

The Integrated Management of Human Immunodeficiency Virus (HIV) Infection in South Australian Prisons: The Medical Perspective

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The South Australian jurisdiction is a relatively small one with about 900 prisoners distributed over eight institutions (excluding James Nash House).

Three of these institutions, Adelaide Remand Centre, Yatala Labour Prison, and Northfield Prison Complex are in metropolitan Adelaide. The remainder are spread across the State, at Cadell, Port Lincoln, Mount Gambier, Murray Bridge and Port Augusta.

The Prison Medical Service (PMS) is a department of Modbury Hospital, assigned by the South Australian Health Commission to oversee the provision of health services to the State's prisons.

Development of a Policy of Integration of HIV-infected Inmates

The policy to maintain HIV-infected inmates in the prison mainstream, but with appropriate precautions, was a relatively simple one developed in the light of evolving knowledge about the virus between 1984 and early 1985. Since HIV infection was not known to be contagious, the policy assumed that spread of disease could be controlled by taking certain precautions and minimising the known risk behaviours.

Since then, this policy of integrating seropositive prisoners has remained largely unchanged except for the addition of compulsory screening in 1987.

When the first articles appeared in the *New England Journal of Medicine* in 1981 describing cases dubbed initially as GRID5, scant attention was paid to them. But by 1983, when Sydney had already accumulated the first cohort of cases diagnosed in the country and it was clear that an HTLV virus was associated with AIDS (Bare-Sinoussi et al. 1983), we suspected it would be only a matter of time before the infection came our way.

Late in 1983, following consultation and in collaboration with the Institute of Medical & Veterinary Science, a survey was conducted at Yatala Prison and the then Women's Rehabilitation Centre to assess the number of people in the prison environment previously exposed to hepatitis B virus (HBV) infection. At the time, direct HIV screening was yet to be developed, and HBV infection was then the common model used to assess at-risk populations. It was felt that the attack rate of HBV would give an indication of the

susceptible population potentially at risk to HIV infection. This was based on the assumption that, except for identifiable racial groups, those exposed would roughly belong to the groups where the risk behaviours for HIV transmission would also apply.

The results, surprisingly, showed that the prevalence of seropositivity for HBV antibody was only three out of the 110 (2.7 per cent) who volunteered. This was not significantly different from the attack rate for the community as a whole.

However, we were aware that it was possible the survey was not a representative one, and suspected that a potential problem existed. We knew that risk behaviours instrumental in the transmission of HIV existed in the State's prisons. There was empirical evidence of intravenous (IV) drug use in prison, and personal admissions to consensual homosexual practices. There were also periodic requests for medical examinations of inmates suspected to have been sexually assaulted.

Volunteer testing

In October 1984, a commercial enzyme immunoassay kit to screen for HTLV-III (HIV) antibodies was introduced in the State, paving the way for mass screening and direct diagnosis of HIV infection. Preparations were therefore made for the introduction of a voluntary screening program for South Australian prisoners which commenced in April 1985. By July, 116 prisoners had volunteered for testing with three confirmed seropositives. They had each been in prison for periods of four, twelve, and ten months prior to diagnosis. There was a period of two months when all three were in one prison in 1984-85. All three were IV drug users. One of them had a wife, also an IV drug user, who was diagnosed HIV seropositive early in 1985.

A subsequent mass voluntary screening of 350 inmates and officers in July 1985 conducted by the South Australian Health Commission in response to industrial unrest and concerns of prison officers, revealed no additional cases. This reinforced our earlier impression that those who were engaged in at-risk behaviours had already volunteered for testing. We believed that we had a good rapport with those who may have been at risk and that compliance from this group had been good. Our experience was similar to that reported amongst intravenous drug-users with the lymphadenopathy syndrome overseas (Spira et al. 1984).

HIV infection in prison and industrial unrest

The initial identification of an HIV-infected prisoner in Yatala Prison prompted officer demands for segregation of all prisoners with communicable diseases and the compulsory screening of all inmates for all communicable diseases. It also led to a series of industrial actions. All these caused us to critically review the rationale behind the policy of integration. Whilst it put a great deal of pressure on correctional and health policymakers, the exercise helped us to crystallise our thoughts on the issue. With no precedents for us to go by from interstate colleagues, and no knowledge of overseas practices, we had to fully convince ourselves before we could convince others.

To allay officers concerns, a team of clinicians which was headed by Dr Scott Cameron, Chairman of the State AIDS Committee was appointed to look into the whole question of communicable diseases in prison. The PMS was represented on the Committee. This Committee essentially upheld the policy that had been advocated. A by-product of this episode was the conducting of a voluntary HBV and HIV screening program involving a number of the State's larger prisons.

Compulsory testing

Compulsory screening was initially felt to be unnecessary and unhelpful as voluntary testing appeared adequate. Furthermore, early on in the epidemic, a diagnosis did not confer on the individual any advantage in terms of curative treatment. In any case, many HIV-infected individuals were already identifying themselves during the court process, in the hope of getting non-custodial or less severe custodial sentences. Their status was thus known prior to entry into prison.

However, by 1987 there was increasing concern that, with IV drug use and homosexual activity existing in prisons, prisons could be 'incubators for AIDS'. Calls made for compulsory testing of all prisoners led to the introduction of just such a policy in South Australia in August 1987. The impetus for mandatory screening was perhaps prompted more by legal than public health concerns. Fortuitously, it came at a time when AZT was being introduced into Australia after its recognition as a drug of promise in prolonging life and duration of well-being in people with AIDS (Fischel et al. 1987).

Medical benefits of early diagnosis

The situation now, three years hence, is clearly different. Early diagnosis is now clinically beneficial to the infected person. In addition to the availability of AZT to people with AIDS, there is the prospect of delaying the onset of AIDS in asymptomatic HIV-infected individuals with AZT treatment (Volberding et al. 1990; Fischel et al. 1990). Furthermore, there have been advances in the prevention of opportunistic infections for those with significantly depressed immunity, for example, the use of aerosol pentamidine to prevent pneumocystis pneumonia (Armstrong & Bernard 1988). Thus, unlike the early years of the epidemic, there are now clear medical reasons for recommending early diagnosis as medical intervention at a number of levels is possible.

Compulsory testing and segregation

It is interesting that Osborn (1988) suggested that the idea of quarantining people infected with HIV must lurk in the minds of those who advocate mandatory screening programs. The reverse seems to be true in the case of South Australia. The introduction of compulsory testing seemed to satisfy the concerns of the officers to the extent that it helped relieve pressure on the State to segregate all HIV-infected individuals. It removed the threat of quarantine.

Testing and complacency

Nevertheless, there remains the worry that compulsory testing has, and will, continue to lull some into complacency. It must be constantly emphasised to all who work and live in the prison environment that blood and body fluid precautions should be exercised on all occasions, and at all times, regardless of whether a person is known to be a communicable disease carrier.

Some Issues in the Medical Management of HIV Prisoners

Supportive medical initiatives complementing the HIV policy

In recommending the integration of HIV-infected inmates into the general prison routine, the PMS was aware that the prevention of HIV spread was very much dependent on modifying risk-taking behaviours. Those individuals allowed to enjoy the full range of prison programs were expected to comply with the rules of the system. At the same time, such a policy also required staff to exhibit a high level of professionalism in carrying out their duties. They had to exercise effective personal precautions whilst maintaining effective supervision and surveillance of their charges.

At the same time, continued acceptance of the policy by staff and inmates was implicitly dependent upon reasonable efforts being made to promote and police public health in the prison environment. In this context, a number of health programs were introduced progressively as the picture of communicable disease in prison unfolded. These initiatives probably helped both inmates and staff to accept the policy, and included the following.

HBVAX program

The initial negative officer attitude toward communicable disease in prison lumped HIV and HBV infections together. Given that HBV was preventable by vaccination, a vaccination program for officers was promptly begun. This helped to soften officers' attitudes towards the policy of integration. A year later, beginning in December 1986, a similar program was commenced for prisoners with sentences of greater than six months duration. The arbitrary cut-off took into account the cost of the vaccine and also the need to ensure reasonable completion of the vaccination program. It had been our experience that inmates tended to ignore health follow-up appointments upon discharge.

When compulsory testing for HIV was introduced, voluntary screening for HBV was offered as well. There was almost 100 per cent coverage. This led to the discovery that there was a progressive rise in the HBV carriage rate in prison, from an average monthly prevalence of 9.4 seropositive inmates in 1988 to 21 in 1989. This, of course, meant an increasing reservoir for potential transmission. So, in 1989 the program was extended to every inmate admitted into prison. This was necessary given the large proportion of prisoners who were known to be IV drug users and therefore at risk of HBV infection. It also took account of the finding that, in America at least, vaccine programs had been most difficult to carry out amongst parenteral drug users (Hadler 1988). That being the case, to immunise offenders whilst they were in prison seemed most appropriate. Importantly, the program was possible only because by then the cost of recombinant vaccines was only a third of the cost of the previously available vaccine. Immunisation, therefore, became financially affordable.

Annual voluntary CXR screening

A routine annual chest X-ray screening for pulmonary tuberculosis commenced in 1988, again on a voluntary basis. Chest X-ray screening for all HIV seropositive inmates became a routine part of the protocol in 1989.

Standard management protocol for HIV-infected prisoners

A standard protocol was developed so that each inmate was medically reviewed on a three-monthly basis and in a standard format so that there was a consistency in the review process regardless of the prison to which the inmate was transferred. It also helped to set a minimal

standard of care, a necessity if there was to be a policy of integration where an inmate, regardless of HIV status, could progress through a prison plan set for him or her.

In practice, HIV-infected inmates were seen more frequently than required by the protocol. In a review of thirteen HIV-infected inmates in the prison system during the month of September 1990, it was found that they had an average of four medical and eight nursing consultations per month. These did not include consultations with medical specialists in public hospitals, or group sessions held at some of the institutions.

HIV and drugs in prison

As alluded to earlier, a policy to allow the free movement of HIV-infected inmates in prison requires that there be a number of safeguards in place. One of the imperatives is that there must be an energetic and aggressive effort to deal with the issue of IV drug use in prison. This is the main risk behaviour in the spread of HIV in prison and its incidence must be reduced if the transmission of infection is to be minimised.

Over the past twenty-four months there have been, on average, between ten and twelve HIV-infected inmates in the State's prisons daily. In the 1988 calendar year, the average monthly prevalence was 7.3 or 0.9 per cent (7.3 in 840) whilst in the 1989 calendar year, the figure was 11.7 or 1.3 per cent (11.7 in 900). We are currently running around the latter figure. The figure is low and it is important that every effort be made to maintain it that way.

To do so, prison and health administrations must face up to the real need for a significant expansion in drug treatment services if the number of IV drug users in prison is to be reduced. In an exit survey of 193 sentenced prisoners in 1988, 26 per cent gave a history of IV drug use prior to imprisonment (personal data). The criminal careers of IV drug-using prisoners tend to be recidivistic. Our data indicates that of the 32 HIV-infected inmates that have come through the South Australian prison system, 23 or 71 per cent had been in prison at least twice. Fourteen of the 32 or 43 per cent had been in prison on at least three occasions. The vast majority (81 per cent) of the HIV-infected prisoners who have come through the State's prisons were categorised as IV drug users and acquired their infection through that activity.

In having HIV-infected inmates integrated with the general prison population, the danger of spread of HIV infection among IV drug users within prison is the potential cost of the policy. Therefore, every effort must be made to modify drug-using behaviour so that transmission risk is minimised. Every effort must be made to deal with the drug problem including the 'demand' side of the equation.

There is also the 'supply' side. Unfortunately, since the appearance of HIV in prisons, it has been our empirical observation that the incidence of IV drug use in prisons has increased, not decreased. The main conduit of supply seems to be through contact visits. Greater stringency needs to be exercised in the processing of visitors into the prison as well as during visits. More can and should be done in prisons to limit this supply. It is a correctional issue with significant health implications. Improved correctional surveillance techniques, together with random urinalysis and testing on suspicion, linked to sufficiently severe sanctions as deterrents, must be considered.

Unlike the situation in a democratic community where combating the drug problem has many constraints, and the capacity to manipulate the environment is largely limited to public education and persuasion, the prison milieu is quite different, at least in theory. Prison administrations have the power and opportunity to exercise significant control over the prison environment, from restricting access to drugs, to structured and disciplined lifestyles, to productive prison programs to interventional support in times of crises. Or so it should be. Prison administrations should recognise that they have a unique opportunity unavailable to community services in addressing this problem. An integrated policy means that this opportunity must be exploited.

Homosexual activity in prison

This is the second significant risk behaviour in the spread of HIV infection in prison. In the context of HIV and prisons, whilst calls have been made for the need to facilitate 'safe sex' in prisons by the provision of appropriate educational material and the much publicised issue of condoms, surprisingly little encouragement has been given by health advocates to correctional efforts to minimise homosexual activity in prison. The vast majority seem unprepared to say that anal sex is contrary to good health.

From a public health perspective, it would seem logical to actively attempt to minimise anal intercourse, just as attempts should be made to minimise IV drug use, whether in the community or in prison. In the correctional context, it is sensible and desirable that policies be developed to minimise homosexual activities between inmates by reducing the opportunities for such contact and, importantly, to rethink policies on how sexual desires may be legitimately expressed. Control of homosexual activity in prison is about good correctional administration. Then only, at the next level should it be acknowledged that some prisoners will continue to engage in homosexual acts. For these prisoners there should at least be access to the lesser option, i.e. condom protection. It is a lesser option in that it does not completely eliminate the undesirable consequences that arise from anal intercourse, especially anal-receptive (passive) intercourse for the HIV-infected person.

There is available evidence suggesting that anal-receptive intercourse is associated with impairment of the individual's immunocompetence. Thus, continuing in the risk behaviour will further impair the immune status of the infected individual. It has been reported that homosexual men practising anal-receptive intercourse have impaired immunity and higher CD-8 and lower CD-4 lymphocyte counts than men practising no anal intercourse or being the active partner (Ratnam et al. 1986; Detels et al. 1983).

A number of factors have been proposed to account for this observation, including systemic exposure to infectious agents through breaks in the rectal mucosa, the lymphocyte inhibitory effect of seminal plasma and the immunosuppressive properties of antigens from seminal lymphocytes and spermatozoa (Gottlieb 1986). Whilst their clinical significance has yet to be quantified, clinicians would be failing in their duty if they did not warn their patients of these possible untoward effects.

HIV and diets and vitamins

A common problem that medical staff in prisons encounter, and to which HIV-infected inmates are prone to is in the area of diets and vitamin supplements. It is sometimes quite difficult for PMS staff contending with requests for various changes to diets or requests for vitamin supplements.

It is said that HIV-infected individuals need to be given some choices; a patient without choices feels helpless. Inmates should be encouraged to adopt a positive attitude and be allowed to be more in control. But we do not agree with the practice of some agencies to use food and dietary supplements as an area of experimental exercise of choice. They see this as a 'soft option' area that does no harm.

We have difficulty with this. It is our view that having a positive attitude towards their infection also involves being realistic and accepting of many of their circumstances. This assists in avoiding disappointments arising from misplaced hopes. Prisoners with HIV infection should aim for some regular daily routine and a regular and balanced diet. Many of the ideas about food items suggested to HIV-infected inmates, through the prison grape-vine and lay magazines, are no more than fads that have no scientific basis. Furthermore, vitamins pills and capsules and the like are notorious vehicles for other types of illicit drugs in circulation in prison.

However, dietary supplements do have a place where clinically indicated. In this context we are concerned that those who restrict certain food items in their diet or are pure vegetarians do not develop malnutrition or vitamin B12 deficiency. The prison diet in South Australian prisons has been designed and checked by reputable nutritionists, and inmates are encouraged to use it.

HIV infection and equitable access to appropriate health care in prison

Central to the integrative policy is the access of prisoners to programs that help them towards a useful, productive life in the community. This means that the inmate is able to participate in a prison plan that usually involves time spent in country prisons. This would then require HIV-infected inmates to have access to as comprehensive a range of health services in the country as in the city. The problem is that health care services in country areas are not as wide-ranging and as readily available as those in the city. This situation will impact on the policy regarding transfers to outlying prisons when more HIV-infected prisoners become symptomatic.

At the same time, there is also a danger that the importance of and reliance on specialty clinics such as STD clinics may be overemphasised. This is especially so in South Australia where specialist services are concentrated in Adelaide. In the context of our policy, excessive centring of care would foster, in the mind of the HIV-infected inmate, the view that any place outside Adelaide is incapable of providing adequate and competent care.

This issue of relative levels of service is made less clear-cut by the 'softer', often less restrictive, more pleasant and often more supportive environment of country prisons. It is sometimes a difficult decision for the medical officer who has to clear a transfer, having to weigh ready access to health services against the better environment that country prisons generally provide. To date, it has not posed any real difficulties, but may do so when more symptomatic cases occur.

Education and counselling

As yet, PMS staff have not encountered any significant difficulty in getting inmates tested for HIV. Only a handful of prisoners initially refused but promptly changed their minds when spoken to by prison management. Education about HIV infection accompanied all testing and was repeated when test results were given out.

The difficulty has been in maintaining the same initial level of enthusiasm and comprehensiveness during counselling with the progress of time. The presentation of complete and accurate information is, needless to say, very important. Each new admission, after counselling, is also given a copy of the AIDS Report (published by NACAIDS, Canberra). This provides ready information for the inmate wishing to know more.

All PMS nursing staff have gone through an AIDS counselling course conducted by the main STD clinic in Adelaide. This, together with their professional access to, and knowledge of the inmates and the prisons provides a timely, appropriate and relatively uniform presentation of information and advice to the prisoners.

There was a time when counsellors from other agencies as well as PMS nurses and doctors participated in the counselling process. Inmates are generally suspicious and are quick to pick apparent discrepancies in information given to them from different sources. Problems arose but the potential for confusion and manipulation was resolved by making the PMS solely responsible for counselling.

Individual questioning of PMS staff at various times showed that after a while, the information they gave about HIV tended to be summarised. It became less than complete. This is something that health care staff need to be aware of and guard against. The message must be given concisely and yet adequately and accurately, and in such a way as to positively encourage the right behaviour.

The ultimate test for effective education and counselling is changed behaviour. Any other measure of outcome is only secondary. To this end, medical and nursing staff need to keep abreast of scientific developments. The challenge is for prison health administrators to facilitate on-going education to enable staff to enhance communication skills and keep in touch with the rapid advance of knowledge about HIV infection and AIDS.

HIV infection and the stress of imprisonment

Since the days of Galen, physicians have been aware of the link between stress and illness. The advent of HIV did, for a while, raise the issue of psychoneuroimmunology into prominence. The PMS was, on a number of occasions, called to give an opinion as to what possible fate would await an incarcerated HIV-infected person. Of particular concern was any deleterious effect that the stress of imprisonment could have on the health of the infected person.

There is a body of scientific evidence that links stress with disease through neuronal and hormonal pathways between the brain and the immune system (Lancet 1987; Schindler 1985). However, for the clinician, the difficulty lies in defining and then quantifying stress. As if that is not hard enough, it is just as difficult to quantify the clinical impact of stress on an individual's immunocompetence.

Any stress experienced in prison must be weighed against the stress that these same individuals would face engaged in their lifestyles in the community. Many would agree that the latter is not without significant stress. So to step into this area is to be like the proverbial fool walking in where angels fear to tread.

Nevertheless, it is apparent to us over the last five years that HIV-infected inmates coming into prison for a period of time more often than not leave the prison having put on weight, and looking more healthy than when they first came in. This would be an interesting area of research. It is our suspicion that the structured lifestyle, the relatively protected environment and the separation from their previous environment probably did them some good, at least in terms of physical health.

Industrial and occupational issues

Even in recent days there remains much apprehension and trepidation about HIV amongst correctional staff. This is not surprising, given similar reactions amongst ambulance drivers and even some health care staff in South Australia. Even in New York in 1988, where knowledge about AIDS is probably widespread, a survey by Link, Feingold et al. showed that 48 per cent of house officers reported moderate-to-major concern about acquiring AIDS from their patients. The reason is simple. AIDS is a fatal infection that is as yet without a cure. Whilst those working in certain hospitals, like those in New York, are obviously exposed to a greater risk, to correctional officers, to be at risk means to be in danger. Possibility is the same as probability to them.

In the context of an integrated policy, it therefore behoves policymakers to incorporate any new and significant developments into the process promptly to maintain credibility.

Despite two highly publicised reports on the failure of AZT to prevent infection after accidental exposure to HIV (Lange et al. 1990; Looke & Grove 1990), we are about to put in place an AZT prophylaxis protocol in accordance with recommendations of the Australian National Council on AIDS (1990). The protocol provides that staff accidentally exposed to possible HIV infection may commence on starter doses of AZT prophylaxis whilst awaiting initial telephone contact with an infectious disease physician. Subsequent appropriate medical supervision is then organised.

Confidentiality

In one sense, confidentiality about HIV infection does not exist in prison. Somehow, people in prison get to know those who are seropositive. In a number of instances, inmates have identified themselves as seropositive. Either this reflected their confidence in their colleagues and in the system, or they were 'persuaded' to reveal their status. If the former is the case, then it is an attitude perhaps fostered by an integrative policy. The latter does not appear to be common.

Nevertheless, the PMS maintains the same attitude towards the confidentiality of the inmates under our care as we would the other patients in our hospital. PMS staff make it a point to tell inmates that we are from a public hospital and independent of the Department of Correctional Services, and that we meticulously follow the rules of confidentiality. This assurance of confidence is necessary even though some may be already known to others in prison as HIV-infected.

Conclusion

This paper has detailed the experience of the PMS in coping with HIV infection in South Australian prisons over the past five years. The focus has been on the virus and how we contended with it. But the success of our efforts will be measured by the lives of the people who have been and may be affected by it.

On his deathbed in 1895 Louis Pasteur, the man who proved the existence of microbes, and of which HIV is simply one, is reported to have said, in reference to his lifelong rivalry with Claude Bernard, 'Bernard was right. Microbes are nothing, the soil is every thing'. His lesson applies today. The soil is the person upon whom the virus wreaks its havoc. We must focus on the whole person: the physical, emotional and spiritual. There are still quite a few gaps yet to be filled.

References

- Armstrong, D. & Bernard, E. 1988, 'Aerosol pentamidine', *Annals of Internal Medicine*, vol. 109, pp. 852-4.
- Australian National Council on AIDS 1990, *Bulletin* no. 2, January.
- Barre-Sinoussi, F., Chermann, J-C., Schutzer, S.E. et al. 1983, 'Isolation of a T-lymphotropic retrovirus from a patient at risk for Acquired Immune Deficiency Syndrome (AIDS)', *Science*, vol. 220, pp. 868-71.
- Detels, R., Fahey, J.L., Schwartz, K. et al. 1983, 'The relationship between sexual practices and T-cell subsets in homosexually active males', *Lancet*, vol. 1, p. 609.
- Fischl, M.A., Richman, D.D., Grieco, M.H. et al. 1987, 'The efficacy of azidothymidine (AZT) in the treatment of AIDS and AIDS Related Complex. A double-blind, placebo-controlled trial', *New England Journal of Medicine*, vol. 317, pp. 185-91.
- Fischl, M.A., Richman, D.D., Hansen, N., Collier, A.C., Carey, J.T. et al. (AIDS Clinical Trials Group) 1990, 'The safety and efficacy of zidovudine (AZT) in the treatment of subjects with mildly symptomatic HIV-1 infection', *Annals of Internal Medicine*, May, vol. 112, no. 10, pp. 727-37.
- Gottlieb, M.S. 1986, 'Immunologic aspects of the Acquired Immunodeficiency Syndrome and male homosexuality', *Medical Clinics of North America*, vol. 70, no. 3, pp. 651-64.
- Hadler, S.C. 1988, 'Hepatitis B prevention and Human Immunodeficiency Virus (HIV) Infection', *Annals of Internal Medicine*, vol. 109, no. 2, pp. 92-3.
- Lancet* [Editorial] 27 June, 1987 pp. 1467-8.
- Lange, J.M.A. et al. 1990, 'Failure of zidovudine prophylaxis after accidental exposure to HIV-1', *New England Journal of Medicine*, 10 May, vol. 322, pp. 1375-7.
- Link, R.N., Feingold, A.R., Charap, M.H., Freeman, K. & Shelov, S.P. 1988, 'Concerns of medical and pediatric house officers about acquiring AIDS from their patients', *American Journal Public Health*, vol. 78, pp. 455-9.
- Looke, D.F.M. & Grove, D.I. [letter] 1990 'Failed prophylactic zidovudine after needlestick injury', *Lancet*, May 26, vol. 335, p. 1280.
- New England Journal of Medicine* 1981, vol. 305, no. 24, 10 December.
- Osborn, J.E. 1988, 'AIDS: politics and science', [Editorial] *New England Journal of Medicine*, vol 318, pp. 444-7.
- Ratnam, K.V, Wong, T.W., Lee, J. et al. 1986, 'Effect of ano-receptive homosexual practice on T-lymphocytes and delayed hypersensitivity in transsexuals', *Australian & New Zealand Journal of Medicine*, pp. 757-60.
- Schindler, B.A. 1985, 'Stress, affective disorders, and immune function', *Medical Clinics of North America*, vol. 69, no. 3, pp. 585-97.

- Spira, T.J., Des Jarlais, D.C., Marmor, M. et al. 1984, 'Prevalence of antibody to lymphadenopathy-associated virus among drug-detoxification patients in New York', [Letter] *New England Journal of Medicine*, vol. 311, pp. 467-8.
- Volberding, P.A., Lagakos, S.W., Koch, M.A. et al. (AIDS Clinical Trials Group) 1990, 'Zidovudine in asymptomatic Human Immunodeficiency Virus Infection. A controlled trial in persons with fewer than 500 CD4-Positive cells per cubic millimeter', *New England Journal of Medicine*, vol. 322, pp. 941-9.