SEPSIS - EARLY IDENTIFICATION and TREATMENT USING CERNER EHR - PROTOCOL

Summary of Changes

	NEW	Previous
All Sites	This protocol is to be used in conjunction with the **Cerner EHR** embedded clinical decision support system, which has two components: 1) an electronic surveillance system (**St John's Sepsis Agent**) that alerts nurses and medical staff based on clinical indicators of sepsis and SIRS, and 2) adult and pediatric **Sepsis Power Plans** with the **Sepsis Advisor.** The combination of Power Plans and Sepsis Advisor provides clinical decision support and orders for antibiotics, diagnostics, lab investigations, fluid therapies, consults and patient care based on best practice standards.	
	3 and 6 Hour Goals and Interventions based on Surviving Sepsis Campaign. **See TABLE 1.**	
VCH		VA PPO, RHS PPO
PHC		Sepsis guideline and algorithm
PHSA		BCCH Sepsis guideline and algorithm

Sepsis Early Identification and Treatment Using the CERNER EHR Protocol

SIRS/Sepsis/Septic Shock Identification and Treatment Algorithm

Nurse documents vital signs in EHR

Was an EHR Alert triggered?

- **YES** → EHR Sepsis/Septic Shock Alert to Nurse and Medical Staff
- **YES** → EHR SIRS Alert to Nurse
- **NO** → No EHR Alert

Nurse
- Reviews and confirms patient vitals signs & results
- Selects "Dismiss the alert"
  - Notify Medical Staff directly
- Document provider notification through Provider Notification Task (PNT) and complete PNT
- Documents in Iview
Adult ED RN can launch the NIP ED Sepsis Triage Powerplan for adult patients

Nurse Are you suspicious of Sepsis?

- **YES** →
- **NO** →
  - Continue to monitor
  - Consult with PCC/CNL/Delegate

Medical Staff (excluding ED)
Receive notification/Alert notification from Nurse or Open Chart Alert

Launch Sepsis Power Plan

Adult Power Plan	**Pediatric** Power Plan
- Fluids	- Fluids
- Blood work	- Blood work
- Diagnostics	- Diagnostics
- Labs	- Labs
- Vasoactives	- Vasoactives
Sepsis Advisor	Sepsis Advisor
- Antibiotics	- Antibiotics

Acknowledge; Dismiss 48 Hours for All

Complete assessment, if not already done

Open Chart for Review

Opens the patient's chart for the medical staff

If Medical Staff have not entered a sepsis diagnosis, activated a Sepsis PowerPlan, or placed an order for an antimicrobial, contained within the Sepsis Advisor, they will receive a **Closed Chart Alert**

Close Chart; Dismiss 24 Hours for Me	Acknowledge; Dismiss 48 hours For All	Launch (Adult or Pediatric) Sepsis Power Plan

Adult and Pediatric Goals and Interventions

0 – 3 hour plan
Aim to complete in first hour, if possible

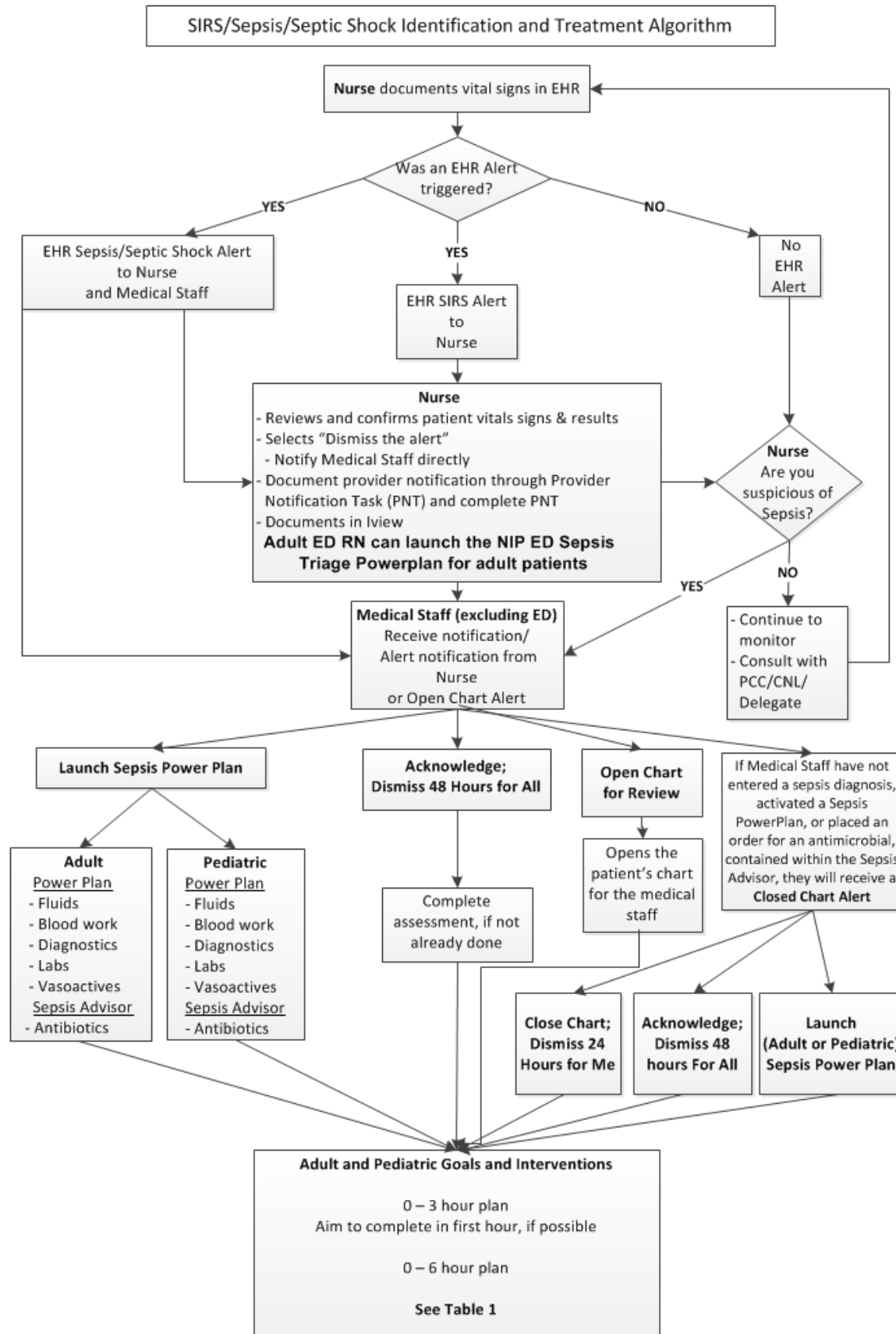0 – 6 hour plan

See Table 1

TABLE 1: Adult and Pediatric Goals and Interventions

3 HOUR PLAN Adult and Pediatric Goals and Interventions	6 HOUR PLAN pg 3 Adult and Pediatric Goals and Interventions
GOALS	

Complete as many of the following goals in **the first hour** as possible. Goals not attained in the first hour should be completed within the first 3 hours.
 	
a. Frequent **Assessment & Monitoring**
b. **Airway & Breathing:** maintain or restore airway, oxygenation, and ventilation.
c. **IV Access:** establish IV access as soon as possible.
d. **Fluid & Resuscitation:**
  - Maintain or restore circulation as defined by age appropriate norms for blood pressure;
  - Administer crystalloids for hypotension and/or lactate greater than or equal to 4mmol/L;
  - Consider vasopressors and Critical Care consult if unresponsive to initial fluid resuscitation.
e. **Blood cultures, bloodwork and other tests:**
  - Obtain cultures prior to antibiotics, if possible, but do not delay antibiotics for more than 30 minutes to do so.
  - Measure serum lactate
  - Perform other diagnostics, labs and tests to assess end organ function and identify infection source.
f. **Antibiotics:** administer broad spectrum antibiotics within <u>THE FIRST HOUR</u> if possible.
	If any 3 Hour Plan goals and interventions are not achieved by this point, complete those first.
	Additionally:
	
	a. Ongoing **Assessment & Monitoring:**
	  - Ongoing close monitoring of vital signs, organ and tissue perfusion.
	  - Evaluate effectiveness of fluid resuscitation, volume status and tissue perfusion.
	  - Monitor for respiratory distress due to fluid overload.
	b. **Airway & Breathing:** Optimize airway, oxygenation, and ventilation.
	c. **IV Access:** Optimize vascular access as needed.
	d. **Fluid & Resuscitation:** Continue to treat as needed.
	e. **Blood Cultures, bloodwork and other tests:**
	  - Blood cultures should already be completed.
	  - Re-measure serum lactate if initial lactate was elevated.
	  - Use other diagnostics, labs and tests to identify infection source and assess end organ function
	f. **Antibiotics:** Review choice based on test results.

ASSESSMENT AND MONITORING	
Medical Staff will • Select and Initiate treatment within 30 minutes; • Ensure the patient is assessed in person within 60 minutes; • Investigate for potential sources of infection (e.g. source control, existing lines, tubes, drains). • Consult with Critical Care, Surgery, Infectious Diseases, as required.	**Medical Staff** will • Assess effectiveness of fluid resuscitation; • Further investigate the source of infection; • Order additional diagnostics (e.g. ECHO) as applicable.

RN/RPN will
- Monitor and document:
  - vital signs (i.e., blood pressure, pulse, temperature, respiratory rate and oxygen saturation) and urine output
  - for altered tissue perfusion (e.g. capillary refill, skin temperature and colour)
  - respiratory status (i.e., breath sounds, breathing effort)
  - Level of consciousness/ neurological status (i.e., Glasgow Coma Scale [GCS] Score, delirium screening)
  - central venous pressure (CVP) and end tidal CO_2 (as applicable in Critical Care areas)
- Continuous ECG, as applicable/ordered

NOTE: If patient deteriorates further, contact Most Responsible Medical Staff (MRMS). If MRMS has not responded within 30 minutes then escalate care to the next senior medical staff. Notify nursing leader (Clinical Nurse Leader (CNL)/Patient Care Coordinator (PCC) or delegate. Activate Rapid Response or Clinical Resource Team, if available**.**

CODE BLUE: Nursing or Medical Staff will call a Code Blue as applicable

AIRWAY AND BREATHING

Medical Staff and Respiratory Therapists (within scope of practice):
- Will, as necessary, order oxygen therapy or intubation and mechanical ventilation.
- NOTE: For intubation in non-Critical Care areas, call a Code Blue.

RN/RPN will
    Provide supplemental oxygen to maintain oxygen saturation greater than 92% or as ordered.

IV ACCESS

Medical Staff or Nursing (within scope of practice and competency level) will establish and maintain IV Access (i.e., IV, CVC and/or Interosseous) to facilitate fluid resuscitation and IV antibiotic administration.

TABLE 1: Adult and Pediatric Goals and Interventions

3 HOUR PLAN Adult and Pediatric Care Interventions	6 HOUR PLAN pg 4 Adult and Pediatric Care Interventions
FLUID RESUSCITATION	

Medical Staff will
• Order crystalloid fluid resuscitation:
  o **For adults:** Rapid boluses of crystalloid fluid (30 mL/kg) to a maximum of 2 litres in 30 minutes. Reassess for fluid overload
  o **For all pediatric fluid resuscitation the rate of fluid bolus administration depends on the severity of abnormal vital signs.**
  ▪ **For Pediatrics 0 to 28 days**: Bolus 20ml/kg of crystalloid fluid rapidly within 5 minutes. Reassess BP, HR, capillary refill time, level of consciousness and for fluid overload. <u>Consult with pediatric specialist.</u>
  ▪ **For Pediatrics 29 days to 16.99 years:**
   - <u>Within 10 minutes</u>: Bolus 20mL/kg of crystalloid fluid rapidly within 5 minutes. Reassess BP, HR, capillary refill time, level of consciousness and for fluid overload. <u>Consult with pediatric specialist.</u>
   - <u>At 20 minutes</u>: If vital signs remain abnormal and no signs of fluid overload, consider ordering a 2nd bolus of 20mL/kg of crystalloid fluid. Reassess BP, HR, capillary refill time, level of consciousness and for fluid overload.
   - <u>At 30 minutes</u>: If vital signs remain abnormal and no signs of fluid overload, consider ordering a 3rd bolus of 20mL/kg of crystalloid fluid. Reassess BP, HR, and capillary refill time, level of consciousness and for fluid overload.
• Order vasopressors to maintain an age appropriate MAP if patient is unresponsive to fluid resuscitation.
<u>**NOTE:**</u> Consult Critical Care for vasoactive agent administration or continuous hemodynamic monitoring.	

RN/RPN will - • Administer crystalloid fluid boluses. Prior to and after each bolus reassess and document BP, HR, capillary refill time, level of consciousness and signs and symptoms of fluid overload. Document vital signs prior to and after completion of each fluid bolus to determine ongoing changes. • Administer vasopressors (Restricted to Critical Care areas or with appropriate Critical Care support).	
BLOOD CULTURES, BLOOD WORK AND OTHER TESTS	

Medical Staff will
• Place orders and review results in the EHR.
Orders could include:
  - Blood cultures (within 30 minutes)
  - Lactate, electrolytes, Complete Blood Count (CBC), EKG, chest x-ray, blood gases
	Medical staff will
	• Re-order lactate if initial lactate elevated.
	• Order serial venous blood gases, coagulation studies, CBC, glucose levels, electrolytes, urea, creatinine, troponin and any other investigations as applicable.
	• Order central venous oxygen (ScvO2) monitoring if central line in place.

RN/RPN will - • Collect blood and/or other specimens. • Obtain blood cultures as soon as possible (within 30 minutes) prior to giving antibiotic is preferred. • Facilitate completion of other diagnostics. • **NOTE: DO NOT DELAY** antibiotic administration for more than 30 minutes to obtain blood culture.	
ANTIBIOTICS	
Medical Staff will • Order antibiotics within 30 minutes of diagnosis of sepsis or septic shock. Contact Pharmacy or Infectious Diseases if guidance is needed.	**Medical Staff** will • Re-evaluate antibiotics based upon microbiology results. • Evaluate effectiveness of current therapies and if patient not responding as expected consider differential diagnosis.
RN/RPN will - • Obtain order for antibiotics within 30 minutes of alert/patient presentation. • Administer antibiotics ideally after blood cultures. • Do not delay antibiotics for more than 30 minutes to obtain blood cultures or because of difficulties establishing venous access. • Notify MRMS for insertion of alternate administration route (i.e. intraosseous or central venous catheter).	**RN/RPN will** - • Administer any newly ordered antibiotics.

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SEPSIS - EARLY IDENTIFICATION and TREATMENT USING CERNER EHR - PROTOCOL

1. Introduction

1.1. Focus

Sepsis is a leading cause of death in hospitalized patients. Early recognition and management of infection, hemodynamic issues and organ dysfunction associated with sepsis can improve patient outcomes and save lives.

This protocol provides guidance on early identification and standardized treatment of **systemic inflammatory response syndrome (SIRS)**, **sepsis**, and **septic shock** in adult and pediatric patients in the Emergency Department/Urgent Care Centre and inpatient setting.

This protocol is to be used in conjunction with the **CERNER EHR** embedded clinical decision support system, which has two components: 1) an electronic surveillance system (**St John's Sepsis Agent**) that alerts nurses and medical staff based on clinical indicators of sepsis and SIRS, and 2) adult and pediatric **Sepsis Power Plans** with the **Sepsis Advisor.** The combination of Power Plans and Sepsis Advisor provides clinical decision support and orders for antibiotics, diagnostics, lab investigations, fluid therapies, consults, and patient care based on best practice standards.

All SIRS and Sepsis Alerts are suppressed for:
- Ambulatory patients
- Level 3 Neonatal Intensive Care Unit (NICU) patients
- The first 4 hours patients are in the Post Anesthetic Care Unit (PACU)
- Patients with active labour order set in place
- 24 hours for inpatients with active ST Elevation Myocardial Infarction(STEMI)/Stroke
- Patients in final stages of a terminal illness (e.g. on Palliative Care Terminal Care Power Plan)
- Residential Care clients
- All facilities that use external labs

All SIRS Alerts are suppressed for
- Emergency Department patients
- Intensive Care Unit (ICU) patients
- Post open heart Cardiac Surgery PowerPlan (the suppression timeframe is variable by procedure)

Open Chart Alerts are suppressed for
- All ED providers (as they receive LaunchPoint Alerts)

1.2. Health Organization Site Applicability

This protocol applies to all Health Organizations (HO - i.e. VCH, PHC and PHSA) **medical staff** and **nurses** in Emergency Department/VCH Urgent Care Centre and inpatient care areas using the CERNER EHR.

1.3. Practice Level

Profession	Setting	Basic Skill	Advanced Skill (requiring additional education)
LPN	ED, Urgent Care Centre and Inpatient areas	• Assess and document vital signs into the appropriate section of iView • If sepsis/septic shock suspected discuss with **CNL/PCC** and if confirmed CNL/PCC to reassign patient care to RN/RPN	
RN & RPN	ED, Urgent Care Centre and Inpatient areas	• Assess and document vital signs into the appropriate section of iView • Review information to confirm results are correct • Notify Most Responsible Medical Staff (MRMS).	
Profession	Setting	Basic Skill	Advanced Skill (requiring additional education)

RN	ED & Urgent Care Centre	Core competencies and expectations of the role:
		• Oxygen to treat hypoxia
		• Venipuncture:
		   o to establish IV access and initiate fluid administration
		   o to collect blood samples
			Adult:
			• Initiate Nurse Initiated Protocols (NIPs) within the Sepsis Power Plan
			
			Pediatric:
			• Must consult with MRMS prior to initiating any NIPs within the Sepsis Power Plan

1.4.   Definitions

Alert: a system generated message that identifies a problem and offers follow-up actions.

CERNER EHR: Cerner electronic health record

Basic Metabolic Panel (BMP) includes the following:

Sodium	Creatinine and Estimated Glomerular Filtration Rate (eGFR)	Random Glucose
Potassium	Chloride	Anion Gap
Urea	Carbon Dioxide	

Comprehensive Metabolic Panel (CMP) includes the following:

Potassium	Anion Gap	Calcium
Sodium	Random Glucose	Alkaline Phosphatase
Chloride	Creatinine Level and eGFR	Bilirubin Total
Carbon Dioxide Total	Urea	Albumin
ALT		

CNL/PCC – Clinical Nurse Leader or Patient Care Coordinator, which could also include a charge nurse, clinical nurse supervisor or other delegate

Febrile neutropenia: a single oral temperature equal to or greater than 38.3°C or a temperature of greater than or equal to 38.0°C for more than one hour in a patient with neutropenia.

Rapid Metabolic Panel (RMP) includes the following:

Creatinine and eGFR	Lactate	Hemoglobin Total
Glucose Random Level	Sodium	Base Excess Venous
Chloride	pH Venous	Carboxyhemoglobin (reported if greater than 0.1)
Potassium	Anion Gap	Base Deficit Venous
Methemoglobin (reported if greater than 0.1)	Bicarbonate Venous	

Medical Staff: Physicians, Dentists, Midwives, and Nurse Practitioners - in consultation with the most responsible physician.

Nurse(s): Registered Nurses (RN), Registered Psychiatric Nurse (RPN) and Licensed Practical Nurse (LPN).

Scratch Pad: a screen view/function in the EHR that allows users to view, modify, and/or cancel orders.

Sepsis Advisor: is a clinical decision support system which provides antibiotic recommendations based upon suspected or known infection sources, age, weight and renal function. The Sepsis Advisor has a streamlined list of infections sources or factors (i.e. potential causes) and standardized antibiotic recommendations (see Appendix C).

Sepsis Power Plans refers to pediatric and adult order sets for management of sepsis. This will include clinical decision support and orders for fluids, patient care, diagnostics, labs, consults and vasoactives.

St John's Sepsis Agent: an EHR embedded algorithm surveillance system (See Appendix A) based on patient vital signs and lab results (see Appendix B) that facilitate identification of suspected SIRS/sepsis/septic shock through the generation of an alert. The Sepsis Advisor's surveillance system is suppressed for certain patient populations because the alerts generated by the system are not appropriate for those populations.

Systemic Inflammatory Response Syndrome (SIRS): is, in the absence of painful stimuli or medications, the persistent, and otherwise unexplained alteration of two or more of a patient's:
- Heart rate (HR)[#]
- Respiratory rate (RR) [#]
- Body temperature[#]
- White Blood Cell (WBC) Count [#]

NOTE: [#] For age specific parameters - See Appendix B)

The SIRS criteria are to used alert clinicians that the patient could be septic. Thus the SIRS criteria lead to initiation of a SIRS/Sepsis/Septic Shock Alert.

	Cerner Definition	SEPSIS-3 Definition
Sepsis*	SIRS in presence of, or as a result of, suspected or proven infection and evidence of organ dysfunction based on the St John's Sepsis agent algorithm (See Appendix A).	Infection with evidence of organ dysfunction. In adults this would include an increase in Sequential Organ Failure Assessment (SOFA) Score greater than or equal to 2.

Septic Shock*	SIRS in presence of, or as a result of, suspected or proven infection and a low systolic blood pressure (SBP) or Mean Arterial Pressure (MAP) based on normal ranges for age.	An infection that requires vasopressors to maintain a MAP of 65 mmHg, and a serum lactate of greater than 2 in the absence of hypovolemia.

NOTE*: CERNER EHR performs surveillance for SIRS/Sepsis/Septic Shock and initiates alerts based upon programmed criteria. Currently, this criteria does not include SOFA as outlined in the SEPSIS-3 definition.
Tracking Shell refers to screen view in the CERNER EHR that provides access to toolbars, menus, and patient lists and information.

1.5. Need to Know

a. Sepsis is a life-threatening condition. Mortality ranges from 18 to 30% for sepsis to 40 to 70% for septic shock.
   i. The most commonly infected systems are respiratory, genitourinary, gastrointestinal, central nervous system and integumentary systems.
   ii. Bacterial infections account for the majority of sepsis cases. Fungal, viral, or parasitic infections can also lead to sepsis.
b. Early identification of sepsis can improve patient outcomes if rapid response is initiated. Daily screening (e.g. routine vital signs and clinician assessments) facilitates early identification and treatment.
c. Early best practice evidence-based goals and intervention (3 and 6 hour) bundles have been developed and have been shown to improve survival (See TABLE 1).
d. Complete as many of the 3 hour goals as possible **in the first hour**. This is important for adult and especially pediatric patients. Goals not attained in the first hour should be completed within the first 3 hours.
e. **For each hour delay in antibiotic therapy, the patient survival rate decreases.**
f. Along with early administration of antibiotics, it is paramount to identify, remove, or control the source of infection. Nursing actions that can aid the identification of the source of infection include astute clinical assessment and accurate reporting the patient's signs and symptoms.
g. There are some patient conditions (e.g. **febrile neutropenia**, immunosuppression) that clinicians need to be more vigilant about monitoring for sepsis because those patients may not produce some of the clinical indicators (i.e., elevated WBC) that the Sepsis Advisor uses to initiate an alert. If Clinicians are suspicious of SIRS or sepsis, they can independently launch the appropriate Sepsis Power Plan, even if an alert is not generated.

2. Protocol

2.1 Identifying Systemic Inflammatory Response Syndrome (SIRS)/Sepsis/Septic Shock

2.1.1. Inpatient and ED/Urgent Care Centre Nursing actions

a. A nurse assesses and documents vital signs into appropriate section of IView. The Cerner system will use the St John's algorithm to evaluate patient information (e.g. vital signs, laboratory results) for alignment with SIRS/Sepsis/Septic Shock criteria. If patient information aligns with SIRS/Sepsis/Septic Shock criteria, the system will generate an **Alert** for either the nurse or medical staff (See Appendix A).

b. SIRS/Sepsis/Septic Shock Alerts will be received by the nurse any time they are logged into the CERNER EHR based upon established relationship with patients, regardless of which patient record they are currently working in.

c. Upon receiving the Alert, the RN/RPN will review the information to confirm the results are correct. If no errors are noted, the RN/RPN will click on 'DISMISS THE ALERT', and notify the MRMS. The RN/RPN will complete medical staff notification using the Provider Notification Task from within their Task List. **NOTE**: If medical staff has not responded within 30 minutes then escalate care to the next senior medical staff. Notify nursing leader (Clinical Nurse Leader [CNL]/Patient Care Coordinator [PCC] or delegate. Activate the Rapid Response or Clinical Resource Team, if available.

d. If errors are noted in how vital signs were documented (e.g. temperature documented as   39.5° C when it was actually 35.9 ° C), the RN/RPN will return to the most appropriate section of IView to correct/modify the erroneous documentation. Correction of the documentation may not generate further alerts as the patient may no longer meet SIRS/Sepsis/Septic Shock criteria.

e. For those areas (Emergency and Maternity units) that utilize the **Tracking Shell**, the EHR will generate either through an icon or colour and message notification for SIRS/Sepsis/Septic Shock. The icon or colour/message is an indicator for nurses and medical staff to review patient's EHR and assess the patient for SIRS/Sepsis/Septic Shock.

2.1.2 Emergency/Urgent Care Centre Registered Nurses Only

a. For adult patients - Emergency Department(ED)/Triage Registered Nurse (RN), either upon receiving an alert or at their discretion, can access the appropriate NIP ED Triage Sepsis (Adult) Powerplan from the ED nursing Quick Orders or the Ad Hoc order process to initiate all appropriate sepsis diagnostics and patient care orders.

For pediatric patients - Emergency Department(ED)/Triage RN will consult with the MRMS. Should the MRMS be unable to place orders the nurse may place verbal/telephone once consultation has occurred. The ED/Triage RN can leverage the PED ED Sepsis Power Plan to place any orders.

b. Within the NIP ED Triage Sepsis (Adult) Powerplan, the Triage RN will review all the orders to ensure the appropriate orders are selected. Should a preselected item not be necessary, the RN can unselect it by clicking on the item once. After review, the nurse will sign all the orders.

2.1.3 Medical Staff Actions for 'Open Chart' Alert

NOTE: ED Medical Staff do not receive Open Chart alerts.

a. Medical staff ONLY receives Sepsis and Septic Shock Alerts (not SIRS Alerts) and ONLY upon entry into the specific patient's chart. Medical staff will otherwise be notified by the nurses of patients with suspected SIRS/sepsis/septic shock alerts. The MRMS is expected to make the decision about the initial treatment within 30 minutes and ensure the patient is assessed in person within 60 minutes.

b. Medical staff has three options to choose from within the Alert (i.e. 'Launch (adult or pediatric) Sepsis Power Plan'; 'Acknowledge; Dismiss 48 hours For All'; or 'Open Chart for Review'. Medical staff can select the action by clicking on the associated button at the bottom of the alert.

  i. **Open Chart for Review –** Open Chart for Review opens the patient's chart for the medical staff. When one medical staff selects 'Open Chart for Review", the alert is still available to other medical staff.

  ii. **Acknowledge; Dismiss 48 hours For All** – is recommended when no additional orders are immediately needed the provider can document acknowledgement of the alert and identify if treatment was previously initiated or treatment is not necessary. For example, the medical staff has completed the assessment and has ruled out Sepsis/Septic Shock or has already initiated Sepsis Advisor.

iii. **Launch (Adult or Pediatric) Sepsis Power Plan** – is recommended when medical staff want to enter orders related to sepsis. This will launch the appropriate Sepsis Power Plan with the Sepsis Advisor (ED or inpatient, adult or pediatric). The Sepsis Power Plan will include orders required for diagnostics, labs, patient care, and fluids. The Advisor will include current patient information and provide clinical decision support for recommended antibiotic therapies. There are limited infection sources and factors within the Sepsis Advisor (for specific infection sources and factors see Appendix C). Should the medical staff require guidance in regards to an infection source and factor not included in the Advisor (e.g. systemic viral infections), the medical staff can search within the EHR for a Power Plan specific for that infection source and factor. If a Power Plan is not available, then medical staff should consult with Pharmacy and/or Infectious Diseases.

iv. **In the event that a weight has not been documented on the patient** - during use of the Sepsis Advisor the provider will receive an alert with a link to the Height/Weight PowerForm. The Provider must complete this documentation. An estimated weight is acceptable.

v. **In the event that allergies have not been documented on the patient** - during the use of the Sepsis Advisor the provider will receive an alert. The provider must exit the Sepsis Advisor and document allergies within the Allergy Control. In order to return to the Sepsis Advisor the provider will need to use the Ad Hoc Order functionality to use the Sepsis Advisor.

vi. After review of the patient's chart, if the medical staff have not entered a sepsis diagnosis, activated a Sepsis PowerPlan, or placed an order for an antimicrobial, contained within the Sepsis Advisor, they will receive a Close Chart Alert.

2.1.4 Medical Staff Actions for 'Close Chart' Alert

a. Medical Staff has three options to choose from within the 'Close Chart' Alert (i.e. 'Launch (adult or pediatric) Sepsis PowerPlan'; 'Acknowledge; Dismiss 48 hours For All'; or 'Close Chart; Dismiss 24 Hours for Me'. Medical staff can select the action by clicking on the associated button at the bottom of the alert.

i. **Close Chart; Dismiss 24 Hours for Me** – is recommended for a "consulting provider" to proceed with their workflow. When one medical staff selects 'Dismiss Alert', the alert is still available to other medical staff. (e.g. if a consulting provider dismisses the alert, the alert will still be viewable/actionable by the covering provider).

ii. **Acknowledge; Dismiss 48 hours For All** – is recommended when no additional orders are immediately needed the provider can document acknowledgement of the alert and identify if treatment was previously initiated or treatment is not necessary. For example, the medical staff has completed the assessment and has ruled out Sepsis/Septic Shock or has already initiated Sepsis Advisor.

iii. **Launch (Adult or Pediatric) Sepsis Power Plan** – is recommended when medical staff want to enter orders related to sepsis. This will launch the appropriate Sepsis Power Plan with the Sepsis Advisor (ED or inpatient, adult or pediatric). The Sepsis Power Plan will include orders required for diagnostics, labs, patient care, and fluids. The Advisor will include current patient information and provide clinical decision support for recommended antibiotic therapies. There are limited infection sources and factors within the Sepsis Advisor (for specific infection sources and factors see Appendix C). Should the medical staff require guidance in regards to an infection source and factor not included in the Advisor (e.g. systemic viral infections), the medical staff can search within the EHR for a Power Plan specific for that infection source and factor. If a

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Power Plan is not available, then medical staff should consult with Pharmacy and/or Infectious Diseases.

iv. **In the event that a weight has not been documented on the patient** - during use of the Sepsis Advisor the provider will receive an alert with a link to the Height/Weight PowerForm. The Provider must complete this documentation. An estimated weight is acceptable.

v. **In the event that allergies have not been documented on the patient** - during the use of the Sepsis Advisor the provider will receive an alert. The provider must exit the Sepsis Advisor and document allergies within the Allergy Control. In order to return to the Sepsis Advisor the provider will need to use the Ad Hoc Order functionality to use the Sepsis Advisor.

NOTE:
The Sepsis Power Plans and Sepsis Advisor can be accessed at any time using the Ad Hoc Order functionality by typing in "sepsis", "adult sepsis", "ped sepsis" or "ED Sepsis." There is no need to wait for an alert to launch the Sepsis Power Plan and/or Sepsis Advisor.

2.1.4 Three and Six Hour Bundle Goals and Interventions (see TABLE 1**)**

a. The Three and Six Hour Bundle goals have been adapted from the Surviving Sepsis Campaign.
b. The pediatric fluid resuscitation content has been adapted from ChildHealth BC.

2.2. Site Specific Practices

a. Urban sites will leverage the RMP plus calcium, bilirubin, ALT, ALP, and albumin for all sepsis Power Plans
b. Rural sites will leverage the CMP plus additional orders for lactate for all sepsis Power Plans. Rural VCH Sites: Bella Coola General Hospital, RW Large Memorial Hospital (Bella Bella), Sechelt Hospital, Powell River General Hospital, Squamish General Hospital, Pemberton Health Care Centre, Whistler Health Care Centre
c. Not all facilities have similar resources including in-house medical staff, 24 hour pharmacy coverage, and/or an in-house Infectious Disease department. These facilities should follow local processes to ensure prompt identification and treatment of patients with suspected SIRS/sepsis/septic shock.
d. All sites that primarily use external labs will not receive Sepsis Alerts.

2.3. Documentation
The expectation is that documentation is completed at the time of assessments and interventions.

2.4. Patient and Family Education
Communicate in timely manner information about the patient's status and medical course of treatment.

Include the patient/family in discussion on goals of care.

3. Related Documents and References

3.1. Related Documents

CST MEWS Protocol

CST PEWS Protocol

3.2. References

British Columbia Patient Safety and Quality Council. Clinical Improvement – Sepsis. Available from https://bcpsqc.ca/clinical-improvement/sepsis/.

ChildHealth BC. Pediatric Sepsis Algorithm (0 Days of Age – 16.99 Years). 2017.

Davis AL, Carcillo JA, Aneja RK, et. al. American College of Critical Care Medicine clinical practice parameters for hemodynamic support of pediatric and neonatal septic shock. Crit Care Med 2017; 45:1061–1093.

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Singer M, Deutschman CS, Seymour CW, et al. The third international consensus definitions for sepsis and septic shock (Sepsis-3) JAMA. 2016; 315:801–10. [PMC free article]

Society of Critical Care Medicine. Surviving Sepsis Campaign Bundles. 2015. Accessed from http://www.survivingsepsis.org/Bundles/Pages/default.aspx.

4. Appendices
Appendix A: St John's Agent Version 14
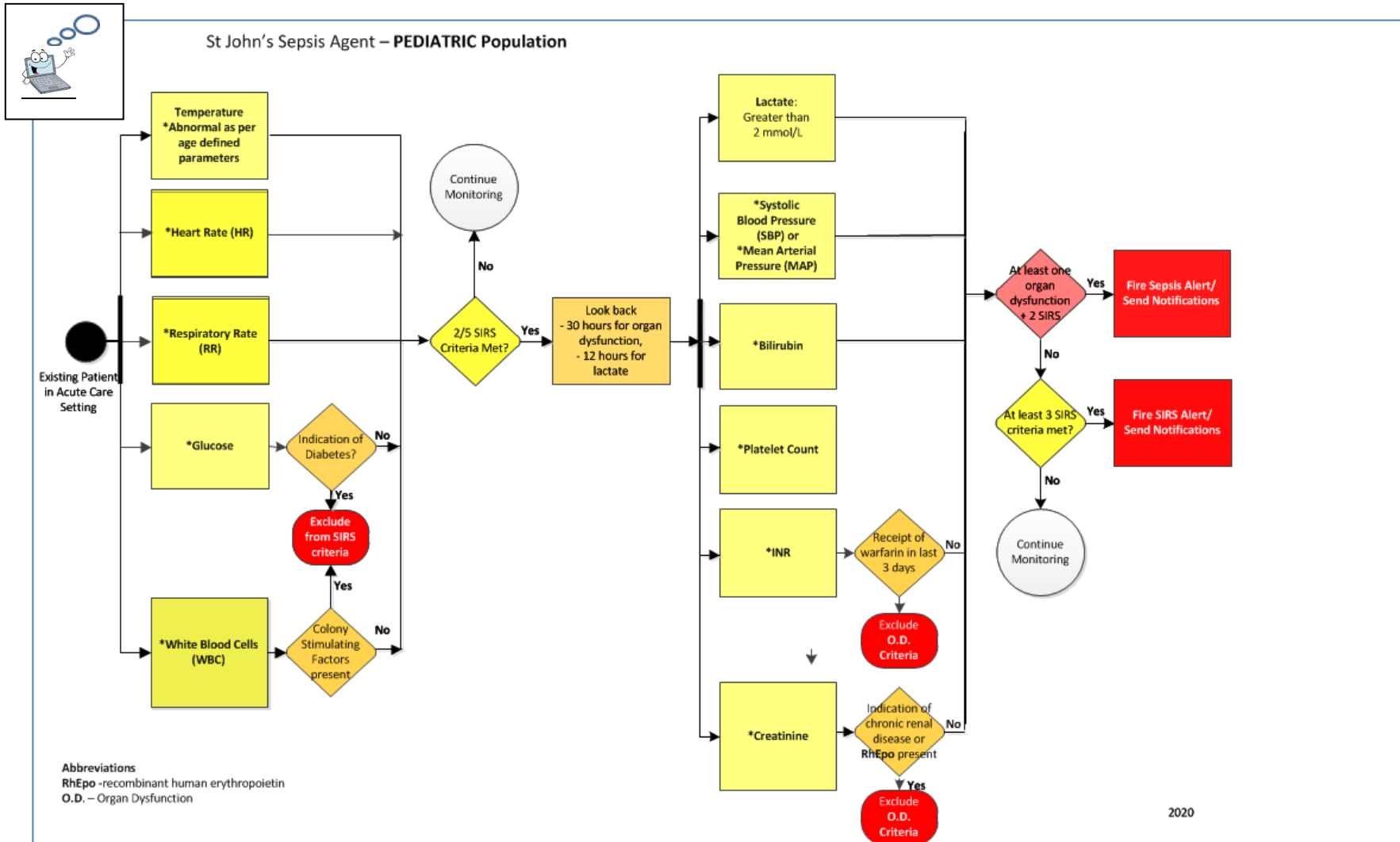Appendix B: SIRS and Sepsis Criteria Age Specific Reference Range Table
Appendix C: Infection Sources and Factors

Appendix A: <u>EHR embedded</u> St John's Sepsis Agent Algorithm for Identification of SIRS and Sepsis in Pediatric and Adult Populations

PEDIATRIC Algorithm

NOTE: This computer algorithm works in the background to analyze vital signs and lab data to determine if SIRS/Sepsis Alerts should be sent to the nurse.
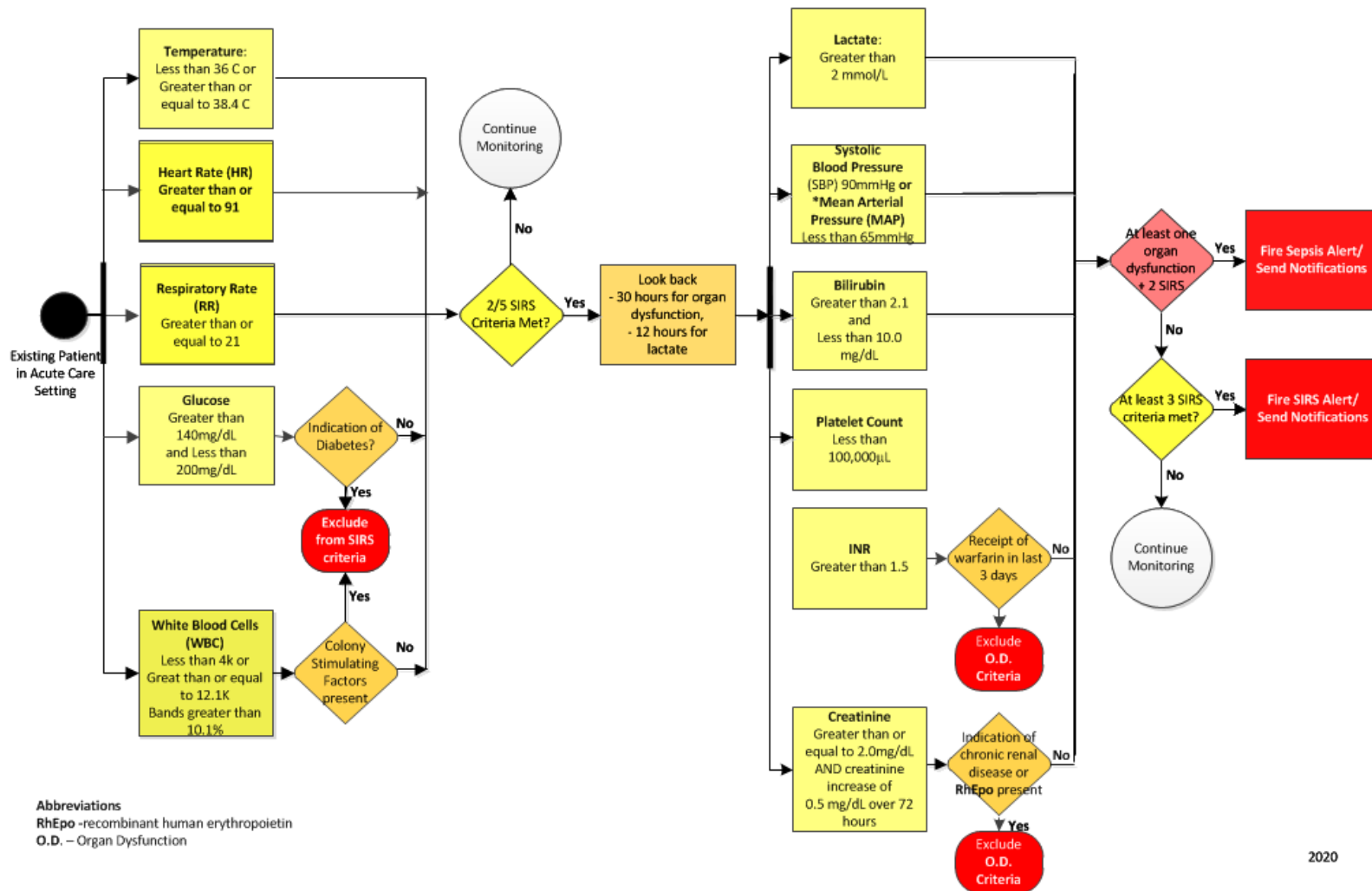

St John's Sepsis Agent – **PEDIATRIC Population**

Abbreviations
RhEpo -recombinant human erythropoietin
O.D. – Organ Dysfunction

2020

*<u>NOTE</u>. The age specific values are viewable in the SIRS and Sepsis Criteria Reference Range Table (see Appendix B).

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Adult Algorithm

St John's Sepsis Agent – **ADULT Population**

Abbreviations
RhEpo -recombinant human erythropoietin
O.D. – Organ Dysfunction

2020

Appendix B: SIRS and Sepsis Criteria Age Specific Reference Range Table

NOTE: CST parameters have been adjusted to align with Provincial and Health Organization requirements.

NOTE: If the glucose is within the range of 7.82 mmol/L – 11.1 mmol/L, it will be considered eligible criteria for SIRS. However, if the patient is receiving any diabetic agents or has a documented problem/diagnosis related to diabetes, the elevated glucose will be excluded from eligible SIRS criteria.

0 Days – 12 months

Criteria	Concept Unit of Measure	0 Days to 1 Week		1 Week to 1 Month		1 Month to 12 Months	
		Triggers when less than	Triggers when greater than	Triggers when less than	Triggers when greater than	Triggers when less than	Triggers when greater than
SIRS	Band Man (%)		10		10		10
SIRS	Blood Glucose (mmol/L)	11.1	7.82	11.1	7.82	11.1	7.82
SIRS	Glucose (mmol/L	11.1	7.82	11.1	7.82	11.1	7.82
SIRS	Heart Rate (beats/min)	100	180	100	180	90	180
SIRS	Respiratory Rate(breaths/min)	25	50	25	40	20	34
SIRS	Temperature (C)	36	38.5	36	38.5	36	38.5
SIRS	WBC (x 10^9/L		34	5	19.5	5	17.5
Sepsis	Bilirubin (umol/L)			171	35.9	171	35.9
Sepsis	Creatinine (umol/L)		38.12		38.12		38.12
Sepsis	Lactate (mmol/L)		2		2		2
Sepsis	MAP (mmHg)	55		60		60	
Sepsis	Systolic BP (mmHg	65		75		100	

One year to 13 years

Criteria	Concept Unit of Measure	1 to 2 Years		2 to 6 Years		6 to 13 Years	
		Triggers when less than	Triggers when greater than	Triggers when less than	Triggers when greater than	Triggers when less than	Triggers when greater than
SIRS	Band Man (%)		10		10		10
SIRS	Blood Glucose (mmol/L)	11.1	7.82	11.1	7.82	11.1	7.82
SIRS	Glucose (mmol/L	11.1	7.82	11.1	7.82	11.1	7.82
SIRS	Heart Rate (beats/min)	90	180		140		130
SIRS	Respiratory Rate(breaths/min)	20	34		24		22
SIRS	Temperature (C)	36	38.5	36	38.5	36	38.5
SIRS	WBC (x 10^9/L	5	17.5	6	15.5	4.5	11
Sepsis	Bilirubin (umol/L)	171	35.9	171	35.9	171	35.9
Sepsis	Creatinine (mg/dL)		2		2		2
Sepsis	Lactate (mmol/L)		2		2		2
Sepsis	MAP (mmHg)	60		65		65	
Sepsis	Systolic BP (mmHg	100		94		105	

13 years to 150 years

Criteria	Concept Unit of Measure	13 to 18 Years		18 to 150 Years	
		Triggers when less than	Triggers when greater than	Triggers when less than	Triggers when greater than
SIRS	Band Man (%)		10		10
SIRS	Blood Glucose (mmol/L)	11.1	7.82	11.1	7.82
SIRS	Glucose (mmol/L	11.1	7.82	11.1	7.82
SIRS	Heart Rate (beats/min)		110		91
SIRS	Respiratory Rate(breaths/min)		22		21
SIRS	Temperature (C)	36	38.3	36	38.3
SIRS	WBC (x 10^9/L	4.5	11	4	12
Sepsis	Bilirubin (umol/L)	171	35.9	171	35.9
Sepsis	Creatinine (mg/dL)		2		*2
Sepsis	Lactate (mmol/L)		2		2
Sepsis	MAP (mmHg)	65		65	
Sepsis	Systolic BP (mmHg	117		90	

* and an increase of 0.5 mg/dL over 72 hours

Appendix C: Infection Sources and Factors (i.e. potential causes) included in the Sepsis Advisor

As outlined below there are limited infection sources and factors within the Sepsis Advisor. Should a medical staff member require guidance in regards to an infection source and factor that is not included in the Sepsis Advisor (e.g. systemic viral infections), the medical staff member can search within the EHR for a PowerPlan specific for that infection source and factor. If a PowerPlan is not available, then medical staff should consult with Pharmacy and/or Infectious Diseases.

Infection source	Infection factor (i.e. potential causes)
Urosepsis	• N/A
Biliary source	• N/A
Necrotizing fasciitis/myositis	• N/A
Meningitis/Encephalitis	• Community • Post neurosurgery
Febrile neutropenia	• N/A
Intra-abdominal	• Primary and Secondary peritonitis
	• Tertiary peritonitis
	• Necrotizing enterocolitis (Pediatrics only)
Osteomyelitis/Joint Infections/Septic Arthritis	• No risk factors
	• Septic Arthritis - STD Risk (Neisseria gonorrhea (adults only)
Choriomionitis/ intra amniotic	• N/A
Pneumonia	• Aspiration pneumonia (community)
	• CAP: atypical suspected
	• Healthcare associated pneumonia/CAP: with risk factors
	• Chlamydia suspected (peds only)
	• CAP –no risk factors
Skin/soft tissue (cellulitis)	• Non diabetic
	• Diabetic
Intravascular Catheters /Suspected Endocarditis	• Intravascular catheters
	• Suspected endocarditis
Wound infection	• Post trauma wound infection
	• Surgical (not GI or GU) wound infection
	• Surgical (GI or GU) wound infection
Source unclear (not neutropenia)	• N/A

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Final Sign Off:	**Name**	**Title** e.g. Director – Professional Practice	**Date Signed** **DD-MMM-YYYY**
VCH		VP Professional Practice, CNIO VP Medicine Chair, HAMAC	09-JUL-2018
PHC		Director, Professional Practice Chair, MAC	09-JUL-2018
PHSA	SET		15-MAY-2018
Developed By:	**Name**	**Dept.**	**HO**
	CST Sepsis Protocol Development Team		PHC, PHSA, VCH
Owners:	**PHC**	**PHSA**	**VCH**
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	Sepsis WG	Adult St John's Algorithm added Additional alert suppression for cardiac surgery	01-SEP-2020