IMPROVING PEDIATRIC SEPSIS OUTCOMES

Evidence Table for IPSO Bundles

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Relevant Recommendations (Reference; Category/Grade)	CHA Bundle Details	Notes
1. Prevention: Appropriate and timely treatment of IPSO Suspected Infection that may lead to IPSO Sepsis (a) Use clinical pathways and/or order sets for common bacterial infections		
(Ref 1, pg 461-469)	Use clinical pathways and/or order sets to standardize appropriate antimicrobial treatment for children who are hospitalized with common bacterial infections. Individual institutions will define what constitutes appropriate antimicrobial treatment for specific bacterial infections.	Non-severe sepsis identification and timely treatment of patients with infection to prevent progression to sepsis.[1]
	If these pathways/order sets are used in lieu of a severe sepsis order set for patients with a bacterial infection, ensure they contain all key elements for severe sepsis management.	Utilization of standardized orders for the treatment of common bacterial infections may improve timeliness of treatment.
	Patients should also undergo appropriate diagnostic evaluation (see Bundle 3-Diagnostic Evaluation) to identify a specific cause of infection to: determine the need for initial source control; direct initial empiric antimicrobial therapy; provide microbiologic information that can be used to provide targeted antimicrobial therapy at a later point in time; evaluate other potential infected sites (e.g., endocardium, kidney, bone).	
1. Prevention: Appropriate and timely treatment of suspected infection that may lead to severe sepsis (b) Administer ordered IV antibiotics in a timely fashion		
Antimicrobial Therapy (ref 2, pg 494-502) (ref 3, pg e60-61)	Ordered IV antibiotics should be administered in a timely fashion. The time between the time of the antibiotic order and the time of initiation of the first antibiotic infusion should not exceed 60 minutes.	2016 SSC guidelines recommend initiation of broad spectrum antibiotics within 60 minutes for treatment of severe sepsis.[2]

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	NOTE: In some conditions, a more stringent time interval may apply. For example, for cases of fever and neutropenia, the accepted standard is 60 minutes from the time of ED triage (in outpatients) or the time of fever (in inpatients) to the start of the antibiotic infusion. If a more stringent time interval is widely accepted, it should be followed.	2020 SSC guidelines recommend starting antimicrobial therapy as soon as possible, within 1 hour of recognition in children with septic shock and within 3 hours in children with sepsis-associated organ dysfunction but without shock.[3]
1. Prevention: Appropriate and timely treatment of IPSO Suspected Infection that may lead to IPSO Sepsis (c) Use a process to recognize clinical deterioration despite antibiotic treatment		
Utilization of screen (trigger tool), clinical assessment (huddle) and utilization of sepsis bundle (order set) (ref 4 pg 1077; IC)	The components of the process to identify patients with non-severe sepsis will likely be similar to the process used to identify possible severe sepsis, e.g., the process may include primary screening/use of trigger tools, secondary clinical assessments, and team-based discussion of the available clinical findings and risk factors (see Bundle 2-Recognition). The content of these components and their application may vary by institution.	Recognition of patients with infection. Screen for sepsis 2017 ACCM guidelines recommend use of a recognition bundle.[4]
	The outcome of the team-based discussion is a determination whether possible severe sepsis is present or developing in the patient and a decision whether to perform additional diagnostic evaluation and initiate treatment for severe sepsis in parallel with this evaluation (see Bundle 3-Diagnostic Evaluation and Bundle 4-Resuscitation-Stabilization). If the patient is unstable, proceed with immediate advanced pediatric life support assessment and resuscitation. Track patients who progress from non-severe sepsis to severe sepsis.	Huddle/Order set 2017 ACCM recommend a trigger tool, rapid clinician assessment within 15 minutes for any patient identified by trigger tool, and activation of a sepsis resuscitation bundle within 15 minutes for patients with suspected septic shock.[4]
2. Recognition: Sensitive, specific, efficient and timely recognition of IPSO Sepsis (a) Use a process that involves screening, a structured clinical assessment and team-based discussion to identify cases of possible severe sepsis		
Utilization of screen (trigger tool), clinical assessment (huddle) and utilization of bundles of care (order set) (ref 4 pg 1077; IC)	The components of the process (used separately or in combination) may include primary screening/use of trigger tools, secondary clinical assessments, and team-based discussion of the available clinical findings and risk factors for severe sepsis. The content of these components and their application may vary by institution. Considerations for each are described in the IPSO Bundle Documentation.	2017 ACCM recommend a trigger tool, rapid clinician assessment within 15 minutes for any patient identified by trigger tool, and activation of a sepsis resuscitation bundle within 15 minutes for patients with suspected septic shock.[4]
	The outcome of the team-based discussion is a determination whether possible severe sepsis is present or developing in the patient and a decision whether to perform additional diagnostic evaluation and initiate treatment for severe sepsis in parallel with this evaluation (see Bundle 3-Diagnostic Evaluation and Bundle 4-Resuscitation-Stabilization).	2017 ACCM guidelines recommend use of a recognition bundle.[4] Huddle

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	If the patient is unstable, proceed with immediate advanced pediatric life support assessment and resuscitation.	Use of Sepsis Order Set
2. Recognition: Sensitive, specific, efficient, and timely recognition of IPSO Sepsis (b) Initiate continuous cardiorespiratory monitoring and ongoing assessment of patients identified with possible severe sepsis		
Use of multi-modal monitoring (ref 4, pg 1065; IC)	Initiate continuous monitoring of heart rate, respiratory rate, and pulse oximetry, and frequent determinations of blood pressure for any patient who is identified with possible severe sepsis. For inpatients, review trends of vital signs over past days (graphically if available). Reassess patients frequently to detect deterioration and response to therapy.	2017 ACCM state use multimodal monitoring to optimize fluid, hormonal, and cardiovascular therapies to attain hemodynamic goals.[4]
3. Diagnostic Evaluation (a) Use an order set for laboratory and imaging studies		
Utilization of bundles (Ref 1 pg 1077; IC)	The order set may be a single comprehensive severe sepsis order set or separate order sets for specific components.	2017 ACCM state utilization of bundles (order sets) optimize care.[4]
	Recommended laboratory tests for patients with possible severe sepsis include: Blood culture(s) – at least 1 blood culture if no central line is in place and at least 2 blood cultures if a central line is in place; see CHA weight-based recommendations for blood culture volume and recommended sources of blood culture collection when a central line is in place; Complete blood count (CBC) and differential; Blood gas (arterial, venous or capillary); Electrolytes, BUN, creatinine, and glucose; Ionized calcium; Lactate; Liver function tests; Coagulation studies. Conduct additional studies as needed for individual patients	
3. Diagnostic Evaluation (b) Identify potential site and cause of infection, and need for source control		
Diagnosis (ref 3, pg e60)	Prioritize collection of a blood culture and other specimens for microbiologic evaluation before administration of antibiotics if possible. If unable to do so, do not delay antibiotics to collect microbiologic samples. Collect other specimens for microbiologic evaluation as indicated (e.g., CSF, urine, pleural fluid, purulent drainage from wounds).	Identification of cause of infection enables clinicians remove source of infection and empiric and definitive antibiotic therapy.
	Consider analysis of inflammatory markers to identify patients with bacterial infection (e.g., procalcitonin, C-reactive protein).	2020 SSC guidelines recommend obtaining blood cultures before initiating antimicrobial therapy in situations where this does not substantially delay antimicrobial administration.[3]

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	Consider removal of vascular access devices that are a potential source of infection.	2020 SSC guidelines recommend removal of intravascular access devices that are confirmed to be the source of sepsis or septic shock after other vascular access has been established and depending on the pathogen and the risks/benefits of a surgical procedure.[3]
	Perform imaging studies necessary to identify the site of infection and need for source control (e.g., chest x-ray, abdominal/pelvic imaging, extremity imaging). Do not delay antibiotic administration or fluid resuscitation to perform radiologic studies outside of the department/unit.	Goal for source control—within 6 hrs of identification
3. Diagnostic Evaluation (c) Identify and characterize organ dysfunction		
(Ref 5, pages 2-8) (Ref 6, page 501)	Interpret labs and clinical status in relation to published severe sepsis/septic shock definitions.	Close monitoring of all organs for dysfunction[5,6]
4. Resuscitation/Stabilization: Appropriate, timely and effective treatment of IPSO Sepsis (a) Use a severe sepsis order set		
(ref 4, page 1065)[4]	Institutions should develop/use severe sepsis management order set(s), which may include an initial screening algorithm and diagnostic and treatment order sets	2017 ACCM state utilization of bundles (order sets) optimize care.[4]
		Hemodynamic support of septic shock should be addressed at the institutional level rather than only at the practitioner level with coordination between the family, community, pre-hospital, ED, hospital, and ICU setting.[4]
4. Resuscitation/Stabilization: Appropriate, timely and effective treatment of IPSO Sepsis (b) Ensure adequate caregivers and care setting for severity of illness throughout course of care		
Initial resuscitation (ref 2, pg e66) (ref 3, page 491)	Establish and follow criteria/protocol for activation of sepsis experts: Engage sepsis experts (e.g., RRT or intensivists) in assessment and reassessment of patients who meet criteria for potential transfer. In the ED setting, consult from outside sepsis experts may not be necessary.	Clinical assessment by experts (huddle); Appropriate care for severity of patient illness. Establish criteria for transfer of patient to higher level of care.[2,3]

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	Follow established criteria for transition to a higher level of care as indicated by the patient's status: Develop criteria for transfer to PICU/higher level of care with inclusion of one or more of following: Infusion of ≥ 40 mL/kg of intravenous fluid for patients with risk for pulmonary edema or other vulnerabilities to fluids (e.g., immunocompromised, severe heart disease); ≥ 40 mL/kg (or 2 L for larger patients) over one to two hours in an inpatient unit; ≥ 60 mL/kg (or 3 L for larger patients) over one to two hours in the ED Sustained systolic hypotension; Evidence of ongoing impaired perfusion/end-organ function; Need for vasoactive/inotrope medications; Need for NIPPV or IPPV support	2020 SSC guidelines recommend fluid resuscitation up to 40-60 ml/kg over the first hour.[3]
	PICU/"higher level of care" should be clearly delineated by each institution, but this level should include each of the following elements: Availability of personnel (e.g., physicians, physician assistants, nurse practitioners, nurses, respiratory therapy) to provide immediate hemodynamic or respiratory assessment and support 24 hours/day; Ability to provide continuous hemodynamic and respiratory monitoring; Ability to provide positive pressure ventilation (non-invasive or invasive).	
4. Resuscitation/Stabilization: Appropriate, timely and effective treatment of IPSO Sepsis (c) Provide oxygen and ventilation support (if needed)		
Airway/breathing (ref 4, pg 1077; 1C)	Provide supplemental O2, escalate respiratory support as indicated	2017 ACCM guidelines reference airway and breathing.[4]
	Address respiratory failure: Treat respiratory failure with noninvasive (HFNC, CPAP/BiPAP) or invasive support (mechanical ventilation); Each institution should have or develop guidelines for the use of non-invasive and invasive mechanical ventilation for the management of respiratory failure. For patients with severe sepsis, considerations should exist for the following: Patients may tolerate endotracheal intubation better after intravascular volume repletion, even if partial. However, endotracheal intubation should not be unnecessarily prolonged awaiting volume resuscitation - Consider peripheral epinephrine infusion before intubation; Provide supplemental oxygen and optimize airway positioning for intubation; Use medications to facilitate endotracheal intubation per institutional protocol/policy - See Appendix A of IPSO Bundle Documentation for medication details; Once intubated: Maintain appropriate tidal volume for patient condition; Utilize PEEP as needed for optimal alveolar recruitment (open lung model).	2017 ACCM guidelines recommend use of a resuscitation bundle.[4]

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4. Resuscitation/Stabilization: Appropriate, timely and effective treatment of IPSO Sepsis (d) Ensure adequate vascular access		
IV access (ref 4, pg 1077; 1C)	Establish/ensure adequate IV/IO access, if not already present Note: Any medication/infusion that is given IV can also be given IO	2017 ACCM guidelines state attain IV/IO access within 5 minutes.[4]
	Standardize indications for placement of central venous lines (CVLs) and arterial lines for monitoring	2017 ACCM guidelines recommend use of a resuscitation bundle.[4]
4. Resuscitation/Stabilization: Appropriate, timely and effective treatment of IPSO Sepsis (e) Initiate rapid parenteral fluid resuscitation		
Fluid resuscitation (ref 3, pg e66) (ref 4, pg 1077-1079; IC)	Fluid should be given with the goal of attaining normal perfusion and blood pressure, thus patient must be reassessed between each bolus.	2017 ACCM guidelines state appropriate fluid resuscitation begun within 30 minutes; references 20 mL/kg rapid fluid boluses and in absence of findings of fluid overload, 40-60 mL/kg in the first hour[4]
	Consider using balanced/buffered crystalloids, rather than 0.9% saline (based on weak recommendation and evidence).	2020 SSC guidelines suggest using balanced/buffered crystalloids, rather than 0.9% saline.[3]
	Caution should be exercised for patients during their resuscitation if ICU care is not readily available to avoid fluid overload.	2020 SSC guidelines suggest in healthcare systems with no availability of intensive care, if hypotension is present, administering up to 40 mL/kg in bolus fluid (10–20 mL/kg per bolus) over the first hour with titration to clinical markers of cardiac output and discontinued if signs of fluid overload develop.[3]
Maintain and restore circulation, defined as normal perfusion (ref 4, pg 1070)	Within the first 60 minutes of recognition: Administer up to 40-60 ml/kg in bolus fluid (10-20 ml/kg per bolus; maximum of 1 liter per bolus) by push-pull, pressure bag, or rapid infuser method. After each bolus, evaluate for signs of fluid overload (rales, gallop rhythm, increased work of breathing, or increased oxygen need); reassess patient's clinical status and discuss with team, evaluate for persistence of shock state, and consider need for additional fluid bolus.	2020 SSC guidelines suggest in healthcare systems with availability of intensive care, administering up to 40–60 mL/kg in bolus fluid (10–20 mL/kg per bolus) over the first hour, titrated to clinical markers of cardiac output and discontinued if signs of fluid overload develop, for the initial resuscitation of children with septic shock or other sepsis-associated organ dysfunction.[3]
		2017 ACCM guidelines recommend use of a resuscitation bundle[4]

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Vasoactive agents (ref 4, pg1077-1079; 1C)	Reassess after second bolus and if signs of persistent shock, consider starting vasopressors and third bolus while awaiting vasopressors.	
Starches and gelatin (ref 3, pg e68)	NOTE: In alignment with the SSC guidelines, we suggest against using starches or gelatin in the resuscitation of children with septic shock or other sepsis-associated organ dysfunction.	2020 SSC guidelines recommend against using starches or gelatin in the resuscitation of children with septic shock.[3]
4. Resuscitation/Stabilization: Appropriate, timely and effective treatment of IPSO Sepsis (f) Establish advanced hemodynamic support and monitoring (if needed)		
Vasoactive agents (ref 3, pg e70) (ref 4, pg1077-1079; 1C)	Initiate use of peripheral or central vasoactive agents for fluid-refractory shock per institutional policy: Initiate within 60 minutes of septic shock recognition for persistent shock state and/or if hypotension persists despite aggressive fluid resuscitation - Identify goal SBP (systolic BP) or MAP (mean arterial BP); Consider epinephrine or norepinephrine infusion for persistent shock. Note: Epinephrine infusion can be given via peripheral IV, but should be given at a lower dilution (and correspondingly higher rate). Tailor fluids and vasoactive agents due to underlying clinical conditions and contraindications. In the ICU: Establish hemodynamic targets appropriate for age (SBP, MAP, CVP if central line in place); Use published methods to set age-appropriate targets; Assess perfusion as a team to ensure consistency of assessment; Consider echocardiogram to evaluate cardiac function and filling volume status; Initiate or continue vasoactive agents for fluid-refractory shock; Start epinephrine or norepinephrine for persistent shock; ECMO. For refractory hypoxemic respiratory failure, consider: Prone positioning; Nitric Oxide (not for routine use, but specifically for refractory hypoxemic respiratory failure); ECMO	2017 ACCM guidelines state begin peripheral or central inotrope infusion therapy for fluid-refractory shock within 60 minutes. 2017 ACCM guidelines recommend use of a resuscitation bundle. Support for our recommendation comes from 2017 ACCM pediatric guideline.[4] 2020 SSC guidelines suggest using norepinephrine rather than dopamine in children with septic shock. 2020 SSC guidelines were unable to issue a recommendation about initiating vasoactive agents through peripheral access in children with septic shock. 2020 SSC guidelines suggest not using bedside clinical signs in isolation to categorize septic shock in children as "warm" or "cold."[3] 2020 SSC guidelines suggest a trial of prone positioning in children with sepsis and severe PARDS. 2020 SSC guidelines recommend against the routine use of inhaled nitric oxide in all children with sepsis-induced PARDS. 2020 SSC guidelines suggest using inhaled nitric oxide as a rescue therapy in children with sepsis-induced PARDS

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		and refractory hypoxemia after other oxygenation strategies have been optimized.[3]
(ref 7, pg 2483-2495.) (ref 8, pg 68) (ref 9, pg S98-S113), (ref 10, pg 286-291), (ref 11, pg 884-898)	Evaluate for chronic anemia and need for tailored IVF resuscitation and transfusion: Establish transfusion criteria - Recommend blood transfusion if the hemoglobin concentration is less than 5 g/dL. For patients with hemoglobin between 5 and 7 g/dL, consider blood transfusion based on clinical judgment. After stabilization and recovery from shock and hypoxemia, avoid transfusion if hemoglobin levels are >7 g/dL. Include transfusion targets/orders in the sepsis order set. Important issues to consider: For special populations, for example children with complex congenital heart disease or who are immunocompromised, consider blood transfusion goals appropriate for the patient, their physiology, and lab findings to determine hemoglobin level appropriate to support tissue oxygenation (hemoglobin target may differ from what is listed above); Critically ill children with chronic anemia and hemoglobin ≤ 5 g/dL are at risk for increased morbidity (e.g., pulmonary edema and myocardial dysfunction) and mortality with aggressive fluid resuscitation - Consider using lower fluid volume for resuscitation for these patients. Consider using lower blood transfusion volume with slower infusion rate than typical for critically ill patients. Consider starting vasoactive agents earlier than typical for persistent signs of septic shock. Discuss with appropriate consultant if the patient has underlying chronic complex condition.[7-11]	
Hydrocortisone therapy (ref 4, pg1079; 1C)	Consider steroids at the point of fluid and/or vasoactive resistant shock, particularly if adrenal insufficiency risk: Immunocompromised patients who have received steroid therapy prior to the episode of sepsis may be at particular risk for adrenal insufficiency; Standardize indications for steroid therapy, assess risk, and measure compliance.	There are a host of articles adding to debate about the appropriate indications for steroids with some demonstrating no benefit and some associated with harm.
Initial Resuscitation (ref 3, pg e66) (ref 4, pg 491)	ICU: Standardize indications for placement of central venous lines and arterial lines for monitoring: Develop and use standards for multimodal monitoring to optimize fluid, hormonal, and cardiovascular therapies to attain hemodynamic goals.	Standardization of care

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Goal of invasive monitoring (ref 4, pg1079; 1C)	ICU: Monitor and treat patient according to either non-invasive monitoring (no central venous line in place) or invasive monitoring (CVL in place) guidelines as developed by each institution Non-invasive monitoring (no CVL) should include: Frequent assessment of clinical parameters of perfusion, including capillary refill, heart rate, mental status, blood pressure, and urine output; Consider non-invasive multimodal monitoring of hemodynamics and oxygen utilization according to institution preference; Consider lactate determination as correlates of organ dysfunction. Invasive monitoring (CVL in place) should include all factors listed above, as well as using mixed venous saturation (SvO2) with a goal of ≥70% for therapeutic target.	2017 ACCM Guidelines recommend reassessment of severe sepsis or septic shock patients through non-invasive or invasive monitoring methods.[4]
4. Resuscitation/Stabilization: Appropriate, timely and effective treatment of IPSO Sepsis (g) Provide appropriate antimicrobial therapy		
Antibiotic administration (ref 3, pg e60) (ref 4, pg1077; 1C)	Initiate timely empiric antimicrobial therapy: Empiric treatment should be broad spectrum but guided by suspected site of infection; Initiate timely empiric antibiotics within 1 hour of recognition of septic shock and within 3 hours of recognition of sepsis without shock; Develop a guideline/algorithm for empiric antibiotic choices for specific sites of infection (e.g., skin/soft tissue, intra-abdominal, CNS, endocarditis, genitourinary, etc.).	2017 ACCM guidelines state initiation of broad spectrum antibiotics within 60 minutes and confirm administration of appropriate antimicrobial therapy and source control. 2017 ACCM guidelines recommend use of a resuscitation bundle. 2020 SSC pediatric guidelines recommend starting antimicrobial therapy as soon as possible, within 1 hour of recognition in children with septic shock and within 3 hours in children with sepsis-associated organ dysfunction but without shock.[3,4]
Administration of appropriate antibiotic therapy and source control (ref 4, pg 1077; 1C)	Confirm appropriate antimicrobial therapy and source control: Tailor antimicrobial therapy as needed; Consider intravenous immunoglobulin (IVIG) and clindamycin for toxic shock; If indicated, consult surgery (e.g., foreign body, infected device, appendicitis); Modify or stop immunosuppressive therapy if appropriate. Immunocompromised: Confirm antimicrobial therapy appropriate for immunocompromised status: Per national guidelines and institutional standards.	

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4. Resuscitation/Stabilization: Appropriate, timely and effective treatment of IPSO Sepsis (h) Monitor and correct organ dysfunction		
Continuous monitoring of patient (ref 4, pg 1077; 1C) Insulin (ref 3, pg e76)	Measure urine output accurately; consider Foley placement per your institution's guidelines. Note: Foley placement increases CAUTI (Catheter-Associated Urinary Tract Infection) risk. Initiate correction of metabolic or electrolyte abnormalities: Hypoglycemia; Hyper/hyponatremia; Hyper/hypokalemia; Hypocalcemia if <2 y/o; Adrenal insufficiency. NOTE: To align with the Surviving Sepsis Campaign Pediatric Guidelines we recommend against insulin therapy to maintain glucose target at or below 140 mg/dL. ICU: Monitor end organ function: Treat acute kidney injury (AKI) or significant (20%) volume overload with diuretics or continuous renal replacement therapy (CRRT) when clinically appropriate.	2017 ACCM guidelines recommend use of a stabilization bundle. Monitor for changes in organ function.[4] 2020 SSC pediatric guidelines recommend against insulin therapy to maintain glucose target at or below 140 mg/dL.[3]
4. Resuscitation/Stabilization: Appropriate, timely and effective treatment of IPSO Sepsis (i) Address special care setting considerations		
(ref 12, pg 675-715)	Immunocompromised: Review infection risk with continued immunosuppressive therapy and/or chemotherapy treatment: Consider dose reduction or discontinuation; Evaluate need for granulocyte colony-stimulating factor (GCSF); Confirm engraftment status of transplant patients, assess for graft vs. host disease. ICU: Initiate timely nutritional support (parenteral or enteral) unless contraindicated: Consider early initiation of enteral feedings, even if the patient is on vasoactive medications. Assess rehabilitation needs: Consult support services (e.g., PT, OT, Speech, Rehab). Confer with subspecialists as appropriate	2017 PCCM guidelines recommend all patients in the PICU undergo a nutritional assessment within 48 hours of admission.[12]
5. De-escalation: Appropriate and timely de-escalation of care (all care settings, except ED) (a) Discontinue or wean treatment no longer indicated		
Best Practice Statement (BPS)	Discuss daily to evaluate the need for current treatments (e.g., vasoactive agents, mechanical ventilation, parenteral nutrition) and goals for weaning/discontinuation.	
5. De-escalation: Appropriate and timely de-escalation of care (all care settings, except ED) (b) Remove invasive devices no longer required for patient monitoring		
Best Practice Statement (BPS)	Discuss daily to evaluate need for invasive devices (urinary catheter, arterial line, central line, chest tube, drains).	
5. De-escalation: Appropriate and timely de-escalation of care (all care settings, except ED) (c) Review antibiotics daily and discontinue based on cultures and lab results if appropriate for clinical condition		
Best Practice Statement (BPS)	Involve antibiotic stewardship if available. Define duration of antibiotic therapy. Consider changing from IV to oral antibiotics if appropriate.	
5. De-escalation: Appropriate and timely de-escalation of care (all care settings, except ED) (d) Assess for delirium or withdrawal, sedation and pain medication needs		

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5. De-escalation: Appropriate and timely de-escalation of care (all care settings, except ED) (e) Assess for mobility		
	Consult PT/OT, Speech Therapy, and Child Life. Consider rehabilitative services/physical medicine consultation. Consider use of a mobility assessment tool by nursing staff.	
6. Patient and Family Engagement (a) Include families in planning and implementation teams		
Setting goals of care (ref 2, pg 523)	Engage Family Advisory Council to review sepsis risks, indicators, and recognition to determine and prioritize patient and family engagement for specific care settings. Include Family Advisor on sepsis core team to provide insight and serve as liaison to Family Advisory Council for more diverse input on patient and family education materials and additional interventions. Co-develop family facing education materials with Family Advisors and clinicians. Use health literacy and plain language guidelines. Create feedback loop to determine if family education is effective. Work with family advisors to assess culture with aim to create a supportive environment for families to escalate concerns or initiate a call for a rapid response team. Get input from patients/families on potential changes to care processes.	2016 Surviving Sepsis Campaign guidelines recommend the use of family care conferences to identify treatment goals and promote communication and understanding.[2]
6. Patient and Family Engagement (b) Family-activated Rapid Response System		
(ref 13, pg 106)	Modify existing tools with sepsis in mind. Address barriers to family activation. Survey family perceptions of their comfort to act on a family activated rapid response team. Partner with family advisory councils to determine best way to support culture of family activation. Build nurse engagement/commitment. Review outcomes of activations for learning.	2017 Guidelines for Family-Centered Care in ICUs recommend families participate as part of the interdisciplinary team to improve engagement.[13]
6. Patient and Family Engagement (c) Use storytelling to increase awareness and commitment across the organization (leadership and staff)		
(ref 13, pg 107)	Live presentations to the extent possible. Record stories if possible. Widely publicize stories in print. Consider developing an education forum with those families who might have the skills and readiness to co-teach with a sepsis team leader and share their story about the experience of patients and families and the role families can play as allies in sepsis prevention. Use inpatient champions to share stories in targeted areas. Connect with nationally known stories, e.g., Rory Staunton, Josie King.	2017 Guidelines for Family-Centered Care in ICUs recommend hospitals implement policies to promote family-centered care.[13]

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6. Patient and Family Engagement (d) Real-time discussions with family members to discuss the patient's care, provide education, answer questions, and identify concerns about care		
Setting goals of care (ref 2, pg 523)	Can be done for all cases or for a subset (e.g., transfers to PICU). Review outcomes of family-initiated rapid response team activations. Debrief with families whose children were diagnosed and treated for sepsis. Ask specific questions - did someone explain __ to you? (Create a template/script.) Provide printed materials about sepsis – how it presents, how it is diagnosed, information about treatment (antibiotics, fluids, etc.). These materials could be developed with Family Advisory Council input and given to families at the time of presentation when it is likely that the child has severe sepsis and/or later in the course of treatment. Ensure sensitivity to family's experience, address timing.	2016 Surviving Sepsis Campaign guidelines recommend the use of family care conferences to identify treatment goals and promote communication and understanding.[2]
6. Patient and Family Engagement (e) Create or engage organizational, service line, and/or care setting PFE resources		
(ref 13, pg 107)	Family Advisory Board or Panel, operations teams, patient advisors, parent-to-parent rounding (visit patients in their rooms to provide customized support).	2017 Guidelines for Family-Centered Care in ICUs recommend hospitals implement policies to promote family-centered care.[13]
6. Patient and Family Engagement (f) Ensure common understanding of PFE across the organization		
(ref 13, pg 107)	Front line staff perceptions are often most accurate; perceptions can often vary among staff.	2017 Guidelines for Family-Centered Care in ICUs recommend hospitals implement policies to promote family-centered care.[13]
7. Optimize performance (a) Develop and implement a comprehensive multi-professional education program		
Measure compliance with use of institutional bundles (ref 4, pg 1065; 1C)	Define core knowledge and key providers/target learners. Provide initial education to ensure shared understanding of science and literature as well as project and goals. Provide just-in-time education, including readily available tools for bedside caregivers. Provide ongoing education, including simulation, case review, and divisional educational conferences. Assess knowledge/competencies using pre- and post-testing.	2017 ACCM guidelines state measure adherence to trigger, resuscitation, and stabilization bundles. 2017 ACCM guidelines recommend use of a performance bundle.[4]
7. Optimize performance (b) Apply QI principles and methods		
Best Practice Statement (BPS)		

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7. Optimize performance (c) Monitor and provide feedback on compliance with identification, treatment, and de-escalation interventions to frontline staff and leadership		
Measure compliance with use of institutional bundles (ref 4, pg 1065 and 1077; 1C)		2017 ACCM guidelines state measure adherence to trigger, resuscitation, and stabilization bundles. 2017 ACCM guidelines recommend use of a performance bundle.[4]
7. Optimize performance (d) Monitor and provide feedback on compliance with HAI prevention bundles to frontline staff		
Measure compliance with use of institutional bundles (ref 4, pg 1065 and 1077; 1C)		2017 ACCM guidelines state measure adherence to trigger, resuscitation, and stabilization bundles. 2017 ACCM guidelines recommend use of a performance bundle.[4]
7. Optimize performance (e) Conduct real-time review of cases for which identification or treatment was not timely or appropriate to identify areas for improvement		
Measure compliance with use of institutional bundles (ref 4, pg 1065 and 1077; 1C)		2017 ACCM guidelines state measure adherence to trigger, resuscitation, and stabilization bundles. 2017 ACCM guidelines recommend use of a performance bundle.[4]

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Categories/Grading

System 1: Category: 1=Strong Recommendation 2=Weak Recommendation. The strength of the literature used to support these number recommendations was given a "letter" grade with A=multiple randomized controlled trials + at least one meta-analysis; B=one randomized controlled trial; C=cohort, case control studies; and D=expert opinion and case reports. These recommendations are largely based on opinion regarding the systematic review by subcommittees with editorial decision regarding content done initially by group leaders and ultimately by the chairperson.

System 2: The principles of the Grading of Recommendations, Assessment, Development, and Evaluation (GRADE) system to assess the quality of evidence from high to very low, and to formulate recommendations as strong or weak, or best practice statement (BPS) when applicable.