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# Pediatrics

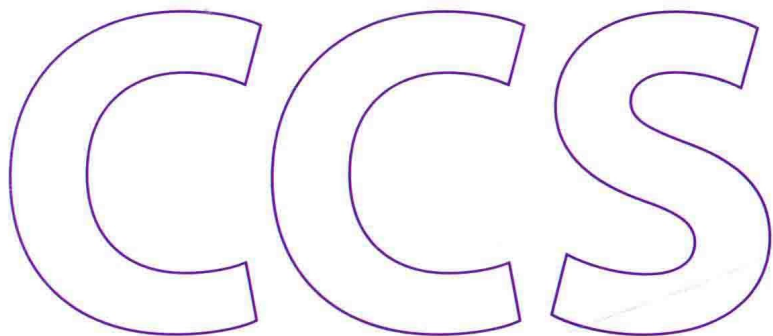
## CORRELATIONS & CLINICAL SCENARIOS

for the USMLE Step 3

- Progressive cases with Q&A and pearls
- Basic science correlations

CCS navigation tips

# Pediatrics



## Correlations and Clinical Scenarios

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**Correlations and Clinical Scenarios: Pediatrics**

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# Pediatrics

# CCS

Correlations and Clinical Scenarios

### Notice

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*To Martin Restituyo, thank you for all of your support  
and love during this time. I could not have dreamt of a better partner.  
I love you with all my heart.*

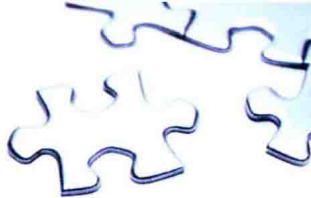
*Elizabeth V. August, MD*

*To my parents, Navin and Pravina Sonpal.  
Their guidance, love, and support have led me  
to be the physician and educator I am today.*

*Niket Sonpal, MD*



# HOW TO USE THIS BOOK



The primary purpose of this book is to coach you in the precise sequence through time to manage the computerized case simulation (CCS) portion of the step 3 exam, specifically for questions pertaining to the specialty of Pediatrics. You will find directions on moving the clock forward in time and the specific sequence in which each test or treatment should be done in managing a patient. This will cover the order in which to give treatments, order tests, and how to respond to test results. All CCS-related instructions appear in **RED TYPE**.

If you have never seen a particular case, this book is especially for you. It never has statements about “using your judgment” because you basically do not have any in these areas. We have made a cookbook that says “Do this, do that, do this.” We do not consider the term “cookbook” to be inappropriate in this case.

You need to learn the basics of pediatrics. Less than ten percent of physicians are in this specialty, but the other 90% need to have at least a working knowledge of it.

This book will prepare you for multiple-choice questions, which comprise the majority of the exam, as well as the computerized clinical case simulations and the new basic science foundations that have just been added to the exam.

USMLE Step 3 or COMLEX Part 3 is the last phase in getting your license. Most of you are in residency and have no time to study. Here is how to best use this book.

First read about the disease or subspecialty in any standard text book. We personally suggest either *Master the Boards Step 3* book (Conrad Fischer) or the *Current Medical Diagnosis and Treatment* book.

The cases in this book are meant to enhance your understanding of the subject. All initial case presentations and their continuing scenarios appear in yellow boxes. There are also hundreds of new multiple-choice questions that are not in anyone’s Q bank.

Every single case has related basic science foundations (which appear in blue boxes), so you will get a solid grasp of these simply by following along in the case. You do not have to consult any of your old step 1 books or basic science texts. The basic science correlates should be painless. You need not search for extra information. Just learn what we have selected in these chapters.

We always wanted to write something specifically for CCS. This is it. Because new test changes are frightening and the basic science questions are new for step 3, we made one book to cover both the simulations and the basic science.

Elizabeth V. August, MD  
Niket Sonpal, MD  
Conrad Fischer, MD



# CONTENTS

How to Use This Book .....	xi
<b>Chapter 1. Newborn Management.....</b>	<b>1</b>
Case 1: Healthy Newborn .....	1
Case 2: Neonatal Jaundice.....	6
Case 3: Neonatal Hypoglycemia.....	12
Case 4: Respiratory Distress in the Newborn .....	15
Case 5: Hyaline Membrane Disease .....	19
Case 6: Necrotizing Enterocolitis .....	22
Case 7: Congenital Malformation .....	26
Case 8: Birth Injuries.....	29
Case 9: Sepsis.....	32
<b>Chapter 2. Genetics .....</b>	<b>35</b>
Case 1: Abnormal Number of Chromosomes .....	35
<b>Chapter 3. Growth and Development .....</b>	<b>41</b>
Case 1: Milestones.....	41
Case 2: Immunizations .....	44
Case 3: Enuresis .....	47
Case 4: Encopresis.....	50
Case 5: Autism.....	51
<b>Chapter 4. Respiratory Diseases.....</b>	<b>55</b>
Case 1: Bronchiolitis .....	55
Case 2: Acute Asthma Exacerbation.....	60
Case 3: Asthma.....	63
Case 4: Pneumonia.....	66



Case 5: Foreign Body Aspiration .....	69
Case 6: Cystic Fibrosis .....	70
<b>Chapter 5. Ear, Nose, and Throat</b> .....	75
Case 1: Otitis Media .....	75
Case 2: Otitis Externa .....	79
Case 3: Malignant Otitis Externa .....	81
Case 4: Strep Throat .....	83
Case 5: Peritonsillar Abscess .....	85
Case 6: Retinoblastoma .....	87
<b>Chapter 6. Endocrinology</b> .....	89
Case 1: Hypothyroid .....	89
Case 2: Diabetes .....	92
<b>Chapter 7. Poisoning</b> .....	95
Case 1: Acetaminophen .....	95
<b>Chapter 8. Orthopedics</b> .....	97
Case 1: A Loud Clunk .....	97
Case 2: Can't Run or Climb a Tree But Can See and Pee .....	100
Case 3: My Leg Hurts .....	103
Case 4: My Knee Hurts .....	105
Case 5: Another Broken Bone? .....	107
Case 6: Sunburst or Onions .....	110
<b>Chapter 9. Gastrointestinal</b> .....	113
Case 1: Pink Baby Sometimes .....	113
Case 2: My Baby Dislikes Milk .....	116
Case 3: My Baby Vomits .....	120
Case 4: My Child Vomits All the Time .....	124
Case 5: Cystic Fibrosis .....	126

Case 6: My Baby Doesn't Poop .....	128
Case 7: Bloody Diarrhea.....	130
Case 8: Currant Jelly Again.....	133
Case 9: My Kid Has a Rash on His Bottom.....	136

## **Chapter 10. Cardiology** .....

Case 1: Machines and Much More .....	139
Case 2: Tetralogy of What? .....	142
Case 3: Who is Ebstein? .....	146
Case 4: Transposition .....	149
Case 5: Single Truncus .....	152
Case 6: Coarctation .....	154
Case 7: Acute Rheumatic Fever .....	157

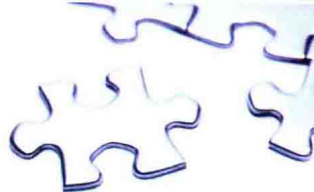
## **Chapter 11. Infectious Disease** .....

Case 1: Red Eyes .....	161
Case 2: Baby is Kind of Floppy .....	164
Case 3: Bad Kitty .....	167
Case 4: Spots .....	169
Case 5: Three-Day Measles .....	172
Case 6: Fever First, Rash Later .....	175
Case 7: Mumps .....	177
Case 8: Fifths, Not Sixths .....	179
Case 9: Scarlet Fever .....	182
Case 10: Whoop, There It Is .....	185
Case 11: Steeples and Coughs .....	187
Case 12: Drool Everywhere .....	189

Index .....	193
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## CHAPTER 1

# NEWBORN MANAGEMENT



### CASE 1: Healthy Newborn

**Setting:** Hospital

**CC:** "I was just born."

**Vitals:** HR, 150 beats/min; RR, 30 breaths/min

**HPI:** Patient was born seconds ago to a 26-year-old G<sub>1</sub>P<sub>0</sub> at 39 weeks' gestation. The mother had no medical problems and no gestational complications. The patient was born via normal spontaneous vaginal delivery (NSVD). The patient is screaming and crying.

#### Physical Exam:

- Gen: awake, crying, moving all limbs
- Head: No hematoma, open fontanelles
- Eyes: + Red reflex
- Clavicles: Normal clavicles, no trauma noted
- CVS: S<sub>1</sub>S<sub>2</sub> + tachycardia, no murmurs, rubs, gallops (no m/r/g)
- Lungs: Clear to auscultation bilaterally (CTA b/l)
- Abdomen: Soft, nontender, nondistended
- Rectum: Passage of meconium
- Genitalia: Penis, passage of urine, testicles descended bilaterally
- Spine: Straight, no patches of hair or spina bifida
- Hips: Negative Barlow and Ortolani
- Neurological: + Sucking reflex, + Moro reflex, + rooting reflex
- Skin: Pink centrally with blue tint noted in the extremities

**Which of the following is this baby's APGAR score?**

- a. 2
- b. 4
- c. 6
- d. 8
- e. 9

**Answer e. 9**

APGAR is a measure of how the baby is doing. It is based on the following scoring system.

APGAR Scoring System

	0 Points	1 Point	2 Points
Appearance	Pale blue	Pink body, blue extremities	Pink all over
Pulse	None	Less than 100	More than 100
Grimace (when stimulating child)	No response	Facial movement	Trying to pull away or crying
Activity	Limp	Flexion in arms and legs	Active movement
Respirations	None	Slow, irregular	Crying

Most babies only ever achieve a 9 because the skin tone almost always is pink centrally with bluish tinge in the extremities (acrocyanosis).

APGAR scores are done at 1 minute and 5 minutes after birth. The 1-minute score is based on how the baby was doing in utero, and the 5-minute score is how well the baby is responding to the resuscitative treatments or the environment.

In newborns, blood pressure is not routinely checked. Heart rate, respiratory rate, temperature, and weight are most often checked.

Range of normal vital signs in newborns:

- Heart rate: 120 to 160 beats/min
- Respiratory rate: 30 to 50 breaths/min

After the baby is born, which of the following is the next step in the management of this patient?

- a. Draw a CBC and blood cultures

b. Put erythromycin ointment in the patient's eyes
- c. Do a blood glucose

d. Give hepatitis vaccination

Answer b. Put erythromycin ointment in the patient's eyes.

Erythromycin ointment should be put in the eyes of the newborn within 1 hour of birth. If the patient was shaky or had a an elevated temperature, the blood sugar, complete blood count (CBC), and blood cultures could be done. These tests are not routinely done in newborns. Hepatitis vaccination is not given within minutes of birth. The vitamin K injection is given within minutes of birth.

**Mechanism of erythromycin**

- Binds 50S subunit of ribosome
- Blocks translation of RNA
- Blocks protein production in bacteria

**Gonorrhea**

- Gram-negative diplococcus
- “Fastidious” = picky eaters!
- Only eats candy (glucose)
- Chocolate agar and 5% CO<sub>2</sub> growth
- Has “pili,” which is a penis-like grappling hook that allows attachment to tissues

**Pharmacokinetics of erythromycin**

- Demethylation in liver
- Cytochrome P450 system
- Excretion through bile

Vitamin K is given to prevent hemorrhagic disease of the newborn.

**For which of the following factors is vitamin K needed?**

- |        |       |
|--------|-------|
| a. I   | d. VI |
| b. II  | e. V  |
| c. III |       |

**Answer b. II**

Vitamin K–dependent bleeding factors are factors II, VII, IX, and X. Newborns are given vitamin K at birth to prevent bleeding caused by vitamin deficiency. Breast milk does not provide adequate amounts. Without vitamin K, the baby may start to bleed intracranially or from the gastrointestinal tract, umbilical cord, nose, or circumcision site.

**Mechanism of vitamin K**

- Gamma carboxylation
- Adds carboxyl group to glutamate
- Formula has 100 times more vitamin K than human milk



*Move the clock forward 1 hour.*

*The patient continues to do well and is crying intermittently. The mother would like to breastfeed the baby.*

### Which of the following is a contraindication to breastfeeding the newborn?

- a. The mother had spinal anesthesia
- b. The mother is positive for hepatitis B surface antibody
- c. The mother has HIV
- d. The mother has erythema of the breast

**Answer c.** The mother has HIV.

There are few absolute contraindications to breastfeeding. Maternal HIV and tuberculosis are the strongest absolute contraindications. Maternal herpes infection of the nipple is also a contraindication.

Anesthesia and pain medications are not contraindications to breastfeeding. Smoking and alcohol are relative contraindications, meaning that women should not smoke and drink and then breastfeed. If a woman chooses to smoke or drink alcohol, the milk should be expressed for a time before breastfeeding again. Mothers should be encouraged to not smoke, drink, or use drugs while pregnant or breastfeeding. If the patient has the hepatitis B surface antigen, it is not a contraindication to breastfeeding. Breastfeeding transmits as much HIV as passing through the birth canal.

*Move the clock forward 1 hour.*

*The mother's hepatitis status is unknown. Blood is drawn for the hepatitis panel, and it returns that she is hepatitis B surface antigen positive.*

### Which of the following is the next step in the management of this patient?

- a. Hepatitis B vaccination
- b. Hepatitis immunoglobulin
- c. Hepatitis immunoglobulin and hepatitis B vaccination
- d. Quarantine the child and administer hepatitis B vaccine, hepatitis B immunoglobulin, and interferon

**Answer c.** Hepatitis B immunoglobulin and hepatitis B vaccination

All newborns will receive the hepatitis B vaccination before discharge from the hospital. Administration of the hepatitis immunoglobulins alone is insufficient.

Quarantining a child is unnecessary. It is unknown if the child had hepatitis B, and treatment would be unwarranted at this point.



HbcAg = hepatitis B core antigen  
 HbeAb = hepatitis B "e" antigen  
 BOTH are present during an active infection.

#### Mechanism of hepatitis B vaccine

- It is protein only.
- There is nothing "live" at all in hepatitis B vaccine.
- Recombinant production of surface antigen protein from yeast
- Surface antigen protein has no potential to initiate infection.

*Move the clock forward 1 day.*

#### **Setting:** Hospital

*The mother states that the baby is latching onto the breast well and seems to be crying from hunger every 2 to 3 hours. The infant has had two or three bowel movements that are a greenish-yellow color.*

### Which of the following is NOT mandatory before discharge?

- a. Newborn screening
- b. Circumcision
- c. Hearing test

#### **Answer b.** Circumcision

Circumcision is not required by any state. However, all states do require both the newborn screening and the hearing test. Hearing is needed for normal language development. If the patient is deaf or cannot hear normally, then there may be speech delay and behavioral changes in the child. Newborns are screened for brainstem responses to the sounds that are emitted from the apparatus. Since the implementation of newborn hearing screening, the average age of confirmation of deafness has dropped from 2 years old to 2 to 3 months.

Newborn screening is a mandatory blood test that is done to detect hormonal changes and inborn errors of metabolism. The tests are required by the state, but each individual state will have different requirements. More than 40 genetic tests are done in the newborn screening.

*The patient was discharged healthy at 2 days of life. The patient's mother is to follow up with the primary care physician in 2 days.*

## CASE 2: Neonatal Jaundice

**Setting:** Hospital

**CC:** "My baby looks yellow."

**Vitals:** HR, 120 beats/min; RR, 20 breaths/min; birth weight: 7lb, 6 oz; today's weight: 6 lb, 12 oz

**HPI:** The mother states that the baby has been latching onto the breast well, sucking well, and is crying every 2 or 3 hours. The infant has been urinating often and had 2 stools this morning. The baby is currently 2 days old. The mother states that she feels that the child is yellow in color. The mother is a G<sub>1</sub>P<sub>0</sub> with no gestational complications during pregnancy. The mother was group B streptococcus (GBS) negative.

### Physical Exam:

- Gen: Awake, alert
- Head: Asymmetric; small collection on top of head that does not cross the suture lines
- Clavicles: Normal, no birth trauma noted
- CVS: S<sub>1</sub>S<sub>2</sub>+, tachycardia, no m/r/g
- Lungs: CTA b/l
- Abdomen: Soft, NT, ND, +BS
- Skin: Slight yellowing of the skin

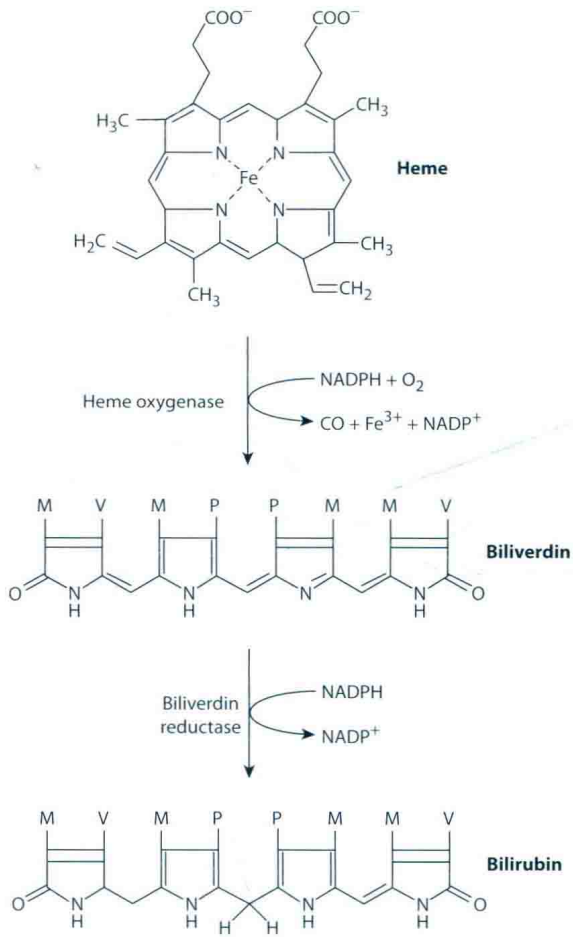
**Which of the following is the next step in the management of this patient?**

- |                           |                         |
|---------------------------|-------------------------|
| a. Bilirubin levels       | c. Start phototherapy   |
| b. CBC and blood cultures | d. Exchange transfusion |

**Answer a.** Bilirubin levels

This patient seems to be slightly jaundiced. The next step in the management of a jaundiced baby is to order a bilirubin level; blood type and screen; and if the patient is at risk for infection (e.g., the mother was GBS positive without adequate treatment during delivery), then a CBC or blood cultures. Treatment with phototherapy and exchange transfusion is too early at this point. All babies will become slightly jaundiced after birth, but if it increases to a dangerous level, then phototherapy or exchange transfusion may be considered.

Newborns normally lose weight in the first week of life. It should NEVER be more than 10%.



**Figure 1-1.** Molecular breakdown of hemoglobin to bilirubin. (Reproduced with permission from Barrett KE, et al. Chapter 28. Transport & metabolic functions of the liver. In: Barrett KE, et al., eds. *Ganong's Review of Medical Physiology*. 24th ed. New York, NY: McGraw-Hill; 2012. Figure 28-4.)

### Biochemical pathway of bilirubin production

- Bilirubin is a byproduct of heme breakdown.
- Porphyrin of heme broken down by heme oxygenase (Figure 1-1)
- Biliverdin converted in the macrophage to bilirubin

Bilirubin level was drawn and returns at 12 mg/dL. The patient and her mother have the same blood type, O+.