of the checkerboard for AZ+TX indicated synergy for only 2 of the 15 strains (FICI: 0.16 and 0.5). The mean FICI of all strains was 0.64 (0.16–1.01). Adding AZ to TX could not lower the TX MIC below 0.25 for one TX resistant strain (MIC for TX alone: 2).

**Conclusion** The recommended combination therapy against Ng (AZ+TX) showed no in vitro synergy using either the Etest or the agar dilution method. Other combinations of antibiotics from various groups showed no indication of in vitro synergy using the Etest method.

**021.5 UNDERSTANDING THE MOLECULAR MECHANISM OF MTRR IN THE REGULATION OF ANTIMICROBIAL RESISTANCE IN NEISSERIA GONORRHOEAE USING IN VITRO AND IN SILICO STUDIES**


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**Background** Neisseria gonorrhoeae, a major STD causing pathogens, tends to pose high burden of morbidity that is borne disproportionately by women and infants with approximately 2/3rd of cases from developing countries. In the absence of appropriate vaccine and rapid, easy, economical test, antibiotic therapy is recommended for treatment on the basis of clinical symptoms. This has led to the emergence of antibiotic resistant strains. Since increasing antimicrobial resistance makes Neisseria as super bug, we have tried to elucidate the mechanism of development of antibiotic resistance.

**Methods** Mutational analysis of mtrR gene and its DNA binding site was carried out for 28 clinical isolates resistant to multiple drugs. Wild type and mutant mtrR were cloned, expressed and purified. Fluorescence assay and electrophoretic mobility shift assay (EMSA) were carried out to study the effect of mutations in MtrR on its biological activity. Using discovery studio, structure of MtrR was modelled in-silico to understand how mutations affect its interaction with DNA.

**Results** Mutations in DNA binding domain (G4S5) and dimerization domain of MtrR (H105Y) as well as in promoter region of MtrR (A/T deletion) were observed in clinical isolates (n=28). EMSA and fluorometric results suggest decreased binding of mutant MtrR with its promoter. In silico modelled structure of wild type and mutant MtrR proteins suggest altered conformation of the mutant protein. Altered conformation leads to difference in the posture of homodimer formed and increased centre to centre distance of helix 1 and helix 1’ in two monomers of mtrR. In silico analysis of protein-DNA complex suggest that this increased distance cause altered binding of the mutant with DNA.

**Conclusions** Mutations in mtrR result is altered conformation of the protein leading to its decrease binding to DNA. This leads to enhanced expression of MtrCDE efflux pump resulting in increased efflux of drug.

**021.6 A TALE OF TWO CITIES: TREPONEMA PALLIDUM MACROLIDE RESISTANCE IN COLOMBO (SRI LANKA) AND LONDON (UNITED KINGDOM)**


**Background** The bacterium Trepomonema pallidum (T. pallidum) causes syphilis. Penicillin is effective treatment, but azithromycin (a macrolide) is a single-dose oral alternative for those with allergy. Unfortunately, macrolide resistance secondary to one of two 23S ribosomal RNA (rRNA) point mutations (A2058G and A2059G) is now wide-spread. Molecular strain-typing suggests that epidemics and macrolide resistance are unlikely the spread of single clones.

We present typing and macrolide resistance data from two geographically distinct populations: Colombo, Sri Lanka and London, UK.

**Methods** Cross-sectional studies were conducted at the Colombo District STD clinics and St Mary’s Hospital, London. Ulcer exudate and/or blood were collected from patients with microbiologically confirmed syphilis. Presence of T. pallidum DNA (tpp047 gene) was confirmed with PCR. Next, using published techniques, the 23SrRNA gene was PCR-amplified for a point-mutation assay and tpp0548, arp and tphE,C,G,BJ ampiclons were used for strain-typing.

**Results** Sri Lanka: 24 T. pallidum PCR-positive samples were collected. Patients were men (45.9% MSM) and 91.6% Sinhalese with a mean age of 28 (range 29). None were HIV-1 infected. Two strain types were discovered (14b/f and 15b/f), neither harbouring macrolide resistance.

London: 43 men were recruited, 18 in 2006–8 and 25 in 2011–12. Mean age was 37.5 (range 45); 95.2% were MSM and 62.8% were HIV-1 infected. Half (22/43) were white British. A total of 5 full and 14 partial strain types were identified, of which 6 were unique. Macrolide resistance increased from 66.7% (12/18) in 2006–8 to 80% (20/25) in 2011–12.

**Conclusion** Colombo T. pallidum strains have limited diversity with no macrolide resistance. London strains are more varied and increasingly macrolide-resistant. Ethnic diversity in London exceeds Colombo’s and may explain increased strain diversity. In contrast to Sri Lanka, azithromycin is widely used to treat Chlamydia and non-specific urethritis in the UK thus selection pressure may be driving macrolide resistance.

**022.1 EVALUATION OF SYPHILIS POINT OF CARE TESTS CONDUCTED BY MIDWIVES AT PRIMARY HEALTH FACILITIES IN GHANA**


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**Background** Globally, over two million pregnancies are affected by syphilis annually, resulting in adverse pregnancy outcomes and severe sequelae in the newborn. Cost-effective strategies exist, which prevent vertical transmission. Ghana’s Policy recommends antenatal (ANC) syphilis screening and treatment of positive clients, but pregnant women were often not tested especially in areas where laboratory services are unavailable. The study examined the performance of point-of-care (POC) tests for screening ANC attendants for syphilis conducted by midwives at the primary level health facilities in Ghana.

**Methods** The study was conducted from March to September 2010. In all, 1,249 pregnant women attending ANC in 8 sites were recruited and tested using Determine® Syphilis TF (POC) and results compared with Trepomonema Pallidum Haem-AGglutination Test (TPHA) and Rapid Plasma Reaginin test (RPR).

**Results** The sensitivity of tests conducted by midwives was 25%, 60% and 75% when compared with TPHA, active syphilis (reactive to TPHA and RPR) and High titre active syphilis (HTS) (greater than 1:8) respectively. A higher sensitivity was noted in detecting active syphilis and high titre infections. The prevalence of syphilis using POC test on whole blood conducted by midwives was 5.5% (70/1282), at the district laboratory on serum samples was 10.1%...
Switzerland; 3Julius Centre for Health Sciences and Primary Care, University Medical

toring of health personnel and instituting quality assurance systems
should be addressed with training, effective supervision and moni-
ting (STI) results to emergency department (ED) patients is a bar -

Background Pelvic inflammatory disease (PID) results from the
ascending spread of microorganisms, including Chlamydia trachoma-
tis, to the upper genital tract. The timing of ascending infection is
unknown. Screening can prevent PID either by identifying and
Treating infections before they progress (direct effect) and/or reduc-
ing chlamydia transmission (indirect effect). We did this study to
examine the contributions of direct and indirect effects of a screen-
ing intervention, using different assumptions about the timing of
progression from chlamydia infection to PID.

Methods We developed a compartmental model of chlamydia trans-
mission in a heterosexual population of 16–25 year olds with two
sexual activity classes. The model explicitly incorporates the progres-
sion from chlamydia to clinical PID. Behavioural parameters are
informed by a British population-based. We studied the effects of cha-
lydia screening introduced at low levels but with coverage increasing to
40% after ten years. We estimated the numbers of PID cases pre-
vented and the proportions prevented by direct and indirect effects.

Results At baseline, the cumulative probability of developing PID
by age 25 years was 3.1%. After five years, screening prevented a
total of 187 PID cases per 100,000 women. Most PID cases were
prevented and the proportions prevented by direct and indirect effects.

Conclusion The ratio of direct to indirect effects depends on the
timing of progression from chlamydia infection to PID. Mathemati-
cal modelling has helped to understand the mechanisms of cha-
lydia screening programmes by showing that there are separate roles
for direct and indirect PID prevention and potential harms of
screening, which could not have been observed by empirical studies.

WHAT ARE YOUNG PEOPLE’S PERCEPTIONS OF USING
ELECTRONIC SELF-TESTS FOR STIs LINKED TO MOBILE
TECHNOLOGY FOR DIAGNOSIS AND CARE (eSTI2)?

Background UK rates of sexually transmitted infections (STI) are
sustained or rising, particularly among young people aged 16–24,
despite decreases in patient waiting times within traditional ser-
dices. Modern advances in communication and diagnostic technolo-
gies offers the potential of electronic self-testing and diagnosis for
STIs (eSTI2), linked to Internet/mobile-App based clinical manage-
ment and support, which could be accessed wherever people find
convenient and safe. We aimed to explore opinions on using eSTI2
among a sample of potential users.

Methods Twenty-five semi-structured interviews were conducted
with a purposive sample of sexually active young people aged 16–24
years enrolled in London further education colleges. Analysis was
based on the Framework method.

Results Participants were 64% male (n = 16), 36% female (n = 9).
Mean age was 19. They described their ethnicity as Black 84%
(n = 21), mixed race 12% (n = 3), Asian 4% (n = 1). Including those
screened via the National Chlamydia Screening Programme (NCSP),
the majority of participants (92%, n = 23) had previously screened
for STIs at least once. The young people in our sample were highly
conversant in mobile technology but had limited experience of
using it to access health-related services. Participants reported strug-
gling between desire to access services out of concern for their
sexual health and repercussions from being discovered by family
and peers at testing centres. These barriers were seen to be miti-
gated by using eSTI2. Participants expressed the importance of

TEXTING IMPROVES NOTIFICATION OF SEXUALLY
TRANSMITTED INFECTION RESULTS AFTER EMERGENCY
DEPARTMENT VISITS

Background Failure to communicate sexually transmitted infec-
tion (STI) results to emergency department (ED) patients is a bar-
rier to appropriate STI treatment. We aimed to improve the
proportion of female adolescent ED patients who are notified of
positive STI tests (gonorrhoea, Chlamydia, or trichomoniasis) using
mobile phone calls and texting.

Methods A randomised intervention among 14–21 year-old
females using a 2X3 factorial design with replication to improve
patient notification, defined as the proportion of STI-positive
females notified within 7 days of STI testing. We evaluated six com-
binations of two factors: (1) method of notification (call, text mes-
 sage, or call + text message) and (2) provision of an STI information
card with or without an ED phone number to obtain test results.
Covariates for logistic regression included age, empiric STI treat-
ment, days until first contact and documentation of a confidential/
mobile phone number.

Results Of 386 patients, 51% were 18–21 years, 35% were 16–17
years and 14% were 14–15 years old. Successful notification was
significantly greater for call + text message vs. call only (Odds Ratio
[OR] 3.1, 95% confidence interval [CI] 1.4 – 6.7). There was no sig-
nificant interaction between card and method of notification. Text-
ing only or type of STI information card was not significantly
associated with patient notification. Documenting a confidential
phone number was independently associated with successful notifi-
cation (OR 3.3, 95% CI: 1.6–6.9). In total, 94% of those with a doc-
umented confidential phone number who received call + text
message were notified of their positive STI results within 7 days of
their ED visit.

Conclusions A combination of call + text messaging improved our
ability to successfully notify adolescent women of their positive
STI results after an ED visit. Documentation of a confidential phone
number is also an important strategy to notify adolescent women
of their STI results.

DIRECT AND INDIRECT EFFECTS OF SCREENING FOR
CHLAMYDIA TRACHOMATIS ON THE PREVENTION OF
PELVIC INFLAMMATORY DISEASE: MATHEMATICAL
MODELING STUDY


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Institute of Social and Preventive Medicine (ISPM), University of Bern, Bern, Switzerland; Julius Centre for Health Sciences and Primary Care, University Medical Centre Utrecht, Utrecht, The Netherlands

Background Pelvic inflammatory disease (PID) results from the
ascending spread of microorganisms, including Chlamydia trachoma-
tis, to the upper genital tract. The timing of ascending infection is
unknown. Screening can prevent PID either by identifying and
treating infections before they progress (direct effect) and/or reduc-
ing chlamydia transmission (indirect effect). We did this study to
examine the contributions of direct and indirect effects of a screen-
ing intervention, using different assumptions about the timing of
progression from chlamydia infection to PID.

Methods We developed a compartmental model of chlamydia trans-
mission in a heterosexual population of 16–25 year olds with two
sexual activity classes. The model explicitly incorporates the progres-
sion from chlamydia to clinical PID. Behavioural parameters are
informed by a British population-based. We studied the effects of cha-
lydia screening introduced at low levels but with coverage increasing to
40% after ten years. We estimated the numbers of PID cases pre-
vented and the proportions prevented by direct and indirect effects.

Results At baseline, the cumulative probability of developing PID
by age 25 years was 3.1%. After five years, screening prevented a
total of 187 PID cases per 100,000 women. Most PID cases were
initially prevented by interruption of progression to PID (direct
effect). The indirect effect produced a small net increase in PID
cases early on, which was outweighed by the effect of reduced cha-
lmydia transmission after 2.2 years. The later that progression to
PID occurs, the greater the contribution of the direct effect.

Conclusion The ratio of direct to indirect effects depends on the
timing of progression from chlamydia infection to PID. Mathemati-
cal modelling has helped to understand the mechanisms of cha-
lmydia screening programmes by showing that there are separate roles
for direct and indirect PID prevention and potential harms of
screening, which could not have been observed by empirical studies.

TEXTING IMPROVES NOTIFICATION OF SEXUALLY
TRANSMITTED INFECTION RESULTS AFTER EMERGENCY
DEPARTMENT VISITS


Cincinnati Childrens Hospital Medical Center, Cincinnati, OH, United States

Background Failure to communicate sexually transmitted infec-
tion (STI) results to emergency department (ED) patients is a bar-
rier to appropriate STI treatment. We aimed to improve the