Neonatal Sepsis

Standard Operating Procedure (SOP)

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MPDSR National committee

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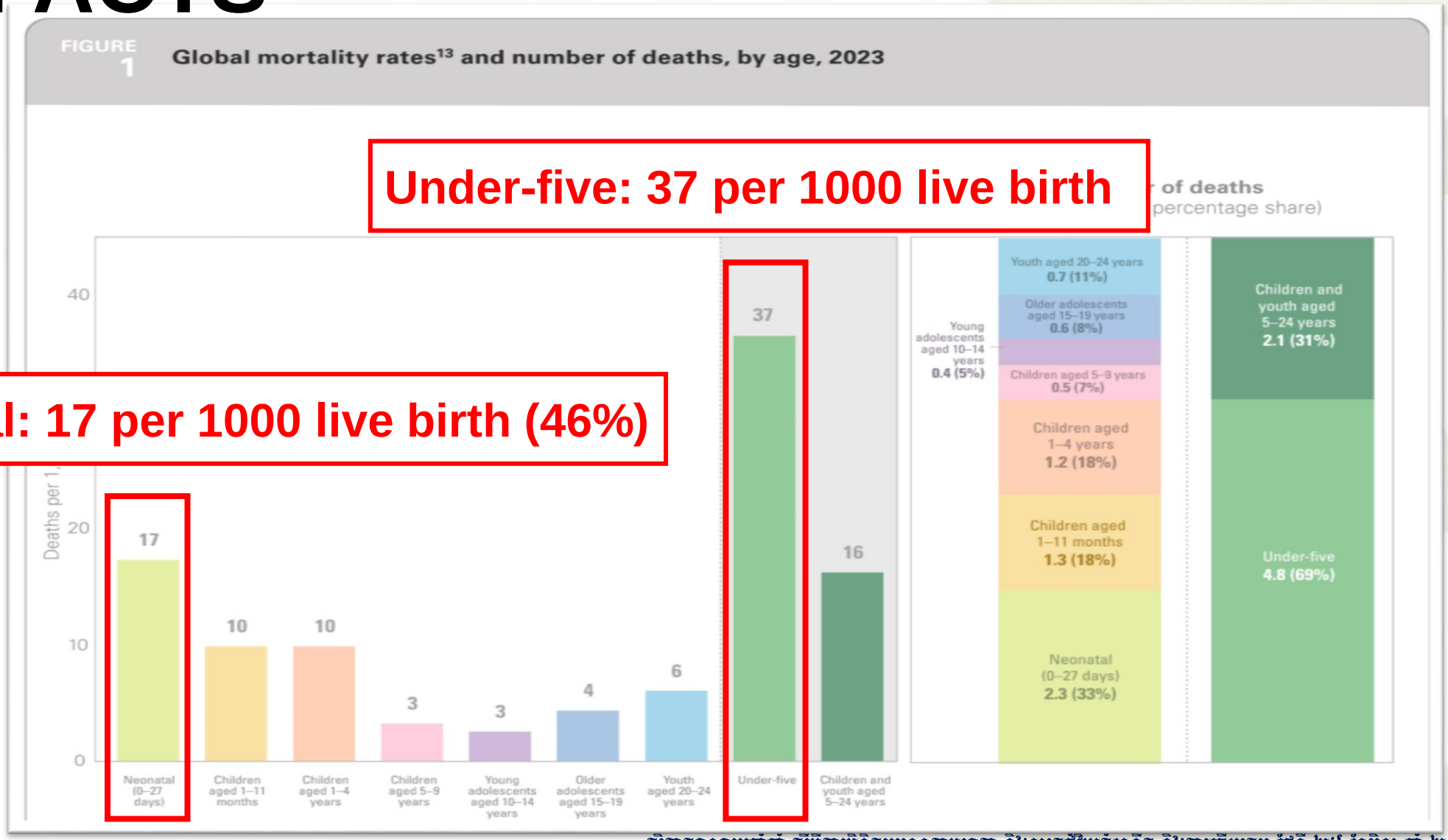
KEY FACTS

Under-five: 37 per 1000 live birth

Neonatal: 17 per 1000 live birth (46%)

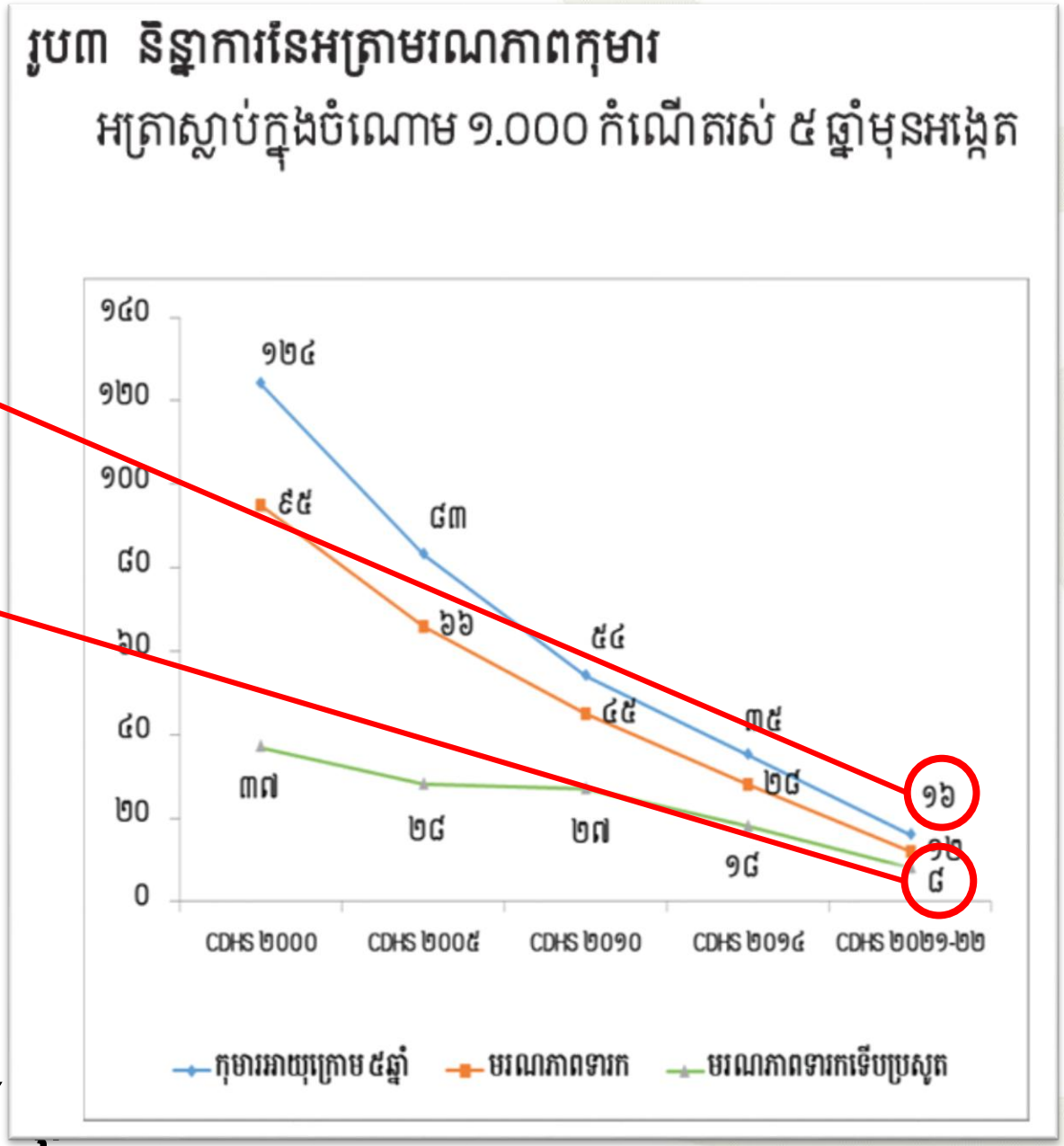


United Nations Inter-Agency Group for Child Mortality Estimation (UN IGME), Report 2024

KEY FACTS

Under-five: 16 per 1000 live birth

Neonatal: 8 per 1000 live birth (50%)



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KEY FACTS

Causes

Most neonatal deaths (75%) occur during the first week of life, and about 1 million newborns die within the first 24 hours.

Among neonates, the leading causes of death include premature birth, birth complications (birth asphyxia/trauma), neonatal infections and congenital anomalies, which collectively account for almost 4 in every 10 deaths in children under 5 years of age. It is worth noting that although the rates for the
natal deaths have declined globally since
for the same proportion of under-5 deaths
2022. Access to and availability of quality
to be a matter of life or death for mothers and newborns globally.

Neonatal sepsis remains a significant cause of neonatal death

https://www.who.int/news-room/fact-sheets/detail/newborn-mortality

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PURPOSE

- ✓Reduce neonatal sepsis mortality and morbidity through timely recognition and treatment
- ✓Standardize antibiotic stewardship across all levels of neonatal care
- ✓Define clear escalation and transfer criteria to prevent delays in care
- ✓Ensure equitable care for all neonates regardless of receiving health facility level

TERMINOLOGY

Neonatal Sepsis		Clinical signs of infection with pathogens isolated from blood or cerebral fluid in neonate
Suspected Neonatal sepsis		Clinical signs of infection, required septic workup and empirical antibiotic treatment
Early-Onset Neonatal Sepsis (EONS)		Sepsis within 72 hours of birth, up to 7 days depending on pathogen, often vertical transmission
Late-Onset Neonatal Sepsis (LONS)		Sepsis after 72 hours of life, often nosocomial
Neonatal Care	Level 1	CPA 1/CPA2
	Level 2	CPA 3
	Level 3/NICU	National/Regional hospital

EPIDEMIOLOGY

Onset	Common pathogens	Some less common pathogens
EONS	GBS, *E. coli*	*Enterobacter*, *Enterococcus*, *Klebsiella*, other gram-negative bacilli, *S. aureus*
LONS	CoNS, *S. aureus* *E. coli*, *Klebsiella* GBS	*Enterobacter*, *Pseudomonas*, *Serratia,* other gram-negative bacilli, *Enterococcus*

CoNS: coagulase-negative staphylococci, *E. coli*: *Escherichia coli,* GBS: group B *Streptococcus, S. aureus*: *Staphylococcus aureus*

RISK FACTORS

EONS	LONS
Maternal fever > 38°C intrapartum or peripartum	Prolonged hospital stay > 5 days
Premature rupture of membranes (PROM) > 18 hours	Invasive procedures: central venous catheter, intubation, urinary catheter
Foul-smelling or purulent amniotic fluid	Parenteral nutrition use > 3 days
Maternal urinary tract infection not treated before delivery	Skin breakdown or wounds
GBS colonization, positive screen, or UNKNOWN status with risk factors	Broad-spectrum antibiotic use > 7 days
Preterm birth < 37 weeks	Crowded NICU conditions, poor hand hygiene compliance

CLINICAL SIGNS

System	Signs & Symptoms
Temperature	Fever > 38°C OR hypothermia < 36°C
Respiratory	Tachypnea, apnea, grunting, nasal flaring, retractions, increased O2 requirement
Cardiovascular	Tachycardia, bradycardia (unrelated to vagal stimulation), hypotension, mottling skin, prolonged capillary refill time > 3s
Neurological	Lethargy, hypotonia, irritability, seizures, bulging fontanelle
GI	Abdominal distension, vomiting, poor feeding, feed intolerance
Skin	Jaundice (especially early or rapidly rising), petechiae, purpura, sclerema, umbilical redness/discharge
Metabolic	Hypoglycemia, unexplained hyperglycemia, metabolic acidosis (pH < 7.25, BE < -8)

DIAGNOSIS

Newborn care	Lab Available	Remarks
Level 1 (CPA1/CPA2)		• Risk factor of sepsis assessment • Clinical reassessment every q2-4h • If any sign of infection, initiate antibiotic immediately then transfer to Level 2 – Ampicillin 50mg/kg/dose IM

Level 2 (CPA 3)	• Laboratory:
	  • CBC, CRP, Electrolyte
	  • Hemoculture, Urinalysis with culture via suprapubic aspiration or catheter specimen)
	• Imagery
	  • Ultrasound, X-ray, CT-scan
		• Absolute Neutrophil Count (ANC) < 1,500 cells/mm³→significant neutropenia, high-risk
		• Immature to Total neutrophil (I:T) ratio > 0.2 with Neutrophil to Lymphocyte ratio (NLR) > 3 →suggests active infection
		• Platelets < 100,000/mm3 — thrombocytopenia→late and serious sign

Level 3/NICU (National/Regional hospital)	• All level 2 Plus:
	  • Procalcitonin (PCT)
	  • Lumbar Puncture (LP)
	  • Complete metabolic panel
	  • Blood gas (ABG or VBG), Lactate
	  • PT, aPTT, Fibrinogen, D-dimer
	  • Echocardiography
		• LP for CSF — perform in all neonates with suspected meningitis
		• Echocardiography if hemodynamic instability or suspected cardiac dysfunction
		• Repeat blood cultures at 48-72h if not clinically improving

MANAGEMENT-Antibiotics

EONS

- ✓ within one hour of clinical suspicion
- ✓ Do not wait for culture results

First-line:
- Ampicillin
- Gentamicin

- ✓ Not improved after 48 hrs of treatment
- ✓ Antibiogram results show resistance to 1st line antibiotics

First-line + Ceftriaxone

Necrotizing Enterocolitis
- First-line +
- Metronidazole

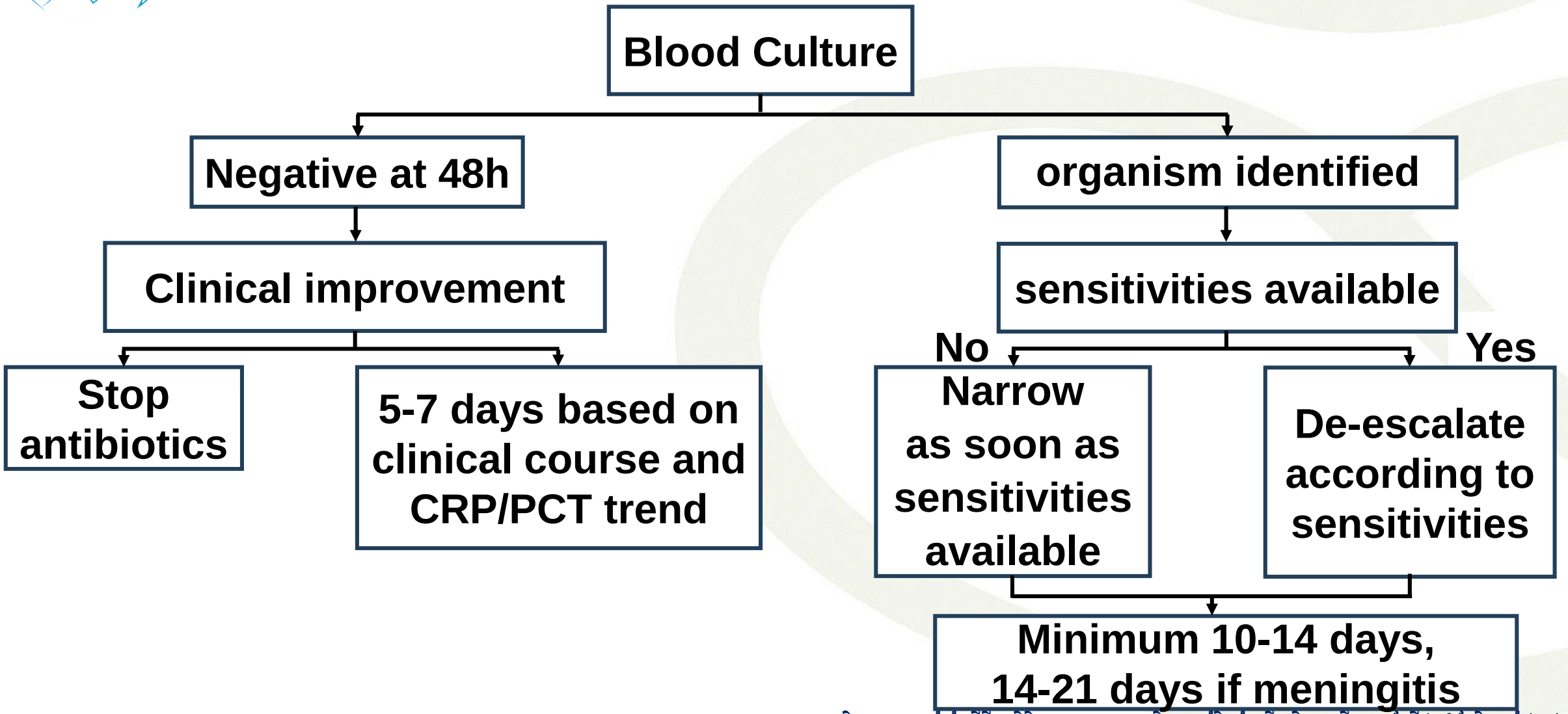
If > 10 skin pustules
- Cloxacillin
- Gentamycin

MANAGEMENT-Antibiotics

LONS: Empirical antibiotics

Antibiotic	Dose			Frequency	Route
Vancomycin	10-15 mg/kg/dose			q8-12h (adjust by GA and PNA)	IV over 60 min
Meropenem	≤2 kg	≤14 days	20 mg/kg/dose	q12h	IV Slow (30 min)
		>14 days	20-30 mg/kg/dose	q8h	
	>2 kg	≤14 days	20 mg/kg/dose	q8h	
		>14 days	30 mg/kg/dose	q8h	

MANAGEMENT-Antibiotics



SUPPORTIVE CARE

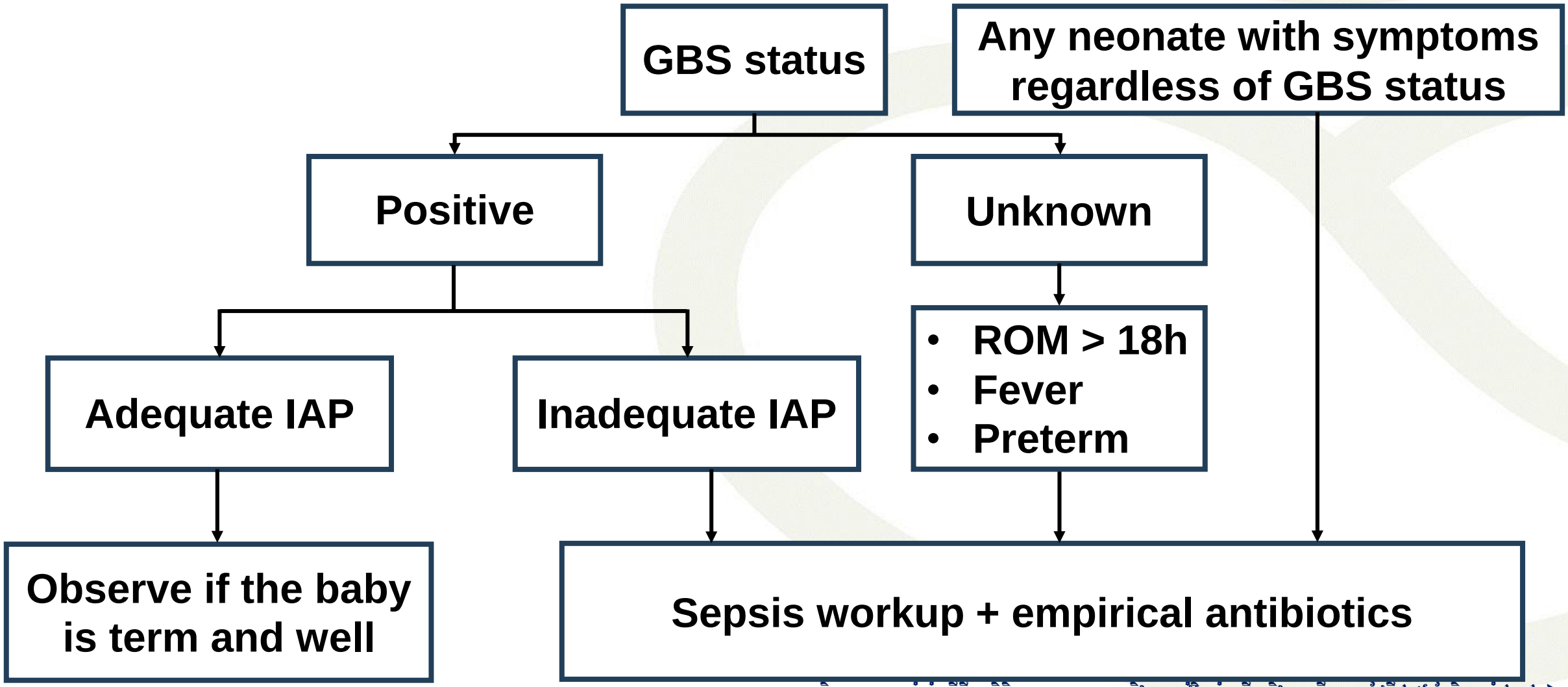
Thermoregulation	Target axillary temperature 36.5-37.5°C
	Monitor temperature every 1-2h in unstable neonates
Fluid & Hemodynamic	Peripheral IV; umbilical arterial/venous catheter or PICC at Level 3
	Vasopressor — if hypotension persists after 20-30 mL/kg fluid bolus
	Hydrocortisone: 1-2 mg/kg/dose q8-12h IV — for vasopressor-refractory shock (Level 3 only). If unresponsive to at least 2 vasopressors
	Monitor vital sign and urine output: target > 1 mL/kg/h; oliguria < 0.5 mL/kg/h — notify physician
Respiratory	Maintain normal gas exchange and oxygen saturation
Nutrition	Pause enteral feeds if hemodynamically unstable, ileus suspected, or NEC
	IV maintenance fluids: 60-80 mL/kg/day on Day 1
	Start parenteral nutrition within 24-48h if enteral feeds held
	Trophic feeds 10-20 mL/kg/day first is the best option

PREVENTION

GBS Prevention Protocol for EONS

- Obtain maternal GBS screening status on neonatal admission form
- Intrapartum antibiotic prophylaxis (IAP) given to mother
- Adequate IAP = Penicillin G given ≥ 4 hours before delivery

PREVENTION


GBS status
Any neonate with symptoms regardless of GBS status
Positive
Unknown
Adequate IAP
Inadequate IAP
• ROM > 18h
• Fever
• Preterm
Observe if the baby is term and well
Sepsis workup + empirical antibiotics

PREVENTION

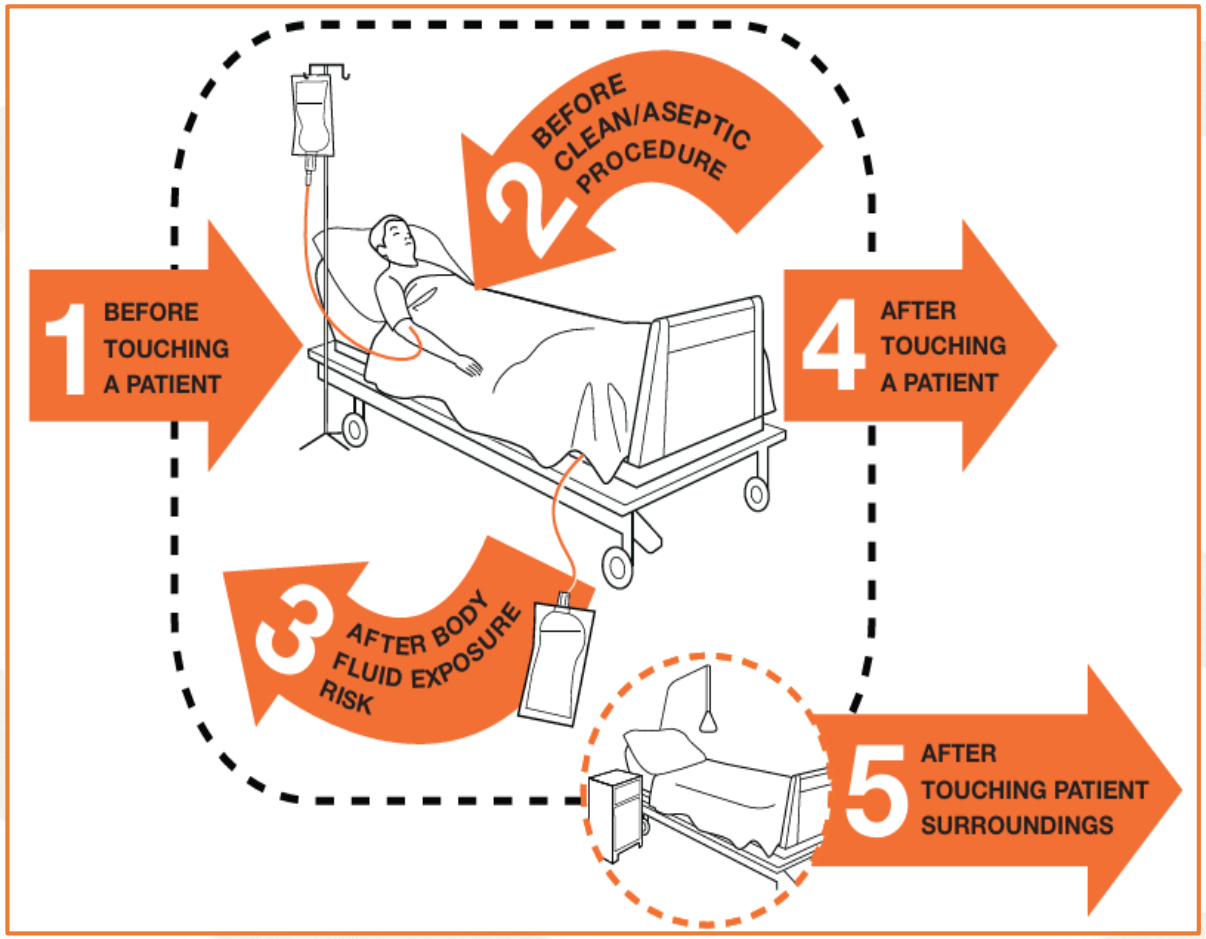
Hand Hygiene

- Most effective to prevent LONS
- Target compliance > 80%
- If not visibly soiled

→ handrubs with alcohol-based 60-80% of alcohol for 20-30 sec

- If visibly soiled

→ handwash with soap and water for 40-60 sec



WHO Five Moments for hand hygiene

REFERENCES

- The NCU Clinical Manual, NMCHC, NCGM, 2015
- World Health Organization (WHO). Pocket Book of Hospital Care for Children, 3rd edition. WHO, 2022.
- Puopolo KM, et al. Management of Infants at Risk for Group B Streptococcal Disease. Pediatrics. 2019;144(2):e20191881.
- Shane AL, et al. Neonatal Sepsis. Lancet. 2017;390(10104):1770-1780.
- NICE. Neonatal infection: antibiotics for prevention and treatment. NICE Guideline NG195, 2021.
- Rybak MJ, et al. Therapeutic monitoring of Vancomycin for MRSA infections. ASHP/IDSA/SIDP Guidelines. Am J Health-Syst Pharm. 2020;77(11):835-864.
- Polin RA, et al. The conundrum of early-onset sepsis. Pediatrics. 2014;133(6):1122-1123.