCENTESIS

Thoracocentesis is often a life-saving treatment that should be performed during initial stabilization, ideally prior to radiographic confirmation of pneumothorax or pleural effusion to prevent patient decompensation in radiology.^{1,2,4}

ANALGESIA IN TRAUMA

Quick and effective analgesia is essential for patients with vehicular trauma. Opioids are the drug of choice because of their efficacy and limited adverse effects. NSAIDs should be avoided until the patient is hemodynamically stable. In addition, butorphanol has minimal analgesic effects and should not be used. IM or SC administration of pure µ-receptor agonists may cause vomiting; IV administration is strongly preferred.^{1,13}

- ▶ Morphine (0.1-0.5 mg/kg IV every 4 hours)
- ▶ Hydromorphone (0.05-0.2 mg/kg IV every 4-6 hours)
- ▶ Methadone (0.1-0.5 mg/kg IV every 4-6 hours)
- ▶ Fentanyl (2-5 µg/kg bolus, then 2-6 µg/kg/hour IV CRI)
- ▶ Buprenorphine (0.01-0.03 mg/kg IV or IM every 6-8 hours)

Continues ▶

ANCILLARY MATERIAL TO VEHICULAR TRAUMA CONTINUED

THREE COMPARTMENT MODEL

- ▶ Dorsal column: laminae, spinous processes and their ligaments
- ▶ Middle column: dorsal longitudinal ligament, dorsal annulus, dorsal cortex of the vertebral bodies
- ▶ Ventral column: ventral longitudinal ligament, ventral annulus, ventral cortex of the vertebral bodies

SYSTEMIC CONSEQUENCES OF TRAUMA

- ▶ Common metabolic consequences^{6,12}
 - Activation of the coagulation cascade
 - Hypothermia
 - GI disturbance (eg, vomiting, diarrhea)
 - Systemic inflammation (eg, SIRS, MODS)
- ▶ Common clinical pathologic abnormalities^{2,6,12}
 - Hyperglycemia
 - Hyperlactatemia
 - Metabolic acidosis
 - Hypoalbuminemia
 - Anemia
 - Thrombocytopenia
 - Increased ALT
 - Increased CK
 - Prolonged PT/PTT

TABLE 2

RESUSCITATION ENDPOINTS

Perfusion Parameters	Normal Endpoints
Heart rate	Dogs: 60-120 bpm Cats: 160-220 bpm
MM color	Pink
CRT	1-2 seconds
Temperature	99°F-102.5°F (37.2°C-39.2°C)
Mentation	Alert
SAP (systolic BP)	>90 mm Hg
MAP (mean BP)	>70 mm Hg
Urine output	1-2 mL/kg/hour
Lactate	<22.5 mg/dL (2.5 mmol/L)

BP = blood pressure
 CRT = capillary refill time
 MAP = mean arterial pressure
 MODS = multiple organ dysfunction
 PT = prothrombin time
 PTT = partial thromboplastin time
 SIRS = systemic inflammatory response syndrome

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