

estimation methods are not able to incorporate data from high risk populations and are not able to generate national STI estimates.

The Spectrum suite of estimation and program planning tools has been developed to support estimation of burdens, trends, service needs and program impact for family planning, HIV/AIDS, tuberculosis and other diseases. The HIV/AIDS, Spectrum is used by over 120 countries every two years to estimate their burden of HIV/AIDS, antiretroviral treatment need and other services.

Next generation of estimating STIs A module for estimating burdens and trends of STIs in the Spectrum suite of health modelling tools is being developed, initially for gonorrhoea and syphilis, for which relatively good and abundant country data are available. The Spectrum module will fit STI burdens and trends using standard STI indicators collected routinely by countries and reported annually to the WHO and UNAIDS through the Global AIDS Response Progress Reporting (GARPR) system and STI data on general populations from peer-reviewed literature.

By building onto the HIV/AIDS model within Spectrum, the STI estimation tool will benefit from efficiency, expertise, coherence and consistency with estimations of HIV/AIDS.

Next steps The development and piloting of the Spectrum STI module is a first phase towards supporting country-level STI estimation and program planning. The STI module will be implemented in selected countries in two-yearly cycle of country consultations tagged into the UNAIDS HIV/AIDS estimation. A companion module for strategic STI intervention modelling, program planning and costing – as an extension to Spectrum's current One Health Tool representation of MNCH, family planning and HIV primary/behavioural prevention programs will be designed and developed.

S04 - Revealed: Neglected and emerging STIs

S04.1 HAEMOPHILUS DUCREYI IN "YAWS" ULCERS IN PAPUA NEW GUINEA

Oriol Mitja*. *University of Barcelona, Barcelona, Spain*

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Skin infections with ulceration are a major health problem in the South Pacific countries. Yaws, diagnosed by the presence of cutaneous ulcers (CU) and a reactive syphilis serology, is one important cause, but this can be confused clinically with ulcers due to other aetiologies. In a prospective cohort study in yaws-endemic villages of a Papua New Guinean (PNG) island we showed that *Haemophilus ducreyi* is the leading cause of chronic CU in children; nearly 60% of patients with ulcers had detectable lesional *H. ducreyi* DNA, while 35% were *Treponema pallidum* subsp. *pertenue* positive. Similar findings were reported from yaws endemic communities in the Solomon Islands, Vanuatu and Ghana. Unlike yaws, *H. ducreyi* lesions appear to be restricted to the skin and, if left untreated, do not result in inflammatory lesions of the bones. Whole-genome sequencing studies have shown that CU strains of *H. ducreyi* are remarkably similar to class I genital ulcer (GU) strains with an overall sequence similarity of 99.98%, and that CU strains diverged from class I strains

≈0.18mya which supports the idea that CU with *H. ducreyi* preceded syndromic management of GU. A single oral dose of azithromycin (AZ, 30 mg/Kg) is effective for treatment of yaws and, cutaneous strains of *H. ducreyi* have been shown to be susceptible to macrolides. In the context of new efforts to eradicate yaws, the use of mass treatment with azithromycin in PNG reduced the absolute prevalence of yaws CU from 2.4 to 0.3 percent at 12 months after treatment, and *H. ducreyi* CU from 2.7% to 0.6%. The persistence of skin ulcers in the population raises the possibility that the bacteria may exist in an environmental reservoir or are so infectious that MDA at less than 100% above coverage rate fails to eradicate the diseases from a community.

S04.2 NEW DIAGNOSTICS FOR SYPHILIS AND YAWS AND DETECTION OF HAEMOPHILUS DUCREYI IN CUTANEOUS LESIONS IN CHILDREN

¹Allan Pillay*, ¹CH Chi, ²C Kwakye, ¹D Danavall, ³F Taleo, ¹S Katz, ⁴M Lahra, ⁵Y Tun, ⁵RC Ballard, ⁶K Asiedu, ¹CY Chen. ¹Division of STD Prevention, CDC, Atlanta, USA; ²Ministry of Health, Accra, Ghana; ³Ministry of Health, Port Vila, Vanuatu; ⁴Microbiology Department, The Prince of Wales Hospital, Sydney; ⁵Center for Global Health, CDC, Atlanta, USA; ⁶World Health Organization, Geneva, Switzerland

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Introduction We evaluated a multiplex PCR assay that can distinguish between syphilis and yaws on children with cutaneous lesions. Also, a rapid syphilis test, Chembio DPP Screen and Confirm Assay was evaluated for serological diagnosis of yaws.

Methods Lesions swabs for PCR were obtained from children (5–14 years old) in West Akyem Municipality, Ghana pre- and post-MDA with azithromycin and pre-MDA on Tanna Island, Vanuatu. DPP testing was done on site and blood was collected for serology (RPR and TPPA). Molecular diagnosis and screening for azithromycin resistance markers was done using TaqMan-based real-time multiplex PCR tests. Another duplex PCR test was used to detect *H. ducreyi* and *M. ulcerans*.

Results Pre-MDA TPPA and RPR dual positivity was 35.8% (63/176) in Vanuatu and 33.6% (109/326) in Ghana and post-MDA was 18.6% (16/43) and 6.5% (3/46), respectively in children with skin lesions. The overall sensitivity and specificity of the DPP treponemal component versus TPPA was 88.2% and 82.7%, and DPP non-treponemal component versus RPR was 84.8% and 94.7%. In children with *T. pertenue* PCR-positive lesions, dual positive DPP had an overall sensitivity and specificity of 86.3% and 78.6%, and a PPV of 44% and a NPV of 96.7%. 14.9% (27/181) of pre-MDA swab samples from Vanuatu and 17.3% (31/179) in Ghana were PCR-positive for *T. pertenue*. None of the 49 samples from Ghana were positive for *T. pertenue* post-MDA. Azithromycin resistance markers were not found in any of the samples. *H. ducreyi* was detected by PCR in 40.3% (73/181) of samples from Vanuatu, and 27.4% (51/208) from Ghana pre-MDA and 28.6% (14/49) in Ghana post-MDA. Six children were co-infected with *T. pertenue* and *H. ducreyi* in Vanuatu and seven in Ghana. *M. ulcerans* was not detected.

Conclusion The DPP test is a useful screening test to exclude yaws in cases with a high index of suspicion on clinical grounds and the real-time PCR is essential for confirmation of a yaws diagnosis. MDA with oral azithromycin is effective for treatment of yaws but has limited impact on *H. ducreyi*.