June 2011

Clinical Practice Guideline

Pediatric Severe Sepsis

BCCH

Clinical Practice Guideline:

Pediatric Severe Sepsis

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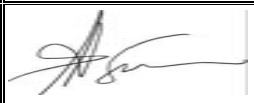
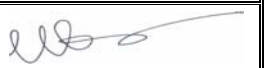
		Signature		Signature	
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Introduction

Severe sepsis and septic shock is the most common cause of death in children throughout the world. The World Health Organization's statistics show that of the approximately 9 million children that die each year worldwide, approximately 70% die from sepsis and its related complications.

In developed countries, severe sepsis remains the 4th leading cause of death in children under 1 year of age and 2nd leading cause of death in children aged 1-14 years with a mortality ranging between 12-20%. The last 15 years has seen a significant change in the epidemiology of organisms with the advent of preventative strategies such as new vaccines. Pneumococcus and hemophilus are now uncommon, and new emerging strains are becoming more common (e.g. resistant strains of staphylococcal). As a result, the sepsis syndrome has become a less common presentation in the busy pediatric emergency departments, and recognition of the septic child is often delayed. The child who presents with sepsis requires a prompt diagnosis and aggressive treatment to minimize morbidity and mortality.

The diagnosis of severe sepsis should be based on a high degree of suspicion from a targeted history and physical signs and treatment instituted as soon as the diagnosis is suspected. While laboratory confirmation of the diagnosis (microbiological, radiological etc.) may be helpful, reliance on these tests should not preclude commencing appropriate antibiotic therapy and other necessary life saving treatment. It is critical for front line paediatricians or emergency specialists faced with a child with possible sepsis to understand that pediatric septic shock differs from adults with septic shock in having a higher incidence of impaired cardiac function. This implies the earlier need for vasopressor therapy in addition to fluid therapy as essential components of resuscitation. In addition, prompt attention to the underlying etiologies and predisposing factors are necessary.

It is also important for clinicians to have an understanding of the differential diagnosis of severe sepsis in the pediatric patient. Other conditions such as disseminated viremia (adenovirus, enterovirus) and toxic shock syndrome are important to recognize. In newborn children and infants with shock, persistent fetal circulation and congenital heart disease may need to be excluded while treating sepsis empirically. In an older child, acute myocarditis may be misdiagnosed as sepsis. These other conditions require a high index of suspicion in the appropriate clinical setting and judicious and timely investigations and interventions to minimize morbidity and mortality.

These guidelines are aimed at NOT missing a child presenting with severe sepsis. Clinical suspicion of the differential diagnosis should direct the astute clinician to also investigate for alternate causes of the child's presentation, and may also require modification of the suggested algorithms presented in this guideline.

This guideline is a synthesis of contemporary knowledge of diagnosis and treatment approaches to the management of severe sepsis in children. It is linked to various tools developed for use at BCCH to guide the clinician through assessment, communication, decision-making, and interventions. Some of the tools are linked to timing sequences to help expedite the care required to mitigate undesired outcomes.

Scope and Purpose

The purpose of this guideline is to enable clinicians to appropriately recognize, manage and standardize the care delivered to infants, children or youth who have been diagnosed with or are suspected of having severe sepsis.

This guideline addresses the following questions:

1. Who is the intended patient population this guideline was developed for?
2. How and where should screening for early identification of suspected or actual severe sepsis/septic shock occur?
3. What actions should be taken in the first hour (initial resuscitation phase) once a child is identified as septic?
4. What end point goals are targeted with the above actions at the end of the first hour of resuscitation?
5. What antibiotics should be used?
6. How much fluid should be delivered?
7. What other supports should the patient receive?
8. What clinical actions should be taken in hours 1 to 6 (ongoing resuscitation phase) for a patient who has been identified as being severely septic or in septic shock?
9. What end point goals are targeted by the end of 6 hours of resuscitation?
10. What tools or supports are available to be used to assist in decision making for patient care?
11. What resources are required to implement this guideline at BCCH or other health care centres?

Target User

The British Columbia Children's Hospital (BCCH) guideline is appropriate for use by the health care team in the emergency department, the acute care inpatient setting as well as in the Pediatric Intensive Care Unit.

The guideline is available for use in other provincial health care facilities but the tools provided may require adaptation for implementation as resources and supports may vary from what is available at BCCH.

Guideline Summary of Recommendations

Severe Sepsis Improvement Bundle

The Severe Sepsis Improvement Bundle consists of a package of clinical practices that used together assist the clinician to rapidly assess and begin implementation of time sequenced interventions, based upon an approach called Early Goal Directed Therapy. It remains unclear the relative importance of individual components of the bundle but is based on the premise that use of the bundle improves outcomes.. The bundle presented here is based upon the most recent consensus guidelines published and the best evidence available in 2011. As of December 2011, there are a number of active large multicentre randomized clinical trials exploring the efficacy of different components of the bundle, in both adult and pediatric populations. At the time of the next revision of this document, there will hopefully be better evidence to more clearly define the effective bundle components.

In the bundle there is a *Sepsis Screening Tool* to be used in any clinical setting, an initial *Order Set* to be used by the physician including *Empiric Antibiotic* recommendations, a *Resuscitation Phase Algorithm,* a *Management Phase Algorithm for hours 1 to 6,* and a *Critical Care Order Set*.

The recommendations have been assigned a rating level based on the American College of Critical Care Medicine working group and the GRADES system (Grades of recommendation, assessment, development and evaluation) used by the Surviving Sepsis Campaign.

Rating System for Recommendations Taken from American College of Critical Care Medicine 2007	
Level I	Convincingly justifiable on scientific evidence alone
Level II	Reasonably justifiable by scientific evidence and strongly supported by expert critical care opinion
Level III	Adequate scientific evidence is lacking but widely supported by available data and expert opinion

Rating System for Recommendations Taken from Surviving Sepsis Campaign using the GRADE system (Grades of Recommendation, Assessment, Development and Evaluation) 2008	
Grade 1	A strong recommendation: This reflects that the desirable effects of adherence to a recommendation will clearly outweigh the undesirable effects.
Grade 2	A weak recommendation: Indicates that the desirable effects of adherence to a recommendation probably will outweigh the undesirable effects
A	Randomized Control Trial (RCT)
B	Down-graded RCT or up-graded observational studies
C	Well-done observational studies
D	Case series or expert opinion

Practice Recommendations "Screening Phase"	Level of Evidence
The Screening Patients for Sepsis Tool should be used in the following groups: 1. All pediatric patients that present to the *emergency department.* 2. All pediatric patients in PICU daily 3. Pediatric patients in the *acute inpatient setting* at BCCH and SHHC that present with a change in clinical status or a change in Escalation of Patient Care (EoPC) score. 4. All pediatric patients who present to or deteriorate in *outlying facilities* should be initially screened using the Sepsis Alert Tool. Those patients who are assessed in either the Amber (intermediate risk) or Red (high risk) categories should be further screened.	
If screening is positive for sepsis/severe sepsis then: • In emergency call for assistance and move to resuscitation area • On inpatient unit use EoPC protocol and access supports to assist with care of the patient • **It must be emphasised that all children presenting with a clinical picture of sepsis should be isolated and cared for using full barrier precautions to protect the health care worker.**	

Practice Recommendations 0 – 60 minutes "Resuscitation Phase"	
Goals to be targeted: Maintain or restore airway, oxygenation and ventilation; maintain or restore circulation as defined by normal perfusion and blood pressure; maintain or restore threshold heart rate.	Level III
Therapeutic End points: Capillary refill less than or equal to 2 seconds, normal pulses with no differential between the quality of peripheral and central pulses, warm extremities, urine output greater than 1 mL/kg/hr, normal mental status, normal blood pressure for age, normal glucose concentration. Utilize Initial Order Set	Level III Grade 2C
Monitoring: Pulse oximetry, continuous ECG, blood pressure and pulse pressure. Pulse pressure and diastolic pressure obtained via invasive arterial pressure monitoring may help to distinguish between low SVR (wide pulse pressure) and high SVR (narrow pulse pressure),temperature, and urine output Blood work: If possible take blood samples for blood culture, venous blood gas, lactate, coagulation studies, CBC, glucose, electrolytes, BUN and creatinine when establishing venous access ideally before antibiotic administration but *should not be delayed due to difficulties in establishing venous access*. Other laboratory tests (as ordered by physician) for identification of the source of infection: urinalysis, nasopharyngeal wash for rapid respiratory panel (VIRAP), chest x-ray, etc.	Level III Grade 1C
Consider PICU Consultation – see algorithm	
Airway and Breathing: Apply oxygen. Airway and breathing should be closely monitored. Lung compliance and work of breathing may change precipitously. Intubation may be required for worsening respiratory distress, ongoing hemodynamic instability or decreasing LOC. Ketamine in reduced doses (0.5-1mg/kg) and Rocuronium (1mg/kg) or Succinylcholine (2mg/kg) are appropriate medications for intubation. A moribund child may require no medication. End tidal CO_2 monitoring is essential to confirm ETT is placed in the trachea. A CXR is always required to confirm ETT position in relation to the carina. Whenever possible vascular volume loading and peripheral or central inotropic/vasoactive drug support is recommended before and during intubation because of relative or absolute hypovolemia, cardiac dysfunction, and risk of suppressing endogenous stress hormone response with agents that facilitate intubation.	Level III Level III

Circulation: Vascular access should be rapidly obtained (5 mins or 3 attempts) Establish intraosseous access (IO) if reliable venous access cannot be obtained in 5 minutes or 3 attempts. Fluid Resuscitation: Rapid boluses of 20 mL/kg (isotonic crystalloid or 5 % albumin) can be administered by push or rapid infusion device while observing for signs of fluid overload (increased work of breathing, rales, gallop rhythm or hepatomegaly). Children with severe sepsis commonly require 40 – 60 mL/kg in the first hour. (In the absence of clinical improvement and a confirmed diagnosis of septic shock, repeated boluses can be administered up to as much as 200 mL/kg in the first few hours) A 5% dextrose containing isotonic IV solution can be run at maintenance intravenous rates to provide age appropriate glucose delivery and to prevent hypoglycaemia. In the fluid refractory patient, begin an inotrope (low dose adrenaline) infusion. If the infusion is to be infused through a peripheral IV the inotrope must be delivered as either a dilute solution or with a carrier solution at a low rate to assure that it reaches the heart in a timely fashion. *Peripheral adrenaline infusion dose: 0.01 to 0.15 micrograms/kg/min* If the child has a pre-existing central vascular access device (e.g. Oncology or ward patient), or Intraosseous device (IO) this would be the preferred route for vasopressor infusions. *Central adrenaline infusion dose: 0.01 to 0.3 micrograms/kg/min.*	Level II Level II & Grade 2C Level II
Antibiotics: Administer antibiotics within the first 30 minutes of identification ideally after blood cultures are obtained but *should not be delayed due to difficulties in establishing venous access*. Refer to the Empiric Antibiotic Treatment Guide	Grade ID
Hydrocortisone Therapy: If a child remains in shock despite an adrenaline infusion, hydrocortisone can be administered, preferably after obtaining a blood sample for determination of baseline cortisol concentration (to exclude relative or absolute cortisol deficiency).	Level III Grade 2C
Protein C and Activated protein C: Not recommended	Grade 1B
Deep Vein Thrombosis (DVT) Prophylaxis: Prophylaxis is recommended for postpubertal children with severe sepsis. DVTs occur in approximately 25% of children with a femoral central venous catheter.	Grade 2C
Arrange transfer to PICU for continued care if patient condition warrants	
PICU Recommendations 1 – 6 hours "Management Phase"	
All patients with a diagnosis of severe sepsis should receive a complete head to toe assessment, with a specific focus on identifying the source of infection.	Grade 1C

Use the Severe Sepsis/Septic Shock Management Algorithm hour 1 – 6 to direct therapeutic interventions for care of the patient once Severe Sepsis/Septic Shock Resuscitation Algorithm 0 – 1 hr is complete.	
Goals to be targeted for the unintubated patient: Normalized vital signs: cap refill ≤ 2 seconds, normal pulses, warm extremities, urine output > 1mL/kg/hour and a normal pre-septic mental status An $Scv0_2$ > 70% (if central venous access available) Goals to be targeted for the intubated patient: Normalized VS: cap refill ≤ 2 seconds, normal pulses, warm extremities, urine output > 1mL/kg/hour and a normal pre-septic mental status (this will be altered if sedation or paralyzing agents have been administered) An $Scv0_2$ > 70% Utilize Critical Care Order Set	Level III
Monitoring: Pulse oximetry, continuous ECG, continuous intra-arterial blood pressure, temperature (core), urine output, central venous pressure/$Scv0_2$ saturation, end tidal CO_2. Blood work: Serial venous blood gases, lactate, coagulation studies, CBC, glucose/glucometer, electrolytes, BUN, creatinine and any other investigations ordered by physician, depending on response to therapy.	Level III
Other Investigations: Cardiac ECHO to assess cardiac function Other investigations at the discretion of the critical care physician to exclude other diagnoses in the differential.	Level II
Hemodynamic Support: Ongoing fluid replacement may be required due to ongoing hypovolemia secondary to diffuse capillary leak. Use vasopressor, inotropic or inodilator therapy according to the clinical state of the child (cold or warm shock, fluid refractory, catecholamine refractory). Cardiorespiratory failure not responding to conventional therapies may require extra corporeal life support (ECLS).	Level II Level II Grade 2C
Antibiotics: Reassess antimicrobial therapy after final culture result reported/consult ID early; usual course is typically 7 – 10 days for confirmed bacterial sepsis. If a viral etiology is confirmed and bacterial cultures are negative, antibiotics should be discontinued.	Grade 1C & Grade 1D
Sedation/Analgesia: Appropriate sedation and analgesia are the standard of care for children who are mechanically ventilated; there is no data to support any particular drug or regimen	Grade 1D

Appendices

Appendix A: Methods

i. Acknowledgements

This group would like to acknowledge the many other health care professionals who contributed to the development of this guideline by sharing their expert opinion and by acting as reviewers. We would also like to acknowledge JP Collet, MD PhD Clinical Professor and Associate Head of Research, Department of Pediatrics, UBC, Associate Director Quality and Safety Evaluation and Mir Kaber Mosavian Pour PhD student for their assistance in development of the framework to use for guideline development.

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iv. Literature search strategy

The BCCH working group was aware that pre-established international guidelines for identification and treatment of pediatric septic shock had been developed and implemented successfully in 2002 and revised in 2007. Using search words such as sepsis, septic shock, infection, septicaemia and American College of Critical Care Medicine in MEDLINE and CINAHL a thorough search was done to locate the most recent pre-existing published guidelines. The group's decision was to include only these pre-existing guidelines as they contained a thorough literature search, and the evidence had been graded and recommendations put forth. Information from The Surviving Sepsis Campaign website; http://www.survivingsepsis.org/Pages/default.aspx was also reviewed. Articles not written in English were excluded from use.

v. Development process

1. Strengths and limitations of the body of evidence

A modified Delphi method was used by the American College of Critical Care Medicine to grade any new literature published since the launch of their original 2002 guideline to create updated recommendations.

The Surviving Sepsis Campaign incorporated the Grades of Recommendation, Assessment, Development and Evaluation (GRADES) system to guide assessment of the quality of evidence from very high (A) to very low (D) and to determine the strength of recommendations. A strong recommendation indicates that an intervention's desirable effect clearly outweigh its undesirable effects or clearly do not. Weak recommendations indicate that a trade off between desirable and undesirable is less clear.

The BCCH expert group selected the recommendations made specifically for pediatric patients. Where no recommendation could be made for the pediatric population, adult recommendations

were considered and consensus was reached amongst clinical experts in critical care and emergency medicine.

2. Methods for formulating the recommendations

Based on the information listed above in the inclusion/exclusion section all pediatric recommendations were accepted by the BCCH expert working group. Recommendations requiring local adaptation (e.g. medication calculations for pharmacy) were adapted by seeking advice and consensus from clinical experts within BCCH.

vi. Views and preferences of the target population

The BCCH interdisciplinary expert working group identified an opportunity to improve patient care by initiating an aggressive treatment protocol early in the hospital course of patients who have been identified as having severe sepsis.
The views and preferences of the target population have not been sought.

vii. Date of guideline

The original BCCH Severe Sepsis Guideline, released in 2006, was adapted from the adult severe sepsis bundles practiced within the Canadian ICU Collaborative by a group of clinical experts at BCCH who had conducted an extensive review of the pediatric sepsis literature available at that time. In 2008 the BCCH Severe Sepsis Guidelines were reviewed and adapted by a group of BCCH clinical experts to align with the American College of Critical Care Medicine's 2007 severe sepsis recommendations. This updated guideline was developed in response to a series of critical incidents and the recognition of the need for health care team education and improved process delivery.

viii. Guideline update: procedure for updating the guideline

This guideline will be reviewed every 3 years (or earlier if new evidence is published) by a panel of clinical experts at BCCH from the critical care, emergency and acute inpatients units. This guideline will be reviewed again in 2014.

Appendix B: Cost utility, cost effectiveness, acquisition costs, and implications for budgets

There are no identified financial resources required to implement this guideline at BCCH because as a quaternary health care centre all medications, equipment and staff required to care for patients with multi-organ involvement is in place. Paid time of physician champions, clinical educators and quality safety leaders to support staff through the learning phase is an extra cost. Edu-quick resource modules have been developed and will be located in the clinical areas as an extra support for staff.

Other centres who wish to implement these guidelines will have to consider costs for necessary equipment such as cardio-respiratory monitoring equipment, ventilatory supports such as

ventilators and endotracheal tubes, availability of laboratory testing with "stat" results reporting (point of care), the medications required for treatment, and either the clinical experts in medicine, nursing and respiratory therapy who have the proper training, experience and who demonstrate use of professional judgment or the funds to support the education of those individuals required to provide care.

Appendix C: Conflicts of interest

There are no conflicts of interest to report; no members of the guideline development team are involved in any research or promotional activities for outside companies.

Appendix D: Tools and resources necessary for implementation

Procedures: See **Screening Patients for Sepsis Tool**
See Initial **Order Set**; **Critical Care Order Set**

Algorithms: See **Severe Sepsis/Septic Shock Resuscitation Phase 0 -1 hour Algorithm**
Severe Sepsis/Septic Shock Maintenance Phase 1 – 6 hours Algorithm

Other Resources: See **Empiric Antibiotic Guideline**
Sepsis Alert Tool

Training and learning packages: Available upon request: dscott6@cw.bc.ca

These are available for use at other centers; tools may be adapted to suit the learning needs of the intended audience.

Appendix E: Barriers, guideline utilization, and quality indicators

Barriers

It is an expectation that this guideline will be used to assess and treat all patients who are suspected or diagnosed with severe sepsis. As with any guideline personal preference by practitioners is a potential barrier to effective roll-out across an organization. To mitigate this risk guideline champions (change agents) in all disciplines will be engaged early in the process of implementation to be role models and mentors to fellow colleagues. A multi-phased educational strategy that aims at creating awareness and interest, building knowledge and commitment, promoting action and adoption and pursuing integration and sustainability is recommended to be used (Cullen 2011).

Competing interests or other organizational projects are also a barrier to application. Many other quality assurance/improvement projects are underway in most organizations and in many individual programs in hospitals. Communicating with other project leaders to stagger the timing of rollout/implementation to avoid over loading practitioners would be advisable.

Another potential barrier to application could be the clinical setting the patient presents to (required equipment not available) or the skill level of those present to be able to assess and care for the patient.

Guideline Utilization

The guideline and tools were initially designed to be used in the emergency, PICU and inpatient units at BCCH by physicians and nurses. The guideline is available for use in other facilities but the tools provided may require adaptation for implementation as resources and supports may vary from what is available at BCCH.

Various tools have been developed for use at BCCH to guide the clinician through assessment, communication, decision-making, and interventions. A screening tool has been developed for use in the emergency department or inpatient unit to assist in the determination of a patient's status. Some of the tools are linked to timing sequences to help expedite the care required to mitigate undesired outcomes.

Appendix F: Audit criteria

Audit or measurement criteria will be collected to assist in understanding if any changes implemented are leading to an improvement. Audit criteria are one way to understand processes and systems of care. Three types of measures can be included in auditing: Outcome, Balancing and Process.

- Auditing will be done initially on a concurrent basis and then will move to a quarterly and yearly schedule once the guideline is well established.
- Process measures to capture: screening completed on all patients in emergency, daily screening of patients in PICU and screening completed on inpatient units on those patients who have a change in clinical status (Escalation of Patient Care Score); if treatment prescribed, timing of interventions (time to antibiotics, blood cultures, fluids). Compliance rate with screening and use of the guideline components will be measured (all or nothing) as well as length of stay (LOS) for both in-patient and critical care areas.

Appendix G: Disclaimer and funding source

NOTE: A printed copy of this document may not reflect the current, electronic version on the Intranet. Any documents appearing in paper form should always be checked against the electronic version prior to use. The electronic version is always the current version.

This Clinical Practice Support Document has been prepared as a guide to assist and support practice for staff working at BCCH/SHHC. While every effort has been made to ensure the accuracy of the contents at the time of publication, neither the authors nor BCCH give any guarantee as to the accuracy of the information contained in them nor accept any liability, with respect to loss, damage, injury or expense arising from any such errors or omission in the contents of this work. It is not a substitute for proper training, experience and the exercise of professional judgment.

Funding through the Children's Hospital Foundation was used to support the development of this clinical practice support document.

Appendix H: Glossary

American College of Critical Care Medicine definitions for shock	
Cold or warm shock	Decreased perfusion manifested by altered decreased mental status, capillary refill greater than or equal to 2 seconds (cold shock) or flash capillary refill (warm shock), diminished (cold shock) or bounding (warm shock) peripheral pulses, mottled cool extremities (cold shock), or decreased urine output less than 1mL/kg/hr
Fluid-refractory/dopamine- resistant shock	Shock persists despite greater than or equal to 60mL/kg fluid resuscitation (when appropriate) and dopamine infusion to 10 μg/kg/min
Catecholamine resistant shock	Shock persists despite use of the direct acting catecholamines; adrenaline or noradrenaline
Refractory shock	Shock persists despite goal-directed use of inotropic agents, vasopressors, vasodilators and maintenance or metabolic (glucose and calcium) and hormonal (thyroid, hydrocortisone, insulin) homeostasis
Infection	A suspected or proven (by positive culture, tissue stain, or polymerase chain reaction test) infection caused by any pathogen OR a clinical syndrome associated with a high probability of infection. Evidence of infection includes positive findings on clinical exam, imaging, or laboratory tests (e.g., white blood cells in a normally sterile body fluid, perforated viscus, chest radiograph consistent with pneumonia, petechial or purpuric rash, or purpura fulminans)
SIRS - Systemic Inflammatory Response	The presence of at least two of the following four criteria, one of which must be abnormal temperature or WBC count: • Core temperature of greater than 38.5°C or less than 36°C. • Tachycardia, defined as a mean heart rate greater than 2 Standard Deviations (SD) above normal for age in the absence of external stimulus, chronic drugs, or painful stimuli; or otherwise unexplained persistent elevation over a 0.5hr to 4hr time period OR for children less than 1 year old: bradycardia, defined as a mean heart rate less than 10th percentile for age in the absence of external vagal stimulus, B-blocker drugs, or congenital heart disease; or otherwise unexplained persistent depression over a 0.5 hr time period. • Mean respiratory rate greater than 2 SD above normal for age or mechanical ventilation for an acute process not related to underlying neuromuscular disease or the receipt of general anesthesia. • WBC elevated or depressed for age (not secondary to chemotherapy-induced leucopenia) or greater than 10% immature neutrophils.

Sepsis	**Sepsis** SIRS in the presence of or as a result of suspected or proven infection. **Severe sepsis** Severe sepsis occurs upon failure or dysfunction of at least one organ.
Organ Dysfunction	**Cardiovascular dysfunction** Despite administration of isotonic intravenous fluid bolus greater than or equal to 40 mL/kg in 1 hr • Decrease in BP (hypotension) less than 5th percentile for age or systolic BP less than 2 SD below normal for age **OR** • Need for vasoactive drug to maintain BP in normal range (dopamine greater than 5 µg/kg/min or dobutamine, adrenaline, or noradrenaline at any dose) **OR** • Two of the following Unexplained metabolic acidosis: base deficit greater than 5.0 mEq/L Increased arterial lactate greater than 2 times upper limit of normal Oliguria: urine output less than 0.5 mL/kg/hr Prolonged capillary refill: greater than 4 seconds Core to peripheral temperature gap greater than 3^{o}C or palpable difference **AND** • Femoral - dorsalis pedis pulse gradient - no difference ++ - weak DP + - absent DP 0 **Respiratory** • PaO_2/FiO_2 < 300 in absence of cyanotic heart disease or pre-existing lung disease **OR** • $PaCO_2$ greater than 65 mmHg or 20 mm Hg over baseline $PaCO_2$ **OR** • Proven need or greater than 50% FiO_2 to maintain saturation greater than or equal to 92% • Need for non-elective invasive or non-invasive mechanical ventilation **Neurologic** • Glasgow Coma Score less than or equal to 11 **OR** • Acute change in mental status with a decrease in Glasgow Coma Score greater than or equal to 3 points from abnormal baseline **Hematologic** • Platelet count less than 80,000/mm^3 or a decline of 50% in platelet count from highest value recorded over the past 3 days **OR** • Coagulation: International normalized ratio (INR) greater than 2 **Renal** • Serum creatinine greater than or equal to 2 times upper limit of normal for age or 2-fold increase in baseline creatinine **Hepatic** • Total bilirubin greater than or equal to 70micromoles/L (not applicable

	for newborn) **OR** • ALT 2 times upper limit of normal for age

CTAS : Abnormal Heart Rate and Respiratory Rate by Age Groups (CTAS 2008)
(Canadian Triage and Acuity Scale)

Age Group	Birth – 3 mo	3 mo - 6mo	6 mo – 1 yr	1 yr – 3 yr	6 yr	=>10 yr
HR	<90 or >180	<80 or >160	<80 or >140	<75 or >130	<70 or >110	<60 or >90
RR	<30 or >60	<30 or >60	<25 or >45	<20 or >30	<16 or >24	<14 or >20

Table 1: Abnormal Values by Age Groups
Goldstein B, Giroir B, Randolph A: International pediatric sepsis consensus conference: definitions for sepsis and organ dysfunction in pediatrics. Pediatr. Crit. Care Med 2005, 6(1):2-8.

Age Group	0 days-1 wk	1wk-1 mo	1 mo-1 yr	1 yr-5 yr	5 yrs-12 yrs	12 yrs-18 yrs
WBC	>34	>19.5 or <5	>17.5 or <5	>15.5 or <6	>13.5 or <4.5	>11 or <4.5
Systolic BP	<65	<75	<90	<90	<100	<110
MAP		<55	<60	<65	<65	<65

Modified Delphi	The modified Delphi begins with a carefully selected open-ended questionnaire that is given to a panel of selected experts to solicit specific information about a subject or content area. In subsequent rounds of the procedure, participants rate the relative importance of individual items and also make changes to the phrasing or substance of the items. Through a series of rounds (typically three) the process is designed to yield consensus.
Outcome Measures	These measures indicate whether changes are leading to improvement and achieving the overall aim of the project.
Balancing Measures	These measures help a team to understand the effect of their changes on the broader system and to understand relationships, interactions and subsequent trade-offs between measures. It helps ensure that a change to improve one part of a system does not cause new problems to other parts of the system.
Process Measures	These measures indicate whether a specific change is having its intended effect. Changes to several processes in a system may be needed to affect an improvement in the overall aim of a project. The assumption is that improvements in the process measures will eventually improve the outcome measure.

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ADDRESSOGRAPH

Patient Screening for Sepsis

Complete screen progressing from A to B to C as positive for each

Screened: ☐ increase in Escalation of Patient Care Score (EoPC) ☐ Increase in acuity

Date: _____ Time: _____ Screen completed by: _____

A **INFECTION** – Does the patient have any of the following infection criteria or risks?

- ❑ **History of Fever**
- ❑ **Anti-Infective Therapy** (antibiotics/antivirals)
- ❑ **Myelosuppressed or Immunosuppressed**
- ❑ **Indwelling Medical Device(s):**e.g. Central Line, VP shunt, invasive airway
- ❑ **Recent surgery/Invasive Procedure/Hospitalization**
- ❑ **Suspected Perforated Organ** e.g. appendix
- ❑ **Chest**: cough, increased work of breathing
- ❑ **Neuro**: decreased mental alertness, stiff neck, headache
- ❑ **Urine**: dysuria, frequency, odour
- ❑ **Skin**: cellulitis, wound, rash
- ❑ **Abdomen**: pain. peritonism
- ❑ **Musculoskeletal**: inflamed joint

AND

B **SIRS (systemic inflammatory response syndrome)** — Does the patient have 2 of these criteria? **(One of which must be either *temperature* or *WBC*)**.

**For immunosuppressed patients, may accept any 2 criteria.*

- ❑ **Temperature –**greater than 38.5°C or less than 36°C?
- ❑ **WBC count -** abnormal for age (see reverse) or greater than 10% bands? (not secondary to chemotherapy)
- ❑ **Heart Rate -** abnormal for age? (see reverse)
- ❑ **Respiratory Rate -** abnormal for age? (see reverse)

YES ☐ **Notify charge nurse** (consider physician assessment)

AND

Continue to Assess

NO ☐ **Sepsis may still be a concern**
Continue to provide care and re-assess

AND

C **ACUTE ORGAN DYSFUNCTION -** Does the patient have *cardiac or respiratory* involvement?

- ❑ **Cardiovascular-** Is perfusion altered (capillary refill greater than 2 seconds; core to peripheral temperature difference; decreased peripheral pulses compared to central pulses) or blood pressure (BP) abnormal for age?(see reverse)

OR

- ❑ **Respiratory –** Increasing O_2 requirements to maintain SpO_2 greater than 90% or need mechanical ventilation

If there is no cardiovascular or respiratory organ dysfunction then there must be *2 out of 5* of the other systems involved to meet the severe sepsis definition.

- ❑ **Neurological –** Glasgow coma scale score less than or equal to 11 or a drop in score of 3 or more?
- ❑ **Renal -** Low urine output e.g. less than 1 mL/kg/hr despite adequate fluid intake?
- ❑ **Hematologic -** Low platelet count (less than 80,000/mm^3) or PT/PTT greater than upper limit of normal?
- ❑ **Metabolic -** Low pH (e.g. pH less than 7.30) or elevated lactate (greater than 4 mmol/L)?
- ❑ **Hepatic –** Is ALT greater than 2x upper limit of normal?

If patient meets Acute Organ Dysfunction criteria IMMEDIATELY refer to Severe Sepsis/Septic Shock Resuscitation Algorithm 0 – 1 hour.

If patient does not meet above criteria consider sepsis and notify Charge Nurse (consider physician assessment).

< = less than; > = greater than

Created 08/08; Revised 07/11; 09/11

CTAS : Abnormal Heart Rate and Respiratory Rate by Age Groups (CTAS 2008)						
Age Group	**Birth – 3 mo**	**3 mo - 6mo**	**6 mo – 1 yr**	**1 yr – 3 yr**	**6 yr**	**=>10 yr**
HR	<90 or >180	<80 or >160	<80 or >140	<75 or >130	<70 or >110	<60 or >90
RR	<30 or >60	<30 or >60	<25 or >45	<20 or >30	<16 or >24	<14 or >20

Table 1: Abnormal Values by Age Groups

Goldstein B, Giroir B, Randolph A: International pediatric sepsis consensus conference: definitions for sepsis and organ dysfunction in pediatrics. Pediatr. Crit. Care Med 2005, 6(1):2-8.

Age Group	**0 days-1 wk**	**1wk-1 mo**	**1 mo-1 yr**	**1 yr-5 yr**	**5 yrs-12 yrs**	**12 yrs-18 yrs**
WBC	>34	>19.5 or <5	>17.5 or <5	>15.5 or <6	>13.5 or <4.5	>11 or <4.5
Systolic BP	<65	<75	<90	<90	<100	<110
MAP		<55	<60	<65	<65	<65

Definitions:

Infection: A suspected or proven (by positive culture, tissue stain, or polymerase chain reaction test) infection caused by any pathogen OR a clinical syndrome associated with a high probability of infection. Evidence of infection includes positive findings on clinical exam, imaging, or laboratory tests (e.g., white blood cells in a normally sterile body fluid, perforated viscus, chest radiograph consistent with pneumonia, petechial or purpuric rash, or purpura fulminans).

Systemic Inflammatory Response Syndrome (SIRS): The presence of at least two of the following four criteria, one of which must be abnormal temperature or WBC count:

- Core temperature of greater than 38.5°C or less than 36°C.
- WBC count elevated or depressed for age (not secondary to chemotherapy-induced leukopenia) or greater than 10% immature neutrophils (bands) (see Table 1).
- Tachycardia, defined as a mean heart rate greater than 2 Standard Deviations (SD) above normal for age (see Table 1) in the absence of external stimulus, chronic drugs, or painful stimuli; or otherwise unexplained persistent elevation over a 0.5 hr to 4hr time period OR for children less than 1 year old: bradycardia, defined as a mean heart rate less than 10th percentile for age in the absence of external vagal stimulus, B-blocker drugs, or congenital heart disease; or otherwise unexplained persistent depression over a 0.5 hr time period.
- Mean respiratory rate greater than 2 SD above normal for age (see Table 1) or mechanical ventilation for an acute process not related to underlying neuromuscular disease or the receipt of general anesthesia.

Sepsis: SIRS in the presence of or as a result of suspected or proven infection.

Severe sepsis: Severe sepsis occurs upon failure or dysfunction of at least one organ. (see Section C on Screening Tool)

Septic shock: Septic shock is often defined by hypotension in the setting of severe sepsis that is unresponsive to fluid resuscitation. *In children, Septic Shock can occur without the presence of systemic hypotension.*

WBC: white blood cells

°C: degrees centigrade

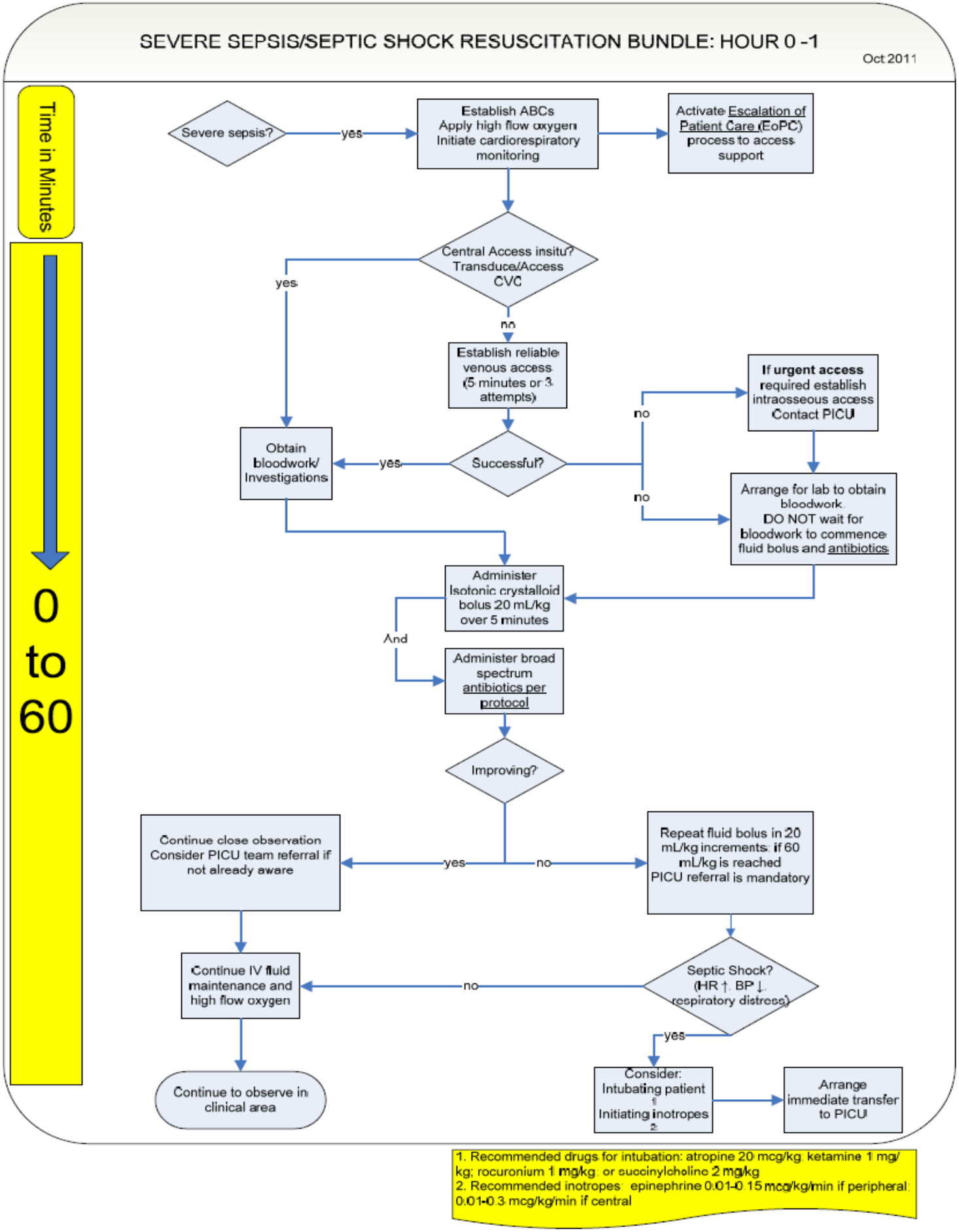
MAP: Mean Arterial Pressure

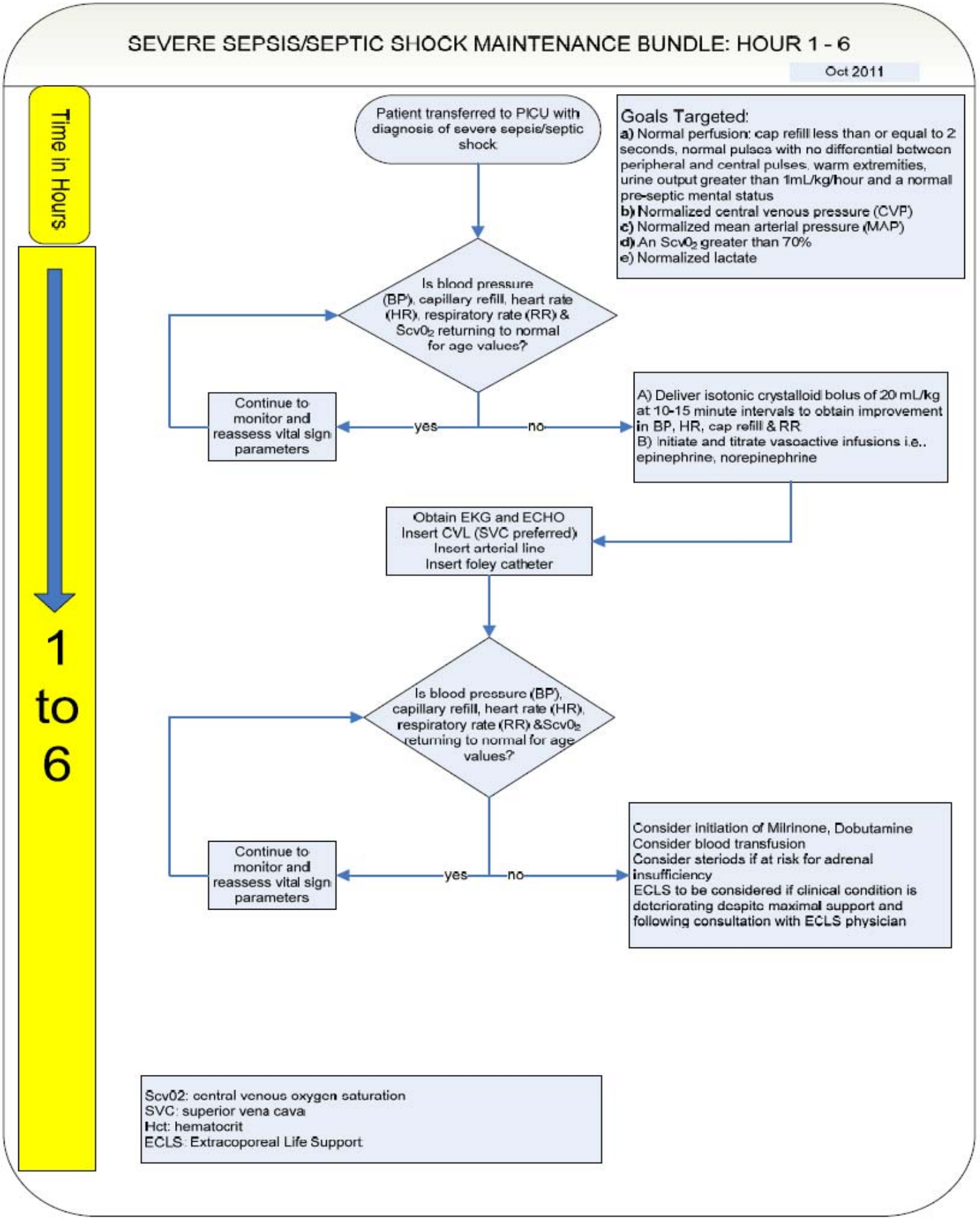
SpO_2: oxygen saturation

PT/PTT: prothrombin time/partial prothrombin time

mmol/L: millimols/litre

Created 08/08; Revised 07/11; 09/11


SEVERE SEPSIS/SEPTIC SHOCK RESUSCITATION BUNDLE: HOUR 0 -1
Oct 2011
Time in Minutes
0 to 60
Severe sepsis?
yes
Establish ABCs
Apply high flow oxygen
Initiate cardiorespiratory monitoring
Activate Escalation of Patient Care (EoPC) process to access support
Central Access insitu? Transduce/Access CVC
yes
no
Establish reliable venous access (5 minutes or 3 attempts)
Successful?
yes
no
Obtain bloodwork/ Investigations
If urgent access required establish intraosseous access Contact PICU
Arrange for lab to obtain bloodwork DO NOT wait for bloodwork to commence fluid bolus and antibiotics
Administer Isotonic crystalloid bolus 20 mL/kg over 5 minutes
And
Administer broad spectrum antibiotics per protocol
Improving?
yes
no
Continue close observation Consider PICU team referral if not already aware
Repeat fluid bolus in 20 mL/kg increments: if 60 mL/kg is reached PICU referral is mandatory
Septic Shock? (HR ↑, BP ↓, respiratory distress)
no
yes
Continue IV fluid maintenance and high flow oxygen
Consider: Intubating patient [1] Initiating inotropes [2]
Arrange immediate transfer to PICU
Continue to observe in clinical area
1. Recommended drugs for intubation: atropine 20 mcg/kg; ketamine 1 mg/kg; rocuronium 1 mg/kg; or succinylcholine 2 mg/kg
2. Recommended inotropes: epinephrine 0.01-0.15 mcg/kg/min if peripheral; 0.01-0.3 mcg/kg/min if central


SEVERE SEPSIS/SEPTIC SHOCK MAINTENANCE BUNDLE: HOUR 1 - 6
Oct 2011
Time in Hours
1 to 6
Patient transferred to PICU with diagnosis of severe sepsis/septic shock
Goals Targeted:
a) Normal perfusion: cap refill less than or equal to 2 seconds, normal pulses with no differential between peripheral and central pulses, warm extremities, urine output greater than 1mL/kg/hour and a normal pre-septic mental status
b) Normalized central venous pressure (CVP)
c) Normalized mean arterial pressure (MAP)
d) An $ScvO_2$ greater than 70%
e) Normalized lactate
Is blood pressure (BP), capillary refill, heart rate (HR), respiratory rate (RR) & $ScvO_2$ returning to normal for age values?
yes
Continue to monitor and reassess vital sign parameters
no
A) Deliver isotonic crystalloid bolus of 20 mL/kg at 10-15 minute intervals to obtain improvement in BP, HR, cap refill & RR
B) Initiate and titrate vasoactive infusions i.e.. epinephrine, norepinephrine
Obtain EKG and ECHO
Insert CVL (SVC preferred)
Insert arterial line
Insert foley catheter
Is blood pressure (BP), capillary refill, heart rate (HR), respiratory rate (RR) &$ScvO_2$ returning to normal for age values?
yes
Continue to monitor and reassess vital sign parameters
no
Consider initiation of Milrinone, Dobutamine
Consider blood transfusion
Consider steriods if at risk for adrenal insufficiency
ECLS to be considered if clinical condition is deteriorating despite maximal support and following consultation with ECLS physician
Scv02: central venous oxygen saturation
SVC: superior vena cava
Hct: hematocrit
ECLS: Extracoporeal Life Support

BC CHILDREN'S HOSPITAL
An agency of the Provincial Health Services Authority

PRESCRIBER'S ORDERS

INPATIENT/EMERGENCY DEPARTMENT FOR PATIENTS WITH SUSPECTED SEPSIS

DATE ___/___/_____ TIME ___:___ HOURS
DD MM YYYY

WEIGHT_____ kilograms | HEIGHT_____ centimetres | □ ALLERGY CAUTION sheet reviewed

Pharmacy Use Only

REFER TO STABLE/UNSTABLE ORDER SET FOR FEVER/NEUTROPENIA
WRITE FIRMLY WITH A BALLPOINT PEN

Noted by RN/UC

Investigations: STAT
☑ establish IV access
☑ blood culture
☑ blood gas (venous)
☑ lactate
☑ CBC
☑ glucose and bedside glucose
☑ coagulation Profile: PT/PTT, INR
☑ electrolytes, BUN, creatinine,

Other:
❒ group & screen/cross match
❒ ALT
☑ chest X-ray
❒ other X-ray _____
☑ naso-pharyngeal wash (NPW) for rapid respiratory panel (VIRAP)
☑ urinalysis
☑ urine for culture & sensitivity
❒ other cultures: _____
❒ consult Critical Care

General Orders:
☑ high flow oxygen
☑ strict intake and output

Fluid therapy:
❒ 0.9% sodium chloride (NS) bolus of 20 mL/kg over 5 minutes
❒ repeat in 20 mL/kg increments if abnormal CVS parameters persist
❒ if 60 mL/kg of fluid is given **mandatory** PICU consult
❒ other_____

Medications:
Antibiotics *STAT - within 20 minutes (Empiric Antibiotic Guide on reverse)*
Consult Infectious Diseases for any Severely Septic Patient

1. _____
2. _____
3. _____

include drug name, (dose/kg formula), total dose, frequency, route

If Mean Arterial Pressure (MAP) is persistently at or below age related guideline despite fluid therapy **begin Epinephrine Infusion; initiated by critical care**

❒ Epinephrine at _____ micrograms (mcg)/kg/min IV:

Peripheral -0.01-0.15 mcg/kg/min; *Central* -0.01- 0.3 mcg/kg/min

CTAS : Abnormal Heart Rate and Respiratory Rate by Age Groups (CTAS 2008)

Age Group	Birth- 3 mo	3 mo-6 mo	6 mo-1 yr	1 -3 yr	6 yrs	> 10 yrs
HR	<90 or >180	<80 or >160	<80 or >140	<75 or >130	<70 or >110	<60 or >90
RR	<30 or >60	<30 or >60	<25 or >45	<20 or >30	<16 or >24	<14 or >20

Print Name:_____ Pager #: _____

Signature: _____ College ID#:_____

mL=millilitre; kg=kilogram; min=minute; IV=intravenous; < less than; > greater than; CVS = cardiovascular system

#BCCH200
Date: August 2011

BC CHILDREN'S HOSPITAL
An agency of the Provincial Health Services Authority

PRESCRIBER'S ORDERS
INTENSIVE CARE UNIT
PATIENTS WITH SEVERE SEPSIS / SEPTIC SHOCK

DATE ___/___/_____ **TIME** ___:___ **HOURS**
DD MM YYYY

WEIGHT_____ kilograms	HEIGHT_____ centimetres	❒ ALLERGY CAUTION sheet reviewed

Pharmacy Use Only	WRITE FIRMLY WITH A BALLPOINT PEN	Noted by RN/UC

Attending Physicians

Intensivist: _____ **Infectious Diseases:** _____

Maintenance Fluids

☑ Total maintenance fluid rate of _____ millilitre (mL)/hour (hr) (80% maintenance)

❒ D10W / 0.9% NaCl for weight less than 5 kilograms (kg)

❒ D5W / 0.9% NaCl for weight greater than or equal to 5 kg

Targeted Goals

HR _____ - _____ SpO_2 _____ - _____ $S_{cv}O_2$ > _____

MAP _____ - _____ CVP _____ - _____ Urine output > _____ mL/hr

Pressure Lines

Central Venous Lines

❑ 0.9% NaCl at 1 mL/hr for weight less than 20 kg

❑ 0.9% NaCl at 2 mL/hr for weight greater than or equal to 20 kg

☑ Access and transduce surgically inserted vascular access device

☑ Add Heparin 2 units/mL to central line fluid if no other fluids running through lumen

Arterial Line

❑ 0.9% NaCl with Heparin 2 units/mL at 1 mL/hr for weight less than 20 kg

❑ 0.9% NaCl with Heparin 2 units/mL at 2 mL/hr for weight greater than or equal to 20 kg

Antibiotics (first dose STAT if not already given; refer to empiric antibiotic guidelines on reverse for drug choice and dosing)

1. _____
2. _____
3. _____

Analgesia and Sedation

❒ Acetaminophen _____ milligrams (mg) (15 mg/kg/dose) PO/PR/NG/NJ q6hr for four doses then q6hr as needed for pain or temperature greater than 38.5° Celsius

❒ Morphine 0-20 micrograms/ kilogram/ hour (mcg/kg/hr) continuous IV infusion, titrated to maintain Multidimensional assessment of pain score (MAPS) 0

❒ Morphine bolus _____ mg (0.05 mg/kg/dose) IV every 1hr as needed to maintain MAPS 0

❒ Dexmedetomidine 0.1-0.7 mcg/kg/hr continuous IV infusion, titrated to maintain State behavioural scale (SBS) -1 to 0 and MAPS 0

❒ Midazolam 0-120 mcg/kg/hr continuous IV infusion, titrated to maintain SBS -1 to 0

☑ Titration of analgesics and sedatives per ICU protocol

Print Name:_____ Pager #: _____

Signature: _____College ID#:_____

Date: November 16, 2011

BC CHILDREN'S HOSPITAL
An agency of the Provincial Health Services Authority

PRESCRIBER'S ORDERS
INTENSIVE CARE UNIT – INPATIENT ORDERS
PATIENTS WITH SEVERE SEPSIS / SEPTIC SHOCK

DATE ___/___/_____ **TIME** ___:___ **HOURS**
DD MM YYYY

WEIGHT_____ kilograms	HEIGHT_____ centimetres	❒ ALLERGY CAUTION sheet reviewed

Pharmacy Use Only	WRITE FIRMLY WITH A BALLPOINT PEN	Noted by RN/UC

Vasoactive infusions

- ❒ Epinephrine 0 – 0.2 mcg/kg/minute (min) continuous IV infusion; start at _____ mcg/kg/min
- ❒ Norepinephrine 0 – 0.2 mcg/kg/min continuous IV infusion; start at _____ mcg/kg/min
- ❒ Dopamine 0 – 10 mcg/kg/min continuous IV infusion; start at _____ mcg/kg/min
- ❒ Milrinone 0 – 0.75 mcg/kg/min continuous IV infusion; start at _____ mcg/kg/min

Investigations

❒ CXR ❒ 12 lead ECG ❒ Echocardiogram

On admission:
- ☑ Blood, urine, Naso-pharyngeal wash (NPW) cultures
- ❒ Endotracheal (if applicable) cultures
- ☑ Coagulation series (PT, PTT, INR, fibrinogen)
- ☑ Liver enzymes (AST, ALT, Alk Phos, GGT)
- ☑ Amylase, lipase
- ☑ Arterial blood gas
- ☑ Mixed venous blood gas

Other scheduled bloodwork:
- ❒ CBC, differential every _____ hour (s)
- ❒ Coagulation series every _____ hour (s)
- ❒ Liver enzymes every _____ hour (s)
- ❒ Arterial blood gas every _____ hour (s)
- ❒ Mixed venous blood gas every _____ hour (s)

Other investigations:
- ❒ _____

Miscellaneous Patient Care
- ❒ Nasogastric tube to gravity drain
- ❒ Nothing by mouth (NPO) except medications
- ❒ Foley catheter

Print Name:_____ Pager #: _____

Signature: _____College ID#:_____

ABBREVIATION	EXPLANATION OF ABBREVIATION	ABBREVIATION	EXPLANATION OF ABBREVIATION
cm	Centimeters	min	Minute
CXR	Chest xray	MAP	Mean arterial pressure
CVP	Central venous pressure	NG	Nasogastric
ECG	Electrocardiogram	NJ	Nasojejunal
HR	Heart rate	NPO	Nothing by mouth
IV	Intravenously	PO	Orally
kg	Kilogram	PR	Rectally
mL	Millilitre	SBS	State behavioural scale
MAPS	Multidimensional assessment of pain score	Sp02	Oxygen saturation
mcg	Microgram	Scv02	Central venous oxygenation saturation
mg	Milligram		

Empiric Antibiotic Guideline

NOTE: If MRSA is a consideration use vancomycin instead of cloxacillin.
Vancomycin 20 mg/kg IV X 1 dose NOW then 15 mg/kg/dose IV q6h.
Consult Infectious Disease Service for ANY Severe Sepsis Patient

	< 1 Month Old	1 – 3 Months Old	> 3 Months Old
Sepsis Unknown Source	Ampicillin + Acyclovir + [Gentamicin or Cefotaxime] Ampicillin 50 mg/kg/dose IV **NOW** and q6h (q8h if < 1 week old) **plus** Acyclovir 20 mg/kg/dose IV **NOW** and q8h (adjust for renal impairment) **plus** Gentamicin 2.5 mg/kg/dose IV **NOW** and q8h (q12h if < 1 week old) **OR** Ampicillin 50 mg/kg/dose IV **NOW** and q6h (q8h if < 1 week old) **plus** Acyclovir 20 mg/kg/dose IV **NOW** and q8h (adjust for renal impairment) **plus** Cefotaxime 50 mg/kg/dose IV **NOW** and q8h (q12h if < 1 week old)	Ampicillin + Cefotaxime Ampicillin 50 mg/kg/dose IV **NOW** and q6h **plus**	Cloxacillin + Cefotaxime Cloxacillin 50 mg/kg/dose IV **NOW** and q6h (Max 2 g/dose) **plus** Cefotaxime 50 mg/kg/dose IV **NOW** and q6h (Max 2 g/dose)
CNS Suspected Source			Cefotaxime +/- Vancomycin Cefotaxime 75 mg/kg/dose IV **NOW** and q6h (Max 2 g/dose) **plus** Vancomycin 20 mg/kg IV X 1 dose **NOW** then 15 mg/kg/dose IV q6h
		Shunt/EVD Meropenem 40 mg/kg dose IV **NOW** and q8h (Max2g/dose) **plus** Vancomycin 20 mg/kg IV X1 dose **NOW** then 15 mg/kg/dose IV q6h	
Pneumonia Suspected Source		Cloxacillin + Cefotaxime Cloxacillin 50 mg/kg/dose IV **NOW** and q6h (Max 2 g/dose) **plus** Cefotaxime 50 mg/kg/dose IV **NOW** and q6h (Max 2 g/dose)	Cloxacillin + Cefotaxime +/- Azithromycin Cloxacillin 50 mg/kg/dose IV **NOW** and q6h (Max 2 g/dose) **plus** Cefotaxime 50 mg/kg/dose IV **NOW** and q6h (Max 2 g/dose) **plus** Azithromycin 10 mg/kg/dose PO/IV X 1 dose (Max 500 mg) then 5 mg/kg/dose PO/IV q24h (max 250 mg/dose) X 5 days
GU Suspected Source	**No known anatomical abnormalities or first presentation:** Ampicillin + Gentamicin Ampicillin 50 mg/kg/dose IV **NOW** and q6h (q8h if < 1 week old) **plus** Gentamicin 2.5 mg/kg/dose IV **NOW** and q8h (q12h if < 1 week old) **Known abnormality of GU tract:** Piperacillin + Gentamicin Piperacillin 75 mg/kg/dose IV q6h (q8h if < 1 week old) **plus** Gentamicin 2.5 mg/kg/dose IV q8h (q 12h if < 1 week old)	**> 1 month old:** **No known anatomical abnormalities or first presentation:** Ampicillin + Gentamicin Ampicillin 50 mg/kg/dose IV **NOW** and q6h (Max 3g/dose) **plus** Gentamicin 7 mg/kg/dose IV **NOW** and q24h **Known abnormality of GU tract:** Meropenem + Gentamicin Meropenem 20 mg/kg/dose IV **NOW** and q8h **plus** Gentamicin 7 mg/kg/dose IV **NOW** and q24h	
Skin/ Soft Tissue Suspected Source	**If Suspected Necrotizing Fasciitis:** Clindamycin + Penicillin + Gentamicin Clindamycin 5 mg/kg/dose IV **NOW** and q6h (q8h if < 1 week old) **plus** Penicillin 50 000 units/kg/dose IV **NOW** and q6h (q8h if < 1week old) **plus** Gentamicin 2.5 mg/kg/dose IV **NOW** and q8h (q12h if < 1 week old) **If Suspected Staphylococcal Toxic Shock:** Vancomycin + Cefotaxime Vancomycin 15 mg/kg IV **NOW** and q8h (q12h if < 1 week old) **plus** Cefotaxime 50 mg/kg/dose IV **NOW** and q8h (q12h if < 1 week old)	**> 1 month old:** **If Suspected Necrotizing Fasciitis:** Clindamycin + Penicillin + Gentamicin Clindamycin 13 mg/kg/dose IV **NOW** and q8h (Max 900 mg/dose) **plus** Penicillin 65 000 units/kg/dose IV **NOW** and q4h (Max 4 million units/dose) **plus** Gentamicin 7 mg/kg/dose IV **NOW** and q24h **If Suspected Staphylococcal Toxic Shock:** Vancomycin + Cefotaxime Vancomycin 20 mg/kg IV X 1 dose **NOW** then 15 mg/kg/dose IV q6h **plus** Cefotaxime 50 mg/kg/dose IV **NOW** and q6h (Max 2 g/dose) **If Group A Strep Necrotizing Fasciitis suspected:** **Add Intravenous immunoglobulin (IVIg) 1g/kg/dose IV q24h X 2 doses** ****ordered from blood bank** **** Consult Infectious Disease prior to administration of IVIg**	
Immunocompromised/ Febrile Neutropenic Patient	Please refer to Fever/Neutropenia Empiric Antibiotic Chart		

Sepsis Alert!

	Green – low risk	Amber – intermediate risk	Red – high risk
Colour	• Normal colour of skin, lips and tongue	• Pallor reported by parent/carer	• Pale/mottled/ashen/blue
Activity	• Responds normally to social cues • Content/smiles • Stays awake or awakens quickly • Strong normal cry/not crying	• Not responding normally to social cues • Wakes only with prolonged stimulation • Decreased activity • No smile	• No response to social cues • Appears ill to a healthcare professional • Does not wake or if roused does not stay awake • Weak, high-pitched or continuous cry
Respiratory		• Nasal flaring • Tachypnoea: RR > 50 breaths/minute, age 6–12 months RR > 40 breaths/minutes, age > 12 months • Oxygen saturation ≤ 95% in air • Crackles	• Grunting • Tachypnoea: RR > 60 breaths/minute • Moderate or severe chest indrawing
Hydration	• Normal skin and eyes • Moist mucous membranes	• Dry mucous membranes • Poor feeding in infants • CRT ≥ 3 seconds • Reduced urine output	• Reduced skin turgor
Other	• None of the amber or red symptoms or signs	• Fever for ≥ 5 days	• Age 0–3 months, temperature ≥ 38 °C • Age 3–6 months, temperature ≥ 39 °C
		• Swelling of a limb or joint • Non-weight bearing/not using an extremity	• Non-blanching rash • Bulging fontanelle • Neck stiffness • Status epilepticus • Focal neurological signs • Focal seizures
		• A new lump > 2 cm	• Bile-stained vomiting

CRT = capillary refill time; RR = respiratory rate.