

DIAGNOSIS AND TREATMENT OF EARLY ONSET NEONATAL SEPSIS

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1. STATEMENT OF PURPOSE

1.1 Provide practice and evidence-based approach for the prevention and treatment of early onset neonatal sepsis (EOS)

Abbreviations

CI	Confidence Interval
CPG	Clinical Practice Guideline
EBM	Evidence-Based Medicine
GIN	Guidelines International Network
EOS	Early onset Sepsis
NICU	Neonatal Intensive Care Unit
LP	Lumbar Puncture

2. INTRODUCTION

2.1 Early onset sepsis (EOS) is a potentially fatal condition in neonates, and its correct management is still challenging for neonatologists. Early antibiotic administration in the neonatal period may carry short- and long-term risks. The latest definition refers to early onset sepsis (EOS) as culture-proven sepsis within the first 72 h after birth. Specific clinical risk factors have been described. Moreover, the infant's clinical condition at birth and the subsequent clinical course over the first 12 to 24 h after delivery are the strongest predictors of early-onset infections.

3. APPLICABILITY

- 3.1. This policy applies to all Health Care Facilities and staff regulated by the Ministry of Health (MOH).
- 3.2. All MOH hospitals who care for newborns at delivery with different levels either in the neonatal intensive care units (NICU) or postnatal ward.

4. DEFINITIONS

- 4.1 **Newborn** is a newborn infant, or neonate, is a child under 28 days of age.
- 4.2 **Premature** refers to any baby delivered alive below 37 weeks gestational age.
- 4.3 **Early Onset of Neonatal Sepsis (EOS)** is defined as a blood or cerebrospinal fluid (CSF) positive culture obtained within 72 hours after birth.

5. POLICY

5.1 Target Population:

- Applies to all newborn with risk factors for EOS within 72 hours of age.

5.2 Risk Factors for EOS

- Maternal intrapartum GBS colonization
- GBS bacteriuria at any time during the current pregnancy
- A previous infant with invasive GBS disease
- Prolonged rupture of membranes ≥ 18 h
- Neonates < 37 weeks gestational age
- Suspected intraamniotic infection is defined as maternal intrapartum fever (either a single maternal intrapartum temperature $\geq 39.0^{\circ}\text{C}$ or a temperature of 38.0°C – 38.9°C that persists for >30 minutes) and 1 or more of the following: maternal leukocytosis, purulent cervical drainage, and fetal tachycardia.

5.3 Investigations:

- Blood Culture
- LP (If the baby is having a positive blood culture, clinically unwell with hemodynamics instability, or CNS manifestations like bulging fontanelle, lethargy, or convulsion)
- LP should be deferred with respiratory symptoms only
- CBC with differential
- Chest X-ray
- Urine culture is not recommended
- Inflammatory markers are not recommended (CRP, ESR, and Procalcitonin)

5.4 Approaches to an Infant with Suspected EOS

- Use of neonatal EOS calculator
- Use of neonatal EOS algorithm

5.5 Antimicrobial choice for EOS

- Empiric therapy should be initiated with Ampicillin and Aminoglycoside (preferably gentamicin)
- Empirical use of Cefotaxime should be avoided on the neonatal unit except in the management of meningitis as it is associated with higher rates of colonization with resistant strains, Extended Spectrum Beta Lactamase (ESBL) infection, invasive candidiasis, and death.
- Use Cefotaxime in place of Ampicillin in any of the following cases:
 - CSF analysis demonstrates a leukocytosis
 - organisms are found on Gram stain or CSF culture (or PCR when available)
 - clinical findings are strongly suggestive of meningitis
- Use Cefotaxime in place of Aminoglycoside in any of the following cases:
 - Renal Failure or high renal function

6-RESPONSIBILITIES

6.1 Leader's responsibility of each health care facility to ensure full implementation.

7-ATTACHMENTS:

7.1 All appendix's names that mentioned in the policy.

7.2 Use of neonatal EOS calculator

- <https://neonatalsepsiscalculator.kaiserpermanente.org/>
- Use CDC incidence of EOS
- Enter the details in the left side
- Press calculate to see the results and use the classifications of the infants condition as indicated in the next figure

Please enter details below.

Predictor	Scenario
Incidence of Early-Onset Sepsis ?	<input type="text" value=""/>
Gestational age ?	<input type="text" value=""/> weeks <input type="text" value=""/> days
Highest maternal antepartum temperature ?	<input type="text" value=""/> Fahrenheit <input type="text" value=""/>
ROM (Hours) ?	<input type="text" value=""/>
Maternal GBS status ?	<input type="radio"/> Negative <input type="radio"/> Positive <input type="radio"/> Unknown
Type of intrapartum antibiotics ?	<input type="radio"/> Broad spectrum antibiotics > 4 hrs prior to birth <input type="radio"/> Broad spectrum antibiotics 2-3.9 hrs prior to birth <input type="radio"/> GBS specific antibiotics > 2 hrs prior to birth <input type="radio"/> No antibiotics or any antibiotics < 2 hrs prior to birth

Calculate »

Clear

Risk per 1000/births

EOS Risk @ Birth

EOS Risk after Clinical Exam	Risk per 1000/births	Clinical Recommendation	Vitals
Well Appearing			
Equivocal			
Clinical Illness			

Classification of Infant's Clinical Presentation [Clinical Illness](#) [Equivocal](#) [Well Appearing](#)

Please enter details below.

Predictor	Scenario
Incidence of Early-Onset Sepsis ?	0.5/1000 live births (CDC nation: ▼)
Gestational age ?	<div>37 weeks</div> <div>5 days</div>
Highest maternal antepartum temperature ?	37.7 Celsius ▼
ROM (Hours) ?	9
Maternal GBS status ?	<input type="radio"/> Negative <input type="radio"/> Positive <input checked="" type="radio"/> Unknown
Type of intrapartum antibiotics ?	<input checked="" type="radio"/> Broad spectrum antibiotics > 4 hrs prior to birth <input type="radio"/> Broad spectrum antibiotics 2-3.9 hrs prior to birth <input type="radio"/> GBS specific antibiotics > 2 hrs prior to birth <input type="radio"/> No antibiotics or any antibiotics < 2 hrs prior to birth

Calculate »

Clear

Risk per 1000/births

EOS Risk @ Birth

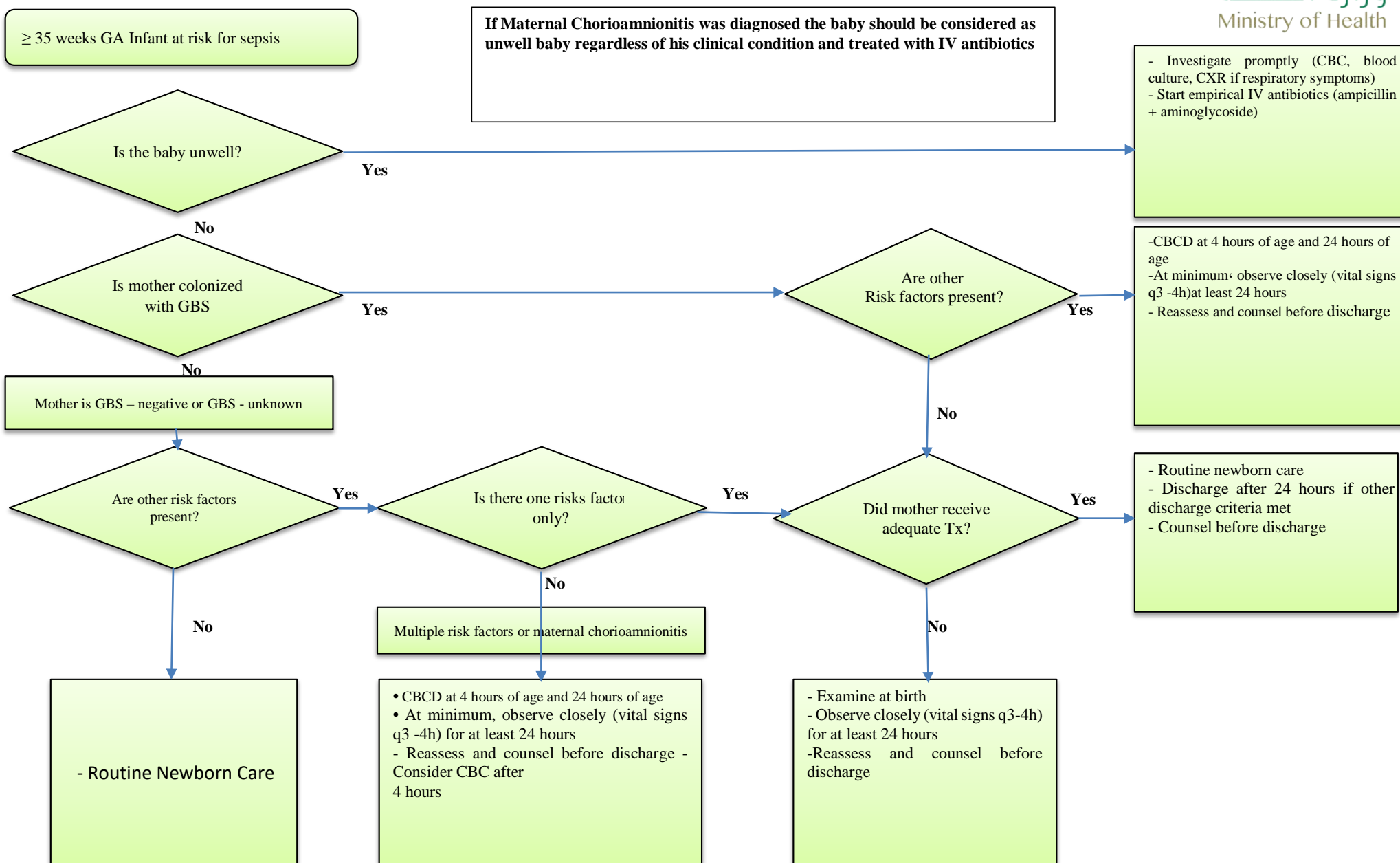
0.17

EOS Risk after Clinical Exam	Risk per 1000/births	Clinical Recommendation	Vitals
Well Appearing	0.07	No culture, no antibiotics	Routine Vitals
Equivocal	0.83	No culture, no antibiotics	Routine Vitals
Clinical Illness	3.50	Empiric antibiotics	Vitals per NICU

Classification of Infant's Clinical Presentation [Clinical Illness](#) [Equivocal](#) [Well Appearing](#)

Clinical Exam	Description
Clinical Illness	<ol style="list-style-type: none"> 1. Persistent need for NCPAP / HFNC / mechanical ventilation (outside of the delivery room) 2. Hemodynamic instability requiring vasoactive drugs 3. Neonatal encephalopathy /Perinatal depression <ul style="list-style-type: none"> ▪ Seizure ▪ Apgar Score @ 5 minutes < 5 4. Need for supplemental O₂ ≥ 2 hours to maintain oxygen saturations > 90% (outside of the delivery room)
Equivocal	<ol style="list-style-type: none"> 1. Persistent physiologic abnormality ≥ 4 hrs <ul style="list-style-type: none"> ▪ Tachycardia (HR ≥ 160) ▪ Tachypnea (RR ≥ 60) ▪ Temperature instability (≥ 100.4°F or < 97.5°F) ▪ Respiratory distress (grunting, flaring, or retracting) not requiring supplemental O₂ 2. Two or more physiologic abnormalities lasting for ≥ 2 hrs <ul style="list-style-type: none"> ▪ Tachycardia (HR ≥ 160) ▪ Tachypnea (RR ≥ 60) ▪ Temperature instability (≥ 100.4°F or < 97.5°F) ▪ Respiratory distress (grunting, flaring, or retracting) not requiring supplemental O₂ <p>Note: abnormality can be intermittent</p>
Well Appearing	No persistent physiologic abnormalities

Use of algorithm for the baby > or equal 35 weeks



9-RELATED REFERENCES

- 9.1 Management of Neonates Born at ≥ 35 o/7 Weeks' Gestation with Suspected or Proven Early-Onset Bacterial Sepsis, Pediatrics 2018
- 9.2 Management of term infants at increased risk of early onset bacterial sepsis, CPS guidelines, 2017
- 9.3 Reappraisal of guidelines for management of neonates with suspected early-onset sepsis. J Pediatr 2015
- 9.4 Stratification of risk of early-onset sepsis in newborns more than 34 weeks' gestation. Pediatrics 2014
- 9.5 Clinical features and prognostic factors of early-onset sepsis: A 7.5-year experience in one neonatal intensive care unit. Korean J. Pediatr. 2019