The evidence for a change in antenatal HIV screening policy in Australia

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ABSTRACT

- Australia is one of the few developed countries without routine antenatal HIV screening, despite having the resources to undertake such a screening program and the availability of antiretroviral therapy.
- National policy recommends that only women with identified risk factors should be offered testing; however, the Royal Australian and New Zealand College of Obstetricians and Gynaecologists recommends that all pregnant women be offered HIV testing as part of their antenatal care.
- Knowledge of a woman's HIV status during pregnancy allows interventions to improve her health and reduce the risk of transmission of HIV to her child.
- A universal antenatal HIV screening program meets many of the Wilson and Jungner criteria for population-based screening programs. This should be considered in the current review of Australia's HIV testing policy.

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In Australia, the Royal Australian and New Zealand College of Obstetricians and Gynaecologists (RANZCOG) recommends that all pregnant women be offered HIV testing, after appropriate pre-test counselling, as part of their antenatal care (a universal approach).[1] This contrasts with the HIV testing policy of the former Australian National Council on AIDS and Related Diseases, last published in 1998, which recommends that only women with identified risk factors should be offered testing (a selective screening approach).[2] An Australian policy for HIV testing in all situations, including antenatal, is currently under review. The review is being conducted under the auspices of the Intergovernmental Committee on AIDS, Hepatitis C and Related Diseases; and the HIV/AIDS and Sexually Transmissible Infections Subcommittee of the Ministerial Advisory Committee on AIDS, Sexual Health and Hepatitis. The final report is expected by the end of the year.

Australia is one of the few developed countries without a national recommendation for universal antenatal HIV screening. This is despite having the resources to undertake such a screening program and the availability of antiretroviral therapy. The purpose of antenatal screening for HIV is to identify an often asymptomatic infection for which interventions are available that alter the outcome for the mother, the baby and the mother's sexual partners. Previous publications have reported differences in recommendations by hospitals and Divisions of General Practice across Australia,[3] along with reported differences in individual practice by obstetricians.[4,5]

In 1968, Wilson and Jungner outlined a number of criteria to be considered before implementing a population-based screening program (Box 1).[6] Here, we will discuss each of these criteria and apply them to universal antenatal HIV testing. These criteria were chosen as they are currently used by the National Health and Medical Research Council (NHMRC) for evaluating population screening programs, by the Royal Australian College of General Practitioners for evaluating preventive activities in general practice, and, internationally, by the World Health Organization.

Criterion 1

The condition should be an important health problem for the individual and the community

The importance of a health problem is determined by both the disease incidence and prognosis.

Epidemiology: About 60–90 women in Australia are diagnosed each year with HIV infection, most commonly acquired through heterosexual contact.[11] Limited data are available on the prevalence of HIV infection among pregnant women in Australia. Analysis of newborn blood samples (as a surrogate marker of maternal HIV infection) or antenatal sera has given a prevalence of between zero and 0.045%.[12] In another study, the prevalence was estimated as 0.003% (range, 0.002%–0.007%) for the period 1983–1985, and 0.009% (range, 0.005%–0.020%) for the period 1992–1994.[13] More recently, Spencer and colleagues reported a seroprevalence of 0.023% (one case per 4348 pregnant women in Australia).[14]

Prognosis: Studies that have controlled for access to medical care, antiretroviral use and disease stage have found similar rates of progression and survival in HIV-infected women and men.[15-17] In Australia, mortality and morbidity secondary to HIV infection have decreased significantly, and survival after a diagnosis of AIDS has improved significantly since the introduction of highly active antiretroviral therapy (HAART).[11]

Despite major advances in the management of HIV in pregnancy, mother-to-child transmission of HIV continues to occur, with 34 infants in Australia infected perinatally between 1994 and 2003. A diagnosis of HIV infection in the mother was made at or after birth, rather than antenatally, in two-thirds of these cases.[11] The prognosis of undiagnosed perinatally acquired HIV infection is poor. However, in children known to be HIV-infected, introducing HAART has resulted in a reduced mortality and progression to AIDS in cohorts from the United States,[18] and the United Kingdom and Ireland.[19]

Criterion 2

The natural history of the condition, including development from latent to declared disease, must be understood

The natural history of HIV infection is well understood, with three phases of infection: acute illness, asymptomatic chronic illness, and symptomatic chronic illness. Progression through these phases is highly variable, ranging from 6 months to more than 20 years.[20] About 5% of HIV-infected individuals remain clinically well for many years with no evidence of immunological damage.[21]

In developed countries, pregnancy does not adversely affect the natural history of HIV infection.[22]

Criterion 3

There should be a recognisable latent or early symptomatic stage

HIV infection is diagnosed by detection of HIV-specific antibodies (discussed under Criterion 4).

Criterion 4

There should be a suitable and acceptable screening test

A screening test is performed on healthy individuals. In contrast, a diagnostic test is usually performed on an individual with a relevant clinical problem who is more likely to have the disease. A suitable screening test should be safe, easy to perform, easy to interpret, reliable, and have high sensitivity and high specificity.

Antenatal HIV screening requires a specimen of blood from the mother for an enzyme immunoassay (EIA) to detect HIV antibodies, followed by a confirmatory western blot test. Newer EIAs designed to detect HIV antibody and antigen simultaneously have been evaluated in Australia and compared with a benchmark assay. These EIAs showed sensitivity and specificity greater than 99.5%.[23] Nearly all HIV-infected pregnant women will be diagnosed by a single test for HIV antibodies. However, even with a specificity of greater than 99.5%, in some women (about one in 1000) the test will give a false positive result. The positive predictive value of a positive result for antibodies to HIV in Australia is likely to be about 9%, but the negative predictive value of such a result would be close to 100% (using an estimated prevalence of 0.01%). In the event of a positive result of an HIV antibody test, review of maternal history as well as a repeat HIV test (up to 1 month later) is required to exclude HIV infection.

Criterion 5

There should be an effective and accessible treatment or intervention for the condition

The earlier a pregnant woman is aware of her HIV status, the better the chance of optimising her care and that of her infant. Three interventions — administration of HAART, a caesarean section delivery, and the avoidance of breastfeeding — reduce the rate of transmission of HIV infection from mother to child to under 2%.[24] Reported rates of HIV transmission without interventions in developed countries range from 14% to 25%.[25]

Criterion 6

There should be an agreed policy on whom to treat as patients

The Australasian Society for HIV Medicine has adopted the US guidelines for the use of antiretroviral agents in HIV-1-infected adults and adolescents, including HIV-infected pregnant women, and incorporated commentary relevant to the Australian setting.[26]

Criterion 7

There should be high-quality evidence that a screening program is effective in reducing mortality and morbidity

Observational studies in the US have shown a significant reduction in mother-to-child transmission of HIV infection, coinciding with a higher proportion of HIV-infected pregnant women identified antenatally and increased use of interventions such as HAART in such women. In the US, the number of children with AIDS has declined since 1992, and HIV-related deaths in children younger than 13 years have declined since 1994, paralleling the falling rates of new cases of AIDS diagnosed in children. The proportion of infected infants receiving antiretroviral therapy over this period increased from 7% to 91%.[18]

1 Wilson and Jungner's 12 criteria and their application to universal antenatal HIV testing in Australia

1	The condition should be an important health problem for the individual and the community	✓
2	The natural history of the condition, including development from latent to declared disease, must be understood	✓
3	There should be a recognisable latent or early symptomatic stage	✓
4	There should be a suitable and acceptable screening test	✓
5	There should be an effective and accessible treatment or intervention for the condition	✓
6	There should be an agreed policy on whom to treat as patients • Evidence-based recommendations from the United States[7] and the United Kingdom[8] are available • The Australasian Society for HIV Medicine has adopted the US guidelines and incorporated commentary relevant to the Australian setting	
7	There should be high-quality evidence that a screening program is effective in reducing mortality and morbidity • There are no randomised controlled trials, but there are data from observational studies[9,10]	
8	Treatment at an early stage should be of more benefit than treatment started later	✓
9	The potential benefit from the screening program should outweigh the potential physical and psychological harm (caused by the test, diagnostic procedure or treatment) • Every screening program has potential benefits and harms. Recognition of this and an attempt to maximise benefits and minimise harms is important	
10	The cost of the screening program should be economically balanced in relation to possible expenditure on medical care as a whole	✓
11	Adequate staffing and facilities for testing, diagnosis and follow-up, treatment and program management should be available • A formalised assessment of this should be undertaken in the Australian setting and re-evaluated after introduction of a universal screening program	
12	Case finding should be a continuing process • Ongoing education of health care providers is essential	

✓ Current published data supports this criterion. ◆

Criterion 8

Treatment at an early stage should be of more benefit than treatment started later

Detection of HIV infection early in pregnancy is of benefit to the mother and her child. Early diagnosis allows time for counselling

2 Potential benefits and harms of universal antenatal HIV screening

Potential benefits	Potential harms
• The opportunity to discuss infections and pregnancy and reinforce the "safe sex" message	• Increased psychological stress and anxiety while waiting for the HIV test results
• Earlier diagnosis in an asymptomatic woman	• Diagnosis during pregnancy may be associated with relationship conflict, or even violence
• The opportunity for assessment and timely commencement of antiretroviral treatment	• Complications associated with interventions to reduce the risk of mother-to-child transmission
• Reduction in risk of mother-to-child transmission of HIV infection	• Delivery of the baby by caesarean section (this is currently recommended, although we are uncertain about how much additional benefit this mode of delivery provides in women who are taking highly active antiretroviral therapy and have undetectable viral loads)
• The woman's sexual partners and previous children have the opportunity to be tested for HIV	• The need to avoid breastfeeding if HIV is diagnosed ◆

(and facilitates options such as termination of pregnancy, if desired) and to plan for interventions to reduce the risk of mother-to-child transmission.

Early diagnosis in the mother facilitates ongoing antiretroviral treatment, if appropriate, to maximise her own health. It allows identification of other contacts potentially exposed to HIV infection and a review of risk behaviour. In the event of failure to prevent mother-to-child transmission by appropriate interventions, early treatment of an HIV-infected child reduces both morbidity and mortality in the child.[18,19]

Criterion 9

The potential benefit from the screening program should outweigh the potential physical and psychological harm (caused by the test, diagnostic procedure or treatment)

Potential benefits and harms are detailed in Box 2.

Criterion 10

The cost of the screening program should be economically balanced in relation to possible expenditure on medical care as a whole

Studies on cost-effectiveness of universal antenatal HIV screening have been undertaken in high-income countries. These studies support universal antenatal HIV testing when the seroprevalence of HIV is reported to be (or assumed to be) greater than 0.01%.[27-31]

The one published cost-effectiveness analysis in an Australian setting suggests that a universal antenatal HIV screening approach would be cost-effective at a very low seroprevalence — 0.004372% (1 case/22 872 population).[32] Net benefits increase with a higher prevalence of HIV infection.

Criterion 11

Adequate staffing and facilities for testing, diagnosis and follow-up, treatment and program management should be available

The number of new HIV cases diagnosed as a consequence of antenatal screening is likely to be small. In Australia, it would be important to assess whether all women diagnosed, irrespective of race, location or socioeconomic status, were able to access appropriate facilities for care. In addition, a detailed support and referral system for health care providers is needed to manage HIV-infected pregnant women.

Another essential element would be to plan for and provide enhanced training and education for health care providers involved in the screening and follow-up of women. As obstetric care is provided by various health professionals in Australia, this would need to encompass GPs, midwives and obstetricians.

The specific cultural issues associated with screening migrant and non-English speaking women must also be considered. Provision of information in languages other than English, use of interpreters, and sensitivity to cultural and religious needs must all be addressed before the implementation of a universal antenatal HIV screening policy.

Criterion 12

Case finding should be a continuing process

Pre-test counselling must involve an assessment of the woman's risk factors for exposure to HIV. Education of health care providers should include the need to consider repeat HIV testing later in pregnancy for a woman who continues her "high risk" behaviour for exposure to HIV. A report describing five cases of vertical transmission occurring in women who tested negative to HIV early in pregnancy, but in whom seroconversion occurred late in pregnancy or during the breastfeeding period, highlights the importance of this criterion.[33]

Conclusion

Universal antenatal HIV screening in Australia — offering HIV testing to all pregnant women after appropriate pre-test counselling, with the possibility of opting out — fulfils most of the Wilson and Jungner criteria that need to be met before introducing a universal screening program. We therefore recommend that, in consultation both with professional medical bodies and with community groups involved in the care and management of HIV-infected women, the current review of Australia's HIV testing policy should consider a plan for implementation, monitoring and evaluation of a universal antenatal HIV screening program to maximise the potential benefits for women and their families and minimise any potential harms.

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Competing interests

None identified.

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References

1 Royal Australian and New Zealand College of Obstetricians and Gynaecologists. Antenatal screening tests. College statement 2004. http://www.ranzcog.edu.au/publications/statements/C-obs3.pdf (accessed Apr 2006).
2 Australian National Council on AIDS and Related Diseases (ANCARD). HIV testing policy. Canberra: Commonwealth Department of Health and Aged Care, 1998.
3 Hunt JM, Lumley J. Are recommendations about routine antenatal care in Australia consistent and evidence-based? *Med J Aust* 2002; 176: 255-259.
4 Giles ML, Sasadeusz JJ, Garland SM, et al. An audit of obstetricians' management of women potentially infected with blood-borne viruses. *Med J Aust* 2004; 180: 328-332.
5 Giles ML, Garland SM, Grover SR, et al. Impact of an education campaign on the management of pregnant women with a blood-borne virus. *Med J Aust* 2006; 184: 389-392.
6 Wilson JMG, Jungner G. Principles and practice of screening for diseases. Public Health Paper Number 34. Geneva: World Health Organization, 1968.
7 AIDSinfo. Public Health Service Task Force recommendations for use of antiretroviral drugs in pregnant HIV-1-infected women for maternal health and interventions to reduce perinatal HIV-1 transmission in the United States, Jul 2006. http://AIDSinfo.nih.gov (accessed Apr 2006).
8 British HIV Association. Guidelines for the management of HIV infection in pregnant women and the prevention of mother to child transmission of HIV. Mar 2005. http://www.bhiva.org (accessed Jul 2006).
9 Lindegren ML, Byers RH, Thomas P, et al. Trends in perinatal transmission of HIV/AIDS in the United States. *JAMA* 1999; 282: 531.
10 Lansky A, Jones JL, Frey RL, Lindegren ML. Trends in HIV testing among pregnant women: United States 1994-1999. *Am J Public Health* 2001; 91: 1291.
11 National Centre in HIV Epidemiology and Clinical Research. HIV/AIDS, viral hepatitis and sexually transmissible infections in Australia Annual Surveillance Report 2004. Sydney: National Centre in HIV Epidemiology and Clinical Research, University of New South Wales, 2004.
12 McLaws ML, Brown AR, Cunningham PH, et al. Prevalence of maternal HIV infection based on anonymous testing of neonates, Sydney 1989. *Med J Aust* 1990; 153: 383-386.
13 Law MG, Dore G, McDonald A, Kaldor J. The use of back projection to estimate HIV prevalence among pregnant women in Australia. *Pediatr AIDS HIV Infect* 1996; 7: 331-336.
14 Spencer JD, Tibbits D, Tippet C, et al. Review of antenatal testing policies and practice for HIV and hepatitis C infection. *Aust N Z J Public Health* 2003; 27: 614-619.
15 Chaisson R, Keruly J. Race, sex, drug use and progression of human immunodeficiency virus disease. *N Engl J Med* 1995; 333: 751-756.
16 Cozzi Lepri A, Pezzotti P. HIV disease progression in 854 women and men infected through injecting drug use and heterosexual sex followed for up to nine years from seroconversion. (Italian seroconversion study.) *BMJ* 1994; 309: 1537-1542.
17 Suligoi B. The natural history of human immunodeficiency virus infection among women compared with men. *Sex Transm Dis* 1997; 24: 77-83.
18 Abrams EJ, Weedon J, Bertolli J, et al. Aging cohort of perinatally human immunodeficinecy virus-infected children in New York City. New York City Pediatric Surveillance of Disease Consortium. *Pediatr Infect Dis J* 2001; 20: 511-517.
19 Gibb DM, Duong T, Tookey PA, et al. Decline in mortality, AIDS and hospital admissions in perinatally HIV-1 infected children in the United Kingdom and Ireland. *BMJ* 2003; 327: 1019-1024.
20 Rutherford GW, Lifson AR, Hessol NA, et al. Course of HIV-1 infection in a cohort of homosexual and bisexual men: an 11 year follow up study. *BMJ* 1990; 301: 1183-1188.
21 Strathdee SA, Craib KJ, Hogg RS, et al. Long-term non progression in HIV infection. *Lancet* 1995; 346: 1372.
22 Saada M, Le Chenadec J, Berrebi A, et al. Pregnancy and progression to AIDS: results of the French prospective cohorts. SEROGEST and SEROCO Study Groups. *AIDS* 2000; 14: 2355-2360.
23 Dax EM, Arnott A. Advances in laboratory testing for HIV. *Pathology* 2004; 36: 551-560.
24 Ioannidis JPA, Abrams EJ, Ammann A, et al. Perinatal transmission of human immunodeficiency virus type 1 by pregnant women with RNA virus loads <1000 copies/ml. *J Infect Dis* 2001; 183: 539-545.
25 The Working Group on Mother-to-Child Transmission of HIV. Rates of mother-to-child transmission of HIV-1 in Africa, America and Europe: results from 13 perinatal studies. *J Acquir Immune Defic Syndr Hum Retrovirol* 1995; 8: 506-510.
26 Australasian Society for HIV Medicine. US Guidelines for the use of antiretroviral agents in HIV-1 infected adults and adolescents incorporating commentary to adapt the guidelines to the Australian setting. Sydney: ASHM, 2005. http://ashm.org.au/aust_guidelines (accessed Jul 2006).
27 Postma MJ, Beck EJ, Mandalia S, et al. Universal HIV screening of pregnant women in England: cost effectiveness analysis. *BMJ* 1999; 318: 1656-1660.
28 Immergluck LC, Cull WL, Schwartz A, Elstein AS. Cost-effectiveness of universal compared with voluntary screening for human immunodeficiency virus among pregnant women in Chicago. *Pediatrics* 2000; 105: E54.
29 Postma MJ, Beck EJ, Hankins CA, et al. Cost effectiveness of expanded antenatal HIV testing in London. *AIDS* 2000; 14: 2383-2389.
30 Patrick DM, Money DM, Forbes J, et al. Routine prenatal screening for HIV in a low-prevalence setting. *CMAJ* 1998; 159: 942-947.
31 Bramley D, Graves N, Walker D. The cost effectiveness of universal antenatal screening for HIV in New Zealand. *AIDS* 2003; 17: 741-748.
32 Graves N, Walker DG, McDonald AM, et al. Would universal antenatal screening for HIV infection be cost-effective in a setting of very low prevalence? Modelling the data for Australia. *J Infect Dis* 2004; 190: 166-174.
33 Duval M, Faye A, Rohrlich P, et al. Failure of pediatric AIDS prevention despite maternal HIV screening in Paris, France. *J Acquir Immune Defic Syndr Hum Retrovirol* 1999; 20: 100-101.

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