Infections in British clinical laboratories 1980-81

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SUMMARY This survey through the Association of Clinical Pathologists was continued and extended for 1980-81, with the help of the Institute of Medical Laboratory Sciences. Hepatitis maintained a low attack rate of 26/100 000 person-years, including only three cases of hepatitis B probably attributable to laboratory work (attack rate 9). Nineteen cases of tuberculosis (attack rate 56) included 14 of probable occupational origin (attack rate 41) half of which involved post-mortem or mortuary work. Thirteen bacterial infections of the bowel (attack rate 38, predominantly shigellosis) involved almost exclusively microbiology MLSOs, with 10 attributed to laboratory work (attack rate 29). The seven other infections included 4 of occupational sepsis in morbid anatomy and post-mortem workers. There appears to be scope for improvement in bacteriological bench techniques particularly at the faeces bench and for reduction in the hazards of tuberculosis and sepsis for morbid anatomy and mortuary workers.

During the decade of the seventies, the "ACP Survey" of hepatitis in the staff of clinical laboratories in Britain showed a marked fall in incidence after 1974^{1,2}. For 1979 the questionnaire to members of the Association of Clinical Pathologists (ACP) was modified on a trial basis to record not only hepatitis but also other types of infection. For the next two years, this successful modification was continued and questionnaires were sent not only to members of the Association but also to the heads of laboratories on a supplementary list compiled with the assistance of the Institute of Medical Laboratory Sciences (IMLS). The results of the survey covering 1980 and 1981 are presented here.

Material and methods

The confidential questionnaire form for the 1979 survey¹ was modified to accept data from the two years and sent out with ACP literature early in 1982. The numbers of staff in different grades and disciplines were recorded as at 1 January 1981 and 1 January 1982, counting part-time staff each as 0.5, and summated to give a reasonable estimate of the populations at risk in person-years. This allowed attack rates per 100 000 person-years of exposure to be calculated for the various infections encountered, as in previous surveys. No attempt was made to distinguish and exclude non-occupational infections since this is often difficult to do even with much more complete information than can reasonably be

sought by an acceptable questionnaire. Supplementary information was obtained by follow-up enquiry in respect of hepatitis cases and other cases where data were incomplete or ambiguous. The same form, with a distinguishing mark, was sent directly by post to the heads of laboratories on the supplementary IMLS list. In order to assess any bias arising from possible differences between this population and that covered by the continuation of the established "ACP Survey", the returns from the two groups were analysed separately for comparison before consolidation.

Results

Returns were received from 260 "laboratories" in the UK. As usual, these ranged from a few single-discipline units to large Divisions covering several hospitals. Infections were recorded in 37 (14.2%), mostly single but including unrelated pairs of infection in seven, one pair of streptococcal infections, and one group of four associated cases of tuberculosis. Thirty-two returns (12.3%) came from the supplementary IMLS list and included three single bowel infections.

SURVEY POPULATION

The composition of the populations covered by the two phases of the survey is summarised in Table 1, showing close similarity in the proportions of staff in the four broad occupational groups each year. Detailed breakdown of the January, 1981 population (Table 2) confirmed the close similarity of the

Table 1 *Composition of population surveyed (person-years)*

Occupational group	At January 1981 (% of total for year)	At January 1982 (% of total for year)
Medical	1635.5 (9.7)	1668.5 (9.7)
Science	958.5 (5.7)	990 (5.8)
MLSO	10284.5 (60.9)	10475 (61.0)
Others	4011 (23.7)	4041 (23.5)
Total	16889.5 (100)	17174.5 (100)

two study populations but with somewhat higher contributions by the IMLS group to "Medical, haematology" (14.7%), "MLSO, haematology" (16.6%) and "Porters, assistants etc" (20.3%). This reflects the relatively higher contribution of Blood Transfusion Centres to the smaller IMLS groups (an eighth of the study population), since four Centres responded in each group (with no recorded infections): the staff of these Centres is large (totalling 2198 person-years), and blood transfusion is classified under "haematology" in the analysis. It seemed justifiable to combine the total data from both groups for the more detailed analysis since no important bias from this source appeared to be likely.

INCIDENCE OF INFECTIONS

Table 3 summarises the data in a similar form to that used for previous surveys. Reported infections were confined to the medical, MLSO and "others" groups. As in 1979¹, the predominant infections were tuberculosis and bowel infections, with very similar attack rates to those calculated from the smaller numbers of 1979. As in 1979, a few other infections were recorded, and various kinds of hepatitis.

Hepatitis

Table 4 summarises the nine infections—two of hepatitis A, five of hepatitis B (including one silent infection) and two cases with negative tests for hepatitis B markers of which one had glandular fever. The other was a mild case with negative Hepatest and hepatitis A IgM test, with insignificant titres of antibody to herpes simplex and cytomegalovirus infections and with IgG but not IgM for Epstein-Barr virus, possibly a "non-A non-B" infection of a haematologist perhaps infected by contact with a patient.

One of the five hepatitis B infections was symptomless, detected only by routine serological screening after a laboratory accident (type unspecified): positive results were found by RIA, RPH and hepatitis Be antigen tests. In the absence of illness, this case would not normally be included in the survey but is reported here because of its association with a laboratory accident involving a biochemistry MLSO, one of the known higher-risk groups. Three others, from which the attack rates were calculated as for previous surveys, included a phlebotomist working in a hospital for mentally subnormal patients and a medical morbid anatomist who suffered an unspecified laboratory accident; the source of the infection of the third case was unknown. Another case acquired infection from a chronic carrier spouse.

The two hepatitis A infections were probably random, non-occupational infections. Attack rates for clinical hepatitis B infections probably attributable to infection during work were calculated and are given at the foot of Table 4—they are encouragingly low.

Tuberculosis

The 19 cases summarised in Table 5 include one

Table 2 *Comparison of the two component populations (based on January 1981 figures)*

Occupational group	"ACP group"*	"IMLS group"* (% of total)	Combined group (100%)
Total	14732.5	2157 (12.8)	16889.5
Medical	1463	172.5 (10.5)	1635.5
Science	844	114.5 (11.9)	958.5
MLSO	9012	1272.5 (12.4)	10284.5
Others	3413.5	597.5 (14.9)	4011
Medical, Morbid anatomy†	540.5	47.5 (8.1)	588
"Haematology†	365	63 (14.7)	428
Science, Morbid anatomy†	33	1 (2.9)	34
"Biochemistry†	462.5	66 (12.5)	528.5
MLSO, Haematology†	2474.5	492 (16.6)	2966.5
"Other"†	197	17 (7.9)	214
Porters and assistants†	513	130.5 (20.3)	643.5
Domestic†	643	77 (10.7)	720

*"ACP group" = population surveyed through membership of Association of Clinical Pathologists.

"IMLS group" = population surveyed through supplementary list of Institute of Medical Laboratory Scientists.

†Subgroups showing greatest percentage deviations in proportion contributed by IMLS group from that in their parent group (Medical, Science, etc).

Table 3 Cases and attack rates of infections in laboratory staff, 1980-81

Grade and discipline	Population at risk (person-years)	Reported infections (attack rates per 100 000)			
		Hepatitis	Tuberculosis	Bowel infections	Others
Medical (total)	3304	3 (91)	4 (121)	1 (30)	3 (91)
" Morbid anatomy	1195	2 (167)	3 (251)	—	3 (251)
" Haematology	865	1 (116)	—	—	—
" Biochemistry	357.5	—	—	—	—
" Microbiology	789	—	1 (127)	1 (127)	—
" Immunology	49	—	—	—	—
" Other	48.5	—	—	—	—
Science (total)	1948.5	—	—	—	—
" Morbid anatomy	69.5	—	—	—	—
" Haematology	94	—	—	—	—
" Biochemistry	1066	—	—	—	—
" Microbiology	491	—	—	—	—
" Immunology	68.5	—	—	—	—
" Other	159.5	—	—	—	—
MLSO (total)	20759.5	5 (24)	13 (63)	12 (58)	4 (19)
" Morbid anatomy	3200.5	—	5 (156)	—	3 (94)
" Haematology	5980	2 (33)	1 (17)	—	1 (17)
" Biochemistry	4788	3 (63)	2 (42)	—	—
" Microbiology	6055	—	5 (83)	12 (198)	—
" Immunology	301.5	—	—	—	—
" Other	434.5	—	—	—	—
Others (total)	8052	1 (12)	2 (25)	—	—
Porters, assistants	1267.5	—	2 (158)	—	—
Domestics	1432.5	—	—	—	—
Office, administration	3690	—	—	—	—
Phlebotomists and donor attendants	1662	1 (60)	—	—	—
Total	34064	9 (26)	19 (56)	13 (38)	7 (21)

Table 4 Hepatitis cases

Type	Year	Occupation	Comments
A	1981	MLSO, Biochemistry	
A	1981	MLSO, Haematology	
B	1980	Medical, Morbid anatomy	Infected by spouse (carrier)
B*	1980	Medical, Morbid anatomy	Laboratory accident
B*	1980	MLSO, Haematology	
B*	1981	Phlebotomist	Works in hospital for mentally subnormal
B	1981	MLSO, Biochemistry	
? (not B)	1981	Medical, Haematology	Silent infection detected by routine screening; laboratory accident
Epstein-Barr virus	1981	MLSO, Biochemistry	? Infected by patient contact

*Clinical "attributable" hepatitis B attack rate = 16/100 000 MLSO Haematology
83/100 000 Medical Morbid anatomy
50/100 000 Phlebotomists
9/100 000 Total staff

"suspected", unconfirmed case in an MLSO (Morbid Anatomy). The mean age was 41 yr (range 22-65 yr; 4 not known) and 16 were men. Not all cases were occupationally derived and several were clearly due to reactivation of pre-established infection. Occupational exposure seemed to be the cause in 14 cases, half of whom were involved in post-mortem or mortuary work. The "suspected" case was also a mortuary technician. Case 7 worked in a mycobacteria laboratory but was exposed to tuberculosis in childhood, became Mantoux-positive and was followed up at a chest clinic: reactivation of endogenous infection was suspected. The attack

rates for tuberculosis probably attributable to occupation are given at the foot of Table 5. They also reflect the higher incidence in groups involved in mortuary and post-mortem work. The rate for medical morbid anatomists is inflated by a group of cases in one laboratory where case to case infection is a possibility as well as common source exposure of this group and their mortuary attendant.

Bowel infections

The hepatitis A infections (Table 4) probably belong in this group, but Table 6 lists the bacterial

Table 5 *Tuberculosis cases*

Case No	Year	Occupation	Comments
1*	1980	Medical, Morbid anatomy	Detected by routine x-ray; exposed in PM room
2*	"	" " "	First case of four
3*	"	" " "	Contact of case 2
4	"	Microbiology	Old lesion (prostatic: Asian)
5*	"	MLSO, "	See text
6*	"	" "	—
7	"	" "	? reactivation—see text
8*	"	PM technician	? occupational
9*	"	Mortuary attendant	Contact of case 2
10*	1981	PM technician	? occupational
11	"	Mortuary technician	Suspected case
12	"	MLSO, Haematology	Urinary tract infection
13*	"	Biochemistry	—
14*	"	" "	Tuberculous meningitis
15*	"	Microbiology	Centrifugation defect
16	"	" "	Reactivation of old lesion
17*	"	Mortuary attendant	Contact of case 2
18*	"	Cytology screener	—
19*	"	Porter	—

*Possibly attributable confirmed cases, attack rate = 251/100 000 Medical Morbid anatomy
 62/100 000 MLSO, " "
 49/100 000 " Microbiology
 42/100 000 " Biochemistry
 316/100 000 Porters, assistants, etc.
 41/100 000 Total staff

Table 6 *Bowel infections*

Type	Year	Occupation	Comments
<i>Salmonella typhimurium</i>	1980	MLSO, Microbiology	Beefburger suspected
<i>Salmonella sp</i> *	1981	" "	Suspected occupational
" " "	"	" "	Same serotype and phage type as recent lab isolate
<i>Shigella sonnei</i> *	"	" "	Laboratory accident
" " "	"	" "	Suspected occupational
<i>Shigella boydii</i> *	"	" "	Laboratory accident
<i>Shigella flexneri</i> *	1980	" "	Laboratory accident
" " "	1981	" "	—
" " "	"	" "	No accident; illness serious
" " "	"	" "	Onset after holiday in Italy
" " "	"	" "	Suspected occupational
Campylobacter*	Not known	" "	Laboratory accident
"	"	Medical, Microbiology	Virologist; chicken dish suspected

*"Attributable" attack rate = 165/100 000 MLSO Microbiology
 29/100 000 Total staff

Table 7 *Miscellaneous cases*

Type	Year	Occupation	Comments
Erysipelas*	1980	Medical, Morbid anatomy	Occupational
Cellulitis (streptococcal)*	?	" " "	" } same laboratory
" " "	?	" " "	" }
Sepsis and abscess*	1981	PM technician	"
Glandular fever	"	MLSO, Morbid anatomy	Young adult male
Zoster	"	" Haematology "	Same laboratory, not connected
"	"	" "	"

*Attack rate of occupational sepsis = 251/100 000 Medical Morbid anatomy
 31/100 000 MLSO, Morbid anatomy
 12/100 000 Total staff

infections which show a remarkable concentration in microbiology MLSOs, several of them involved with recognised laboratory accidents. It is also clear from the Table that these workers share the common exposure to food-borne infections at home and abroad of the general population.

Other infections

These are summarised in Table 7. The only probable occupational infections were the four cases of sepsis all of which affected staff involved with post-mortem work, with relatively high attack rate in medical staff.

Discussion

This survey is the first product of the extension of the original hepatitis surveys achieved by collaboration between the ACP and the IMLS with encouragement from the Joint Working Party on the Prevention of Infection in Clinical Laboratories.² Extension of the study population by the supplementary IMLS list brought in only an additional eighth, and the small differences in the composition of the supplementary group did not make it unreasonable to combine the data for analysis. Since the effect of this on the calculated attack rates was trivial, comparisons with previous ACP surveys are valid.

The feasibility of surveying infections other than hepatitis had been shown by the pilot study of 1979,¹ though the limited data of this single year (in which it could not be taken for granted that all respondents to the questionnaire had noticed the changed pattern of enquiry) limited confidence in the calculated attack rates. In fact, the attack rates per 100 000 for the predominant infections, tuberculosis (42) and bowel infections (33), were remarkably close to those now reported (Table 3).

As in previous surveys, none of the cases reported was fatal. All recovered without sequelae, except for one case of tuberculous meningitis which was still under treatment at the time of the enquiry.

Hepatitis, the original target of these enquiries, maintained the low incidence found after 1974 with cases scattered over several occupational subgroups. The few hepatitis B infections which were probably acquired in the laboratory nevertheless involved either working with blood or a laboratory accident. An accident was also reported in the symptomless infection which was excluded from the calculations because of non-comparability with the rest of the data in this and previous surveys which can recognise only illnesses. Information about background immunity, seroconversions and carrier states for hepatitis B would be interesting, but the necessary comprehensive and repeated serological testing has proved unpopular and would probably be impracticable and too costly on a national level. The overall attack rate for hepatitis B calculated from the five cases is 15. This is similar to that of 14 for the previous five years and compatible with the independently calculated attack rates of 36 for medical laboratory staff and 18 for scientific and technical laboratory staff in England in 1975-79.³ The average annual rates based on communicable disease reports of hepatitis B in the general population of England and Wales in 1975-79 were calculated as 4.0 for men and 1.8 for women, these being slight underestimates.³

As in 1979, tuberculosis showed numerical pre-

dominance. The attack rate of 41 for confirmed cases which seemed probably or possibly to be occupational in origin can be compared with that of 12 for non-occupational cases, with a total attack rate of 53 for the whole survey population. This is considerably higher than the respiratory and non-respiratory rates of around 14⁴ to 18⁵ in the general population and confirms previous reports of an increased risk of tuberculosis in clinical laboratory workers⁶⁻⁸. Post-mortem and mortuary work was largely associated with the cases, as in one case of 1979.¹ Reclassification of occupational groups for the three years 1979-81 gives attack rates of 1506 for "technicians" (post-mortem and mortuary) and 2381 for "attendants" (post-mortem and mortuary, including "morticians"). Of the six microbiologists affected, at least two suffered reactivation of endogenous tuberculosis; one infection was attributed to leakage from a defective centrifuge rotor seal when preparing infected specimens—sealed buckets are now used instead. Attention was drawn recently to the special hazards arising from extrapulmonary tuberculosis.⁹

As in 1979, bowel infections affected almost exclusively microbiology MLSOs and all of these infections attributed to laboratory work were in this group. This relationship is clearly significant. Four laboratory accidents were reported in this group including finger contamination during a slide agglutination test and breakage of a wooden swab stick. No typhoid infections were reported, although this has been reported as a hazard of proficiency testing and teaching in the USA.¹⁰

Of the other infections, the main interest concerns the group of sepsis cases affecting morbid anatomy and post-mortem staff—a reminder that, like tuberculosis, streptococcal infections remain a hazard for these workers. The need for further attention to the risks of infection in this group, notably tuberculosis and sepsis, emerges as one lesson from the survey. The other area of concern is that of microbiology, particularly routine stool examinations and work with enteropathic bacteria, once again indicating the importance of observing strictly the high standards of microbiological technique appropriate to work on the faeces bench. Neither *Brucella spp* nor *S typhi*, both significant laboratory hazards,⁸ caused infection in the three years of the present and previous surveys.

This investigation was carried out with the assistance of the ACP, the IMLS, ACP Branch secretaries and of laboratory colleagues who co-operated by returning completed questionnaires for this model, epidemiologically valid survey. The need for similar studies in other countries in order to estimate occupational risks and determine priorities

for preventive measures is recognised at international level.⁸

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