formed vaginally and combined with the necessary repair, even though at this stage no complaint is made of prolapse, the patient can be saved a great deal of trouble.

Vaginal Pessaries

A final reference is necessary to those controversial instruments, vaginal pessaries. Fortunately the days of rubber rings with offensive discharge and frequent changing have gone, but pessaries still have a contribution to make. No woman should wait a year or more in discomfort for an operation when a correctly fitted plastic ring can relieve her symptoms. If she is comfortable and there is no discharge the pessary does not need changing and can remain untouched for a year if necessary. But an appointment should be arranged for its removal. Otherwise some patients—who are completely free of symptoms—will decide against operation and fail to report back until ulceration occurs perhaps some years later. Even a vesicovaginal fistula may develop.

PUERPERAL PROLAPSE

A second indication for the temporary use of a pessary is puerperal prolapse. Operation should not be performed for at

least six months after delivery while involution occurs, and pessary support during this time can relieve symptoms and allow healing to restore the pelvis to normal.

DOUBTFUL CASES

In a third group of doubtful cases it is uncertain that the symptoms complained of can be explained by the minimal amount of demonstrable prolapse. A ring pessary can provide a useful therapeutic test.

With these exceptions the development of safe and effective anaesthetic and surgical techniques has made surgery the treatment of choice. But safety and good results are not achieved without careful and painstaking clinical supervision at every stage of treatment, preoperative and postoperative as well as in the theatre itself. Many thousands of women in Britain continue to live in discomfort from prolapse, with resultant family tensions, because of long waiting lists and inadequate hospital facilities.

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Clinical Problems

Dialysis-associated Hepatitis: Prevention and Control

B. J. HAWE, H. J. GOLDSMITH, P. O. JONES

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Viral hepatitis has seriously hampered the management of renal failure by both dialysis and transplantation in many countries including Great Britain. The death of four staff and seven patients at the Western General Infirmary, Edinburgh, has recently re-emphasized the risks. Dialysis-associated with the unit, such as laboratory staff, hospital nurses, doctors, and technicians and to others less closely associated with the unit, such as laboratory staff, hospital porters, and cleaners. Relatives are susceptible to infection when a patient with hepatitis is dialysed at home.

The initial stages of the Liverpool outbreak were described by Jones *et al.*¹ The present brief account of the later stages of the outbreak at the Sefton General Hospital may be of help both to units that have experienced the disease and to those that have so far been fortunate enough to escape infection.

Regional Urological Unit, Sefton General Hospital, Liverpool L15 2HE

B. J. HAWE, M.B., CH.B., Assistant Physician

H. J. GOLDSMITH, M.D., F.R.C.P., Consultant Physician

Department of Pathology, Sefton General Hospital, Liverpool L15 2HE

P. O. JONES, F.R.I.C., M.R.C.PATH., Consultant Pathologist

Dialysis Unit

Only patients with acute failure were treated in the dialysis unit at the hospital from 1958 until 1965. Initially the Skeggs-Leonards kidney was used, and after 1963 the Birmingham Minicoil. In 1965 two significant changes took place—firstly, a repeated dialysis treatment programme was started, and, secondly the Kiil kidney was introduced.

Because of overcrowding, staff came into contact with all patients, who, irrespective of whether in acute or chronic failure, were treated with the same Kiil dialyser. In the early stages of the outbreak therefore, it was impossible to trace the pathway of infection from person to person. In 1967 the unit was enlarged to allow a dialyser for each patient; however, these were still stripped and reassembled in the same room.

The Outbreak

In March 1966 two nurses and two technicians developed hepatitis, and within six months 15 unit staff and three patients had contracted the infection. Up to January 1967 14 nurses, three technicians, and five patients had developed hepatitis, and by January 1971 55 cases had occurred (see Chart).

Since the introduction of the serum hepatitis (S.H.) test² we have been able to detect hepatitis carriers and therefore use

Cases of hepatitis related to dialysis. Sefton General Hospital 1966-70.

more effective counter-measures. No cases of hepatitis have occurred among the staff or patients during the past 12 months, though in three instances relatives assisting S.H.-positive patients dialysed at home have been infected.

Effect on the Hospital

In July 1966 a hepatitis committee composed of clinical, nursing, laboratory, and administrative staff was set up. Its recommendations were passed to the hospital medical board, the medical officer of health of the City of Liverpool, and the director of the regional public health laboratory. Thus everyone responsible for controlling the outbreak was continuously informed of the clinical situation and of all the administrative steps taken. In addition the committee prepared and distributed an information sheet, which undoubtedly helped to allay anxiety and maintain staff morale. Nevertheless, the outbreak had a profound effect on both the renal unit and the hospital as a whole, seriously hampering recruitment and the expansion of our dialysis programme.

Clinical Features

These have already been described.¹ Older staff tended to be more severely ill, but there was no evidence that the virulence altered as the outbreak progressed. When it could be defined, the incubation period varied from 54 to 150 days. We considered that transmission occurred from patients to staff through infected blood and from one patient to another through communal equipment. There was no evidence of spread from infected staff to patients or to their own families. Relatives of patients did not develop hepatitis before home dialysis started, and to date seven cases have occurred in six of the 11 families of S.H.-positive patients being dialysed at home (see Table). Mishaps, such as a nurse pricking her finger, occurred in only three instances. In four cases a past history of infectious hepatitis did not protect against subsequent serum hepatitis. No one contracted the disease twice.

Clinical Features in Home Dialysis Patients Positive for Serum Hepatitis

Case No.	Date of Start of Dialysis		Hepatitis	Transmission To:
	Hospital	Home		
1	7/65	6/67	Nil	Father
2	9/65	3/67	Icteric	Nil
3	4/66	5/67	Nil	Nil
4	5/67	9/67	Anicteric	Wife, Son
5	6/67	1/68	Anicteric	Nil
6	6/67	7/68	Anicteric	Nil
7	10/67	9/68	Anicteric	Nil
8	2/68	6/68	Nil	Wife
9	4/68	10/68	Icteric	Husband
10	10/68	12/68	Nil	Husband
11	12/68	3/69	Nil	Wife

Cases 1-9 correspond to those quoted by Turner and Bruce White.³

Prophylactic gammaglobulin neither protected against the disease nor modified its course.

Initially the diagnosis of serum hepatitis rested on the clinical features, the history of contact with infected patients, and on the finding of a raised serum aminotransferase. The introduction of the S.H.-antigen test³ made it possible to diagnose subclinical and anicteric infections; these occurred in dialysis patients but not in unit staff nor in patients' relatives. Similar findings have previously been reported.⁴

Management

Our initial measures to control the outbreak were described by Jones *et al.*,¹ and others were subsequently added as recommended in a report to the Public Health Laboratory Service by the Working Party on Haemodialysis Units.⁵ By opening a new unit at Mossley Hill Hospital, two miles (3 km) from the parent unit, patients with acute disease were separated from those with chronic renal failure. Between March 1967 and October 1968 all patients on repeated dialysis treatment were transferred from hospital to home dialysis.

Since early 1968 the Mossley Hill unit has been used to train new patients for home dialysis and, before the introduction of the S.H. test, to provide hospital facilities for those home dialysis patients who were free from hepatitis. The remainder, considered to be infectious, were readmitted to hospital only in an emergency. Dialysis facilities were reserved exclusively for these infectious patients in accommodation carefully isolated from the rest of the hospital.

Sera stored from the beginning of the outbreak were tested for S.H. antigen in March 1969, giving a clearer epidemiological picture of the outbreak; three patients, thought to be non-infectious by our previous criteria were shown to be carriers. These patients had been readmitted to the supposedly hepatitis-free Mossley Hill unit. Because of this further contamination the unit was closed, cleaned, and disinfected. From this date the importance of the S.H.-antigen test both in the prevention of hepatitis and in its control has been appreciated, and our present policy is therefore based on its use.

Prevention

S.H.-ANTIGEN TEST

This test³ represents a major advance in the laboratory diagnosis of serum hepatitis. A positive result indicates infection but a negative result does not necessarily exclude hepatitis.⁶ The results described in this paper are based on a modification of the S.H. test.⁷ In view of the danger of relying entirely on a negative result, however, we still retain in the S.H.-negative group many other important measures designed to prevent cross-infection.

Both patients and staff are tested for serum hepatitis before joining the unit and are rejected if the result is positive. Staff of dialysis units and associated departments, as well as patients and their relatives, are made aware of the high infectivity of the S.H.-positive blood.

TRANSFUSION

Adequate dialysis with ample diet and haematinics avoids the need for blood transfusion. If sterilization for renal disease is advised, or menstrual loss is severe, hysterectomy is the preferred treatment. Our views on avoiding blood transfusion and on the screening of donor blood for virus have been circulated to all medical consultants in the region, thus ensuring that patients for dialysis or transplantation have not inadvertently been transfused with infected blood before coming under our care.

TRAINING AND SUPPORT UNITS

Hospital units should be used only as home dialysis training centres and support units or, in the short term, to sustain patients awaiting transplantation. Preferably these patients should also be maintained at home; in the event of graft failure they will be able to resume repeated dialysis treatment with the minimum of disturbance. Patients already on "permanent" hospital dialysis should be trained for home dialysis.

Groups of two to four patients and their relatives are trained intensively in dialysis techniques, including fistula puncture. In favourable circumstances patients may be trained for home dialysis in six to 10 weeks—that is, a shorter time than the average incubation period of serum hepatitis. New groups of patients are not admitted until the last member of the previous group has been discharged home, thereby avoiding the possibility of spread of infection from one group to the next.

All S.H.-positive home dialysis patients who require re-admission and any other S.H.-positive patients whom we may inadvertently acquire are admitted to a special isolation unit. These patients will, whenever possible, be nursed by staff who have had hepatitis. If no such "immune" staff are available, we ask relatives to help with dialysis in hospital; when the facts have been explained relatives are generally willing to help.

STAFF

The employment of qualified rather than junior nurses allows them to work on the unit for long periods, thus reducing the numbers exposed to hepatitis. A book is kept to record accidents occurring on the unit. Separate toilet facilities for the staff are provided. Staff are warned not to accept food or drink in the homes of S.H.-positive patients.

EQUIPMENT

Each patient uses the same dialysis apparatus while in hospital. We prefer disposable kidneys for hospital dialysis because of the risks of spreading infection of all types in the pack room when non-disposable plate dialysers are stripped. Disposable dialysers are *essential* for the treatment of S.H.-positive patients.

Home dialysis patients continue to use Kiil dialysers. They use the Minicoil in the event of a "burst pack" or while a major overhaul of the Kiil is undertaken. One spare Kiil is reserved for S.H.-positive patients and a second for those whose result is negative. These are kept in the house of the last user until needed again. The equipment of S.H.-positive patients is permitted to return to the unit only after overnight sterilization by formalin vapour in the unit van.

The risk of disseminating virus is considerable during shunt declotting and reinsertion. The Cimino fistula is preferred as it virtually abolishes problems associated with infection via the blood stream. In a centre orientated towards home dialysis this reduction in readmission rate minimizes contact between hospital staff and potentially infected blood.

LABORATORY TESTS

Provided the patient is adequately dialysed laboratory tests are considered unnecessary unless the patient becomes ill. Consultants only may request laboratory work on S.H.-positive patients. The specimen containers are placed in easily identifiable boxes which are treated with special care; all work on patients receiving repeated dialysis treatment is undertaken by designated senior technicians.

OTHER PRECAUTIONS

Before S.H.-positive patients visit other hospital departments their staff are warned of the special risks involved. In the operating theatre S.H.-positive patients constitute a serious risk. They should be placed last on the operating list. The surgical, anaesthetic, nursing, and technical staff must be informed of the special precautions required, such as the wearing of two pairs of gloves and the sterilization of used instruments and linen before cleaning. The surgeon and his assistant are advised to wear goggles. Radiological investigations requiring access to the blood stream are limited to life-saving ones. Necropsies are not carried out on S.H.-positive patients.

Dialysis units require special laundering facilities. Soiled linen is conveyed to the laundry in marked plastic bags. Porters are instructed in the handling of potentially infected material; this is placed in special containers on the ward and disposed of by incineration. The local authority supervises the collection and incineration of disposable equipment from home dialysis patients.

SCREENING

The serum hepatitis virus may enter an uninfected unit by at least two known routes; firstly, through infected patients—either those incubating the disease or symptomless carriers—and transmission usually follows direct contact with their blood or blood-contaminated fomites; and, secondly, through transfused blood or plasma.

From our experience we believe that in future it should be possible to prevent the virus from entering a unit by using the S.H. test to screen patients, staff, and donor blood. In the first instance only S.H.-negative patients will be accepted for dialysis or transplantation. After acceptance additional tests will be carried out at intervals of three months or in the event of suspected hepatitis or of an undiagnosed illness.

Only S.H.-negative staff will be employed. They will be tested before joining the unit and again after six weeks and three months. The control-of-infection officer will be notified in the event of any illness and also when staff return from leave.

If possible donor blood will be screened before transfusion; otherwise it will be tested immediately afterwards. Thus a recipient who in an emergency has inadvertently received S.H.-positive blood can be identified and isolated before he becomes highly infectious. As an additional precaution recipients of blood or plasma will be tested for serum hepatitis monthly for a period of six months.

Because a single negative S.H. test does not necessarily exclude hepatitis, we will obtain blood preferably from S.H.-negative "safe" donors (a safe donor being one whose blood has been transfused on 10 or more occasions without being known to have caused hepatitis); otherwise, either S.H.-negative or safe donors will be used, unselected donors being used only in an emergency.

Control

Finding a single case of hepatitis or one positive S.H. test in patients or staff raises the possibility of a serious outbreak. To prevent or minimize spread our recommended practice, in addition to the steps already outlined, is as follows: the S.H. test is carried out immediately on all staff and patients, and if negative is repeated at fortnightly intervals or earlier in the event of illness. No new patients are accepted for dialysis or transplantation and transplantation is discontinued. No patients are moved between other dialysis and transplantation units. If urgent treatment is required in another hospital department the special risks are clearly explained before

transfer. Infected staff may not return to the unit until their S.H. test has become negative. Such staff are then of great value to the unit since they are regarded as immune.

Patients are immediately divided into three groups on the basis of S.H. testing: (a) infected—patients with hepatitis or S.H.-positive carriers; (b) uninfected—S.H.-negative patients who during the preceding six months have neither had contact with S.H.-positive patients or their blood nor received unscreened blood or plasma; and (c) potentially infected—the remainder who, though S.H.-negative, could be incubating the infection. Patients in the first group are isolated from all other patients, while those uninfected—mainly on home dialysis—may mix among themselves but must be isolated from the other groups. Potentially infected patients are isolated from each other so far as possible and also from those in the other two groups. Ultimately, the former are allocated to these two groups, but clearly this cannot be done until six months have elapsed since finding the last positive S.H. test on the unit.

REPEAT TESTING

In our experience repeated S.H. testing of infected patients is unnecessary, as most infected dialysis patients become permanent carriers, and even if their S.H. test becomes negative they should still be regarded as infectious. A separate dialysis unit for each group is required if segregation is to be effective.

These measures should continue until the outbreak is under control—that is, until no new cases have been associated with the unit during the previous six months. The development of hepatitis in relatives of S.H.-positive patients on home dialysis need not, however, affect the hospital programme.

Transplantation of S.H.-positive patients seems to us to be too dangerous unless an immune hospital team is available.

Future Implications

Hepatitis has introduced doubts about the future of dialysis and transplantation. Centres should be designed to permit easy division into three self-contained subunits in the event of an outbreak of hepatitis.

To encourage recruitment of nursing staff to dialysis units incentive payments ("leads") should be made, similar to those paid to nurses on psychiatric and geriatric units. We suggest that hepatitis contracted in dialysis and transplantation units should be regarded as an industrial hazard for the purpose of the National Insurance Acts, and that those exposed to these high risks should in addition be covered by adequate life assurance.

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Requests for reprints should be addressed to Dr. B. J. Haiwe.

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Investigation and Treatment of Resistant Urinary Incontinence

LYNN EDWARDS, NEVILLE HARRISON, J. P. WILLIAMS

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Recently much interest has been expressed about the management of urinary incontinence.^{1,2} This paper describes the investigation and management of 211 consecutive cases of incontinence of urine seen in the unit for electronic control of incontinence at the Shaftesbury Hospital (St. Peter's Hospitals and Institute of Urology, London) since October 1967.

Patients and Methods

The patients are investigated and subsequently treated in a self-contained unit (see Plan). Patients are usually admitted on Monday afternoon and discharged on Friday afternoon of the

same week. During this period the following investigations are undertaken: (1) physical examination, including a careful neurological examination; (2) electromyographic (E.M.G.) studies of the legs and perineum; (3) cystometrograms; (4) urethral pressure profile;³⁻⁵ (5) pressure flow study; (6) examination under anaesthesia—which includes the urethral pressure profile and a cystometrograms, both these investigations being undertaken in conjunction with perineal stimulation of the pelvic floor;⁶ (7) intravenous pyelogram; and (8) micturating cystogram. The last investigation is undertaken after the preliminary investigations have been completed, at a time when treatment has been decided on, and repeated with and without the prescribed treatment as applicable.

Essentially the patients seen in the unit have "resistant" incontinence—that is, incontinence which has persisted despite orthodox treatment. Thus the patients referred have almost always undergone surgical or gynaecological procedures, or have incontinence for which there is no apparent remedy. In this study we have found that a patient's incontinence must be clearly defined as being primarily due to either sphincter disturbance—for example, female stress incontinence or male postprostatectomy incontinence—or detrusor dysfunction (neurogenic incontinence of all varieties, such as multiple

Institute of Urology, London W.C.2

LYNN EDWARDS, M.B., F.R.C.S.(ENG., ED.), Lecturer and Research Fellow

J. P. WILLIAMS, M.CHIR., F.R.C.S., Senior Lecturer

Department of Surgery, Mulago Hospital, Kampala, Uganda

NEVILLE HARRISON, M.B., F.R.C.S., Surgical Registrar (Formerly Research Fellow, Institute of Urology)