

Problems in diagnosing sexually transmitted infections in remote Australia



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Times are changing. The National Aboriginal and Torres Strait Islander Sexual Health and Blood Borne Virus Strategy 2005-2008 provides current commentary on the problems facing Australia's Indigenous population. While the rates of sexually transmitted infections have always been higher in Indigenous Australians, there is some evidence of increasing rates of HIV infection. The rate of Chlamydia infection in non-Indigenous Australians has doubled between 1999 and 2003, while the rate of infection in some populations of Indigenous Australians has moved from 658 per 100 000 to 1140 per 100 000 population. Indigenous Australians are forty-times more likely to be infected with the gonococcus than non-Indigenous Australian men and women. It should not be surprising that Indigenous Australian rates of syphilis are unacceptably high at ~250 per 100 000 population and almost non-existent in the non-Indigenous population.

In remote and regional Australia, medical laboratory scientists and pathologists cover vast tracts of land in their catchment areas. For example, the pathology services in Alice Springs cover almost 1 000 000 km² in three jurisdictions. The Northern Territory itself covers 1 360 000 km² and contains just 1% of the nation's population. In the NT, 25% of the population identifies as Indigenous. The movement of clinical specimens depends on the condition of roads and/or the availability of flights. Electricity for refrigeration in some communities is not as reliable as larger town and metropolitan centres. It is not uncommon for a specimen to wait three or more days at the clinic before it reaches a pathology service. At that service, microscopy and culture for the gonococcus is usually possible but nucleic acid amplification for the gonococcus, Chlamydia and other microorganisms causing STIs may not be available.

A further referral to a city-based pathology service in Darwin, Perth or Adelaide may be required. The same is true for serology for HIV and HBV, although screening for syphilis is now available in Alice Springs.

Add to this the extremes of temperature and the lessons we learnt at university about the gonococcus being a fastidious bacterium become paramount. We have to protect clinical specimens from freezing cold nights to day temperatures in excess of 45°C in some settings. Contrary to traditional teaching we have found urine to be a good transport medium for the gonococcus, but this may relate more to bioburden than greater resilience of strains. Conventional teaching suggests the ideal specimen for culturing gonococcus is an endocervical swab or urethral swab. We grow gonococci from high vaginal, low vaginal and introital swabs. I recall growing the bacterium from a swab of discharge that was on the upper thigh. While nucleic acid amplification assays have significantly assisted in the diagnosis of STIs, current NADTs (nucleic acid detection tests) do not facilitate broad antimicrobial resistance testing. In an environment where penicillin is still a major component of STI management, culture of the gonococcus remains important despite the widespread use of nucleic acid technology. For this reason, there is an equal emphasis on both culture and nucleic acid detection methods.

Of greater concern in recent times have been the widely broadcast revelations of paediatric sexual abuse in Indigenous Australian communities. Coupled with high rates of STIs, we make diagnoses on children all too frequently. This poses a number of problems. Is notification to public health officials enough for the pathologist in charge or should the pathologist also notify the family and children's services sections in their jurisdictions? The major quandary that has occupied the minds of medical and legal practitioners is the status of nucleic acid detection methods in the criminal justice system. It is said that culture remains the irrefutable benchmark but we know in Australia it is very difficult to convince anyone to culture a specimen for *Chlamydia trachomatis*. We also know that in some centres it is increasingly difficult to get a culture result for the gonococcus. What is the answer?

We need to engage with legal practitioners and explain the processes used in nucleic acid detection – the fact that a nucleic acid extraction process occurs and nucleic acid can be stored in special cases for future analysis. With genome sequencing becoming more commonplace, why can we not take stored nucleic acid from the specimens from the *victim* and the *alleged perpetrator* and compare them genetically? We may not be able to sequence entire genomes, but we should be able to compare sufficient lengths of DNA to irrefutably prove identity.

While classical culture methods may not yet be dead, they may be in the next decade or so. To provide assistance to victims of sexual abuse, our goal must include education of legal practitioners.

Another concern with the diagnosis of STIs by nucleic acid methods is the current need to perform a supplementary assay for the diagnosis of gonorrhoea. In 2005, the Public Health Laboratory Network published with colleagues, a position statement on the interpretation of NADT for *N. gonorrhoeae* in Australia. This guideline took into account the relevant medical testing standards from the National Pathology Accreditation Advisory Council (NPAAC) and known Australian testing performance data of the time. While this has generally been accepted by most pathologists and medical laboratory scientists, as yet there remains no funding mechanism for the supplementary test if required. As newer technology emerges on current platforms or new platforms, it is vital that field testing be performed in well-established locations of varying prevalence, as well as testing archived isolates from the distant past. The high recombination rates in the pathogenic *Neisseria* makes any assertion that a single test can produce a reliable result across the nation, difficult to verify.

Moreover, concerns continue to be raised about the Chlamydia assay. Some isolates in Sweden have apparently emerged with gene deletions in their cryptic plasmid and this has been used as a target for diagnostic assays. With the Australian Government's current emphasis on Chlamydia detection and treatment in Australia, such a clone would ironically make the programme look very good but belie the true nature of the epidemic.

Despite the problems described in this text, the outlook for the diagnosis of STIs in regional and remote Australia is good. Australians in these areas often have services from multiple providers in the public and private sectors. Modern technology

is facilitating better diagnostic capacity, while at the same time governments at all levels acknowledge the significance of STIs in regional centres, particularly in Indigenous Australians, by providing targeted funding for such testing in some areas.

References

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MICRO-FACT

Antibiotic resistance in *Neisseria gonorrhoeae* is at unprecedented levels and has the potential to significantly compromise disease control efforts.