

ORIGINAL ARTICLE

Change of pathology request forms can reduce unwanted requests and tests

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Background: Developments in clinical and laboratory medical practice have resulted in a large increase in laboratory workload, with considerable financial implications. It has been shown that the design of laboratory request cards can influence patterns of test ordering and possibly reduce inappropriate requests.

Aims/Methods: To redesign pathology request cards with a view to reducing inappropriate test requesting.

Results: A redesign of the request cards used by general practitioners in the Bradford area led to a significant reduction in the ordering of specific investigations.

Conclusions: The redesigning of pathology request cards can have a beneficial effect on test requesting.

Over recent years, medical laboratory practice has changed and developed beyond recognition.¹ An increase in the level and technological sophistication of medical interventions, in addition to a growing and ageing population, has increased the workload, with a corresponding increase in overall costs. Simultaneous changes in attitudes and expectations from the users of the National Health Service (NHS) have demanded faster turnaround times within fixed budgets. Work by others^{2–3} has shown that the design of laboratory request cards can influence patterns of test ordering and possibly reduce inappropriate requests.

“We reviewed the effect that changes to the design of our laboratory request cards had on patterns of test requesting within the local general practices”

The pathology service at Bradford Teaching Hospitals NHS Trust, in partnership with Leeds Teaching Hospitals NHS Trust, serves a population of approximately 500 000 in the Bradford area. The services support both hospital and community doctors. We reviewed the effect that changes to the design of our laboratory request cards had on patterns of test requesting within the local general practices.

METHODS

Until the end of 1998, a request form that listed 16 different biochemical and immunological tests was in regular use (table 1). This form, which was used by both hospital and community doctors, had been developed to enable fast data inputting and test ordering in the laboratory using barcodes printed on the form next to tick boxes. The barcodes could be scanned with magic wands attached to the laboratory computers. The request forms used in the community served by Bradford Trust were redesigned and tests more appropriate for hospital use were removed. We set out to study the effect on requesting patterns and therefore the number of tests as a result of this reduction in the number of tick boxes.

We conducted a systematic search for all the requests and the tests carried out in the community during the two year period spanning the changeover. Tables 1 and 2 show the formats of the old and the new forms, respectively. Preprinted tests with check boxes were reduced in number

Table 1 Tests listed until January 1999

Urea and electrolytes
Serum glucose
Blood glucose
HbA1c (glycated haemoglobin)
Renal
Hepatic
Cardiac
Cholesterol
Thyroid screen
Hypothyroid on treatment
Hyperthyroid on treatment
Lipids
Chemotherapy
Rheumatoid factor
C reactive protein
Autoantibody screen

and labelling was simplified in the new forms, but barcodes to facilitate data entry remained.

The tests studied were C reactive protein (CRP), rheumatoid factor, lactate dehydrogenase (LDH), and serum calcium. CRP and rheumatoid factor were removed from the form as individual check boxes. Calcium and LDH were originally included as components of the “chemotherapy” profile. Calcium was also included in the “renal” profile.

The number of times each investigation was performed was established from the laboratory records over a two year period. This period spanned the change in request form design. The data for each test were analysed using a Poisson regression model, with intervention and month as factors in the model, and with year as a covariate. Analysis was performed using Statacorp Statistical Software Release 8.0.

RESULTS

The incidence rate ratio was calculated for each test studied (table 3). With the new form the request rate for calcium fell to an average of 38% of the original request rate when the old form was in use (fig 1). Serum LDH showed an even more dramatic fall to 21% of the original request rate (fig 2). The

Abbreviations: CRP, C reactive protein; LDH, lactate dehydrogenase; NHS, National Health Service

Table 2 Tests listed from January 1999

Urea and electrolytes
Blood glucose
HbA1C (glycated haemoglobin)
Cholesterol
Lipids (cholesterol and triglycerides)
Liver function tests
?Menopause
Thyroid screen
Thyroid on treatment

Table 3 Incidence rate ratio (IRR) data

Test	IRR	95% CI	p Value
Calcium	0.38	0.37 to 0.39	<0.001
LDH	0.21	0.16 to 0.29	<0.001
RF	0.73	0.68 to 0.78	<0.001
CRP	0.70	0.66 to 0.74	<0.001

CI, confidence interval; CRP, C reactive protein; LDH, lactate dehydrogenase; RF, rheumatoid factor.

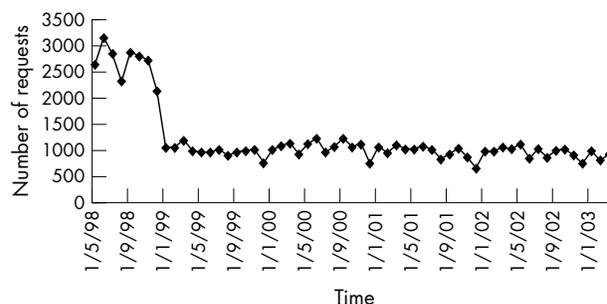
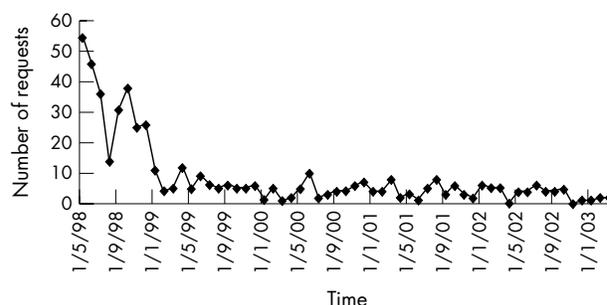
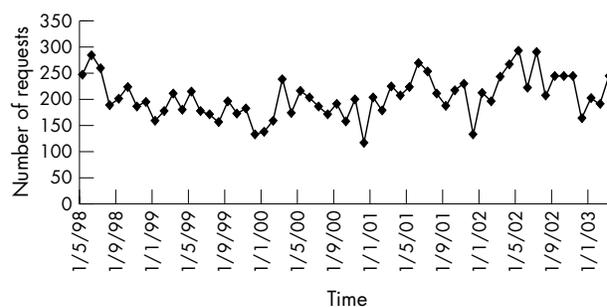
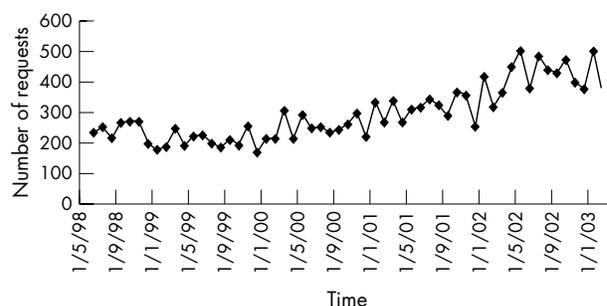
reductions in request rate for rheumatoid factor and CRP were smaller but nevertheless highly significant at 73% and 70% of the original request rates, respectively. Table 3 shows the incidence rate ratio data. The rheumatoid factor requests showed a month on month growth rate of approximately 7% after they were removed from the form (fig 3). This is in keeping with our current overall increase in workload. CRP showed a significant decrease in the number of requests, although there has been a pronounced increase in the number of requests in the follow up period (fig 4). This may reflect the increasing use of CRP instead of the erythrocyte sedimentation rate.

DISCUSSION

Research, particularly in the Netherlands, suggests that request cards with multiple check boxes increase laboratory requests and discourage the rational ordering of investigations. Our study also supports the idea that multiple tick boxes can encourage excessive and probably inappropriate requesting, simply by offering a list of easily accessible tests that may not have been foremost in the clinician's mind. The continued increase in rheumatoid factor requests at the expected rate in our study suggests that their removal from the request cards did not have a deleterious effect on appropriate usage. These tests have specific indications and tend not to be treated as "profiles".

"Our study also supports the idea that multiple tick boxes can encourage excessive and probably inappropriate requesting, simply by offering a list of easily accessible tests that may not have been foremost in the clinician's mind"

Our work also illustrates the importance of using clear labelling and explanations of the individual test components of a composite request. For example, ticking the "chemotherapy" profile on the original form actually ordered a serum urate, LDH, calcium, and urea and electrolytes. When this was removed, LDH testing underwent a large reduction. This probably reflects the highly ambiguous nature of profiles, which were originally included for perceived ease of use by clinicians and the laboratory.

**Figure 1** Calcium requests against time.**Figure 2** Lactate dehydrogenase requests against time.**Figure 3** Rheumatoid factor requests against time.**Figure 4** C reactive protein requests against time.

In the cost conscious NHS, it is important that investigations are ordered in a rational and appropriate manner.⁴ Any change in the design of request cards should always be made with this in mind. Unfortunately, the data available on influencing patterns of requesting are scanty. Zaat *et al* showed an 18.5% reduction in blood test requesting using a redesigned form.² The benefit from this was lost as soon as

Take home messages

- We found that redesigning pathology request cards, in particular reducing the number of preprinted tests with check boxes, led to a reduction in inappropriate test requesting
- Requests for serum calcium, lactate dehydrogenase, rheumatoid factor, and C reactive protein all showed large reductions
- The continued increase in rheumatoid factor requests at the expected rate in our study suggests that their removal from the request cards did not have a deleterious effect on appropriate usage

practitioners were allowed to revert to their original request form. Others have shown that education strategies can improve the rationality of test ordering in the short term, but without longterm feedback the effect is short lived.⁵ Smellie *et al* showed how the development of coronary prevention patient categories could be used to encourage the rational and appropriate use of the laboratory investigation of lipid profiles.³ The effect of such strategies might produce a more durable change in clinical behaviour.

At a time when the NHS is becoming ever more cost conscious and competitive, there is a need to develop effective

strategies for promoting rational and cost effective test requesting. Our study illustrates the significant effect that a change in request card design can have on the rate of test ordering.

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