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→ [redacted]

Tel. [redacted]
EXTENSION
Your Ref.
Our Ref.

RUCHILL HOSPITAL,
GLASGOW G20 9NB

With Compliments

[redacted]

p.p. [redacted]
Consultant Epidemiologist

A.N.S.W.E.R

CDS 87/25
(A12)

(AIDS News Supplement, CDS Weekly Report)

Prepared and presented as a professional service by the Communicable Diseases (Scotland) Unit, Ruchill Hospital, Glasgow, G20 9NB, Scotland

Update: Human Immunodeficiency Virus Infections in Health-Care Workers Exposed to Blood of Infected Patients - USA

(Based on and reproduced, with acknowledgement, from *Morbidity and Mortality Weekly Report* of the Centers for Disease Control, US Public Health Service (1987) **36**, no. 19 285-9)

Six persons who provided health care to patients with human immunodeficiency virus (HIV) infection and who denied other risk factors have previously been reported to have HIV infection. Four of these cases followed needle-stick exposures to blood from patients infected with HIV (Anonymous 1984, Stricof and Morse 1986, Oksenhendler *et al* 1986, Neisson-Vernant *et al* 1986). The two additional cases involved persons who provided nursing care to persons with HIV infection. Although neither of these two persons sustained needle-stick injuries, both had extensive contact with blood or body fluids of the infected patient and neither observed routinely recommended barrier precautions (Grint and McEvoy 1985, see also CDS 86/07).

The Centers for Disease Control (CDC) of the U.S. Public Health Service have received reports of HIV infection in three additional health-care workers following non-needle-stick exposures to blood from infected patients. The exposures occurred during 1986 in three different geographical areas. Although these three cases represent rare events, they re-emphasise the need for health-care workers to adhere rigorously to existing infection control recommendations for minimizing the risk of exposure to blood and body fluids of all patients (see CDS 85/50 and 86/19).

Health-Care Worker 1: A female health-care worker assisted in an emergency room with an unsuccessful attempt to insert an arterial catheter in a patient suffering a cardiac arrest. She applied pressure to the insertion site to stop the bleeding and during the procedure she may have had a small amount of blood on her index finger for about 20 minutes before washing her hands. Afterwards, she may also have assisted in cleaning the room but did not recall any other exposures to the patient's blood or body fluids. She did not have any open wounds but her hands were chapped. Although she often wore gloves when anticipating exposure to blood, she was not wearing gloves during this incident.

The patient with the cardiac arrest died. A post-mortem examination identified *Pneumocystis carinii* pneumonia, and a blood sample was positive for HIV antibody by enzyme immunoassay (EIA) and Western blot methods. Twenty days after the incident, the health-care worker became ill with fever, myalgia, extreme fatigue, sore throat, nausea, vomiting, diarrhoea, a 14-pounds' weight loss, and generalised lymphadenopathy, which her physician diagnosed as a viral syndrome. That illness lasted three weeks. She felt much better nine weeks after the incident and, when she was examined six months after the incident, all signs and symptoms had resolved. She had donated blood eight months before the incident and was 'negative' for HIV antibody by EIA. She donated again 16 weeks after the incident and was 'positive' for HIV by EIA and Western blot (bands p24 and gp41). Serum samples obtained 20 and 23 weeks after the incident were also 'positive' for HIV antibody. She stated that for over eight years her only

sexual partner had been her husband, who denied risk factors for HIV and was seronegative for HIV antibody. She denied ever receiving a blood transfusion, ever using intravenous drugs, or having any needle-stick injuries or other significant exposures to blood or body fluids in the past eight years. Her serological test for syphilis was 'negative'. Fifteen other employees who assisted in the care of the patient were seronegative at least four months after the exposure.

Health-Care Worker 2: A female phlebotomist was filling a 10 ml vacuum blood-collection tube with blood from an outpatient with a suspected HIV infection when the top of the tube flew off and blood splattered around the room, on her face and in her mouth. She was wearing gloves to protect her hands and was wearing eyeglasses so she did not think any blood reached her eyes. She had facial acne but not open wounds. She washed the blood off immediately after the exposure. The outpatient's blood sample was 'positive' for HIV antibody by EIA and Western blot and a hepatitis B surface antigen test was 'negative'. The phlebotomist's EIA was 'negative' the day after the incident and again eight weeks later. When she donated blood nine months after the exposure, she was 'positive' for HIV antibody by EIA and Western blot (bands p24 and gp41) but she has not had any symptoms. She denied having any sexual contact during the previous two years, ever using drugs intravenously, or ever receiving a transfusion. Two months after the incident, she scratched the back of her hand with a needle used to draw blood from an intravenous drug-abuser of unknown HIV-antibody status. She did not bleed as a result of the scratch and has not had any needle-stick injuries in over two years. Her serological tests for syphilis and hepatitis B were 'negative'. A co-worker who was splattered with blood on the face and in the mouth during the same incident remains seronegative one year after the incident.

Health-Care Worker 3: A female medical technologist was manipulating an apheresis machine (a device to separate blood components) to correct a problem that developed during an outpatient procedure when blood spilled, covering most of her hands and forearms. She was not wearing gloves. She does not recall having any open wounds on her hands or any mucous-membrane exposure. However, she had dermatitis on one ear and may have touched it. She washed the blood off herself and the machine several minutes after the spill. The patient undergoing the apheresis had denied risk factors for HIV infection. However, a blood sample from the patient was 'positive' for HIV antibody by EIA and Western blot methods and 'negative' for hepatitis B surface antigen the next day. The technologist's HIV-antibody tests were 'negative' five days after the exposure and again six weeks later. Eight weeks after the exposure, she had an influenza-like illness with fever, myalgia, diarrhoea, hives and a pruritic, red, macular rash on her arms and legs. The illness resolved after a few weeks and her physician though the illness was probably a viral syndrome. Three months after the incident, she was 'positive' for HIV antibody by EIA and Western blot methods (band p24 alone). Four months after the incident, a Western blot was 'positive' (bands p24 and gp41). She indicated that for more than eight years her only sexual partner had been her husband, who denied risk factors for HIV infection and was seronegative for HIV antibody. She denied ever receiving a transfusion, ever using intravenous drugs, or having any needle-stick injuries in over two years. Her serological tests for syphilis and hepatitis B were 'negative'. She has an immunological disorder which had been treated with corticosteroids in the past, but she had not taken any immunosuppressive medication for the past year. A co-worker with a similar exposure during the same procedure remains seronegative after three months.

MMWR Editorial Note: Three instances of health-care workers (HCWs) with HIV infections associated with skin or mucous-membrane exposure to blood from HIV-infected patients are reported above. Careful investigation of these three cases did not identify other risk factors for HIV infection, although unrecognised or forgotten needle-stick exposures to other infected patients cannot be totally excluded. The exact route of transmission in these three cases is not known. HCW 1 had chapped hands and the duration of contact with the blood of the

patient experiencing a cardiac arrest may have been as long as 20 minutes. HCW 2 sustained contamination of oral mucous membranes. This individual also had acne but did not recall having open lesions. In addition, she had sustained a scratch from a needle used to draw blood from an intravenous drug abuser of unknown HIV infection status. HCW 3 had a history of dermatitis involving an ear. Health-Care Workers 1 and 3 were not wearing gloves when direct contact with blood occurred, whereas HCW 2 was wearing gloves but blood contaminated her face and mouth.

Three on-going prospective studies provide data on the magnitude of the risk of HIV infection incurred when HCWs are exposed to blood of infected patients through needle-stick wounds or contamination of an open wound or mucous membrane. In a CDC co-operative surveillance project (McCray 1986), a total of 1,097 HCWs with parenteral or mucous-membrane exposure to the blood of patients with AIDS or other manifestations of HIV infection had been enrolled as of March 31, 1987. Needle-stick injuries and cuts with sharp objects accounted for 969 (89%) of the exposures to blood; 298 of these had paired serum samples tested for HIV antibody. One (0.3%) seroconverted (Stricof and Morse, 1986), indicating that the risk of transmission during these exposures is very low. In addition, 70 HCWs had open wounds exposed to blood and 58 had mucous membrane exposed to blood. Post-exposure serum samples from 82 of these 128 workers have been tested for antibody to HIV but none have been found to be seropositive.

In a study at the National Institutes of Health through April 30, 1987, none of the 103 workers with percutaneous exposures and none of the 229 workers with mucous-membrane exposures to blood or body fluids of patients with AIDS was seropositive. At the University of California, none of 63 workers with open wounds or mucous membranes exposed to blood or body fluids of patients with AIDS was seropositive. Although the precise risk of transmission during exposures of open wounds or mucous membranes to contaminated blood cannot be defined, these studies indicate that it must be very low.

The three cases reported here suggest that exposure of skin or mucous membranes to contaminated blood may result rarely in transmission of HIV. The magnitude of the risk is not known since data on the frequency with which such exposures occur are not available. Skin and mucous-membrane exposures are thought to occur much more commonly than needle-sticks and the risk associated with skin or mucous-membrane exposures is likely to be far lower than that associated with needle-stick injuries. Nonetheless, the increasing prevalence of HIV infection increases the potential for such exposures, especially when routinely recommended precautions are not followed.

It is unlikely that routine serological testing for HIV infection of all patients admitted to hospitals would have prevented these exposures since two of the three exposures occurred in the out-patient clinic setting and one occurred during a resuscitation effort in an emergency room shortly after the arrival of the patient. At the time of exposure, HCW 2 suspected that the source patient was infected with HIV, but HCW 1 and HCW 3 did not. The hospital where HCW 3 was exposed has a protocol for apheresis which normally involves HIV-antibody testing of donors; however, such testing was not done in advance of the procedure. Previous CDC recommendations have emphasised the value of HIV serological testing for patient diagnosis and management and for prevention and control of HIV transmission and have stated that some hospitals in certain geographical areas may deem it appropriate to initiate serological testing of patients (see CDS 85/50). Such testing may also provide an opportunity to reduce the risk of HIV infection to HCWs but it has not been established that knowledge of a patient's serological status increases the compliance of health-care workers with recommended precautions.

These cases emphasise again the need to implement and enforce strictly previously published recommendations for minimising the risk of exposure to blood and body fluids of all patients

in order to prevent transmission of HIV infection in the workplace and during invasive procedures.

1. As previously recommended, routine precautions must be followed when there is a possibility of exposure to blood or other body fluids. The anticipated exposure mayrequire gloves alone (e.g. when placing an intravascular catheter or handling items soiled with blood or equipment contaminted with blood or other body fluids). Procedures involving more extensive contact with blood or potentially infective body fluids (e.g. some dental or endoscopic procedures or post-mortem examinations) may require gloves, gowns, masks, and eye-coverings. Hands and other contaminated skin surfaces should be washed thoroughly and immediately if accidentally contaminted with blood. These precautions deserve particular emphasis in emergency care settings in which the risk of blood exposure is increased and the infectious status of the patient is usually unknown (Baker *et al* 1987).

2. Previous recommendations have emphasised management of parenteral and mucous-membrane exposure of HCWs (see footnote). In addition, HCWs who are involved in incidents that result in cutaneous exposures involving large amounts of blood or prolonged contact with blood - especially when the exposed skin is chapped, abraded, of afflicted with dermatitis - should follow these same recommendations. Moreover, serological testing should be available to all HCWs who are concerned that they may have been infected with HIV.

Footnote: If a HCW (health-care worker) has a parenteral (e.g. needle-stick or cut) or mucous membrane (e.g. splash to the eye or mouth) exposure to blood or other body fluids, the source patient should be assessed clinically and epidemiologically to determine the likelihood of HIV infection. If the assessment suggests that infection may exist, the patient should be informed of the incident and requested to consent to serological testing for evidence of HIV infection. If the source patient has AIDS or other evidence of HIV infection, declines testing, or has a 'positive' test, the HCW should be evaluated clinically and serologically for evidence of HIV infection as soon as possible after the exposure and, if seronegative, retested after six weeks and on a periodic basis thereafter (e.g. three, six and twelve months following exposure) to determine if transmission has occurred. During this follow-up period, especially the first 6-12 weeks, when most infected persons are expected to seroconvert, exposed HCWs should receive counselling about the risk of infection and follow U.S. Public Health Service recommendations for preventing transmission of AIDS. If the source patient is seronegative and has no other evidence of HIV infection, no further follow-up of the HCW is necessary. If the source patient cannot be identified, decisions regarding appropriate follow-up should be individually based, on the type of exposure and the likelihood that the source patient was infected.

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Acquired Immune Deficiency Syndrome (AIDS) - United Kingdom

TABLE

Cumulative totals of UK reports of AIDS cases by transmission characteristic, to 31 May 1987

Transmission Categories	Cases			
	Male	Female	Total	Deaths
Homosexual/bisexual	686	-	686	373
Intravenous drug abuser	10	2	12	6
Homosexual and IV drug abuser	9	-	9	5
Haemophilia	31	-	31	25
Haemophilia and IVDA	1	-	1	1
Recipient of blood : abroad	5	5	10	6
UK	4	2	6	6
Heterosexual - possibly infected abroad	13	7	20	11
UK (no evidence of being infected abroad)	2	5	7	6
Child of HIV-antibody 'positive' parent	3	4	7	4
Other	-	1	1	1
Undetermined	1	-	1	-
Total	765	26	791	444

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p.p. [redacted]
Consultant Epidemiologist

[redacted]

— Please file copy.

A.N.S.W.E.R

CDS 87/26
(A13)

(AIDS News Supplement, CDS Weekly Report)

Prepared and presented as a professional service by the Communicable Diseases (Scotland) Unit, Ruchill Hospital, Glasgow G20 9NB, Scotland

HUMAN IMMUNODEFICIENCY VIRUS INFECTION TRANSMITTED FROM AN ORGAN DONOR SCREENED FOR HIV ANTIBODY - NORTH CAROLINA, USA

(Based on, and reproduced, with acknowledgement, from *Morbidity and Mortality Weekly Report* of the Centers for Disease Control, US Public Health Service (1987) **36**, no 20, 306-8)

In August 1986, a cadaveric organ donor was found 'positive' for antibody to the human immunodeficiency virus (HIV) by both enzyme immunoassay (EIA) and Western blot methods after some of the donated organs had been transplanted. A blood sample, which was taken after the donor had received a large number of blood transfusions, had been 'negative' for HIV antibody. Two days later, when the organs were removed, more blood samples were collected. These were forwarded with the donated organs to the various transplantation centres. At one of these centres, one of these later samples was found to be seropositive.

Three persons received organs from this donor. Two of them were subsequently found to be seropositive for HIV antibody. The third, who had received the donor's heart, did not survive the transplant procedure. This is the first report of HIV transmission by organ transplantation from a donor screened for HIV antibody. A summary of the investigation of the donor and the two surviving recipients follows.

Donor. A 30 year-old man who was involved in a motor vehicle accident was admitted, while in a coma, to a North Carolina hospital. He was hypotensive because of bleeding from multiple head and neck lacerations. On admission, a blood sample was collected for type and cross-matching, and blood transfusions were started within one hour. The donor's bleeding persisted despite surgery to improve haemostasis. Approximately 11 hours after admission, he had received a total of 56 units of blood and blood components (one unit of whole blood, 28 units of packed red blood cells, seven units of fresh frozen plasma, and 20 units of platelets). At this time, another blood sample was collected and tested for HIV antibody. The specimen was negative by EIA (Abbott Laboratories, North Chicago, Illinois; optical density ratio, sample/control = .103/.131). The donor's condition did not improve, and he was declared brain-dead two days after being tested for HIV antibody. Family members consented to organ donation and denied any knowledge that the donor had a risk factor for HIV infection.

The donor's kidneys, heart and liver were removed and transported to other medical centres for transplantation. Samples of the donor's blood, which were collected when the organs were removed, were sent with each organ. As part of one centre's routine procedure, one of these blood samples was tested for HIV antibody and was found 'positive' by EIA (Genetic Systems, Seattle, Washington; optical density ratio = .95/≤.30) and was subsequently found 'positive' by Western blot assay. The transplantation teams were notified of the test result, but the heart, liver and one kidney had already been transplanted.

Personnel from the hospital where the organs had been removed were contacted. They located both the serum sample collected on admission and the serum sample previously found 'negative' for HIV antibody. The serum collected at the time of admission, before any transfusions were administered, was highly reactive on the Abbott EIAs performed at the hospital (optical density ratios = .766/.126, .556/.126) and at the North Carolina State Laboratory of Public Health (optical density ratios = .842/.108, .698/.137) and was also 'positive' by Western blot assay at the State Laboratory. When testing was repeated, the serum collected after the blood transfusions was again seronegative by EIA at the hospital and by both EIA and Western blot methods at the State Laboratory.

Recipient 1. A man with end-stage renal disease received the donated kidney that was transplanted. The recipient is married and denied risk factors for HIV infection. He was 'negative' for HIV antibody three days after transplantation. A blood specimen collected ten weeks after transplantation was 'positive' for HIV antibody by EIA, and a specimen collected one week later was 'positive' by both EIA and Western blot assay. The recipient had a fever eight days after receiving the renal allograft and a biopsy of it showed acute rejection. He improved with additional immunosuppressive therapy. To date, he has not developed any opportunistic illness and continues to feel well.

Recipient 2. A man with sclerosis of the bilary ducts and progressive liver failure received the donated liver. He is married and denied risk factors for HIV infection. He was tested four days after transplantation and was 'negative' for HIV antibody. Twelve weeks after the procedure, he was 'positive' for HIV antibody by EIA, and a specimen collected four weeks later was 'positive' by both the conventional EIA and EIA using recombinant viral proteins (ENVACORE, Abbott Laboratories). Four months after transplantation, the recipient developed fever and malaise. A liver biopsy showed moderate allograft rejection. The recipient's condition improved with an adjustment in immunosuppressive therapy and he returned home the following month.

MMWR Editorial Note: Previous reports have linked kidney-transplant recipients who have subsequently become HIV-seropositive with donors who were later found to have risks for HIV infection. However, this is the first report of transplantation-associated HIV transmission from a cadaveric organ donor screened for HIV antibody. This donor appears to have been 'false-negative' for HIV antibody by EIA as a result of the large number of transfusions he received before serum was collected for testing.

The US Public Health Service recommended in May 1985 that potential organ donors be screened for HIV antibody. In January, 1986, the Centers for Disease Control (CDC) conducted an anonymous survey of representatives from 44 transplantation programmes who attended a meeting of the Southeastern Organ Procurement Foundation. All of the 26 representatives who responded reported that their centres screened donors for HIV antibody. Three of these representatives (12%) also reported identifying at least one potential organ donor who was 'positive' for HIV antibody by EIA and Western blot methods.

Organs from donors who are HIV-seropositive should not be used for transplantation except in very unusual circumstances. If an urgent need requires that transplantation of an organ from a seropositive donor be considered, the potential recipient or the appropriate family members should be informed of the risks of acquiring HIV infection. Such transplantation should not take place without the consent of either the potential recipient or the appropriate family members. When donors have been transfused before their organs are removed, testing for HIV antibody should be conducted on serum collected at the time of admission rather than on serum obtained after multiple transfusions. If donor serum collected at the time of admission is not available from other sources, a pre-transfusion sample may be available from the blood bank since many US blood banks hold, for at least seven days, specimens collected for compatability testing.