P14

PRETERM OPTIMIZATION: A RETROSPECTIVE ANALYSIS

Nicole Moriarty[1], Rebecca Ketteman[2], Manju Chandiramani[1,2]
[1]Guy's and St Thomas' NHS Foundation Trust , [2]King's College London

Guy's and St Thomas' NHS Foundation Trust

INTRODUCTION

Preterm Birth, defined as delivery prior to 37 weeks' gestation, occurs in 15 million pregnancies worldwide annually. Prematurity is the leading cause of neonatal mortality and morbidity, resulting in significant psychological impact on families, their children, and huge financial costs to society. The UK has one of the highest perinatal mortality rates in Western Europe[1]. In 2019 the British Association of Perinatal Medicine introduced the saving babies lives care bundle, with and updated version 3 launched in Spring 2023[2]. To achieve a 50% reduction in stillbirth, maternal mortality, neonatal mortality and serious brain injury by 2025, as set out by the "better births" transformation programme in 2016[3], 6 key areas were identified for improvement.

The bundle aims:

- Reducing smoking
- Fetal Growth
- Fetal Monitoring
- Management of Pre-existing diabetes.
- Reducing preterm birth
- Raising awareness of reduced fetal movement

Guy's and St. Thomas' NHS trust was 1 of 44 trusts who were part of the first wave to engage in support from the National Maternity and Neonatal Safety improvement Programme (MatNeoSIP) to improve maternity care safety and outcomes. The MatNeoSIP project was introduced to standardise care, improving safety and outcomes of maternity and neonatal service users. Pharmacological interventions to improve neonatal outcomes include Antenatal corticosteroids for accelerated lung maturity, Magnesium Sulphate infusion for fetal neuroprotection and benzylpenicillin for Group B streptococcus prophylaxis. Appropriate timing of these interventions is complex and often difficult to achieve. While there is benefit to these interventions being offered to those born prematurely, no benefit has been demonstrated for the 40% of neonates who receive antenatal steroids, or other preterm optimization medications and go on to deliver at term[7,8].

AIM:

To assess the delivery of pharmacological interventions- Antenatal Corticosteroids (ACS), Benzylpenicillin and Magnesium Sulphate (MgS04)- for optimization of preterm labour in a London maternity unit.

METHOD

- Retrospective systematic chart analysis of preterm deliveries between 1st January 2022 and 31st December 2022 at Guy's and St Thomas' NHS Foundation Trust, using electronic maternity records
- **Inclusion criteria:**
  - Women delivering between 22^{+0} and 34^{+6} gestation in the year 2022 at Guy's and St Thomas' Hospital
- **Exclusion criteria:**
  - Women delivering outside this gestational range
  - Intrauterine death
  - Medical termination of pregnancy
  - Fatal fetal abnormalities
  - Women who received Antenatal corticosteroids, Magnesium Sulphate, benzylpenicillin and progressed to term

RESULTS:

- 191 women were included for analysis
- Data was collected on preterm optimization interventions as per the saving babies lives care bundle[5] including mode of delivery, benzylpenicillin administration for GBS prophylaxis, magnesium sulphate administration and in utero transfers from other units.
- **Indication/cause of preterm birth**
  - PPROM 69 (36%)
  - PET/HTN 33 (17%)
  - APH/Abruption 15 (7%)
  - Abnormal Dopplers/IUGR/Fetal CTG concerns 27 (14%)
  - Spontaneous Preterm Labour 35 (18%)
  - Maternal conditions 5 (2%)
  - Iatrogenic/planned 8 (4%)
- **Singleton**: 163 (85%)
- **Multiples**: 28 (15%)
- Spontaneous vaginal deliveries (SVD) higher in women who had no ACS compared to those who received in optimal timing (39% vs 25%).
- Similarly spontaneous cause for PTB higher in women who had no ACS.

RESULTS:

Initial dose of antenatal corticosteroids was achieved in 168 (88%) preterm infants, however only 68 (36%) received these within the optimal timing window.

16 Women had received steroids >7 days prior to delivery without receiving a rescue dose. Of these, 10 women had PPROM.

Antibiotic prophylaxis was commenced in 54 (28%) of the cohort, a further 14 (7%) were given antibiotics to treat chorioamnionitis. Three women received vancomycin as they were penicillin allergic.

Magnesium sulphate was commenced in 111 (58%) preterm births. When we examined births <30 weeks in keeping with recommendations for preterm neuroprotection, 43/76 (57%) had received optimal magnesium sulphate infusion prior to delivery.

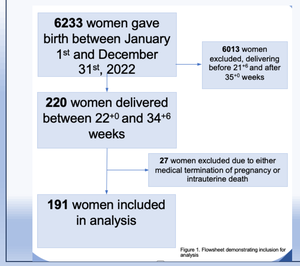
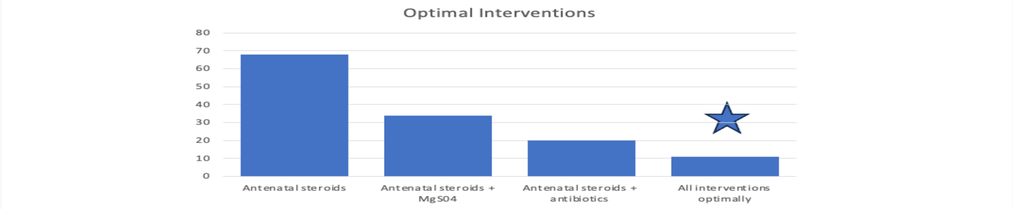


Figure 1. Flowsheet demonstrating inclusion for analysis

RESULTS

Intervention	Number received optimally	%
Antenatal Corticosteroids (ANS)	68	36%
ANS + Magnesium Sulphate (MgS04)	34	18%
ANS + IV antibiotics	20	11%
ANS + IVAB +MgS04	**11**	**6%**



Analysis by timing of intervention

Intervention	Initial dose	Subsequent dose *(12-24 hours later)*	Optimized prior to delivery *(>24hours and <7 days prior to delivery)*
Antenatal Corticosteroids **<34+6 (N=191)** **Single dose only** **Repeat dose (3rd dose)** **No steroids 23 (12%)**	 168 (88%) 34 (18%)	 134 (70%)	 68 (36%) 17 (9%)
Benzylpenicillin/Vancomycin **<34+6 (N=191)** **BENZYLPENICILLIN (N=51)** **VANCOMYCIN (N=3)** **OTHER (AMOX/TAZOCIN)**	 54 (28%) 51 (27%) 3 (1.5%) 14 (7%)	 36 (19%) 35 (69%) 1 (33%) 14 (7%)	2 doses 36 (19%) 4 hours apart 35 (69%) 4 hours apart 1 (33%) 12 hours apart *Chorioamnionitis protocol
Magnesium Sulphate **<34+6 (N=191)** **<30+0 (N=76)**	 111 (58%) 68 (89%)	>4 hours infusion 83 (43%) 43 (57%)	>4 hours infusion 83 (43%) 43 (57%)

Analysis by length of admission

Admission to Delivery Interval: Intervention	<4 hours N=34	>24 hours N=113
Antenatal steroids (Dexamethasone 9.9mg IM x2 doses)	No steroids: 7 (21%) 1st dose: 21/34 (62%) 2nd dose: 6(18%) Steroid mature: 2/34	No steroids: 3 (3%) 1st dose: 110 (97%) 2nd dose: 101 (89%) 3rd dose: 15 (13%) Steroid mature at delivery: 57 (51%)
IVAB (Benzylpenicillin/Vancomycin or chorioamnionitis treatment) (Benzylpenicillin 3g then 1.4g 4 hourly Vancomycin 1g 12 hourly)	sepsis protocol: 2 (6%) 1st dose 9: (26%) 2nd dose: 4 (18%) No antibiotics: 19 (56%)	Sepsis protocol: 7 (6%) 1st dose: 33 (29%) 2nd dose: 27 2(4%) No antibiotics: 46 (41%)
MgS04 (4g loading dose then 1g/hour for up to 24 hours prior to delivery)	Loading dose: 18(53%) Maintenance prior to birth 7 (21%) No dose prior to delivery: 16 (47%)	Loading dose 76 (67%) Maintenance >4 hours 60 (53%) No Dose Prior to delivery: 37 (33%)

DISCUSSION

- Getting pharmacological preterm optimisation timing right is clearly a challenge, as less than 50% received steroids optimally,
- **Only 6% of preterm births receiving all three interventions prior to delivery.**
- Most preterm neonates have not received optimal care prior to delivery.
- The proportion of women receiving steroids optimally and the proportion of women not receiving any ACS is comparable to other studies, highlighting the challenge further. As administration is completed ideally 24 hours before delivery and looses peak benefit after 7 days this is the most difficult intervention to correctly administer.
- Spontaneous deliveries are evidently even more difficult to predict, as are emergencies and therefore women delivering preterm in these scenarios are the most at risk of not receiving optimal management.
- Women with an iatrogenic cause for PTB are the most likely to receive optimal care

NEXT STEPS:

- Education on rescue dose – 16 women did not receive a rescue dose when should have and 12 women did not receive the rescue dose in the correct time frame
  - Some clinicians not giving a rescue dose because of misunderstanding of the current guidance, therefore this should be reinforced
- Improve consistency and accuracy of recording obstetric data
  - Uniform recording between departments which will make it easier for clinicians to be informed of whether steroids have been given and make future research easier
- Educate women, particularly primiparous women on signs of preterm labour as primiparous women are most at risk of PTB
  - The PERIPrem passport was introduced in 2023 in GSTT as an educational tool for staff and patients for preterm optimisation.
- Further assessment of administration of these medications in women who progress to a term delivery would give further insight into this issue

RESULTS

1. World Health Organisation. WHO: recommended definitions, terminology and format for statistical tables related to the perinatal period and use of a new certificate for cause of perinatal deaths. Modifications recommended by FIGO as amended October 14, 1976. Acta Obstet Gynecol Scand. 1977;56(3):247-53.
2. Stock S, Thomson A, Papworth S, Obstetricians fRCo, Gynaecologists. Antenatal corticosteroids to reduce neonatal morbidity and mortality. BJOG: An International Journal of Obstetrics & Gynaecology. 2022;129(8):e35-e60.
3. Norberg H, Kowalski J, Maršál K, Norman M. Timing of antenatal corticosteroid administration and survival in extremely preterm infants: a national population-based cohort study. BJOG: An International Journal of Obstetrics & Gynaecology. 2017;124(10):1567-74.
4. Norman M, Piedvache A, Børch K, Huusom LD, Bonamy A-KE, Howell EA, et al. Association of Short Antenatal Corticosteroid Administration-to-Birth Intervals With Survival and Morbidity Among Very Preterm Infants: Results From the EPICE Cohort. JAMA Pediatrics. 2017;171(7):678-86.
5. NHS England. Saving Babies' Lives Care Bundle Version 2 [Internet]. 2019 [Available from: https://www.england.nhs.uk/wp-content/uploads/2019/03/Saving-Babies-Lives-Care-Bundle-Version-Two-Updated-Final-Version.pdf.
6. Association of antenatal corticosteroids with risk of serious infection in children: nationwide cohort study doi: 10.1136/bmj-2023-075835
7. The proportions of term or late preterm births after early antenatal exposure to corticosteroids, and outcomes: systematic review and meta-analysis of 1.6 million infants doi: 10.1136/bmj-2023-076035
8. Flenady V, Hawley G, Stock OM, Kenyon S, Badawi N. Prophylactic antibiotics for inhibiting preterm labour with intact membranes. Cochrane Database of Systematic Reviews 2013, Issue 12. Art. No.: CD000246. DOI: 10.1002/14651858.CD000246.pub2

KING'S College LONDON