Healthcare providers' knowledge of group B streptococcus

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Healing Begins with Knowledge

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CHAPTER I: Introduction

Group B Streptococcus (GBS) is the most common cause of invasive neonatal sepsis (Spellerberg, 2000). Colonization occurs via the mother during birth, leading to early onset disease (EOD); illness will transpire during the first six days of life. Late onset disease (LOD) is seen between the ages of one week to three months; the route of transmission is less clear but believed to be from health care workers, family members or the community. Only ten percent of infants colonized with GBS will develop the disease. Approximately thirty percent of those with disease will have long-term neurologic sequelae (Keenan, 1998).

This chapter includes a statement of the problem, research questions, definitions of terms, significance of the problem, assumptions, and limitations of the study.

Statement of the Problem

Group B streptococci colonize ten to thirty percent of pregnant women (Keenan, 1998). From the time a woman becomes pregnant, natural flora can threaten the life of the fetus. It is important for healthcare providers to have knowledge about GBS bacterium in order to prevent and treat any illness that may develop. Another important reason to be aware of GBS is past research has shown nursery staff transmit the bacteria from themselves to infants, and from infant to infant (Easmon et al., 1983). If healthcare providers are aware of these implications, more caution can be demonstrated by hand washing in trying to prevent spread of the bacteria.

Statement of the Purpose

The purpose of this study is to determine the knowledge healthcare providers have related to Group B streptococcus (GBS).

Research Questions

1. What is the Cronbach reliability of the GBS knowledge tool developed?
2. What are the profession, practice specialty, length of time in practice, and length of time in specialty of study participants?
3. What is healthcare provider knowledge of risk factors for developing EOD?
4. What is healthcare provider knowledge of the major risk factor for developing LOD?
5. Is there a relationship between professional licensure and overall knowledge of GBS?
6. Is there a relationship between practice specialty and overall knowledge of GBS?
7. Is there a correlation between years of practice and overall knowledge of GBS?
8. Is there a correlation between years in specialty practice and overall knowledge of GBS?

Definition of Terms

Early Onset Disease. (1) Onset of symptoms in a neonate younger than seven days of age; and/or (2) positive sterile body fluid or exudates culture obtained before the seventh day of life.

Group B Streptococcus. Gram-positive, encapsulated diplococcus.

Healthcare Provider. Physician, Physician Assistant, Nurse Practitioner, Midwife, Registered Nurse, Licensed Practical Nurse.

Horizontal transmission. Passing of GBS from an environmental source to the neonate.

Intrapartum. Occurring during the period between onset of labor or rupture of the membranes and delivery

Late onset disease. (1) Onset of symptoms in an infant $\geq$ seven days of age; and/or (2) positive sterile body fluid or exudates culture.

Low Birth Weight. Weight <2500 grams.

Maternal fever. Temperature $\geq 38.0^{0}C$

Midlevel provider. Physician Assistant, Nurse Practitioner, and Midwife.

Prematurity. Delivery at less than 37 weeks of gestation.

Prolonged rupture of membranes. $\geq$ 18 hours ruptured membranes

Vertical transmission. Passing of bacteria from colonized mother to newborn during labor and birth.

Significance

To date, little research has been done to determine what healthcare providers actually know about GBS. This study provides insight and determines if there is need for further education on the topic. Group B Streptococcus is a virulent organism; therefore it is necessary for all healthcare providers to be knowledgeable regarding transmission and treatment. It is essential for practitioners to be able to educate families, to understand risk and potential sequelae for affected newborns, to be able to determine if mother and baby are at risk for developing GBS infections, and to appropriately initiate treatment protocol set forth by the CDC.

Assumptions

It was assumed that all respondents answered the survey with their knowledge alone, i.e. with no outside assistance obtained. It was also assumed that respondents accurately revealed demographic information.

Limitations

This study was conducted in one geographic area, so the sample may not be representative of all healthcare providers in obstetric, gynecology, family practice and pediatric specialties. The survey was distributed in hospital settings; therefore no outpatient providers participated. Individuals choosing to respond may be more knowledgeable on the topic, which increases risk for skewed data. Another limitation was low response rate, possibly due to decreased lack of desire or time to complete a survey, or not being at data collection sites during the study time frame.

Summary

GBS infection rates have declined with the initiation of antibiotic treatment although it is a still a deadly organism. Knowing screening recommendations, risk factors, transmission, signs, symptoms and treatment of GBS is important for all healthcare providers in the position of caring for pregnant women and/or newborns.

CHAPTER II: Review of the Literature

In the early 1970's, GBS emerged as a leading cause of neonatal infection. Two distinct forms of the disease emerged: early and late onset disease. EOD is transmitted from the mother to the neonate; onset is within seven days of birth. LOD manifests in one week to three months of age as sepsis, meningitis, or focal infection. Initially, EOD mortality rate was fifty-five percent and LOD rate was twenty-three percent (Yagupsky, Menegus, & Powell, 1991). Currently, GBS causes invasive disease in 1.8 infants per one thousand live births (Keenan, 1998).

Group B Streptococcus-The Organism

Group B Streptococcus, Streptococcus agalactiae, is a gram-positive, encapsulated diplococcus classified as Lancefield group B usually producing a narrow zone of beta-hemolysis on blood agar (Gotoff, 2002). The organism is catalase negative and grows in chains (Spellerberg, 2000). Based on cell wall polysaccharides, serologic differentiation was established by Lancefield (Hoshina et al., 2001). Presumptive diagnosis is achieved by identification of a double-zone of hemolysis when cultured on the blood agar plates. Definitive identification of GBS requires the detection of the group B carbohydrate antigen (Platt et al., 2003). Type specific capsular polysaccharides and protein antigens allow for further differentiation (Hoshina et al., 2001). Virulence of the bacteria is type-specific (Platt et al., 2003). Current serotypes include: Ia, Ib, Ia/c, II, III, IV, V, VI, VII, and VII. The most common serotypes associated with EOD in the United States are Ia, II, III, and V. In early onset disease, type III GBS serotype is most common, followed by type Ia, then type Ib (Hoshina et al., 2001). Type III causes LOD 90% of the time (Gotoff, 2002). Serotype distribution does vary with geographical region

and ethnic origin (Spellerberg, 2000).

Hemolysin, a cytolysin in GBS, has been found to be a causative agent in the prominent pneumonia of early onset disease. The vast majority of GBS strains produce hemolysin (Spellerberg, 2000).

Additional virulence factors found in GBS are C protein, C5a peptidase, CAMP, and hyaluronate lyase. C protein elicits immunity for the organism against host defenses. C5a peptidase impairs leukocyte recruitment to the sites of infections. CAMP has membrane-damaging abilities, which increases mortality by the organism. Lastly, hyaluronate lyase cleaves a bond in hyaluronic acid, which is a major component of connective tissue (Spellerberg, 2000).

Epidemiology

Group B streptococcal organism initial colonizes approximately twenty percent of pregnant women's intestinal tract and cross contaminates the reproductive tract (American College of Nurse-Midwives, ACNM, 2003). Infections can be chronic, transient, or intermittent. Those at increased risk of carrying the organism are women of lower socioeconomic status, black race, and less than twenty years old. Cultures obtained at 35 to 37 weeks gestation have a negative predictive value of 97% and a positive predictive value of 89% (Gotoff, 2002). Although 60-70% of neonates born to maternal carriers will be colonized at birth, passively acquired immunity derived from maternal antibodies protects a majority of healthy newborns (ACNM, 2003).

History of Group B Streptococcus

Group B Streptococcus was initially isolated by Nocard in 1887 and described as streptococcus agalactiae, a cause of bovine mastitis. Research began on Group B

streptococci around 1931 along with rickettsial and viral diseases. Dr. Rebecca Lancefield developed a system for differentiating hemolytic streptococci. This enabled group A streptococci, the current major pathogen associated with puerperal sepsis at the time, to be distinguished from Group B streptococci which was initially identified in postpartum specimens obtained after uncomplicated deliveries. This pathogen was initially described as a symbiotic human pathogen until there were reported fatal human sepsis cases associated with the organism (Schuchat, 2001).

In the 1960's there were numerous reports of neonatal infection linked to GBS; by the 1970's GBS had emerged as the leading cause of neonatal sepsis. During this time, approximately 50% of infants with early onset infections died of the illness; many of those who did survive had permanent neurologic sequelae. During the 1980's advances were made and the fatality rate dropped to 15% (Schuchat, 2001).

Progress in Disease Treatment

In the 1970's, cases of GBS infections were reported sporadically until it was identified as a major cause of neonatal sepsis. There was a documented rise in infection in pregnant and nonpregnant women, with 7500 new cases yearly prior to initiation of prevention measures. The first suggestion for use of antibiotics to prevent disease was in 1973; initially the antibiotics were given orally which was found to have little significant impact on infection rates. Then there were investigations and trials documenting use of intrapartum antibiotics to decrease vertical transmission. Boyer and Gotoff (1986) conducted a randomized controlled trial with intravenous ampicillin therapy; the intervention was effective in preventing EOD in neonates of women with positive GBS cultures and intrapartum risk factors. Prospective studies documented

intrapartum penicillin and erythromycin to have similar results (Platt et al., 2003).

In 1996, CDC and American College of Obstetrics and Gynecology (ACOG) published guidelines supporting the implementation of either a risk-based or a culture-based prevention plan (Platt et al., 2003). The CDC revised the most current recommendations in 2002. Key changes include recommendation for: universal prenatal screening for vaginal and rectal GBS colonization of all pregnant woman at 35-37 weeks gestation; updated prophylaxis regimens for penicillin allergic women; detailed instructions on prenatal collection and expanded methods of GBS culture processing; recommendations against routine intrapartum antibiotic prophylaxis for GBS-colonized women undergoing planned cesarean deliveries; suggested algorithm for management of patients with threatened preterm delivery; and for newborns exposed to intrapartum antibiotic prophylaxis (CDC 2002).

Early Onset Disease

Risk factors for the disease have been determined to be 1) preterm labor, 2) prolonged rupture of membranes, 3) maternal fever, 4) GBS bacturia during pregnancy, and 5) previous delivery of a newborn with GBS infection regardless of current maternal GBS colonization status. Bacterial and immunologic risk factors include 1) GBS strain with enhanced virulence, 2) heavy maternal colonization ($>10^5$ cfu/ml), and 3) deficient maternal GBS type-specific capsular antibody (Eichenwalk, 1997)**.** In the absence of intrapartum chemoprophylaxis (IPC) colonization will occur in about 40-50% of infants of mothers who are GBS positive on screening (Canadian Task Force on Preventative Health Care, CTFPHC, 2002).

Studies of pregnant women and their infants indicate a maternal antibody to the

GBS capsular polysaccharide protects newborns from invasive GBS infection (Lachenauer et al. 2002). Approximately 50% of colonized mothers transmit the disease to their newborn; although, only one to two percent of newborns will develop EOD (Eichenwald, 1997).

The typical presentation of EOD occurs in infants less than one week old. Acquisition of the disease is through vertical transmission from colonized mothers. Typical clinical presentations include sepsis, pneumonia, and meningitis (CTFPHC, 2002). There is extensive pulmonary damage found in GBS pneumonia (Spellerberg, 2000). Incidence of the disease is one to three per one thousand births, with the death rate approximately 4.7% (CTFPHC, 2002).

Late Onset Disease

LOD occurs in infants older than one week. This form of the disease is acquired by vertical transmission, a delayed infection after early colonization in 50% of the cases, or by horizontal transmission occurring in the hospital or in the community (CTFPHC, 2002). Prematurity is the major risk factor for LOD development (Lin, 2003). Meningitis is the most common presentation, which increases the chance of having clinically apparent seizures (CTFPHC, 2002). Other presentations of LOD are pneumonia, septic arthritis, osteomyelitis, cellulitis, and adenitis. The infant usually presents with a fever of 38^{o}C and a history of concurrent respiratory infection (Baker & Edwards, 2001).

Colonization and Transmission

The natural reservoir for GBS is the lower gastrointestinal tract, which cross contaminates the reproductive tract (CDC 2002). GBS adheres readily to vaginal epithelial cells, chorion cells, amnion cells, and can invade the chorion cells, but not the

amnion cells. Having positive urine culture for GBS indicates a heavy colonization (Platt et al., 2003).

Risk factors for becoming colonized are diabetes, teenager, having fewer than four pregnancies, and being of African-American decent. Pregnancy is not a risk factor in becoming colonized since heterosexual partners become co-colonized in half of cases (Platt et al., 2003).

Factors with no impact on transmission are maternal age, race, parity, blood type, duration of labor, and method of labor. Neonatal colonization is prompted by exposure to GBS either through ruptured amniotic membranes or during fetal descent through a colonized birth canal (Platt et al., 2003).

Horizontal transmission of GBS has been documented; hospital sources indicate cross contamination from an infected neonate to an uninfected neonate via nursing personnel. Community-acquired GBS has also been documented in a neonate with negative cultures at hospital discharge (Platt et al., 2003).

Prevention

The major strategy for prevention is universal screening of pregnant women followed by selective intrapartum antibiotic prophylaxis (IAP) given to colonized women with risk factors. GBS culture-based screening was found to be 50% more effective than the risk-based approach at preventing GBS disease. The benefit of universal screening is to identify colonized women without risk factors and allow for appropriate IAP administration. The incidence of disease among infants of culture-positive women without risk factors who did receive intrapartum prophylaxis was 1.3:1000 live births; in the era before prevention, the incidence of disease among such infants was as high as

5.1:1000 live births. The efficacy of intrapartum antibiotics in preventing early-onset disease among infants of culture-positive women without risk factors was also close to 90% (CDC, 2002). The benefit of prevention is reduction of neonatal GBS colonization and early-onset infection (CTFPHC, 2002).

The potential risk of prevention strategies is an increase incidence of GBS strains resistant to erythromycin and clindamycin; current resistance rates for resistance are 3-16% and 2-15% percent respectively. A second risk is occurrence of neonatal sepsis due to ampicillin-resistant organisms other than GBS (CTFPHC, 2002).

Maternal Detection & Diagnosis

The sites selected for culture, number of cultures obtained and the interval of collection influence accuracy of GBS isolation (Platt et al., 2003). Maternal colonization is best detected using selective broth medium and swabs of the lower vagina and anorectum (Baker, 2000). Culturing both sites increases detection rates by 10-15% percent (Platt et al. 2003). Rapid detection kits are not sufficiently sensitive to detect GBS carriage (Baker 2000).

Multiple identification techniques are available with different time intervals until detection. The current recommended usage of selective broth followed by growth on blood agar requires a seventy-two hour period for a negative result and minimum of forty-eight hours for a positive result. This is not the timeliest procedure for determining colonization in a labor patient; therefore additional research into more expedient techniques is needed (Platt et al., 2003).

Other identification tests available are AccuProbe Group B Streptococcus Culture Identification Test and the Strep B OIA kit. The AccuProbe incorporates a DNA probe

after selective broth incubation; results are available in 25 hours with 90-96% sensitivity, and 97.5-99% specificity. The quality of the test is acceptable, although the time frame for results is still not rapid enough for a laboring patient (Platt et al., 2003).

The Strep B OIA kit requires only 30 minutes to perform; however sensitivity is lower at 47-63%, and specificity 86-96%. The speed is acceptable but quality of the test is less than desirable (Platt et al., 2003).

Lastly, there are two newly developed polymerase chain-reaction (PCR) assays. The standard PCR has a 100-minute requirement, but rapid PCR requires only 30 minutes; both tests have 97% sensitivity and 100% specificity. PCR assays meet the timeliness of results requirement, but the tests are not currently commercially available (Platt et al., 2003).

Timing of cultures is essential for GBS prevention. Platt (2003) reported GBS colonization during pregnancy may be chronic (36%), transient (20%), intermittent (15%), and with 29% of patients being indistinguishable from chronic and transient. To achieve the maximum predictive value of 87% and negative predictive value of 96%, vaginal and rectal cultures should be performed one to five weeks prior to delivery. When delivery does not occur within five weeks of initial cultures, repeat cultures should be obtained (Platt et al., 2003).

Newborn Diagnosis

Management of neonates exposed to IAP challenges pediatricians because antibiotics may mask signs of neonatal illness, resulting in subclinical infection. Guidelines for prevention of neonatal GBS infection predictably increased use of IAP but the effect on management of newborns is not yet clear (Balter et al., 2003).

Evaluation of an infant with suspected GBS entails a complete blood count with differential, blood culture, chest radiograph, and lumbar puncture (Pickering, 2003). Blood cultures can be sterile in as many as 15% of newborns with meningitis (CDC, 2002). Cerebrospinal fluid (CSF) is checked for cell count with differential, protein and glucose concentration, gram stain, and culture. A neonate presenting greater than six days old needs to have a urine culture performed as well (Pickering, 2003).

Treatment

During the 1990's, widespread use of IAP resulted in a 65% decline in the number of EOD cases (Lachenauer et al. 2002). GBS is sensitive to penicillin, which is considered the first line agent for IAP; ampicillin is an acceptable alternative (CDC, 2002). During labor, adequate IAP consists of at least one dose of penicillin (five million units) given intravenously at least four hours before birth. For labor beyond four hours, intravenous penicillin (2.5 million units) should be administered every four hours until delivery. For women with penicillin allergy, intravenous clindamycin (900 milligrams every eight hours) or erythromycin (500 milligrams every six hours) should be administered (CTFPHC, 2002).

Ampicillin is generally used for empiric treatment of EOD along with an aminoglycoside until cultures results are obtained or until CSF is sterile. Initial treatment for suspected LOD is ampicillin in conjunction with cefotaxime or ceftriaxone. High dose penicillin should be used for treatment of meningitis. Vancomycin and cephalosporins should not be used in treatment of GBS unless there is a documented penicillin allergy, since penicillin and ampicillin are superior drugs for treatment. Clindamycin is recommended over erythromycin for penicillin-allergic women (Gotoff, 2002).

Length of treatment for bacteremia, pneumonia, or other soft tissue infection is ten days. Meningitis and arthritis may require two to three weeks of treatment; extended treatment for three weeks may be required for complicated meningitis cases (Gotoff, 2002).

Guidelines

Compelling evidence for a strong protective effect of screening-based strategy relative to the risk-based strategy led to new recommendations in 2002: universal prenatal screening for group B streptococcus colonization by vaginal-rectal culture at 35-37 weeks gestation. The cultures should be collected at the vaginal introitus and rectum (Platt et al., 2003).

Current Related Research

Only one study was identified in the literature related to GBS knowledge in healthcare providers; the focus was on lead maternity caregivers, midwives and physicians. Seventy nine percent of respondents believed perinatal GBS infections were important; 85% supported antenatal screening, while 81% were confident in determining risk factors for GBS infection and counseling women. However, less than one-third listed major risk factors and none identified all five high-risk criteria; only 26% regularly discussed GBS with clients. When asked to list high-risk criteria, midwives were more likely than physicians to disclose incomplete knowledge or to not answer this item (Gosling, Stone, & Grimwood, 2002).

The Future

Immunization. Maternal immunization with GBS capsular polysaccharide-protein conjugate vaccines has the potential to decrease burden of this disease (Lachenauer et

al. 2002). Conjugate vaccines have been prepared against the most prevalent GBS serotypes in the United States (Types Ia, Ib, II, III, and V) and Japan (Types VI and VIII); effectiveness in preventing disease in animals has been established. Serotype III continues to show particular propensity to cause meningitis and a high proportion of late-onset GBS infections (Campbell et al., 2000). Most of these conjugate vaccines have been administered safely to healthy adults in Phase I and Phase II clinical trials (Paoletti & Kasper, 2002).

Education. Awareness of perinatal GBS is high among pregnant women, for whom this issue is most important. Efforts to raise awareness should be targeted to women from traditionally underserved populations, such as nonwhite race, or lower educational attainment, or lower household income because their women have increased risk of GBS colonization. (Cowgill, Taylor, Schuchat, & Schrag, 2003).

Handwashing

Hand hygiene is the single most important measure to reduce transmission of microorganisms from person to person, or prevent reinoculation from site to site in the same individual. The primary problem with hand hygiene is not rarity of effective products, but rather carelessness of practice. Plain soap, antiseptic soap or antiseptic handrub are available, so selection for usage should be based on degree of contamination (Larson, 1995).

Previous research with plain soap failed to show consistently reliable prevention of microbial transmission. Frequent handwashing causes skin damage, with resultant changes in microbial flora, so there may be increased skin shedding and risk of microorganism transmission (Larson, 1999). Voss & Widmer (1997) reported

handwashing compliance to be less than 40% in staff working in intensive care units. Ninety percent of the time handwashing occurred for less than ten seconds-- the recommended time is 15-30 seconds (Quraishi, McGuckin, & Blais, 1984).

Alcohol based hand disinfectant was reported to be an excellent alternative to soap and water; with rapid antimicrobial effect and equally effective against gram positive and gram negative organisms when compared to chlorhexidine (Voss & Widmer, 1997). Alcohol-based preparations require less contact time than chlorhexidine gluconate to effect a maximum reduction in bacteria counts and are at least as skin surface tolerable as antiseptic detergents (Larson, 1999).

Larson (1995) recommends use of antimicrobial soaps and alcohol-containing hand disinfection (AHD) products throughout the hospital because AHD is more efficient than hand washing with soap and water.

Gloving has an important role in reducing the risk of microorganism transmission, but does not replace need for handwashing. Small defects or tears in gloves are not easily seen; improper removal of gloves can also result in contamination (Garner, 1996). Alrawi, Houshan, & Satheesan (2001) determined 14% of 206 gloves examined after being worn during surgery had unrecognized perforations, primarily in the thumb and index fingers.

Doebbeling, Pfaller, Houston, and Wenzel (1988) found that gloved hands inoculated with selected nosocomial pathogens, then washed, had recoverable organisms on the hands after glove removal. This reaffirms the need to wash hands after glove removal.

The three important reasons gloves should be worn by hospital personnel are to provide a protective barrier for the hands; to reduce the acquisition of microorganisms from a patient or object; and to reduce the transmission of microorganisms from hands of hospital staff to patients (Garner, 1996).

Expertise, Learning, and Knowledge Acquisition

Dreyfus and Dreyfus (1985) developed a model of skill acquisition that is a situational rather than a trait or talent model. An individual passes through five levels of proficiency: novice, advanced beginner, competent, proficient, and expert. Passage through the levels is demonstrated by changes in three general aspects of skill performance. First, movement is from reliance on abstract principles to use of past concrete experience as a paradigm. The second is a change in the learner's perception of the demand situation, seeing a situation as a complete whole in which only certain parts are relevant instead of a compilation of equally relevant pieces. Finally, the passage is from detached observer to involved performer.

Stage 1- Novice. Three main foundations differentiate this group: rigid adherence to taught rules or plans, little situational perception, and no discretionary judgment.

Stage 2-Advanced beginner. Actions are based on attributes or aspects, which are treated as having equal importance, with the individual limited to situational perception. At this point, the individual can demonstrate marginally acceptable performance and has coped with enough real situations to determine the recurring meaningful situational components which Dreyfus has termed "aspects of the situation". Aspects of the situation are context-free attributes or procedural lists that are learned

and used by the beginner, which require prior experience in actual situations for recognition. Experts can only be identified through prior experience.

Stage 3-Competent. Seeing some longer-term goals, deliberate planning, and routine procedures are traits for this category.

Stage 4-Proficient. Situations are viewed holistically and important features are used to guide performance. Perception is key and the perspective is not thought out but "presents itself" based upon experience and recent events.

Stage 5-Expert. At this level, the individual no longer relies on rules and has an intuitive grasp of most situations. Experts operate from a deep understanding of the total situation; therefore, it is difficult to describe an expert's performance.

Overall, expertise develops as the individual tests and refines propositions, hypotheses, and principle-based expectations in actual practice situations. For example, memorizing characteristics and features of a diagnostic category from a textbook is not the same as recognizing when and how these characteristics manifest. For healthcare providers discernment is learned in practice so experience is necessary for expertise. Expertise allows interpretation of clinical situations; clinicians cannot be held accountable for slight clinical variations not yet seen in their practice. For this reason, healthcare providers should offer insight to less experienced colleagues so best use of experientially gained clinical wisdom is possible (Benner 2001).

Summary

Group B Streptococcus has proven to be a virulent organism affecting neonates. Extensive research has been done on identification, transmission and treatment of the disease. The CDC has distributed recommendation protocols for the prevention of GBS

infection. This study attempted to determine what healthcare providers know about GBS.

CHAPTER III: Methods

This chapter describes the design and methodology of this study. Descriptions of design, sampling method, subjects, demographic and knowledge instrument tool, data collection and data analysis are presented.

Purpose

The purpose of this study is to determine knowledge healthcare providers have related to GBS.

Design

In an effort to answer the research questions an exploratory, descriptive survey was conducted.

Subjects

Subjects were solicited from Northwest Ohio area hospitals. Access to professional staff was elicited with assistance of unit managers or nursing administration. Inclusion criteria were as follows: the provider is currently practicing in obstetrics, gynecology, family practice or pediatrics and is a physician, physician assistant, nurse practitioner, midwife or nurse.

Variables

The dependent variable was GBS knowledge, as assessed by a score. The independent variables were: professional licensure groups, practice specialty, years in practice, and years in current specialty.

Material

The 29 item multiple choice and fill-in item survey was developed addressing demographic background, general knowledge on colonization, time frame for screening,

signs and symptoms, and general treatment of GBS. The knowledge elements were obtained through extensive review of the literature.

Content Validity.

Content validity of the survey was evaluated prior to administration of the survey by three healthcare providers: a physician, a physician assistant, and a nurse. Recommended changes were incorporated into the survey instrument.

Methods

Exploratory Research. The purpose of exploratory research is to provide a beginning familiarity within the topic and examine an area of research that is relatively new and unstudied. These studies are done for three major purposes: 1) to satisfy the researcher's curiosity and desire for better understanding, 2) to test the feasibility of undertaking a more careful study, and 3) to develop the methods to be employed in a more careful study. A limitation of exploratory research is its inability to frequently provide adequate answers to research questions. It may give insight and direction to methods that will give definitive answers (Babbie 1989).

Descriptive Study. Situations and events are described by descriptive research. The researcher observes and then describes what was observed. Scientific descriptions are typically more accurate and precise than casual descriptions (Babbie 1989).

Cronbach's alpha coefficient. A coefficient value of 1.00 implies an instrument is measuring exactly the same thing. A slightly lower coefficient, 0.8 to 0.9, indicates an instrument that will reflect more richly the fine discriminations in levels of the construct. Magnitude can then be discerned more clearly (Burns & Grove 1993).

Data Collection

Sampling. All professional staff working in obstetrics, gynecology, family practice and pediatric units at participating hospitals were potential subjects in this non-randomized convenience sample.

Protection of Human Rights. The Medical College of Ohio's Institutional Review Board approved the study after review of protocol, data collection instructions, cover letter, and agency agreements; exempt status was granted. The protocol and survey was submitted to each hospital IRB or administration for approval. Subjects were informed of IRB approval via a cover letter attached to each survey. No personal information or signatures were collected; data was coded and entered into a statistical program. Findings are presented as group data, so an individual cannot be identified.

Data Collecting and Recording. Following IRB approval, the principal researcher distributed the survey packets. Survey and cover letters were placed in a highly visible site at each facility to ensure volunteer response. To reach all employees, surveys were left on units for two and a half weeks in hopes to obtain the maximum possible sample. A sealed box was placed at each site for depositing completed surveys.

Completion and submission of the survey implied consent for participation. No signatures were requested or required. The principal researcher retrieved surveys from each hospital on a weekly basis. To reach private practice physicians with privileges at the selected sites, a cover letter, survey, and self-addressed stamped envelope was placed in the respective medical records mailbox if access was available. This strategy was used to increase response rate from providers who were not present on the unit daily.

Data Analysis. After coding and entry into SPSS 11.5 for Windows, descriptive statistics were calculated. ANOVA analysis for GBS knowledge was used to compare professional licensure groups, practice specialty, years in practice, and years in current specialty. Pearson chi-square was used for analysis of EOD and LOD knowledge within each demographic group.

Cronbach's alpha and item analysis were determined as a basis for GBS knowledge tool revision for future use.

Statistical significance was pre-established at 0.05 or less.

Chapter IV: Results

The purpose of this study was to determine the knowledge healthcare providers have related to GBS. This chapter reports outcomes of data analysis.

Research Question #1: What is the reliability of the GBS knowledge tool developed?

Cronbach's alpha reliability was 0.6447. This is a moderate reliability score. A score 0.8 to 0.9 would be ideal to ensure a richness in data questioned. Power analysis was not performed.

Research Question #2: What are the profession, practice specialty, length of time in practice, and length of time in specialty of study participants?

Ninety-eight surveys were returned, 94 were included in data analysis. Incomplete demographic data for two surveys and two respondents whose profession did not meet the inclusion criteria were excluded. Twenty-four physicians (25.5%), eight midlevel providers (8.5%), and 62 nurses (66.0%) represent the professional groups demonstrated in Figure 1. The nursing cohort included registered nurses and licensed practical nurses.

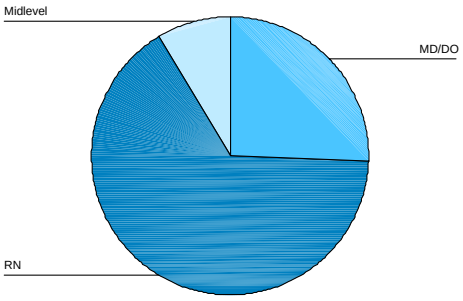

Figure 1: Professional Groups

The frequency by specialty was 74 (78.7%) for obstetrics and gynecology, 13 (13.8%) for pediatrics, and seven (7.4%) family practice. Neonatology was recoded into the specialty group of pediatrics, demonstrated in Figure 2.

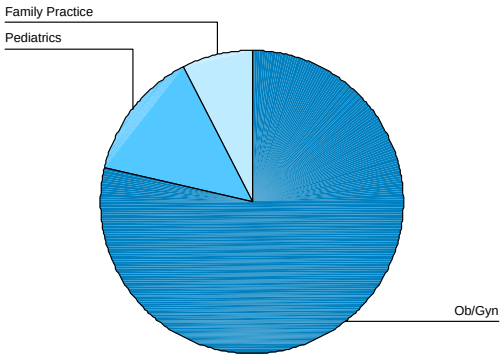

Figure 2: Practice Specialty

Years of practice and years in current specialty ranged from 1 to 35 years. The years of practice and years in specialty were recoded "five-year" groupings for statistical analysis. The years of practice were 0-5 years, 25%; 6-10 years, 18.1%; 11-15 years, 12.8%; 16-20 years, 12.8%; and 21-25 years, 12.8%; 26-30 years, 9.6%; and 31-35 years, 8.5% as shown in Figures 3 and 4.

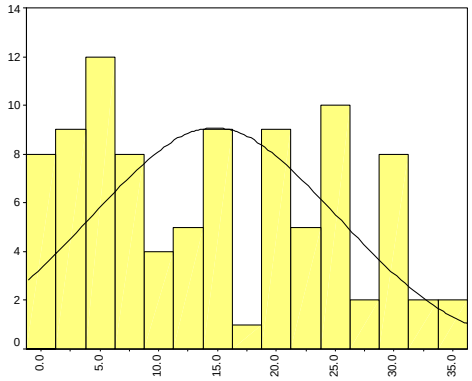

Figure 3: Years in Profession

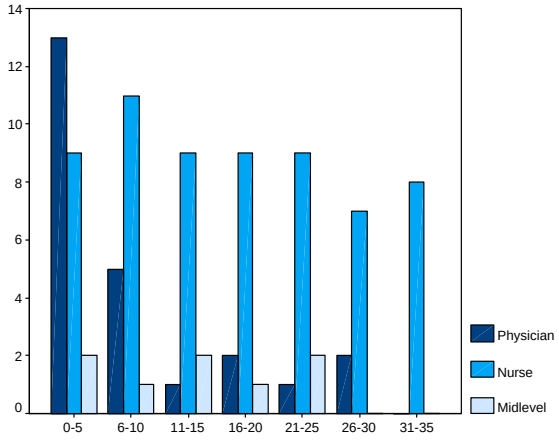

Figure 4: Years in Practice by Profession

Years in specialty were 0-5 years, 29.8%; 6-10 years, 24.5%; 11-15 years, 11.7%, 16-20 years, 18.1%; 21-25 years, 8.5%; 26-30 years, 6.4%, and 31-35 years, 1.1% as illustrated in Figures 5 and 6.

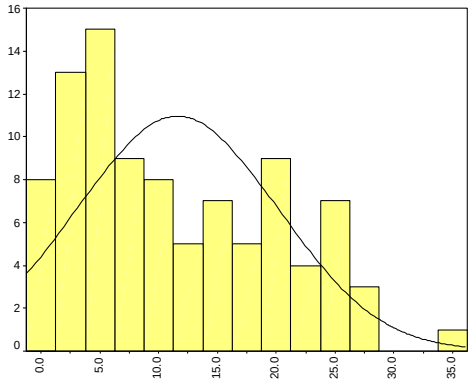

Figure 5: Years in Specialty

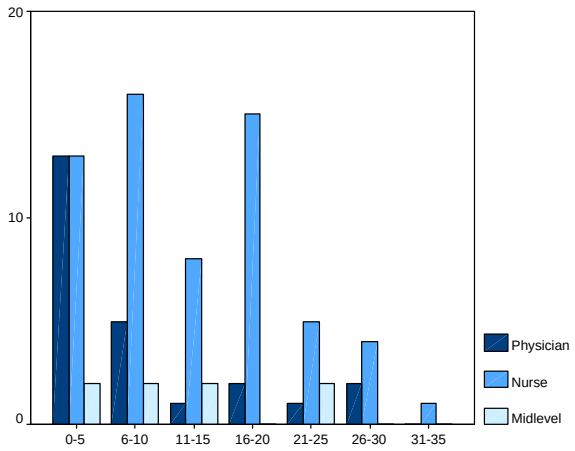

Figure 6: Years in Specialty by Profession

Research Question #3: What is healthcare provider knowledge of risk factors for developing EOD?

Correct responses for this item were prematurity (51.1%), PROM (48.9%), maternal fever (25.5%), bacturia (23.4%), and history of GBS neonate (14.9%). There were 19.1% with answers missing and 11.7% listed no correct answers.

Sixty-three percent of physicians, 88% of midlevels, and 42% of nurses answered prematurity correctly, $\chi^2(2, N = 94) = 7.574$, $\underline{p} = .023$. Forty-two percent of physicians, 88% of midlevels, and 47% of nurses answered PROM correctly, $\chi^2(2, N = 94) = 5.385$, $\underline{p} = .68$. Twenty-one percent of physicians, 63% midlevels, and 23% nurses correctly answered maternal fever, $\chi^2(2, N = 94) = 6.313$, $\underline{p} = .043$. Twenty-one percent of physicians, 25% of midlevels, and 24% of nurses correctly answered bacturia, $\chi^2(2, N = 94) = 0.121$, $\underline{p} = .941$. Lastly, 17% of physicians, 25% of midlevels, and 13% of nurses correctly answered history of GBS neonate, $\chi^2(2, N = 94) = 0.898$, $\underline{p} = .638$.

Forty-seven percent in obstetrics and gynecology, 69% in pediatrics, and 57% in

family practice correctly answered prematurity, $\chi^2(2, N = 94) = 2.241$, p = .326. Forty-five percent in obstetrics and gynecology, 69% in pediatrics, and 57% in family practice correctly answered PROM, $\chi^2(2, N = 94) = 2.890$, p = .236. Twenty-six percent in obstetrics and gynecology, 23% in pediatrics, and 29% in family practice correctly answered maternal fever, $\chi^2(2, N = 94) = 0.076$, p = .963. Twenty-six percent in obstetrics and gynecology, 23% in pediatrics, and 0.0% in family practice correctly answered bacturia, $\chi^2(2, N = 94) = 2.353$, p = .30. Eighteen percent in obstetrics and gynecology, 8.0% in pediatrics, and 0.0% in family practice correctly answered history of GBS neonate, $\chi^2(2, N = 94) = 2.174$, p = .337.

Comparing years of practice, in five year clusters, correct answers for prematurity were: 0-5 years, 54%; 6-10 years, 41%; 11-15 years, 67%; 16-20 years, 67%; 21-25 years, 33%; 26-30 years, 33%; and 31-35 years, 50%, $\chi^2(6, N = 94) = 4.767$, p = .574. For PROM: 0-5 years, 46%; 6-10 years, 29%; 11-15 years, 67%; 16-20 years, 83%; 21-25 years, 58%; 26-30 years, 22%; and 31-35 years, 38%, $\chi^2(6, N = 94) = 13.290$, p = .039. For maternal fever: 0-5 years, 21%; 6-10 years, 18%; 11-15 years, 33%; 16-20 years, 58%; 21-25 years, 25%; 26-30 years, 22%; and 31-35 years, 0%, $\chi^2(6, N = 94) = 10.806$, p = .095. For bacturia: 0-5 years, 25%; 6-10 years, 18%; 11-15 years, 17%; 16-20 years, 50%; 21-25 years, 17%; 26-30 years, 11%; and 31-35 years, 25%, $\chi^2(6, N = 94) = 6.461$, p = .374. For history of GBS neonate: 0-5 years, 21%; 6-10 years, 6%; 11-15 years, 25%; 16-20 years, 33%; 21-25 years, 0%; 26-30 years, 0%; and 31-35 years, 13%, $\chi^2(6, N = 94) = 9.654$, p = .140.

Lastly, comparing years of specialty, in five year clusters, correct answers for prematurity were: 0-5 years of specialty, 57%; 6-10 years, 35%; 11-15 years, 73%; 16-

20 years, 53%; 21-25 years, 50%; 26-30 years, 50%; and 31-35 years, 0%, $\chi^2(6, N = 94) = 5.994$, $\underline{p} = .424$. For PROM: 0-5 years 50%; 6-10 years, 30%; 11-15 years, 91%; 16-20 years, 59%; 21-25 years, 50%; 26-30 years, 17%; and 31-35 years, 0%, $\chi^2(6, N = 94) = 15.046$, $\underline{p} = .020$. For maternal fever: 0-5 years, 21%; 6-10 years, 17%; 11-15 years, 45%; 16-20 years, 35%; 21-25 years, 25%; 26-30 years, 17%; and 31-35 years, 0%, $\chi^2(6, N = 94) = .790$, $\underline{p} = .571$. For bacturia: 0-5 years, 29%; 6-10 years, 17%; 11-15 years, 27%; 16-20 years, 24%; 21-25 years, 25%; 26-30 years, 17%; and 31-35 years, 0%, $\chi^2(6, N = 94) = 1.442$, $\underline{p} = .963$. For history of GBS neonate: 0-5 years, 21%; 6-10 years, 13%; 11-15 years, 27%; 16-20 years, 12%; 21-25 years, 0%, 26-30 years, 0%; and 31-35 years, 0%, $\chi^2(6, N = 94) = 5.092$, $\underline{p} = .532$.

Research Question #4: What is healthcare provider knowledge of the major risk factor for developing LOD?

The correct answer was prematurity. Overall, only 5.3% of providers by professional licensure group correctly answered this question. Shown in Figure 7, 4.2% of physicians answered correctly; 12.5% of midlevels; and 4.8% of nurses, $\chi^2(2, N = 94) = 0.911$, $\underline{p} = 0.634$. Shown in Figure 8, 5.4% in obstetrics and gynecology answered correctly; 7.7% in pediatrics; and 0% in family practice, $\chi^2(2, N = 94) = 0.540$, $\underline{p} = .763$. Those in 0-5 years of practice answered 4.2% correctly; 6-10 years, 5.9%; 11-15 years, 8.3%; 16-20 years, 16.7%; 21-25 years, 0%; 26-30 years, 0%; and 31-35 years, 0%, $\chi^2(6, N = 94) = 4.988$, $\underline{p} = .545$. For specialty, 0-5 years answered 10.7% correctly; 6-10 years, 0%; 11-15 years, 9.1%; 16-20 years, 5.9%; 21-25 years, 0%; 26-30 years, 0%; and 31-35 years, 0%, $\chi^2(6, N = 94) = 4.075$, $\underline{p} = .667$. Some incorrect answers were “lacking antibiotic treatment” (11.7%), “death” (7.4%), and “nosocomial infection” (4.3%).

The remaining incorrect answers are listed Table 1.

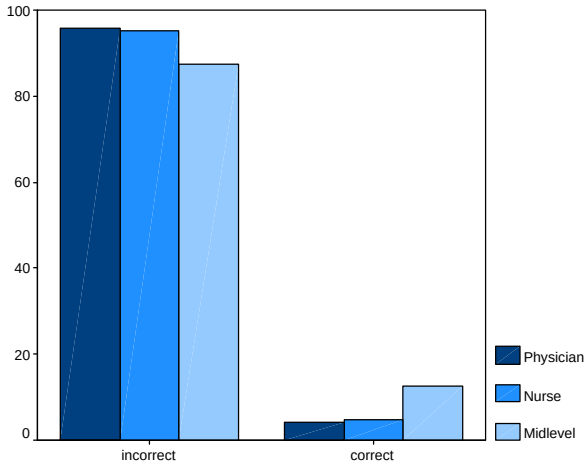

Figure 7: Percent Correct for LOD Risk Factor by Profession

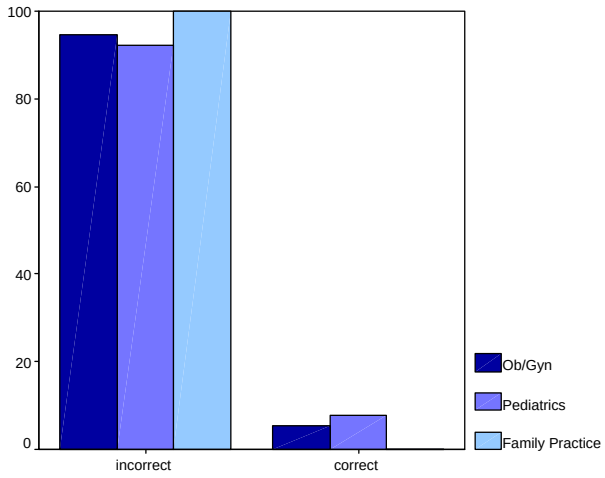

Figure 8: Percent Correct for LOD Risk Factor by Specialty

Research Question #5: Is there a relationship between professional licensure groups and overall knowledge of GBS?

As shown in Figure 9, physicians had a range of scores from eight to 20 (x = 13.00). Midlevel providers' scores ranged from four to 17 (x = 11.75). Nurses had a

score range of one to 19 (x = 11.05). Using ANOVA, F(2, *N* = 94) = 2.073, p = .132; there is no significance difference in score by profession.

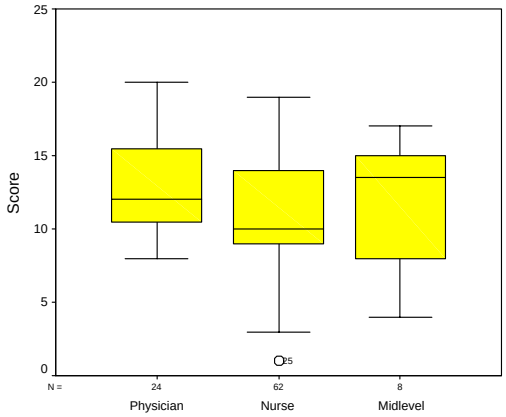

Figure 9: Total Score by Profession

Research Question #6: Is there a relationship between practice specialty and overall knowledge of GBS?

As shown in Figure 10, those practicing obstetrics and gynecology scored one to 20 correctly (x = 11.65). Pediatrics respondents scored between four and 18 (x = 11.00). Family practice respondents scored between ten and 16 (x = 12.29). Using ANOVA, F(2, *N* = 94) = 8.143, p = .783; the comparison is not significant.

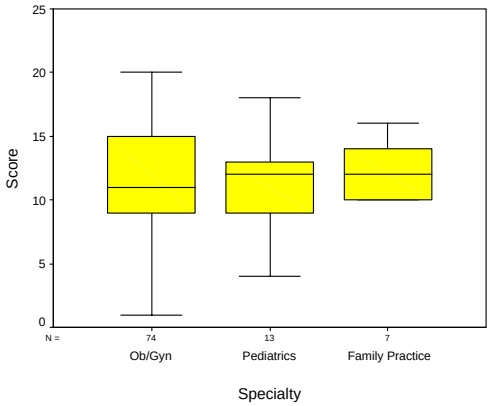

Figure 10: Total Score by Practice Specialty

Research Question #7: Is there a correlation between years of practice and overall knowledge of GBS?

Scores for those practicing 0-5 years ranged from three to 16 (x = 10.50); 6-10 years were six to 19 (x = 12.06); 11-15 years were one to 16 (x = 12.33); 16-20 years were eight to 20 (x = 15.00); 21-25 years were four to 18 (x = 9.33); 26-30 years were ten to 18 (x = 13.11); and 31-35 years were seven to 13 (x = 9.50). Boxplot of scores is shown in Figure 11. Using ANOVA, F(6, *N* = 93) = 3.506, p = .004 which indicates a statistically significant difference.

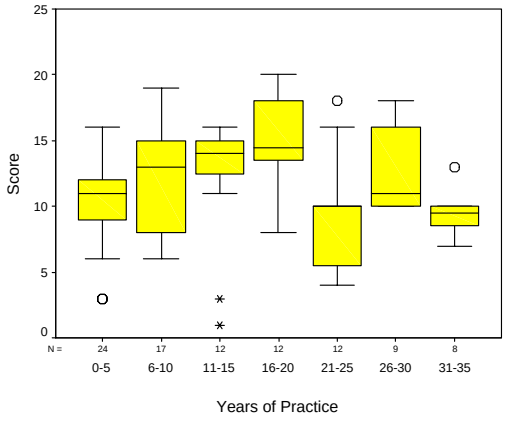

Figure 11: Total Score by Years of Practice

Research Question #8: Is there a correlation between years in specialty practice and overall knowledge of GBS?

Scores for those practicing in current specialty 0-5 years ranged from three to 19 correct (x = 11.11); 6-10 years were one to 19 (x = 10.78); 11-15 years were ten to 17 (x = 14.55); 16-20 years were eight to 20 (x = 12.47); 21-25 years were four 18 (x = 9.00);

26-30 years were eight to 18 (x = 13.00); and 31-35 years was ten (x = 10.00). Boxplot of scores is shown in Figure 12. Using ANOVA, F(6, *N* = 93) = 2.189, p = .052 which is not significantly different.

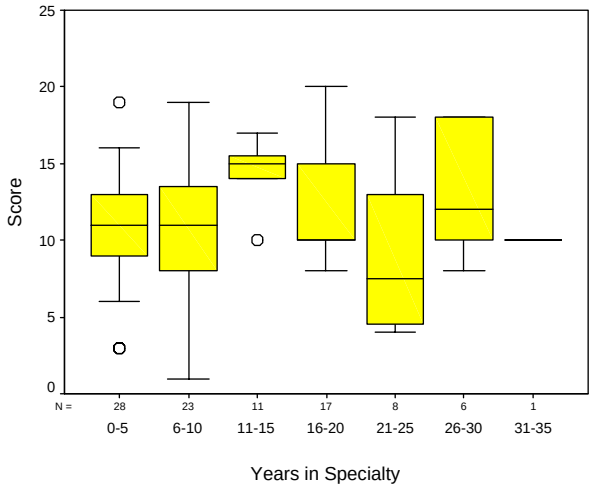

Figure 12: Total Score by Years in Specialty

Summary

Statistically significant results were noted for “prematurity” and “maternal fever” as EOD risk factors by profession, “PROM” as an EOD risk factor by years in practice, “PROM” as EOD risk factor by years in specialty, and score by years of practice. Cronbach’s alpha reliability of the tool was 0.6447. Data analysis required the use of ANOVA and chi square tests to determine relationship and statistical significance.

Chapter V: Discussion

The purpose of this study was to determine the knowledge healthcare providers have related to GBS. This chapter contains an overview of the data, discussion, relevance to the physician assistant profession, and conclusion.

Research Question #1: What is the reliability of the GBS knowledge tool developed?

Based on Cronbach's alpha reliability, this survey had a moderate score. A superior result would have been reliability between 0.8 - 0.9. Re-evaluation of the tool with adjustments made for improvement would be justifiable based on the current reliability. Given this score, it could be said the GBS knowledge items or format need revision before retesting with a similar population. For instance, multiple questions in the survey allowed for write-in of the correct answer. Conversion to multiple choice-type format, removal of True/False questions, and increasing the number of items may improve the reliability of the tool.

Research Question #2: What are the profession, practice specialty, length of time in practice, and length of time in specialty?

The return rate of surveys was acceptable for pilot evaluation of the tool, although a larger pool of participants would be beneficial. With only 24 participating physicians, representation of specialties was limited. The nursing profession had the largest response rate, which is attributed to the surveys and return boxes being on the units where working. Receiving only eight surveys from midlevels was not ideal, and is likely attributed to the small number of midlevels practicing in obstetric, gynecology, and pediatric specialty areas.

The range of years of practice and specialty were well represented from one year

through 35 years. Distribution of the tool to providers in a variety of practice settings and obtaining more dispersion of respondent demographics may give a clearer picture of GBS knowledge.

Research Question #3: What is healthcare provider knowledge of risk factors for developing EOD?

The number of correct answers was fewer than expected. For responses grouped by profession, “prematurity” and “maternal fever” were the only answers that were statistically significant. This is an unexpected finding, since physicians would be expected to know more than midlevels, who would be expected to know more than nurses. This assumption is based upon the amount of schooling required for each degree earned, but does not take into account recency of training. Gosling, Stone, and Grimwood (2002) findings were similar to results of this study. No providers in their study were able to list all five high-risk criteria for GBS.

Comparing responses by specialty group, there were no statistically significant differences. Anticipation that specialty practice would increase knowledge of GBS was not supported. Obstetric and gynecology professionals should be most knowledgeable on EOD risk because their role in detection and management of maternal GBS. The CDC recommends universal screening and selective IAP for colonized women; when practitioners are unaware of risk factors, proper compliance with recommendations may not occur. Not following appropriate guidelines for GBS prevention could result in increased neonatal infection rates, subsequent overuse of antibiotics, and an increase in number of drug resistant strains.

Comparing years in practice by scores, the only statistically significant finding

was for “PROM”. Based on Benner’s (2001), theory of development of knowledge, providers with extensive experience should know more factors. Lastly, for years in specialty and EOD knowledge, statistical significance was evident for “PROM”. With time should come expertise.

Research Question #4: What is healthcare provider knowledge of the major risk factor for developing LOD?

There was no statistically significant difference for answers in relationship to profession, practice specialty, years in practice and years in specialty. Knowing the single major risk factor is essential and allows for risk identification and initiation of treatment. A variety of incorrect answers were given which indicates confusion about LOD or what the question was asking. Current research documents a persistence of cases of LOD; knowledge of the major LOD risk factor and awareness of transmission modes may improve precaution by healthcare providers.

Research Question #5: Is there a relationship between professional licensure groups and overall knowledge of GBS?

No relationship was noted for profession and knowledge. The physician’s role in diagnosis and treatment of GBS makes it imperative to be most knowledgeable on the topic.

Research Question #6: Is there a relationship between practice specialty and overall knowledge of GBS?

Family practitioners’ mean score was highest on the GBS knowledge tool; pediatrician mean scores were lowest. This finding is perplexing since specialty training in pediatric and obstetric/gynecology residency includes GBS. It is possible that more

knowledgeable pediatricians chose to not complete a survey. Awareness of risk factors as well as signs and symptoms for EOD and LOD disease is important for all practice specialties.

Research Question #7: Is there a correlation between years of practice and overall knowledge of GBS?

Outcomes of this survey support Benner's theory of knowledge acquisition. Healthcare providers with more years of practice have more overall knowledge about GBS. There was a decline in mean scores for healthcare providers with 20 or more years of practice, which may be attributed to not keeping current with GBS updates. Concern about the organism occurred only thirty years ago, so continued vigilance is recommended.

Research Question #8: *Is there a correlation between years in specialty practice and overall knowledge of GBS?*

It was surprising to find no correlation between years in specialty practice and GBS knowledge. As stated previously, based on Benner's theory of knowledge development, there should be increasing knowledge with length of practice. The possible results may be skewed due to the distribution of professions, which was more nurses. The majority of responding physicians most knowledgeable were within the first 5 years of practice; the small pool of physician subjects limits generalization. Nursing staff might not be expected to have more knowledge on GBS than other healthcare providers; there was a lack of improving scores with experience. Based on these research findings, continued monitoring of GBS infection rates is crucial; an increase in infection rate due to decreasing knowledge over time places neonates at risk.

Significance to the PA Profession

Physician assistants function as part of the healthcare team, so awareness and knowledge of GBS is as important for the physician assistant profession as for any other healthcare provider. Too few physician assistants responded to this survey to accurately assess relative knowledge on GBS. Based on physician and nursing outcomes, it is likely physician assistants have a knowledge deficit regarding GBS.

Conclusions

It was demonstrated that there is a correlation of knowledge of GBS and years of practice. The EOD risk factors “prematurity” and “maternal fever” were determined to show a relationship to profession; “PROM” and “prematurity” risk factor knowledge correlated with years of practice and years in specialty respectively.

Further research on a larger scale would provide additional insight into healthcare provider GBS knowledge. Reevaluation and revision of the survey tool is suggested as a means to improve reliability. Continuing medical education and in-service on GBS should be available to all healthcare providers; future research and recommendations must be evaluated and integrated in practices and outcomes assessed.

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Appendix A

Incorrect Responses for LOD Major Risk Factor

	Frequency	Percent	Valid Percent	Cumulative Percent
	45	47.9	47.9	47.9
GBS + without treatment	2	2.1	2.1	50.0
Bacturia	1	1.1	1.1	51.1
Death	7	7.4	7.4	58.5
Decreased immune system	1	1.1	1.1	59.6
Exposure from caregiver	1	1.1	1.1	60.6
Exposure in birth canal	1	1.1	1.1	61.7
GBS+ and vaginal delivery	2	2.1	2.1	63.8
Immune incompetent	2	2.1	2.1	66.0
Lack intrapartum antibiotics	11	11.7	11.7	77.7
Maternal colonization	1	1.1	1.1	78.7
Nosocomial	4	4.3	4.3	83.0
EOD not recognized and treated	1	1.1	1.1	84.0
Partial treatment	2	2.1	2.1	86.2
Partially or untreated mom	1	1.1	1.1	87.2
Poor handwashing	2	2.1	2.1	89.4
Poor hygiene	2	2.1	2.1	91.5
Poor maternal handwashing	2	2.1	2.1	93.6
Respiratory distress	1	1.1	1.1	94.7
Sepsis	1	1.1	1.1	95.7
Pneumonia	1	1.1	1.1	96.8
Untreated and amt inoculated	2	2.1	2.1	98.9
Untreated infection	1	1.1	1.1	100.0
Total	94	100.0	100.0	

Appendix B

IRB Authorization Form

Appendix C

Survey Cover Letter

April 2, 2004 IRB# 104704

Dear Healthcare Provider,

My name is Nicole Horn and I am a Physician Assistant student at the Medical College of Ohio working on my Master's degree. As part of the completion of my program, I am conducting a research study on healthcare provider knowledge about Group B streptococcus. You are being asked to participate because you are a physician, physician assistant, nurse practitioner, midwife, or nurse working in a Northwest Ohio area hospital.

I am interested in your understanding of group B streptococci transmission, symptoms, and treatment for babies. You will be asked to answer several demographic questions and thirteen knowledge based questions. A box has been placed in the unit work area to return the questionnaire, or you may have received a stamped envelope for return. A second set of surveys will be made available if there are an inadequate number of completed surveys from the initial attempt.

Participation in this study is voluntary and will not result in any cost or benefit to you. Confidentiality and anonymity will be ensured as no personal identifying information is collected. As a participant, you can choose to not answer any question.

There are minimal risks to participating in this study. Loss of confidentiality may occur if others see your responses as you fill out the survey. This survey should take about five minutes. If you wish to take part in this study, the returned questionnaire will imply consent.

Please feel free to contact myself or my advisor, Dr. Susan Batten, if you have any questions about this study. Thank you for helping me with the project.

Nicole Horn
Student Researcher

Susan Batten, PhD.
Primary Investigator

Appendix D

Group B Streptococcus Survey

1. Profession (circle one): MD/DO PA NP Midwife RN LPN Other: _____

2. Practice: Obstetrics Gynecology Pediatrics Neonatology Family Practice
   Other: _____

3. Years of practice: _____

4. Years in current specialty: _____

5. Group B Streptococcus (GBS) initially colonizes the mother's:
   a. Skin
   b. Fingers
   c. Vagina
   d. Bowels

6. Pregnant women are typically tested for GBS colonization at:
   a. 29-31 weeks
   b. 32-34 weeks
   c. 35-37 weeks
   d. 38-40 weeks

7. If a child is exposed to GBS they will develop the disease. TRUE FALSE

8. The time frame in which Early Onset disease typically presents is: _____

9. The time frame in which Late Onset disease typically presents is: _____

10. I am capable of transmitting GBS to infants for whom I provide care. TRUE FALSE

11. Please list the risk factors for Early Onset disease:
    a. _____
    b. _____
    c. _____
    d. _____
    e. _____

12. The MAJOR risk factor for developing Late Onset disease is: _____

13. Please mark signs/symptoms typically seen in Early Onset disease:

__ Respiratory distress
__ Hypotonia
__ Fever
__ Lethargy
__ Hypoxemia
__ Bulging fontanel
__ Shock
__ Poor feeding

14. Please mark signs/symptoms typically seen in Late Onset disease:

__ Respiratory distress
__ Hypotonia
__ Fever
__ Lethargy
__ Hypoxemia
__ Bulging fontanel
__ Shock
__ Poor feeding

15. Please mark common manifestations of Early Onset disease:

__ Pneumonia
__ Sepsis
__ Meningitis
__ Osteoarthritis

16. Please mark common manifestation of Late Onset disease:

__ Pneumonia
__ Sepsis
__ Meningitis
__ Osteoarthritis

17. Prevention for Early Onset disease: (circle one)

a. None
b. Intrapartum antibiotics
c. Hand washing
d. Isolation

Abstract

Objective. This exploratory study was designed to determine healthcare providers knowledge related to Group B streptococcus (GBS). Method. A 25-item survey instrument was utilized to determine a general knowledge score; four additional demographic items addressed professional designation, primary practice area, length of practice and in current specialty for physicians, physician assistants, nurse practitioners, midwives and nurses. Participants worked at six hospitals, including Level I, II and III designation. Results. Ninety-eight surveys were returned. Scores ranged from 1 to 20; there was a statistically significant difference in score based on years in practice, but not for profession, type of practice and years in specialty. The GBS knowledge tool alpha reliability was 0.6499. Conclusions. Results suggest only providers' years in practice affect GBS knowledge. Re-evaluation of the tool and a larger scale experiment would be beneficial to further assess provider knowledge of GBS. Recommendations for further GBS education would be appropriate.