

# Regional single-queue scheduling platform for specialist diagnostics in the lung cancer pathway: accelerating cancer recovery from the COVID-19 pandemic

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## ABSTRACT

Lung cancer is the single biggest cause of cancer death. The diagnostic pathway can be complex, including specialist cancer diagnostics that are not performed at every hospital. One such example is endobronchial ultrasound (EBUS), a day-case bronchoscopic procedure used for nodal staging and tissue diagnosis. In this proof-of-concept pilot in Greater Manchester, we tested a novel digital EBUS booking platform. This platform was accessible across multiple acute care trusts and provided visibility of all available EBUS appointments, allowing referring teams to book directly into the appropriate slot. During a 6-month pilot, 193 EBUS procedures were booked through this new single-queue platform. The median waiting times reduced by 2 days from 9 to 7 days (22% reduction and saving approximately 386 days in total) and reduced variation in waiting times by 1 day from 5 to 4 days (20% reduction). 98% of patients who completed an experience of care survey felt the process was ‘very well’ or ‘well’ organised and 77% felt the most important factor in deciding where to have their EBUS was the earliest possible appointment regardless of travel. This proof-of-concept pilot has shown improvements in cancer waiting times with significant future potential in delivering specialist cancer diagnostics.

## WHAT IS THE PROBLEM BEING ADDRESSED?

Lung cancer is the single biggest cause of cancer-related death in the UK, causing approximately 35 000 deaths per year.<sup>1</sup> Furthermore, lung cancer disproportionately affects the most deprived communities and has suffered the most significant impact in outcomes from the COVID-19 pandemic. COVID-19 has led to later presentation, translating to worse performance status at diagnosis, more advanced stage disease, less curative-intent treatment and more emergency presentations.<sup>2</sup> Overall, lung cancer outcomes have been set back 10 years nationally. There is an urgent need, therefore, for rapid recovery from COVID-19 in lung cancer

pathways and to address the health inequalities of this disease. One component of this is delivering accelerated pathways with equitable access for all patients. Improved survival through accelerated pathways in lung cancer has been demonstrated in both randomised controlled trials and in meta-analysis<sup>3 4</sup> though this was in post-hoc analysis and there are weaknesses within the data.

Endobronchial ultrasound (EBUS) is a bronchoscopic procedure used to sample mediastinal and hilar lymph nodes for the purpose of pathological nodal staging and to sample central lung and lymph node tumour in advanced stage disease to provide tumour subtyping and tissue for predictive marker testing. Greater Manchester (GM) is a region in the North West of England with a population of over 3 million people and a significantly higher age-standardised mortality rate for lung cancer compared with the national average.<sup>5</sup> EBUS services in GM have a long-standing history of collaborative working, predominantly with the purpose of quality assurance and performance monitoring.<sup>6 7</sup> This work has, however, highlighted delayed and variable access to EBUS across the region with compliance to the national EBUS service specification<sup>8</sup> quality standard of referral to procedure time of  $\leq 7$  calendar days ranging from 37% to 87% across the GM EBUS services.<sup>7</sup> The management of capacity and demand for EBUS across the region could, therefore, be improved to ensure equitable and more rapid access to this specialist diagnostic test.

The importance of rapid access to specialist cancer diagnostics in the lung cancer pathway has been acknowledged in the recently published National Specialty Report for Lung Cancer Getting by the Getting It Right First



Time (GIRFT) Programme.<sup>9</sup> Within the GIRFT recommendations on ‘making a rapid and accurate diagnosis’, a national target for key specialist lung cancer diagnostics, including EBUS, has been set at 5 days from referral to test. The report also acknowledges that regional cancer alliances must ‘play a critical role in implementing and coordinating a regional approach to managing capacity and demand, and ensuring equitable access to expertise across their regions’.<sup>9</sup>

### WHAT COULD BE A POTENTIAL SOLUTION?

Prior to this pilot project, EBUS referral pathways in GM were relatively rigid with each of the 10 acute care hospital sites having one defined referral pathway to a single EBUS provider (from a total of five EBUS providers). Each EBUS provider, however, has differing capacity and resilience with the number of operators, for example, ranging from two to seven across the EBUS services.<sup>7</sup> This left services vulnerable to the impact of staff absence or sickness. The mechanism of referral was an email from referring hospital to EBUS provider. The EBUS provider then managed the process of scheduling the procedure using its own internal booking processes. Current waiting times for EBUS services are not available to the referring teams to allow patient choice and pathway coordination. As such, the responsibility of the EBUS scheduling is passed to the provider organisation but the accountability remains with the referring hospital from a cancer waiting times perspective.

To address this problem, GM Cancer (the regional cancer alliance for GM) designed a proof-of-concept pilot of a digital scheduling system that would allow a referring team to view the available EBUS waiting times and all available appointments across multiple EBUS services and decide which appointment to book in discussion with the patient. This novel approach would deliver the first single queue for cancer diagnostics across multiple providers through a single digital platform in which the ownership of booking the test is handed over to the referring team ensuring they have greater coordination of the lung cancer pathway. The pilot objectives were to deliver improved patient experience through faster diagnosis, reduce cancer waiting times and reduce inequity of access.

Phase 1 of this pilot single-queue project was delivered in a focused area of GM including three hospitals: a single EBUS provider (named EBUS centre A) and two referring trusts (named Referring Hospitals 1 and 2). Prior to the pilot, the median wait for EBUS at centre A for its own local patients was 10.49 days and for the patients at Referring Hospitals 1 and 2 it was 11.10 and 11.20 days, respectively. For the pilot, a new EBUS centre (named EBUS centre B), with a median waiting time of 6.32 days, would be added to the referral matrix within this specific area of GM. The digital platform would display live appointments at both EBUS centres A and B and allow referring teams from across all four hospitals

to book EBUS at either site, driven by patient choice and to support improved pathway management. During the pilot, a third EBUS centre (named EBUS centre C), which provided EBUS solely for its local population without receiving referrals from any additional hospitals (and which had a median wait for EBUS of 10.15 days), requested to join the pilot to be able to access additional EBUS capacity as their service suffered the impact of staff absence. The addition of this extra hospital to the pilot was phase 2.

GM Cancer procured the partnership of ‘InfoFlex’ to deploy this platform. InfoFlex has an established relationship and integration with the National Health Service (NHS) for over 20 years. It is a data management system that brings together patient data so that multiple healthcare workers and systems across the NHS can access up-to-date patient data easily, at one central point with advanced reporting and analysis functionality. The InfoFlex EBUS platform was designed in collaboration with clinical teams across GM and the InfoFlex design team to capture the required referral data and allow certain rules to be applied that would show the referring teams the earliest possible EBUS dates under different scenarios. These included rules for anticoagulation and antiplatelet therapy, COVID-19 swab status and those patients who required a Positron Emission Tomography (PET) scan prior to EBUS (for staging EBUS as per National Institute for Health & Care Excellence (NICE) guidance<sup>10</sup>).

The pilot launched in May 2021 for a period of 6 months to November 2021. Phase 1, involving the four hospitals, ran from May 2021 to August 2021 with the fifth hospital joining from August 2021 onwards in phase 2. The evaluation of this pilot consisted of two components. First, an experience of care survey was offered to all patients who completed an EBUS using this single-queue platform (table 1). The survey collected postcode information which could be matched to the English Index of Multiple Deprivation (IMD) decile to facilitate a deprivation analysis to ensure the responses received were fully representative of the GM population. The data were collected in a mixed-methods approach by handing out questionnaires in clinic and telephone calls with patients. Second, referral to procedure waiting times was collated for the 4 months prior to the pilot (January–April 2021) to provide the baseline data and compared with waiting times during the pilot. The referral date in the baseline data was taken as the date of email referral and in the pilot data this was taken as the date the patient was first registered on the InfoFlex system. This does not take into account the earliest possible date an EBUS could be performed when considering anticoagulation, COVID-19 swab status and PET scan status for either cohort and should, therefore, create an equal comparison. The median number of days from referral to EBUS for both cohorts was calculated and compared for each individual site and for the entire pilot project. The variation in waiting time (difference in longest median wait and shortest median wait across the

**Table 1** Results of the experience of care survey during the regional single-queue EBUS pilot in Greater Manchester

Question	Outcome
How happy were you to travel to the hospital where your test was done? <i>5-point Likert scale (very happy to very unhappy)</i>	95% 'very happy' or 'happy' (41/43)
How did you attend your appointment for your EBUS test?	79%: own/family/friends transport (34/43)
In your own opinion, what is the most important thing about having an urgent test? ▶ Completing the test as fast as possible regardless of which hospital it happens at ▶ Completing the test as close to home as possible, even if that means waiting a little longer ▶ Something else ▶ None of the above ▶ I'm not sure	77%: completing the test as fast as possible regardless of which hospital it happens at (33/43)
Overall, how well organised was the process of completing test? <i>5-point Likert scale (very organised to very disorganised)</i>	98%: 'very organised' or 'organised' (42/43)
Is there anything else you would like to say about your experience during this test project or anything about where you feel patients should have urgent tests in Greater Manchester?	'Very happy to go anywhere to get EBUS done as soon as possible so I can have results and start treatment as soon as possible.' 'I was extremely impressed by the teamwork & professionalism at [EBUS Centre B]. They acknowledged my fears, made me feel comfortable and it would be good if I needed another to go back to Wythenshawe.' 'Brilliant experience. Don't mind travelling to [EBUS Centre B] even if it's awkward to get to.'

EBUS, endobronchial ultrasound.

pilot hospital sites) was also compared from baseline to during the pilot project.

### THE RESULTS SO FAR

During the 6-month pilot from May to November 2021, 193 EBUS procedures were scheduled and completed through the regional single-queue EBUS platform. A total of 43 patients (22% of patients completing an EBUS in this pilot) completed the experience of care survey (table 1). The top priority for 77% (33 of 43) of patients surveyed when considering where to have their EBUS test was to have the fastest possible appointment regardless of travelling. Ninety-five per cent (41 of 43) of patients surveyed were 'very happy' or 'happy' to travel to the location where they had their EBUS and 98% (42 of 43) felt the whole process was 'very organised' or 'organised'. Fifty-four per cent (23 of 43) of individuals who provided feedback reside in an area that has an IMD decile score of 4 or less (considered most deprived area). Thirty per cent (13 of 43) of individuals who provided feedback reside in an area that had an IMD decile score of 6 or more (considered least deprived areas).

The baseline data confirmed waiting times for EBUS vary across the different sites with EBUS centre B having significantly more capacity than EBUS centre A with a 4-day shorter median waiting time overall (table 2). Over the course of the pilot, across all six sites involved, the median wait for EBUS reduced by 2 days (22% reduction)

from 9 days to 7 days. The new system supported the diversion of EBUS procedures to centre B to use the additional capacity and shorter waiting times. From the 193 patients, 31 patients were diverted to EBUS centre B instead of the established referral pathway. The median waiting time for the 31 patients who diverted to EBUS centre B was 6 days. This switch in capacity utilisation did not adversely affect the overall waiting times at EBUS centre B (6 days pre-pilot and post-pilot). The overall variation in mean waiting times across GM reduced by 1 day (20% reduction).

### PERSPECTIVE

This pilot has successfully generated the first single-queue system for cancer diagnostics across multiple providers while still preserving the option of patient choice. We have positive results with a 22% reduction in cancer waiting times, an 20% reduction in variation in waiting times and excellent patient experience reported in the respondents to the patient questionnaire. There are, however, a number of limitations to the pilot to consider. First, the 22% completion rate in the patient experience questionnaire could make the results prone to inclusion bias, though the high proportion of patients from the most deprived communities in GM provides some assurance of appropriate representation of patients with lung cancer. It was not possible to integrate the single-queue digital platform with existing hospital

**Table 2** Median and mean waiting times (days) from referral to EBUS procedure at baseline and during the regional single-queue pilot

GM site	Baseline median EBUS wait	Pilot median EBUS wait	Reduction in median waiting times
Referring Hospital 1	11	8	3
Referring Hospital 2	11	10	1
EBUS centre A	10	9	1
EBUS centre B	6	6	0
EBUS centre C	10	7	3
<b>Overall pilot sites</b>	<b>9</b>	<b>7</b>	<b>2</b>
<b>Overall variation in waiting times</b>	<b>5</b>	<b>4</b>	<b>1</b>

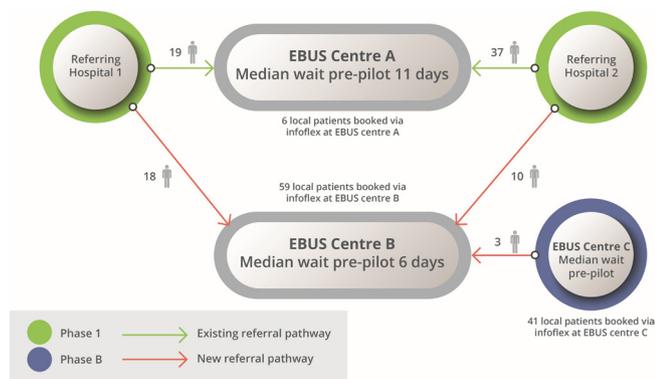
EBUS, endobronchial ultrasound; GM, Greater Manchester.

systems and therefore, this created additional workload to maintain two scheduling systems (the existing local scheduling system and the InfoFlex instance). This also prevented the development of additional functionality such as procedure reporting and pathological results communication via the system. These were provided to refer through existing processes as per local EBUS centre standard operating procedures. The pilot did not use all EBUS assets across GM, instead focusing on a small geographical area within GM. The reasons behind this were the short time frame of project design and development and the relatively small funding envelope for the pilot (£38 000 for additional workforce to support the duplication of scheduling processes, project management and system design, build and access). Finally, there were challenges in overcoming existing referral practices and fears of destabilising EBUS services. This is reflected in the number of patients who were actually diverted to a different EBUS location to use the additional capacity and the variation in uptake of additional capacity offered in this pilot across participating sites (figure 1). From the 193 patients booked for an EBUS via InfoFlex, 16% (31 of 193) were diverted to EBUS centre B where there was extra capacity. The median time at EBUS centre B did not change despite this additional workload and there remained unused capacity at EBUS centre B suggesting

the maximal potential benefit had not been reached. Despite these limitations, however, the pilot has provided demonstrable benefits of reduced waiting times and reduced variation of access EBUS. The simple act of a referrer being to directly select the EBUS appointment removes a number of administrative delays and may be responsible for some of the improvements seen as well as the improved use of EBUS capacity across the services involved. It is estimated that approximately 386 days (193 patients with an average of 2 days saved) on the cancer pathway were saved through this pilot while delivering an excellent experience of care that aligns with patients' priorities. Furthermore, GM has a well-established and collaborative EBUS network with some informal capacity-sharing pathways already in existence and some providers already operating exceptionally close to the GIRFT target of 5 working days request to procedure (mean wait of 6 days). The benefits in other regions without such connections and waiting times might see the biggest benefits from this system.

### POTENTIAL FOR THE FUTURE

The benefits seen in this pilot are likely just the tip of the iceberg to what could be achieved with a system that provides access to all EBUS services across GM, integrates with existing information technology networks to allow procedural reporting and results communication and could be used for multiple specialist cancer diagnostics (eg, PET-CT, EBUS and CT-guided lung biopsy) in the lung cancer and other cancer pathways. If these tests were aligned with the next available lung cancer multi-disciplinary meeting, also visible and booked via the same system, it could allow highly efficient coordination of the lung cancer pathway for all lung cancer services across GM and is driving the vision for a specialist cancer diagnostics digital platform for GM building on the success of this proof-of-concept pilot. This may also provide a framework for achieving the recommendations set out in the National Lung Cancer GIRFT report in relation to specialist lung cancer diagnostics.



**Figure 1** Summary of EBUS referral pathways during the single queue pilot.



**Contributors** LG-D and ME developed the concept of the single-queue pilot and oversaw the design, implementation and running of the pilot. LG-D led the data analysis. ME drafted the initial version of the manuscript and all authors (ME, DS, LG-D) edited and agreed the final version.

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