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Specimen transport audit

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Abstract

A specimen transport audit was performed at a routine and reference laboratory. Over the survey period (1986–89) the percentage of specimens received and assessed as hazardous (inadequately packed, misidentified, or contaminated by leakage) fell significantly from 12·0 to 2·8%. Specimen transport audit identified technical and logistical faults associated with sample transmission. It is concluded that no type of hazard should exceed 0·5% of samples, with the total being less than 1% of specimens received. Specimen transport audit is an additional laboratory performance indicator.

The importance of safely and properly transported specimens is well recognised. We present the results of a four year survey investigating the quality of specimens received at our laboratory.

Methods

The Royal Air Force Institute of Pathology and Tropical Medicine acts as the routine laboratory for the local military hospital and general practices. It also provides reference laboratory services in all pathology specialities for four other Royal Air Force hospitals.

The recommendations of the Health Services Advisory Committee for the labelling, transport, and reception of specimens were circulated to all our laboratory users. Thereafter the Institute's Health and Safety at Work Committee organised annual specimen transport audits from 1986 to 1989. These assessments covered six to eight week periods and were conducted at random intervals during the year without prior notification to laboratory users. After each survey the analysed results with comments and recommendations were distributed to the specimen sources.

Specimen hazards were recorded by specifically trained technicians in each department and were defined as:

1 *Packing:* inadequately or inappropriately packed specimens including multi-packing—that is, more than one primary container within the same secondary container.

2 *Leakage:* leakage of specimen material or its transport medium from the primary container.

3 *Identification:* insufficient or illegible labelling of a primary container or its attendant request form in such a way that the specimen could not be matched to a particular request card. The identifying features sought were forename or initial, surname, date of birth or age, specimen origin, type of specimen, hospital number, date and time of specimen.

The results were analysed using a logistic regression model—GLIM 3·77 statistical software.

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Table 1 Survey results of total number of hazardous specimens received

Hazard	1986 (n = 4376)	1987 (n = 10 980)	1988 (n = 6037)	1989 (n = 11 452)
Packing	6·3	2·9	4·2	0·5
Leakage	4·8	1·7	2·8	1·7
Identification	0·9	0·7	0·1	0·6
Total percentage of hazardous specimens	12·0	5·3	7·1	2·8

Results

Table 1 shows the overall results. No breakages were recorded and no hazardous specimens were received from patients identified clinically as being "high risk", such as hepatitis B surface antigen positive.

Table 2 records the results from the individual specimen sources. Clerical problems prevented analysis of the 1986 survey results for sources E and F.

Statistical analysis showed a highly significant non-linear downward trend in overall hazard rates over the survey period ($p < 0·01$).

Discussion

The importance of safe specimen transport has recently been highlighted by several authorities.[1–3] The principles and procedures concerned form part of medical laboratory scientific officers' and, to a lesser extent, medical and nurse training. The techniques involved are simple and straightforward, requiring minimal support equipment.[4] Despite the importance of safe specimen transmission we have been unable to find any previous investigations into the quality of transported specimens.

Three types of hazardous specimens were defined. Individually and collectively these result in exposure to risk and inconvenience to patients and laboratory and medical staff. The definitions of leakage and packing faults are self evident. The minimum acceptable criteria for satisfactory specimen identification proved harder to establish. It was finally decided that at least three details, including forename or initial and surname, would be required. The receiving technician, however, was additionally instructed to reject any sample and request that, for whatever reason, could not be confidently identified. We feel this represents a practical approach to the problem of iden-

Table 2 Hazardous specimens from each source given in percentage values

Source	Hazard type percentage	1986	1987	1988	1989	Specimen totals
A	Total number of specimens	1434	1121	855	1021	4431
	Packing	12	1	0	0	
	Leakage	8	6	9	1·5	
	Identification	1	9	0	3	
B	Total number of specimens	995	785	426	806	3012
	Packing	12	16	11·5	2	
	Leakage	0·5	3	7·5	10·5	
	Identification	0·5	1	0	2	
C	Total number of specimens	1366	1078	725	1131	4300
	Packing	0	0	4	4	
	Leakage	1	2	0	0	
	Identification	1	0·5	0	0	
D	Total number of specimens	581	408	160	346	914
	Packing	0	0	3	0	
	Leakage	7	2	2	1	
	Identification	0	0·5	0	0	
E	Total number of specimens		4470	3060	6257	13787
	Packing		3	0	0	
	Leakage		0·5	1	0·5	
	Identification		0·5	0	0	
F	Total number of specimens		3118	771	1891	5780
	Packing		1	0·5	0	
	Leakage		0·5	0·5	0·5	
	Identification		0·5	0·5	0·5	

Sources A, B, C, D = referring hospitals.
Source E = local hospital.
Source F = local general practices.

tification, though would argue that the fullest details possible should accompany each request. Given inevitable human error and container failures, satisfactory transmission of all specimens is unlikely to be achieved. Our findings show a highly significant downward trend in overall hazardous specimen rates over the period audited. Although there was no control group, laboratory staff education and the relevant equipment remained constant over the trial period and we therefore believe that this improved performance was due to audit result feedback to the specimen sources. The high leakage rates from two sources in the first survey were found to be due in part to faults with a particulr container. A further leakage problem was identified where referring laboratories failed to tighten container tops on specimens being forwarded after thawing from deep freeze storage.

Although all known "high risk" samples were transported safely, this does not detract from the importance of the other results because all samples should be viewed as being potentially "high risk".

We were surprised to find that specimen quality from the local hospital and general practices was much higher than that from the referring laboratories. All Royal Air Force laboratory technicians receive the same training and are supplied with similar equipment and specimen containers. Although the study produced a significant overall improvement in specimen quality, it was found that different sources performed variably over the survey period. We conclude that this reflects individual laboratory performance and as such provides a further indicator to technical standards.

Our findings show that half of the sources monitored in 1989 sent less than or equal to 1% of their specimens in an unsatisfactory condition, and we feel that this figure would make a reasonable target for all sources to achieve. Similarly, we would also argue that no one type of hazard should exceed 0·5% of total samples. These figures may need to be changed in the light of future experience. We have shown that periodic but regular specimen transport audit is simple to perform and has a valuable part to play, particularly in laboratories receiving large numbers of specimens from distant sources. It provides a check on technical and logistic problems related to specimen transport and acts as an additional laboratory performance indicator.

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1 Health and Safety Commission. *Control of substances hazardous to health regulations 1988—Approved code of practice.* London: HMSO, 1988:12.
2 Royal College of Pathologists. *Codes of practice for pathology departments.* London: Chameleon Press, 1989:2.
3 Anthony PP. *Model training programmes.* Brighton: Association of Clinical Pathologists, 1989:26.
4 Health Services Advisory Committee. *Safety in health service laboratories: The labelling transport and reception of specimens.* London: HMSO, 1986.