Appropriate design of biochemistry request cards can promote the use of protocols and reduce unnecessary investigations

J H Barth[1], A H Balen[2] and A Jennings[1]
From the Departments of [1]Clinical Biochemistry and [2]Reproductive Medicine, Leeds General Infirmary, Leeds, UK

SUMMARY. Attempts to control laboratory workload in the past always proved to be short-lived. We designed a request card based on clinical conditions for a gynaecology out-patient clinic to help clinical staff to adhere to agreed investigation protocols. Each request card had a tick-box associated with a clinical condition. The tests performed for each condition were advertised on a poster in the clinic.

The workload was assessed for a 2-year period before and after the introduction of these cards. The numbers of all endocrine tests, except progesterone and sex hormone binding globulin, fell by 19% ($P< 0{\cdot}0001$) whereas the clinical cases seen remained steady at 227 per month.

This report demonstrates that agreed protocols can be implemented but that a persistent *aide-mémoire* is necessary.

Requests for laboratory investigations have been progressively increasing over recent years; and attempts to control workload have been largely unrewarding.[1] Laboratories have attempted to survive this extra work first by the use of discretionary profiles rather than large panels of tests and, more recently, by the use of increasingly automated forms of analysis. A further approach has been to re-design the request cards. It is recognized that open request cards result in fewer tests than cards with tick-boxes cataloguing the full range of tests available. The value of these tick-boxes in relieving the burden of the physician ordering tests has to be balanced against the risk of increasing workload by subliminal suggestion.

In previous reports, request card design has been used to reduce requests for tumour markers[2] and thyroid tests.[3] We report the use of a request card using a clinical symptom-based tick-box design in a gynaecology endocrine clinic to help ensure compliance to agreed protocols.

METHODS

This study was performed in the gynaecological out-patient department in the Leeds General Infirmary. Investigative protocols for the endocrine investigation of common gynaecological disorders were agreed by consensus with senior medical staff. Request cards were designed with only tick-boxes for clinical conditions but not the names of the individual hormones. The actual tests performed for each condition were not written on the cards but were posted in the out-patient department. There was no restriction on individual clinicians' ability to request any other biochemical test.

The design of the new request card consisted of an adhesive label added to the usual request card. The name of each clinical condition was associated with a tick-box and a barcode strip. The latter was used by laboratory staff to ensure the clinical detail and the agreed investigations were entered into the laboratory computer. Request cards without the adhesive label were still available and contained an open box for free requesting.

Clinical and laboratory workload data were retrieved from the Trust and pathology activity monitoring systems over the 4-year period comprising 2 years prior to and 2 years after the implementation of the new request cards. Data for clinical cases seen were only available for 1 year prior to the introduction of the new request cards.

Correspondence: Dr J H Barth.
E-mail: j.h.barth@leeds.ac.uk

TABLE 1. *Monthly workload data before and after introduction of new request card*

	April 1996 to March 1998	April 1998 to July 2000	Change
Clinical cases seen	*227 (74)	227 (40)	NS
CA125	50·5 (18·75)	71·0 (31·5)	+41% $P<0.001$
Luteinizing hormone and follicle-stimulating hormone	67·0 (19·0)	50·5 (8·0)	− 25% $P<0.001$
Follicle-stimulating hormone	24·5 (11·25)	16·5 (6·25)	− 33% $P=0.0004$
Oestradiol	70·0 (18·75)	41·5 (14·5)	− 41% $P<0.0001$
Progesterone	9·5 (6·25)	11·5 (6·5)	NS
Prolactin	46·5 (14·0)	21·0 (7·5)	− 55% $P<0.0001$
Sex hormone binding globulin	3·0 (2·5)	3·0 (3·0)	NS
Testosterone	23·0 (11)	15·0 (5·0)	− 35% $P=0.0002$
Thyroid function tests	66·5 (18·5)	50·0 (10·75)	− 25% $P<0.0001$
Total	366·0 (88·75)	296·75 (54·75)	− 19% $P<0.0001$

Monthly workload data (median [interquartile range]). Significance by Wilcoxon signed rank test.
*Clinical case numbers were only available for the period July 1997 to March 1998.

RESULTS

The monthly test rate for the agreed tests are shown in Table 1. All the endocrine tests except progesterone and sex hormone binding globulin showed a significant fall despite a similar number of clinical cases.[3] Request rates for CA125, which was included in the analysis as a control test, increased significantly.

DISCUSSION

There have been two previous reports of request cards designed around clinical disorders. Durand-Zaleski *et al.*[2] in a large teaching hospital in France responded to excessive and inappropriate requests for tumour markers by producing a request card with a box grid, with tumour markers on one side and organs on the other. Boxes that corresponded to inappropriate requests were blacked out (although there was a facility to over-ride this restriction). This measure resulted in a 25% fall in the tumour marker workload. Wong *et al.*[3] have also used a disease-based design for request cards. They used clinical history to choose the most appropriate thyroid hormone tests. They used thyroxine as a first-line test, and by using the clinical indication reduced thyroid-stimulating hormone and tri-iodothyronine estimations by 39% and 62%, respectively. At the same time, their control investigations (CK and lactate dehydrogenase) showed little change.

The value of reducing unnecessary tests is not only as a cost-saving exercise but also because there is a risk of false positive results as well as a direct relationship between overall numbers of investigations and downstream therapeutic interventions.[4]

Patients with suspected ovarian cancer were likely to present to the gynaecology outpatient clinic in this study and therefore CA125 was analysed as a control to assess the background increase in workload. Although no measure of case mix was made, the clinic in this report is a specialist gynaecology endocrinology clinic and would not have seen significant numbers of patients with malignancy. There has been no change in staff members. The marked increase in CA125 requests may indicate the uptake of a test whose value has been established recently or it may reflect a general increase in laboratory tests. The indiscriminate use of tick-boxes is well recognized to increase workload. In our experience, the addition of an additional tick-box for thyroid function resulted in an increase in monthly requests of 170%, whereas a comparable nearby laboratory experienced an increase of only 107% per month (unpublished data).

This report demonstrates that agreed protocols can be implemented but that a persistent *aide-mémoire* is necessary. The approach that we have used would not be useful for general investigations but more sophisticated disease-based protocols could be built into electronic test-ordering systems and our study indicates that this is likely to be successful.

REFERENCES

1 Fraser CG, Woodford FP. Strategies to modify the test-requesting patterns of clinicians. *Ann Clin Biochem* 1987; **24**: 223–31

2 Durand-Zaleski I, Rymer JC, Roudot-Thoraval F, Revuz J, Rosa J. Reducing unnecessary laboratory use with new test request form: example of tumour markers. *Lancet* 1993; **342**: 150–3
3 Wong ET, McCarron MM, Shaw ST Jr. Ordering of laboratory tests in a teaching hospital. Can it be improved? *J Am Med Assoc* 1983; **249**: 3076–80
4 Verrilli D, Welch HG. The impact of diagnostic testing on therapeutic interventions. *J Am Med Assoc* 1996; **275**: 1197–8

Accepted for publication 16 July 2001