

An experimental collection service for pathology specimens

R. H. GREEN, B.Tech., M.A., Ph.D.
School of Management, University of Bath

SUMMARY. The use of laboratory services made by a group of general practitioners was compared before, during and after the provision of a free collection service for transporting specimens and results between the practices and the laboratory.

In comparison with the use of a control group of general practitioners, the study group made a sharply increased use of the laboratory during the 33-week survey period. In addition, both the practices. The laboratory staff welcomed the service.

Introduction

During the past 15 years, use of the open-access pathology service by general practitioners has been studied several times. These studies have previously been discussed (Green, 1973, 1974). Briefly, it has been suggested that while some doctors make extensive use of the service, the majority make less use than would be expected according to criteria of ideal clinical practice. This is a cause for some concern.

Use could perhaps be increased by making access to laboratory services more convenient for doctors and patients. This is certainly intuitively appealing. While it might be argued that a decision to use a pathology investigation should depend only on a doctor's interpretation of the clinical circumstances of a consultation, it seems reasonable to suggest that other factors might influence the decision. In particular, it could be postulated that a doctor would balance the potential value of further information against its timeliness and the effort, both his own and his patient's, involved in obtaining it and these factors are clearly related to accessibility.

One of the ways in which the accessibility of a laboratory can be improved is by providing a service for collecting specimens from general practitioners' surgeries and delivering reports, replacement specimen containers, request forms, and other equipment to the surgeries. Thus the need for a doctor or patient to travel to the hospital merely to deliver a pathology specimen is avoided and the delay between requesting and receiving the report can be reduced.

This paper describes the implementation, on an experimental basis, of such a service. The experiment was sponsored by the Department of Health and Social Security and carried out in the Wigan Area Health Authority by Lancaster University's Unit for Operational Research in the Health Services.

Aim

The main aim of the experiment was to examine the hypothesis that general practitioners' demand for pathology investigations would increase as a consequence of being provided with a collection service for specimens.

In addition it was expected that the experiment would provide information to help the design and evaluation of similar schemes which might be considered elsewhere.

Method

The Department of Health and Social Security provided the finance for one vehicle and driver with which to operate the experimental service in addition to their support of Lancaster University's Unit.

Experimental design

The design of the experiment was quite straightforward. The open-access pathology use of an 'experimental group' of practices was monitored both before and after being provided with a daily specimen collection service. Simultaneously the usage of a 'control group' of practices, not provided with the service, was monitored in order to detect and correct for the presence of extraneous factors which might have affected pathology use during the period of the experiment.

The 129 doctors in 53 practices in the Wigan area divide geographically into two groups: 92 doctors in 32 practices use the laboratory at the Royal Albert Edward Infirmary, Wigan, the remainder use mainly the laboratory at Leigh Infirmary. It was decided to restrict the experimental scheme to one only of these groups of practices to allow more efficient use of the vehicle for the number of practices which could be served. In addition monitoring pathology use at only one laboratory was required.

The practices using the laboratory at Wigan Infirmary were selected for this purpose. It was then necessary to allocate these practices to either the experimental group provided with the collection service or the control group. In order to ensure that these groups were similar with respect to their coverage of the area and the range of pathology use rates the following procedure was adopted.

The practices were first divided into three sets according to their distance from the laboratory: 0-2 miles (14 practices), 2-4 miles (ten practices), and 4-6 miles (eight practices). The practices within these sets were then ranked on the basis of pathology use, divided into pairs and one member of each pair was randomly allocated to the experimental group. Thus each group consisted of 16 practices.

Organisation of the collection service

For a collection service to be successful in terms of the number of specimens carried it must be designed so that the general practitioner is able to use it, i.e. specimens which might have been taken in its absence and conveyed to the laboratory by some other means could be transferred to it, and that the general practitioner should be encouraged to investigate where previously he might not have done so.

The implication is that the timing of the calls of the collection service at practice premises relative to the working day of the doctor is of great importance, as is reliability. Design is also constrained by the working routine of the laboratory and because most pathology specimens deteriorate once taken.

On the basis of discussions with general practitioners and pathologists it was decided that, as far as possible, the service should call at the practices after morning surgery, Monday to Friday, and from the point of view of 'specimen life' and in order to help processing the specimens, delivery at the laboratory by about 13.15 hours was envisaged. It was felt that this would provide good specimen availability and a potential for rapid reporting of results on processed specimens.

Since no morning surgery finished before 10.00 hours this meant that the vehicle would leave the laboratory at about 9.45 hours, make its first call at about 10.00 hours and return to the laboratory by 13.15 thus operating over a maximum period of 3½ hours.

It was decided that the vehicle should be equipped with some means of keeping appropriate specimens cold, but it should be left to the individual doctor, knowing the characteristics of the service, to decide which specimens could be sent. Guidance on this could be obtained from the handbook *Using the Laboratory* (Department of Health and Social Security, 1971) or from the staff of the laboratory. An insulated box containing ice was used to keep specimens cold.

Two practices declined to participate in the experimental group and it was found possible to replace these by one practice. Thus the final experimental group consisted of 15 practices requiring 16 calls by the service, since one practice operated two main surgeries. Only 13 of the original 16 pairs of practices remained valid for comparison of the two groups on a statistical basis. Data on all the practices remain suitable for descriptive purposes, however.

The service started operation on 19 March 1973.

Data collection

For the 11-week period (1 January–18 March 1973), before the introduction of the experimental collection service, the use of the biochemistry, haematology, and bacteriology departments of the Wigan laboratory by all the doctors in the experimental and control groups was monitored.

The laboratory employs a part-time receptionist/filing clerk and she collected all the general-practitioner requests each week and during the following week transcribed information from each request on to a coding sheet for each doctor. The information collected included: request date, patient's name, branch of laboratory, specimen type, and tests requested. Histology/cytology and blood bank requests were omitted because they formed a small proportion of the total general-practitioner requests and they were not usually handled by the filing clerk.

The collection of this information was continued after the collection service started operation. In addition the driver collected data on the time each call was made, the number of requests picked up at each call, the total number of specimens of each type carried each day and the reporting delay on reports delivered.

Results

Results from the 15 practices provided with the experimental service and the remaining 17 practices were obtained. Comparison of the valid 13 pairs of practices on a statistical basis has been described in a thesis (Green, 1974).

Those practices provided with the service are referred to as the 'experimental group', the remainder as the 'control group'. Use was measured by 'requests' although request here has a slightly different connotation to its normal use in pathology laboratory statistics, where it is intended to reflect laboratory workload. In this particular context a request is a specimen, or more than one specimen, taken from a single patient on a particular day and it may therefore involve work in more than one branch of the laboratory. In effect it is equivalent to the number of patient contacts resulting in pathology investigation, however extensive.

The 11 weeks 1 January–18 March 1973 constitute the 'before' period for the experiment and the two 11 week periods 19 March–3 June and 4 June–19 August constitute two 'after' periods for which detailed data about use are available. Although these three periods comprise the formal duration of the experiment as originally proposed to DHSS the service did continue on an 'experimental' basis and total use data are available for a third 11-week 'after' period.

Level of use

Table 1 shows the basic data on the effect of the collection service on level of use of open-access pathology investigations. It is quite clear that the collection service generated a large increase in use for those practices in the experimental group.

TABLE 1
AVERAGE USE DURING THE 'BEFORE' PERIOD COMPARED WITH AVERAGE USE DURING THE THREE 'AFTER' PERIODS FOR BOTH GROUPS OF PRACTICES

Group of practices	Average requests per week during 'before' period	Average requests per week during the three 'after' periods		
		'after' 1	'after' 2	'after' 3
Experimental group	73	128	131	140
Control group	55	58	58	60

The total increase was of the order of 80 per cent while the use of the control group remained remarkably constant during the entire period of the experiment. The increases of individual practices varied considerably, however, only two practices in the experimental group showed decreases between the 'before' period and any of the 'after' periods.

The apparent differences between the experimental and control groups during the 'before' period is not statistically significant (Green, 1974). It is due to the inaccuracy of the use data, obtained from laboratory day-books, on which the allocation to the groups was based.

Table 1 shows that the response was quick, although use appeared to be still increasing during the whole duration of the experiment.

Pattern of use

Table 2 shows the increase in total use classified under four headings: pregnancy tests, other biochemistry, haematology, and bacteriology for both groups. Quite clearly, while the total increase in use which has occurred for the experimental group has been

TABLE 2
ABSOLUTE AND PER CENT INCREASES REPRESENTED BY THE DIFFERENCE BETWEEN THE AVERAGE OF THE FIRST TWO 'AFTER' PERIODS AND THE 'BEFORE' PERIOD FOR BOTH GROUPS

		<i>Pregnancy tests</i>	<i>Other bio-chemistry</i>	<i>Haematology</i>	<i>Bacteriology</i>	<i>Total</i>
<i>Absolute increase</i>	Experimental group	57.5	48	252.5	282.5	640.5
	Control group	2.5	3.5	16	10.5	32.5
<i>Per cent increase</i>	Experimental group	24.8	49.9	66.4	176.5	73.5
	Control group	1.2	5.4	6.2	9.0	5.1

contributed to by all these categories, the increase is dominated by haematology and bacteriology investigations. The pattern of use of the control group remained relatively stable.

Not surprisingly, since it is likely to be the least discretionary of all the investigations, the demand for pregnancy tests showed the lowest per cent increase. The per cent increase in demand for other biochemical investigations was considerably higher than this although not in absolute terms and use of biochemical investigations remained a fairly small proportion of total demand.

The biggest increase in both absolute and proportional terms was for bacteriology investigations and these were predominantly for routine urine investigations, throat and vaginal swabs.

Of the practices which carried out their own pregnancy testing only one appeared to transfer pregnancy tests to the laboratory after implementation of the collection service. Similarly, of the practices equipped to carry out haemoglobin determinations only one transferred a significant number of these to the laboratory. Thus it is considered that the total increase observed relates primarily to 'new' investigations rather than transfers to the laboratory from elsewhere.

Use of the collection service

The collection service rapidly developed a routine and the driver was readily accepted by the office and technical staff at the laboratory and the doctors and their staff. The vehicle usually left the laboratory at 9.45 and returned about 12.15 so the route took approximately 2½ hours providing a reliable service.

The total mileage was 36 miles and the average speed 20 mph, thus the average time spent at each call delivering reports and supplies of equipment and collecting the specimens was about 2½ minutes. This is felt to be low and represents the competence and motivation of the driver specially recruited for the experimental service. This would not necessarily be achieved in a more routine implementation.

Of the 4,386 requests submitted by the experimental group during the 33 weeks after introduction of the service, 3,375 were transported to the laboratory by the collection service. Thus the weekly average of requests transported was approximately 102 compared with an average weekly use of 133. The indications were that the weekly total of requests carried by the service was increasing during the 'after' period and likely to increase further just as was the total use of the experimental group.

Report delay

Each day the driver recorded the request dates of all the reports she was delivering. Thus the reporting delay on each request could be easily established. About 16 per cent of reports were delivered after one day, 50 per cent within two days or less and 65 per cent within three days, the average delay being about three days.

What happens in the absence of the service is not known since it would depend on the vagaries of the second class postal service which was used for most reports. This suggests that the average delay in the absence of the service would be about 4½–5 days, so on average the service has saved about 1½–2 days.

In comparison Patterson *et al.* (1974) report that in their survey about 70 per cent of requests were available within one week whereas in this study about 70 per cent were available within four days.

No attempt was made to modify the working routine of the laboratory and office staff responsible for the preparation of reports in order to help the processing of general-practitioner requests. Almost certainly further improvement in report delay could

have been achieved by re-arranging routine so as to maximise the availability of reports before the vehicle left the laboratory each morning.

Costs and cost savings

The experimental collection service occupied somewhat less than a half-day per day of vehicle time. The route duration was $2\frac{1}{2}$ hours and the time required to prepare reports and supplies to be delivered and to take requests to the appropriate branches of the laboratory was no more than a half-hour per day. This suggests an annual fixed cost for the experimental service, calculated on a pro rata basis, of about £450 (at 1973 prices assuming a basic eight-hour day).

The annual mileage of the vehicle while operating the experimental service was 9,360 miles and costed at 4 pence per mile the mileage cost would be about £374. Thus the total annual cost of the experimental collection service, at 1973 prices, was about £824. These costs, of course, refer only to this experimental collection service. A simple method for estimating the costs of providing a variety of collection service configurations in any area will be described in a later paper.

Since the average number of requests carried per week was 102 the average cost per request carried was 15.5 pence, the weekly cost of the service being about £15.85. Similarly the average cost per increased request generated by the service was $\text{£}15.85/60 = 26.4$ pence.

Those requests carried by the collection service which have been transferred from doctor or patient transport (i.e. those that would have been made in the absence of the collection service) have a travel and time cost saving associated with them. Of the 102 requests carried per week 42 could be considered to have been transferred from doctor or patient transport and generated cost savings although it was not possible to establish a value for these savings. Suffield *et al.* (1973) suggest that quite often the delivery of a pathology specimen to the laboratory involves a half-day off work which could be avoided. Whether this is true in general is not known but clearly if only a few of the 42 requests were in this category then the collection service could be justified on these grounds alone.

Effect on the laboratory

From the viewpoint of laboratory organisation the collection service proved convenient. The disruption of office and technical activities caused by patients when delivering specimens themselves was much reduced and the laboratory staff consider desirable the arrival of specimens in bulk at a predictable time and in good condition.

Further, because of the more reliable reporting of results, there were fewer telephone queries by doctors and consequently less searching through files and day-books by the laboratory staff in order to give results over the telephone. Although it was not possible to quantify these features the laboratory staff considered themselves adequately compensated for any extra workload generated by the collection service.

Discussion

The main purpose of the experiment was to confirm the hypothesis that general practitioners would make more use of the open-access pathology service through being provided with a specimen collection service. It was found that the collection service generated a large increase in demand for pathology investigations. This increase persisted throughout the duration of the experiment and occurred across all categories of use and for all but one of the practices served.

If the purpose of a specimen collection service is to secure an increase in use of pathology investigations by general practitioners then ideally it should be evaluated

in terms of its cost and its effect on health care, resulting from improved clinical decision making.

It was not possible to explore these consequences in this study, so evaluation of the specimen collection service concept must remain judgmental. However, given that the evidence suggests that general practitioners are discriminating in their use of the open-access pathology service and under use it, then securing an increase in use is likely to be a move in the right direction. The judgment to be made concerns the acceptability of the cost of the collection service given that it produces the desired increase in pathology investigations.

In some ways this takes a rather narrow view of evaluation. The benefit to the Health Service and the community of any travel and time cost savings and improvements in laboratory organisation could be set against the cost of the service. An argument in favour of a collection service might be sustained on these grounds alone.

In addition, the collection service was favourably received both by the doctors served and the laboratory staff. The majority of doctors felt that they were able to offer better health care to their patients and thought that the service was a great success. The laboratory staff considered themselves well compensated for any increase in workload by the convenience of the majority of specimens arriving in bulk rather than sporadically during the working day. In addition it was felt that there was a smaller incidence of spoilt specimens and telephone enquiries about reports delayed in the post.

It is interesting to note that a recent report by the Joint Working Party on General Medical Services endorses the implementation of specimen collection services for general practitioners (Department of Health and Social Security, 1974).

REFERENCES

- Department of Health and Social Security (1971). *Using the laboratory*. A Handbook for Medical Practitioners prepared on the advice of the Standing Medical Advisory Committee and the Central Pathology Committee.
- Department of Health and Social Security (1974). *General Medical Services*. Report of the Joint Working Party 1973. London: H.M.S.O.
- Green, R. H. (1973). *Journal of the Royal College of General Practitioners*, **23**, 316-325.
- Green, R. H. (1974). *An Investigation of Certain Aspects of the Design of Open Access Pathology Services for General Medical Practice*. Ph.D. Thesis, University of Lancaster.
- Patterson, H. R., Fraser, R. C. & Peacock, E. (1974). *Journal of the Royal College of General Practitioners*, **24**, 237-241.
- Suffield, W. E., Calvert, J. W. & Suffield, S. B. (1973). *Journal of the Royal College of General Practitioners*, **33**, 344-351.

THE ELDERLY IN HOSPITAL

... "The proportion of elderly people, who already account for over a third of hospital costs and nearly half the personal-social-services costs is increasing rapidly. The definition of elderly is those aged over 65 years. Were data available for people over 75 they would be even more impressive, because the changes between dependence and independence in the decade of age from 68 to 77 are probably as great, albeit in the opposite direction, as those in the decade 8 to 17.

REFERENCE

- The *Lancet* (1974). Editorial, **2**, 201-20.