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Editorial

Human immunodeficiency virus infection: screen, be clean, or both?

Continuing concern about the transmission in hospitals of the human immunodeficiency virus (HIV) associated with the acquired immune deficiency syndrome (AIDS) is understandable. Once contracted the infection probably persists for life: there is no prospect of effective treatment in the foreseeable future and the evidence so far accumulated points to a dramatic increase in the number of affected patients in the months ahead. The current programme of public education may be successful in modifying sexual behaviour, but with a latent period of up to five years between inoculation and the onset of symptoms[1] the number of patients in the United Kingdom will continue to increase, from 273 patients in 1985 to perhaps 2000 new patients in 1988.[2 3] Respiratory physicians throughout the country will be increasingly exposed to patients with diseases related to HIV, as will the staff of bronchoscopy and lung function units, for whom acceptable procedural guidelines have not yet been established.

Although human immune deficiency virus has been isolated from blood, saliva, semen, tears,[4] breast milk,[5] and cervical and vaginal secretions,[6 7] the virus appears to be more ubiquitous than it is infectious. Transfusion of blood and blood products, sexual intercourse, artificial insemination,[8] organ transplantation,[9] and percutaneous inoculation with contaminated needles[10] have all resulted in transmission of the virus infection. Breast milk may have been responsible for one case of transmission to an infant[11] and vertical transmission from mother to baby can occur in utero. Casual social contact and kissing do not apparently lead to transmission of infection between household and family members,[12] perhaps because the virus is found only infrequently in saliva and probably in small numbers.[13] Heterosexual transmission has occurred only rarely in the United States: 14·7% of 1026 women and 0·2% of 14 693 men were considered to have been infected by heterosexual contact, mainly with drug addicts who abuse intravenous drugs.[14 15] Although there is no evidence so far that heterosexual transmission is on the increase in the UK, these figures are at variance with those from some areas of central Africa, where male to female ratios of reported cases of AIDS are approaching unity. Furthermore, HIV infection in Africa is closely associated with the presence of other sexually transmitted infections.[16] The greater prevalence of genital tract ulceration, the higher background level of immunosuppression, or differences in the virus itself may possibly facilitate heterosexual transmission in Africa; but until this phenomenon has been more fully explained, heterosexual transmission should be considered an important potential source of viral transmission in the United States and Europe.

HIV infection results in a range of clinical disorders, from an asymptomatic carrier state through various combinations of lymphadenopathy, diarrhoea, fatigue, weight loss, fever, and candidiasis to the full clinical syndrome characterised by opportunist infections and tumours, of which Kaposi's sarcoma is the most common. The interval between inoculation with the virus and seroconversion is variable but most people will develop specific antibodies within 10 weeks. The mean latent period between inoculation and the onset of symptoms is 4·5 years for transfusion associated AIDS and over 3 years in homosexual men. The risk of infected haemophiliacs going on to develop AIDS or an AIDS related illness appears to be less than that of homosexuals. It is not known, however, whether symptomless carriers of the virus are more or less infectious than patients with overt disease. In common with other retrovirus infections, HIV infection is persistent and individuals with a confirmed infection should be considered potentially infectious for life.

HIV infection and health care workers

Even though AIDS has proved a more lethal disease than hepatitis B, the problems for health care workers presented by the two conditions are very similar. Many health care workers, however, have died from

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serum hepatitis B acquired in hospital, whereas no one anywhere in the world has yet contracted AIDS solely in the course of his occupation. It has been shown that 1 ml of blood infected with hepatitis B contains as many as 10^{13} viral particles, compared with only 10^{4} for HIV.[17] Indeed, inoculation with serum containing both hepatitis B virus and HIV has resulted in hepatitis B infection in health service staff but not HIV infection.[18] A World Health Organisation survey of 1758 doctors, nurses, and technicians in the United States, excluding 23 from known risk groups, who had direct or indirect contact with patients with AIDS or an AIDS related condition, found that only three staff had HIV antibodies in their serum. In none could all of the known risk factors for HIV infection be definitely excluded.[19] At San Francisco General Hospital one third of the 160 staff concerned with the care of 500 patients with AIDS have sustained needle stick injuries or skin contaminations since 1981, and none have shown seroconversion.[18] So far there have been only three confirmed reports of transmission of HIV infection to health care workers—in England, the United States, and France. In all cases a needlestick injury was responsible.[10 20 21] Experience so far indicates that the only risk to hospital staff arises from percutaneous inoculation of contaminated blood—for example, by needles or broken glass. As the virus has been identified in most body secretions, however, it is unacceptable to expose health care workers to even a theoretical risk from these. Transmission of infection has not occurred by splashing or through mucosal surfaces in the eyes, mouth, or nose. These must, however, be considered potential routes of infection until subsequent studies show that they are safe.

Possible strategies

Possible strategies for preventing cross infection with HIV to other patients and health care workers may be considered under three headings:

1 Selective screening of those individuals judged to be possible carriers of HIV.

2 Universal screening of all patients who undergo hospital treatment or investigation.

3 The adoption of infection control measures adequate to prevent cross infection with HIV for all hospital patients.

DHSS guidelines

The Department of Health and Social Security (DHSS) has circulated advice on HIV infection to all health care professionals in the United Kingdom in a series of four booklets with distinctive pale blue covers.* The third of these, entitled *Guidance for Surgeons, Anaesthetists and Dentists and Their Teams in Dealing with Patients Infected with HTLVIII* (CMO(86)7, April 1986), gives guidelines for preventing cross infection in clinical practice. These guidelines are partly based on the recommendations of the Working Party of the Hospital Infection Society (1985) and the Advisory Committee on Dangerous Pathogens (1984). The DHSS advises that containment measures for HIV infection should be the same as those currently in practice for hepatitis B infection. This policy requires doctors to recognise "high risk" patients from clinical and social cues and apply to them containment measures over and above those normally applied to non-infected patients. These measures include notifying laboratories in advance of the arrival of specimens, putting specimens in double bags flagged "biohazard," taking particular care with contaminated sharps (and especially not resheathing needles), and covering cuts, abrasions, and vascular access sites on patients and staff alike with waterproof dressings. Contaminated work surfaces should be wiped with bleach, diluted 1/10, or with 2% glutaraldehyde and left for 30 minutes. Instruments that cannot be autoclaved, such as fibreoptic bronchoscopes, should be soaked immediately after use for one hour in 2% glutaraldehyde, then thoroughly cleaned and further soaked in glutaraldehyde for three hours. It is also advised that precautions to be applied to the minority of patients with established AIDS may need to be more stringent if they are infected with dangerous opportunist pathogens. Patients may, however, be nursed in open wards and use normal crockery, cutlery, toilet, and washing facilities—but not shaving equipment. Only patients with a potentially dangerous opportunist infection or who are bleeding excessively, incontinent, mentally disturbed, or terminally ill need to be nursed in a side room. Isolation techniques to be applied in such cases and also for the handling of any contaminated equipment require attendants to wear a plastic apron, gown, gloves, and, if there is a risk of splashing of blood or secretions, a mask and goggles.

The dilemma

These guidelines rely for their success on the prompt identification by medical staff of patients in the "HIV risk" categories. These categories are: patients with known or suspected AIDS or persistent generalised lymphadenopathy; patients known to be positive for HIV antibody; homosexuals and bisexuals; drug abusers who use injections; haemophiliacs and others.

*Obtainable from DHSS Store, Health Publications Unit, No 2 Site, Manchester Road, Heywood, Lancs OL10 1PZ. Reference Nos: CMO(85)7, CMO(85)12, CMO(86)7, CMO(86)12.

who receive blood concentrates; patients who have been resident in central Africa in the past five years; and sexual partners and babies of any of the above. Even the most fastidious clinician could be excused for failing to suspect that a patient may belong to certain of these groups in all but most overt cases. Given the natural disinclination of many doctors to inquire about a patient's sexual habits and the tendency for patients to give ambiguous or untruthful replies, it is probable that some patients positive for HIV are not being subjected to serological screening. With a period of up to 10 weeks between inoculation and the development of specific antibodies a minority of those screened will be infectious but found to be antibody negative. A smaller minority of patients infected with the virus will have persistently negative serological results.[22] Consequently health care workers and laboratory staff in particular are taking special precautions for known high risk specimens while assuming that current routine practices are safe for those whose infectivity has passed unrecognised.

These shortcomings would be resolved only partially by a programme of universal screening of all hospital patients. While such a programme would remove the problem of human error in identifying the "high risk" patient, there remains the lesser problem of those patients who are infectious but who prove to be antibody negative at the time of testing. To screen all hospital patients would also accentuate the current legal and social problems arising from HIV screening. Currently common practice in the United Kingdom is to obtain a patient's verbal consent to test serum for HIV antibodies. There are, however, no firm legal precepts to guide doctors in their decisions about informing patients that they are to be screened for HIV antibody and about disclosure or concealment of the information obtained. This problem has now been addressed in California with the result that legislation has been passed that requires the explicit and written informed consent of the patient before any AIDS virus serological tests are ordered. Considerable mental and emotional problems and some suicides have occurred after disclosure of a positive HIV antibody test result. Although the prognosis associated with the asymptomatic carrier state is not known, many such individuals have experienced difficulty in obtaining life assurance and mortgages. Others have lost their friends and their jobs. Some organisations in the homosexual community recommend that homosexual men ensure that their financial position is secure before offering themselves for testing; advice that would be less practicable if a policy of universal screening were to be adopted. Serological screening inevitably means a conflict of interests between the benefits of infection control to other patients and staff on the one hand and the social, financial, and psychological difficulties for those patients found to be antibody positive on the other.

Suggestions for an alternative strategy

These arguments lead to conclusions different from those hitherto accepted. Firstly, the central role of screening should be reduced so that it has a more specific role in organ transplantation and in blood, plasma, and semen donation, and possibly with selected groups such as patients having dialysis and high risk antenatal patients.[23] Secondly, those infection control practices deemed necessary for an HIV positive individual should be adopted for all hospital patients. The rising tide of HIV infection necessitates a re-examination of current standards of infection control in hospitals to raise them to a level sufficient to prevent the spread of any infection between patients and from patients to staff. This would not prove unduly onerous. The application to all patients of the precautions currently recommended for containment of HIV infection would require considerable capital expenditure or unacceptable compromise in patient care. It is suggested that the current DHSS advice is too cautious.

HIV, like other members of the Retroviridae, is readily destroyed by heat and disinfectants. Exposure to hypochlorite, glutaraldehyde, or alcohols for 30 minutes is sufficient to destroy HIV and hepatitis B virus.[24 25] The soaking of instruments in 2% glutaraldehyde for one hour before they are cleaned may damage fibreoptic instruments by allowing detritus to set in the channels before cleaning. Moreover, a further three hours in glutaraldehyde is excessive. Such a lengthy cleaning procedure would reduce a bronchoscopy list at all but the most lavishly equipped units to one or two patients. Instead, it is here suggested that instruments should be carefully cleaned immediately after use and soaked for 60 minutes in 2% freshly activated glutaraldehyde. This is sufficient to destroy HIV, hepatitis B virus, and mycobacteria. There is no need for bronchoscopes or endoscopes "dedicated" to use on HIV positive patients. The bronchoscopist and assistants should wear gloves for all patients having bronchoscopy because tiny skin abrasions are a potential site for transmission of infection. That staff should wear gowns seems desirable, not least to serve as a reminder about maintaining good standards of hygiene. To prevent mucosal inoculation the bronchoscopist should in addition wear a mask and comfortable, close fitting eye protection (for example, Armamax Pulsafe). Detritus produced during bronchoscopy, such as swabs and syringes from all patients, should be treated as a potential source of infection and disposed of in sealed bags for incineration. Similarly all specimens should be handled, in

transport and in the laboratories, as a potential hazard for infection.

The flagging of samples with "biohazard" stickers, which attributes to unlabelled specimens a degree of safety they may not have, would be rendered unnecessary. Ironically, the increasing use of these labels with the advent of HIV infection has lessened their impact and usefulness. Instead, the minimum level of laboratory safety for all samples needs to be determined and adopted universally. Routine laboratory procedures may yet prove adequate to contain all likely pathogens, as is the current "de facto" assumption, or it may be necessary to abandon current routine procedures in favour of more stringent containment measures. To conduct all laboratory business at, for example, containment level 2 would require considerable expenditure for improving laboratory facilities, but if this level is genuinely thought to be the minimum required to prevent the laboratory spread of HIV infection it should logically be adopted for all specimens and without recourse to screening. Contaminated work surfaces should always be disinfected with 2% glutaraldehyde, bleach diluted 1:10, or other disinfectant equally effective against HIV. The wearing of gloves is advised for all procedures in which arteries, veins, or capillaries are punctured, though the wearing of gowns for this purpose is not strictly necessary. The DHSS recommendations for the disposal of linen used for HIV infected patients are unnecessarily burdensome and if universally adopted would impose severe limitations on laundry services. The dilemma presented by the failure to recognise some carriers of HIV infection makes it advisable to adopt a universal but less stringent policy for handling linen. It is recommended that all linen contaminated with body fluids should be contained in plastic bags and laundered at 93°C for 10 minutes.

Carriers of HIV have undoubtedly undergone investigation and treatment in hospitals without recognition of their infectious state. It is encouraging that there have been no documented cases of transmission of infection from those who have slipped through the screening process, or who have been recognised too late. Complacency, however, should not preclude the overdue adoption of consistently safe yet practical precautions against the transmission of all hospital infections.

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Book notices

Organization and Practice in Tuberculosis Bacteriology. C H Collins, J M Grange, M D Yates. (Pp 124; £16.00, hardback.) London: Butterworth, 1985. ISBN 0 407 00296.

This presentation of the organisation and practice of a tuberculosis bacteriology laboratory is based on the authors' lifelong experience. It is a practical manual that describes in detail the laboratory methods used in the diagnosis of mycobacterial infection and the control of chemotherapy. The methods described range from simple side room microscopy for acid fast bacilli to culture of mycobacteria and identification of species, a facility usually available only at national level. A wide range of methods are presented, including the formulae of media and reagents, and considerable attention is given to the description of the apparatus and procedures necessary to prevent laboratory acquired tuberculosis. It includes a short but adequate description of methods used in the diagnosis and control of the treatment of leprosy. From the point of view of the clinician the presentation of the technical aspects is somewhat remote in the context of the practice of thoracic medicine in Britain. For practice in the developing world, however, it is essential. What is of much greater interest to the physician in Britain is the concise and clear presentation of the taxonomic principles applying to the classification of the mycobacteria and the criteria for the identification of the species and variants that are of medical importance. These two chapters and the one on drug sensitivity testing should become recommended reading for training in thoracic medicine. The wide range of methods presented makes this book as applicable in developing countries as in Britain and, with the sole exception of the failure of chapter 5 to emphasise that it is essential to use new slides for smear examinations under all conditions, the methods described are reliable and acceptable. The detailed discussion of the advantages and limitations of the different techniques allows a choice of methods to meet even the most restricted budget. This book is therefore an essential bench manual for all microbiologists and a useful reference book for chest physicians, particularly during their training and when working abroad.—JBS

Essentials of Thoracic and Cardiac Surgery. K Moghissi, C P Aber. (Pp 408; £39.95, hardback.) London: Heinemann Medical Books, 1986. ISBN 433 22131 3.

When a textbook is entitled *Essentials of Thoracic and Cardiac Surgery*, and in it 61 pages describe cardiac surgery and 402 pages the rest, the reader is entitled to expect a script enlivened by quirks: a break in the dullness of medical publication. The quirks may not be evident to the junior or "training" surgeons to whom this book is addressed. They will find a detailed account of the day to day management of their patients, cardiac patients excepted. The so called simpler (but so difficult to describe) essentials, such as what to do with pleural drains and when to operate on haemothorax, are dealt with in an unambiguous way. The more arcane is stated with equal clarity. A trainee on reading this book will know what Mr Moghissi and most thoracic surgeons would expect of him or her. The section on cardiac surgery, written with Dr Aber, could be read by a registrar the night before he starts work for the first time in cardiac surgery. It is none the worse for that but is not, nor is it meant to be, all embracing or even embracing. With regard to the quirks: any practised surgeon has his own way of going about things and those oddities, too often hidden from print, are of value when controlled by the general rules of surgery. Both rules and quirks are present, to the advantage and interest of readers.—EC

Surgical Diseases of the Pleura and Chest Wall. R M Hood. (Pp 269; £52.50, hardback.) Philadelphia: W B Saunders, 1986. ISBN 0 7216 1401 9.

The aim of this book, according to the author, is to instruct residents and fellows in general and thoracic surgery and provide a basic knowledge of disease and surgical care and techniques. To do this requires clear decisive instruction with a plan of management. This has been done with flow charts, which are quite useful. The selection of topics is, however, a little surprising in a book with this title. In the 250 pages there are only 22 pages of chest wall tumours yet 15 pages on spontaneous pneumothorax, more a disease of the lung than pleura. The first chapter gives a brief account of chest wall anatomy and a page on physical examination, suitable for a first year clinical student. In the second chapter there is an interesting account of computed tomography although very little on standard radiography, which might be more useful for the intended readers. This emphasis presumably is due to the availability of computed tomography in North America. The next chapter discusses the causes and diagnosis of pleural effusion. Thoracoscopy is only briefly mentioned and only after open biopsy. The next 93 pages discuss pleural infection; a quarter of this section is on bronchopleural fistula. For surgeons in training a discussion of causes and prevention of fistulas would be more useful. Further chapters on chest wall injuries and particularly mesothelioma are disappointing. The title of this book is misleading and, although written in a readable style, the book cannot be recommended as essential reading for surgeons in training.—REL