

Improving Sepsis Outcomes in Hospitalized Children Within a Safety Net Hospital

A Quality Improvement Project

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QUALITY PROBLEM

- Delayed diagnosis of pediatric sepsis increases morbidity, mortality and healthcare costs.
- Specific interventions have been shown to decrease time to sepsis treatment and child sepsis-attributable mortality. These interventions include:
 - Sepsis screening tool
 - Sepsis huddles
 - Sepsis management pathways
 - Continuous quality improvement (QI)-based reviews
- When this project was designed, the University of New Mexico (UNM) Children's Hospital did not have any of these interventions in place in the General Pediatrics Unit (GPU).

SELECTION OF CHANGES TO TEST

Based on literature review and team assessment of UNM Children's Hospital systems, implementation of a sepsis management pathway and screening tool, sepsis huddles, and CQI-based reviews of sepsis cases are being prioritized for implementation during the QI project.

PLAN-DO-STUDY-ACT (PDSA) CYCLES

PDSA focus	# of cycles	Outcome
Develop and test pediatric sepsis management pathway	1	Testing in progress
Develop and test sepsis huddle script	1	Testing in progress
Develop and test sepsis huddle checklist	1	Testing in progress
Develop and test inpatient sepsis EMR trigger tool	1	Testing in progress
Identify recipients of an automatic Tiger Text for sepsis management	1	Testing in progress

Parent sepsis huddle script for situations when team is worried about a severe infection:

"Your child has signs of a serious infection that we are worried is getting worse."

"We are going to *(give fluids, antibiotics, use medicine to support blood pressure, admit to the hospital, transfer to the PICU).*"

"A team member will be back within 30 minutes to see how your child is doing."

"Please tell us if your child is *(breathing faster, not waking easily, getting worse).*"

"You can tell use by *(using your call button, telling your bedside nurse).*"

"*(Teach Back to confirm)* I want to make sure I explained this well for you. Can you tell me what we are going to do for your child, and what we want you to do?"

SETTING AND TEAM

This project is being conducted in the General Pediatrics Unit at UNM Children's Hospital.

The QI team includes collaborators from the GPU, the Pediatric Emergency Department and Urgent Care, the Pediatric Intensive Care Unit, and Envision NM 2.0.

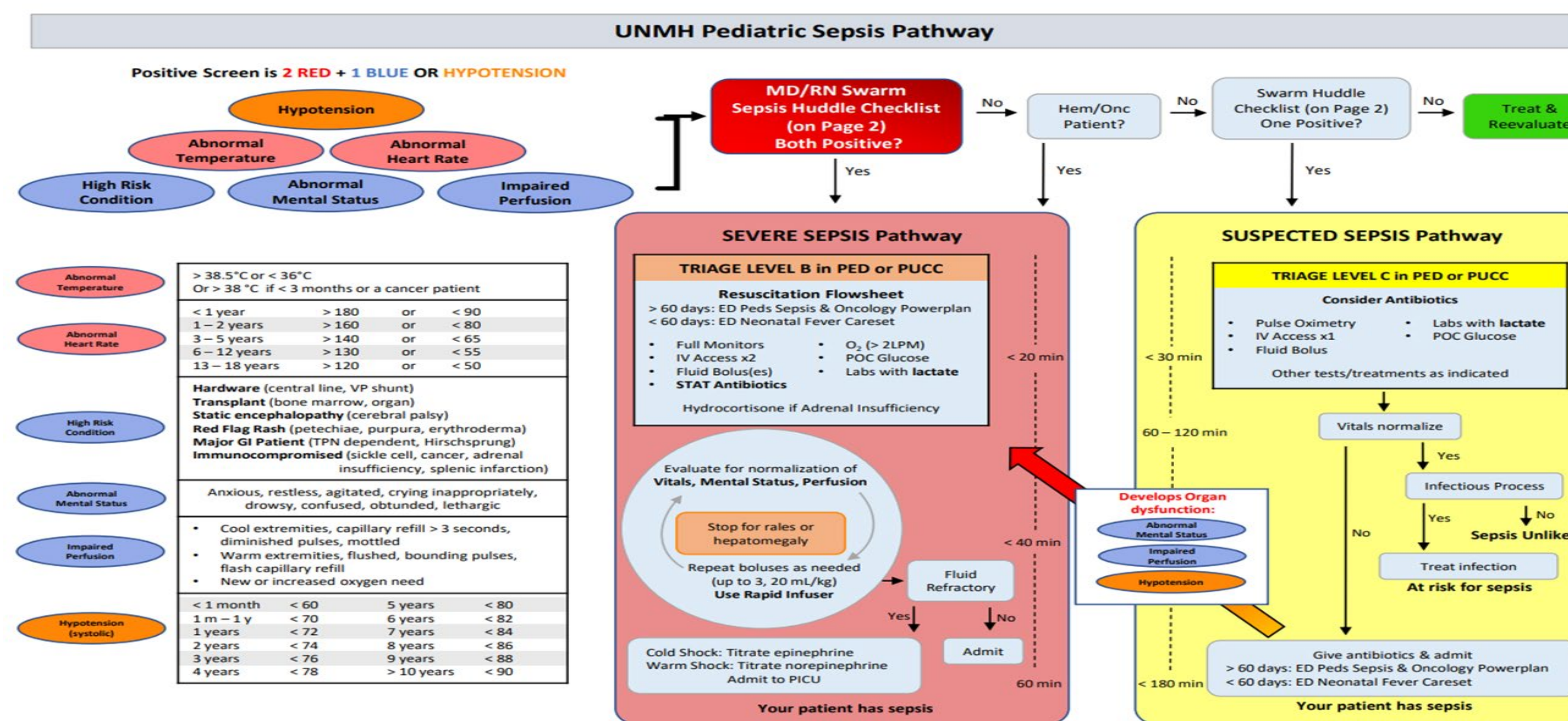
QI FRAMEWORK

Model for Improvement from Associates in Process Improvement, endorsed by the Institute for Healthcare Improvement.

QI PROJECT AIMS

- Implement a sepsis screening huddle within 20 minutes when pediatric patients meet a clinical trigger based on vital signs;
- Ensure patients who screen positive for sepsis receive antibiotics within 3 hours; and
- Ensure that patients who screen positive for severe sepsis/septic shock receive antibiotics within 60 minutes.

For all measures, the goal is that they occur at least 60% of the time within 9 months of QI project initiation.



ANTIBIOTIC RECOMMENDATIONS	
"ED Pediatric Sepsis and Oncology (>60 days) Careset"	
Healthy Patient, No Central Line (Including Skin/Soft Tissue, Bone, Joint Infection)	Ceftriaxone Vancomycin
Immunocompromised Oncology Patient Immunosuppressive meds Recent hospitalization (> 4 days within 2 months) Chronic medical condition Central line	Cefepime Vancomycin
Patient with Suspected Intraabdominal Source (Including GI and TPN dependent patients)	Piperacillin/ Tazobactam Vancomycin
"ED Peds Neonatal Fever (0-60 days) Careset"	
≤28 days: Ampicillin + Gentamicin + Acyclovir >28 days: Ceftriaxone OR [Ampicillin + Gentamicin]	
Immunosuppressive Medications Azathioprine/Mercaptopurine Anakinra Cyclophosphamide Etanercept Monoclonal antibodies (e.g., infliximab, vedolizumab, rituximab, adalimumab, etc.) Mycophenolate mofetil Oral or SQ methotrexate > 5 mg Prednisone 2 mg/kg/day or >20 mg daily (> 2 weeks) Tacrolimus/Sirolimus	Penicillin/Cephalosporin Allergy Alternatives True Penicillin Allergy (non-anaphylaxis): Replace with Cefepime True Cephalosporin Allergy: Replace with Aztreonam If Anaphylaxis: Replace with Aztreonam
Fluid Responsive Shock Shock resolves with less 60 ml/kg fluid resuscitation when appropriate	
Fluid Refractory Shock Shock persists with greater than 60 ml/kg fluid resuscitation when appropriate	
Warm shock Flash capillary refill, bounding peripheral pulses, wide pulse pressure	Cold shock Prolonged capillary refill of > 2 seconds, mottled cool extremities, diminished pulses
Additional Medication Recommended Starting Doses Hydrocortisone: 25 mg IV (0-3y), 50 mg IV (3-12 y), 100 mg IV (>12 y) Dopamine 5-15 mcg/kg/min for Cold Shock Epinephrine 0.05-0.3 mcg/kg/min for Cold Shock Norepinephrine ≥ 0.05 mcg/kg/min for Warm Shock (mixing instructions on code sheets)	
Cefepime <10kg: 50mg/kg q8h 10-11.9 kg 540 mg q8h 12-14.6 kg 660 mg q8h 14.7-17.7 kg 800 mg q8h 17.8-21.3 kg 960 mg q8h 21.4-25.6 kg 1160 mg q8h 25.7-31.1 kg 1400 mg q8h 31.2-37.7 kg 1700 mg q8h 37.8 kg 2000 mg q8h	Zosyn (Based on Piperacillin Component) 10-12.2 kg 1100 mg 12.3-14.8 kg 1340 mg 14.9-18.6 kg 1600 mg 18.7-22.2 kg 1980 mg 22.3-26.6 kg 2400 mg 26.7-30.9 kg 3000 mg >30 kg: 3375 mg q8h, then 3375 mg extended 4 hour infusion q8h
Ceftriaxone <10kg: 50mg/kg q12h 10-11.9 kg 540 mg q12h 12-14.6 kg 660 mg q12h 14.7-17.7 kg 800 mg q12h 17.8-21.3 kg 960 mg q12h 21.4-25.6 kg 1160 mg q12h 25.7-31.1 kg 1400 mg q12h 31.2-37.7 kg 1700 mg q12h 37.8 kg 2000 mg q12h	Vancomycin (Careset Contains Only Load Dose/2x Maintenance) <10 kg: 25 mg/kg *1 10-12.2 kg 275 mg 12.3-14.8 kg 335 mg 14.9-17.7 kg 400 mg 17.8-22.2 kg 500 mg 22.3-27.7 kg 610 mg 27.8-33.3 kg 750 mg 33.4-40 kg 900 mg 40.1-44.4 kg 1000 mg 44.5-55.5 kg 1250 mg 55.6-66.5 kg 1500 mg 66.6-77.5 kg 1750 mg 77.6 kg 2000 mg q12h *CHANGE TO 20 mg/kg loading dose if GFR < 30 or check creatinine if low GFR suspected

UNMH Children Hospital Sepsis Huddle Checklist	
Results and Next Steps	
Any yes in both 1 and 2 = Severe Sepsis Update Family (with interpreter if needed) • Your child is showing signs of a serious infection that we are worried is getting worse. • We are going to (give fluids, antibiotics, use medicine to support blood pressure, admit to hospital, transfer to PICU). • A team member will be back within 30 minutes to see how your child is doing. • Please tell us if you feel your child is (breathing faster, not waking easily, getting worse). • What questions do you have? Next Steps • Use UNMH Pediatric Sepsis Pathway for Severe Sepsis • Inform Attending regardless of hour • Notify Charge Nurse and Admin Supervisor • Document Status Change	
Any Positive = Suspected Sepsis Update Family (with interpreter if needed) • We are worried your child may be developing a more serious infection. • We are going to (run more tests, give fluids, antibiotics). • A team member will be back within an hour to see how your child is doing. • Please tell us if you feel your child is getting worse. • What questions do you have? Next Steps • Use UNMH Pediatric Sepsis Pathway for Suspected Sepsis • Inform attending within an hour if inpatient and overnight, immediately otherwise • Notify Charge Nurse and consider notifying Admin Sup based on clinical judgement • Document Status Change	
No to both 1 and 2 = Sepsis unlikely Update Family (with interpreter if needed) • We came to check on your child because we were worried about a possible infection. We think that instead your child is (in pain, having a medication side effect, dehydrated). • We are going to (give pain medication, fluids, run more tests). • Please tell us if you feel your child is getting worse. • What questions do you have? Next Steps • Treat cause of vital sign changes (pain, medication, anemia, dehydration) • Re-evaluate for resolution	

QI MEASURES

The primary QI project measures are being collected via medical record review and focus on timely implementation of the sepsis huddle and timely antibiotic administration.

NEXT STEPS

Additional PDSAs are planned to:

- Build and use the automatic Tiger Text
- Complete and test Powerplan in Cerner
- Train inpatient clinicians and staff on using these tools

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