

## Contemporary Themes

# Effectiveness of out-of-hours biochemistry investigations

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### Abstract

A survey was carried out of doctors who used their out-of-hours biochemistry service to find out why requests for investigations were made, how often the results altered patient management, and whether they could define areas where investigations were unproductive. Of 167 questionnaires distributed, 147 (88%) were completed. In 86% the requests were for diagnosis or immediate patient management and in 35% the results actually altered management. Senior clinical staff were more efficient than their juniors in instigating biochemical investigations that proved to be effective. In no instance where the clinical staff predicted that it was unlikely that the results would alter management was management altered.

It is suggested that joint reviews of case notes by junior and senior clinical staff would prove to be the most appropriate way to increase the effectiveness and efficiency of clinical investigation.

### Introduction

"It is a salutary exercise in mental discipline to catechise oneself when ordering any medical investigation, saying, 'Why do I order the test? What am I going to look for in the result? If I find it will it affect my diagnosis? How will this affect the management of the case? Will this ultimately benefit the patient?'"<sup>1</sup>

St James's University Hospital is a district general hospital of 1398 beds that, on alternate days, provides an acute medical service for a population of over 490 000. In 1979 the department of chemical pathology dealt with roughly 130 000 requests (600 000 tests), of which 6500 were emergency investigations handled outside normal laboratory hours.

A survey of doctors who requested out-of-hours biochemistry investigations was carried out shortly after a 10-week period of industrial action by technical staff, when a restricted range of emergency investigations was performed by senior laboratory medical and scientific staff after the case had been discussed with the doctor concerned. During this 10-week period there were fewer than 20 requests each week; both before and after this period requests averaged 152 each week. We undertook the survey to find out why emergency biochemistry requests were made and by whom, how often the results altered management, and to see if topics could be defined where biochemical investigation was ineffective.

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### Methods

For a period of nine days a questionnaire (fig 1) was sent to the doctor responsible for each request for an out-of-hours biochemistry investigation, the request/report form being photocopied on the reverse of the questionnaire. A request was defined as any number of biochemical tests performed on one or more specimens obtained from a patient at one time.

Questionnaires and an envelope addressed to one of us (RY) were dispatched daily whenever possible, so that details of the case would be fresh in the doctor's mind. An explanatory letter was included with the first questionnaire sent to each doctor. Of the 167 questionnaires distributed, 78% were returned within two weeks. Subsequently those doctors who had not responded were telephoned, and when necessary provided with duplicate copies. In all, 147 questionnaires (88%) were returned. Doctors were not warned in advance that a survey was to be undertaken.

For two weeks before the survey and for four weeks afterwards the numbers and origins of out-of-hours requests were recorded to see whether the total number or pattern of requests had altered.

A poster presentation of the results of the survey was displayed in the entrance hall of the residents' mess for two weeks, and the numbers of out-of-hours requests before, during, and after the display were recorded.

The main reason the request was sent to the laboratory outside normal working hours was:

- To help in diagnosis of a new problem
- To help in immediate patient management
- For medico-legal purposes
- Because for your firm this is a "routine" in this type of problem
- For pre-operative assessment before urgent surgery
- For pre-operative assessment before cold surgery the following day
- In case you were subsequently asked for the result by one of your seniors
- To reassure yourself that you had not missed a treatable condition
- Other (please specify under 8 below)

FIG 1—Sample of questionnaire showing question 2.

### Results

Most requests (86%) were made for patient management or diagnosis (fig 2). The results actually altered management in 35%. Management was not altered if the request was for anything other than diagnosis, management, or preoperative assessment before "cold" surgery the following day.

In all cases where the doctor's clinical judgment at the time of making the request was that the results would be unlikely or very unlikely to alter management (19% of the total) management was in fact not altered (fig 3).

Management was altered in 68% of patients when requests came

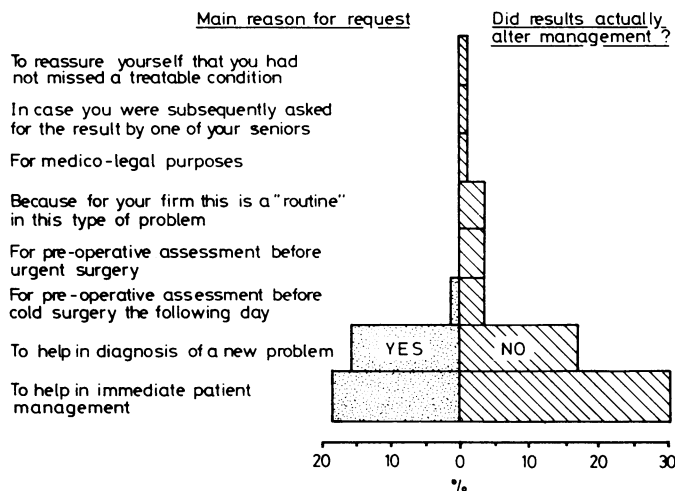


FIG 2—Main reasons for out-of-hours requests related to whether results altered patient management.

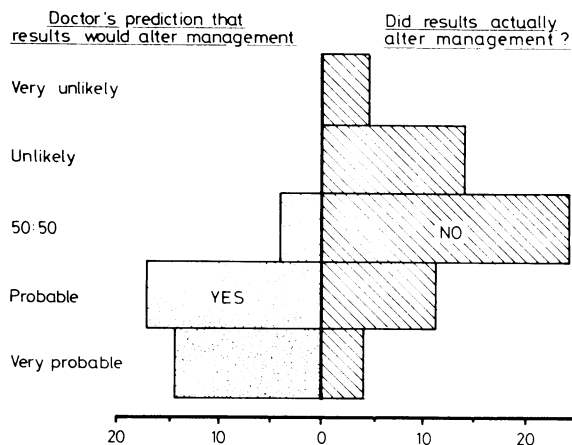


FIG 3—Doctors' predictions at time of making requests that results would alter patient management related to whether results actually altered management.

glucose, and CSF protein concentrations; together with plasma bilirubin, calcium, and magnesium concentrations in neonates. Facilities for measuring blood glucose concentration, pH, and gases, and the semiquantitative measurements of serum amylase activity and salicylate concentration were available for use by clinical staff. During the period of the survey most of the latter measurements were accompanied by a request for electrolyte concentrations, and we estimate that if the requesting pattern had been unchanged during the dispute we would have received 130 requests each week rather than 20. The laboratory medical and scientific staff refused only a very small proportion of the requests made during the dispute because they were unjustified. Thus the dramatic reduction in numbers was probably in response to our appeal to restrict requests and reluctance to call out senior laboratory staff at night. No clinical disasters were reported during the period of industrial action.

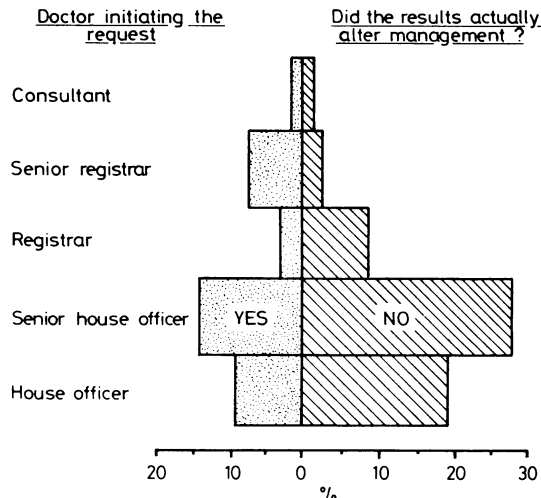


FIG 4—Seniority of doctors who initiated requests related to whether results altered patient management.

from a senior registrar or consultant but in only 32% of those from a more junior doctor (fig 4). This distribution is unlikely to have occurred by chance (Fisher's exact test:  $p < 0.003$ ).

In retrospect, the doctors considered that requests for investigations on 23% of their patients could have waited until the following morning, including 3% in whom the results altered management. They considered that unnecessary treatment would have been instituted in 28% of the patients had the test not been available. Nearly all doctors (99%) were satisfied with the speed with which results were reported.

There was no significant difference between the total number of out-of-hours biochemistry requests each week before, during, and after the survey, nor were there significant changes in the proportion of the total originating from accident and emergency (22%), paediatric (29%), medical (27%), surgical (19%), or other firms (3%).

A poster presentation of the results of the survey in the doctor's mess for two weeks had no significant effect on the number of out-of-hours requests.

**Discussion**

We carried out the survey because biochemistry requests numbered fewer than 20 each week during a 10-week period of industrial action by technical staff but about 150 each week before and after this period.

During the dispute senior laboratory medical and scientific staff provided an analytical service for serum concentrations of sodium, potassium, urea or creatinine; plasma glucose, CSF

We were surprised that the requesting rate returned to its former level within two days of the end of the dispute, suggesting that there had been a constant but unfulfilled demand rather than that medical staff had formerly made a large number of unnecessary routine requests.

The doctors were questioned in February 1980, four weeks after the resumption of the normal service. They said that 86% of their requests were for diagnosis or management, and that 35% actually altered management. They considered that more than one-quarter of patients would have received unnecessary treatment had the tests not been available. We have no evidence that the alterations made to management were beneficial or even necessary, nor that the unnecessary treatment would have been harmful. Nevertheless, these results suggest that the efficiency of patient management was reduced when the emergency service was restricted.

The difficulties of judging cost-effectiveness in the health services are legion.<sup>2</sup> Some decisions have already been taken about the cost-effectiveness of emergency investigations in that a full range of tests is not available out-of-hours in any hospital. The difficulty is that the restricted range of tests, each of which is essential in some condition, is available in all. Our survey was biased to show the requesting practice of medical staff in a favourable light because it was based on the doctors' own views and the questionnaires were completed after the outcome was known. Even so, clearly certain types of requests were ineffective. The management of the patient was rarely altered if the request was made for any reason other than diagnosis or management, and management was never altered if, when the request was sent, the doctor's clinical judgment was that the result would be unlikely to alter management. Thus, even given the broad view that an emergency investigation is one that is required

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for the immediate management of the patient, there is considerable room for a reduction in cost with no loss of effectiveness.

Payments of over £20 000 were made for emergency biochemistry calls in this hospital in 1978-9. Although there is little published information, comparison with Scottish laboratories of similar size shows that we do not have a uniquely large out-of-hours work load in relation to total work load.<sup>3</sup> Perhaps these costs are not excessive: they amount to about £3 an hour for emergency cover outside normal laboratory hours for 365 days a year (including weekends and holidays), cost under 2.5% of the total drug bill, and are of the same order as the annual expenditure in this hospital on cimetidine. Nevertheless, they can clearly be reduced with no loss of effectiveness.

How may this be achieved? The number of emergency requests was not altered by the survey itself, nor by a poster demonstration of its results. Our survey showed that senior registrars and consultants were considerably more efficient than their junior staff in instigating effective investigations, although they may have seen a different type of patient. It has been suggested that greater teaching emphasis should be placed on the "patient care—laboratory interface" when training house staff.<sup>4</sup> There is impressive evidence from Harvard Medical School that a reduction of nearly one-half in all biochemical and serological tests requested by junior clinical staff was achieved by four one-hour sessions early in their

internships, during which juniors discussed the case notes of their patients with their seniors; this reduction in requests for tests was sustained.<sup>5</sup> Previous studies have shown similar results.<sup>6</sup> We believe that this approach to postgraduate medical education will prove the most appropriate way to increase the effectiveness and efficiency of clinical investigation. Consultants in the clinical specialties should consider the evidence that they and those responsible to them are using the available resources inefficiently, and that a short period spent with newly appointed house staff on reviewing case notes will be both practically and intellectually rewarding.

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# Telling the right patient

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Not having been told what is wrong is the commonest complaint that patients make about the medical profession.<sup>1</sup> Yet no one really knows whom to tell, and publications on the subject are dogmatic and anecdotal, with a minimum of useful facts. This raises the possibility that the patient might know best whether he should be told.

## Patients, methods, and results

During a concurrent study of 200 consecutive patients (170 men, 30 women) with inoperable bronchial carcinoma, each was told that, after investigation intended to exclude various named diseases including cancer, they would be given truthful clearance or a firm diagnosis if they cared to ask. They also were told that if they did not care for medical details there would be no need to ask and that exchanges of information would be confined to their general practitioner. Subsequently, those who were told at their own request were asked if they regretted having asked. After their death the thoughts of 191 were verified as part of an interview with the closest relative.

Eight patients were too ill to be treated in this way, and three were demented. Six were told by relatives or others before the interview at which they were to be informed. This left 90 patients who had asked for the diagnosis and 93 who deliberately did not, despite being given more than one obvious opportunity.

Of the 90 patients who had had their questions answered, only one subsequently objected to having been told, and she had insisted on

the truth from the start. After her death, her husband said that she had changed her opinion and that they both had been helped to comprehend the course of her illness.

Ten patients who asked for the diagnosis subsequently "denied"<sup>2</sup> what they had been told, speaking as if their expectation of life was good. Asked what they had been told at the crucial interview, they used such terms as "congestion," probably used earlier by someone else. Of the 93 who did not ask, some explained that they did not want to be told the diagnosis. Forty-two subsequently showed "awareness," speaking as if they had a fatal illness. It was not humanely possible to explore the mechanism of this. For many it must have been common sense. For 18 it could have been their radiotherapy.

## Comment

The report of Novack *et al*<sup>3</sup> that 52% of patients wanted to be told is close to the 49% of the present series. Very likely, therefore, a policy of telling all patients or of telling none never could suit more than half.

Because the dying prefer not to know<sup>4</sup> they should not be encouraged to ask for the diagnosis, but most patients can be given one or two obvious opportunities, with a simple sentence such as, "Is there anything more you would like to know?" This is part of a trend reviewed by Novack *et al*<sup>3</sup> and described over 20 years ago by Aitken-Swann and Easson,<sup>2</sup> who regretted that patients' own views were seldom heard. As may happen, their zeal led them to tell too many, for 7% of their patients subsequently disapproved of being told and 19% "denied" the diagnosis. Some of the 11 "denials" in our series could be due to an admitted tendency to encourage the hesitant to ask. But it seems possible that some confident patients, unprepared for bad news, also could respond only by "denial." If so they always