



Recognizing sepsis in the newborn:

Speak up!!

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Objectives:

- ▶ Understand the incidence and prevalence of sepsis in the newborn period
- ▶ Identify the risk factors for neonatal sepsis
- ▶ List the most frequent causative organisms in newborn sepsis
- ▶ Describe the symptoms present in the septic newborn
- ▶ Outline treatment options for newborn sepsis
- ▶ Discuss outcomes after newborn sepsis

What is sepsis?

A clinical syndrome of systemic illness related to bacteremia with potential for multisystem involvement, failure, and or death.

"Circling the drain!"

How big is the problem in the NICU?

Term

- ▶ Ranges from 1 per 3000 up to 1.5 per 1000 births

Preterm or LBW

- ▶ Wide ranging from 3 to 27 babies per 1000 births

That seems pretty low...so what's the big deal?

- ▶ Incidence is low in term infants
- ▶ Incidence is much higher in at risk infants (preterm and LBW)
- ▶ More importantly though—morbidity and mortality are high

Two main sepsis categories:

► Early Onset:

- Onset from birth to 72 hours of life (85% in first 24 hrs)
- Different causative organisms
- Vertical transmission
- Risk factors include: preterm (Twice as likely if <28 wks), ELBW/LBW, maternal infection/chorio, PROM, Vaginal delivery versus CS without labor, GBS+/ untreated

Two main sepsis categories:

► Late Onset:

- Onset after 72 hours of life
- Different causative organisms
- Horizontal transmission (Need we talk about hand washing?)

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**“I spent 2 years in nursing school. There was
3 months of anatomy, 3 months of clinical
and 18 months learning how to
wash our hands properly.”**

Two main sepsis categories:

► Late Onset:

- Onset after 72 hours of life
- Different causative organisms
- Horizontal transmission (Need we talk about hand washing?)
- Risk factors include: preterm, ELBW/LBW, prolonged intubation, indwelling lines/caths, possibly higher in blacks, delayed achievement of full enteral feeds

And that is where
you become
invaluable...

SPEAK UP!!

**I CAN'T ALWAYS BE AT THE
BEDSIDE!!**

What does it look like at the bedside?-

- ✓ Lethargy/Listlessness
- ✓ Fever/Temperature instability
- ✓ Glucose troubles
- ✓ Poor feeding or Feeding intolerance/Emesis/Bloody stools
- ✓ Respiratory distress/Apnea
- ✓ Tachycardia
- ✓ Irritability/Seizures
- ✓ Abdominal distention
- ✓ Poor perfusion/Hypotension
- ✓ Metabolic Acidosis

Unfortunately, it looks like every other NICU diagnosis!

Now what do we do?

“Rule out sepsis”

1. Good physical exam is crucial: Appearance, HR, RR, cap refill, BP, temp, glucose
2. Consider CXR/ KUB
3. LP with CSF studies. Success is in the “holder”
4. Blood culture (**Gold standard**)-min of 1 ml in bottle. Betadine prep. Some institutions do peripheral and central
5. Acute phase reactants: CRP and procalcitonin
6. Other labs: ABG, Lytes, Lactate, UA and urine culture
7. CBC with differential

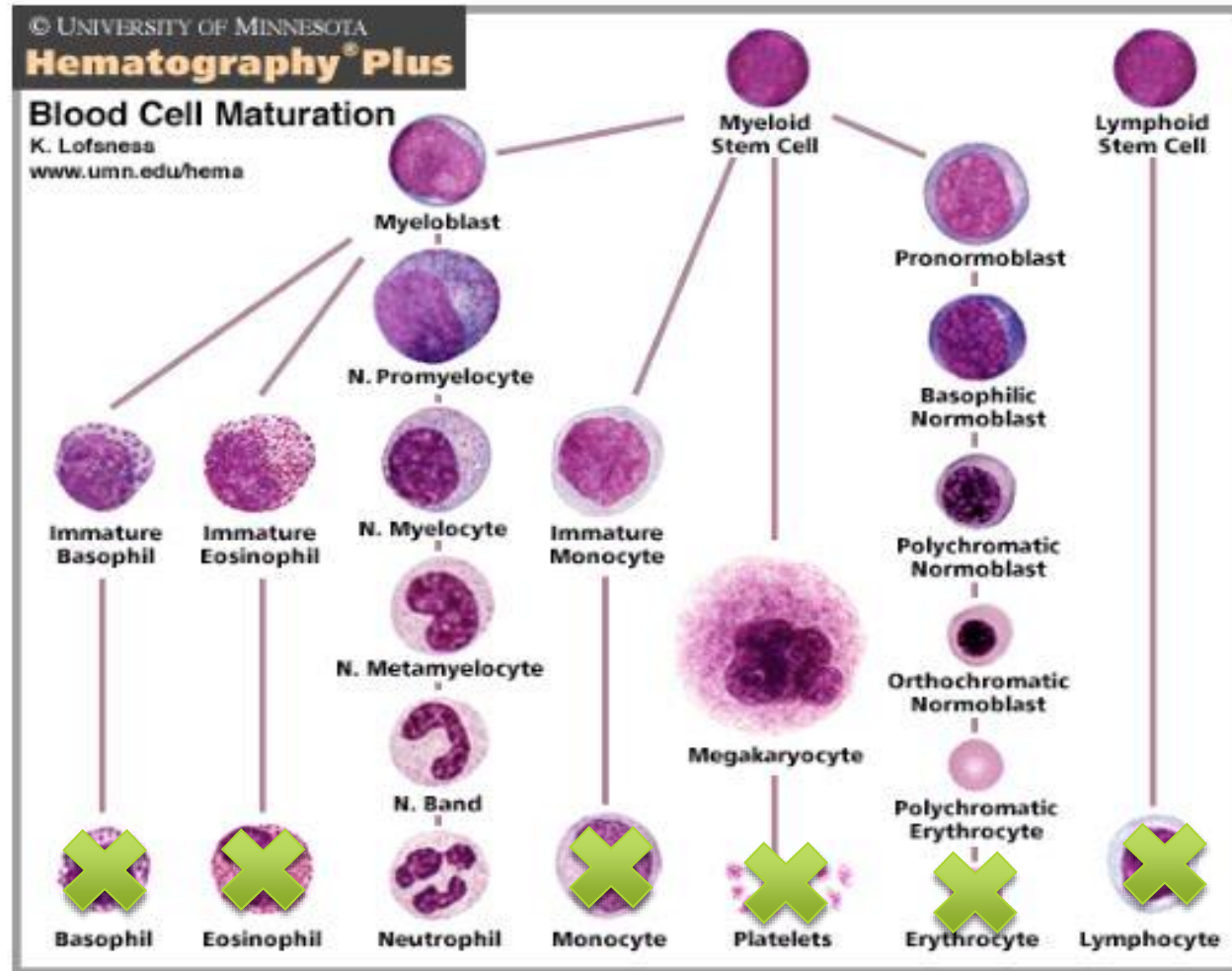
Let's talk about CBC interpretation:

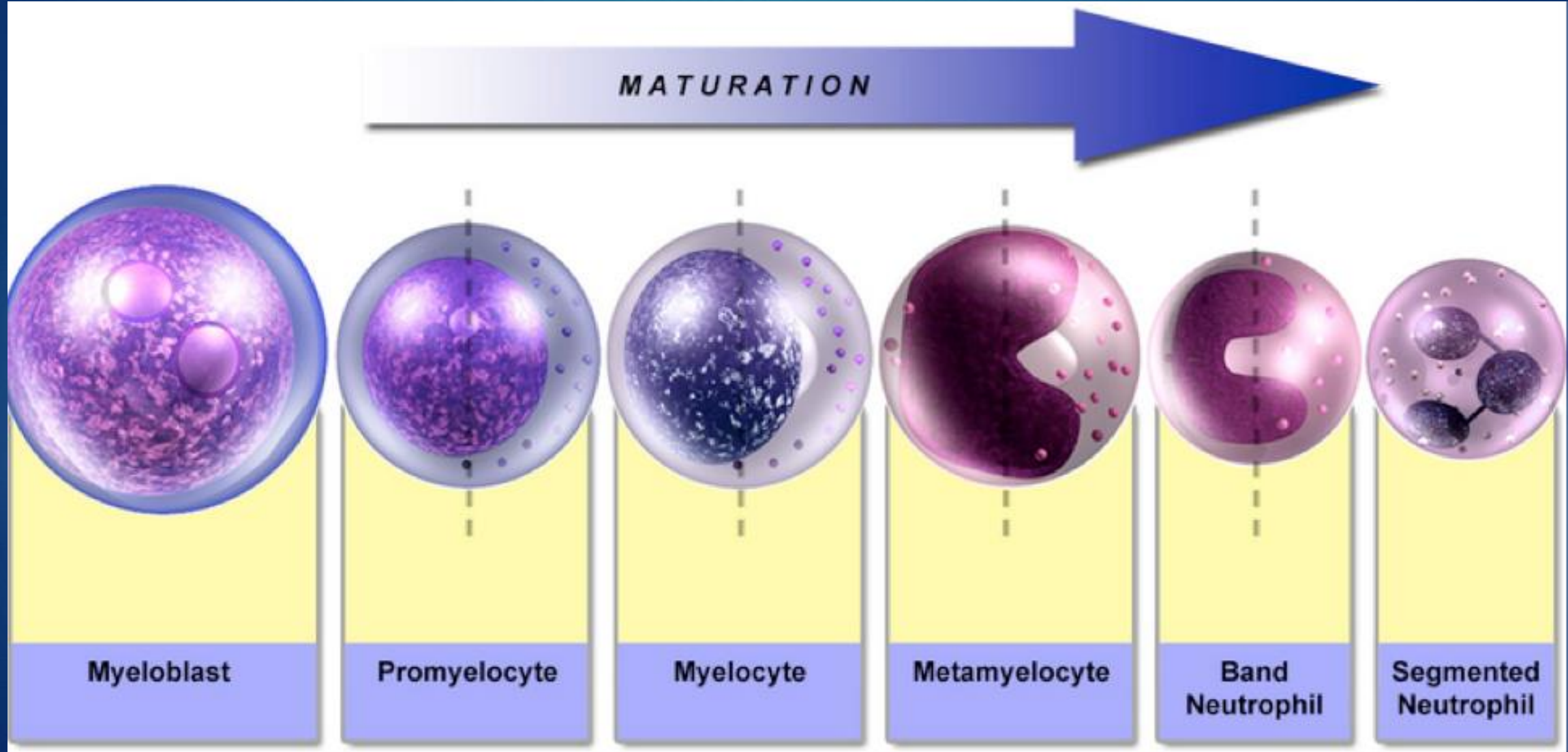
Complete blood count:

Just what it says.

It is a complete count of the components of your blood. If I count 100 cells in your blood what will I see?

White Blood Cells: Leukocytes





Immature to Total Neutrophil Count: I:T Ratio

Add up all the neutrophils including the immature ones and then divide the number of immature ones by the total number of neutrophils. Anything > than 0.2 suggests infection

Example #1

Myelocytes 1

Metamyelocytes 2

Bands 20

Segs 30

Therefore immature = 24

Total = 54

$24 \div 54 = 0.44$ I:T ratio

Example #2

Myelocytes 0

Metamyelocytes 0

Bands 6

Segs 58

Therefore immature = 6

Total = 64

$6 \div 58 = 0.10$ I:T Ratio

Acute phase reactants:

Labs that indicate the body's response to infection, inflammation, or injury.

CRP

Procalcitonin

Now that we have determined that we have a problem:

- ▶ Treat – antimicrobials, immune globulins
- ▶ Supportive – respiratory, metabolic, thermal, nutrition

Which
drug
for
which
bug?



We must make an educated guess at the bug before we can pick the drug!

Early Onset infection
versus
Late Onset infection

Common Bacteria in the NICU!

EOS

- ▶ Group B Strep
- ▶ E Coli-especially in preemies
- ▶ Listeria
- ▶ *Don't forget HSV

LOS

- ▶ Staph, Staph and more Staph (>60%)



Common Bacteria in the NICU!

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- ▶ Group B Strep
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LOS

- ▶ Staph, Staph and more Staph (>60%)
- ▶ E Coli and other gram negatives such as Klebsiella, Enterococcus, and Pseudomonas
- ▶ * Don't forget Viruses and Fungus!!

Common Bacteria in the NICU!

EOS

- ▶ Ampicillin and Gentamicin
- ▶ Consider Acyclovir

LOS

- ▶ Vancomycin and Gentamicin
- ▶ Add Clindamycin, Cefotaxime (esp with meningitis)
- ▶ Consider Amphotericin B or fluconazole

Antibiotic Stewardship

Accurately identify patients who need antibiotic therapy

Obtain two blood cultures for evaluation of late onset sepsis prior to starting antibiotics

Utilize local and regional antibiograms-
Providers should know what grows at their hospital!

Give the right dose and interval of drug and monitor peaks and troughs when indicated

Review culture results and adjust antibiotics

Stop therapy promptly if indicated by culture results

Now that we have started treatment how do we support them until it works?

- ✓ Lethargy/Listlessness-Positioning
- ✓ Fever/Temperature instability-Warmer
- ✓ Glucose troubles-Dextrose/Insulin/ TPN/IL
- ✓ Poor feeding or Feeding intolerance/Emesis- NPO, IV fluids, Replogle
- ✓ Respiratory distress/Apnea-CXR, CPAP, ventilation
- ✓ Tachycardia- BP support, control fever
- ✓ Irritability/Seizures- sedation, anticonvulsants, narcotics
- ✓ Abdominal distention- Replogle to LIS, KUBs
- ✓ Poor perfusion/Low BP/Hypotension-Pressors, volume, PRBCs
- ✓ Metabolic Acidosis- acetate, better perfusion, volume

How will it turn out? ...what does the future look like for this baby and their family?

- ▶ Higher likelihood of dying...**duh!**
- ▶ Prolonged hospital stay and higher financial cost (avg stay extended 19 days)
- ▶ Increased rates of BPD, IVH, NEC, clots/thrombi, seizures, poor growth, vision problems,
- ▶ Neurodevelopmental impairment
- ▶ Hearing damage/loss

So what's the bottom line...



- ▶ Avoid infection with good prenatal care and diligent hand washing
- ▶ Identify early and treat promptly and effectively.
- ▶ That's why your role is vital! Speak up for the babies...
- ▶ Early recognition of symptoms and prompt treatment saves lives and improves outcomes

**And that's
why the
babies and
I thank you!!**

