VANDERBILT UNIVERSITY
MEDICAL CENTER

Time is Ticking!
Improving Time to Antimicrobial Therapy for Sepsis Patients Using a Multidisciplinary Approach

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Introduction

- Sepsis is a leading cause of morbidity, mortality, and healthcare utilization in children worldwide.

- Early identification and appropriate resuscitation/management are critical to optimizing outcomes for children with sepsis.

- Delayed antimicrobial therapy is an independent risk factor for mortality and prolonged organ dysfunction.

- Increased risk of mortality is observed with each hour delay from sepsis recognition to antimicrobial administration.

Weiss, S. et al. *Pediatric Critical Care Medicine.* 2020

MCJCHV PICU Sepsis Workgroup

- Multidisciplinary workgroup created January 2022
  - Physicians, nurses, nurse practitioners, pharmacist

- Goals/Objectives:
  - Improve recognition of severe sepsis
  - Improve team communication when caring for patients with sepsis
  - Decrease antimicrobial time to administration

Gap Analysis

- Evaluated time to antimicrobial administration in the PICU from 9/1/2022 – 2/15/2023.
  - 30 cases reviewed
  - Time to administration: 113 minutes
  - Medications ordered as STAT: 17%

Medication Tracking	Time
Order Verification	14 minutes
Dispensing and Checking	39 minutes
Transit Time	60 minutes
Total (verify to administration)	113 minutes

MCJCHV Med Admin Policy:
STAT Orders: 30 minutes
Routine Orders: Within 1 hour before or after due time

Gap Analysis – Action Items

Improve provider ordering + pharmacy dispensing process

- Creation of a code sepsis orderset

Improve team communication + prioritize care at bedside

- Creation of a code sepsis bedside checklist

Pediatric Sepsis Inpatient Orderset

- Utilized hospital wide (not just PICU) for patients that trigger a sepsis alert/huddle or based on provider discretion.

- Assists provider with ordering labs/cultures, fluids, and antimicrobials within 1 hour of alert/huddle.

- Antimicrobials:
  - Selected based on suspected infection
  - Defaulted to ONCE – STAT
  - Order states "Code Sepsis/Sepsis Huddle"

Empiric Antimicrobial Guide

Suspected Infection	Antimicrobial Agent (s)
Community-Onset CNS	Ceftriaxone, Vancomycin
VP Shunt Infection	Vancomycin + Cefepime
Community Acquired Infection	Ceftriaxone ± Vancomycin
Hospital Acquired Infection	Cefepime ± Vancomycin Consider meropenem if MDRO is suspected
GI Infection	Piperacillin-Tazobactam OR Ceftriaxone + Metronidazole
Neonate	Ampicillin ± Gentamicin If confirm for CNS: Ampicillin ± Cefotaxime
Tickborne	Doxycycline added to other coverage
Other	Azithromycin, Clindamycin

Code Sepsis Antimicrobial Order

Pharmacy Verification + Dispensing Process

- February 2023 - provided department wide education and awareness

- Pharmacy is notified of a "code sepsis" patient (via order or provider/RN)

- Dispense and Preparation Location
  - Emergency Department – Omnicell (if loaded), PharmD/RN to prepare
  - Inpatient – Defaults to Pharmacy, PharmD or technician to prepare
  - If made outside of the IV room beyond use dating (BUD) is 4 hours (immediate use CSP per USP 797)

Antimicrobial Dispense + Prep Location

Medication	Dispense Location
Ampicillin	Pharmacy AND ED
Azithromycin	Pharmacy
Cefepime	Pharmacy AND ED
Cefotaxime	Pharmacy
Ceftriaxone	Pharmacy AND ED
Clindamycin	Pharmacy AND ED
Doxycycline	Pharmacy
Gentamicin	Pharmacy AND ED
Meropenem	Pharmacy
Metronidazole	Pharmacy
Piperacillin-Tazobactam	Pharmacy AND ED
Vancomycin	Pharmacy

Code Sepsis Bedside Checklist

Bedside reminder to administer within 60 minutes

Providers help RN's prioritize delivery in real-time

Septic Shock Priorities of Care

Code sepsis criteria*:
- Suspected or proven infection
- 2+ SIRS criteria (tachycardia, tachypnea, leukocytosis/leukopenia, hyper/hypothermia)
- Signs of end organ dysfunction (hypotension, poor perfusion, AMS, oliguria)

*Use clinical judgment/lower threshold to call code sepsis for patients with immune compromise, s/p BMT, etc.

Time 0[a]: _____ **1-hr time[b]:** _____

- **Has the patient received any antibiotics? Time of doses:**

- **Current access:**

- **Goal blood pressure:**

- **Other pertinent history/clinical concerns:**

_____

First Hour Checklist

- ☐ **Determine additional IV access needs**
- ☐ **Cycle BP cuff every 5 minutes, or place arterial line**
- ☐ **Give 1st dose antibiotics within 60 minutes -- ORDER STAT. Do not delay for cultures if difficult to draw.**
- ☐ **Prioritize antibiotics (write number 1,2,3 etc. next to antibiotic on the back)**
- ☐ **Discuss priorities for all medications (antibiotics, vasoactives, fluids, sedation, etc.)**
- ☐ **Ensure second antibiotic doses are ordered and timed correctly**
- ☐ **Other:**

MD/NP: _____   RN:_____

Feedback:
How long did this form take to fill out? _____ min   Was this form helpful?   yes/no
Additional Comments:

Please return this form to the 5A fishbowl folder to help improve patient care!

Code Sepsis Bedside Checklist

Reminder to providers and nursing to administer via IV push to free up access points and manage time more effectively

Antimicrobial Administration Rates

Antimicrobial	Epic Default Administration Rates	Code Sepsis Administration Rates
Ampicillin-Sulbactam	30 min.	IV Push 10-15 min.
Ceftriaxone	30 min.	IV Push 10-15 min.
Cefotaxime	15 min.	IV Push 3-5 min.
Cefepime	30 min.	IV Push 3-5 min.
Clindamycin	30 min.	10 min. (must go on guardrails) Never exceed 30 mg/min.
Flagyl	60 min.	30 min.
Meropenem	30 min.	IV Push 3-5 min.
Metronidazole	60 min.	30 min.
Ampicillin	Doses < 500 mg (IV Push 3-5 min.) Doses >/= 500 mg over 10-15 min.	
Gentamicin	30 min.	
Vancomycin	60 min.	
Piperacillin-Tazobactam	30 min.	

Reference: Lexicomp Online, Pediatric and Neonatal Lexi-Drugs Online. Waltham, MA: UpToDate, Inc.; February 17, 2023. https://online.lexi.com. Accessed February 17, 2023.

Gap Analysis Follow Up

- Audit conducted December 2023 following go-live of code sepsis orderset + bedside checklist.

Audit	Nov 2022 to Feb 2023	Mar 2023 to Dec 2023
Cases (number)	30	28
STAT Orders (percent)	17	29
Order Verification (time, min)	14	6
Dispensing + Checking (time, min)	39	32
Transit (time, min)	60	38
Total (time, min)	113	70

Next Steps

- Improve use of inpatient code sepsis orderset

- Provide ongoing education on the importance of ordering antimicrobials as STAT rather than routine

- Roll out sepsis alert in PICU

- Create a long-term QI audit plan—plan to use hospital sepsis data

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Questions?

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