Reducing Perinatal Infection Risks from Sexually Transmissible Components of the Reproductive Tract Microbiome through Parental Behavior Changes: a CROWDSOURCED-Inspired Analysis

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ABSTRACT
Objective: Devise biologically-based primary prevention behavioral strategies to reduce risks of potentially lethal or damaging vertical infections caused by reproductive microbiome microorganisms. 

Background: Common and important reproductive tract infections originate from the reproductive tract microbiome (male or female). Most common vertical infections (VIs), i.e., GBS, C. trachomatis, CMV, genital mucosal, have not been considered STDs by pregnancy care providers or public health officials. Beginning in 1998, families with questions regarding GBS infection made internet-enabled enquires to www.groupbstreptinterna7onal.org focusing on general categories: 1) how are we infected or GI or other pathogen colonization? 2) how do we prevent this from happening? 3) how do we prevent damage to our baby? 

Methods: We aggregated questions and answers regarding microbiologic and infectious disease (IDO) into action-oriented responses. 

Results: 1) Enquiring parents readily comprehended (microbe-host) pathophysiological principles including necessity to “screen and treat” commonly accepted STDS (or VI) which are required to be screened during pregnancy by CDC, ACOG, or other bodies; 2) Parents of affected children frequently express frustration and dismay that women are not screened for recognized bacterial, viral, fungal, or pathologic vaginal microflora such as “BV” or dysbiosis; 3) Once informed, parents readily understood that various microbes (GBS, CMV, HSV) may be transmitted or inoculated during sexual contact, parents offered behaviorally-based recommendations for future research or immediate implementation including: a) avoidance of new or multiple sex contacts before or during pregnancy; b) restrict use of condoms or other barriers or abstinence to prevent microbiologic disease during pregnancy; c) avoidance of recalcitrant contact and possibly oral-genital compliance; d) routine screening and treatment of abnormal vaginal microbiota (GBS, UT), vaginal dysbiosis e) serum testing for common relevant viral infections (HSV, HPV) so that subsequent couples can be identified and modify their behaviors; and f) pursuing world doubleness which can disrupt normal vaginal flora Alert medical providers if you are pregnant BEFORE any transplants (not all blood is tested for CMV) 

Background
Common and important reproductive tract derived vertical infections originate from the endogenous genitourinary and oral/gastrointestinal microbiome. Most pregnancy associated fetal/perinatal infections (Figure 1) are not considered sexually transmissible, and thus not considered preventable by pregnancy care providers as potentially preventable sexually transmitted infections (STIs). Beginning in 1998, using internet “commons” or direct contact sources we heard from women/families who had suffered consequences of pregnancy associated infections, most commonly ascribed to group B Streptococcus (GBS).

Figure 1. Chart of the five phyla of the intra/intra-vaginal bacteria of 345 women with intra-amniotic infection who gave birth preterm

Table 1. Parental Behaviors which May REDUCE Spread of Reproductive Tract Infections Implicated in Stillbirth

Table 2. Possible candidates for “perinatal pathogen” vaccination* development/implementation strategies

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Objectives
1) Collect, analyze, and interpret internet crowdsourced and direct contact enquires from 1998-2014 regarding perinatal infections
2) Secondly, also analyze suggestions offered by internet correspondents or direct contacts focusing on prevention of maternal colonization or infection with potential “perinatal pathogens,” especially GBS.
3) Transpose these “commons-based” suggestions and questions into Parental Behavior changes
   a) that might reasonably be adopted by parents before and during pregnancy and postpartum, and/or
   b) which could be evaluated for efficacy in quasi or rigorous experimental designs
4) Derive a parent-enquiry-based research agenda to enable perinatal infection research.

Results
1) Corresponding parents and others, readily comprehended the need to “screen and treat” for “traditional” STIs, which are MANDATED by authoritative sources (CDC-P, ACOG, AAP, Canadian and WHO organizations).
2) Parents and providers reported affected children frequently express dismay that microbial (viral, bacterial, yeast) or “microscopiclogits” (BV, intermediate vaginal microflora, dysbiosis) are NOT routinely screened for because of “cost,” or operational complexity, or tradition.
3) Almost uniformly, enquiring parents wish to know how they became colonized/infection with the “perinatal pathogens.”
4) Enquiring parents and providers appeared to readily understand that microorganisms such as GBS, CMV, HSV-1 and -2, and others could be “inoculated” during sexual and other intimate contacts. These parents and providers spontaneously volunteered reason-based or anecdotal recommendations to reduce risk of untoward exposure and possible infection or microbiome invasion/change (Table 1).

Conclusions
Parents and providers and others are “ready and willing” to provide positive preventive recommendations including: 1) mandatory routine clinical care screening and treatment of implicated STIs or microbial alterations; 2) universal prevention and pregnancy behavior changes intended to reduce risks of potentially pathogenic oral/GI or universal microbiome changes, and 3) active basic and clinical research to identify and measure EVIDENCE-BASED personal and medical strategies to optimally prevent and repeated pregnancy infection related morbidity, mortality, costs, and liability especially identification of effective vaccinations for “perinatal pathogens” (Table 2).

Discussion
How to best inform women to be aware that: 1) naturally-occurring microorganisms are often not considered to be STIs, but still may be sexually transmissible CAUSING INOCULATION OF NON-COLONIZED PARTNERS, 2) even if test results are negative, caution in behavior choices may still be warranted as: a) naturally-occurring microorganisms can be transitive so status can change, and b) test results can show a false negative, and 3) some microorganisms can cross intact membranes and infect babies prior to possible expected treatment during labor and delivery.

Recommendations
1) Encourage providers, parents, and perinatal organizations through the internet “commons” and personal communications to inform women as to what they need and want to know to be able to reduce the risk of perinatal infections, and 2) actively support evidence-based research.

For more information, please email info@gbstrept.org or visit www.groupbstreptinternational.org.

Bibliography

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Group B Streptococcus (GBS)
Hemophilus influenzae, unencapsulated
Coxsaciogolavus (CMV)
Herpes simplex virus-1 (HSV-1)
Herpes simplex virus-2 (HSV-2)
Human parvovirus B-19 (HPV-19)
Neisseria gononrapeae
Chlamydia trachomatis
Ureaplasma parvum
Syphilis
Others (“x”)

*Bacitracins already developed: Hepatitis E virus (HEV), Hepatitis B virus (HBV), Human papilloma virus (HPV)