

# A fast track clinic improves diagnosis and treatment times for those investigated for lung cancer in Northland District Health Board

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## ABSTRACT

**AIM:** In 2009, a Respiratory Fast Track Clinic (RFTC) was introduced successfully by Southern District Health Board. Advancing on this model by incorporating further biopsy methods, we aimed to streamline our investigative cancer pathway.

**METHODS:** The RFTC introduction was bi-phasic with staggered introduction of computed tomography (CT), and then biopsy, to the first service appointment (FSA). Patients with suspected lung cancer were identified for a six-month period preceding the RFTC. The time for the diagnostic pathway was then contrasted to the two RFTC introductory phases.

**RESULTS:** In total, 212 patients were investigated for suspected lung cancer. Endobronchial ultrasound (EBUS) was the most utilised biopsy method. Time from GP referral to FSA improved significantly ( $p=0.005$ ). Similarly, time from FSA to diagnosis and treatment improved, median times reducing from 15 to 0 ( $p<0.001$ ) and from 37 to 24 days ( $p=0.004$ ) respectively.

**CONCLUSION:** The RFTC significantly shortened time to diagnosis and treatment. To the best of our knowledge, this is the first study demonstrating a reduction in time to treatment for suspected lung cancer patients in an Australasian fast track clinic. EBUS, when utilised as the initial investigation, results in faster treatment and, may improve survival if incorporated into the RFTC model.

Lung cancer remains the leading cause of cancer death in New Zealand despite a lower incidence than other developed countries such as Australia (29.2 verses 33.3 per 100,000).<sup>1,2</sup> Poignantly, New Zealand is lagging behind other Western nations in lung cancer outcomes, with a five-year survival rate of 11% contrasting 14% in Australia and 18.1% in the US.<sup>3,4</sup>

In recognising the need to improve outcomes, the New Zealand Ministry of Health initiated a Faster Cancer Treatment initiative. This set a target of 85% of lung cancer patients to have received treatment within 62 days of referral by June 2017.<sup>4</sup> This initiative promotes prompt investigation, diagnosis and treatment, not only

to achieve better outcomes, but to reduce stress and anxiety associated with the diagnostic process. An audit of lung cancer care in Auckland in 2004 found that “patients felt the worst part of the pathway was waiting for investigations and appointments...particularly leading up to diagnosis”. As a result, ‘day-stay’ or ‘rapid access’ clinics were recommended.<sup>5</sup>

The concept of lung cancer respiratory fast track clinics (RFTC) or “lung investigation days” originated in the UK, incorporating first specialist appointment (FSA), imaging and biopsy.<sup>6</sup> In 2009, the Southern District Health Board set up a RFTC for patients with high suspicion of lung cancer, streamlining services and improving patient experience

at no extra cost.<sup>7</sup> In Northland District Health Board (NDHB), we sought to improve this model with the addition of same-day computed tomography (CT) guided and ultrasound guided biopsies into the clinic model. We assessed the impact of a phased introduction of this approach through analysis of diagnostic timeframes.

## Method

The respiratory fast track clinic comprises three clinic slots per week for those referred with a suspicion of lung cancer. This includes three allocated CT scans, two bronchoscopy slots and one for CT-guided biopsy. This was modelled on observed distribution of biopsy methods in the standard clinic model (SCM).

Patients were identified through the lung cancer multi-disciplinary meeting (MDM) and clinic lists, with a total of 212 patients. Data was collected retrospectively using the 'Concerto' electronic health record<sup>8</sup> and the 'RMS Lite' electronic GP referral system.<sup>9</sup> These systems were used to access GP referrals, clinic letters, multi-disciplinary meeting reports, imaging and histology reports, and hospital discharge documents.

The study population consisted of patients in NDHB, referred to a respiratory physician with suspicion of lung cancer between December 2015 and October 2016. Phase 1, from December 2015 to May 2016, consisted of conventional diagnosis and staging prior to the RFTC. This facilitated comparison between the SCM and the RFTC. The initiation of the RFTC was biphasic. Phase 2 incorporated CT scanning into the SCM between May and July 2016. Subsequently, Phase 3, between July and October 2016, saw the introduction of biopsy methods (bronchoscopy, CT-guided or ultrasound-guided) to the clinic. All lung cancer patients were included in the results over the phased introduction, including 135 who were seen outside the RFTC.

Basic demographic data was recorded alongside the diagnosis and biopsy method. Time frames from referral to FSA, and from FSA to diagnosis and treatment, were calculated. Diagnosis date was upon reported histology, or if a presumptive diagnosis was made in the absence of histology, the date of the imaging report. The treatment date represents the initiation of chemotherapy,

radiotherapy or surgery. Where treatment was not offered or was declined, no date was recorded.

Primary outcomes were the impact of the RFTC on time from referral to FSA, diagnosis and treatment; this was determined by comparison between the three phases. Median times were used, as the data was skewed and some patients experienced long waits for personal or clinical reasons. Statistical analysis was undertaken in Stata using the Pearson Chi-squared test to calculate p-values.

A total of 25 patients were excluded as they were re-referrals or referred from other health boards either with a known cancer or nodules under surveillance. Additionally, data was excluded where unavailable, ie, not included in time from FSA to treatment where no treatment was received.

## Results

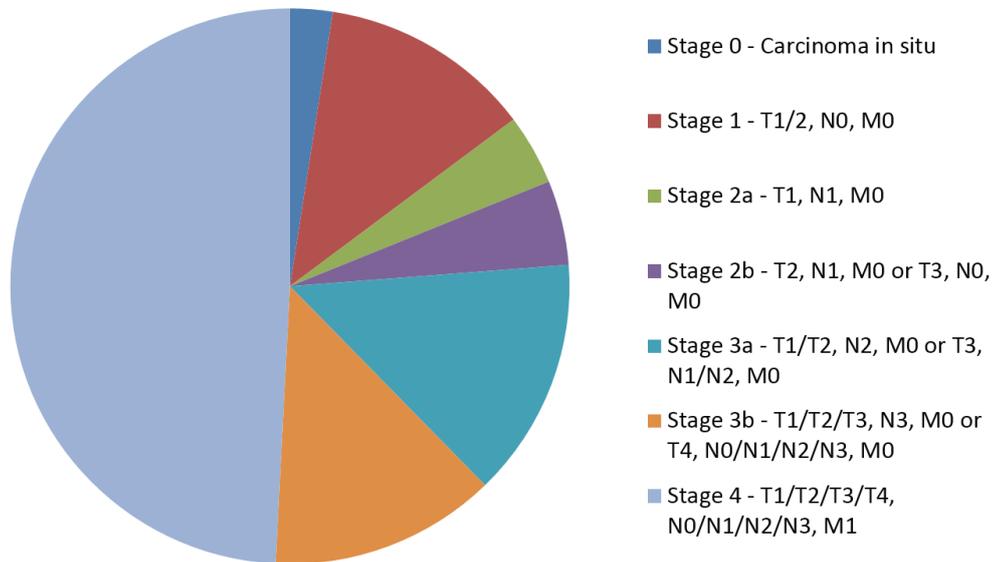
### Demographics

The male to female ratio of patients referred were exactly one to one and the peak age group was 61–70 years. The ethnic distribution was divided, to Māori patients comprising 31% of those referred, and non-Māori 69%. Although this is comparable to the 2013 census data, which recorded 29.6% of NDHB residents as Māori,<sup>10</sup> it does in fact suggest inequity of access to the service. In 2014, the age standardised lung cancer registration rate per 100,000 population was 79.7 among Māori compared to 26 among non-Māori.<sup>11</sup> This higher incidence of lung cancer in the Māori population was not replicated in our clinic, where only 32% of patients diagnosed with lung cancer were Māori.

### Cancer demographics

Out of the patients referred, 59% were diagnosed with lung cancer, 34% were cancer free and 7% had another cancer primary (0.4% had a primary of unknown location). The most commonly used biopsy method was endoscopic bronchial ultrasound (EBUS), 17.8%, which is performed, on referral, in Auckland District Health Board. This was followed by bronchoscopy (15.2%), CT-guided biopsy (13.2%), resection (12.2%), pleural fluid aspiration (6.1%), fine needle aspiration of neck nodes (3.5%),

**Figure 1:** Distribution of stages among patients with lung cancer.



ultrasound guided liver biopsy (2.0%) and thoracoscopy (1.5%). Notably a proportion of those without cancer will not have required biopsy, thus lowering these figures.

Our data reiterated the advanced stage at which lung cancer often presents; 49.1% of patients had Stage 4 (metastatic) disease, with only 23.8% presenting at Stage 2 or below (Figure 1).

**Pathway outcomes**

In total, Phase 1, 2 and 3 consisted of 70, 46 and 71 patients respectively. There was significant improvement in time from GP referral to FSA from Phase 1 to 3, p=0.005, with a median reduction from eight to six days (Table 1, Figure 2). Similarly, a significant reduction was observed in time to diagnosis from FSA with a reduction in

median waits from 15 to 0 days, p<0.001 (Table 1, Figure 3). Although this includes all patients, the fall to a median of 0 days reflects the significant number of same-day diagnoses with ‘no cancer’. For patients receiving the most commonly used biopsy method, EBUS, the median time from FSA to diagnosis was 16 days (total of 34 patients). Finally, there was also a significant reduction in time from FSA to treatment, p=0.004, with a drop in median times from 37 to 24 days (Table 1, Figure 4). These improved timeframes allowed achievement of the New Zealand Ministry of Health Target;<sup>4</sup> the percentage of lung cancer patients’ receiving treatment within 62 days rose by 25%, from 72% in Phase 1 to 97% in Phase 3 (p=0.002).

**Table 1:** The effectiveness of the rapid access clinic on pathway timing from referral through to commencing treatment.

Measurement	Median difference in days from Phase 1 to Phase 3	P=
GP referral <sup>†</sup> to FSA	-2	0.005
FSA to diagnosis <sup>‡</sup>	-15	<0.001
FSA to treatment <sup>§</sup>	-13	0.004

<sup>†</sup>GP referral = date of the referral to specialist from general practitioner.

<sup>‡</sup>Diagnosis = date of diagnosis (biopsy report date or CT report date if no biopsy taken).

<sup>§</sup>Treatment = date of treatment (chemotherapy, radiotherapy, surgery).

Figure 2: Box and whisker plot showing time from GP referral to FSA through Phases 1 to 3.

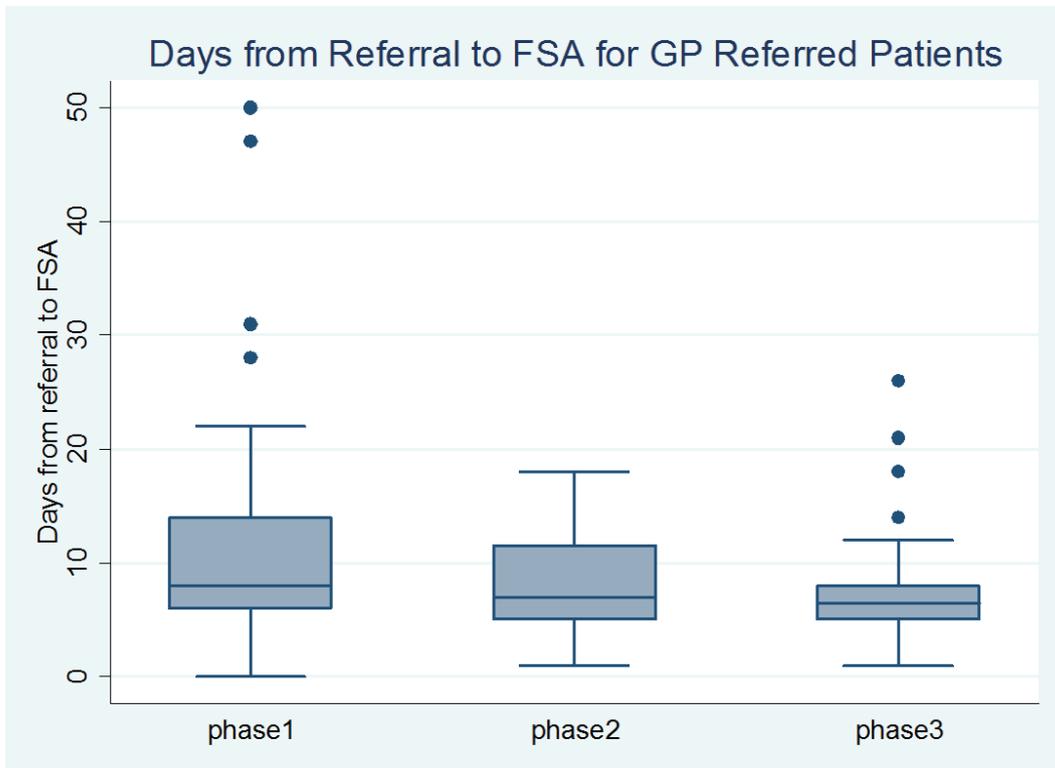


Figure 3: Box and whisker plot showing time from FSA to diagnosis through Phases 1 to 3.

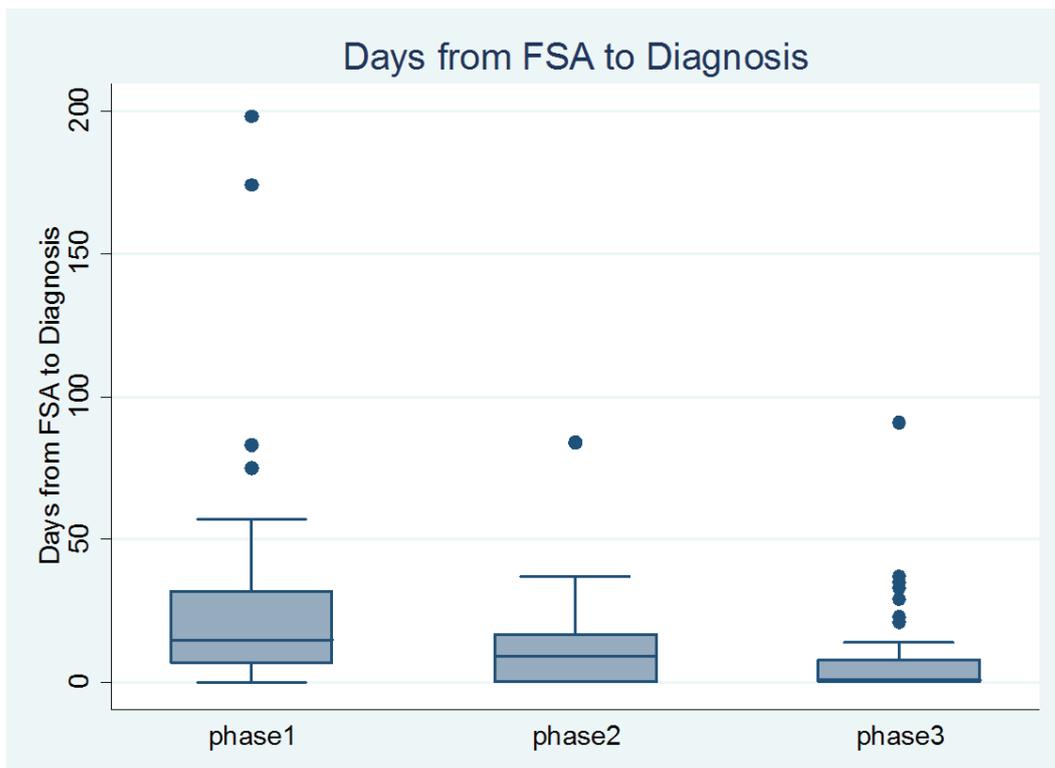
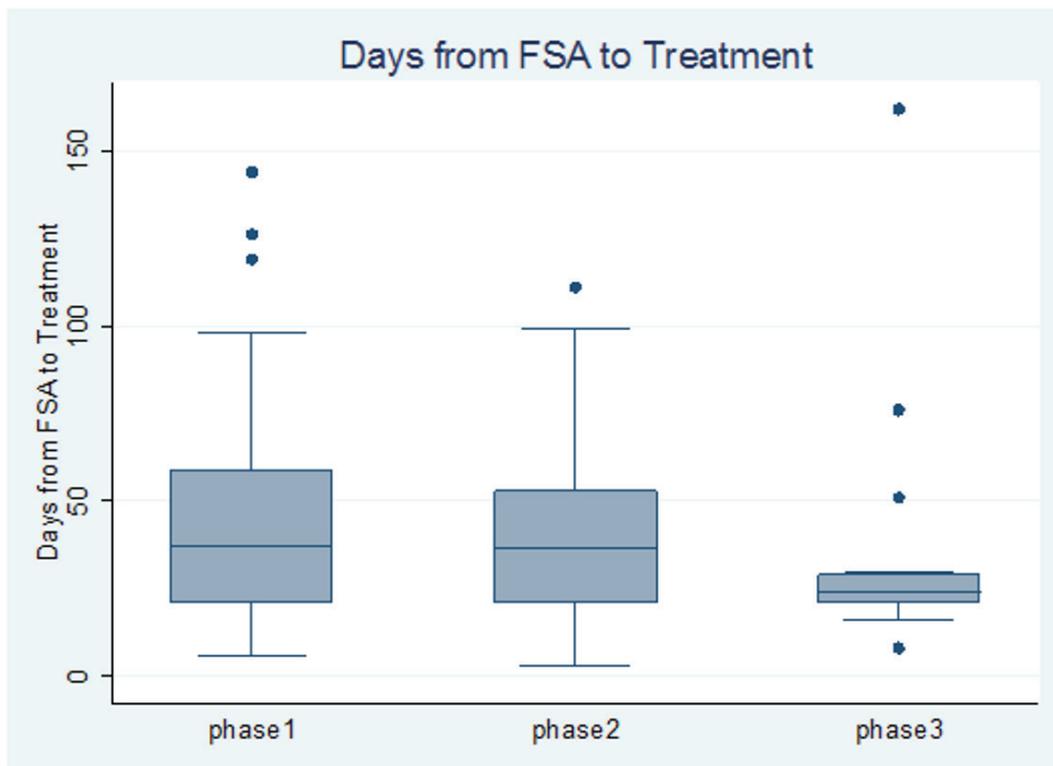


Figure 4: Box and whisker plot showing time from FSA to treatment through Phases 1 to 3.



## Discussion

### Cancer pathways and diagnostic timeframes

The aims of the RFTC were two-fold, firstly to improve outcomes through shortening the diagnostic and investigatory timeframe and secondly to improve patients' experience of the pathway. This is in keeping with the New Zealand Cancer plan 2015–2018, which seeks to improve the diagnostic intervals for patients, with the goal of 85% of patients initiating treatment within 62 days from referral and 31 days from decision to treat, by June 2017.<sup>4</sup> These guidelines broadly reflect those internationally; Australia, however, employs a more ambitious target of 42 days from referral to treatment.<sup>12,13</sup> Our results suggest that RFTC implementation allows comfortable achievement of New Zealand's targets, with 97% of patients in Phase 3 initiating treatment within 62 days of referral. Alongside shorter diagnostic and treatment timeframes, access also improved, with a reduced wait to FSA in Phase 3. Although the reasons for this were not directly assessed, a number of factors

are likely to have contributed. The RFTC ran weekly, with cover from a number of physicians, thus preventing cancellations. It created three new clinic slots, additional to the existing service, with coordinated triage. Finally, the clinic was carefully designed by those who would run it; in comparison to a system which develops organically, this allowed systematic improvement in areas that were not anticipated.

A more complex question is how the impact of this streamlined diagnostic process will affect overall patient outcome. The poor five-year survival in lung cancer internationally reflects the late presentation of the disease, preventing curative intervention. It is naturally assumed that quicker investigation and diagnosis will lead to prompt treatment, and thereby confer a mortality benefit. Evidence for this simple logic is, however, sparse and conflicting, with significant variation seen between cancer primaries. Broadly, there is evidence to support reduced diagnostic intervals with rapid access clinics and national implementation of cancer care pathways.<sup>14</sup> Most of this research and interest is in primary care,

assessing, the timeframe between presentation, referral to secondary services and outcome. There has been comparatively little work done focusing on the role of diagnostics in referral centres.

Supporting evidence of a linear association between diagnostic intervals and outcome following referral from primary care in lung cancer is limited. Indeed, paradoxically longer diagnostic intervals, in some cases, are associated with a better outcome as advanced disease often confers a simple and rapid diagnostic process. This paradox has been observed in colon and other cancers.<sup>15</sup> However, a prospective Danish cohort study in primary care measuring the interval between first symptomatic presentation and diagnosis demonstrated that longer diagnostic intervals are associated with worse outcomes in lung cancer.<sup>16</sup> A cohort study from an English database looking at the nature of the presenting symptoms failed to demonstrate this association in breast, lung or colorectal cancer, and indeed for those with 'non-alert' symptoms the reverse was true.<sup>17</sup> Despite the paucity of evidence, simple logic suggests that in early disease, rapid diagnostics and treatment will confer a survival advantage.

The standards of investigations of those with lung cancer have shifted away from conventional biopsy methods towards new modalities such as EBUS-transbronchial needle aspiration (EBUS-TBNA) using rapid on-site evaluation (ROSE), which provide a greater likelihood of histological diagnosis. ROSE allows on-site assessment of histological material and therefore an improvement in diagnostic yield. For instance, one prospective study places the sensitivity and specificity of 100% and 98.4%, respectively, for malignancy using EBUS-TBNA.<sup>18</sup> As such, EBUS-TBNA has been trialled as the first-line biopsy method for lung cancer investigation. This has been shown to significantly improve time to diagnosis compared to conventional diagnostic and staging techniques, and interestingly, subgroup analysis demonstrated a significant mortality benefit.<sup>19</sup> Although not widely explored, if reproducible, this may represent a systems approach that could

infer a survival benefit comparable to novel chemotherapy agents.<sup>19</sup>

### Limitations and further development

This study was limited in its effect due to the lack of an effective control arm. It could be argued that by using a time series analysis from the same population, the change found was already happening independently of the intervention. However, the time to treatment effect was flat across Phases 1 and 2 and then dropped in Phase 3 which, the authors would argue, is persuasive of an effect of the RFTC. A longer baseline would have been optimal to confirm such an effect. A second limitation of the study was that patients with lung cancer not referred by primary care and thereby not seen in secondary care were not studied. This paper fails to address such patients and this remains both a weakness of the study and a concern to the authors.

A further and significant concern is the apparent lack of equity of access to the clinic among Māori and non-Māori patients, when incidence of lung cancer in these two populations is considered. The cause of this inequity goes beyond the realm of this study, although again, inclusion of community and primary care data could provide additional information.

Notably, EBUS was the most utilised biopsy method in this clinic. Its absence locally therefore represents the natural development of the RFTC and a major weakness in the study. In fact, the Standards of Service Provision for Lung Cancer Patients in New Zealand states that all patients should have timely access to CT guided biopsy and EBUS;<sup>4</sup> a target that was regrettably not achieved. EBUS was included in the proposal for the RFTC, however as with other small centres, cost and provision of necessary expertise proved the major barrier. With a rural and low socio-economic patient demographic it is the authors' opinion that dissemination of these techniques to regional centres would further reduce diagnostic timeframes, with a possible mortality benefit, but moreover, a qualitative and financial improvement. The impact of ROSE on this process in ensuring histological quality would further this goal

**Table 2:** Examples of patient feedback from Phases 2 and 3 of the clinic.

“Excellent service today”
“Better than four-five visits. Thank you”
“Found fast track very efficient and helpful, great to have services done so quick, stress was only minimal, instead of having to wait”
“Very happy with service and new procedure”

but adds another layer of expertise that may not always be present in rural centres.

Further limitations to the RFTC are also largely based in resource allocation. The clinic runs at maximum capacity with the resources available locally. Despite this, out of approximately 300 referrals per year with suspected lung cancer, there is only space for around half in the RFTC.

### Patient experience

There is agreement that, despite paucity of evidence in terms of outcome, rapid investigation and diagnosis is essential in reducing anxiety and stress for patients and their families. Anecdotal evidence of patients’ feedback from Phases 2 and 3 of the clinic (Table 2) add weight to this hypothesis, although data is lacking from Phase 1 to allow direct, objective comparison. Several clinic appointments are condensed to one; reducing both the financial and time-cost; which, given the rural geography of Northland, is significant. This is translatable to improved access for family attendance and support. The rapid access also allows early referral to other elements of the multi-disciplinary team, such as Māori cultural support, dieticians and social work. We are confident that the RFTC enhances the quality of survival.

## Conclusion

The benefits provided by the RFTC model are transferrable to other centres, having been successful in both Northland and Southland District Health Boards, and may contribute significantly to attaining national targets. In addition, the advantages of a one-stop clinic may be applicable to other specialities; a similar approach is already well established for suspected breast cancer.

Overall, the RFTC improves timeframes to diagnosis and treatment for patients with suspected lung cancer, subsequently reducing stress and anxiety for themselves and their families, and may construe a mortality benefit. Arguably, any potential mortality benefit is of less significance than improved quality of life; lung cancer’s poor prognosis means for many the focus of care is palliation. Rapid diagnostic timeframes through the RFTC allow earlier switch to this focus of care, and less time spent at hospital appointments. In other centres, where EBUS can be incorporated, or with other types of cancer, this clinic model has potential to provide mortality benefits, alongside these improved patient outcomes. As such, we speculate whether a single-day multi-investigation clinic for diagnosis or exclusion of suspected cancer should be used across the board as a standard model.

**Competing interests:**

Nil.

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