Title: Infectious Agents Associated with Stillbirths and Early Neonatal (0-2 days) Deaths in Sub-Saharan Africa and South Asia: Findings from Child Health and Mortality Prevention Surveillance (CHAMPS), 2016-2019

Board no 423

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Background

- In low and middle-income countries, infection is a major cause of stillbirths and neonatal deaths
- Significantly over time, the causative pathogens have changed but epidemiologic evidence is scanty

Objective

To characterize the pathogens contributing to stillbirths and neonatal deaths occurring within the first two days of life in sub–Saharan Africa and South Asia

Methods

- CHAMPS is a multi-country programme and the sites are –

- The objective of CHAMPS is to investigate the causes of stillbirths and children under 5 years old deaths using laboratory and clinical data including verbal autopsy
- Expert panels review the data and assign underlying, immediate and morbid causes of death (“causal chain”)
- CHAMPS uses below methods to detect pathogens –
  1. Microbial Culture
  2. Molecular Assay using TaqMan Array Card (TAC)

Results

We examined 440 stillbirths and 433 neonatal deaths occurring in the first two days of life between December 2016 and December 2019 from all CHAMPS sites except India.

Congenital infection was present in the causal chain of 12% stillbirths and 28% (0-2 days) deaths

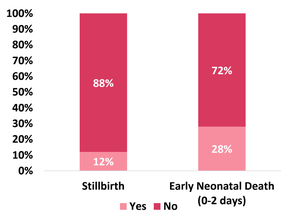

Figure 1: Infection in the causal chain of death

Major pathogens identified among stillbirths and neonates (0-2 days) were gram-positive & gram- negative bacteria and viruses

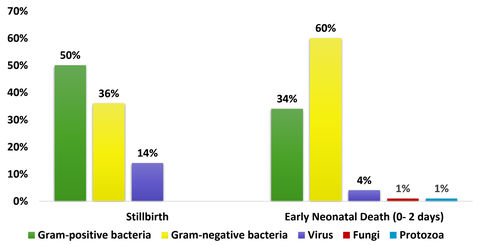

Figure 2: Type of pathogen identified

- Half of the pathogens identified (N=64) among the stillbirth were gram-positive bacteria (50%, 32/64), 36% (23/64) were gram-negative, and 14% (9/64) were viruses (Fig 2)
- We identified 140 pathogens in the causal chain for neonates; 60% (84/140) were gram-negative bacteria, 34% (47/140) gram-positive, and 4% (6/140) viruses (Fig 2)

Table 3: Etiologic agents identified in the causal chain in stillbirth, 2016-2019

Infectious agent type	Specific agents	Stillbirths
Gram- positive bacteria (N= 32)	Streptococcus agalactiae	14
	Enterococcus faecalis	8
	Streptococcus spp.	6
	Streptococcus pneumoniae	3
	CoNS	1
Gram- negative bacteria (N=23)	Escherichia coli / Shigella spp.	9
	Klebsiella pneumoniae	3
	Treponema pallidum	3
	Enterobacter spp.	2
	Ureaplasma spp.	2
	Klebsiella oxytoca	1
	Haemophilus influenzae type B	1
	Pseudomonas aeruginosa	1
	Sneathia amnii	1
Virus (N=9)	Cytomegalovirus	8
	Varicella zoster virus	1

Table 4: Etiologic agents identified in the causal chain in early neonatal deaths (0-2 days), 2016-2019

Infectious agent type	Specific agents	Early Neonatal death (0-2 days)
Gram-negative bacteria (N=84)	Acinetobacter baumannii	17
	Acinetobacter spp.	1
	Chlamydia trachomatis	1
	Enterobacter cloacae	2
	Enterobacter spp.	1
	Escherichia coli	23
	Haemophilus influenza	2
	Klebsiella pneumoniae	31
	Morganella morganii	1
	Proteus mirabilis	1
	Pseudomonas spp.	1
	Salmonella spp.	1
	Ureaplasma spp.	2
Gram- positive bacteria (N=47)	CoNS	1
	Enterococcus faecalis	3
	Enterococcus faecium	1
	Enterococcus spp.	1
	Listeria monocytogenes	3
	Staphylococcus aureus	4
	Staphylococcus spp.	1
	Streptococcus agalactiae	22
	Streptococcus pneumoniae	4
	Streptococcus pyogenes	1
	Streptococcus spp.	6
Virus (N=6)	Cytomegalovirus	4
	HIV	2
Fungi (N=2)	Candida albicans	1
	Candida glabrata	1
Protozoa (N=1)	Toxoplasma gondii	1

Conclusion

- The frequency of Gram-positive vs Gram-negative bacteria was divergent when comparing stillbirths and neonatal deaths
- The differences highlight the need for better characterization of cascades contributing to utero-fetal infection scenarios
- Understanding the source of infection through effective screening during pregnancy is crucial to prevent their associated morbidity and mortality

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