The role of smoking cessation services within the Targeted Lung Health Checks programme

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1. Context

1.1 Lung cancer screening in the UK

After smoking cessation, screening with low dose computed tomography (LDCT) is the most effective way to reduce lung cancer mortality. Unlike a number of other cancer types, however, there is currently no national screening programme for lung cancer in the UK. The UK National Screening Committee (UK NSC) advises ministers and the NHS on population screening and supports the implementation of screening programmes. The UK NSC's last review of lung cancer screening (LCS), carried out 15 years ago in 2007, did not recommend screening.[1] However, since then two large scale randomised controlled trials have provided conclusive evidence as to the efficacy of LCS, with reports of reductions in mortality of 8-26% amongst men and 26-61% amongst women undergoing LDCT screening in the National Lung Screening Trial (NLST) and the Dutch-Belgian lung cancer screening trial (NELSON).[2,3] The NLST also reported a 6.7% decrease in all-cause mortality.[2] Recent analysis from five UK-based lung cancer screening programmes, including over 11,000 scans conducted between 2011 and 2020 found a prevalence screen detected lung cancer of 2.2%.[4] The benefits of LDCT are therefore twofold; detecting cancer more frequently, at an earlier stage, and saving lives through other health interventions. Given that lung cancer is more common in socioeconomically disadvantaged groups, an effective screening programme could also contribute to reducing health inequalities, particularly if current smokers are successfully engaged.

The UK NSC has recently published an interim health technology assessment that strongly indicated the programme would be cost effective[5] and following a consultation between March – June 2022 the UK NSC has recently recommended screening for people aged 55 to 74 years and identified as being at high risk for lung cancer.[6] With regard to smoking cessation, the recommendation states there should be "consideration of alignment with smoking cessation services within and beyond the eligible population", though provides no further detail on organisation.

If a decision were made to implement a national LCS programme, the UK would not be the first country to implement such a model; a number of current guidelines recommend LCS from a number of countries, and also include recommendation for the offer of smoking cessation intervention to participants who smoke.[7–12] It is, therefore, vital to assess the available evidence to delineate the most effective way of integrating effective smoking cessation support to this population who are at high risk of smoking related disease.

The overall success of LCS programmes may be significantly influenced by smoking behaviour and there is often a discussion of whether LCS may provide a "teachable moment" or "license to smoke".[13–15] The "teachable moment" has been described as an event or set of circumstances

which leads individuals to positively change their health behaviour. In the context of LCS, it has been suggested that this could be an opportunity to inform participants of the harmful effects of smoking and increase their motivation to stop.[15–17] Conversely, there has been a concern raised that a reassuring scan result may induce a false sense of security, in that participants feel protected against the harmful effects of their smoking and thus may be less likely to attempt to stop.[18] Currently available research evidence suggests that this 'license to smoke' is not present, and indeed a clear scan result has been reported as being perceived as a 'clean slate' motivating a quit attempt.[19] Only 1.7% of continuing smokers in the Manchester LHC reported that the screening made them 'worry less about smoking'.[20] However, there is potential that a clear scan result could promote continuation of smoking if not accompanied by effective communication of risk[21] and thus this needs to be considered in any future intervention.

1.2 Benefits of smoking cessation in the context of LCS

LCS is a complex intervention, and its cost-utility is dependent on outcomes beyond the primary measure of reducing lung cancer mortality; it is dependent on acting as an important intervention for reducing all-cause morbidity and mortality.

Smoking cessation is the most effective way to reduce risk from lung cancer,[22] given that smoking is the cause of over 70% of lung cancer cases in the UK[23] and an even greater proportion of lung cancer deaths.[24] Stopping smoking cannot entirely eradicate harms from years of smoking cigarettes, and there is a strong link between 20-30 year historical smoking trends.[25] However, quitting at any age reduces the risk of dying from smoking-related diseases.[26] For those aged 65, it is estimated those who quit smoking between the ages of 55-59 will have half the risk of lung cancer death compared to current smokers.[27] Another study found that for high-risk individuals aged 55-74, seven years of smoking cessation reduced lung-cancer specific mortality by 20%.[28] Of those diagnosed with non-small cell lung cancer, those who quit smoking have a 21.6 months longer median overall survival time compared to those who continue smoking, as well as reduced risk for all-cause mortality and disease progression.[29] Continued smoking in cancer patients also increases risk of developing a second primary cancer.[22]

The effects of smoking cessation extend beyond lung cancer, both in terms of health benefit and cost-effectiveness. The 2020 Surgeon General report identifies 11 additional cancers caused by smoking, the risk of all being reduced with smoking cessation.[30] Further, people who smoke are also at risk of premature death due to chronic obstructive pulmonary disease (COPD), heart disease and stroke. Subjects eligible for lung cancer screening have a 3 times greater relative risk death due to heart disease than a non-smoker.[31] 62% of participants in the Lung Screening Uptake Trial had coronary artery calcification present on the scan.[32] Further, nearly one quarter of participants undergoing LDCT screening in the International Early Lung Cancer Action Programme (I-ELCAP) were found to have emphysema.[33] There is thus a potential opportunity

to provide better management and reduce the clinical impact of these conditions through effective smoking cessation intervention, building on the teachable moment in those attending for LCS. Cao and colleagues have highlighted that adding tobacco treatment to lung cancer screening will decrease deaths by an additional 14% and increase the overall number of life years gained by 81%.[34] Given long term conditions such as those listed above are more prevalent in more deprived groups (people in the poorest social class have a 60 per cent higher prevalence than those in the richest social class and 30 per cent more severity of disease[35]), any intervention addressing these conditions has potential decrease health inequalities, and smoking cessation is one of the most effective interventions available.

1.3 The Targeted Lung Health Check programme

Announced in 2019, the Targeted Lung Health Checks (TLHC) programme is an NHS England (NHSE) commissioned service currently being piloted in 23 areas in England[36] and increasing to 43 areas from 2022. The programme runs in areas of England with high rates of lung cancer mortality, inviting individuals aged 55-74 years who have ever smoked to an appointment where their risk of lung cancer is calculated. Those who are at or above a certain risk threshold for lung cancer are then eligible for a LDCT scan. The protocol for the programme includes sparse detail on the provision of smoking cessation and there is no standard specified approach. It does state that all those attending for the lung health check who smoke be advised on smoking cessation, including those not meeting the inclusion criteria for a scan, and smoking cessation advice should be incorporated into written correspondence. Advice should be face to face where participants attend.

The protocol goes on to state that enhanced smoking cessation interventions are encouraged, including the use of pharmacotherapy, and that there should be sufficient capacity and infrastructure to deliver the programme, including smoking cessation support and advice. There is limited guidance as to how the support should be delivered, or details about how the smoking cessation provision will be funded. Given the move to local authority responsibility for smoking cessation services and cuts to public health budgets and smoking cessation services in recent years there remain numerous unanswered questions about how this will work in practice and whether the smoking cessation response can be scaled if the TLHC is further expanded.

1.4 Current provision of smoking cessation services

Smoking cessation services are a vital tobacco control intervention. Those who use these services in England are up to three times as likely to quit as those who make a quit attempt unaided.[37] Smoking cessation services in England were historically commissioned by the NHS. In 2013, however, the responsibility for public health transferred to local government and are now funded by the Department for Health and Social Care through the Public Health Grant.[38]

The leading sources of information on England's smoking cessation services are the NHS Digital Stop Smoking Service reports[39] and ASH/Cancer Research UK annual survey of local authorities.[40]

The 2021 ASH/Cancer Research UK survey, which covered all local authorities with public health budget for the questions relating to service provision, found two-thirds (67%) of local authorities commissioned a universal specialist smoking cessation service, 9% commissioned a specialist service restricted to specific groups (e.g. people with mental health conditions), 15% commissioned a lifestyle service and 7% commissioned a service in primary care only. 1% had telephone helpline only and 1% no service at all.[40] The capacity of existing services is stretched. In the context of a 24% real-term per capita cut to the broader public health grant between 2015/16 and 2020/21, net expenditure by local authorities in England on smoking cessation services declined from around £130 million to £71 million between 2013/14 and 2020/21. Over the same time period, and amongst those local authorities who submitted data to the NHS Stop Smoking Service, there has been an overall decline of 66% in numbers setting a quit date with services. This figure masks significant variation, however, with some local authorities seeing more than a 90% decline in quit dates while others have had less than 30% decline.[39]

In recent years there has been a move towards expanding the role of the NHS in identifying and supporting smokers within secondary care.[41,42] The NHS Long Term Plan has recognised the importance of smoking as a key contributor to health inequality, committing to ensuring that all inpatients admitted to hospital that smoke are offered tobacco dependency treatment, funded by the NHS, by 2023/24. In addition, there are newly funded pathways in maternity and secondary mental health services. The NHS is also investing in community pharmacy support for smokers to access on discharge and piloting new services for NHS staff who smoke. [43] Smoking is a strong risk factor for of all five of the clinical priorities in the Core20PLUS5 programme, which forms NHS England's core approach to reducing health inequalities.[44]

Further, the most recent NICE guidance makes it clear that health care professionals should ascertain the smoking status of their patients and provides detail on the range of evidence-based smoking cessation interventions available to support smokers to stop. It does not, however, resolve the outstanding issues of how services should be funded.[45]

2. Smoking cessation provision in the context of LCS

2.1 Attendance at screening

Attendance at lung cancer screening has been shown to increase quit rates in comparison to control groups. Data from 19 studies included as part of a recent review of smoking cessation interventions in LCS reported baseline smoking cessation rates of between 7 and 23% amongst smokers participating in research studies.[46] Five key RCTs compared smoking outcomes between screened and control arms of LCS studies. The Danish Lung Cancer Screening Trial (DLCST), German LUng Cancer Screening Intervention (LUSI) and Dutch-Belgian NEderlands Leuvens Screening ONderzoek (NELSON) studies reported no difference study arms using intention to treat analyses at follow up points up to five years post screening.[18,47–49] The UK Lung Cancer Screening (UKLS) and Italian Lung Cancer Screening Trial (ITALUNG) studies, however, both reported higher quit rates in the screening arm compared to control group participants up to four years after screening,[50,51] thus the screening process in itself could be considered a 'teachable moment' for smoking cessation, prompting quit attempts in those attending. Comparing data from these trials is difficult, however, since each trial employed a different intensity of smoking cessation provision (for example minimal intervention in UKLS and NELSON compared to personalised counselling in LUSI).

2.2 Scan outcome

Both UKLS and ITALUNG reported that participants who received an abnormal baseline scan result were more likely to quit smoking than those in the control arm, whilst there was no difference between those with a normal scan result and the control group. Normal scans were not associated with increased smoking or relapse in those who had previously quit.[50,51] The DLCST, NLST, UKLS, Early Lung Cancer Action Project (ELCAP), a Mayo Clinic study and Pittsburgh Lung Screening Study (PluSS) all reported higher quit rates following an abnormal scan result or referral to a physician as compared to a normal scan result.[48,50,52–56] Current smokers with an incidental finding participating in the Lung Screen Uptake Trial (LSUT) more frequently reported cutting down on smoking rather than making a quit attempt compared with those who had indeterminate results.[21] Communicating incidental results may therefore be an opportunity to capitalize on the teachable moment offered within LCS, motivating a change than could reduce future health implications resulting from disease progression.

2.3 Attendance at LCS as a motivator for quit attempts

A community-based Lung Health Check (LHC) in Manchester found that 12 months after their baseline scan, 29% of current smokers reported that the LHC had made them try to stop, with a further 44% reporting that they had considered quitting. Of those who had successfully quit between scans, 55% attributed their quit to the LHC.[20] Three quarters of participants in the US ELCAP reported increased motivation for quitting.[57] Kummer et al conducted semi-structured interviews with current and ex-smokers attending for an LDCT lung cancer screening scan as part of the LSUT, with some participants stating that they felt motivated to quit in response to the invitation for a LHC, after receiving an indeterminate scan result or after having a discussion with a clinical staff at the appointment. Some participants who had not quit reported that this was because they had not specifically been told to quit by the clinical team and were not concerned enough by their indeterminate scan result. Low confidence in quitting was reported by some participants, despite high motivation and the LCS process overall was not always a motivator to change their behaviour.[21] Participants in the Quit Smoking Lung Health Intervention Trial (QuLIT) based within a TLHC in London reported that the CT scan was often seen as a powerful tool in changing their mindset regarding smoking, acting as a prompt or wake up call to consider quitting, regardless of scan outcome.[58]

2.4 Combining smoking cessation interventions with LCS

A systematic review synthesizing evidence regarding combining smoking cessation interventions with LDCT lung cancer screening published up until May 2018 identified nine studies meeting inclusion criteria (five RCTs, four observational studies with a control group). The authors reported that most studies were of poor to fair quality and that there was insufficient data to suggest a particular approach to smoking cessation in the LCS setting.[59] Given the lack of setting specific evidence, another systematic review was published in the same year which identified data on effective interventions among populations likely to be eligible for LCS (based on age and smoking history) and identified 85 trials for inclusion. The authors reported that electronic/web-based interventions, in-person counselling and pharmacotherapy interventions significantly increased the odds of abstinence from smoking (telephone counselling increased the chances of successfully achieving abstinence but not significantly so); at 12 months only in-person counselling and pharmacotherapy remained efficacious.[60] Whilst the studies included were not conducted in the LCS setting and there was no specific mention of socio-economic status, the similarities in study population suggest that the findings of this review should be considered for future interventions. Since the above reviews were published, the evidence base in this area has grown, though interventions tested, settings and outcomes measures have lacked consistency.

Between June 2015 and December 2017, 345 smokers participating in the Alberta Lung Cancer Screening Study were randomised to seven sessions of telephone-based smoking cessation counselling intervention, personalised to motivation and addiction level and incorporating the lung cancer screening result (including emphysema) versus usual care (information leaflet). A referral to counselling was made at the time baseline screening results were communicated to participants in order to maximise the impact of scan outcomes. NRT and pharmacologic cessation aids were not provided as part of the study but was available for over-the-counter purchase and covered by most private medical insurance plans. At least one telephone contact was recorded for 73.7% of participants in the intervention arm. Thirty-day self-reported smoking abstinence at 12 months post randomisation was 14% in the intervention group and 12.6% in the usual care group.[61] At 24 months, smoking abstinence increased to 21.4% and 18.3% respectively.[62]

In 2017, three pilot sites in Ontario launched lung cancer screening with opt-out smoking cessation embedded in the pathway. Hospital based cessation support was scheduled during the LDCT appointment, with the intervention comprising a 10-minute behavioural counselling session, recommendation or prescription for pharmacotherapy and arrangements for proactive follow up. 89% of screen-eligible smokers accepted hospital-based cessation counselling, with 93% of survey respondents indicating that they were satisfied with the support they received; indicating that this approach may be positively received by participants in screening programmes.[63]

Attendees at the Manchester Lung Health Check pilot, the first community based LCS in the UK, who smoked were provided with brief smoking cessation advice and signposted to a smoking cessation service. Twelve months after the LHC, 10.2% of participants had stopped smoking for at least 4 weeks; of these 79% reported being quit for over 6 months. [20]

Analysis of data from the NLST retrospectively reviewed delivery of the 5As (Ask, Advise, Assess, Assist and Arrange) by the primary care providers to smokers participating in the NLST and linked this to self-reported cessation outcomes. The authors reported that delivery of 'assist' and 'arrange' follow up delivered by primary care were associated with increased quitting, whereas delivery of the less intensive 'ask', 'advise' and 'assess' were not different between study quitters and continued smokers.[46]

Studies comparing clinician-delivered behavioural counselling alone to usual care have not shown an effect on self-reported quitting,[58] though a study by Taylor et al reported a benefit of multiple sessions of telephone counselling when using biochemical validation of quitting.[65] Studies which combined behavioural counselling from a clinician with pharmacotherapies have shown that such interventions are feasible and efficacious. The Continuous Observation of SMOking Subjects (COSMOS II) trial reported that a sub group of participants who participated in the smoking cessation programme comprising behavioural support with a cognitive-

behavioural psychologist and pharmacotherapy were three times more likely to quit smoking, and 57% of participants reported abstinence for at least 6 months.[66] Analysis of the Early Lung Cancer Detection in High Risk Individuals (MILD) trial reported 48.7%, 33.7% and 19.8% sustained 3-, 6- and 12-month smoking abstinence respectively following a cessation intervention comprising behavioural support plus varenicline.[67] Low intensity internet-based interventions in the NELSON study (computer-tailored smoking cessation information) and from the Mayo Clinic trial (a list of internet resources) have not shown a significant benefit over standard written materials.[68,69]

The COSMOS-II Italian trial was the first to report the effectiveness of using e-cigarettes plus telephone behavioural counselling as part of the cessation package offered to LCS attendees recruited at one study site. No differences in cessation were reported between groups receiving nicotine containing e-cigarettes, non-nicotine containing e-cigarettes and those receiving behavioural telephone counselling only. Participants in the nicotine containing e-cigarette group smoked significantly fewer cigarettes than other groups at 6-month follow up.[70]

In 2015, the National Cancer Institute in the US announced a funding opportunity, SCALE (Smoking Cessation within the Context of Lung Cancer Screening), to support projects testing smoking cessation interventions for patients undergoing LCS to build an evidence base for effective intervention. Six clinical trials were initially funded under the call, plus one additional trial and another funded by the Veterans Health Administration are testing various permutations of intervention strategy and intensity with a core of data collection measures to allow meaningful comparisons.[71] One of the trials has recently reported their initial results, finding that 8 weeks of telephone counselling plus NRT resulted in significantly higher quit rates than 3 x 20 minute telephone sessions plus 2-weeks of NRT (3 month 7-day point prevalent validated quit rates 9.1% vs 3.9%; self-reported quit rates 14.3% vs 7.9% respectively).[72] Once complete, these eight studies will considerably add to the evidence base for effective interventions.

The first research study to provide evidence regarding the integration of smoking cessation support within English TLHC programmes comes from QuLIT.[58] On randomly allocated days, QuLIT offered either immediate access to free pharmacotherapy to support quit attempts plus six sessions of face-to-face one-to-one cessation support; or usual care, which comprised very brief advice. The trial was delivered as part of a TLHC delivered at the Royal Brompton Hospital in London. 65 smokers attended on intervention days and 50 on usual care days, with 48 and 36 smokers providing follow up data and 14 and 4 smokers reporting 7-day point prevalent smoking abstinence respectively at 3-months after the LHC (21.5% and 7.2% respectively, assuming those not contactable were continuing to smoke).[58]

As a result of the Covid-19 pandemic, face to face support delivered as part of the QuLIT-1 trial was suspended and the trial modified to provide six sessions of remote smoking cessation support via telephone, with attempts to deliver the first call on the same day as the TLHC (QuLIT-

2).[73] All other study processes remained the same as in the QuLIT-1 trial. 152 individuals who smoked attended on intervention days and 163 on usual care days, with 112 and 115 smokers respectively providing 3-month follow up data and 32 and 14 smokers reporting 7-day point prevalent smoking abstinence smoking (21.1% and 8.6% respectively, assuming those not contactable were continuing to smoke). Of note, 80 smokers (52.6%) attending on intervention days explicitly declined contact from the smoking cessation specialist and a further 16 dropped out after the initial consultation. The study also found no difference in quit rates between those individuals receiving a CT scan and those who did not, highlighting the importance of offering smoking cessation support to all those participating in the TLHC, not only those at a high enough risk to be eligible for LDCT screening.[73]

The provision of smoking cessation support at the Manchester TLHC site is linked with the Conversation, Understand, Replace, Experts and evidence-based treatments (CURE) project.[74] A tobacco dependency specialist nurse is co-located with the LHC and provides support and direct supply of two weeks of NRT/4 weeks of vaping supplies on an opt-out basis. After the initial consultation, individuals are offered a referral to the local community smoking cessation service to complete a full treatment programme. In the six months between October 2021 and March 2022, 462 smokers attended for a LHC, 436 (94%) completed the CURE intervention on the mobile LHC unit and 193 (44%) accepted referral to the community smoking cessation service. 177 engaged with the smoking cessation service, representing 92% of all referrals and 38% of all smokers attending for a LHC (M. Evison, personal communication, 8 May 2022).

The Yorkshire Enhanced Stop Smoking study (YESS) is testing the uptake and effectiveness of a co-located, opt out smoking cessation delivery model offered to all smokers attending for a LHC[75] as part of the Yorkshire Lung Screening Trial (YLST)[76] between December 2018 and December 2020. Smoking cessation support was offered in line with National Institute for Health and Care Excellence (NICE) PH48 guidance comprising one session of behavioural support at the time of the LHC and provision of pharmacotherapy. Pharmacotherapy was either nicotine replacement therapy through delegated prescribing at the visit and/or a commercially available e-cigarette and vaping supplies, or an arranged GP prescription for varenicline or bupropion). Follow-up contact was provided either face-to-face or by telephone. It was typically provided weekly, but the frequency could be varied according to participant preference. Contact was provided for up to 4 weeks from the date of the LHC with replenishment of quit aids on a bi-weekly basis for any individuals engaging with a quit attempt. Recruitment to the study paused for three months during the Covid-19 pandemic, though ongoing support to patients continued via telephone with quit aids sent via post. Following resumption of the study, the baseline visit returned to a face-to-face counselling session, but all subsequent interactions were via telephone and quit aids continued to be dispensed by post. The Covid-19 pandemic necessitated a change in delivery model to telephone only support for all visits after the initial consultation as

opposed to face-to-face. However, both smoking cessation practitioners and participants reported still building a strong rapport through regular phone calls and did not feel this had a negative impact on their experience.

The study found that of 2150 eligible smokers attending for lung cancer screening, 89% of smokers agreed to a consultation with the smoking cessation practitioner at the time of the screening appointment. Of these, 84.5% agreed to ongoing cessation support and 20.1% of these were self-reported quit at 4 weeks (16.5% validated) (15% self-reported;12.4% validated of all eligible smokers).

The YESS study also tested the efficacy of adding a personalized intervention comprising the use of heart and lung images captured during the LDCT scan, highlighting areas of coronary artery calcification and emphysema, as part of the smoking cessation intervention delivered at the 4-week follow up, in a randomized controlled trial. Of 1003 participants, 7-day validated point prevalent quit rates at 3-months were 33.6% in the intervention group, 30.0% in the ongoing standard smoking cessation support delivered by the dedicated team of SCPs. There was no significant difference between study arms, but the personalised intervention resulted in significantly higher quit rates in females as compared to standard treatment. 7-day validated point prevalent quit rates at 12-months were 29.2% and 28.6% respectively.[77]

The YESS model is continuing into the second round of LCS as part of YLST and is offering smoking cessation support to individuals who were unsuccessful in their quit attempt, who declined to accept smoking cessation support or did not attend for the baseline screening round. Whilst still ongoing, the sustained offer of smoking cessation support is again being well received, with the majority of smokers who declined a consultation in the baseline round now agreeing to see a smoking cessation practitioner. Many smokers declining support or making an unsuccessful quit attempt report that it was just 'not the right time for them', despite being motivated to try and stop smoking.

2.5 Attitudes towards smoking cessation within LCS

There is a body of published research which suggests that individuals eligible for LCS believe the offer of smoking cessation support is acceptable as part of the screening process.[78,79]

In a survey of 459 current smokers and recent quitters aged 50-75 who indicated that they would attend lung screening if invited, the most selected preference (37.7%) was to receive lifestyle advice (including smoking, alcohol consumption, weight, diet and physical activity) at the time of the screening appointment, and 30.5% at the time of the screening results. Only 14.6% of respondents suggested that they would prefer to receive lifestyle advice at a later date.

Interest was highest for smoking cessation at 41% (increasing to 51% of current smokers).[80] More recently, in a qualitative study of 31 participants who would be eligible for LCS, the integration of smoking cessation into LCS in the UK was viewed positively, with participants reporting it necessary and expected.[81] A key factor reported as likely to encourage uptake was the availability of a non-judgmental and accessible service, along with provision of personalised information regarding the impact of smoking on their health.

An embedded process evaluation undertaken as part of the YESS trial has shown that individuals attending for LHC expected to discuss smoking and it did not surprise them; some even indicated that they had attended the LHC in the hope of receiving support to stop smoking. They found the offer of smoking cessation support acceptable, largely due to the lack of stigma, the non-judgemental style of discussion and positive support they received from smoking cessation practitioners at the time of the LHC. The co-location of the smoking cessation service alongside the LHC reduced burden on the participants as they were provided with behavioural and pharmacological support straight away, not referred on to someone else or another service where there may be a delay in receiving support. Those that did not want to take up smoking cessation support at the time of the LHC did so because it was not the right time for them, not because they felt it was unacceptable to offer smoking cessation in a LHC context.

3. Current smoking cessation provision on TLHC programme

3.1 Formal national evaluation

NHSE is conducting a national evaluation of the TLHC programme to understand the impacts and economics of the programme and has collected data from existing TLHC sites during the two years from December 2019 to December 2021. TLHC are requested to provide the following information relating to smoking cessation:

- Number of patients who were offered the option of a smoking cessation course*
- Number of patients who accepted an offer of a smoking cessation course
- Number of patients who completed a smoking cessation course

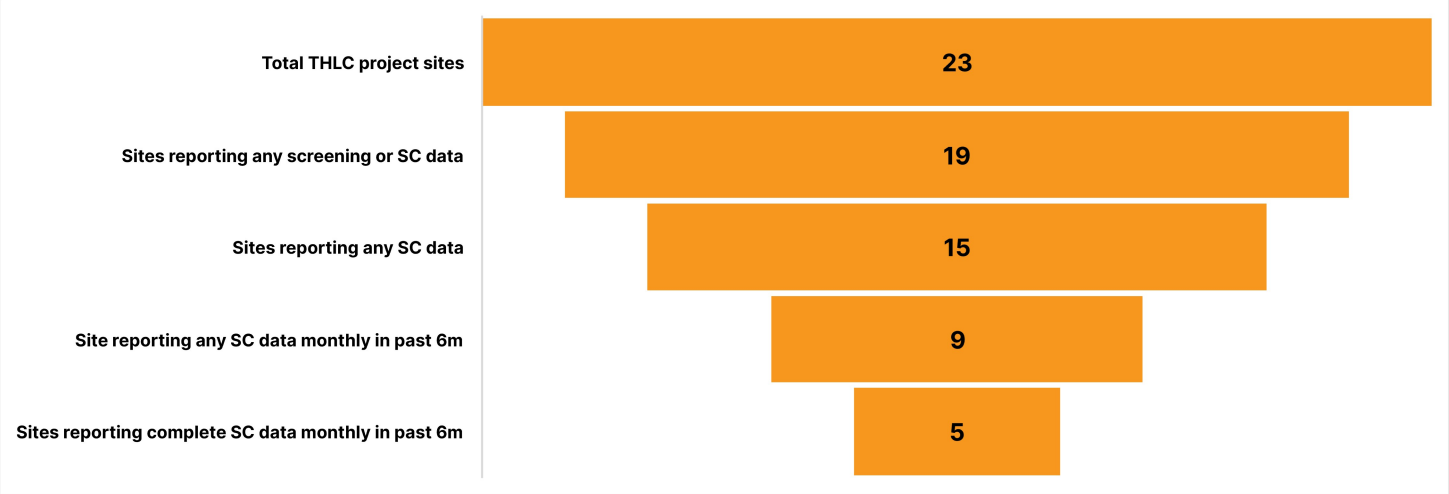
An evaluation progress report of the TLHC programme from December 2021 included interview data from programme stakeholders and participants and survey data from participants and non-attendees provides information on progress of the TLHC to August 2021.[82] Seven percent of attendees at a LHC reported attending the appointment because they thought it might help them to reduce or stop smoking, increasing to 31% in those who had smoked within the previous week. Only around half of current smokers (54%) reported receiving advice on quitting or reducing smoking (usually taking the form of very brief advice, with or without referral to support services), with 82% reporting that they found this advice helpful. Qualitative feedback was mixed, with some respondents reporting feelings of surprise and disappointment and not receiving any advice around smoking cessation. A number of participants who did receive advice reported negative experiences such as lack of eligibility to attend, or lack of follow up following referral to community services and feelings of disappointment resulting from this lack of support. Others reported feeling encouraged to try and stop smoking as a result of the advice provided at their LHC, though some did not intend to change their behaviour as they did not see the value in doing so.

* Standard 10 in the Quality Assurance Standards for the TLHC programme states that "smoking cessation support should be offered to all participants at their lung health check, including those who are ineligible for LDCT. Where possible this should be provided in the immediate lung health check setting and include offer of pharmacotherapy."

3.2. Analysis of routine performance data

Project sites have reported varying degrees of information on smoking cessation data (Figure 1). 5 of 23 sites consistently reported all three smoking cessation indicators for the six months between July and December 2021.

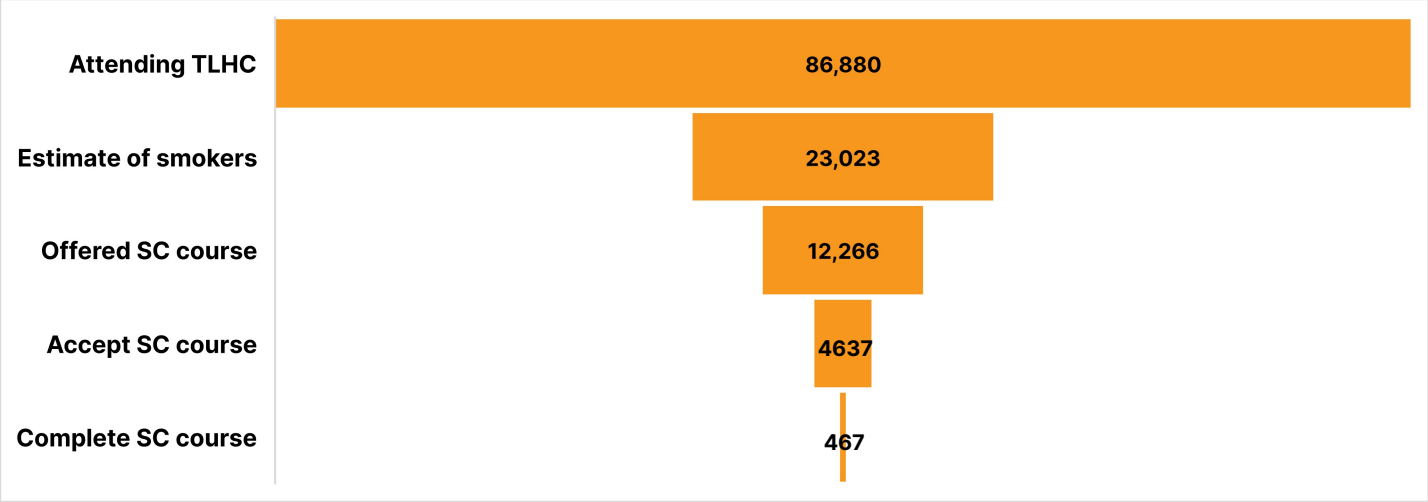
Figure 1: National site reporting of TLHC performance data, December 2021



As of December 2021, a total of 12,266 participants had been offered a smoking cessation course, of which 4,367 accepted the offer (36%). It should be noted that despite the guidance regarding smoking cessation, delivery remains at the discretion of individual sites and varied from zero provision to an initial onsite appointment with provision of stop smoking aids followed by referral to community services. Of those offered support, 467 participants completed the course (11%) (Figure 2). For context, 44% of smokers at the Manchester TLHC, linked to the CURE project accepted a referral to a community smoking cessation service, with 37% engaging with the service. For those on the YESS trial, 89% of smokers agreed to a smoking cessation consultation, of which 84.5% agreed to ongoing cessation support and 20.1% of these were self-reported quit at 4 weeks (16.5% validated) (15% self-reported;12.4% validated of all eligible smokers attending for a LHC).

The numbers of those offered a smoking cessation course rose over the course of 2021. The proportion of those completing the course remained low, although this is likely affected by the time lag from accepting a smoking cessation course to completing the course, and by the incomplete data reporting highlighted in Figure 2. The estimate of the number of smokers participating in the THLC is based on responses from project site leads to the survey (see section 3.3). However, many site leads expressed uncertainty in their estimate and this figure should be interpreted with caution.

Figure 2: National invite to, acceptance of and completion of smoking cessation course on TLHC, December 2019 – December 2021



3.3. Survey of project leads for TLHC

In March 2022, a separate survey on smoking cessation was sent to all TLHC project leads by the authors of this report, specifically asking about smoking cessation provision within their site. The findings are reported below.

Responses

Responses were received from 16 of the 23 total project sites. One respondent submitted a response on behalf of two sites simultaneously and one respondent submitted a response on behalf of three sites simultaneously. There was no discernible pattern amongst sites that did not respond.

Project lead reporting of smoking cessation model

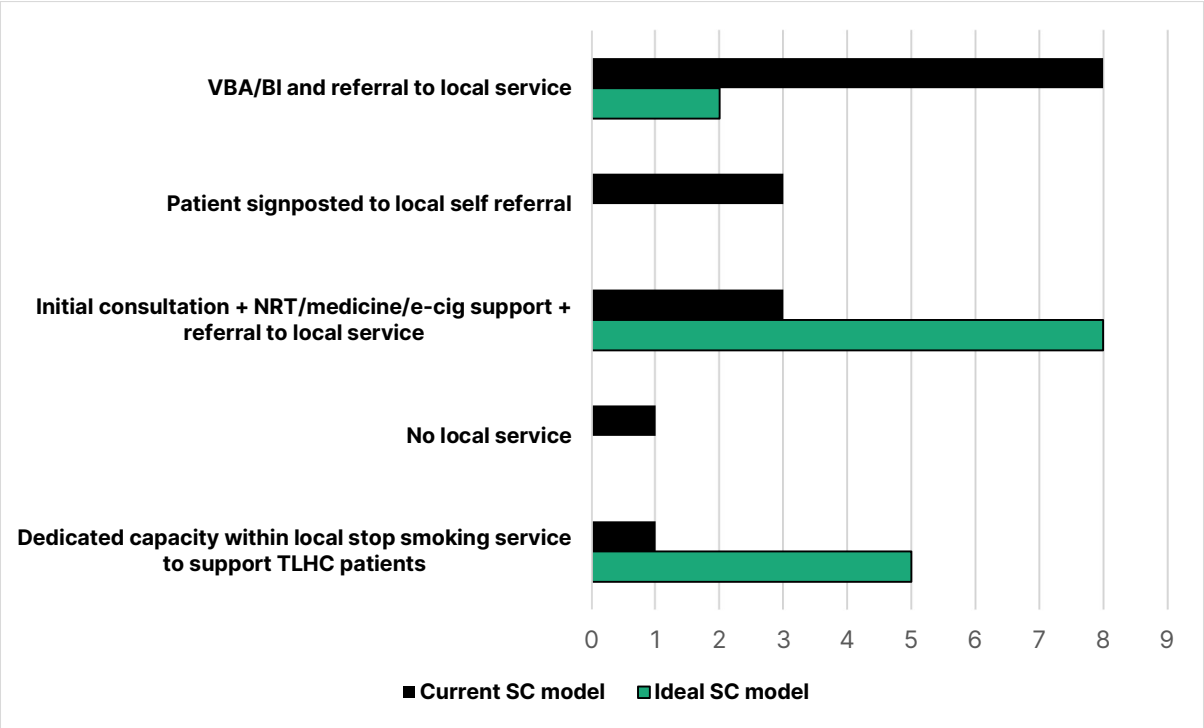
All 16 sites provided responses on their current operating model for smoking cessation and their ideal model for smoking cessation support (Figure 3). The most common existing model was a referral to a local service, either following an initial consultation and provision of quit aids (n=3) or brief intervention alone (n=8). One site had dedicated capacity within their local smoking cessation service to support TLHC patients, three sites simply signposted participants to local services, and one site had no local service to refer to.

Three sites did not feel that they were fully able to meet the THLC specification requirement to offer smoking cessation, with a further three sites reporting that they were partially meeting the specification. Nine of 16 sites reported they did not feel that they were effectively meeting the needs of participants who smoke, with factors such as no local service to refer to, a lack of

dedicated funding and insufficient staffing capacity cited as reasons. Further, seven sites reported that they did not feel their current model was sustainable in its current format.

When asked how they would like to be able to provide smoking cessation support if given the choice and opportunity, most indicated that they would like to offer an initial cessation consultation with provision of quit aids followed by referral to a local service (n = 8) or dedicated capacity in the service to offer full smoking cessation support (n=5).

Figure 3: Current and ideal smoking cessation models for THLC sites



4. Reflections on the integration of smoking cessation support

4.1 TLHC project leads

Project leads of TLHC programmes gave qualitative assessments on providing and evaluating smoking cessation support for those attending TLHCs. Several respondents flagged issues with data collection and reporting, including strong difficulties tracking patients all the way through to quits in external services for reasons including the use of different data collection software, multiple local smoking cessation providers for a TLHC site and differential provision of follow up data by smoking cessation providers. This may provide a partial explanation for the current low smoking cessation course uptake reported for THLC.

Those sites running in areas with operational smoking cessation provision for all NHS in-patients can offer initial consultation with quit aids through this provision. Some of these sites intend secure permission to also offer e-cigarettes as a quit aid. However, some of these sites faced issues where smoking cessation professionals faced long waits with no patients to see, particularly in areas with lower smoking rates, leaving smoking cessation professionals feeling under-utilised.

The degree to which patients are offered brief advice as well as a referral to a smoking cessation service varies, with some offering very brief advice and others offering longer consultations before onward referral. Some sites reported that their staff were not used to talking about smoking cessation. Having the ability to offer a choice of face-to-face or remote appointments was reported as a strength.

Reliance on self-referral was reported as inappropriate for a population group facing inequalities for whom making quit attempts is particularly difficult and for whom accessing services may not be straightforward.

Project leads made the following requests for national support:

- Dedicated funding for smoking cessation delivery as part of TLHC delivery
- Supporting data collection processes, and being understanding that local data collection processes will take some time to finalise
- Training for LHC nurses and others involved in supporting smoking cessation

4.2 Evidence from research studies

Reflections from the team running the YESS study revealed several considerations that may be useful to inform future decisions regarding the implementation of smoking cessation provision with SCS, alongside quantitative data on efficacy and effectiveness. Having a team of smoking cessation practitioners who are experienced in engaging with the high-risk group that are eligible for LCS was viewed as valuable. This population are often highly dependent with long and complex smoking histories and require specialist support, in much the same way that specialist advisors support pregnant women that smoke. Second, placing the smoking cessation as part of the LHC, both in terms of the staffing team and physical location was viewed as being important for maximising uptake of support offered as attendees considered the smoking cessation support as an integrated part of the LHC.

The co-location of the service was also convenient, since people accepting smoking cessation support did not need to make an additional trip to another location at another time, and the provision was made even more convenient by the direct supply of NRT/e-cigarettes at the time of the LHC and repeated provision of quitting aids for engaged individuals via post. The provision of e-cigarettes was valued; many of those trying to quit had preciously tried using NRT but not an e-cigarette and thus having something new to offer helped smoking cessation practitioners to engage with more reticent participants. The benefit of using personalised heart and lung images is still unclear, though there appears to be a positive effect in females that requires further investigation. However, the intervention has been positively received and has been a motivator in quit attempts, either supporting quitting or preventing relapse in individuals who had quit before receiving the intervention.[77]

Similar reflections have been presented by the Manchester LHC site. The team reported that having specialist nurses on site to offer support and provide NRT/e-cigarettes on an opt-out basis was a strength of their service model and was a key factor in the high uptake rates. A continuity in the supply of e-cigarettes and liquids on the mobile LHC unit and in the community smoking cessation service was also viewed as a strength, providing a seamless transition between services. It was felt that the onward referral to the local smoking cessation service was a hindering factor (despite the community service being highly effective) and being able to offer follow up either on the mobile LHC unit or a virtual follow up service with delivery of NRT/e-cigarettes would increase engagement in follow up after the LHC.

5. Cost-effectiveness data for smoking cessation programmes linked to lung cancer screening

5.1 Existing modelling studies

Several studies have taken a simulation modelling approach to estimate the cost-effectiveness of smoking cessation services linked to lung cancer screening. Although the studies vary in their assumptions, populations, payer perspectives and specific smoking interventions, they all find that smoking cessation services linked with lung screening programmes are extremely likely to be cost-effective at their respective willingness-to-pay thresholds. Many of the studies found the cost per QALY of screening programmes was at least halved by adding a smoking cessation component (Table 2).

Table 2: Summary of research modelling cost-effectiveness of smoking cessation intervention as addition to lung cancer screening (base case estimates unless otherwise stated)												
ID	**Year**	**Country**	**Lead author**	**Screening population**	**Screening type**	**Smoking cessation intervention**	**Comparator**	**Perspective**	**Discount**	**Sensitivity analyses**	**Cost per QALY estimate**	**Comments**
1	**2022**	**US**	Cao[83]	50-80 with 20+ pack year smoking history	Repeat annual screening	Screening + 3 / 8 weeks telephone counselling plus nicotine replacement therapy	Screening w/o cessation support	6 month / lifetime societal	3%	2-way sensitivity analyses	4029 (2021 USD) (8-weeks telephone counselling compared to 3 weeks); dominated screening alone	Screening alone cost more and saved fewer QALYs than either telephone counselling strategy. Both counselling strategies are considered cost effective in the lung screening setting
2	**2021**	**US**	Cadham[84]	55-80 with 30 pack-year smoking history	Repeat annual screening	Various types of intervention modelled	Screening w/o cessation support	Lifetime societal	3%	1-and 2-way sensitivity analyses	555-5258 (2019 USD)	All smoking cessation interventions delivered with LCS likely to provide benefits at reasonable cost
3	**2020**	**Canada**	Evans[85]	55-74 with 30-pack year smoking history	Repeat annual screening	Screening + NRT, varenicline + individ. counselling offered up to 10x	Screening w/o cessation support	Lifetime public healthcare system	1.5%	Probabilistic sensitive analyses	22,000 (2019 CND)	Recommend offering an intervention at each screen. Results are most sensitive to changes in quit rates. Probabilistic screening analysis found intervention was cost-effective 80% of the time if the cost-effectiveness threshold was $50 000 per QALY gained.
4	**2018**	**Canada**	Gauvrea[86]	55-74 with 30-pack year smoking history	Unclear	Unclear	Screening w/o cessation support	Lifetime public healthcare system	1.5%	1-way sensitivity analyses	14,000 (CND, year unclear)	Meeting abstract
5	**2016**	**Canada**	Goffin[87]	55-74 with 30-pack year smoking history	Repeat biennial screening	Screening + single intervention + pharmacotherapy	Screening w/o cessation support	10/20 years /lifetime, public healthcare system	3%	2-way sensitivity analyses	14,000 (screening + SC) compared to 31,000 (screening alone) (2008 CND)[a]	Varying the cost of the smoking cessation programme did not have a significant impact on the cost per QALY
6	**2015**	**Canada**	Goffin[88]	55-74 with 30-pack year smoking history	Repeat annual screening	Screening alone, screening + cessation intervention	No screening	Lifetime public healthcare system	3%	1-way sensitivity analyses	24,000 compared to 52,000 without the programme (2009 CND)	Halving of the cost per QALY compared to screening alone

[a] *no single most likely estimate available – estimate taken from biennial optimistic scenario

Table 2: Summary of research modelling cost-effectiveness of smoking cessation intervention as addition to lung cancer screening (base case estimates unless otherwise stated)												
ID	**Year**	**Country**	**Lead author**	**Screening population**	**Screening type**	**Smoking cessation intervention**	**Comparator**	**Perspective**	**Discount**	**Sensitivity analyses**	**Cost per QALY estimate**	**Comments**
7	**2013**	**US**	Villlanti[89]	50-64 with 30-pack year smoking history	Repeat annual screening	Screening and 'light' cessation intervention	Screening w/o cessation support	15 year commercial payer	3%	2-way sensitivity analyses	16,198 to 23,185 (2012 USD)	
8	**2011**	**US**	McMahon[90]	50-74 with 30-pack year smoking history	Repeat annual screening	Screening + bupropion and/or NRT offered annually	Screening w/o cessation support	Lifetime societal	3%	2-way sensitivity analyses	12,500 to 69,400 additional benefits compared to screening alone (2006 USD)	Finds that cost-effectiveness of screening is likely strongly linked to achievable smoking cessation rates.

In addition to published cost-effectiveness studies, some early cost data is available for the YESS study.[77] The overall intervention cost was estimated at £175.10 (SD £77.50) per participant in the intervention group and £124 (SD £76.80) in the control group. The quit rates were 33.6% (n = 177) and 30% (n = 143) respectively. The cost per quitter at three months was £521.30 in the intervention group and £412.80 for the control group.

Many of the studies found that increased frequency of smoking cessation intervention offer (e.g. at each screening, rather than at the first screen alone), the greater the cost-effectiveness of intervention.

The most recent modelling study, published in 2021, modelled the cost-effectiveness of several different smoking cessation interventions, rather than a single intervention, and researchers were able to draw on most recent data on costs and benefits of screening and cessation provision. Cessation interventions remained cost-effective even at the lowest rate of assumed effectiveness, and base case scenarios ranged from an additional 555 USD per QALY for screening + electronic support + pharmacotherapy to 5258 USD for screening + individual counselling + pharmacotherapy. This is extremely cost effective when compared to the commonly used willingness-to-pay threshold of £20,000-£30,000 in the UK.[91] The analysis also only considered lung cancer, not prevention of other diseases, which is likely to underestimate cost-effectiveness.

The costs of providing a cessation intervention to those eligible were largely offset by reducing the costs of screening (because some of those who quit smoking were no longer eligible for future screening) and lower cancer treatment costs for fewer lung cancer treatments.

The cost-effectiveness literature does not present strong evidence that a particular smoking cessation intervention is particularly cost-effective compared to another. Maximising quit rates are important as changes in quit rates can substantially change the cost-effectiveness of a programme.[74] However, the cost of the smoking cessation programme was not found to significantly affect the total cost-effectiveness of the intervention.[76]

5.2 Modelling the likely impact of offering smoking cessation support as part of lung cancer screening

Researchers at UCL modelled the likely impact of offering smoking cessation support as part of lung cancer screening to the roughly 1.1 million eligible smokers with at least 30 pack years aged 55-74 in England. The estimates were based on several assumptions with data used from the Office for National Statistics, Cochrane reviews, the current report and the Smoking Toolkit Study (a population level survey of adults aged 16+). Full details can be found here **https://osf.io/6hkpv/.**

It was estimated that offering cessation support alongside lung cancer screening to smokers meeting risk criteria would result in an additional ~30k long term abstinent smokers aged 55 to 74. This would reduce smoking prevalence to 10.6% from 10.8% in this age group. This is a 0.24 percentage point reduction (or 2.23% relative reduction) in smoking prevalence. If the anticipated uptake of screening were higher (modelled as 51% responding to the invite and 87% of these attending screening) this would lead to a substantially greater number of abstinent smokers.

5.3 The cost of rolling out integrated smoking cessation with a national screening programme.

Combining the cost per participant in the YESS usual care group and the modelling work detailed in section 5.1 above, it is possible to estimate a cost to incorporate gold standard stop smoking support within a national screening programme. Offering 1-1 behavioural support plus medications/e-cigarettes to those engaging in a quit attempt for up to 12 weeks cost an estimated £124 per participant. On the basis that an estimated 519,491 smokers attend screening and 457,152 take up support offered this would result in an estimated cost of £56.7million in the first year of rollout.

6. Discussion and recommendations

There is little doubt that the TLHC programme, and the potential introduction of a national LCS screening programme, heralds an unprecedented opportunity to provide effective stop smoking support to a population at high risk of smoking related morbidity and mortality. Available cost-effectiveness data indicates that adding any kind of smoking cessation intervention to LCS is likely to be cost effective, even with the most intensive interventions. The findings of the Khan Review[92] have also reinforced the need for reinvestment into stop smoking provision and so the timing is prime for a bold move to support quitting in the lung screen eligible population. In addition to published research, experience gained from the NHS TLHC pilots also provide essential real-life experience that should be considered to inform the design of any future intervention.

It is possible that attendees at LHCs are subject to a healthy adherer bias, whereby those attending for screening are more motivated and likely to quit smoking,[93] and indeed this may be suggested in the results of many of the research studies reported where no or minimal smoking cessation intervention is provided. It is proven that quit attempts are more likely to be successful if made with evidence-based support,[37] making it even more important to offer of an effective intervention to capitalise on the 'teachable moment' that has promoted an individual with a smoking history that spans decades to make a quit attempt and so it is not sufficient to rely on this healthy adherer bias to achieve optimal quit rates.

There is no definitive answer as to the most effective way to provide stop smoking support specifically in LCS settings. However, drawing on the research that has been described previously and other literature in the smoking cessation field can shed light on models of provision that should be considered. Overall, smokers who use smoking cessation services (behavioural support plus pharmacotherapy) to support a quit attempt are three times more likely to successfully quit than those who use no support.[37] In LHC/LCS research studies, a benefit has been shown of offering a more intensive (for example akin to smoking cessation services) versus less intensive stop smoking intervention (for example self-help materials, very brief advice, internet resources and referral to support), reinforcing the need to use evidence-based support and the additional benefit that can be gained through additional investment in provision.

Ensuring consistency between localities is, and will remain, a key challenge when implementing stop smoking support within TLHCs, particularly where there is no specification for provision and/or dedicated funding. Disparities are already clear when examining provision within existing TLHC sites, with at least one site reporting that they have no community SSS to refer to. Nationally, only three quarters of local councils were able to provide some form of dedicated smoking cessation service in 2021[40] and so the current position is likely to worsen if a national

screening programme is rolled out. In areas that there is a community smoking cessation service, lengthy waiting times have been reported for appointments which will fail to capitalise on the 'teachable moment'. There is thus a potential that the national screening programme could actually widen health inequalities if smoking cessation is not meaningfully considered and embedded.

Research has showed that a dedicated stop smoking service, co-located within the mobile LHC and presented as an 'opt-out' model is effective and ensures immediate, convenient and accessible intervention.[74,94] The importance of having an on-site SCP is further inferred from the QuLIT 2 trial, where over half of eligible smokers declined contact from a SCP when the offer comprised a telephone call to be delivered after the LHC (as necessitated by protocol changes due to the Covid-19 pandemic).[73] Despite this high decline rate, however, 7-day point prevalent quit rates were similar between the QuLIT-1 and QuLIT-2 trials, suggesting that remote provision of support may still effectively capture those people who are likely to make a successful quit attempt.[58,73] Though the initial consultation was delivered face to face at the time of the LHC the YESS study also used telephone support, following an initial face to face consultation, as a result of protocol changes necessitated by the Covid-19 pandemic. Unpublished data illustrates that there was no negative impact of delivering cessation support by telephone, and this could thus prove to be an effective model for consideration alongside a national screening programme.

The efficacy of opt-out delivery of smoking cessation support has been shown in secondary care and pregnancy settings[95,96] and it is therefore not surprising that similar results have been demonstrated in the LHC environment. The opt-out model helps to embed the smoking cessation service into the LHC, presenting as a comprehensive package to those attending for screening and the effectiveness of the model meant that downtime was minimised. Further, having the team carry their own caseload of patients in the YESS study meant they were able to manage their time and utilise quieter times on the mobile unit to conduct telephone support for existing patients. There was, therefore, little time not effectively used by the SCP team in the case of non-attendance or refusal to meet with the SCP. Consideration would need to be given to efficient use of resource in areas with low smoking prevalence, though the impact of this could be minimised through modelling and partnership working with community or hospital-based services. Though the immediate provision of stop smoking support is important, and the evidence suggests that a proportion of smokers attending for a LHC do so in the hope they will be offered support to quit smoking, there will also be a proportion of smokers who will not be ready to make a quit attempt, for a variety of reasons. It is therefore important to consider whether provision can and should be made to contact those who decline stop smoking support at the time of their LHC and offer them support at a point in the future. The YESS model previously described has been embedded within the second round of screening as part of the Yorkshire Lung Screening Trial and individuals who declined support at the time of their initial

appointment are accepting support at this later visit, providing an insight into the need for repeated offers of proactive support to this population.

Upon exploring current stop smoking support being provided as part of the TLHC, current site leads reported that whilst community services are highly effective, referring patients on to these services for follow up support is a hinderance (as also demonstrated via the low uptake of community referral in the Manchester LHC programme), and instead suggested that offering a virtual or mobile unit based follow up service would increase engagement. Indeed, this was illustrated in the Manchester LHC with a minority of those accepting stop smoking support at the mobile site accepting and attending ongoing community-based intervention. This would fit with the evidence provided above around the potential for a telephone or virtual service to be considered as part of LCS programmes.

In models where an initial consultation happens at the time of the LHC with onward referral to community SSSs, investigation is needed into how to reduce the drop off seen between the initial consultation and subsequent attendance at local services. The Manchester TLHC site, likely the most established and effective real-world model currently in operation, reports that over half of those accepting an initial consultation failed to accept the ongoing referral to community SSSs and only 38% engaged with the service. This compares to three quarters agreeing to ongoing support when delivered as part of a continuous service offered in the YESS study. This decline in participation has also been seen with referral to community SSSs following an opt-out hospital inpatient service[96] and so the finding is not unique to TLHC settings. To date, there have been few solutions identified to address these challenges.

When considering the content of an intervention, the availability of e-cigarettes may be important for this population to support attempts to quit smoking, though evidence as to their efficacy in this setting is mixed. The COSMOS-II study was the first to offer e-cigarettes in combination with behavioural support but found no difference in quit rates between those using nicotine containing e-cigarettes, non-nicotine containing e-cigarettes or behavioural support only.[66] The QuLIT-1 and QuLIT-2 trials did not offer e-cigarettes as part of their intervention but did report use, in 4% and 14% of trial participants respectively.[58,73] The YESS trial offered e-cigarettes, with over 50% of participants accepting an e-cigarette (either alone or in combination with NRT), a slightly lower proportion than those accepting NRT but qualitative evaluation suggested that having 'something new to offer' in an e-cigarette to a population who had often unsuccessfully tried or used NRT was valuable.[94] Being provided free of charge also eliminated the barrier of a relatively high start-up cost of purchasing an e-cigarette, to a predominantly socio-economically deprived population, and thus the e-cigarette was a valuable addition to the intervention package. The Manchester THLC site also offer e-cigarettes to attendees, with the community SSS now providing the same e-cigarettes and liquids to ensure a seamless transition

for those accepting the onward referral. Further evidence is needed as to the effectiveness of e-cigarettes as a quit aid in this population but given NICE now recommends nicotine-containing e-cigarettes[45] and the Khan Review has recommended that e-cigarettes are offered as a tool to help quit tobacco use[92], consideration must be given to including provision of e-cigarettes in any stop smoking support provision within LHCs.

A further consideration which has received attention is the use of incidental findings captured during the LCS and how these can be integrated into the offer of support to stop smoking. The use of disease-specific health risks to support smoking cessation has been reported by Gilbert and colleagues who conducted a randomised controlled trial compared an individually tailored risk letter with an invitation to attend an introductory smoking cessation session to a standard generic letter advertising smoking cessation services. The personalised information was presented as a "Personal Health Risk Report" and included information on the participant's general health plus disease-specific health risks with the aim of making the individual aware of the personal health consequences of continuing to smoke, and their own individual risk of serious illness. The group receiving personalised risk information had significantly higher attendance at stop smoking service, higher completion of a 6-week NHS course and higher 6-month validated abstinence.[97] There is, therefore, potential to use data collected as part of the LHC to motivate and support attempts to quit. In particular, the prevalence of undiagnosed emphysema and coronary artery calcification may be expected to be high in the population of smokers undergoing LDCT scans, with individuals often asymptomatic and unaware of their status. Only one study to date has investigated the utilization of such images[75] and whilst the researchers reported a significant increase in quit rates amongst female participants, there was no overall population effect.[77] Until the evidence base grows, therefore, it is difficult to make recommendation as to the potential for, or appropriateness of, such an intervention to be integrated into LCS programmes.

Whilst the content and delivery mechanisms for stop smoking support within LCS can be informed by existing evidence, equally important is how interventions will be funded. There are multiple options for the funding of smoking cessation services associated with TLHCs in England. Although the bulk of current smoking cessation services are funded from local authority public health budgets, smoking cessation services for those in hospital, expectant mothers and partners, and for long term users of specialist mental health services will be funded by the NHS through the Long Term Plan and thus there is a precedent for NHS funding of SSS delivery in place of local authority. However, funding is allocated, there are several key principles to consider when devising funding arrangements to ensure a well-resourced and equitable provision.

The funding should be sufficient to provide high quality, effective and evidence-based support to all smokers attending for screening and should follow the delivery of stop smoking support regardless of the model of service delivery adopted, be that as a dedicated and integrated service as part of the LHC or delivered through community services. It would be unrealistic to expect existing community SSSs, funded by stretched public health departments, to develop and evaluate the services and pathways required to offer optimal smoking cessation support to those attending LHCs. In considering sufficient infrastructure, funding should include costs for recruiting and training smoking cessation practitioners. Following cuts to public health budgets in England, there is not a readily available pool of smoking cessation practitioners to draw upon. Responsibility for service and pathway development should be identified and appropriately funded. In a best-case scenario, the NHS and local smoking cessation services would play fully funded roles in planning, delivering, and evaluating smoking cessation support for LHCs. As recommended by both the independent Khan review[92] and the All-Party Parliamentary Group for Smoking and Health,[98] this could be financed by a polluter pays industry levy if this funding mechanism is implemented.

Whilst investment in stop smoking support is an essential component of LHC programmes, quality standards and monitoring will be essential to ensure that money is being spent effectively and providing return on investment. In order to ensure both effective and equitable provision, every person that smokes who attends for a LHC should be offered intervention in line with current NICE guidance,[45] though as previously discussed this can only be achieved if sufficient funding is made available to all programmes. Consideration is needed as to what would be an acceptable uptake and quit rate, and this would vary according to the model implemented. Arguably most important is the uptake of support in order to give all attendees effective support to quit. Evidence has shown that the offer of stop smoking support embedded within and delivered at the time of the LHC can achieve acceptance rates of 88-94%[63,94] (M. Evison personal communication, 8 May 2022) and so it would not be unreasonable to expect uptake rates of above at least 80% as a conservative approach if such a model were employed. Lower figures have been reported where this immediacy of support was not available, therefore minimum expectations for uptake of support should be adjusted accordingly if an alternative model is implemented. Quit rates will be an important measure of effectiveness, though subject to variation and influence from a number of factors. Quit rates are likely to be higher in more affluent areas than those which are more disadvantaged and are also subject to a number of individual and demographic characteristics and so variation is likely as the TLHC expands to more affluent areas, or as a national lung cancer screening programme is introduced. In this eventuality liaison with local SSSs to calculate target quit rates, accounting for geographic and local demographic factors, may be appropriate.

Conclusion

There is little doubt that the TLHC programme, and the potential introduction of a national LCS screening programme, heralds an unprecedented opportunity to provide effective stop smoking support to a population at high risk of smoking related morbidity and mortality. Available cost-effectiveness data indicates that adding any kind of smoking cessation intervention to LCS is likely to be cost effective, even with the most intensive interventions. Experience from the TLHC programme has indicated that a lack of specified approach or dedicated funding has resulted in geographical disparities in availability and a relatively low uptake of smoking cessation support. In contrast, co-location and integration of smoking cessation services within the LCS setting has demonstrated high uptake, acceptability and long term quit rates for relatively little additional investment. The potential benefits that can be gained through effective smoking cessation intervention in LCS settings extend well beyond lung cancer, with potential to narrow health inequalities if optimally delivered.

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