Prophylactic obstetric antimicrobial use, maternal colonization and vertical transmission of antimicrobial-resistant bacteria among mother-newborn pairs in Nepal

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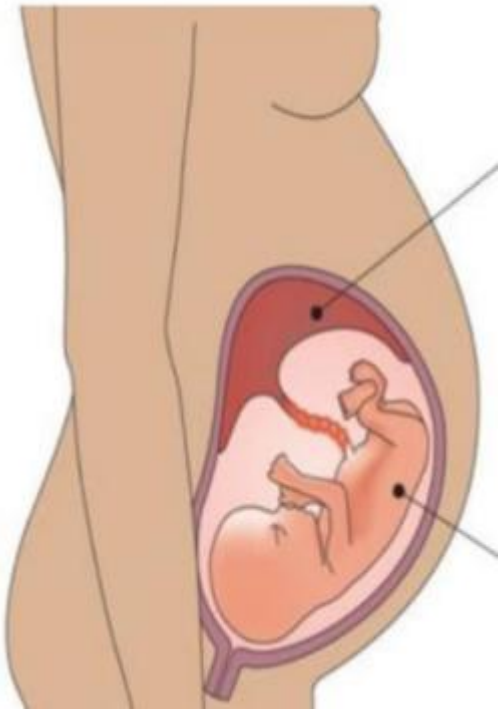
Background



- Antibiotics are **vital** in obstetric health
  - for maternal and neonatal infection prevention (**prophylaxis**) and treatment (**therapeutic**)

- High use in **LMIC obstetric care settings**

- Often **inappropriate prophylactic use** **around delivery** without clear indication

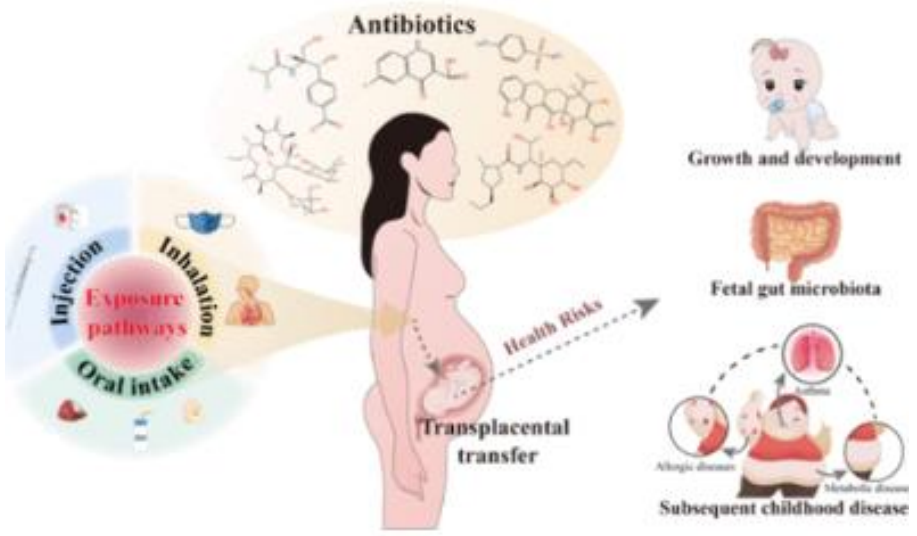
- Practices often **deviate from WHO &** other international **standard guidelines**

Common **drivers** for over use of antimicrobials in **LMICs**:

1. Weak **infection prevention and control (IPC)**
2. Limited **diagnostics**
3. Fear of **poor outcomes**
4. Poor healthcare **infrastructure**
5. Lack of **antimicrobial stewardship**

Implication of perinatal antibiotic exposure:

- Drives development and spread of **AMR**
- Disruption of **neonatal microbiome**
- Increased risk of **adverse outcomes**



Objectives

- Characterize obstetric antibiotic use
- Characterize maternal carriage of potential pathogens and associated AMR
- Characterize neonatal carriage of potential pathogens and associated AMR
- Determine risk of vertical transmission of potential pathogens

Methodology

- A part of a NHRC-approved study "*Prevalence and microbiological epidemiology of Group B streptococci and other opportunistic pathogens among mothers and neonates in Nepal* "
- **Study Design:** Prospective observational cross-sectional Study
- **Study Site:** Community-level maternity and children hospital
- **Study Population:** Pregnant Women and Neonates
- **Target Sample Size:** 250-300 mother-neonate pairs
- **Enrollment period**: March and September 2025

Workflow

Pregnant women admitted to MATERNITY WARD

↓ Screening for inclusion/exclusion criteria

Eligible participants

↓ Informed consenting (written)

Consented participants

↓

Enrolled participants

↓

Collect low-vaginal swab samples
BEFORE giving any antimicrobials
(LVS in Amies transport media)

↓

CRF completion (maternal part)

↓

Trace CHILD at BIRTH

↓

Screen and enroll eligible Neonate

↓

IMMEDIATELY collect umbilical swab samples
BEFORE cleaning/wiping or bathing
(US-2 in Amies transport media)

↓

CRF completion (neonatal part)

Transport all swab samples to microbiology lab

↓

LVS, US-2 processed in lab for identification and antimicrobial susceptibility test (AST) of Gram-positive and -negative potential pathogens

Results

252 Mothers;

253 Neonates

Delivery: 63% CS

Obstetric antimicrobial use

Vaginal delivery (N=93)

	Practiced Antibiotic Regimen	N%, Use days (x̄)	WHO/International Obst. Standard Protocol
Pre-operative	PO Ampicillin (500 mg, TDS)	4%, 1±0	None*
Post-operative	PO Ampicillin (500 mg, TDS)	100%, 6 ± 1.4	None*

Obstetric antimicrobial use

Cesarean section (N=158)

	Practiced Antibiotic Regimen	N%, Use days (x̄)	WHO/International Obst. Standard Protocol
Pre-operative	IV Ceftriaxone (1 gm, OD)	100%, 1±0	IV Cefazoline, 1 gm, OD Single dose, 1 day
Post-operative	IV Ceftriaxone (1 gm, BD)	97%, 1 ± 0.5	None*
	IV Metronidazole (500 mg, TDS)	99%, 1 ± 0.5	
	PO Cefixime (200 gm, TDS)	100%, 6 ± 1	
	PO Metronidazole (400 gm, TDS)	100%, 5 ± 1	

Carriage of Opportunistic Pathogens

(Preliminary)

Culture positivity (%)*

	GNB	GPC
Mother (LVS)	48	22
Baby (US)	11	4

70% being vertically transferred

Predominant isolates (%)

	E. coli	*K. pneumo*	*S. aureus*
Mother (LVS)	69	10	22
Baby (US)	50	11	4

Table 3. List of microorganisms isolated from LVS and US-2 samples shown by their clinical significance under the GBS study

Pathogen/potential pathogens to screen and report (**On MacConkey agar plate**)	Pathogen/potential pathogens to screen and report (**On 5% Sheep blood agar plate**)	Contaminants (not required to process and report)
Enterobacterales	GBS (*Streptococcus agalactiae*)	CoNS
	Streptococcus pyogenes	
	Other B-hemolytic streptococci	
	Listeria monocytogenes	
	Staphylococcus aureus	
	Yeast	

AMR in carriage opportunists & Risk of vertical transmission

% Resistance (AMR)

Isolate	Sample (N)	Cef	Mero	Gen	Cip	Cot
E. coli	Mother(54)	15	4	28	54	35
	Baby (9)	22	0	22	33	22
K. pneu	Mother (8)	0	0	13	38	0
	Baby (2)	0	0	0	50	0

Isolate	Sample (N)	Cefo	Gen	Ery	Clin	Cip	Cot
S. aureus	Mother (35)	63	31	97	17	47	11
	Baby (6)	67	50	83	17	67	0
		MRSA					

Odds of vertical transmission = 1.48X higher among colonized than not-colonized mothers undergoing vaginal delivery ($p \approx 0.56$).

Conclusion: Takeaway messages

- **Prolong** prophylactic antibiotic use: in both CS and VD

  -**Exceeded** recommended guidelines

- High maternal and neonatal colonization with **AROs**(MDR, ESBL,MRSA, CRO)
- Higher risk of **vertical transmission** of MDROs

Urgent need for:

- Rational obstetric antibiotic stewardship
- Adherence to evidence-based guidelines

Acknowledgement

Core Study Team

Entire MODRA team
Entire Administrative/Clinical/Lab team of SMH
Mr. Anil Rajbhandari, SMH
Ms. Suruchi Dhaubadel, SMH
Dr. Shreena Shrestha, SMH
Mr. Raj Kumar Shrestha, SMH
Ms. Dristi Maharjan, SMH
Ms. Season Maharjan, SMH
Ms. Senegal Khadka, SMH
Mentors/CoIs
Dr. Abhilasha Karkey, OUCRU-Nepal
Prof. Stuart Blacksell, MORU
Dr. Claire Chewapreecha, MORU
Entire OUCRU-Nepal team
Ms. Alisha Pradhan, OUCRU-Nepal
Mr. Divesh Shrestha, OUCRU-Nepal
Ms. Sushmita Shrestha, OUCRU-Nepal
Ms. Sristi Koirala, OUCRU-Nepal
Dr. Sabina Dongol, OUCRU-Nepal
Mr. Nhukesh Maharjan, OUCRU-Nepal
Wellcome Sanger Institute, JUNO

Thank you

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