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## A syphilis outbreak in remote Australia: epidemiology and strategies for control

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### SUMMARY

This paper describes the epidemiology of a syphilis outbreak in remote Australia, and explores contributing factors and control strategies. Between 1 August 2000 and 31 January 2002, 74 cases of early syphilis (42 female, 32 male) were identified in 73 Kimberley residents. Syphilis rates in age groups 10–19 and 20–29 years were 583 and 439 per 100 000 person years respectively. Factors contributing to the outbreak included incompleteness of sexually transmitted infection (STI) clinical management, untimely contact tracing, staffing and management issues, and poor community knowledge about STIs. Outbreak control strategies addressed factors that could be influenced by changes in health service delivery, and focused on providing education and support to health staff, and efforts to increase community knowledge about sexual health. Although some improvements have occurred, the outbreak is still continuing. Until open and honest discussion and a collaborative approach is taken toward STI problems affecting Indigenous Australians, outbreaks such as this will continue to occur.

### INTRODUCTION

Incidence rates of notifiable sexually transmissible infections (gonorrhoea, chlamydia, syphilis and donovanosis) in the Kimberley, a remote and sparsely populated region in far-northern Western Australia, are among the highest in Australia [1]. From the mid-1980s until the end of the millennium syphilis rates decreased nine-fold [2].

This paper aims to:

- (1) describe the epidemiology of an ongoing syphilis outbreak during its first 18 months;

- (2) explore the factors contributing to the outbreak;
- (3) describe the strategies implemented to control the outbreak.

### SETTING

The Kimberley has a resident population of 32 000, half of them Aboriginal people, scattered over an area of more than 420 000 km<sup>2</sup>. There are six towns with populations ranging from 2000 to 10 000 and more than 200 discrete Aboriginal communities ranging in size from just a few families to over 500 people.

Health care is provided predominantly by government and Aboriginal community-controlled organizations. Each of the towns has a hospital and one or more primary-care services. Remote area clinics staffed by resident nurses and Aboriginal health workers are present in fewer than 15 communities.

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Over 70% of sexually transmitted infection (STI) notifications are reported by government-employed doctors [3, 4].

Syphilis is endemic in the Northern Territory that borders the Kimberley [1]. There is considerable movement of people between the Central and East Kimberley and the Northern Territory due to kinship and cultural links.

### STI control in the Kimberley before the outbreak

Unlike many other remote areas of Australia with high STI endemicity, STI control infrastructure has been well established in the Kimberley since the 1980s [5–7]. From at least the mid-1980s, syphilis control has been an integral part of STI control, with regional guidelines recommending that syphilis testing be offered to all patients presenting with STI, or named as a STI contact, at the initial consultation and 3 months later; and all Kimberley antenatal women at the initial clinic visit and during the third trimester [8, 9].

The guidelines also contained standard treatment regimens for syphilis and standing orders for empirical treatment for sexual contacts of syphilis.

Since 1986, and with the agreement of state government and Aboriginal community-controlled health services, and private general practitioners in the region, the Kimberley Public Health Unit (KPHU) has maintained a regional syphilis register of syphilis serology (SS) results and treatments [10]. In the same year, a formal programme of periodic screening was introduced, based on a population register, with the aim of reducing the incidence of syphilis by the detection and treatment of cases. This programme offered SS testing to all Kimberley Aboriginal residents, annually to those aged 15–40 years and every second year to those aged over 40 years.

In 1996, following evaluation of the programme and discussions with the Kimberley Aboriginal Medical Services Council, the target group of the screening programme was modified to include all Kimberley residents aged 15–25 years [11]. In late 1999, this programme was evaluated again, and subsequently discontinued in 2000 [10].

## PATIENTS, MATERIALS, METHODS

### Descriptive epidemiology

Records of all cases of early syphilis identified in the Kimberley between 1 August 2000 and 31 January

2002 were examined. Syphilis occurring in unauthorized immigrants and Indonesian fishermen were excluded from the analysis as they represented infections acquired overseas, with virtually no potential to spread into the resident Kimberley population†. Patients were defined as having early syphilis if they had:

- (1) primary syphilis – serological evidence of infection or re-infection of <6 months' duration and/or clinical signs of primary syphilis, or
- (2) secondary syphilis – serological evidence of infection or re-infection of 6–24 months' duration and/or clinical signs of secondary syphilis, or
- (3) congenital syphilis, or
- (4) rapid plasma reagin test titre (RPR)  $\geq 8$  and no documented serological evidence of syphilis infection in the preceding 2 years.

Using this classification system, cases of early latent syphilis were included either as primary or secondary syphilis or in the fourth category, depending on the date of their last syphilis serology test.

The following information was obtained for each case: date of birth, sex, race, address, district of health service provider, stage of syphilis, date and result of SS, and most recent previous SS, date treatment completed, indication for serology testing. Data were entered and analysed using SPSS for Windows (SPSS Inc., Chicago, IL, USA).

Indications for SS testing were classified according to patient's clinical presentation as recorded on the pathology request form: STI symptoms; STI contact; antenatal screening; institutional/prison screening; follow-up screening (i.e. SS 3 months following the diagnosis of a STI); other screening (e.g. well person's check-up, diabetes/chronic disease review, asymptomatic patient requesting STI screen); and outbreak screening (i.e. SS done as part of community screening in four locations during the outbreak).

SS testing was performed at accredited laboratories in Perth, Western Australia. Serum was screened for syphilis using a total antibody enzyme immunoassay test for treponemal antibodies (ICE syphilis; Murex Diagnostics, Dartford, UK). Positive samples were confirmed with *Treponema pallidum* particle agglutination testing (TPPA; Fujirebio, Serodia, Japan) and

† Between 1999 and 2001, many hundreds of 'boat' people from Indonesia and the Middle East entered the Kimberley area through illegal means. On arrival, these people are immediately taken to either the regional prison or immigration detention centre, so they have very little unsupervised contact with Kimberley residents.

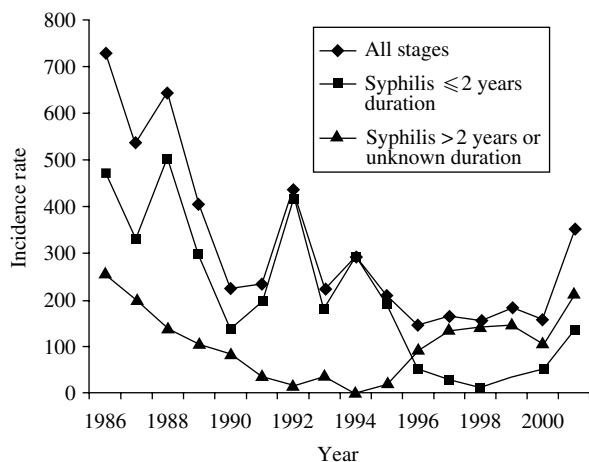


Fig. 1. Kimberley syphilis incidence (per 100 000 person years), by stage, 1986–2001.

then a RPR test (Paramount Diagnostics, Adelaide, Australia) was performed.

In accordance with ethical requirements, access to the data was restricted to two of the authors who had statutory responsibilities for outbreak control and generated the data in the course of implementing and evaluating outbreak control strategies for quality improvement purposes.

### Control strategies and factors contributing to the outbreak

The STI control programmes in the Kimberley region, both before and after the outbreak was recognized, were reviewed by examining written documents (including clinical guidelines, reports in the Kimberley Public Health Bulletin and correspondence) and interviewing staff. Interviews were conducted with all available staff working in STI control from January 1996 to January 2002. Interviews were directed at corroborating and expanding on the possible precipitants of the outbreak and strategies for future control documented in written sources.

## RESULTS

### Descriptive epidemiology

During the late 1990s, there were on average 10 notifications of syphilis of  $\leq 2$  years duration each year in the Kimberley. Syphilis incidence ranged from 12.1/100 000 to 51.4/100 000 person years (Fig. 1). An outbreak began in August 2000, and during the next 18 months, 74 cases of early syphilis were diagnosed in 73 Kimberley residents (Table 1). The number of

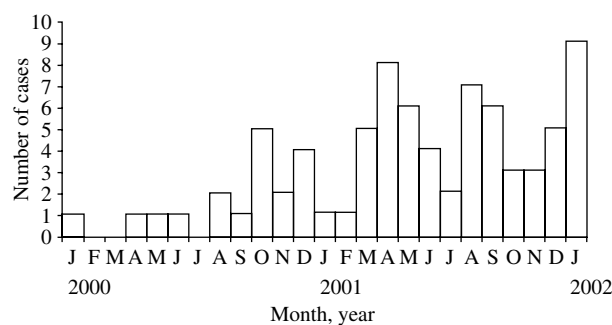


Fig. 2. Early syphilis cases in the Kimberley by month, 1 January 2000 to 31 January 2002, excluding unauthorised immigrants.

incident cases of early syphilis rose dramatically from August 2000 to January 2002 (Fig. 2).†

Syphilis rates in the 10–19 and 20–29 years age groups were 583 and 439/100 000 person years, respectively. Those  $< 20$  years and  $< 30$  years of age accounted for 42% (31/74) and 78% (58/74) of cases respectively (Fig. 3).

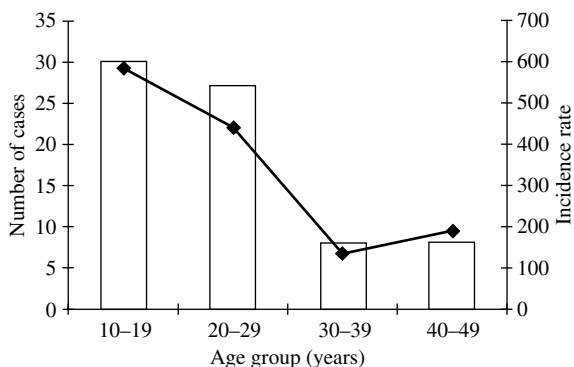
In total 70% (52/74) of cases had no previous history of syphilis infection while 70% (52/74) had undergone syphilis testing at least once in the 15 months prior to their diagnosis.

### Factors contributing to the outbreak

Factors contributing to the outbreak included health service staffing and management issues, sub-optimal STI clinical management quality and timeliness, and socio-political changes outside the health system (Table 2).

It was suggested that stopping the annual syphilis screening programme in January 2000 contributed to the outbreak. This hypothesis was tested by comparing the proportion of early syphilis cases that could have been detected by annual screening before and after the cessation of this screening programme. Patients who were in the annual screening target group (Kimberley resident aged 15–25 years), but had not had a syphilis

† The increase in incidence of late/unknown onset syphilis between 1995 and 1996 was due to a change in regional health policy in mid-1995 after which patients with late/unknown onset syphilis were included in disease notifications and offered treatment. Most of these cases were middle-aged and elderly people with a long history of seropositivity (negative or low titre RPR and positive treponemal serology) but no documented syphilis treatment. Some may have been treated for syphilis but without adequate documentation, others may have been seropositive due to yaws. Probably only a small proportion had untreated late latent syphilis, but it was decided to err on the side of caution by offering definitive treatment [10].



**Fig. 3.** Age distribution and age-specific incidence rates (per 100 000 person years) of sexually acquired early syphilis cases, 1 August 2000 to 31 January 2002. □, Number of cases; ◆, incidence rate.

test in the previous 15 months were defined as ‘could have been detected by annual screening’. In cases of early syphilis diagnosed between 1 January 1996 and 31 December 1999 (before cessation of annual screening) 64% could have been detected by annual screening, whereas for cases diagnosed between 1 January 2000 and 1 May 2001 (i.e. after cessation of annual screening and before the outbreak was recognized and outbreak control strategies implemented) only 44% could have been detected by annual screening ( $\chi^2=3.7$ , D.F.=1,  $P=0.05$ ). These data do *not* support the hypothesis that cessation of the annual syphilis screening programme contributed to the outbreak.

**Outbreak control strategies**

Outbreak control strategies of community screening, community and school education, Kimberley Quality in Sexual Health Management project, and staff orientation and education were aimed at addressing factors that could be influenced by changes in health service delivery (Table 3). Positive outcomes of these strategies are summarized in Table 4. Unfortunately, there was no improvement in the completeness or timeliness of STI contact tracing, with the proportions of reported sexual contacts undergoing STI consultation within 5–10 days being 44% for 1995–1996 and 40% for 2001–2002, and 66% for 1995–1996 and 59% for 2001–2002 respectively [21].

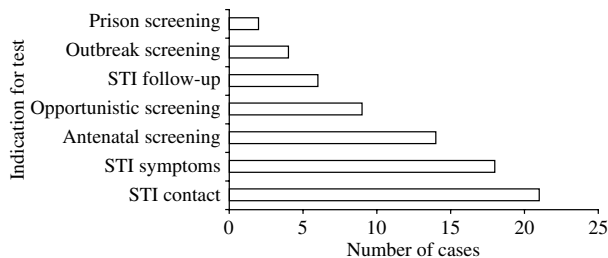
Following the period of the outbreak we have described, 50 cases of early syphilis were identified between 1 February and 31 December 2002, and a further 13 cases were identified in the first 4 months of 2003, corresponding to rates of syphilis of  $\leq 2$  years

**Table 1.** Descriptive epidemiology of syphilis cases, 1 August 2000 to 31 January 2002 (n = 74)

<b>Demographic characteristics</b>	
•	42 female*, 32 male
•	73 Aboriginal*, one non-Aboriginal
•	Age range 12–48 years (median 22 years)
<b>Clinical and serological staging</b>	
•	32% primary syphilis
•	39% secondary syphilis
•	1% congenital syphilis
•	28% RPR $\geq 8$ and no documented serological evidence of syphilis infection in the preceding 2 years
<b>Other clinical features</b>	
•	Presented with STI symptoms (28%), STI contact (24%) or antenatal screening (19%) (Fig. 4)
•	30% seen by doctor, 70% by nurse or Aboriginal health worker
•	Time from date of syphilis test to date of treatment 0–75 days (median 8 days)
•	77% treated within 2 weeks
•	11% treated after 4 weeks

\* One Aboriginal female was infected with syphilis twice during the time-frame of the study.

RPR, Rapid plasma reagin test titre.



**Fig. 4.** Early syphilis cases by indication for syphilis test, 1 August 2000 to 31 January 2002 (n = 74).

duration of 159.4 and 105.4/100 000 person years in 2002 and January–April 2003 respectively.

**DISCUSSION**

During the first 18 months of the Kimberley syphilis outbreak that began in August 2000, 74 cases of early syphilis were identified, including the first reported case of congenital syphilis in the region since 1989. In total, 78% of cases were under 30 years of age. Syphilis rates in age groups 10–19 and 20–29 years were 583 and 439/100 000 person years respectively, between 1 August 2000 and 31 January 2002.

Limitations of the study include completeness of case ascertainment and the absence of data collected from a patient or community perspective. It is possible

Table 2. *Factors contributing to the outbreak identified from historical data and corroborated by staff interviews*


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Changes in state government health service management, 1980–2000	
•	Separation of public health (regional STI control policy responsibility) from community health (implementation of STI control at primary health-care level)
•	Regional community health management structure devolved to local areas
•	Management of community health services integrated with that of local area hospitals
•	Professional management of Aboriginal health workers separated from that of other community health team members
•	Above changes inadvertently resulted in significant incidences of staff destabilization, dysfunctional management structures and low prioritization of STI control [11]
High health staff turnover (Aboriginal and non-Aboriginal) and staff vacancies	
Sub-optimal STI clinical management quality and timeliness	
•	Health staff not offering complete physical examination and minimum appropriate laboratory investigation to STI patients and reported sexual contacts
•	Minimum appropriate testing in 14.5% of patients investigated for STI [12]
•	<50% of antenatal women screened for syphilis at booking and third trimester [13, 14]
•	44% of reported sexual contacts seen within 5 days of being reported [15]
•	34% of reported sexual contacts not seen [15]
Lack of community awareness	
•	Poor community knowledge of long-term consequences of untreated STIs [11]
•	Lack of, or inconsistent, implementation of Education Department sexual health education curriculum in schools
Socio-political climate	
•	Rapidly increasing numbers of Aboriginal communities, often in remote locations and without adequate health infrastructure
•	Increasing opposition by a few vocal people to STI control strategies such as screening and contact tracing [16]

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that some people who acquired early syphilis in the Kimberley during the time-frame of the study did not undergo SS testing or were tested outside the Kimberley and, therefore, would not be included in the study. Heightened awareness of syphilis among health staff in the Kimberley and surrounding areas due to the outbreak, and formal and informal communication networks between KPHU and neighbouring public health units meant that completeness of case ascertainment was likely to be high. Staff contributing data to the interviews did include Aboriginal people and long-term Kimberley residents. We did not have the resources to study community views regarding factors contributing to the outbreak, or to evaluate outbreak control strategies from a patient or community perspective.

Factors contributing to the outbreak included incompleteness of STI clinical management, untimely contact tracing, problems associated with high staff turnover and ineffective staff management, poor community knowledge about long-term consequences of untreated STIs and a socio-political climate which was not always conducive to STI control activities. Outbreak control strategies were aimed at addressing factors that could be influenced by changes in health service delivery. They focused on providing education and support to health staff to improve the quality and

timeliness of STI clinical management, and on enhancing collaboration between health and education staff to increase community knowledge about the long-term sequelae of uncontrolled STI transmission.

Despite persistently high syphilis rates, some positive outcomes followed the implementation of outbreak control strategies (Table 4). The poor yield of early syphilis cases from community screening may lead some readers to interpret this strategy as a failure, and from a case-finding point of view, it probably was. However, these results were invaluable in confirming to health staff the effectiveness of existing STI clinical management, screening and contact tracing guidelines and the importance of adhering to them. In addition, the experience of undergoing a blood test for syphilis provided people with a physically tangible indication of the seriousness of the outbreak and probably made communities more receptive to sexual health education.

Although these outbreak control strategies were necessary and beneficial, the outbreak of syphilis demanded investigation as to why it occurred and why, at the time of writing, the outbreak is still continuing. The ‘code of silence’ that surrounds Indigenous sexual health issues in Australia [23], built on a history of discriminatory health and social policies, has hampered the open and honest discussion that is a



Table 3. *Outbreak control strategies*

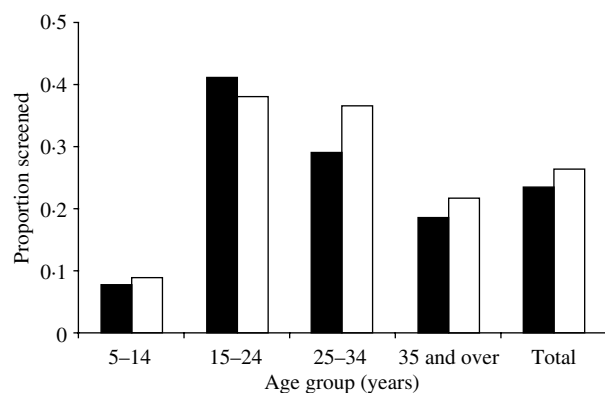
Community screening, May–October 2001
<ul style="list-style-type: none"> <li>• Implemented in four locations where two-thirds of cases had occurred</li> <li>• Negotiated with community leaders/organizations and local health services</li> <li>• Individual consent obtained</li> <li>• 492 males and 509 females [40 % of Aboriginal people aged 15–24 years in participating locations (Fig. 5) screened], two cases early syphilis identified</li> <li>• 176 people in participating locations tested for syphilis during routine primary health care, four cases early syphilis identified (two by contact tracing, one by antenatal screening and one presented with STI symptoms)</li> </ul>
Community and school education
<ul style="list-style-type: none"> <li>• Negotiated with community leaders/organizations and local health and education services</li> <li>• Aimed at informing community about the outbreak, rationale for screening, benefits of early diagnosis, treatment, cooperation with contact tracing, and STI prevention</li> <li>• 103 health, education and youth workers trained to deliver sexual health education ‘Lets’ Talk About Sex’ (sexual health package designed for Aboriginal youth) [17]</li> <li>• Sexual health education delivered to &gt; 500 Kimberley students in 16 schools and in out-of-school settings between June and December 2001 by health, education and youth services staff working collaboratively</li> <li>• Overwhelmingly positive community response to ‘Let’s Talk About Sex’, e.g. resurrection of sexual health education in schools/communities where it had not been offered for many years, condom distribution outlet established by a church youth group, requests for adult sexual health education by male and female community leaders</li> <li>• Funding obtained for further training of health, education and youth services staff in delivery of sexual health education from January to December 2002 [18]</li> </ul>
Kimberley Quality in Sexual Health Management project, July 2001 to January 2002
<ul style="list-style-type: none"> <li>• Prospective clinical audit of patients with notifiable STIs aimed at documenting and improving quality and timeliness of clinical management</li> <li>• Overseen by representatives of government and independent health services and an independent sexual health physician</li> </ul>
Staff orientation and education
<ul style="list-style-type: none"> <li>• As 70 % syphilis cases seen by nurse or Aboriginal health worker, so orientation/education targeted at primary health care, hospital emergency department and midwifery staff</li> <li>• Annual STI clinical management workshops since 1997. A total of 134 staff attended workshops in 2001 focused on outbreak epidemiology, clinical management of syphilis and launched new edition of Guidelines for managing STIs [9]</li> <li>• Face-to-face or telephone orientation, supported by written STI orientation package (8–12 new primary health-care staff each month) since May 2000 [19]</li> <li>• STI orientation package developed for hospital midwives, July 2001 [20]</li> <li>• Weekly to monthly outbreak updates by email or fax.</li> </ul>

Table 4. *Outcomes of outbreak control strategies*

Confirmation that adherence to established STI clinical management, screening and contact tracing guidelines were more effective than community screening in detecting new cases
Demonstration that sexual health education can be successfully implemented in remote, cross-cultural settings
Recognition by health service management of the importance of quality and timeliness of STI clinical management
Improvements in indicators of STI clinical management
<ul style="list-style-type: none"> <li>• Proportion of patients notified with genital gonorrhoea and/or chlamydia in whom syphilis and HIV tests were requested, increased from 64 % and 38 % respectively during 1998–1999 to 91 % and 77 % during 2001–2002 [21]</li> <li>• Proportion of patients notified with genital gonorrhoea and/or chlamydia in whom all appropriate laboratory investigations were requested increased from 25 % during 1998–1999 to 49 % during 2001–2002 [21]</li> <li>• Proportion of Kimberley antenatal women screened for syphilis at their initial visit and during the third trimester, i.e. in accordance with Kimberley guidelines, increased from 45 % in 1997 to 81 % in 2001 [22]</li> </ul>

prerequisite of a sustainable, adequately resourced and collaborative intersectoral approach to STI prevention and control. Syphilis rates in the Kimberley, even before the outbreak, were among the highest in

the world. Yet few people outside of Western Australian health circles were then, or are now, aware that 0.3 % of Kimberley Aboriginal people are infected with syphilis each year. This is in stark contrast to the



**Fig. 5.** Proportion of Aboriginal population in the four locations participating in syphilis outbreak screening, by sex and age group, tested for syphilis for outbreak screening purposes in 2001. ■, Male; □, female.

United States, where mainstream and medical media reported a 'serious outbreak of syphilis' involving 68 cases during 2 years in 270 000 Navajo (0.01% of Navajo each year) that prompted the tribe to demand a doubling of their social hygiene programme funding and initiate a partnership with liquor outlets to combat the problem [24–27].

The understandable fear of further marginalizing or stigmatizing Indigenous Australians by openly acknowledging the fact they are disproportionately affected by STIs has pervaded most levels of government and Indigenous organizations in Australia. It has stifled productive debate to the extent that health organizations have lacked the political will and resources to address deficits in STI prevention and clinical management services. This has resulted in treatable STIs continuing to be highly endemic and sometimes epidemic in the Kimberley and other parts of Aboriginal Australia [1], infertility affecting one quarter of females in some Aboriginal communities [28], congenital syphilis still occurring [29–32], and the people most affected by STIs being generally unaware about the long-term consequences of untreated infections [11, 33]. Fortunately, the political climate is beginning to change, as indicated by a parliamentary inquiry into family violence and child abuse, including sexual abuse, in Aboriginal communities, in 2002 and a statewide Aboriginal STI Summit in 2003 – events that, as recently as the late 1990s, would have been almost unthinkable [34, 35]. Health organizations and staff need to support these changes and to work collaboratively with community leaders to take advantage of the opportunities they bring. More importantly, health organizations and staff must embrace

and fulfil their professional duties by providing high-quality STI prevention and clinical management services at all times, and to work around socio-political obstacles rather than use them as excuses for sub-optimal services and therapeutic nihilism.

Until open and honest discussion and a collaborative approach is taken towards the Indigenous Australians' STI problems, the Australian community (Indigenous and non-Indigenous) will not be able take up their responsibility to improve Indigenous health and outbreaks such as this will continue to occur, threatening the well-being, health and survival of Australia's small Indigenous population.

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## REFERENCES

1. Lin M, Roche P, Spencer J, et al. Australia's notifiable diseases status, 2000 Annual Report of the National Notifiable Diseases Surveillance System. *Commun Dis Intell* 2002; **26**: 118–203.
2. Mak DB, Platt E, Marshall L. Gonorrhoea and syphilis in the Kimberley region [Letter]. *Aust NZ J Public Health*, 1998; **22**: 167–169.
3. Mak D. Gonorrhoea and chlamydia: epidemiology in Kimberley. *Kimberley Public Health Unit Bulletin* 2001 (May): 19–23.
4. Mak D. Chlamydia and gonorrhoea notifications by practitioner type. *Kimberley Public Health Unit Bulletin* 2002 (August): 14.
5. Office of Aboriginal and Torres Strait Islander Health. *STD control in remote Aboriginal communities. A manual for clinic workers.* Canberra: Commonwealth Department of Health and Aged Care, 1999.
6. Carey M. *Handbook on sexually transmissible diseases for community health staff, Kimberley region.* Derby: Disease Control Unit, 1989.
7. Murray S. *We never counted hours: a brief history of the Kimberley disease control unit and its work with STDs.* Derby, 2002.
8. Health Department of Western Australia. *Guidelines for managing sexually transmitted diseases.* Sydney: Australasian Medical Publishing Company, 1997.
9. Health Department of Western Australia. *Guidelines for managing sexually transmitted infections: a guide for primary health care providers.* Perth: Public

- Health Division of the Health Department of Western Australia, 2001.
10. Mak DB, Holman CDJ. A decision to end periodic screening – case study of a syphilis screening program in the Kimberley region of Australia. *Commun Dis Intell* 2000; **24**: 386–390.
  11. Bolger A, Guilfoyle A, Hunter P, Ejai G. How can we re-orient STD services to ensure that they are customer focussed? Derby: Derby Aboriginal Health Service and Kimberley Public Health Unit, 1999.
  12. Mak DB, Holman CDJ. STDs aren't sexy: health professionals' lack of adherence to clinical guidelines in an area of high STD endemicity. *J Public Health Med* 2000; **22**: 540–545.
  13. Mak D. Antenatal syphilis screening. *Kimberley Public Health Unit Bulletin*, 1999 (May): 24–25.
  14. Chaves N. Completeness of antenatal syphilis screening. *Kimberley Public Health Unit Bulletin*, 2001 (May): 29–31.
  15. Mak D. Kimberley gonorrhoea evaluation, Dec. 1995–Feb. 1996. *Kimberley Public Health Unit Bulletin*, 1996 (May): 15–17.
  16. Mak DB, Holman CDJ. Age at first episode of venereal syphilis in an Aboriginal population: an application of survival analysis. *Aust NZ J Public Health*, 1998; **22**: 704–708.
  17. Let's talk about sex: a sexual health resource package for those who work with Aboriginal young people. Eastern Perth Public and Community Health unit and Derbarl Yerrigan Health Service Inc., June 2000.
  18. Rees J. Let's talk about sex in the Kimberley report. Derby: Kimberley Public Health Unit, 2002.
  19. STD program orientation manual. Derby: Kimberley Public Health Unit, 2000.
  20. Chaves N. STIs and the antenatal. Derby: Kimberley Public Health Unit, 2001.
  21. Mak DB, Plant AJ, Bulsara MK. Quality of STI clinical management and contact tracing outcomes in a remote area of high STI endemicity. *Sex Transm Dis* (in press).
  22. Mak DB, Murray JC, Bulsara MK. Antenatal screening for sexually transmitted infections in remote Australia. *Aust NZ J Obstet Gynaecol* 2003; **43**: 457–462.
  23. Neill R. White out: how politics is killing black Australia. Crows Nest: Allen and Unwin, 2002: 76–115.
  24. Associated Press. Navajo Nation dealing with outbreak of syphilis. The body: an AIDS and HIV information resource ([http://www.thebody.com/cdc/news\\_updates\\_archive/2003/mar27\\_03/navajo\\_syphilis.html](http://www.thebody.com/cdc/news_updates_archive/2003/mar27_03/navajo_syphilis.html)). Accessed May 2003.
  25. Kurt C. Navajo Nation dealing with outbreak of syphilis (<http://www.kob.com/index.cfm?viewer&id=476&cat=TRIBES>). Accessed May 2003.
  26. The Daily Times. Navajos seek aid from bar owners to combat STD outbreak. *The Daily Times*, 1 May 2003 (<http://www.daily-times.com.Stories/0,1413,129%7E6574%7E1361921,000.html>). Accessed May 2003.
  27. Di Giovanni L. Gallup bars not a target, says Tribe. *Gallup Independent*, 1 May 2003 (<http://www.gallupindependent.com/05-01-03gallup.html>). Accessed May 2003.
  28. Kildea S, Bowden FJ. Reproductive health, infertility and sexually transmitted infections in indigenous women in a remote community in the Northern Territory. *Aust NZ J Public Health* 2000; **24**: 382–386.
  29. How JHY, Bowditch JDP. Syphilis in pregnancy: experience from a rural Aboriginal community. *Aust NZ J Obstet Gynaecol* 1994; **34**: 383–389.
  30. Humphrey MD, Bradford DL. Congenital syphilis: still a reality in 1996. *Med J Aust* 1996; **165**: 382–385.
  31. Department of Health and Community Services. NT AIDS/STD Program Surveillance Update July–Sep. 2001 and Oct.–Dec. 2001; 2: 1–3.
  32. Department of Health and Community Services. NT AIDS/STD Program Surveillance Update Jan.–Mar. 2002 and Apr.–June 2002; 3: 6–12.
  33. Johnson G. Men's sexual health education. *Kimberley Public Health Unit Bulletin*, 2001 (Nov.): 14–15.
  34. Gordon S, Hallahan K, Henry D. Putting the picture together. Inquiry into response by government agencies to complaints of family violence and child abuse in Aboriginal communities. Department of Premier and Cabinet, Western Australia, 2002.
  35. Wilson-Clark C. Aboriginal HIV concern. *West Australian*, 24 September 2003: 50.