ORIGINAL ARTICLE

Nurses' attitudes to a medical emergency team service in a teaching hospital

D Jones, I Baldwin, T McIntyre, D Story, I Mercer, A Miglic, D Goldsmith, R Bellomo

Qual Saf Health Care 2006;15:427-432. doi: 10.1136/qshc.2005.016956

See end of article for authors' affiliations

Correspondence to:
Dr D Jones, Department of
Epidemiology and
Preventive Medicine, 3rd
floor Burnett Building,
Commercial Road,
Melbourne, Victoria 3004,
Australia;
djones26@bigpond.net.au

Accepted 4 July 2006

Background: Cultural barriers including allegiance to traditional models of ward care and fear of criticism may restrict use of a medical emergency team (MET) service, particularly by nursing staff. A 1-year preparation and education programme was undertaken before implementing the MET at the Austin Hospital, Melbourne, Australia. During the 4 years after introduction of the MET, the programme has continued to inform staff of the benefits of the MET and to overcome barriers restricting its use.

Objective: To assess whether nurses value the MET service and to determine whether barriers to calling the MET exist in a 400-bed teaching hospital.

Methods: Immediately before hand-over of ward nursing, we conducted a modified personal interview, using a 17-item Likert agreement scale questionnaire.

Results: We created a sample of 351 ward nurses and obtained a 100% response rate. This represents 50.9% of the 689 ward nurses employed at the hospital. Most nurses felt that the MET prevented cardiac arrests (91%) and helped manage unwell patients (97%). Few nurses suggested that they restricted MET calls because they feared criticism of their patient care (2%) or criticism that the patient was not sufficiently unwell to need a MET call (10%). 19% of the respondents indicated that MET calls are required because medical management by the doctors has been inadequate; many ascribed this to junior doctors and a lack of knowledge and experience. Despite hospital MET protocol, 72% of nurses suggested that they would call the covering doctor before the MET for a sick ward patient. However, 81% indicated that they would activate the MET if they were unable to contact the covering doctor. In line with hospital MET protocol, 56% suggested that they would make a MET call for a patient they were worried about even if the patient's vital signs were normal. Further, 62% indicated that they would call the MET for a patient who fulfilled MET physiological criteria but did not look unwell.

Conclusions: Nurses in the Austin Hospital value the MET service and appreciate its potential benefits. The major barrier to calling the MET appears to be allegiance to the traditional approach of initially calling parent medical unit doctors, rather than fear of criticism for calling the MET service. A further barrier seems to be underestimation of the clinical significance of the physiological perturbations associated with the presence of MET call criteria.

Medical emergency team (MET) systems have been introduced in hospitals to identify, review and treat severely unwell ward patients, to potentially reduce serious adverse events and cardiac arrests. MET services are an example of rapid response systems that also include "code blue", "cardiac arrest", "condition C" and "critical care outreach" systems. Most studies of the MET system focus on its role in reducing cardiac arrests or detecting medical error.¹ A recent cluster randomised prospective controlled trial of the MET system in 23 Australian hospitals failed to show improved outcome using the MET system.² However, half of the patients with cardiac arrests in this study had prior documented MET criteria, but for unknown reasons the MET service was not called.²

At the Austin Hospital, Melbourne, Australia, most MET calls are initiated by nurses.^{3,4} Informal surveys of nursing staff during the introduction of the MET suggested that fear of criticism was an important barrier to calling the MET (unpublished results). Other studies have shown that calling of the MET by nursing and junior medical staff may be hindered by traditional social and cultural barriers in hospitals.^{5,6}

A 1-year education and preparation programme was undertaken at the Austin Hospital before introducing the MET system, and ongoing education continues for all new and existing hospital staff. To date, the attitudes of staff

activating the system are not known. We prospectively proposed that education processes would lead to nurses understanding the key concepts and potential benefits of the MET service. We also proposed that barriers to activation of the MET system may still exist, particularly fear of being criticised for making a MET call, adherence to previous models of care for unwell patients, and allegiance to the traditional medical hierarchy. To test these hypotheses, we conducted a questionnaire of ward nursing staff in the Austin Hospital.

METHODS

Ethics approval

Prospective approval was obtained from the human research ethics committee of the Austin Hospital for the survey to be conducted.

The hospital

Austin Health is a university-affiliated hospital network in the north of Melbourne, which provides acute care, geriatric and rehabilitation medicine facilities. The Austin Hospital is a 400-bed acute-care hospital providing services including cardiothoracic and neurosurgery, and is the site where the medical emergency team (MET) operates. The hospital is also

Abbreviations: ICU, intensive care unit; MET, medical emergency team

the referral centre for acute spinal injuries and liver transplantation for the state of Victoria. The intensive care unit (ICU) has 21 beds and receives approximately 1700 admissions/year.

Medical emergency responses

The Austin hospital has two different rapid response systems. The traditional "code blue" call is intended for resuscitation of cardiac arrests and other acute life-threatening emergencies. It consists of an anaesthetic fellow, a coronary care fellow and nurse, an ICU fellow and nurse, as well as the medical fellow of the receiving unit of the day.

The MET is intended to review all medical emergencies other than cardiac arrests, and has been described in detail previously.^{3,4} The MET has been fully operational since November 2000, and consists of an ICU fellow and nurse, as well as the medical fellow of the day. It can be activated by any member of hospital staff according to predetermined criteria that are based primarily on abnormalities in vital signs and clinical status. Specifically, the criteria are acute changes in heart rate (<40 or >130 beats/min), systolic blood pressure (<90 mm Hg), respiratory rate (<8 or >30 breaths/min), oxygen saturation (<90% despite oxygen therapy) or falling conscious state. The staff member can also initiate a MET review if he or she is worried ("staff member worried" criterion) about the patient for any other reason. All members of staff, including nurses, are instructed to call the MET in cases involving the MET criteria, irrespective of the availability of the covering or treating team doctors.

Education process

A 1-year programme of preparation and education was provided to all hospital staff before implementing the MET service. After obtaining support from medical and nursing administration, we conducted a series of presentations at medical and surgical grand rounds, as well as smaller group presentations for ward nursing and medical staff. In the 4 years after the introduction of the MET, all new and existing employees of the hospital have received regular education regarding the theory behind the MET system, the criteria for making a MET call and changes to MET protocol. As part of this education, we emphasise that it is hospital policy that no member of staff should be criticised for initiating a MET call.

Details of survey process

We used an anonymous Likert-type agreement questionnaire to survey the nursing staff. The principles behind the designs and execution of the survey are those of a group-tested survey as outlined elsewhere.⁷⁻¹⁰

Survey objectives and prospectively defined research questions

The survey was undertaken to assess whether the nurses understand the theory behind the MET and to assess for obstacles to its use. Specifically, we wished to assess: (1) whether nurses understand the potential benefits of the MET system; (2) whether nurses find the MET service useful in managing unwell ward patients; (3) whether obstacles exist that restrict nurses from using the MET service; (4) what patient and system factors nurses think result in patients needing MET calls; (5) under what conditions nurses make or do not make a MET call; and (6) whether nurses believe that the MET reduces their ability to manage severely unwell patients.

Target population

We obtained a list of nurses' names for the general and specialty medical and surgical wards where the MET service

operates from nursing administration. This was converted into an MS Excel spreadsheet and itemised according to ward. Respondents' names were checked off to prevent multiple questionnaire completion by the same respondent.

Developing the questionnaire

The initial questionnaire contained 15 items with a closed format response that used a Likert-type agreement scale. The questions were designed to be unidimensional (ask only one question at a time) and to consider the six study questions outlined above. The items were revised on three occasions before pre-testing. Space was left to allow additional comments (text open-ended format) and to record the level of experience of the nurse (closed multiple-choice format).

Pre-testing of the survey

The survey was piloted to predict the emotional responses, comprehension and interpretation of items by the target population⁹ using a focus group with different levels of nursing experience that was nominated by nurse unit managers on target wards. Moderation and feedback were conducted by the principal investigators (DJ and IB), and all members of the focus group participated. After pre-testing, poorly worded items were modified and two items added. The focus group also suggested that the best time to administer the survey was at the start of hand-over of nursing.

Sample frame construction, recruitment and administration of the survey

The target population for the survey consisted of ward nurses employed during the period of administration of the survey. From this population, a sample frame was constructed by visiting wards and approaching nurses working on morning, evening and night duty. The nurse unit manager on each ward was notified of the planned times for survey administration. Nurses were approached to complete the survey during the first 10 min of hand-over of nursing. Interviewers (IB, TM and IM) used a pre-rehearsed oral introduction to limit interviewer bias. The sample frame surveyed thus comprised the nurses who were available on the chosen shift. Each nurse completed the questionnaire (table 1) in the presence of the interviewer, but without communication with the interviewer or other nurses of their ward. We documented the characteristics of the sample frame by recording the proportion of nurses on each ward who were approached to complete the survey. In addition, we documented the response rate by recording the proportion of nurses approached who completed the survey. The survey was conducted in May and June 2005.

Data management and analysis

The completed questionnaires were entered manually into an MS Excel spreadsheet (by AM) and double-checked by a second investigator (DJ). No assumptions were made about missing fields, which were omitted from analysis. Responses are presented as a percentage of the overall responses for each field.

Analysis of additional comments

Additional comments were assessed before grouping them into several themes. Each theme was summarised by paraphrasing one or more of the respondents' comments. The number of comments in each category was subsequently collated.

RESULTS

Details of pre-testing

The focus group of 12 nursing staff included three associate nurse unit managers, four clinical nurse specialists, four

Table 1 Responses to "Survey of nurses attitudes to the MET"

	Strongly disagree	Disagree	Uncertain	Agree	Strongly agree
1. Patients in the hospital have complex medical problems (n = 347)	0.3	2.0	1.4	34.9	61.4
2. The MET prevents unwell patients from having an arrest (n = 350)	0.6	4.6	3.7	38.0	53.1
3. The MET allows me to seek help for my patients when I am worried about them (n = 349)	0	0.9	1.7	28.7	68.8
4. The MET is not helpful in managing sick patients on the ward (n = 350)	49.1	38.9	4.6	4.6	2.9
5. When one of my patients is sick I call the covering doctor before calling a MET (n = 343)	1.7	9.0	17.2	58.0	14.0
6. If I cannot contact the covering doctor about my sick patient I call a MET (n = 345)	1.7	6.4	10.7	47.8	33.3
7. I am reluctant to call a MET on my patients because I will be criticised if they are not that unwell (n = 350)	35.4	46.3	8.3	8.0	2.0
8. MET calls are required because the management of the patient by the doctors has been inadequate (n = 350)	16.6	48.0	16.3	15.4	3.7
9. MET calls are required because the management of the patient by the nurses has been inadequate (n = 351)	38.2	48.7	6.6	4.8	1.7
10. I would call a MET on a patient I am worried about even if their vital signs are normal (n = 351)	1.1	19.4	23.6	41.9	14.0
11. I think that the MET is overused in the management of hospital patients (n = 350)	43.4	42.9	9.7	2.9	1.1
12. I don't like calling MET because I will be criticised for not looking after my patient well enough (n = 350)	51.4	44.0	3.1	0.9	0.6
13. MET calls reduce my skills in managing sick patients (n = 351)	51.0	43.6	3.4	0.9	1.1
14. Using the MET system increases my work load when caring for a sick patient (n = 351)	39.9	44.4	6.6	8.3	0.9
15. The MET can be used to prevent a minor problem from becoming a major problem (n = 347)	1.4	2.6	3.2	37.5	55.3
16. If my patient fulfils the listed MET criteria but does not look unwell I would not make a MET call (n = 349)	22.1	39.5	22.6	13.8	2.0
17. MET calls teach me how to better manage sick patients in my ward (n = 350)	2.9	12.0	14.3	53.7	17.1

MET, medical emergency team.

*Numbers within columns indicate the percentage of overall responses for each option in the Likert agreement scale. (n) Indicates the number of respondents who completed the corresponding question.

division 1 nurses of <4 years experience and one division 2 nurse. Spacing between items was increased and the wording of 10 of the 15 items was altered. Two items (16 and 17) were added (table 1) in response to feedback from the focus group.

Characteristics of the sample frame

At the time of survey administration, there were 689 ward nurses employed at the hospital. A total of 351 nurses completed questionnaires from day, evening and night shifts. Thus, we were able to survey approximately 50% of the overall accessible target population. The proportion of nurses approached to complete the questionnaire varied between wards from 35% to 65% (table 2). Every nurse approached to undertake the survey completed the questionnaire (response rate 100%).

Of the completed questionnaires, 97% gave information on the nurse's level of experience: 20% were graduate nurses, 40% were division 1 nurses of 2–9 years experience, 11% were clinical nurse specialists, 13% were associate nurse unit managers, 2% were nurse unit managers and 14% were division 2 nurses.

Characteristics of questionnaire item responses

There were only 33 missing responses in the 5967 (351 surveys each with 17 items) responses. In all, >96% of the respondents agreed or strongly agreed that patients in the

Austin Hospital have complex medical problems (table 1, item 1).

Potential benefits of the MET

For questions about nurses' understanding of potential benefits of the MET, >91% of respondents agreed or strongly agreed that the MET prevents unwell patients from having an arrest (table 1, item 2), and almost 93% agreed or strongly agreed that the MET can be used to prevent a minor problem becoming a major problem (table 1, item 15).

Usefulness of the MET for nursing staff

For questions about whether nurses find the MET service helpful in managing unwell ward patients, >97% of respondents agreed or strongly agreed that the MET allowed them to seek help in managing a patient they are worried about (table 1, item 3), and 88% disagreed or strongly disagreed when asked if they thought that the MET is not helpful in managing sick patients on the ward (table 1, item 4). In all, >86% disagreed or strongly disagreed when asked if they thought that the MET was overused in the management of hospital patients (table 1, item 11).

Obstacles to the nurse using the MET service

When asked if they were reluctant to make a MET call on a patient for fear of criticism if the patient was not that unwell, >81% of respondents disagreed or strongly disagreed,

Table 2 Proportion of nurses approached to complete survey according to ward or unit

Ward or unit	Surveyed	Not surveyed	Surveyed (%)
Long-term respiratory medicine	18	10	64.3
Spinal cord medicine	26	21	55.3
General medicine	79	44	64.2
Nephrology	19	15	55.9
Oncology	26	35	42.6
Neurosurgery	29	20	59.2
Neurology	26	23	53.1
General surgery and urology	39	72	35.1
Orthopaedic surgery	20	17	54.1
Respiratory medicine	19	21	47.5
Cardiothoracic medicine	32	23	58.2
Nursing pool/bank	18	37	32.7
total	351	338	50.9

whereas 10% agreed or strongly agreed (table 1, item 7). Among the respondents, >95% disagreed or strongly disagreed when questioned whether they do not like making MET calls because they will be criticised for not looking after their patient well enough (table 1, item 12); >84% disagreed or strongly disagreed that using the MET system increases their workload when caring for sick patients (table 1, item 14).

Why do the nurses think MET calls are required for ward patients?

Few (7%) agreed or strongly agreed that MET calls were required because the management of the patient by the nurse had been inadequate (table 1, item 9). In contrast, when asked whether MET calls were required because the management of the patient by the doctor had been inadequate, 64% disagreed or strongly disagreed, with 19.1% agreeing or strongly agreeing with this statement (table 1, item 8).

Under what conditions do nurses make or not make a MET call?

In total, 72% of the respondents agreed or strongly agreed that they would call the covering doctor before the MET when one of their patients was sick (table 1, item 5); >81% agreed or strongly agreed that they would call the MET if they could not contact the covering doctor about a sick patient (table 1, item 6). Only 55.9% of respondents agreed or strongly agreed that they would make a MET call on a patient they were worried about even if their vital signs were normal (table 1, item 10). When asked if they would not make a MET call on a patient who fulfilled the MET criteria but did not look unwell, 61.6% of respondents disagreed or strongly disagreed, 22.6% stated they were uncertain, and 15.8% agreed or strongly agreed (table 1, item 16).

Effect of the MET on nurses' ability to manage unwell patients

Almost 95% of respondents disagreed or strongly disagreed when asked whether they thought the MET reduced their skill in managing sick patients (table 1, item 13). In fact, almost 71% agreed or strongly agreed that the MET teaches them how to better manage sick patients in their ward (table 1, item 17).

Additional comments

Additional comments were made on 143 of the 351 (40.7%) completed questionnaires. A total of 255 comments were made regarding various aspects of the MET service. These were grouped into several themes (table 3). In all, 52

respondents stated that the MET service provided back-up and support for doctors and nurses in the management of sick ward patients and 23 respondents made reference to item 9 of the questionnaire. All stated that MET calls are "sometimes" required because the management by the doctors has been inadequate. All such comments provided further qualifications such as "especially new interns" or "due to lack of knowledge and experience".

Of the 255 additional comments, 95 (37.3%) suggested that the decision to initiate a MET call in response to the scenarios presented in four of the items (items 5, 6, 10 and 16) would depend on how sick the patient was.

Four comments suggested that item 5 was poorly worded, with two suggesting that the word "sick" was either "not specific" or should have been replaced by the term "severely unwell".

DISCUSSION

We conducted a survey on the nurses' attitudes to the MET system 4 years after its introduction to the Austin Hospital. We found that most nurses surveyed understood the potential benefits of the MET, valued its presence and did not believe that using the MET increased their workload or reduced their skills in managing sick patients. However, despite hospital protocol, we found evidence to suggest that nurses use clinical judgement and discretion and not just the predefined MET criteria when choosing whether to activate the MET service.

A 1-year education phase was undertaken before implementing the MET system in the Austin Hospital. In addition, education sessions are provided for all new and existing staff employed by the hospital. This approach appears to have been successful in instilling knowledge of the theoretical benefits of the MET service into our nursing staff.

We found that most respondents indicated that they value the MET service, that the MET was useful in the management of ward patients, and that they believed the MET was not overused in the management of hospital patients. Despite this, almost three quarters of nurses suggested that they would call the covering doctor before calling the MET when a

Table 3 Categorisation of additional comments

Category	Number of comments
It is reassuring to have the MET as back-up when managing sick patients	52
The MET improves outcome or prevents deterioration	28
MET calls are required because of doctor inexperience or poor management	23
I have been criticised or fear criticism for making a MET call	14
The MET teaches me how to manage sick patients	10
MET calls are required because of poor nursing management	8
I have not been involved in a MET call	7
The MET staff are friendly, patient, and approachable	7
The MET helps establish a management plan for unwell patients	6
I would consult others (registrar other nurse) before making a MET call	5
Decision to make a MET call depends on how sick the patient is	
Item 5	46
Item 6	25
Item 10	6
Item 16	14
Item 5 poorly worded	4

MET, medical emergency team.

patient in their ward was sick. However, a similar proportion suggested that they would call the MET if they were unable to contact the covering doctor. These findings are consistent with at least two other studies suggesting that use of a MET service may be impeded by cultural barriers in the staff of the hospital.^{5,6} Specifically, it has been suggested that some medical and nursing staff are reluctant to breach the "traditional" hierarchical system of patient management that usually involves notification of the most junior member of medical staff first.^{5,6} The observation that our nurses call the covering doctors before the MET service may also have implications for the findings of the MERIT study. In particular, it was observed that 50% of the patients with cardiac arrests in the MET hospitals had antecedent MET criteria but did not receive a MET review.²

The inclination of nurses to call covering doctors before the MET would not appear to result from fear of criticism. Most nurses surveyed suggested that they did not limit initiating MET calls because of fear of criticism regarding their management of the patient, and only 10% agreed or strongly agreed that they feared criticism for initiating a MET call on a patient who was not very unwell. Thus, our study suggests that there is a disparity between nurses' belief of the benefits of the MET and their expressed intent to call the MET service in the presence of MET call criteria.

Our findings suggest that nurses at the Austin Hospital use clinical judgement and discretion in addition to, or instead of, the objective predefined criteria for MET activation. In a previous study at the Austin Hospital³ the "staff member worried" criterion was the most common indication for initiating a MET call. Despite this, only half of respondents agreed or strongly agreed that they would initiate a MET call on a patient they were worried about even if his or her vital signs were normal. Further, only three of five disagreed or strongly disagreed when asked if they would not make a MET call on a patient who fulfilled the MET criteria but did not look unwell.

Further evidence that our nurses use discretion when deciding to make a MET call comes from the additional comments. More than one third of the 255 additional comments suggested that the decision to initiate a MET call in response to the scenarios presented in four of the items (items 5, 6, 10 and 16) would depend on how sick the nurse thought the patient was.

Any future strategy to overcome the apparent reluctance of ward nurses to call the MET will need to strike a balance between three important issues. Firstly, the MET should ideally be used to review patients in cases where the patient is very unwell, and in instances where the covering doctors are unavailable. Secondly, the ICU must be seen to be collegial and cooperative, and not to take over the management of ward patients from the attending doctors. Finally, increases in the use of the MET must take into account resource limitations of the ICU.

Our study has several strengths and limitations. It is the first to formally assess the attitudes of nursing staff to the MET system. The questionnaire was developed to deal with prospectively defined questions, and was pre-tested and revised before implementation. The survey was administered to a large sample frame that is likely to be representative of the accessible target population. Using a personal interview approach at a time when it was convenient for the respondents to participate (at the start of hand-over of nursing), we obtained a response rate of 100%, thereby eliminating contamination of results by non-responder bias. The interviewers introduced the survey in a prescribed manner to limit interviewer bias.

The two possible sources of bias that could have affected the validity and generalisability of our survey findings to the

target population are population sample bias and bias resulting from poorly worded items. The target population was derived from a list supplied by nursing administration. However, the dynamic nature of the nursing workforce (staff changing wards, staff joining nurse bank, staff on leave) meant that we were unable to guarantee the exact number of nurses working on each ward at the time of the study. Sampling from the target population was done on the basis of the presence of the respondent on the day of interviewing. The use of a random number generator may have improved randomisation of the sample. We are unable to comment on the difference between those nurses who were approached to complete the questionnaire and those who were not. Despite these limitations, we have shown that the sample frame contained representatives from all target wards and that the participants had variable levels of nursing experience. In addition, we were able to sample approximately 50% of the accessible target population and obtain a response rate of 100%. Accordingly, we believe that the responses obtained to our questionnaire are likely to be representative of those of the wider population of nurses in the Austin Hospital.

Despite pre-testing, we found evidence that at least four respondents had difficulty with interpreting the word "sick" in item 5. Alternate wording of this item may have altered the responses. However, the remaining 46 comments regarding this item suggested that their response was conditional on how sick the patient was and did not make reference to the wording of the item per se.

A further limitation is that the survey represents the opinions of nurses at only a single centre. It would be of interest to learn the attitudes of nurses at other institutions that possess a MET service. At least two studies^{5,6} have reported that uptake of the MET service was hindered by a reluctance of nurses to call the MET.

CONCLUSIONS

In the Austin Hospital a detailed information and education programme was associated with an understanding of the potential benefits of the MET service by our nursing staff. In addition, nurses appeared to value the service and did not believe that it reduced their skills or increased their workload when managing severely unwell ward patients. Despite these positive impressions, there appears to be a persistent commitment to the traditional model of calling a junior covering doctor before the MET service. Our findings also suggest that underestimation of the significance of physiological perturbations is likely to be a greater barrier than fear of criticism for making a MET call in the Austin Hospital.

Authors' affiliations

D Jones, Australian and New Zealand Intensive Care Research Centre (ANZIC-RC), Department of Epidemiology and Preventive Medicine, Monash University, Melbourne, Victoria, Australia

I Baldwin, D Goldsmith, Intensive Care Unit, Austin Hospital, Melbourne, Victoria, Australia

T McIntyre, I Mercer, A Miglic, Austin Hospital, Melbourne, Victoria, Australia

D Story, Department of Anaesthesia and Department of Surgery, University of Melbourne, Austin Health, Melbourne, Victoria, Australia

R Bellomo, Intensive Care Research, Austin Hospital, Melbourne, Victoria, Australia

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ECHO

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More endoscopists improve outcome for upper GI cancer

More endoscopists may be the answer to better outcomes for upper gastrointestinal (GI) cancer, as recent improvement seems to owe more to the introduction of nurse endoscopists than the UK government's two week wait scheme for a specialist consultation, according to doctors in one cancer unit.

True enough, the odds of curative resection increased significantly (odds ratio 1.48) in their unit in the two years after the scheme was introduced compared with the two years before, and curative resections for early (stage 1 and 2) cancers rose from 47 to 58. But only two patients (5%) of 38 diagnosed with the cancer out of 623 referred under the scheme had early stage disease compared with 56 (27%) outside it. Furthermore, just over a third of patients with early stage cancer had symptoms consistent with the referral criteria in the scheme, but only two of them were referred under it.

When the scheme was implemented at Norfolk and Norwich University Hospital, in September 2000, it coincided with appointment of two full time nurse endoscopists, which reduced routine waiting times for endoscopy—and probably accounted for the improvement.

Under the scheme guidelines for urgent referrals for upper GI cancer were issued to general practitioners to ensure timely specialist evaluation. Detecting the cancer early is key to curative treatment, but symptoms can be unreliable. This may be why reducing times for routine endoscopy may be the best option.

The UK government has been under pressure to improve its poor record on upper GI cancer outcome in western Europe.

▲ Spahos T, *et al*. *Postgraduate Medical Journal* 2005;**81**:728–730.