- Some challenges were identified, such the lack of a system for referral of specimens at national and regional level.
- This effort should be continued, emphasising the importance of periodicity on data collection, analysis and dissemination.

S.06 - How does your partner know?

S06.1 TREATING CONTACTS TO GONORRHOEA AND CHLAMYDIA WITHOUT A CLINIC VISIT; THE EFFICACY AND EFFECTIVENESS OF DIFFERENT MODELS

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The sex partners of persons with Chlamydia trachomatis (CT) and Neisseria gonorrhoeae (GC) infection must be treated to prevent repeat infection of the index patient and to interrupt forward transmission of disease. Asking patients to refer sex partner(s) for evaluation and treatment ('patient referral') is an inadequate strategy, as many sex partners will not seek care, and the large burden of CT and GC infections makes it impractical and cost prohibitive to rely upon health care providers or public health field investigators to assure partner treatment. Although no single sex partner treatment approach will be a panacea, innovative strategies are clearly needed.

This session will focus on strategies that do not require sex partners to attend a clinic to obtain treatment for CT or GC. The presenter will describe two models: (1) Expedited Partner Therapy (EPT), used in many parts of the US, includes patient delivered partner therapy, wherein a patient is asked to deliver medication or a prescription to their sex partner; (2) Accelerated Partner Therapy (APT), studied in the UK, uses clinician-staffed hotlines or pharmacists to assess the health status of sex partners before arranging for treatment. APT is being evaluated in a community-based randomised controlled trial, and efficacy data are not yet available, however, EPT has been shown to reduce risk for repeat GC infection by 68% and repeat CT by 20%. In practise, uptake and effectiveness of EPT has been limited by a variety of implementation challenges. The session will describe and - where possible - quantify obstacles to EPT, including: legal issues (perceived and real), lack of provider and pharmacist knowledge, patient preference and acceptability (for example, as few as 50% of eligible patients accept EPT for CT), medication costs, use of prescriptions rather than dispensing medication, and the emergence of cephalosporin resistance among GC.

S06.2 USING SOCIAL MEDIA FOR PARTNERS SERVICES IN ADOLESCENTS

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Partner notification (PN) and treatment is a cornerstone of STI prevention. In the U.S., face-to-face, patient-initiated or provider-assisted partner notification has shown to result in approximately 50% of patients referring at least one partner for evaluation and treatment. While to some this percentage is higher than expected, there is considerable room for improvement. A number of developments in the past decade have shown promise in enhancing PN. Expedited partner treatment, i.e., providing medications to partners without an intervening medical consultation, has been proven to decrease re-infections among index patients above and beyond traditional partner notification and this practise is now widely endorsed. Second, the Internet has provided the technical means to enhance communication between providers, patients and their partners that could result in a higher proportion of notified contacts. Internet-based interventions include simple email or text messages to the partner, either directly from the patient or from health-department staff (if agreed to by the index patient), outreach in chat rooms on gay websites, stand-alone online partner notification programmes, and interventions using social networking sites. While the online possibilities appear to be limitless, especially for adolescents who are very engaged in the online environment, there are few interventions that have been formally evaluated. This presentation aims to provide and overview of online programmes for partner services and a review of studies that have attempted to evaluate them. So far, it appears that few online interventions have risen above the "proof-of-concept" and their overall effectiveness may be limited. In addition, a number of studies have indicated that the majority of STI-infected patients prefer to notify their partner in person rather than using text or email messages. While research into effective online interventions for PN and treatment should continue, this must not come to the detriment of high-quality, in-person PN practises.

S06.3 MSM PARTNER SERVICES: WHAT WORKS?

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Background Partner notification (PN) is an important public health activity in STI control to stop onwward transmission. Various forms of PN services have been developed but not all have been evaluated to the same extent. In the era of evidence-based resource allocation, it is of utmost importance to focus limited resources on services shown to be the most efficient and effective.

Methods A review of the current literature and of the National Collaborating Centre for Infectious Diseases (NCCID) STBBI partner notification (PN) project productions was conducted. The impact of these various forms of PN services on disease incidence, re-infection, relationship status and healthcare costs will serve as efficiency and effectiveness markers.

Results Outcomes of MSM PN services has been measured and found to be associated with

- reduced index case GC and CT reinfection rates through patient delivered therapy,
- higher adoption of safer sexual practises in both index case and their partners,
- reduced incidence of STIs,
- higher rates of notification to long term partners and significant partners,
- high acceptability of face-to-face patient delivered partner notification in significant or long term relationships compared to higher acceptability of physician or electronic notification for casual or anonymous partnerships
- lower cost per case reached by patient referral compared to provider referral,
- lower levels of stress in relationships. Emotional and physical abuse after PN services can occur. The fears accompanying PN services can affect sexual spontaneity.

Caution should be used before discarding PN services when efficiency or effectiveness is low because epidemiologic insight can still be gathered to help redirect screening activities.

Conclusions A Review of the evidence indicates that MSM PN services works!

S06.4 NEW DIRECTIONS IN HIV PARTNER SERVICES: AN EVOLVING MODEL OF GLOBAL, INTEGRATED FIELD SERVICES

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Partner services are a longstanding component of public health efforts to control sexually transmitted infections (STI). However, they have not been a consistent part of HIV prevention efforts either in high-or lower-income nations. In many areas, partner services for HIV and other STIs have been administratively separated, and the goals of partner services have usually been narrowly conceived to concentrate exclusively on the diagnosis and treatment of sex partners. This is now beginning to change. New evidence suggests that HIV PS in high income nations may be less effective at finding new cases of HIV than previously believed, but could play an important role in linkage to care. In sub-Saharan Africa, HIV PS appears to be highly acceptable and effective.

This session will focus on new opportunities in the area of HIV PS. The speaker will review the following issues: (1) data supporting the efficacy of HIV partner services as an HIV case-finding tool in both in high and low-income nations; (2) cost and cost-effectiveness data on HIV PS; (3) evidence that PS for bacterial STIs can been used to promote HIV case-finding and engagement in care among persons with previously diagnosed HIV infection; and (4) outstanding research questions related to HIV PS.

S.07 - Bacterial virulence and host response

S07.1 INSIGHTS INTO MATERNAL GONORRHOEA: HUMAN PRIMARY CERVICAL AND AMNIOCHORIONIC EPITHELIAL CELL RESPONSES TO NEISSERIA GONORRHOEAE INFECTION

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Bacterial infection is widely recognised as a factor contributing to adverse pregnancy outcomes (APOs). *Neisseria gonorrhoeae* infections continue to be a universal and intractable problem. In this regard, maternal gonorrhoea increases a woman's risk for APO by 6.5-fold. Bacterial infection is thought to trigger a pro-inflammatory response that initiates those processes involved in (preterm) human parturition. The ability of gonococci to invade and transcytose amniotic sac tissues, *in vivo*, is inferred from the ability to isolate gonococci from these tissues and from amniotic fluid. However, there are currently no data to indicate how gonococcal infection can result in APO, and a physiologically relevant human model of pregnancy that is amendable to scientific analyses has hindered elucidation of factors contributing to APO. Thereby, an understanding of gonococcal infection as it relates to human pregnancy, using *human* cell models of disease, could provide new insights into the pathophysiology of gonococcal disease and of APO as they likely occur *in vivo*. To this end, we investigated gonococcal infection under conditions reflecting normal pregnancy by using primary epithelial cells derived from the human cervix (i. e. pex cells) and amniochorionic membranes (i. e. pace cells) and by altering the combined concentrations of pertinent steroid hormones. Comparative, quantitative, infection assays indicated that gonococci adhere to and invade amniochorionic cells and tissue, which was further observed to occur by a complement receptor-mediated mechanism. We demonstrate that *N. gonorrhoeae* infection of pex and pace cells elicits the differential production of nitric oxide and complement proteins, as well as the specific matrix metalloproteases, prostaglandins, and cytokines thought to participate in triggering the onset of human parturition. Hence, we provide the first direct evidence to indicate a potential link between gonococcal infection and the induction of APOs.

S07.2 THE EXTRUSION PARADIGM OF CHLAMYDIA PATHOGENESIS

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Chlamydia is the most commonly reported bacterial disease in the United States, and remains the leading bacterial cause of sexually transmitted infection, responsible for approximately 90 million new STI cases annually worldwide. Of particular concern is that infections with *C. trachomatis* can lead to severe medical complications in women, such as pelvic inflammatory disease and ectopic pregnancy. Alarmingly, there remain fundamental gaps in our understanding of *Chlamydia* pathogenesis *in vivo*, for example their natural course of infection in humans and why protective immunity is not established. To help address these questions, our laboratory has been interested in determining how *Chlamydia* disseminate within the host. Our original discoveries elucidated the mechanisms by which chlamydiae exit host cells *in vitro*. Surprisingly, *Chlamydia* possess two mechanisms for cellular escape that are mutually exclusive: (*i*) Extrusion, a packaged release of *Chlamydia* in which the vacuole pinches off and exits the cell within a membrane-encased compartment; this leaves the original host cell intact, often with a residual chlamydial inclusion. (*ii*) Lysis, a destructive process that is mediated by proteases and the sequential rupture of vacuole, nuclear and plasma membranes, culminating in the release of free bacteria. The maintenance of two discrete exit mechanisms underscores the fundamental importance of this process for intracellular pathogens such as *Chlamydia*. Extrusions are novel pathogenic structures that we hypothesise confer unique means of interacting with the host's innate immune system, enabling immune evasion and promoting tissue dissemination. To this end, we have recently illuminated key characteristics of chlamydial extrusions that allow direct infection of new cells and their engulfment by professional phagocytes. Bacteria within phagocytosed extrusions are protected from macrophage killing mechanisms for at least 8 h. These results have important implications for *Chlamydia* pathogenesis *in vivo*, including dissemination, transmission and the elicitation of immune responses.

S07.3 SURVIVAL STRATEGIES OF HAEMOPHILUS DUCREYI: ROLE OF TRANSPORTERS

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During human disease, Haemophilus ducreyi leads a primarily extracellular lifestyle, in which the organism is under constant pressure from the immune system. To survive in this environment, H. ducreyi expresses multiple mechanisms that counteract various antimicrobial activities of innate immunity. Key among these is secretion of LspA proteins to prevent phagocytosis, allowing H. ducreyi to reside extracellularly. When phagocytes cannot engulf bacteria, they secrete granule contents, including antimicrobial peptides (APs) such as cathelicidin and defensins, to kill the pathogens extracellularly. APs bind and destabilise cell membranes to lyse bacteria. Our laboratory is studying two transporter systems that protect H. ducreyi from human APs, including cathelicidin LL37 and beta-defensins. To prevent lethal interactions between LL37 and the inner membrane, H. ducreyi utilises the Sap (sensitive to antimicrobial peptides) transporter, which takes up periplasmic LL37 for cytoplasmic degradation. By mutagenizing structural components of the Sap transporter, we have found a direct correlation between the effectiveness of Sap-mediated LL37 resistance *in vitro* and the contribution of the transporter to virulence in humans. Further, we found that H. ducreyi