

Choriophobia: A 1-Act Play

abstract

The management of a newborn born to a mother with chorioamnionitis is controversial. By using data collected on neonates born in the era of routine maternal screening for Group B *Streptococcus*, we calculate that the risk of early-onset sepsis in a hypothetical infant born at term to a mother with chorioamnionitis, who has a normal physical examination at birth, is likely substantially <1% if the mother's screen for Group B *Streptococcus* was negative. This low rate of sepsis calls into question current guidelines recommending treatment of all such newborns with intravenous antibiotics for 48 hours pending the results of a blood culture. Current guidelines for the management of infants born to mothers with chorioamnionitis also raise an important ethical issue; the recommendation to treat these infants with intravenous antibiotics is, in essence, a de facto determination of what constitutes unacceptable risk to the newborn. We argue that this determination is ultimately value-based and therefore requires broader deliberation than that which frequently occurs among medical experts who develop medical guidelines. *Pediatrics* 2012;130:342–346

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KEY WORDS

Streptococcus agalactiae, infant, newborn, chorioamnionitis, bioethics

ABBREVIATIONS

CBC—complete blood cell count

CDC—Centers for Disease Control and Prevention

GBS—group B *Streptococcus*

IV—intravenous

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Almost 30 years ago, Watchko and Oski used the format of a tongue-in-cheek 1-act play, "Bilirubin 20 mg/dL = Vigintiphobia,"¹ to challenge the then-standard management of newborns with hyperbilirubinemia. With the intention of stimulating discussion on another controversial clinical issue, management of a term neonate born to a mother with chorioamnionitis, we present a similar 1-act play adapted from their original work. In this play, we offer our perspective on the clinical and ethical issues arising when parents and clinicians disagree on the care of a neonate born to a mother with chorioamnionitis. The clinical details of the hypothetical patient presented in this 1-act play were taken, almost verbatim, from a recently published commentary, "When Parents Refuse a Septic Workup for a Newborn."²

CAST

A third-year pediatric resident
A 55-year-old attending pediatrician

SCENE

Daily rounds at the newborn nursery of a large academic medical center

TIME

Early morning, any time in 2012

Resident:

(*addressing the attending*) The next patient is a 1-hour-old infant born to a 30-year-old woman at 38 weeks' gestation. The mother had a negative group B *Streptococcus* (GBS) screen at 37 weeks of gestation. Her membranes ruptured 38 hours before delivery, and she spiked a temperature to 39°. The mother received intrapartum antibiotics. The infant was born vaginally, needed no resuscitation, and had Apgar scores of 7 at 1 minute and 8 at 5

minutes. Examination of the infant is normal. How do you wish to manage this patient?

Attending:

Get a blood culture and complete blood cell count (CBC) and begin intravenous (IV) antibiotics for a minimum of 48 hours pending results of the blood culture. OK, next patient.

Resident:

Wait ... why?

Attending:

(*looking surprised*) Really? This is an infant born to a mother with chorioamnionitis, and we should treat her as such in accordance with the 2010 Centers for Disease Control and Prevention (CDC) guidelines.³ The guidelines say blood culture, CBC, and IV antibiotics.

Resident:

Well, I had a chance to do some reading on my post call day...

Attending:

(*interrupting*) You should be sleeping, not reading, on your post call day. Maybe you're not working hard enough when you're on call.

Resident:

(*ignoring the attending*) ... which included the CDC guidelines. Many of the references supporting the recommendation of IV antibiotics for all infants of mothers with chorioamnionitis include data before the widespread implementation of GBS screening of mothers. It doesn't seem like those data are all that relevant now that we screen mothers for GBS at 35 to 37 weeks' gestation. As it says in the guidelines, this screening has reduced the incidence of early-onset GBS sepsis by 80%, to a rate of 0.34 to 0.37 cases per 1000 births in term infants.³ Given this

decrease in rate, shouldn't we consider *not* putting all of these babies on antibiotics?

Attending:

(*seeing the chance to regain the upper hand and move on*) Perhaps you should have read the article referenced in the CDC guideline demonstrating that the risk of sepsis is increased more than sixfold in infants of mothers with chorioamnionitis.⁴

Resident:

Yes, I read that. But even if we used that estimate for increased risk of sepsis associated with chorioamnionitis, that would mean that the risk of early onset GBS disease in our baby should be in the range of 0.22% based on the current incidence of GBS disease (0.34–0.37 cases/1000 births × 6.43).

Attending:

Well, that is just a hypothetical calculation. What we really need is a current study of a large cohort of infants born to term to mothers with chorioamnionitis, stratified by GBS screening status and intrapartum antibiotic treatment and the outcomes in these neonates. This would give us good information on both the numerator (the number of babies with GBS sepsis) and, importantly, the denominator data, such as the number of term infants born to mothers with chorioamnionitis who screened GBS negative before delivery. I don't know of any such studies, but, because I see that you are Googling something on your smartphone, I guess you do.

Resident:

(*looking up from her phone*) Not exactly, but there is a large study from Stoll et al, published in 2011, that included almost 400 000 infants born since routine GBS screening of mothers was implemented.⁵ They identified

39 term infants born to mothers with clinical chorioamnionitis who developed early onset GBS disease. I was able to use the data in this study, along with estimates for the rate of chorioamnionitis and rates of GBS screening and results of the screening to calculate the risk for GBS disease in a baby like ours: a term newborn born to a GBS-negative mother who develops chorioamnionitis.^{3,5,6} On the basis of my calculations (*resident begins using her smart phone as a calculator*), the risk of early-onset GBS disease in an infant like this is about 0.3% to 0.4%. Here, I'll show you my calculations (*shows Attending the screen of her smartphone* [Table 1]). Actually, because the mother of our infant received intrapartum antibiotics, the risk is probably lower than this. (*refers to smartphone again*) Benitz et al conducted a systematic review and reported that intrapartum antibiotics administered to women with chorioamnionitis reduced the risk of early-onset sepsis by 82% and reduced the risk of GBS disease by 86%.⁷ Of course, as you say, these are all

just hypothetical calculations; we don't really have the data to calculate a precise, valid estimate.

Attending:

Right, we don't know, so what's your point?

Resident:

Well, my point is this. The overall risk of GBS disease in term infants born in 2012 is low. Even though the risk in our baby is higher because of the mother's chorioamnionitis, this increased risk is at least partially offset by her being GBS-negative and the mother's treatment with antibiotics during labor.^{4,7} Furthermore, because 75% of infants with GBS disease are symptomatic at birth,⁸ the risk is reduced even more given a normal examination in our infant. Thus, it's likely that the overall risk for early onset GBS disease in this particular infant is substantially less than 1.0%. Anyway, don't you think that it would seem reasonable to at least have guidelines for term infants born to mothers

with chorioamnionitis stratified by their mother's GBS status and whether she received adequate intrapartum antibiotic prophylaxis against GBS disease with different management plans for infants based on their estimated risk of sepsis?

Attending:

Um ... I'm not sure, but ... well, what about *Escherichia coli*? I seem to remember that there has been a concern that the rate of this infection would go up if we started intrapartum antibiotic prophylaxis for GBS.^{5,9}

Resident:

In the study by Stoll et al, the rate for *E coli* infection in term infants was only about 0.07/1000, or 0.007%.⁵ Even if you increase this risk by sixfold because of maternal chorioamnionitis, it still is only 0.05%.

Attending:

Okay, I'll grant you that the risk of sepsis in this term infant born to a GBS negative mother who is asymptomatic at birth is likely <1%, but we need to follow the guideline and begin IV antibiotics on this infant.

Resident:

I told the parents that we might recommend IV antibiotics for a minimum of 48 hours. They don't like this idea. They want to take their infant home as soon as possible.

Attending:

(*looking defeated*) Well, at least the decision here is more clear-cut. I will go and talk with the parents myself, but failing my ability to persuade them, we will have to call child protective services.

Resident:

Really?

TABLE 1 Sources of Data and Calculations Used to Estimate the Risk of Early-Onset GBS Disease in a Term Neonate Born to a Mother Who Had a Negative GBS Screen Prenatally and Who Developed Chorioamnionitis During Labor

Data/Estimates	Reference
For Determining Denominator	
Total number of live births = 396 586	5
Term live births = ~340 000 ^a	5
Rate of chorioamnionitis complicating deliveries = 3%	3
Number of term live-birth deliveries complicated by chorioamnionitis: 340 000 × 0.03 = 10 200	
Rate of GBS screening of mothers = 85%	6
Rate of mothers screened negative for GBS = 75.8%	6
Number of term live-birth infants born to GBS negative mothers with chorioamnionitis: 10 200 × (0.758) × (0.85) = 6572 infants	
Data/estimates for determining numerator	
Number of term infants with early-onset GBS disease born to mothers with chorioamnionitis = 39	5
Rate of maternal screening for GBS in mothers of term infants who develop early-onset GBS disease = 68.5%	5
Rate of term infants with early-onset GBS disease whose mothers were screened negative for GBS = 81%	5
Number of term infants who develop early-onset GBS disease born to GBS-negative mothers with chorioamnionitis: 39 × (0.81) × (0.685) = 22 infants	

Risk of early-onset GBS disease in term infants born to GBS-negative mothers with chorioamnionitis = 22/6572 = 0.00334 (95% confidence interval 0.0021–0.0051) or 0.334%.

^a Approximated from data presented on the rate of early-onset GBS disease in infants with birth weights >2500 g.⁵ Estimate for term births is 86% of live births included in study.

Attending:

(now looking annoyed and defeated) Yes, really. We are obligated to protect this infant from harm. By the way, I think I just heard you being paged.

Resident:

(acting aloof) Nope, wasn't my pager. I agree with you that we need to protect this infant from harm, but, in general, we respect a parent's decision on behalf of his or her child unless we can demonstrate that the parent's decision places the child at significant risk of serious harm as compared with alternatives.¹⁰ This requires us to look at the risks and benefits of everything being considered: of the recommended treatment, nontreatment, and other alternatives to the recommended treatment. So far, all we've discussed is the risk of early-onset sepsis in this infant is less than 1% if not treated. What about the risks of treating the child?

Attending:

(looking incredulous) What risks are those?

Resident:

Well, for one, there are risks of hospitalization, such as from a medical error or other therapeutic misadventure. For example, researchers at Johns Hopkins reported that almost 20% of febrile infants less than 60 days old who were admitted for rule out sepsis experienced a medical error, including an overdose of gentamicin and skin sloughing from IV fluid infiltration.¹¹ Heck, 1 child was kidnapped. Plus, there is evidence that other interventions in the newborn nursery, such as phototherapy, disrupt maternal infant bonding and have subsequent negative consequences on parenting attitudes and behaviors.^{12,13}

Attending:

OK, now you're just getting squishy on me. Those studies you're talking about

are more than 20 years old. Maybe things are different now. Anyway, the best medical experts available have considered the evidence and decided that the risk of sepsis in an infant like ours justifies the use of IV antibiotics for 48 hours pending the results of a blood culture.³

Resident:

That's just it! The recommendations come from a group of people who are experts in medicine, not in the determination of what constitutes unacceptable risk. Medical experts can estimate the risk of infection in an untreated infant, the consequences of delayed treatment, and can even estimate the risks associated with treatment of an unlikely, but potentially devastating, disease. But they have no more insight into whether the sum of these risks would be unacceptable for a parent to assume on behalf of their child than would anyone else, particularly the child's parent.

Attending:

(looking perplexed) I'm not following you.

Resident:

All I am saying is that guidelines written by a group of medical experts function implicitly as value statements. By recommending a treatment for patients who meet certain risk criteria, the guideline is de facto determining the level of risk beyond which doing nothing is unacceptable. So for those of us who are trying to follow these guidelines, we feel empowered to claim that a parent who refuses to agree to the guideline is acting unacceptably. Yet all that parents are likely declaring when refusing to follow our recommendation is that their level of unacceptable risk is different from the guideline's stated level of unacceptable risk. And when the risk of disease is less than 1%, and there are

risks to starting IV antibiotics and a 2-day hospitalization, who is to say that the parents' refusal is unreasonable? Besides, isn't a plan of observing the infant closely for clinical signs of sepsis and possibly obtaining a screening laboratory test such as a CBC or C-reactive protein a viable alternative? In fact *(Googling on her smartphone again)*, this is exactly the plan recommended by the Canadian Pediatric Society in 2007.¹⁴ It seems to me that this determination of what constitutes an unacceptable risk should ultimately be determined by societal consensus, not a small group of doctors. In the absence of this consensus and given the low risk of disease if we do what the parents want for this infant, maybe we should provide them the best information available and abide by their decision.

Attending:

Well, now I don't know what to think. My mother was Canadian....

Resident:

(shaking her head) Well, at the very least, we can offer the parents a compromise. Why don't we keep the child overnight and just watch her off antibiotics and without drawing cultures? If she develops any symptoms, we can then proceed with a workup and antibiotics.

Attending:

Sounds reasonable. I suppose you already discussed this with the parents too?

Resident:

No, I wanted to run it by you first.

Attending:

Well, good. Now get to work and go ask them. And, for the future, don't do anymore PubMed searches or else you'll make rounds longer than they already are.

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MUSIC ON THE WEB: “Do people buy music anymore?” asked my friend. I was talking with a third-year medical student with whom I had exchanged copies of songs and music albums in the past. She was explaining that her current finances precluded downloading much music and besides, she mostly streamed music now. Although I was (and still am) quite proud of a burgeoning collection of music files of lesser known artists I purchased from independent sites on the web, I was a bit taken aback, but understood what she meant. I have been around long enough to have purchased music on vinyl albums, tapes, CDs, and as downloads. In the past year or two, I have used some music-streaming sites but have not come to rely on them, maybe because the internet connection at our house (we do live in rural Vermont) can be iffy. However, as reported on CNN (Web: June 15, 2012), how people interact with music is changing rapidly. Just as I can no longer remember the last time I purchased a CD, many young people cannot remember the last time they purchased a music file. Increasingly, listeners now rely on music-streaming services. One advantage of streamed music is that many sites offer the service for free. The applications can be downloaded onto mobile devices, meaning that as long as a person has internet access, he or she has access to millions of songs. Some services pick the songs for you, while others allow you to build and even share playlists. Instead of listening to a limited number of songs or albums stored on a disc or music player, listeners have access to all the music ever recorded by an artist. The downside is that, unless the listener pays a monthly fee, the music is periodically interrupted by advertisements. Still, some of the music-streaming sites are amazing. I certainly have learned a lot about artists both previously known and unknown to me. While streamed music is clearly the wave of the future, I still enjoy knowing that I have a permanent copy of my favorite music - and it is always fun to share music with bright young medical students.

Noted by WVR, MD

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