Challenging STIs in remote Central Australia

Sexually transmitted infections (STIs) are endemic in remote Central Australia in Aboriginal communities, but usually don't prompt individuals to seek testing or treatment. Untreated, a proportion of such infections result in ectopic pregnancies, miscarriages, infertility and enhanced transmission of HIV. The majority of STIs in Central Australia can be diagnosed with current nucleic acid amplification test (NAAT) technologies and treated with single-dose antibiotic treatment. Successful long-term STI control has been achieved in some areas of remote Central Australia by increasing access to testing and treatment for STIs as part of a comprehensive program. Successful control of gonorrhoea also depends on adequate antimicrobial surveillance, which is particularly difficult to achieve in remote areas of Australia.

Public health principles of surveillance, monitoring and evaluation and intervention are very applicable to the management of treatable STIs. Ngnampa Health Council (NHC) has demonstrated the long-term benefits of an active screening, surveillance and treatment program for STIs, which is locally managed to maximise integrity, timeliness, interpretability and, most importantly, translation of surveillance into resultant action. On the Anangu Pitjantjatjara Yankunytjatjara (APY) Lands, such a program has resulted in statistically significant and sustained reductions over 13 years in syphilis and chlamydia and reduction and control of gonorrhoea, despite an outbreak.

Trends in notification data for STIs, such as syphilis, chlamydia and gonorrhoea, can provide particular challenges in interpretation compared with other notifiable diseases. This is because a large proportion of infections are asymptomatic or do not prompt health-seeking behaviour and testing coverage is heavily dependent on practices of individual practitioners and health services. Without the provision of screening coverage data, a true rise in infection cannot be differentiated from an artefactual rise created by an increase in testing.

The 13-year, cross-sectional screening data for chlamydia and gonorrhoea and over 20 years of data on syphilis prevalence on the APY Lands is of unique value in demonstrating long-term prevalence reductions with consistent screening of a remote population as part of a comprehensive program (Figure 1). The significant downward trends are in the opposite direction to general trends in developed countries and rates reported among Aboriginal and Torres Strait Islanders in Australia. In Australia the age-standardised rate of gonorrhoea in this subgroup has risen 48% between 2002 and 2006; chlamydia rates have increased 61% over this time and between 2004 and 2006 there has been a rise in infectious syphilis diagnoses of 38%.

The NHC comprehensive STI control program has been managed since 1995 in a structured manner (the Eight Ways to Beat HIV) including community engagement, health promotion activities and the provision of health hardware (such as condoms). Increased testing, improved case management and surveillance are cornerstones of the program. After an annual census undertaken by NHC to ascertain the target screening population, the designated population group has been offered screening each year during a 6-week time-period. Consistently high coverage and treatment rates have been achieved. This population-wide screening is then followed throughout the year with opportunistic and targeted screening. The annual screening has the multiple functions of providing the opportunity to reduce residual disease in the population, providing accurate prevalence estimates and providing an opportunity for widespread education and engagement about STIs.

Figure 2 is a pictorial representation of population-wide screening compared with opportunistic screening of 3-4% of the population per week in a community with a chlamydial and gonococcal combined prevalence of 15%. The population-wide screening as shown is representative of the coverage expected during the first 4 weeks of a typical community screen on the APY Lands. The rate of notification is more than four times greater in the population-wide screening group in this illustration, due to increased participation rates. The greater potential to reduce residual infection in the community is also illustrated.

Another important area of surveillance in managing STIs in remote Australia is antimicrobial sensitivity testing of gonococci. A rise in gonorrhoea prevalence in 2004 prompted NHC to undertake on-site culture for gonorrhoea in one of the communities of the APY Lands in 2006 during the annual STI screening. The
presence, even in this small sample of positive gonococcal cultures, which were Roche Cobas Amplicor screening test-negative (Roche Molecular Systems, Branchburg, New Jersey, USA) or screening test-positive but supplementary test-negative (Institute of Medical Veterinary Science piv\textsuperscript{R} PCR) (Table 1) illustrate the importance in maintaining gonococcal cultures as a gold-standard comparison against NAATs. In this sample, the negative predictive value of the piv\textsuperscript{R} supplementary testing was 88%. This supports the need to consider treatment for Neisseria gonorrhoeae, even in cases with supplementary test-negative results in higher prevalence regions such as Central Australia. Targets, which amplification tests look for, may be missing in some strains and the biological behaviour for gonorrhoea to change genetically on a continual basis makes the argument for DNA-based tests to be subject to ongoing validation.

Since 2007, after the enhanced culturing ended, an average per year of only 21 gonococcal isolates has been obtained on the APY Lands. This is despite continual efforts to maximise culture yield. Figure 2. Static illustration of population-wide and opportunistic screening over a four week time period.

<table>
<thead>
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<th>Population-wide Screening</th>
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<th>Opportunistic testing</th>
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Table 1: Comparison of Roche Amplicor and piv\textsuperscript{R} in-house NAAT with on-site culture April to June 2006, APY Lands

<table>
<thead>
<tr>
<th>Culture +</th>
<th>Culture -</th>
<th>Total</th>
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<tbody>
<tr>
<td>Roche Amplicor +</td>
<td>37</td>
<td>14</td>
</tr>
<tr>
<td>Roche Amplicor -</td>
<td>2</td>
<td>510</td>
</tr>
<tr>
<td>Total</td>
<td>39</td>
<td>524</td>
</tr>
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| piv\textsuperscript{R} + | 35 | 0 | 35 |
| piv\textsuperscript{R} – | 2 | 14 | 16 |
| Total | 37 | 14 | 51 |

by encouraging culturing of appropriate samples, particularly from symptomatic males or cases and contacts with NAAT supplementary-positive gonorrhoea. Difficulties arise using currently available gonococcal culture techniques in remote regions, because of long transport times, given Neisseria gonorrhoeae is a fastidious organism, which requires specialised agar growth medium and a CO\textsubscript{2}-rich environment to survive outside the human body. While cultures are very difficult to obtain in remote areas, the need for them is great, given these same areas have high endemcity and there are high volumes of treatment for infection based on intensive use of NAATs. It is not clear to what extent antimicrobial susceptibility of isolates from adjacent regional centres, such as Alice Springs, can be taken as representative of the surrounding remote communities. Molecular techniques looking at multi-antigen sequence typing as a surrogate for antimicrobial testing of live isolates are being tested and show some promise.In the meantime, antimicrobial surveillance for Neisseria gonorrhoeae in remote communities remains highly problematic.

In tackling STIs in remote Australia, an initial challenge remains to encourage and sustain adequate testing to allow treatment and secondary prevention. Remote communities, where such infections are endemic and where an appropriate age-based population for screening can be relatively easily defined, are appropriate areas for resource allocation. Surveillance for STIs on a local health-service level should be strengthened in order to encourage testing. Significant opportunities have become available in the past few years to achieve low-cost surveillance of STI testing and yield through patient information recall systems linked to pathology result downloads, which are common in many Aboriginal medical services. Screening for chlamydia, gonorrhoea and syphilis remains a key strategy for STI control in remote Aboriginal communities and concrete collaborative steps should be taken to enable the greater implementation of this in remote Australia.

References

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7. Lum G, Freeman K et al. (2005) A cluster of culture positive gonococcal infections but with false negative cipR gene based PCR. Sex Transm Infect. 81(5), 400–402.
Cervical cancer is the second most common cancer in women worldwide, with the majority of cases occurring in the developing world. With effective high-quality cervical cytology screening programs, with wide coverage of target populations, precursor lesions can be detected and treated, ultimately preventing progression to the development of cervix cancer.

In Australia, long-standing and high-quality screening programs have been implemented for several decades and, consequently, incidence and mortality rates from cervical cancer have declined significantly. They are at some of the lowest worldwide: the age-standardised incidence of cervical cancer being 7.0/100,000 and with a mortality 2.2/100,000 women in 2004.

It is noteworthy, however, that, notwithstanding the success of the National Cervical Screening Program in the general population, Indigenous women were over four times more likely to die of cervical cancer than non-Indigenous women in 2001-2004, with cervical cancer incidence also in the order of four to fivefold higher in Indigenous women. Whilst overall for the Australian population, the estimated lifetime screening participation rate is 88% (62% for over 2 years, 73% for over 3 years), the increased rates in Indigenous women reflects poorer access to cervical cytology screening programs.

The causal role of human papillomavirus (HPV) in cervical cancer has now been firmly established, with genotypes 16 and 18 consistently contributing worldwide to approximately 70% of squamous cell carcinomas. In Australia, we too have shown the preponderance of 16 and 18 in cancers as well as high-grade dysplasias. Recently, prophylactic vaccines (bivalent and quadrivalent) have shown demonstrated high vaccine safety, tolerability and immunogenicity as well as very high efficacy against cervical precancer, attributable to vaccine-related HPV strains, against which the respective vaccines cover.

A proportion of other anogenital cancers are now recognised as also caused by oncogenic HPVs. Vulvar cancer, of the warty basoid type, is caused predominantly by HPV 16. A high incidence of vulvar cancer has been reported in young Indigenous women in remote communities in the East Arnhem region of the Northern Territory. Cases there are being seen at fiftyfold the rate of anywhere else. As we also know that the quadrivalent vaccine prevents the vulvar cancer precursor caused by 16 and 18, as well as for cervical lesions, it is going to be paramount to ensure very high coverage of the government-funded, school-based vaccine program. To date Australia is leading the world in vaccine coverage, as in its third year’s cohort, the average cover is in the order of 75-80%. Coverage to remote communities is indeed a priority.

References

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HPV-related disease in Indigenous health

Vulvar intraepithelial neoplasia [VIN]: a multi focal presentation of VIN 2/3 in a young woman. This is the precursor lesion to vulvar cancer.