

ASA/SCCM/SOCCA – Heme/Musculoskeletal/Best Practices

Meghan Lane-Fall, M.D., M.S.H.P., FCCM

Heme

Five common heme-related concerns in ICU patients include anemia, thrombocytopenia, leukocytosis, thrombosis, and coagulopathy.

- **Anemia:** Anemia is common in critically ill patients even without blood loss. In general, we select a transfusion trigger of 7-8 g/dL in hemodynamically stable patients without active blood loss. When blood is transfused, it should be given one unit at a time. Checking hemoglobin once daily on stable ICU patients is reasonable. More frequent checks may be warranted in an actively bleeding patient. In an exsanguinating patient, however, hemoglobin may not change acutely.
- **Thrombocytopenia:** Thrombocytopenia is also common in critical illness, related to inflammation, autoimmune processes, and/or blood loss. A rarer cause of thrombocytopenia is heparin-induced thrombocytopenia (HIT), which can be diagnosed using a specific assay. In general, it is uncommon to need to transfuse platelets in the ICU. If patients are bleeding and thrombocytopenic, consider transfusing one dose (previously known as “a six-pack”) of platelets. Platelet transfusion is usually not necessary above 50,000 per microliter of blood unless the patient is bleeding or if surgery is anticipated. Platelet transfusions are reasonable at a nadir of 10,000 per microliter to prevent spontaneous bleeding.
- **Leukocytosis:** An elevated white blood cell (WBC) count (leukocytosis) is common in inflammatory states. Infection is high on the differential for leukocytosis. If the leukocytosis is caused by infection, accompanying signs of fever, tachycardia, and tachypnea (the systemic inflammatory response syndrome) may also be seen. Leukocytosis can also be seen after surgery or trauma, or after administration of high-dose steroids. Elevations in WBC above 20,000-30,000 per microliter of blood raise suspicion for *Clostridium difficile* infection. Elevations above 30,000-50,000 per microliter raise suspicion for malignancy, especially if the elevation is sustained without an identified infectious source. Leukopenia (decreased WBC) can also be seen in response to sepsis. Many COVID-19 patients present with relative lymphopenia but a normal overall WBC count.
- **Thrombosis:** ICU patients are at risk for deep venous thromboses (DVT) secondary to decreased mobility and increased inflammation. Unless the patient is actively bleeding, pharmacologic DVT prophylaxis should be ordered. In patients with creatinine clearance >50 mL/min, the preferred regimen is once-daily enoxaparin. Subcutaneous unfractionated heparin can also be used; it is the preferred regimen for patients with GFR <50 mL/min. For patients with COVID-19, DVT prophylaxis should be ordered to decrease nursing contacts (e.g., once-daily subcutaneous enoxaparin if GFR is sufficient, or twice-daily subcutaneous unfractionated heparin with impaired GFR). A more uncommon but important cause of thrombosis is heparin-induced thrombocytopenia and thrombosis (HITT), which can be detected with a specific assay.

- **Coagulopathy:** Clotting can be impaired for multiple reasons in the ICU. Causes to consider include drug-induced coagulopathy (e.g., heparin, warfarin, anti-factor Xa inhibitors); consumptive coagulopathy (e.g., disseminated intravascular coagulation); hyperfibrinolysis (i.e., the body prematurely or aggressively breaks down clot); hypothermia; nutritional deficiency (e.g., vitamin K deficiency); and uremia. Coagulopathy can be diagnosed with conventional coagulation studies (e.g., prothrombin time [PT], activated partial thromboplastin time [aPTT], international normalized ratio [INR]) and thromboelastography or rotational thromboelastometry. Note that an elevated INR by itself does not always indicate coagulopathy. Plasma (either fresh frozen or thawed) has a limited role in the normalization of INR and should not be transfused to normalize an INR <1.7.

Musculoskeletal

Patients in the ICU develop ICU-acquired weakness (ICUAW) and myopathies secondary to immobility and inflammation. To combat ICUAW and improve patient outcomes, early mobility is a cornerstone of ICU care. Best practices relating to musculoskeletal functioning in the ICU include:

- Early mobilization, even if mechanically ventilated
- Early physical and occupational therapy consultations, if available
- Pain treatment to enable mobility
- Frequent (e.g., every 2 hours) turns by nursing staff to prevent pressure ulcers

Rhabdomyolysis: This condition caused by muscle breakdown is not common in the ICU, but may be seen in burn injuries, crush injuries, or in significant musculoskeletal trauma. Extremity compartment syndrome and subsequent rhabdomyolysis can also occur from intravenous line infiltration. Early signs of rhabdomyolysis include pain on examination, hyperkalemia, metabolic acidosis, and tea-colored urine. Rhabdomyolysis is diagnosed by checking serum creatine kinase levels.

Best Practices

ICU care is multidisciplinary care that involves multiple team members, including physicians, advanced practice providers, nurses, respiratory therapists, physical and occupational therapists, registered dietitians, pastoral care providers, speech therapists, and more. The expertise of each of these professionals is consolidated by the ICU physician, who develops the plan of care in close collaboration with other team members.

Multiple best practices have emerged in the care of ICU patients. These can be broadly characterized as “do’s” and “don’ts” as follows:

ICU “Do’s”	ICU “Don’ts”
<ul style="list-style-type: none"> • Involve family on rounds and in care planning as much as possible • Determine goals of care early in care and revisit as needed • Establish feeding plans early and strive to maintain adequate nutrition • Mobilize patient early to prevent weakness • Choose conservative medication doses (“It is easier to add than to subtract”) • Administer prophylaxis for stress ulcers and DVT as indicated • Engage consultants for clinical questions outside one’s level of expertise • Revisit daily the need for lines, tubes, and drains • Screen all patients at least twice daily for ICU delirium using a validated instrument 	<ul style="list-style-type: none"> • Sedate patients just because they are mechanically ventilated • Order daily chest X-rays unless answering a specific clinical question • Order a full battery of blood tests daily unless addressing a specific clinical question • Make treatment decisions based on a single parameter (e.g., central venous pressure or one isolated lab value) • Develop treatment plans without clarifying patient and family goals of care