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Evaluation & Management of a Patient with Hemorrhage

Description of the Activity	Hemorrhage is a common problem encountered in critical care units. All surgical intensivists should be able to assess sources and severity of hemorrhage, resuscitate to optimize physiology, and identify interventions/involve consultants to control the source of hemorrhage as the condition warrants.
Functions	❖ Resuscitation ➢ Perform a comprehensive assessment to determine the severity of hemorrhagic shock and triage acuity. ➢ Use evidence-based resuscitation strategies, including the application of principles of balanced resuscitation. ➢ Identify the cause of hemorrhage, and initiate definitive management for hemorrhage control. ➢ Prioritize and interpret laboratory and imaging studies. ➢ Identify and mitigate coagulopathy. ➢ Uses hemostatic adjuncts. ➢ Reverse anticoagulation when applicable and indicated. ➢ Obtain vascular access. ➢ Use evidence-based principles for hemostatic control. ➢ Evaluate volume status. ❖ Ongoing Management ➢ Transition to goal-directed resuscitation. ➢ Identify and respond to the consequences of hemorrhagic shock. ➢ Identify and manage complications of transfusion. ➢ Identify and manage coagulopathy and reversal of anticoagulation. ➢ Optimize vascular access specificity. ➢ Adapt treatment plans based on the source of hemorrhage and underlying conditions. ➢ Incorporate potential resource use and limitations into resuscitation strategies. ➢ Consult with interventional services based on the identified source of hemorrhage when indicated. ➢ Determine the endpoints of resuscitation. ❖ Transition Of Care ➢ Communicate a diagnostic treatment plan to patients/caregivers. ➢ Lead an interdisciplinary team to ensure streamlined care and communication to patients/caregivers to include decision-making that addresses and considers patients' goals of care. ➢ Customize difficult news to patients/caregivers, setting realistic recovery expectations and facilitating goals-of-care discussions.

THE AMERICAN BOARD OF SURGERY

Evaluation & Management of a Patient with Hemorrhage

	➢ In complex patient care scenarios, lead the team in weighing the risks, benefits, and goal concordance of possible therapies, using the assistance of subspecialty palliative care and ethics teams as needed. ➢ Identify when disease has become acutely life-limiting with no further disease-directed treatments, and lead the team in helping transition patients/caregivers to end-of-life care, prioritizing comfort and symptom-directed therapy as indicated. ➢ Recognize the need for and determine the timing of reinitiation of therapeutic anticoagulation when necessary. ➢ Systematically de-escalate care, and recognize when a patient no longer requires intensive care unit–level care. ➢ Lead the team in reflection on difficult patient care experiences, and employ coping strategies that maximize provider well-being and the health of the team.
Scope	❖ In scope ➢ Coagulopathy ➢ Gastrointestinal hemorrhage ➢ Hemorrhage in patients on anticoagulant or antiplatelet therapy ➢ Massive transfusion (ratios, products), including complications ➢ Obstetric hemorrhage ➢ Occult sources of hemorrhage ➢ Traumatic hemorrhage ➢ Use of diagnostic modalities for source determination and therapeutic intervention ➢ Use of laboratory testing to evaluate coagulopathy

THE AMERICAN BOARD OF SURGERY

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1 **Limited Participation** Demonstrates limited critical care knowledge and skills **Framework:** What a learner directly out of residency should know Performs ICU procedures on straightforward patients but requires supervision/direction for more complex patients/procedures Requires continuous direct supervision by the attending for patient management	• Identifies the presence of hemorrhage and shock using objective clinical data with direction • Identifies basic physiologic changes in a bleeding patient • Develops a narrow differential and requires assistance to select diagnostic tools to evaluate the source of the hemorrhage • Prioritizes source control with assistance • Demonstrates understanding of the role of MTP and avoids crystalloid resuscitation when prompted • Demonstrates incomplete understanding of implementing blood product transfusion • Displays limited ability to interpret lab studies (eg, coagulation studies, viscoelastic testing) to direct blood product administration • Engages a consulting team with supervision • Identifies the urgency of consultation when communicating with a supervisor • Demonstrates limited ability to use POCUS and other technology to identify the source of hemorrhage and assess adequacy of resuscitation • Identifies indications for and complications of common ICU procedures, requiring	• Describes the impact of achieving hemostasis and source control • Initiates management for complications of hemorrhagic shock with ongoing assistance (eg, ACS, AKI, ARDS) • Identifies risk factors for and describes symptoms of transfusion-related complications (eg, transfusion reaction, TACO, TRALI) but requires ongoing assistance to manage them • Requires prompting for de-escalation of vascular access or removal of nonsterile lines • Demonstrates understanding of the relationship between the patient's baseline comorbidities and the development of hemorrhage and need for disease-specific treatment after resuscitation • Identifies initial endpoints of resuscitation • Passively participates in interdisciplinary communication, coordination of care, and conflict resolution • Acknowledges the need for reversal of anticoagulants but needs guidance to identify reversal agents	• Acknowledges basic risks and benefits of reinitiation of anticoagulation in a posthemorrhage setting • Demonstrates understanding that hemorrhagic shock can become acutely life-limiting • With assistance, identifies areas for improvement of resuscitation during debriefing • Respectfully communicates a report of events upon transfer but may omit essential information or require guidance to summarize priorities and active issues

THE AMERICAN BOARD OF SURGERY

Evaluation & Management of a Patient with Hemorrhage

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	instruction to perform them (eg, arterial/central venous catheterization) • Demonstrates limited communication with other team members, including nursing staff, regarding the resuscitation plan		
2 **<u>Direct Supervision</u>** Initiates straightforward management for many critical illnesses but requires active direction for further management and complex critical illnesses **<u>Framework:</u>** Demonstrates a sufficient fund of knowledge for basic critical care and some knowledge of complex critical illness Performs ICU procedures on straightforward patients but may require supervision/direction for more complex patients/procedures The attending gives active help throughout to direct the clinical course.	• Anticipates and prepares for physiologic derangements related to hemorrhage and shock with assistance • Describes likely physiologic derangements of the early stages of bleeding and hemorrhagic shock • Analyzes baseline comorbidities to streamline the differential; requires oversight of during the diagnostic workup • Prioritizes source control • Initiates MTP and prioritizes actions to control bleeding with assistance • Demonstrates understanding of priorities in ordering and administering specific blood products but requires guidance in complex patient • Interprets lab studies to direct blood product administration with supervision • Recognizes the need and urgency for consultation but needs prompting on optimal timing	• With prompting, recognizes the importance of source control for hemostasis and prioritizes interventions accordingly • Identifies organ-specific consequences of hemorrhagic shock for early intervention with supervision (eg, ACS, AKI, ARDS). • Verifies and treats transfusion-related complications with supervision (eg, TACO, TRALI, transfusion reaction) • Replaces emergent nonsterile lines but requires prompting to de-escalate vascular access • Incorporates baseline comorbidities into hemorrhage management and, with support, initiates disease-specific treatment • Uses endpoints of resuscitation to guide efforts but needs assistance in selection of patient-specific markers when considering comorbidities (eg, ESRD, cirrhosis) • Actively participates in interdisciplinary communication, coordination of care, and conflict resolution	• Weighs the risks and benefits of resumption of anticoagulation in a posthemorrhage setting with counsel from the attending • With guidance, identifies when hemorrhagic shock has become acutely life-limiting and additional interventions are unlikely to be beneficial • Initiates reflection on resuscitation efforts but seeks feedback to recognize opportunities for improvement • Respectfully communicates a report of events but needs assistance to anticipate barriers to transitioning the level of care

THE AMERICAN BOARD OF SURGERY

Evaluation & Management of a Patient with Hemorrhage

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	• Identifies the acuity of a patient and formulates an initial plan while communicating with the supervisor • Requires supervision to use POCUS and other technology to identify the source of hemorrhage and assess adequacy of resuscitation • Performs ICU procedures for a straightforward patient but requires supervision for a complex patient • Communicates with other team members, including nursing staff, regarding the resuscitation plan but may require some prompting	• Reverses anticoagulants when indicated	
3 **<u>Indirect Supervision</u>** Manages most critical illnesses but may require guidance for more complex patients or atypical presentations **<u>Framework:</u>** Demonstrates a sufficient fund of knowledge for basic and most complex critical care Independently performs most ICU procedures and supervises procedures on straightforward patients The learner can manage a critically ill patient in	• Independently identifies the presence of all stages of hemorrhage and shock and prepares for physiologic derangements • Identifies physiologic derangements of hemorrhagic shock and measures to mitigate them (eg, warming, correction of acidosis) • Rapidly narrows the hemorrhage differential and initiates an efficient diagnostic workup but may require assistance for a complex or multifocal source • Identifies the source of hemorrhage and prioritizes source control when multiple sources are present	• Independently recognizes the importance of source control for hemostasis and prioritizes interventions accordingly • Anticipates and intervenes early on the organ-specific consequences of hemorrhagic shock (eg, ACS, AKI, ARDS) • Discerns, differentiates, and treats transfusion-related complications but may need assistance with a complex presentation (eg, transfusion reaction, TACO, TRALI) • Promptly de-escalates vascular access when clinically indicated	• Reinitiates anticoagulation in a posthemorrhage setting after weighing risks and benefits and addressing nuances of comorbidities • Identifies when hemorrhagic shock has become acutely life-limiting but needs reassurance in a difficult scenario • Reflects on resuscitation efforts, identifying opportunities for future improvement • Critically reviews self and team decision-making after resuscitation to identify opportunities for improvement, including a situation appropriate for multidisciplinary review (eg, blood bank committee, ICU PI committee)

THE AMERICAN BOARD OF SURGERY

Evaluation & Management of a Patient with Hemorrhage

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straightforward circumstances but may require input to manage the most complicated ICU patients.	• Initiates MTP and prioritizes hemorrhage control but may require oversight if resuscitation efforts become acutely life-limiting • Demonstrates understanding of priorities in ordering and administering specific blood products and use of MTP • Interprets lab studies to direct blood product administration in a straightforward patient (eg, without preexisting comorbidity) • Anticipates and engages consulting teams; may require intermittent assistance in a patient with complex or multifocal hemorrhage • Uses POCUS and other technology to identify the source of hemorrhage and adequacy of resuscitation with intermittent guidance • Performs independently and supervises others in routine vascular access and placement of invasive monitoring devices • Communicates with other team members, including nursing staff, regarding the resuscitation plan and solicits input and suggestions	• Incorporates baseline comorbidities into hemorrhage management and initiates disease-specific treatments • Incorporates knowledge of comorbidities and uses patient-specific markers as endpoints of resuscitation (eg, ESRD, cirrhosis) • Actively solicits interdisciplinary communication, coordination of care, and conflict resolution • Weighs the risks and benefits of anticoagulation reversal in a patient	• Respectfully communicates nuanced details of a patient's critical care course upon transfer and facilitates seamless transition of care
4 **Practice Ready** Independently manages complex critical illnesses and leads a critical care team	• Identifies physiologic derangements of hemorrhagic shock and measures to mitigate them (eg, warming, correction of acidosis) in a complex patient	• Incorporates resource use into a management plan with timely cessation of MTP to limit waste	• Evaluates risks and benefits and uses evidence-based guidelines to determine the timing for (re)initiating anticoagulation

THE AMERICAN BOARD OF SURGERY

Evaluation & Management of a Patient with Hemorrhage

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Framework: Demonstrates an attending-level fund of knowledge Independently performs and supervises procedures The attending is available at the request of the learner but is not routinely needed for common or complex critical illness.	• Demonstrates understanding of priorities in ordering and administering specific blood products and use of MTP and initiates triage measures in a complex situation • Independently interprets lab studies to direct blood product administration in a complex patient (eg, underlying cirrhosis) • Triages and leads resuscitation efforts in coordination with consultants for source control • Uses advanced tools within POCUS to identify the source of hemorrhage and adequacy of resuscitation • Independently obtains difficult and emergent vascular access, facilitating advanced hemostasis adjuncts when indicated, and minimizes resultant complications • Sets the behavioral tone in a challenging situation, leading resuscitation with clear communication, constructive feedback, and conflict resolution • Communicates with other team members, including nursing staff, regarding the resuscitation plan, even in a complex and stressful situation	• Minimizes or mitigates consequences of severe shock in respect to baseline comorbidities and current physiology (eg, avoids nephrotoxic agents) • Delineates, anticipates, and manages complications of transfusion (eg, TACO, TRALI, transfusion reaction) • Critically evaluates ongoing resuscitation with timely de-escalation • Supervises interdisciplinary communication, coordination of care, and conflict resolution	• Leads the team in identifying when hemorrhage has become acutely life-limiting without further disease-directed treatments • Directs multidisciplinary debriefing after a complex case of hemorrhage, aiding resolution of interpersonal or emotional conflict and offering resources for coping • Critically reviews self and team decision-making after resuscitation to identify opportunities for improvement and a situation appropriate for multidisciplinary review (eg, blood bank committee, ICU PI) • Oversees seamless transition of care