

Time to Treat: A System Redesign Focusing on Decreasing the Time from Suspicion of Lung Cancer to Diagnosis

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Introduction: Multiple investigations often result in a lengthy process from the onset of lung cancer–related symptoms until diagnosis. An unpublished chart audit indicated suboptimal delays in patients' courses from onset of symptoms until diagnosis of cancer.

Methods: The Time to Treat Program was designed for patients with clinical or radiographic suspicion of lung cancer. Pre- and postimplementation data on median wait times were compared.

Results: From April 2005 to January 2007, 430 patients were referred. After Time to Treat Program implementation, the median time from suspicion of lung cancer to referral for specialist consultation decreased from 20 days to 6 days, and the median time from such referral to the actual consultation date decreased from 17 days to 4 days. The median time from specialist consultation to computed tomography scan decreased from 52 days to 3 days, and the median time from computed tomography scan to diagnosis decreased from 39 days to 6 days. Overall, the median time from suspicion of lung cancer to diagnosis decreased from 128 days to 20 days. Of all patients in the Time to Treat Program, 33% were eventually diagnosed with lung cancer.

Conclusions: Time to Treat Program was effective in shortening the time from suspicion of lung cancer to diagnosis and reduced time intervals at each step in the process. Earlier diagnosis of lung cancer may allow increased treatment options for patients and may improve outcomes.

Key Words: Lung cancer, Diagnostics, Process.

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Lung cancer is ranked first in terms of cancer incidence and cancer death in Canada and in the world.¹ Clinical outcomes are better for patients diagnosed at an earlier stage of

disease.^{2,3} Unfortunately, the course of diagnostic workup from the onset of symptoms until the time of diagnosis is often lengthy with delays resulting from serial investigations and fragmented care. Undesirable wait times for consultative, diagnostic, and cancer treatment services (surgery, radiation) in Canada have been reported.^{4,5} An unpublished retrospective chart audit was conducted at the Toronto East General Hospital (TEGH), a large urban community teaching hospital servicing southeast Toronto in the province of Ontario, Canada. Wait times in the diagnostic workup of lung cancer were suboptimal. Reducing wait times is a key priority for the provincial government and has resulted in the implementation of the Ontario Wait Times Strategy.⁶

Given the significant global interest in wait time reductions, numerous demand-side and supply-side strategies for reducing wait times have been implemented in several countries and have shown positive results.⁷ The National Health Service (NHS) in the United Kingdom has illustrated the ability to affect both the supply and demand of health care services by focusing on process issues.^{8–10} In addition to developing appropriate capacity, their strategy included a number of elements for process improvement. The NHS showed the importance of sustained focus on the task organizationally (through both management and clinical effort), collecting and analyzing relevant detailed information, and planning.

Based on the experience and the success of the NHS, a proposed solution for local delays in lung cancer diagnostic workup at the TEGH was proposed: the Time to Treat Program. This system redesign was initially a pilot project and consisted of a streamlined referral system and a clerical facilitator to fast-track patients through a diagnostic pathway algorithm.

METHODS

The TEGH Research Ethics Board granted approval of this study.

Retrospective Chart Review

A retrospective chart audit of patients who had confirmed diagnoses of lung cancer made between March 2004 and February 2005 was studied. Interval wait times were collected and analyzed. Based on the results of this audit, an interested group of respirologists, thoracic surgeons, and

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oncologists came together to redesign the process whereby patients with suspected lung cancer were referred and subsequently investigated.

Time to Treat Project

Referral

A single-entry point of contact and a new referral form was developed to access the Time to Treat Program. The respirologists and thoracic surgeons agreed on a set of criteria as to which patients would be best suited to see either the pulmonary specialist or the chest surgeon. The two-sided referral form collected patient demographics, referring physician contact information, and the date of the suspicious chest radiograph. It also asked the referring physician for the reason for referral by way of a checklist menu that included descriptions of possible chest radiograph abnormalities and clinical symptoms. The back of the referral form had two checklists: one of clinical features that should prompt an urgent radiograph and the other of signs and symptoms to guide referral to respirology versus thoracic surgery. The referring physician was also reminded to send clinical notes, including medications, and blood test results to the consultant physician. The referring physician was also asked to help ensure that patients bring their radiographs and computed tomography (CT) scans to the initial subspecialty appointment. The referral sheets are faxed to a central booking clerk, the “navigator.”

Navigator

The navigator was a new clerical position, and this person was hired to coordinate the care of patients during diagnostic workup. The navigator collected referrals, booked initial consultations, facilitated investigation bookings, and recorded data relating to patient appointments and investigations.

Diagnostic Algorithm

A new algorithm was developed entitled the “Lung Cancer Pathway.” There were three possible ways for a patient to enter the pathway: direct referral by a treating clinician, by an in-house radiologist, or redirected into the appropriate step in the pathway by a specialist who was initially consulted in the standard model. At the time of receiving the referral, the navigator booked the patient to see an appropriate consultant. The navigator informed the referring physician’s office about the appointment times, and the patient was informed of their appointment through that office. At the time of entry to the program, a patient was also shadow booked for a CT scan close to but after the date of the consult. A patient could have their CT scan before the initial consult date if the physician reviewing the referral form thought it was appropriate. On the day of the initial visit, the patient arrived, registered, and met with the consulting physician. Spirometry was done immediately for all respirology referrals. At this visit, there were then three possible next steps: no further investigations required, referral to another subspecialty service, or additional investigations including spirometry. For each patient, these investigations included some or

all of the following: fine needle aspiration biopsy, bronchoscopy, complete pulmonary function tests, and CT scan. There were follow-up appointments to review the results of the investigations.

Dedicated CT Scan Slots

CT scans were shadow booked at the time of referral to the Program. Two daily CT scan slots were allotted to the Time to Treat Program from the general pool. If these slots were not used, they were reallocated to the hospital general pool 48 hours before the time slot.

Dedicated Bronchoscopy Slots

There was pooling of bronchoscopy slots at TEGH between the respirologists and the thoracic surgeons to ensure even and shorter wait times.

Treatment Algorithm

There were multidisciplinary tumor boards involving two hospitals, with representation from radiation oncology, thoracic surgery, medical oncology, pathology, radiology, and respirology services. During these weekly meetings, cases of patients with early or locally advanced disease or treatment issues were discussed. A standardized form was developed for patient presentation. A new synoptic sheet was developed to record each patient case.

Target Wait Times

Interval target wait times were set. The target wait time for referral for a specialist consult was 5 or fewer working days. The target wait time for CT scan was fewer than 10 working days.

Referral Base

The local family practice units, radiology department, and potential referring physicians from the TEGH community were educated about the Time to Treat Program. Physicians were asked to give input into the new referral form. A physician representative from each of the large local family practice groups was asked to increase awareness of the Time to Treat in their local centers.

Physician Satisfaction

Physician satisfaction surveys were performed. Referring physicians who referred eight or more patients to the Time to Treat Program or physician representatives of a large family practice group were asked to rate six items on a scale of 1 to 5, with 5 being significantly better, 1 being significantly worse, and 3 being neutral. These six items were ease of referral to a specialist, ease of making initial investigation booking, ease of tracking or changing investigations, communication within the departments, quality of care for the patient, and the patient-physician relationship.

Data Analysis

The dates of investigations and patient visits were recorded and tracked in an electronic database by the navi-

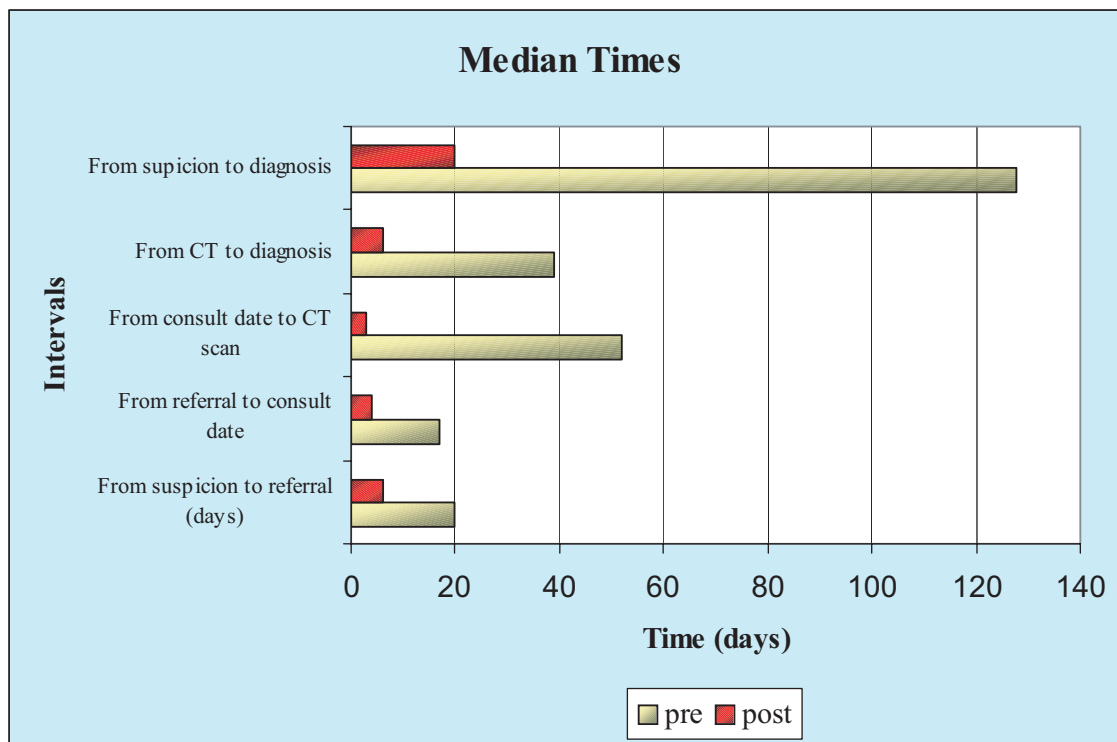


FIGURE 1. Pre- and postimplementation comparison of interval and overall wait times.

gator. Median wait times were compared before and after Time to Treat Program implementation.

RESULTS

Preimplementation Data

From March 27, 2004 to February 1, 2005, 52 patients were diagnosed with lung cancer at TEGH. These 52 patients were referred from 44 different physicians between November 25, 2003 and June 5, 2004 for diagnostic workup and clinical assessment.

As shown in Figure 1, the median time from date of suspicious chest radiograph to referral was 20 days. The median wait time from date of referral for consultation to actual consultation date was 17 days. The time from consultation date to CT date was 52 days and from CT to diagnosis was 39 days. The overall length of time from suspicion of lung cancer from abnormal chest radiograph to confirmed diagnosis was 128 days.

Postimplementation Data

From April 5, 2005 to December 18, 2006, more than 120 physicians referred 430 patients: 193 females and 237 males. The mean age at time of referral to Time to Treat Program was 66 years. For the majority of patients (95.7%), the reason for referral was chest radiograph findings suspicious for lung cancer.

The median time from suspicion of lung cancer to referral for specialist consultation was 6 days (Figure 1), with 75% of patients being referred by 14.0 days and 90% of patients by 27 days. The median time from such referral to

the actual consultation date was 4 days (Figure 1), with the 75% of patients being seen by 7 days and 90% of patients by 10 days.

The median time from specialist consultation to CT scan was 3 days (Figure 1), with a 75th percentile of 5 days and a 90th percentile of 8 days. The median time from CT to diagnosis was 6 days (Figure 1), with a 75th percentile of 15 days and a 90th percentile at 29 days. As shown in Figure 2, overall the median time from suspicion of lung cancer to diagnosis was 20 days. For 25% of the patients in the Time to Treat Program, it took 11 or fewer days from suspicion of lung cancer to diagnosis, whereas for 4% of the patients, it took 90 days or longer.

The time from suspicion to diagnosis took longer for patients who eventually had confirmed lung cancer than those who did not: 37 days versus 29 days.

Satisfaction Survey Results

Of the 12 physicians contacted who had each referred eight or more patients, one had retired and was not available. Satisfaction survey results are shown in Table 1.

Three physicians commented on how they used to admit patients with suspected lung cancer to expedite their diagnostic workup, and after the Time to Treat Program implementation, this practice pattern changed.

DISCUSSION

There were 22,700 new cases of lung cancer in Canada in 2006. The 19,300 deaths from lung cancer last year were greater than the combined total deaths from breast cancer,

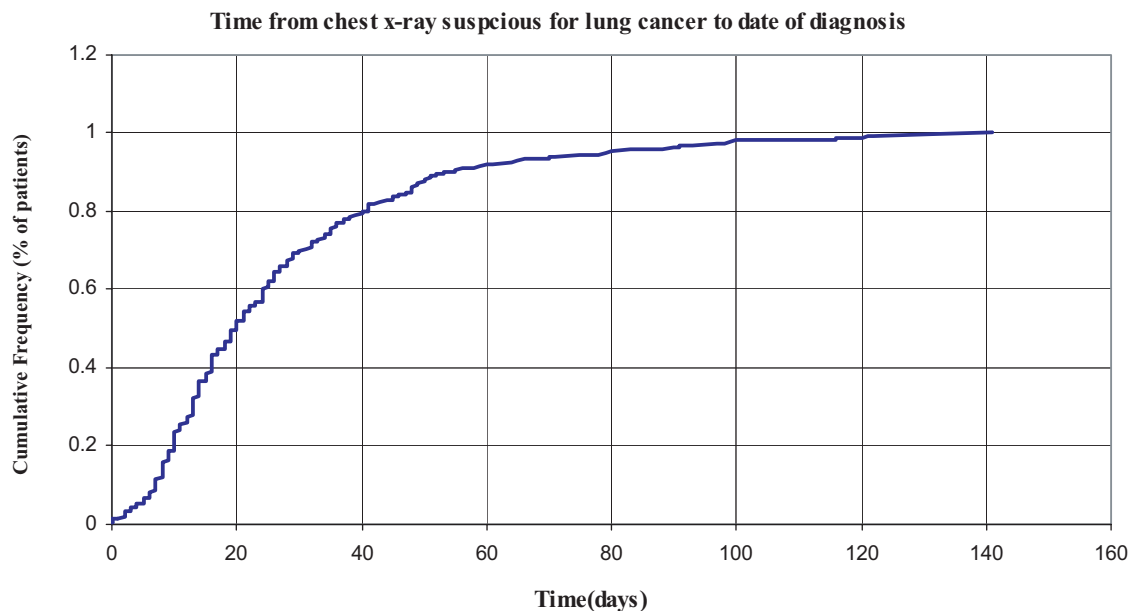


FIGURE 2. Time for patients to receiving diagnosis from suspicious chest radiograph.

TABLE 1. Provider Satisfaction Results

Item	% of Physicians Who Ranked on Satisfaction Survey Better (4/5) or Significantly Better (5/5)
Ease of referral to a specialist	100
Ease of initial bookings of investigations	100
Change/track bookings of investigations/visits	87.5
Communication with health care system	72
Quality of care for patient	90
Patient-physician relationship	70

prostate cancer, and colorectal cancer.¹¹ Although this malignancy is potentially curable, it can progress quickly, and thus timely diagnosis and management are considered part of ideal care. The Time to Treat Program adapted success process engineering from abroad to address local problems.

Outcomes

Individual services (e.g., radiology department, subspecialty consults, family practice groups) were well established and provided good quality care. However, stronger relationships were required. The only new entities that the Time to Treat Program created were stronger linkages between these health care services. There were four core elements that improved communication and multidepartment patient care planning: streamlined referral, the navigator, algorithms (diagnostic and treatment), and dedicated investigation booking slots. Due to these four core elements, the Time to Treat Program was successful in decreasing the overall median wait time and each interval median wait time, especially the interval time to obtain a CT scan.

Clinical Relevance

In lung cancer, negative effects on stage translate to large differences in 5-year survival in non-small cell lung cancer with previously reported 5-year overall survival rates of 66.5% for stage I patients,¹² 49.2% for stage II patients,¹³ 35% for stage IIIA (T3N1) patients, 6% for stage IIIA (T3N2) patients,¹⁴ 5% for stage IIIB patients, and 1% for stage IV patients.¹⁵ It is likely that earlier diagnosis would lead to better clinical outcome.

Once patients are diagnosed with lung cancer and are eligible for surgery, they undergo surgery in a timely fashion at this institution. Earlier diagnosis leads to earlier management. The Ontario Provincial Wait Time Strategy measures the length of time from diagnosis of lung cancer until surgery.¹⁶ During the past quarter, the provincial average wait for lung surgery was 38 days measured as time from decision to proceed with surgery until completion of surgery. The same wait time for lung surgery at this institution was 23 days. The hospital with the shortest wait time for lung surgery in the province had a wait time of 15 days. Currently, there is no published evidence that decreasing diagnostic or treatment wait times results in improved survival.

Is the lead time enough to result in a different stage at presentation? Perhaps. Earlier or more rapid diagnostic workup has been shown to increase therapeutic options in that resection rates increased from <10% to 25% in the United Kingdom¹⁷ and from 25% to 31% in the United States.¹⁸ A study from Denmark in 1997 showed that a few months' delay before treatment of non-small cell lung cancer had an effect on the perioperative stage and therefore prognosis.¹⁹ It is possible that even if rapid diagnostic workup does not change the stage at presentation, it may still increase the number of therapeutic options. Patients diagnosed earlier may have a better Eastern Cooperative Oncology Group performance status and be able to tolerate more aggressive inter-

ventions. Aside from surgery, patients with better performance status may be better candidates for chemotherapy or radiation.

Decreasing wait times has a positive impact on patient anxiety,²⁰ mental well-being,²¹ and satisfaction and physical function.²² Clinically, patients may also benefit from not having redundant investigations performed and thus avoiding the potential side effects of redundant investigations. The two thirds of patients who did not have lung cancer were told so more than 3 months earlier with the Time to Treat Program. For these patients, there is likely a significant quality-of-life benefit.

Two thirds of referrals did not have lung cancer. Currently at this hospital, the majority of patients who are investigated for suspicion of lung cancer are found not to have lung cancer. However, this may not be the case in other centers. The authors believe that it is ideal to have the minority of patients investigated actually found to have lung cancer. If all patients investigated were found to have lung cancer, the concern would be that insufficient numbers of people were being screened. There are currently no data in the literature on what the optimal suspicion threshold is for investigations. It is a balance between investigating more people and not missing any diagnosis of lung cancer and using more resources versus investigating fewer people and potentially missing some patients' diagnosis but conserving resources.

Other Potential Implications

In the large context of the entire health care system, other potential benefits of the Time to Treat Program were better use of the referring physicians' time and office resources.

The upside in terms of cost-benefit analysis may be larger than what is initially apparent. Some referring physicians have indicated that patients who used to be admitted for the sole reason of expediting their diagnostic workup may now be managed as an outpatient. Diverted patient admissions decreased hospital costs.

It is unclear whether there is increased workload as it is unclear whether more patients in this catchment area are being investigated compared with before the Time to Treat Program implementation. Family physicians were given a guideline as to when patients should be referred to the Time to Treat Program. It is possible that increased awareness about lung cancer has increased referrals for investigations; however, it is also possible that by following the distributed guidelines, fewer patients with lower suspicion for lung cancer are referred.

Challenges

The main challenges were access to investigations, education, and sustainability. Access to diagnostic imaging is an ongoing issue in this province, and the Time to Treat Program required dedicated CT scan slots along with effective use of these slots. A system has to be set up to avoid cannibalization of CT slots by returning unused slots to the general pool. Also with almost all new projects, there was the challenge of educating other healthcare departments and

referring physicians about the purpose and role of the Program. Due to the dynamic nature of interval events, continuous effort at each component of the Program was required to ensure sustainability of shortened wait times.

Weaknesses

There are some recognized weaknesses of this study. The preimplementation data are retrospective and have the common downfalls of retrospective studies. The factors affecting the before versus after Time to Treat Program cohort of patients may have been different. Optimally, a randomized study design would have allowed a better comparison between Program and non-Program cohorts.

Another consideration is that while most wait times are involuntary, some are actually voluntary. Patients may not show up or be available for appointments due to medical reasons (e.g., hospitalization) or other reasons (e.g., vacation, transportation, anxiety) reasons rather than the unavailability of an appointment. In this study, we did not separate involuntary and voluntary waits. Information on the type of waits is well captured on transplantation waiting lists and may be adaptable to our future work.

Looking Ahead

It would be useful to understand the implications of the Time to Treat Program for its own hospital services and also for neighboring hospitals. Did the shortened time intervals and multidisciplinary tumor board affect surgical, radiation, or chemotherapy services?

Sharing Successful Strategies

Future endeavors include evaluating other local process improvement initiatives. As a part of continual assessment and response to change, the Time to Treat Program may benefit from the experience of these other institutions. In addition, the Time to Treat Program strategies may be effectively adopted in another institution and may be adaptable to the diagnostic workup of other malignancies.

Success will require support from institution administration and provincial leaders. As illustrated from the experience of the National Health Service in the United Kingdom, the work in this area was not a grassroots project, but rather benefited from strong governmental direction.

Summary

The Time to Treat Program, a system redesign at a community hospital, has been shown to be effective in decreasing wait times at each step of the pathway in the workup of lung cancer. This study illustrated the importance of evaluating and improving the process for optimal clinical outcomes and potentially resource use. Continued motivation and effort on this endeavor are necessary to maintain acceptable wait times.

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