

The novel use of fast track CT to select patients for lung cancer clinics: effect on clinic efficiency, waiting times, and patient satisfaction

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ABSTRACT

Background Lung cancer is the most common cause of cancer death in the UK, and triaging patients 'straight to test' is recommended to improve patient experience and outcomes. While such pathways are likely to lead to earlier diagnosis and treatment, the data to support this assumption are limited.

Objectives To assess the impact of a fast track CT pathway to select patients for lung cancer clinics on clinic efficiency, diagnostic and treatment delays, and patient satisfaction.

Methods Retrospective comparative cohort study of patients referred to lung cancer clinics for investigation of suspicious imaging from January to December 2006 and June to December 2007.

Results The proportion of patients seen in clinic subsequently diagnosed with lung cancer increased from 124/399 (31%) to 86/168 (51%) ($p < 0.001$). Time from referral to diagnosis reduced from 22 to 17 days ($p < 0.001$). Time from referral to first discussion at the multidisciplinary team (MDT) meeting fell from 32 to 22 days ($p < 0.001$). Time from referral to decision to treat reduced from 42 to 35 days ($p < 0.05$). Time from referral to first treatment fell from 55 to 49 days ($p = 0.095$). The proportion of patients who felt the diagnostic process took too long fell from 15/80 (19%) to 3/49 (6%) ($p < 0.05$).

Conclusions The new pathway led to more effective use of clinic appointments, reduced diagnostic delay, and more rapid treatment decision times. Patient satisfaction with the speed of the diagnostic process increased. It is recommended that hospital trusts in England consider adopting similar 'straight to test' triaging to select patients for lung cancer clinics.

INTRODUCTION

Lung cancer is the most common cause of cancer death in the UK¹ and survival rates have not improved significantly over recent years. Radical treatment for early stage lung cancer with surgery or high dose radiotherapy represents the only realistic opportunity of long term cure. However, the majority of patients present with inoperable disease, for which treatment is palliative. This is reflected in the 1 year survival rate for lung cancer in the UK, a proxy indicator for late diagnosis, which at 28.1% is significantly lower than the European average.²

A number of initiatives and guidelines have been published relating to the timeliness of care for cancer patients in the UK. Early diagnosis clinics are recommended by the National Institute for Health and Clinical Excellence (NICE)³ with the aim of

early detection and hence improved survival rates. The Cancer Services Collaborative Improvement Partnership guidelines⁴ on applying high impact changes to cancer care also recommend triaging patients 'straight to test' before the first outpatient visit to reduce waiting times through the diagnostic phase. While both of these recommendations are likely to lead to earlier diagnosis and therefore an increase in the proportion of patients eligible for active anticancer treatment, the data to support this assumption are limited.

An early report from Laroche⁵ *et al* found that that quick access to investigations, high histological confirmation rates, routine CT scanning, and review of every lung cancer patient by a thoracic surgeon was associated with a substantial increase in the surgical resection rate and a reduction in the median time from first specialist visit to surgery by 50%. Murray⁶ *et al* published a pilot feasibility study comparing a conventional chest clinic setting with a centralised two-stop pathway for the investigation of lung cancer and demonstrated a significant reduction in time to first treatment for patients in the central arm (3 weeks vs 7 weeks), although no significant difference was seen in the proportion of patients receiving curative treatment. Patients in the conventional arm felt that the diagnostic pathway was too slow while those in the central arm seemed to have a better care experience. The desire of patients for speedy access to lung cancer investigation services was also confirmed in a patient survey performed by the Roy Castle Lung Cancer Foundation.⁷ A recent systematic review⁸ of the timeliness of care of lung cancer patients concluded that times to diagnosis and treatment of lung cancer are often longer than recommended, but that the factors associated with timeliness have been incompletely examined and it remains unclear whether more timely care improves outcomes.

The objectives of this study were to evaluate the effects of introducing a fast track CT pathway to select patients for rapid access lung cancer clinics on: (1) clinic efficiency, as measured by the proportion of patients seen in clinic whom were subsequently found to have lung cancer; (2) diagnostic and treatment waiting times; and (3) patient acceptability.

METHODS

Subjects

Patients referred to rapid access lung cancer clinics following abnormal lung imaging performed at our institution from January to December 2006, and

following the introduction of a fast track CT pathway from June to December 2007, were enrolled in the study.

Patient pathways before and after the introduction of the fast track CT pathway

Before the introduction of the fast track CT pathway, patients sent to our institution for an outpatient chest x-ray who were found to have suspicious findings were all offered an urgent lung cancer clinic appointment (figure 1A). Following the introduction of the new pathway in June 2007 all outpatients with a suspicious chest x-ray are offered a direct appointment for a staging thoracic CT scan within 1 week of the chest x-ray. Radiologists reporting outpatient chest x-rays add a standard text to a suspicious report which then triggers the CT appointment via the CT booking clerk. Patients are informed of the need for a CT scan by a member of the radiology administration staff who has received brief training in lung cancer communication skills. The lung cancer nurse specialists are also available to speak to patients who may have concerns that the radiology administration staff are unable to address satisfactorily. Information on risk factors for intravenous contrast reactions is obtained along with, if necessary, a recent creatinine measurement. The CT scans are reviewed in a weekly meeting with a chest physician, radiologist, and lung cancer nurse specialist. Only those patients with a suspicious CT scan are offered an urgent lung cancer clinic appointment (figure 1B). Those patients not recalled to clinic are sent a letter reassuring

them that nothing of immediate concern was found on the scan, but advising them to make an appointment with their general practitioner (GP) to discuss the results in more detail. The GP receives a letter to this effect and a copy of the CT report. If the GP has ongoing concerns then the patient is referred to the respiratory clinics via the normal routes, although in the majority of cases further intervention is not required. When intervention is recommended, it is usually to start antibiotic treatment and request follow-up imaging, as would have been the case had the patient been seen in clinic first under the previous pathway.

Diagnostic and treatment waiting times

Data on diagnostic waiting times, final diagnosis and cancer treatment times were collected for all patients seen in clinic with suspected lung cancer from June to December 2007 inclusive and compared to data from patients seen in suspected lung cancer clinics during 2006, before the introduction of the new pathway. For consistency, the date of referral for patients referred following either an abnormal chest x-ray or an abnormal CT was taken as the date of the first suspicious chest x-ray in both groups. The date of diagnosis was taken as the date of the diagnostic biopsy in histologically confirmed cases and the date of the diagnostic x-ray in clinically diagnosed cases. In some cases the final diagnosis could not be established until the patient underwent serial radiological follow-up for 2 years.

Patient satisfaction

At the time of this study patient satisfaction data were collected routinely each year from patients undergoing investigation for lung cancer at our institution using questionnaires adapted from the 2005 NHS inpatient and outpatient questionnaire (see supplementary appendix I and II). We identified the responses from patients who had been referred to clinics from January to December 2006 and following the introduction of a fast track CT pathway from June to December 2007. The design of the two questionnaires differed to reflect the different pathways; however, in both questionnaires patients were asked to rate the duration of the diagnostic process as too short, just right, or too long and these data were compared to assess the impact of the new pathway. In addition, given the novel way in which patients went straight to CT scanning without being seen in clinic first, we report on whether patients felt they were given enough information as to why they were called back for a lung CT scan following their chest x-ray.

Statistical analysis

All statistical analyses were performed using the SPSS statistical package (version 10.0). Categorical data were compared using χ^2 tests. Age was compared using an independent t test. Diagnostic and treatment times were compared using the Mann-Whitney U test. The level of significance was taken as $p < 0.05$.

Ethics

The introduction and evaluation of the fast track CT pathway was a service improvement initiative approved by the medical director of the local primary care trust and the medical director of our institution before implementation.

RESULTS

In the 6 months following the introduction of the fast track CT pathway, 142 patients were recalled for a CT following a suspicious GP chest x-ray: 86/142 (61%) were deemed to have

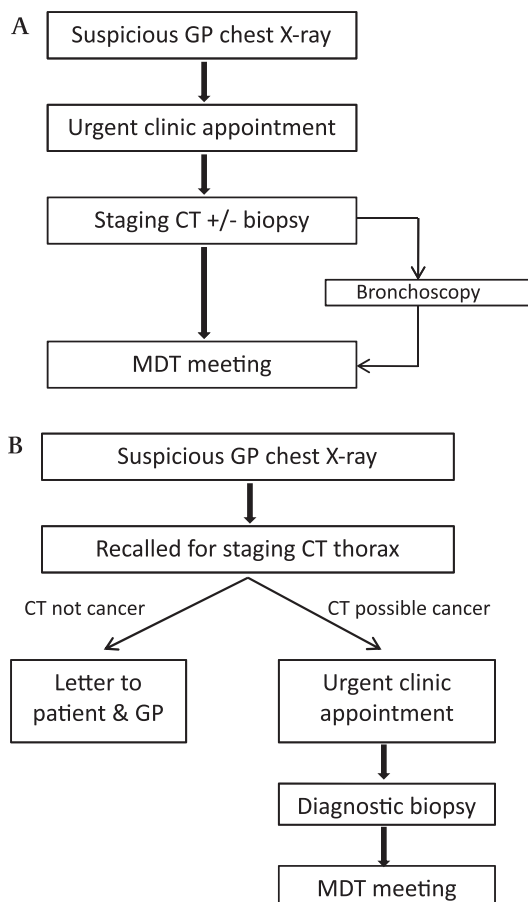


Figure 1 Diagnostic pathway for patients with a suspicious chest x-ray as organised by their general practitioner (GP) before (A) and after (B) the introduction of the fast track CT pathway.

Table 1 Demographic, referral, and diagnostic data for patients seen in the first 6 months following the introduction of the fast track CT pathway compared to those seen in the previous year

	Jan–Dec 2006	Jun–Dec 2007	p Value
Patients (n)	399	168	
Mean (range) age	66 (19–95)	68 (23–93)	0.080
Male	227 (57%)	101 (60%)	0.515
Source of referral			
Radiology department	207 (52%)	86 (51%)	0.023
General practitioner	132 (33%)	42 (25%)	
Other	60 (15%)	40 (24%)	
CT scan performed	348 (87%)	154 (92%)	0.129

a suspicious CT and were referred on for an urgent clinic appointment; and 56/142 (39%) either had normal CT scans or findings consistent with a benign diagnosis, so were not recalled to clinic.

Effect on clinic efficiency

The demographic details, referral source, and diagnostic data for patients seen in the suspected lung cancer clinics the first 6 months following the introduction of the fast track CT pathway compared to those seen in the previous calendar year are shown in table 1. Patients were of a similar age and over half were male. The proportion of patients referred following an abnormal x-ray did not change following the introduction of the fast track CT pathway, whereas those referred directly by their GP fell and those referred via another route (usually a within hospital referral) increased.

The proportion of patients seen in clinic who were subsequently diagnosed with cancer (primary lung cancer, secondary lung cancer or mesothelioma) rose from 124/399 (31%) to 86/168 (51%) ($p<0.001$) following the introduction of the fast track CT pathway (figure 2). This was achieved without a significant increase in the overall proportion of patients who underwent CT scanning which was 348/399 (87%) in 2006 and 154/168 (92%) in 2007 ($p=0.129$).

Figure 3 (A) Time from referral to diagnosis before (2006) and after (2007) the introduction of the fast track pathway. Data are shown as median (horizontal line), interquartile range (IQR) (box), and range (whiskers). Outliers are not shown. Diagnostic times less than zero are due to patients in whom a diagnostic biopsy or x-ray was performed before referral to the urgent lung cancer clinic. (B) Time from referral to first discussion at the lung cancer multidisciplinary meeting before (2006) and after (2007) the introduction of the fast track pathway. Data are shown as median (horizontal line), IQR (box), and range (whiskers). Outliers are not shown. (C) Time from referral to decision to treat for cancer before (2006) and after (2007) the introduction of the fast track pathway. Data are shown as median (horizontal line), IQR (box), and range (whiskers). Outliers are not shown. (D) Time from referral to first treatment for cancer before (2006) and after (2007) the introduction of the fast track pathway. Data are shown as median (horizontal line), IQR (box), and range (whiskers). Outliers are not shown.

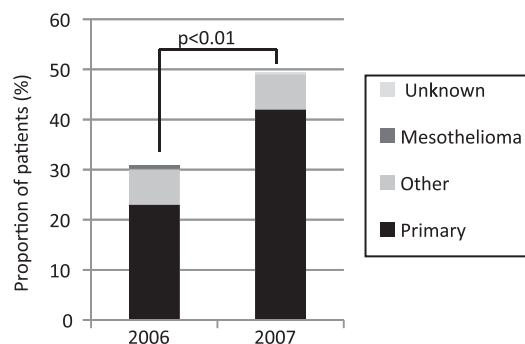
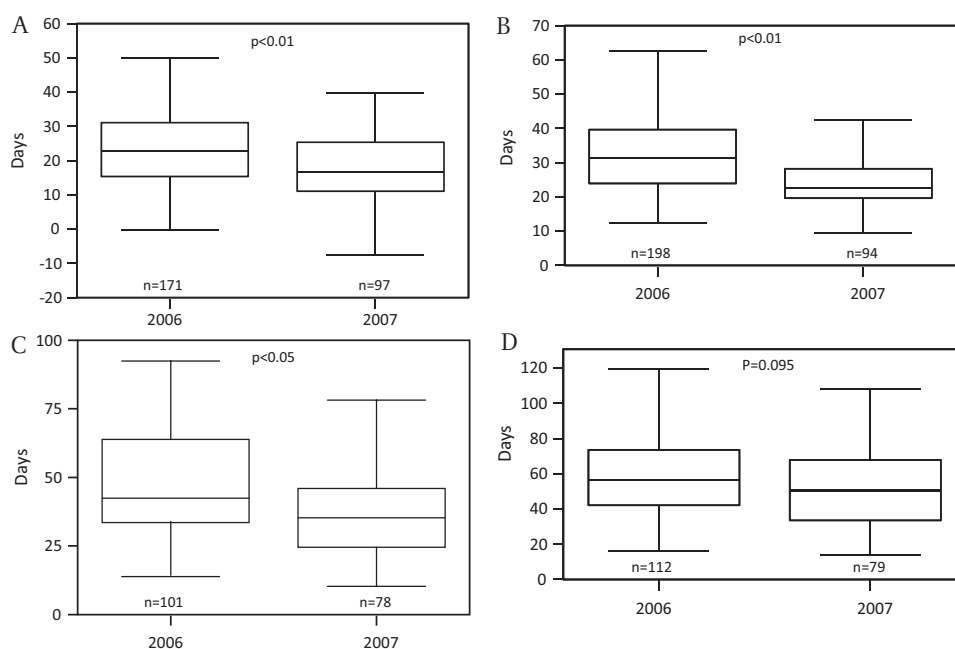


Figure 2 The proportion of patients seen in clinic who were diagnosed with cancer before (2006) and after (2007) the introduction of the fast track pathway.

Diagnostic and treatment waiting times

Diagnostic and treatment decision times were significantly reduced following the introduction of the fast track CT pathway (figure 3A–D). The time from referral to diagnosis reduced from a median (interquartile range (IQR)) of 22 (14) days to 17 (13) days ($p<0.001$). The median (IQR) time from referral to first discussion at the lung cancer multidisciplinary lung cancer meeting fell from 32 (15) to 22 (11) days ($p<0.001$), and the median (IQR) time from referral to decision to treat in clinic for cancer reduced from 42 (30) to 35 (23) days ($p<0.05$). The median (IQR) time from referral to first treatment also fell from 55 (36) to 49 (36) days following the introduction of the fast track pathway, although this did not reach conventional levels of statistical significance ($p=0.095$).

Patient satisfaction

Questionnaires were sent to 122 patients following the introduction of the fast track CT pathway and 49 patients (40%) responded. This compared to a response rate of 48% (80 questionnaires returned from 167 patients) in 2006. Eighty-seven per cent of patients who responded felt they were given adequate information on why they were recalled for a CT scan following

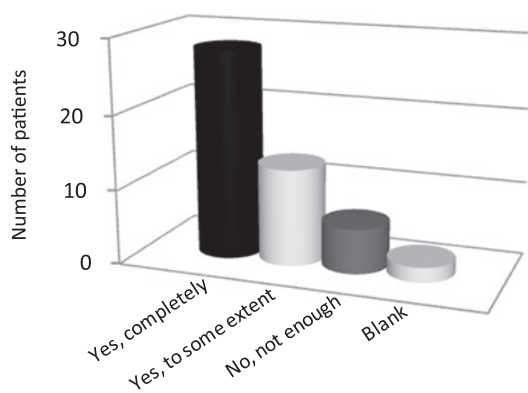


Figure 4 Patient responses to the question 'were you given enough information as to why you were called back for a lung CT scan following your chest x-ray?'.

the chest x-ray (figure 4). Patient satisfaction with the duration of the diagnostic process improved significantly following the introduction of the fast track CT pathway, with the proportion of patients who felt that the diagnostic process took too long falling from 15/80 (19%) to 3/49 (6%) ($p<0.05$), and the proportion who felt that the duration of the diagnostic process was 'just right' increasing from 59/80 (74%) to 41/49 (84%) ($p<0.05$) (figure 5). One patient who underwent fast track CT felt the diagnostic process was too short. The free text patient comments from before and after the introduction of the fast track CT pathway also highlighted the improvement in patient satisfaction with the new service. A selection of these comments is shown in box 1.

DISCUSSION

The results of our study demonstrate that the introduction of a fast track CT pathway to select patients for rapid access lung cancer clinics resulted in increased clinic efficiency (as indicated by the increase in the proportion of patients whom were subsequently diagnosed with cancer), a significant reduction in diagnostic and treatment decision time (with a trend towards earlier treatment times), and greater patient satisfaction with the diagnostic process.

The importance of improving early diagnosis and treatment of lung cancer is highlighted by the poor 1 year survival figures in the UK.² The overwhelming majority of lung cancer patients present with inoperable disease for which treatment will be

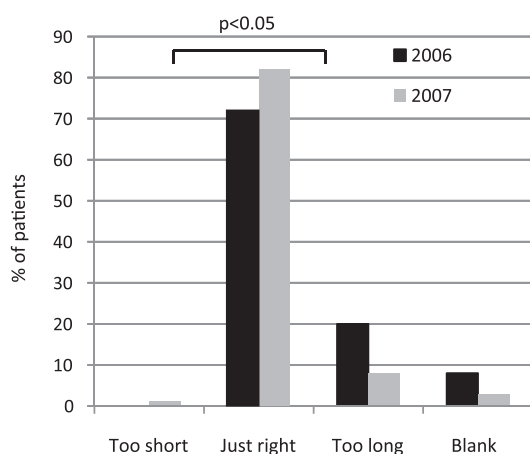


Figure 5 Patient overall rating of the duration of the diagnostic process before (2006) and after (2007) the introduction of the fast track pathway.

Box 1 A selection of free text patient comments following the introduction of the fast track CT pathway (2007) compared to the previous year (2006)

2007

"The speed at which appointments were made for me to attend tests was particularly good, due to the possibility I may have had cancer"

"Everyone was very kind to me. From the time I had my CT scan and saw the consultant, it was only weeks. I cannot believe how quickly the hospital dealt with me"

"From x-ray to diagnosis and receiving treatment was extremely quick, for which I am very grateful. The doctor at the lung clinic had all the relevant tests done before I saw the specialist, which was very impressive"

2006

"It would have been kinder to have the results of the biopsy sooner"

"The time between being told I may have cancer and the appointment with the consultant was 6–10 weeks"

palliative, usually with chemotherapy. However, to benefit from chemotherapy patients must be diagnosed promptly before their performance status deteriorates to the point where they are no longer fit enough for treatment. Our findings suggest that using a fast track CT scan, as opposed to chest x-ray, to prompt a clinic referral reduces diagnostic delay and makes it more likely a patient will still be fit enough for treatment at the time of diagnosis. The reasons for the reduction in diagnostic delay are likely twofold. First, only recalling patients to clinic with suspicious CT scans, as opposed to all suspicious chest x-rays, releases clinic slots. Patients requiring a CT to rule out serious pathology—for example, prominent pulmonary vessels mimicking a hilar mass or a prominent pericardial fat pad mimicking lobar collapse—no longer need to be seen. Following our new fast track CT pathway, 56 potential clinic appointments were avoided in a 6 month period as these patients had benign findings on CT scan. Second, the weekly review of all the CT scans before clinic provided the opportunity to plan histological biopsy and staging investigations in advance.

In addition to increasing the proportion of patients fit enough to receive palliative chemotherapy, previous studies have sought to increase the proportion of patients able to undergo curative treatment for lung cancer (surgery and radiotherapy) by introducing rapid access lung cancer clinics. However, the only randomised trial⁶ showed no benefit and it is more likely that

Main messages

- ▶ Fast tracking outpatients with suspicious chest x-rays straight to CT results in more effective use of clinic appointments, reduced diagnostic delay, and more rapid treatment decision times.
- ▶ Patients undergoing investigation for an abnormal chest x-ray prefer the more rapid diagnostic pathway that is offered by fast track CT, as opposed to a clinic appointment first.
- ▶ Hospital trusts in England should consider adopting similar 'straight to test' triaging to select patients for lung cancer clinics.

Current research questions

- ▶ What is the health economic impact of introducing a 'straight to test' fast track CT pathway for suspected lung cancer?
- ▶ Can fast track diagnostic pathways for suspected cancer increase the proportion of patients who are able to receive curative treatment?

initiatives now in place to promote public awareness of cancer symptoms and earlier presentation⁹ will have the greatest impact on long term survival. However, the benefits to patients of a rapid diagnosis once the suspicion of lung cancer has been raised should not be underestimated. The results of our patient satisfaction survey, in particular the free text comments, together with the results of other patient surveys⁷ highlight the desire of cancer patients to undergo rapid confirmatory tests in order to plan treatment as quickly as possible. This is particular important to lung cancer patients in whom the median survival is only 6 months from diagnosis.¹⁰

A potential disadvantage of a system where a CT scan is organised on the basis of the chest x-ray appearance without a prior clinic review is that any benefits may be at the cost of more indiscriminate use of CT with the associated risk of significant radiation exposure. Our policy of regular feedback to reporting radiologists on their 'conversion rate' from suspicious chest x-ray to suspicious CT is likely to have been an important factor in ensuring that the new pathway did not significantly increase the number of CT scans performed.

The main limitation of this study was that it was not randomised or controlled. However, the study did compare two pathways in the same institution over a relatively short time period, and the patient satisfaction questionnaires were completed by a similar proportion of patients before and after introduction of the new pathway. Therefore, potential

confounding factors such as differences in availability of local radiology services, the referring GP population, and the lung cancer clinical teams were kept to a minimum.

We conclude that the introduction of a fast track CT pathway to select patients for lung cancer clinics leads to more effective use of clinic appointments and reduced diagnostic and treatment decision times which in turn leads to increased patient satisfaction. We recommend that hospital trusts in England consider adopting a similar pathway for their lung cancer clinics. Further work is required to assess the health economic benefits of such a pathway.

Competing interests None declared.

Provenance and peer review Not commissioned; externally peer reviewed.

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