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Effectiveness of a group B streptococcus protocol on screening and intrapartum antibiotic prophylaxis at Kenyatta National Hospital

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Abstract

Background: Intrapartum Antibiotic Prophylaxis (IAP) is highly effective in preventing early-onset Group B Streptococcus (GBS) disease among infants born to colonized women. The burden of GBS at Kenyatta National Hospital (KNH) is comparable to the global prevalence yet standardized IAP guidelines have neither been developed nor implemented. This is important in averting GBS associated mortality and morbidity.
Objective: To determine if introduction of a GBS screening and IAP protocol is associated with changes in proportion of women receiving appropriate GBS screening and IAP at KNH.
Materials and methods: This was a pre and post intervention quasi-experimental study. In the pre intervention phase, clinicians providing reproductive health services were first interviewed on GBS IAP practices and then trained on the proposed GBS IAP protocol. During the post intervention phase, the clinicians were re-interviewed on GBS IAP practices. During both phases, data was extracted from the patient files to assess GBS IAP practice. Intervention comprised Continuous Medical Education (CME), posters of protocol in clinical areas and an email of the proposed protocol sent. Descriptive statistics was conducted for categorical variables and reported as proportions while continuous variables were described using measures of central tendency and dispersion (mean, mode and median). The strength of the association's was obtained from the effect estimate and p value < 0.05 considered significant.
Results: Between 1st May 2015 and 30th November 2015, we retrieved a total of 110 patient files. Nearly half of the files for the pre intervention and post intervention met the inclusion criteria. A total of 93 of the 103 clinicians approached were interviewed; 50 at pre intervention and 43 at post intervention. The prescription of appropriate antibiotics for GBS IAP by clinicians increased from none at pre intervention to 44% at post intervention. However, none of the patients had evidence of rectovaginal swab culture or antibiotic sensitivity pattern for GBS both at pre intervention and post intervention.
Conclusion: Introduction of a GBS IAP protocol substantially and significantly increased GBS IAP but did not have effect on screening practices.

Key words: Group B streptococcus protocol, screening and antibiotic use.

Introduction

Group B Streptococcus (*GBS; streptococcus agalactiae*) is an important cause of maternal perinatal morbidity and mortality. Maternal intrapartum GBS colonization is known to be a major risk factor for early onset neonatal sepsis with vertical transmission primarily occurring after premature rupture of membranes (1). In Kenya, GBS has been associated with preterm birth, neonatal sepsis and accounts for about 1 in 3 admissions to the new born unit (2,3).

Group B Streptococcus is carried by approximately 10-30% of women worldwide in their urogenital or lower gastrointestinal tract (4). The prevalence of GBS in pregnant women at KNH is 25.2% (2), consistent with global and regional prevalence (5-8).

Screening for GBS involves insertion of a cotton swab into the vagina then into the rectum before smearing on Stuarts, Todd-Hewitt or Amie's medium and taken for culture at between 35 to 37 weeks gestation. Carriers are started on a single intravenous antibiotic that may include either of the following: Penicillin G, cefazolin, ampicillin, clindamycin or vancomycin (9). Oral antibiotics such as erythromycin are not recommended due to high resistance and variable absorption during labour (10). The American College of Obstetricians and Gynaecologists and most European countries have adopted the Centre for Disease Control Guidelines 2010 (CDC) and the Royal College of Obstetricians and Gynaecologists guidelines 2012 (RCOG)(1,11).

Implementation of guidelines for GBS screening and IAP has led to 70% reduction in early onset neonatal GBS infection spectrum of sepsis, pneumonia and meningitis (12). Apart from GBS colonization, other indications for GBS IAP include neonatal GBS disease in previous pregnancy, unknown GBS status with preterm

labour or premature rupture of membranes and a temperature of 38^0C and in labour (11). There is paucity of data on GBS screening and IAP use in low resource settings (2).

We therefore conducted a study to determine whether introduction of GBS IAP protocols at KNH would be associated with changes in proportion of women receiving appropriate GBS screening and IAP.

Materials and Methods

This was a quasi-experimental study design without a control group in the labour ward, antenatal ward and antenatal clinic of KNH, the main referral hospital in the country. In this study, a sample of participants representing the target population of clinicians eligible if they directly provided intrapartum care and were either a consultant obstetrician gynaecologist, residents in obstetrics and gynaecology and nurse midwives and files of postpartum women with risk factors and indications for GBS Intrapartum Antibiotic Prophylaxis (IAP) which included preterm Prelabour Rupture of Membranes (PPROM), preterm labour (less than 37 weeks gestation), intrapartum temperature of 38^0C and above, previous infant with known invasive GBS disease or early neonatal sepsis and prolonged prelabour rupture of membranes (> 18hrs) were consecutively selected and current GBS screening and IAP practices evaluated at baseline. Files of patients were considered ineligible if patients were at or more than 37 weeks gestation and GBS negative. Interviews were then conducted amongst consenting clinicians recruited into the study assessing baseline knowledge on *GBS* IAP practice. Eligible clinicians were identified from the weekly duty rota, consecutively sampled until the sample size was achieved. Training was then conducted on clinicians and midwives one month after initial baseline clinician knowledge assessment on GBS screening and IAP. Training involved use of posters with CDC, ACOG guidelines, proposed GBS screening and IAP protocol for KNH as well as Continuous Medical Education (CME) and information on the same disseminated via E-mail. In addition, posters of CDC, ACOG algorithms and proposed protocol were mounted in labour ward, antenatal wards and clinics.

After the intervention, a second representative of the target population of files of women with GBS risk factors were consecutively sampled and evaluated for effectiveness of the intervention. A comparison of the proportion of women whose risk factors were determined and appropriate IAP antibiotics administered at the beginning of the study and after the intervention was made. Similarly clinicians who met the inclusion criteria were interviewed a month after intervention to assess screening and IAP practices post intervention.

In this study, it was estimated that at least 43 files would be sufficient, assuming appropriate GBS IAP of 30% pre intervention, 60% post intervention and 10% addition for incomplete records. Assuming appropriate knowledge of GBS IAP of 50% pre intervention, 80% post intervention and a 10% addition for lack of response, we estimated a minimum sample size of 39 clinicians would be required based on a previous similar study in North America (13).

Ethical approval was obtained from the University of Nairobi/Kenyatta National Hospital (UON/KNH) Ethics committee and the Department of Obstetrics and Gynaecology, University of Nairobi. The proposed GBS screening and IAP protocol approval was obtained from Kenyatta National Hospital, Department of Reproductive Health. Participation in the study was voluntary and informed consent was obtained from participating clinicians. However, incentives were not given for participation. All information obtained was managed in confidentiality.

Data was extracted from patient files using pretested questionnaires and consenting clinicians were given a self-administered structured questionnaire at baseline. Training was then conducted over a period of 3 months. This involved continuous medical education in the Department of Obstetrics and Gynaecology, University of Nairobi and information disseminated through e-mail. Additionally, for all clinician's, posters of Centre for Disease Control (CDC), American College of Obstetricians and Gynaecologists (ACOG) algorithms' and proposed protocol for Kenyatta National Hospital were mounted in labour ward, antenatal wards and clinics. The principal investigator and research assistant conducted all trainings. A similar self-administered structured questionnaire was administered again to clinicians after intervention. This was done over a period of 4 months and data extracted from patient files with a similar data extraction form.

Data was collected using paper questionnaires, double entered into an excel data base and cleaned. Descriptive statistics was conducted for discrete, binary and categorical variables and reported as proportions while continuous variables were described using measures of central tendency and dispersion (mean, mode and median). The strength of the association's was obtained from the effect estimate and considered significant at p value less than 0.05. All analysis was conducted using Statistical Package for the Social Sciences (SPSS) version 20.

Results

Between 1st May 2015 and 30th November 2015, we retrieved a total of 110 patient files nearly half (n=44, 49%) files for the pre intervention phase and (n=45, 51%) files for the post intervention phase met the inclusion criteria. A total of (n=93, 90%) of the 103 clinicians approached were interviewed; (n=50, 54%) at pre intervention and (n=43, 46%) at post intervention. During both pre intervention and post intervention

phases, patients had similar sociodemographic characteristics. Mean age was at 26 years, majority were married (n=37, 84%) at pre intervention and (n=33, 73%) at post intervention, employed (n=27, 61%) and (n=33, 73%) with tertiary level education (n=26, 59%) and (n=23, 51%) at pre and post intervention respectively. Mean gestation was 35 weeks (S.D=4.0), with majority of the patients having one or two previous live births, (n=22, 50%) at pre intervention and (n=25, 55.6%) at post intervention and with no previous history of abortion, (n=36, 81.8%) and (n=32, 71.1).

The prescription of appropriate antibiotics for GBS IAP by clinicians increased from none at pre intervention to (n=20, 44%) post intervention. However, none of the patients had evidence of rectovaginal swab culture for GBS both at pre intervention and post intervention.

Discussion

In this quasi experimental study conducted at KNH, the proportion of patients receiving appropriate GBS IAP after introduction of protocol in our study significantly increased. This finding is comparable to other GBS protocol interventions in two Australian hospitals that increased compliance to more than 76% and 50% post intervention in America (14-16).

In this study, we found that the proportion of patients undergoing screening for GBS did not change despite intervention. This is different from findings in other settings that reveal increased screening after intervention. For example, in a randomized control trial conducted in Porto Alegre Brazil, mail and follow up education of obstetricians was noted to be a more effective intervention compared to mailing only and this increased GBS screening from 17% to 25% (17). Other North American studies have shown increased GBS screening from 30% to 62% and 48% to 85% with use of clinician computer reminders, academic meetings and posters training. This was a similar finding in this study, pointing out the crucial role that educative interventions play in terms of change in clinician prescription practice and attitude towards GBS screening and IAP, (18). It is evident that majority of clinicians in KNH do not routinely screen for GBS and subsequently give IAP. These findings could be attributed to inadequate clinician knowledge on GBS screening and IAP bearing in mind the complex protocols and minimal contact time clinicians have with patients in Kenyatta National Hospital labour ward in labour waiting for a GBS screening result. The lack of readily available GBS collection swabs and transport media in antenatal wards and clinics is also a contributory factor. These findings are comparable to a study carried out in Israel in 2005 when a telephone questionnaire conducted for all 27 delivery units in the country revealed only 2 of them adhered to CDC guidelines (19). In the United Kingdom (UK), an intervention of countrywide circulation of protocols in 2003 was implemented. However, as at 2013 there was little impact as the country is still using a risk based approach to GBS intrapartum antibiotic prophylaxis (20,21). Our study therefore found similarities and differences in clinician prescription practice and GBS screening that is comparable to other global settings.

Conclusion

Introduction of a GBS IAP protocol increased IAP practices. However, it did not increase GBS screening practices. We recommend use of a Group B streptococcus (GBS) screening and intrapartum antibiotic prophylaxis at Kenyatta National Hospital (KNH) well as tackling barriers to implementation of the GBS protocol.

Authors declare no conflict of interest

References

1. Verani JR, McGee L, Schrag SJ, *et al.* Prevention of perinatal group B streptococcal disease: revised guidelines from CDC, 2010 [Internet]. Department of Health and Human Services, Centers for Disease Control and Prevention; 2010 [cited 2015 Mar 23]. Available from: http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5910a1.htm
2. Antenatal CI and Mohamed DSG. Streptococcus (GBS). 2009 [cited 2015 Mar 23]; Available from: http://erepository.uonbi.ac.ke/bitstream/handle/11295/25068/Prevalence%20Of%20Group%20B%20Streptococcus%20(gbs)%20Colonization%20In%20Antenatal%20Women%20At%20Kenyatta%20National%20Hospital%20(knh).pdf?sequence=3
3. Simiyu DE. Morbidity and mortality of low birth weight infants in the new born unit of Kenyatta National Hospital, Nairobi. *East Afr Med J.* 2004;**81**(7):367–374.
4. Chan WSW, Chua SC, Gidding HF, Ramjan D, Wong MYW, Olma T, *et al.* Rapid identification of group B streptococcus carriage by PCR to assist in the management of women with prelabour rupture of membranes in term pregnancy. *Aust N Z J Obstet Gynaecol.* 2014;**54**(2):138–145.
5. Vinnemeier CD, Brust P, Owusu-Dabo E, Sarpong N, Sarfo EY, Bio Y, *et al.* Group B Streptococci serotype distribution in pregnant women in Ghana: assessment of potential coverage through future vaccines. *Trop Med Int Health.* 2015;**20**(11):1516–24.
6. Woldu ZL, Teklehaimanot TG, Waji ST and Gebremariam MY. The prevalence of Group B Streptococus recto-vaginal colonization and antimicrobial susceptibility pattern in pregnant mothers at two hospitals of Addis Ababa, Ethiopia. *Reprod Health.* 2014;**11**(1):80.
7. Ernest AI, Ndaboine E, Massinde A, Kihunrwa A and Mshana S. Maternal colonization by Group B

Streptococcus and Listeria monocytogenes and its risk factors among pregnant women attending tertiary hospital in Mwanza, Tanzania. *Tanzan J Health Res.* 2015;**17**(2).
8. Ezeonu IM and Agbo, MC. Incidence and anti-microbial resistance profile of Group B Streptococcus (GBS) infection in pregnant women in Nsukka, Enugu State, Nigeria. *Afr J Microbiol Res.* 2014;**8**(1):91–95.
9. Nan C, Dangor Z, Cutland C, Edwards M, Madhi S and Cunnington M. Maternal group B Streptococcus -related stillbirth: a systematic review. *BJOG Int J Obstet Gynaecol.* 2015;**122**(11):1437–45.
10. Berger M, Xu X, Williams J, Van de Ven C and Mozurkewich E. Early hospital discharge of infants born to group B streptococci-positive mothers: a decision analysis: Early hospital discharge of infants from GBS-positive women. *BJOG Int J Obstet Gynaecol.* 2012;**119**(4):439–448.
11. Dunn J. TO: State Public Health Veterinarians, State Epidemiologists, State Veterinarians, Others Concerned with Disease Associated with Animals in Public Settings. 2009 [cited 2015 Mar 25]; Available from: https://www.purplealert.ecu.edu/cs-dhs/agromedicine/upload/AnimalsInPublicSettings.pdf
12. Creti R, Berardi A, Baldassarri L, Imperi M, Pataracchia M, Alfarone G, *et al.* Characteristics of neonatal GBS disease during a multicentre study (2007-2010) and in the year 2012. *Ann DellIstituto Super Sanità.* 2013;**49**(4):370–375.
13. MacLaughlin KL, Garrison GM, Matthews MR, O'Brien ML, Westby E and Targonski PV. Increased adherence to prenatal Group B streptococcal screening guidelines through a paired electronic reminder and education intervention. *Matern Child Health J.* 2014;**18**(1):16–21.
14. Gilbert GL, Hewitt MC, Turner CM and Leeder SR. Compliance with protocols for prevention of neonatal group B streptococcal sepsis: practicalities and limitations. *Infect Dis Obstet Gynecol.* 2003;**11**(1):1–9.
15. Fleming MT, M c Duffie RS, Russell K and Meikle S. Compliance with a risk-factor-based guideline for the prevention of neonatal group B streptococcal sepsis. *Infect Dis Obstet Gynecol.* 1997;**5**(5):345–348.
16. Sanders TR, Roberts CL and Gilbert GL. Compliance with a protocol for intrapartum antibiotic prophylaxis against neonatal group B streptococcal sepsis in women with clinical risk factors. *Infect Dis Obstet Gynecol.* 2002;**10**(4):223–229.
17. Silva JM, Stein AT, Schünemann HJ, Bordin R, Kuchenbecker R and de Lourdes Drachler M. Academic detailing and adherence to guidelines for Group B streptococci prenatal screening: a randomized controlled trial. *BMC Pregnancy Childbirth.* 2013;**13**(1):1.
18. Van Dyke MK, Phares CR, Lynfield R, Thomas AR, Arnold KE, Craig AS, *et al.* Evaluation of universal antenatal screening for group B streptococcus. *N Engl J Med.* 2009;**360**(25):2626–36.
19. Goldstick J. Intrapartum prophylaxis of Group B streptococcal disease in Israel, Guidelines and practice. *IMAJ.* 2005;**7**:156-159.pdf.
20. Azad M, Konya T, Persaud R, Guttman D, Chari R, Field C, *et al.* Impact of maternal intrapartum antibiotics, method of birth and breastfeeding on gut microbiota during the first year of life: a prospective cohort study. *BJOG Int J Obstet Gynaecol.* 2016;**123**(6):983–993.
21. Kenyon S, Brocklehurst P, Blackburn A and Taylor DJ. Antenatal screening and intrapartum management of Group B Streptococcus in the UK. *BJOG Int J Obstet Gynaecol.* 2004;**111**(3):226–230.