

Evaluating Current Trends in Diagnosis and Management of Chorioamnionitis

Stephanie Grossi¹, Dr. Molly Seshia^{2,3}, Dr. Christy Pylypjuk^{3,4}

¹ Max Rady College of Medicine, University of Manitoba, Winnipeg MB, Canada

² Children's Hospital Research Institute of Manitoba, Winnipeg MB, Canada

³ Department of Pediatrics and Child Health (Section of Neonatology), University of Manitoba, Winnipeg MB, Canada

⁴ Department of Obstetrics and Gynecology and Reproductive Sciences (Section of Fetal Maternal Medicine), University of Manitoba, Winnipeg MB, Canada

INTRODUCTION

Chorioamnionitis is an infection of the chorion and amnion surrounding the fetus that affects 1-4% of all births and is more common in preterm deliveries. There are several risk factors for chorioamnionitis such as prolonged/prelabour rupture of membranes, nulliparity, sexually transmitted infections, among others. Chorioamnionitis is of grave clinical concern for both moms and neonates (Table 1). Without early recognition and treatment, chorioamnionitis can result in the death of mom and/or the fetus with more severe outcomes being present in the preterm cohort.

While chorioamnionitis is a clinical diagnosis, confirmation by **placental pathology** is considered the **gold standard**. However, placental pathology is costly, there is limited access to it in Manitoba and results are only available weeks-months after clinicians must make a bedside management decisions. Prompt treatment with antibiotics can lower morbidity and mortality and therefore, clear guidelines for practitioners at the bedside are needed to improve outcomes.

Table 1: Complications of Chorioamnionitis

Complications of Chorioamnionitis	
Maternal Complications	Neonatal Complications
Hemorrhage	Pneumonia
Endometritis	Meningitis
Hysterectomy	Cerebral Palsy
Death	Death

There are two main guidelines for chorioamnionitis diagnosis. They come from joint guidelines between NICHD with the American College of Obstetrician and Gynecologist (ACOG) and the Canadian Pediatric Society (CPS). The two guidelines vary in cut off levels for specific clinical factors linked to chorioamnionitis. However, they both include fever as a prerequisites for diagnosis. This creates a balancing act for practitioners between over-use of antibiotics in fevers without infectious causes and overly conservative decision making for infectious causes of fever like chorioamnionitis. Lastly, neither guideline is modified for preterm births, despite the much higher prevalence and more severe outcomes in this cohort. Very little is known about how clinicians prioritize these clinical attributes and make decisions around chorioamnionitis in labour. Discrete Choice Experimentation (DCE) is used in health economics to understand how practitioners prioritize **individual attributes of clinical test**, services or in their decisions and is of high utility in obtaining a better understanding of chorioamnionitis management.

OBJECTIVES

1. To determine the prevalence of chorioamnionitis in Manitoba and stratify it based on gestational age.
2. To determine the clinical factors that **most strongly** influence chorioamnionitis diagnosis and management trends.

METHODS

This was a 3-part, multi-method study including a cross-sectional review of chorioamnionitis from March 1, 2015 - March 1, 2020 at the Health Science Hospital (HSC). For Part 1, delivery record books were hand searched for clinically-diagnosed chorioamnionitis using 2 or more of the cardinal features. Prevalence was calculated using the total number of deliveries at HSC Women's Hospital as the denominator. For Parts 2 and 3, Basic Survey A (April - May 2021) and DCE Survey B (May - June 2021) were distributed to a cross-section of obstetricians practicing in Winnipeg. Demographic and basic knowledge questions about chorioamnionitis were asked in both. Basic Survey A asked respondents to self-report clinical practice pattern for chorioamnionitis and included a range of Likert-scalable question styles. DCE Survey B contained 16 choice sets determining what clinical attributes are prioritized in diagnosis. Six attributes were chosen to analyze, some with four levels others with two levels (maternal fever, maternal tachycardia, fetal tachycardia, uterine tenderness, WBC count and gestational age). The DCE attributes and levels were based on existing clinical guidelines, literature review and expert opinion. For each choice set respondents were asked which patient, A or B, was more likely to have chorioamnionitis requiring antibiotic treatment in a forced choice model. Descriptive statistics and a conditional logit regression model were used to analyse the results.

RESULTS

There was a **significant increase** in clinically diagnosed chorioamnionitis at HSC during the study period from 0.57% in 2015 to 1.1% in 2019 ($p < 0.01$) (Figure 1). However, this number is significantly lower than the expected prevalence especially amongst the preterm group where we expected 40-70% of births to be complicated by chorioamnionitis. Of the practitioners surveyed **100%** were

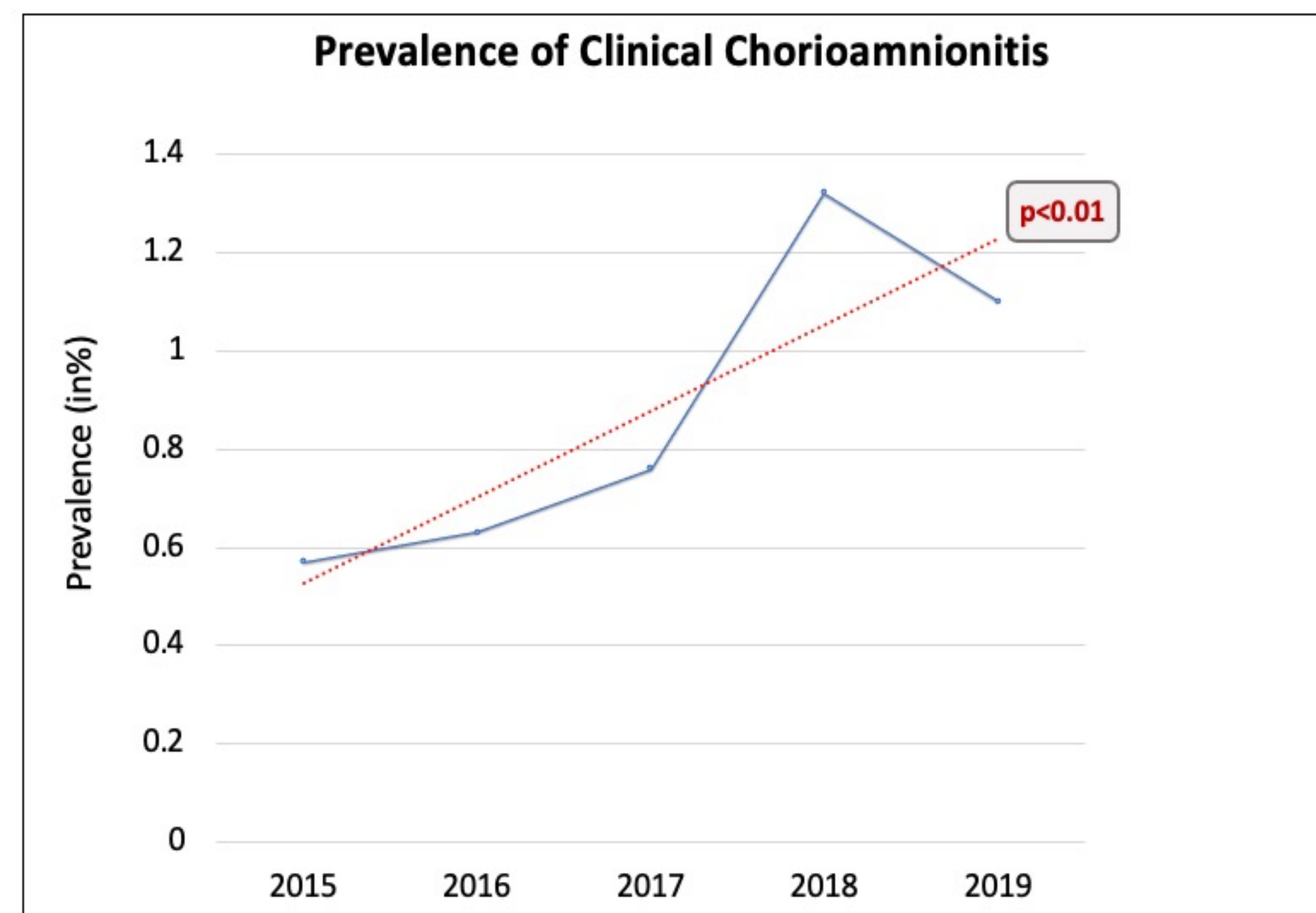


Figure 1: Prevalence of clinical chorioamnionitis at HSC over the past 5 years, stratified by term vs. preterm birth.

Obstetrician-Gynecologists with **75.6%** being between 30 - 49 years of age. **100%** reported **frequent** or **occasional** management of chorioamnionitis. The majority predicted a **10% prevalence** in both term and preterm births with **70.3%** reporting gestational age **rarely** or **never** affecting management. Overall, **94.6%** perceived a benefit to formulation of a standardized approach to diagnosis and management of chorioamnionitis. In Basic Survey A most respondents self-reported **fever** as the most important clinical attribute (Figure 2). Uterine tenderness was **only** valued by **one-third** of respondents and **prematurity** was self-reported to have **no effect** on decision making. As for investigations and treatment blood culture and CBC were the most common investigations utilized and **Cefazolin** with or without **metronidazole** was the antibiotics of choice. When a penicillin allergy was present, the use of **Clindamycin** went up significantly. Basic Survey A had an excellent response rate of 74%. Responses demonstrated a stark contrast between self reported Basic Survey A results and DCE Survey B results (Figure 3). DCE allowed for 1200 comparisons and had a 54% response rate. DCE showed that **Uterine Tenderness** was the **most strongly** weighted attribute by respondents. **Fever** ranked **fourth** in importance, not first as reported in Basic Survey A and was prioritized after uterine tenderness, fetal tachycardia and maternal tachycardia. Gestational age was shown to be significant in clinical decision making. It was clear that at **lower gestational ages**, physicians were **more likely** to make a diagnosis. High WBC count was **not** deemed significant by DCE results. These trends persisted in all subgroups with slight variations by age, years in practice, and site of practice. Upon further evaluation of the relative importance of attributes, we saw that **uterine tenderness, fetal tachycardia and temperature** all contribute a **higher relative importance** to diagnosis compared to maternal tachycardia, gestational age and white blood cells count. This was based on presuming that each attribute had the potential to contribute equally to diagnosis of chorioamnionitis as evident by an equal weight line set at 16.7%. To summarize no respondent's self reported uterine tenderness as important, however DCE identified it to be the **most important**. Nearly two-thirds of respondents reported **rarely** or **never** using uterine tenderness in the diagnosis of chorioamnionitis, yet DCE showed a **6 times higher likelihood** of diagnosis when uterine tenderness was present. Self reports identified no influence of gestational age on management of chorioamnionitis, however DCE found a strong **inverse relationship** between gestational age and diagnosis. Overall, while physicians' self report fever as the most important clinical attribute, head-to-head comparison showed that uterine tenderness was much more important, and gestational age was also significant.

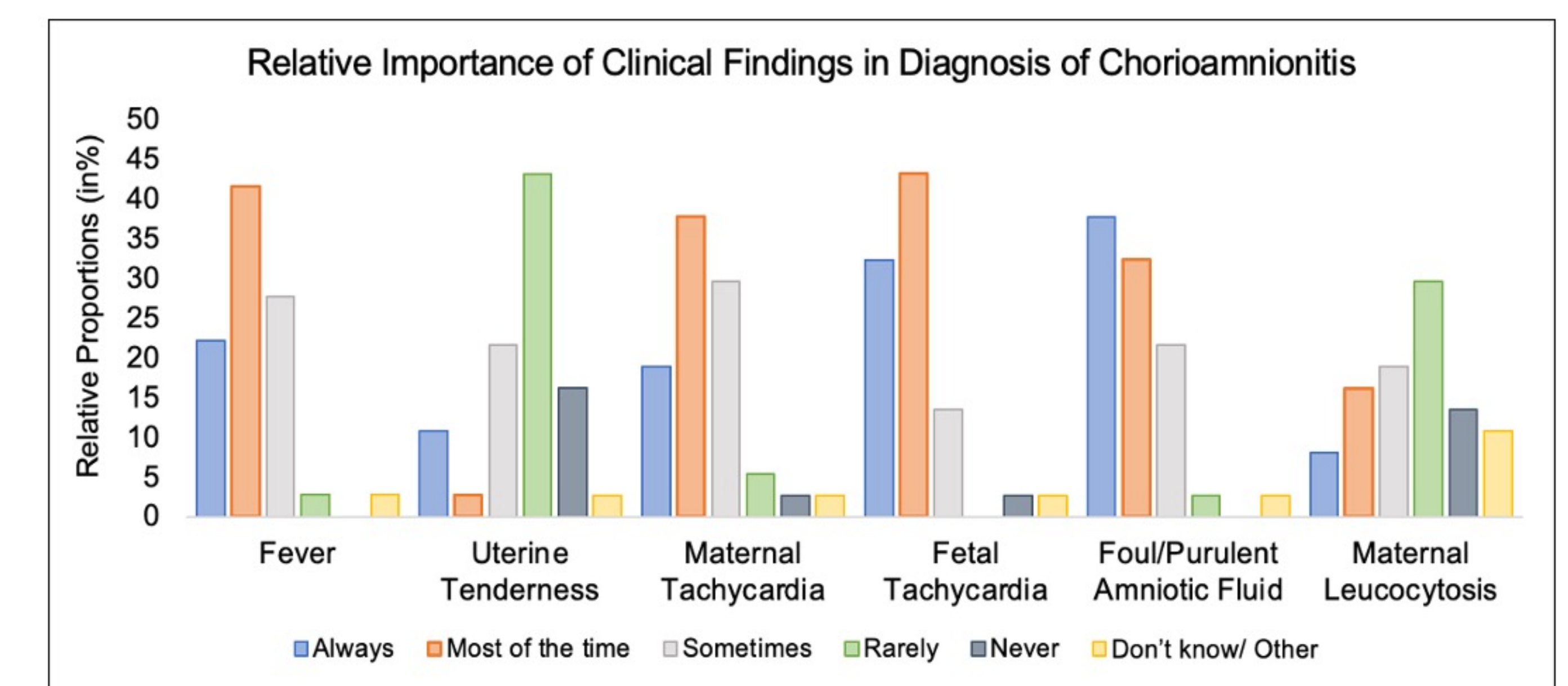


Figure 2: Relative Importance of Clinical Attributes self reported in Basic Survey A.

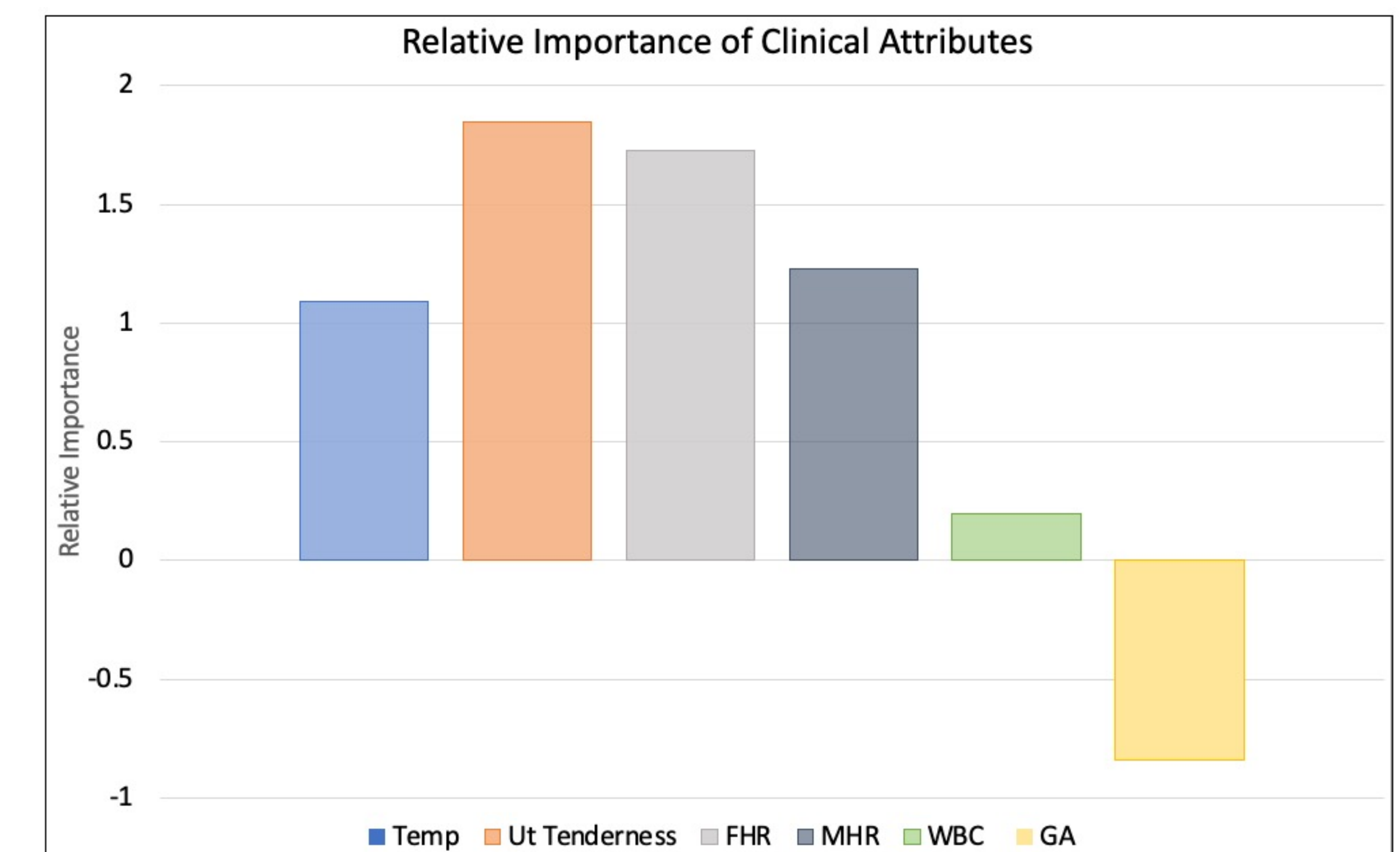


Figure 3: Relative Importance of Clinical Attributes from DCE Survey B

CONCLUSION

The variation in self reported responses of Survey A and the findings of DCE, **are consistent with our impression that there is significant discrepancy in the management of clinical chorioamnionitis locally**. There was also an increased frequency of clinically diagnosed chorioamnionitis over the study time period. However, the preterm prevalence was still far below expected. This matches a knowledge gap found, where respondents under-estimated the prevalence of chorioamnionitis in preterm births. We believe standardized protocols and knowledge translation can improve outcomes for all patients.

ACKNOWLEDGEMENTS: Stipendiary support for the Undergraduate Medical Student Research Programs is funded by the Deans Fund within the Max Rady College of Medicine, Vice-Dean Research at RFHS and through MMSF.