

**Patients' and healthcare professionals' views on a pre- and post-operative rehabilitation programme (SOLACE) for lung cancer: A qualitative study.**

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**Abstract**

**Aims and objectives:**

To explore patients' and healthcare professionals' views and experiences of a pre- and post-operative rehabilitation intervention (SOLACE) for patients undergoing surgery for early stage lung cancer.

**Background:**

Considerable post-operative complications can occur after surgery. A specialist lung cancer service (SOLACE) was developed to optimise health and fitness levels prior to and following lung cancer resections, as well as reducing morbidity and mortality, and improving the physical and psychological wellbeing of patients.

**Design:**

The design was an exploratory, descriptive qualitative interview study.

**Methods:**

Seventeen lung cancer patients and eight healthcare professionals were recruited from a large teaching hospital in South England. Data was collected through semi-structured telephone and face to face interviews. Transcribed interview data was analysed thematically. The COREQ checklist was used to report on the study process.

**Results:**

The SOLACE service was positively perceived by patients and healthcare professionals. Patients valued the provision of tailored support/advice and peer support and reported benefits to their

health and wellbeing. Barriers to patient uptake of the classes included time constraints, motivation and access for patients who lived at a distance.

**Conclusions:**

There is benefit in providing a personalised approach through a pre and post-operative rehabilitation service for lung cancer patients. Virtual support may address equality of access to service for those who live at a distance from the hospital.

**Relevance to clinical practice:**

Introduction of a pre and post-operative rehabilitation service provided by specialist peri-operative rehabilitation nurses and practitioners can yield positive outcomes for patients undergoing surgical treatment of early stage lung cancer. Engagement of key healthcare professionals, consideration of virtual follow up services and making patients aware of services could maximise patient uptake. Further consideration is needed of the best way to promote patient self-management and long-term continuation of patient rehabilitation in the community.

**Keywords:** lung cancer, pre-habilitation, rehabilitation, patient experience, surgery, qualitative

## **Introduction**

Worldwide, the prevalence of cancer is increasing, with an estimated 19.3 million new cancer cases diagnosed in 2020 (Sung et al., 2021). Advances in cancer treatments and a greater focus on earlier detection and diagnosis means that people are living for longer after their diagnosis (McCorkle et al., 2011). In the United Kingdom (UK), it is estimated that the number of people living with cancer is set to increase to 5.3 million by 2040 (Macmillan, 2020). However, around one in four individuals who have had cancer treatment will experience poor long term health or disability (Macmillan, 2013a, 2013b). High symptom burden, high level of psychological distress and poorer quality of life are more common in individuals with lung cancer compared to other patient groups (Lee et al., 2011; Sarna et al., 2004).

In England, the National Health Service (NHS) *Five Year Forward View* set out as a priority the need to provide care and support to individuals to help them manage their own health; this alignment with person-centred care remains central to NHS priorities (NHS, 2014, 2017). Supported self-management is increasingly being embedded in services as a way to address the challenges of living with a long term condition such as cancer. Specifically, some of these self-management strategies may include supporting patients to modify their lifestyle behaviours, monitor their symptoms, manage medications, and improve their diet and exercise behaviours (Blakemore et al., 2016). In order to improve the quality of life for those living with cancer, it is important for healthcare service providers to understand the specific needs of individuals, and to be aware of what resources are available to assist their navigation through their cancer survivorship pathway.

## **Background**

Lung cancer is the second most commonly diagnosed cancer worldwide (11.4%) and the leading cause of cancer death (18.0%) in 2020 (Sung et al., 2021). It is the third commonest cancer in the UK, affecting around 46,700 patients each year (Cancer Research UK, 2015; Office for National Statistics, 2017). Lung cancer has one of the lowest cancer survival outcomes, with around 9.5% of those diagnosed surviving their disease for ten years or more (Cancer Research UK, 2015; Office for National Statistics, 2017).

Surgery remains the mainstay of curative therapy for lung cancer. The number of annual lung cancer operations in England has increased yearly and although short-term survival is good (Royal College of Physicians 2020); long term survival of lung cancer patients in the UK remains low compared to other developed countries (Arnold et al., 2019; Walters et al., 2015). If all NHS hospital trusts had the

resection rates for non-small cell lung cancer of the highest performing ones, it has been estimated that approximately 5,420 deaths could be delayed each year (Riaz et al., 2012).

Increasing patient survival through undergoing surgery requires optimising fitness, managing co-morbidities, and prevention and management of post-operative complications. Surgery can result in substantial post-operative complications. These include sepsis, respiratory and cardiovascular disease (Royal College of Physicians 2020, Sawada et al 2016), which are the leading causes of morbidity and mortality after lung resection, and contribute to increased readmission rates and length of hospital stay (Agostini et al 2010, Royal College of Physicians 2020).

Specialist NHS lung cancer services aim to provide patients with resources and support to optimise rehabilitation following lung cancer resections. However, a review identified key areas for service improvement, including improving access to lung cancer nurse specialists, health and social services and support groups, providing written information on return to work, self-management strategies and prescription charges, and creating more detailed assessments and care plans (Healthcare Quality Improvement Partnership, 2016).

### **The SOLACE Programme**

SOLACE was developed to provide enhanced support for early stage surgical lung cancer patients within one NHS Trust, with the aim of reducing morbidity and mortality and improving physical, psychological and social health and wellbeing (Table 1). The programme was informed by an 18 month pre- and post-surgical intervention study in pulmonary rehabilitation (Bradley et al., 2013), which included exercise classes, smoking cessation, dietary advice and patient education. The study showed that patients who undertook the intervention had fewer post-operative pulmonary complications and hospital readmissions than those who did not; which resulted in decreased service costs per patient (Bradley et al., 2013).

Development of the SOLACE service was enhanced through the employment of two core staff, a Macmillan lung cancer survivorship advanced nurse practitioner (ANP) and a Macmillan lung cancer survivorship advanced therapist practitioner (ATP) whose roles within the multi-disciplinary team included comprehensive history taking, physical assessments and the provision of direct support for patients and carers.

A central feature of SOLACE was the creation of pre and post-operative exercise classes; these aimed to optimise patients' health and fitness levels prior to, and following surgery, with the long-term aim of preventing hospital re-admissions and length of stay. The SOLACE team also provided

personalised intervention support to patients depending on their support requirements and are informed by guidance from Macmillan:

Level 1 intervention consisted of indirect involvement with patients via telephone or email.

Level 2 was a one off face-to-face consultation that assessed patient requirements and provided basic patient advice.

Level 3 consisted of a short term intervention: advice on specific issues(s) and/or extra support for short periods for patient and/or carer.

Level 4 was a long term intervention with patient and or/carer for multiple and/or complex issues (pre/post structured exercise programme).

Service evaluation data indicated that at the time of this study 216 individuals had been included in the SOLACE programme, with a mean age of 70 years (range 30-89) and similar numbers of men and women. Eighty-five per cent of patients were referred to SOLACE pre-operatively. Two per cent were post-operative inpatients, and the remaining 13% were post-operative outpatient referrals.

### **Aim of study**

The aim of this study was to explore patients' experiences of the pre and post-operative rehabilitation intervention service (SOLACE), as well as exploring the experiences and views of healthcare professionals (HCPs) linked to SOLACE.

### **Methods**

The Consolidated Criteria for Reporting Qualitative Research (COREQ) guidelines (Tong et al., 2007) were followed in reporting the study findings (supplementary file 1).

This paper reports an exploratory, descriptive qualitative study design (Hunter et al., 2019; Sandelowski, 2000) which consisted of qualitative interviews with HCPs and patients. An exploratory, descriptive qualitative approach allows for further understanding of the topic being explored and for study participants to contribute to the development of new knowledge in that area (Hunter et al., 2019; Sandelowski, 2000). This approach allowed for the contextualisation and exploration of how the study participants perceived the pre and post-operative rehabilitation intervention service (SOLACE). The evaluation was conducted between March-July 2018 at a large teaching hospital in South England.

## **Interview study recruitment**

Inclusion criteria for this study included patients who were aged  $\geq 16$ , had a diagnosis of early stage lung cancer, and had surgery for lung cancer. HCPs who work with lung cancer patients and were involved in the pre/post care of surgical lung cancer patients as part of the SOLACE pathway were eligible to participate.

Eligible patients and HCPs were identified by the clinical team at the participating hospital. HCPs working in the cancer service who were involved with SOLACE were stratified according to profession (e.g. surgeon, nurse specialist) by the SOLACE team. The researchers then selected a purposive sub-sample of HCPs to be interviewed. Eight of thirteen (61.5%) HCP's invited to face-to-face interviews at the participating hospital accepted the invitation.

Patient participants were identified from a database of lung cancer SOLACE patients, stratified according to sex and level of intervention uptake. All level 4 intervention patients were purposefully invited for interview due to their high levels of involvement with SOLACE which we wanted to explore. Participant invitation letters and study information sheets which explained the aims of the study were sent to eligible participants, who were asked to contact the research team via post, email or phone if they were interested in participating. Following this, a suitable time and date to conduct the telephone interviews was arranged (see Figure 1). Twenty-two of 50 invited patient participants expressed an interest; two subsequently decided not to participate, two could not be reached and one was ineligible due to being hard of hearing, leaving seventeen remaining. We were not able to ascertain reasons for non-response to the study invitation.

## **Ethical considerations**

Ethical approvals were obtained from Oxford Brookes University Research Ethics Committee, reference (2017/12).

## **Data collection**

One to one interviews were conducted face to face in a mutually convenient location or by telephone by three female researchers (NC, CH, EW). All three interviewers had a background in cancer care and had extensive experience of conducting qualitative interviews. They had no prior relationship with the study participants. They also had no specific prior interest in the topic and were invited to undertake an independent evaluation of the SOLACE programme. Interviews lasted 30-60 minutes, were semi-structured, and informed by a topic guide which included questions about experiences/views of the service and improvement suggestions (see Table 2). Field notes were written during the interview to aid analysis process. Interviews were digitally recorded and

transcribed for analysis using a local transcription company. Written informed consent was obtained from all participants prior to the interviews and participants were asked to complete a demographics form.

Free text written responses were also collected from patients who attended rehabilitation sessions by the ATP who facilitated them.

### **Data analysis**

Thematic analysis of the interview data was undertaken (Braun & Clarke, 2006). Transcripts were coded to search for meanings and patterns within and across the data. Initial codes were generated, and coded data were read independently by the researchers (NC, CH, EW). Data were then grouped into higher order themes, by identifying emerging patterns, assimilating codes which overlapped and separating out distinct codes. The coded data was collated and reorganised through team discussions, allowing further refinement and review. This process allowed for any emerging themes to be identified, which were used to develop key recommendations for service development. Microsoft Word and Excel software packages were used to manage the data. Recruitment continued until data saturation had been achieved. Data saturation was apparent as the researchers noted that no new codes had been identified through the analysis of latter interview transcripts (Saunders et al., 2018).

### **Results**

Seventeen patient interviews were conducted (response rate 34%). Ten of the 17 patients interviewed had received intervention level four; none had received level one. Most patients interviewed were over 70 years old, female and had received surgery or surgery and chemotherapy. Eight interviews were conducted with HCPs (response rate 75%). Participant characteristics are reported in Table 3.

Interviews with lung cancer patients and HCPs identified the following key themes: 1) *experience of SOLACE service* 2) *engagement with SOLACE* 3) *barriers to patient uptake of rehabilitation classes* and 4) *follow up pathways*. These themes are presented below.

#### **Experience of SOLACE service**

All patient participants reported positive experiences of the SOLACE service. The types of support they valued included receiving responses to queries and concerns, the provision of tailored support and advice, and being signposted to other support services as necessary. One participant who had

received pre-rehabilitation in his second round of surgery noticed a substantial improvement in his recovery:

*“The difference between the two times I had surgery was extraordinary. In terms of recovery. Extraordinary, it was hugely, hugely beneficial. I mean I just recommend it time and time again”*  
(patient 176, level 4).

Patients recognised the importance of personalised care and the SOLACE team creating a safe and comfortable space to discuss concerns. One participant who had been supported by the Macmillan ATP commented:

*“She held my hand all the way through it. She made me feel as though I was the only one that was important. If I had a question about anything she’d sort it, and I could sit face-to-face with her and she had time. She was just perfect for me...She was a good listener, she took everything I said seriously”* (patient 201, level 4).

HCPs who worked alongside the SOLACE team were aware of patient’s views and experiences of the service, which were unanimously positive.

*“Patients...Who’ve been through the SOLACE project, they couldn’t say nicer things about it. The difference it’s made...Not just physically but the social and psychological support that becomes part of it...I think that’s clearly been a great help to a lot of people”* (SOLACE Nurse).

HCPs who worked alongside the SOLACE team reported that SOLACE influenced their clinical roles, decision-making and provision of patient advice.

*“I would ask [SOLACE Nurse 2] for at least advice on what I could be recommending to [patients]. They’re always so helpful, I’m sure they would be more than happy to at least point me in the right direction... They’re a good resource”* (ANP).

### **Supportive group environment**

Patient participants who had attended rehabilitation classes reported benefits of a supportive peer group environment and knowing they were all ‘in it together’. The classes provided emotional support and opportunities to talk through experiences of surgery and related side-effects.

*“You do have dark moments. And when you’re particularly in pain or you’re tired, that’s when those kind of more morbid thoughts come out...It was kind of great that in a way I could turn up to a gym, with three other old crinklers, and a young nurse, and be able to burst into tears”* (Patient 176, level 4).

### ***Improvements to self***

Patient participants reported marked improvements in their recovery from attending rehabilitation classes, including increased exercise confidence and improvements in mobility and breathing, increasing their desire to be more active.

*“It just gives you confidence, it makes you feel good. It gets you wanting to get out and about. Because if you’re feeling shot to pieces and tired, and drained, you don’t want to get out the chair. Well this gets you out the chair. And it’s more than exercise, it’s about confidence and about self-esteem.”* (Patient 20, level 4).

Some participants felt the programme had helped them achieve their fitness goals.

*“My goal was to use this opportunity to become fitter. I feel I have done this and hopefully have been set on a path which I can continue at home”* (Patient 201, level 4).

This in turn, led to improvements in self-esteem, motivation, wellbeing and exercise maintenance.

*“From the start of the programme I could feel more positive about myself. Also, it encouraged me to do exercises at home which I probably would not have done”* (Patient 63, level 4).

### ***Exercising in gym/home exercises***

Patients who had completed rehabilitation classes were signposted to local gyms to continue their exercise regimes. However, most patients found this new environment challenging and missed HCP facilitation and supervision.

*“It is always easier to do that sort of thing under supervision. We’re all a bit slack when we’re not being boot camped around by somebody else. And obviously it may be in conjunction with other people undergoing a similar exercise regime”* (Patient 229, level 4).

In addition, the provision of home exercise DVD's from the SOLACE team to supplement and sustain exercise activity was unpopular. Most participants desired a coordinator to facilitate, motivate and answer any exercise related queries:

*"I'm not disciplined enough... I need someone there"* (Patient 201, level 4).

### **Engagement with SOLACE**

Patients reported different referral routes through to SOLACE. Often, they were introduced to the SOLACE Macmillan nurse during a clinic appointment at the time of diagnosis. However, one was referred following attendance at a lung cancer support group.

*"We meet up for a coffee, the lung nurses organise it every three months...One of the speakers was a nurse, telling us all about this rehab gym"* (Patient 167, level 4).

The SOLACE team reported variance in HCP engagement and the number of referrals made to the service; often busy workloads were cited as a reason. However, referrals from the wider healthcare team were considered pivotal in ensuring service uptake and development:

*"Given that it's the surgeons that get the most benefit from it, it sometimes seems to me that they're the ones that are maybe not always the best at searching [the nurses] out...It's the respiratory consultants that are, that think more about them and utilise them more"* (ANP).

Patients' reasons for engaging with the rehabilitation programme included improving pre-surgery fitness and recovering post-operatively: *"I felt I must help myself to get as fit as possible after my operation."* (Patient 167, level 4).

At the start of the rehabilitation programme, patients commonly reported feeling weak, nervous about exercising and unconfident. However, reassurance from the SOLACE team regarding the programme's benefits encouraged patient participation: *"[I felt] apprehensive and exhausted, but reassured that I was doing the right thing,"* (Patient 201, level 4).

SOLACE team members commented that patients' levels of engagement with rehabilitation classes often depended on the timing of the offer, as well as factors including socio-economic status, accessibility and personal motivation: *"If I try and have the conversation about physical activity with some people... at their initial appointment...they're a bit like, why are you asking me about this?"*

*They're not actually, not always that engaged, because there's just too much information at that point" (Macmillan ANP).*

Engagement was often facilitated via the provision of leaflets, as well as through HCP endorsement:

*"Consultant endorsement is a massive thing. If it's described as a 'you must go to these sessions and assessment', and it's directed, then they are more likely to come and engage" (Macmillan ATP).*

### **Barriers to patient uptake of rehabilitation classes**

Some patients expressed concern in attending pre-rehabilitation classes close to surgery and reported that mobility issues impacted on their exercise confidence. Perceptions of already being fit enough or living too far away were also barriers to uptake.

*"I...had a thing off the Macmillan nurses...saying about did I want to go there for exercise and things. And I thought I'm going in hospital for an operation soon. It wouldn't, didn't apply to me at the time, no good going to them because I was going in hospital within a week or two" (Patient 111, level 3).*

In addition, making changes to established lifestyle behaviours was perceived as a barrier to engagement.

*"You're asking people who, because of their circumstances don't have a lot of money to join gyms or travel to gyms even if they're offered, and who have led lifestyles that are not about eating healthily and exercising" (Thoracic surgeon).*

### **Follow up pathways**

Patient participants commonly described the support they received post-surgery as insufficient: *"I've had fantastic treatment in hospital and all the way up to having the operation...I just feel that when you come out, you're kind of on your own. You know, you're under your GP's care now. I did feel abandoned" (Patient 201, level 4, SOLACE pre-op).*

Some patients reported having to be proactive in seeking support post-surgery and having to 'push' HCPs to get the necessary support. Patients also felt they had to be confident in asking for help, to access appropriate support. *'The onus has always been put on me contacting them' (Patient 63, level 3).*

Many patients felt that SOLACE filled a gap in follow-up care support. The SOLACE nurse was viewed as a pivotal support for some patients and was a common first point of contact for raising concerns.

*“The lung nurse would sometimes come in with me, so that if I had a question afterwards I could ring them up. And say...what did that mean? ...The lung nurse helpline for me was absolutely amazing”*  
(Patient 167, level 4).

Some HCPs commented that interactions with the SOLACE team provided surgical patients with closer nurse-led follow up than might otherwise have been possible.

*“In terms of our support, surgical patients never got as much. I know [SOLACE Nurse 1], covers all the surgical clinics, so patients coming back, you know, she tries to see them...That’s certainly something that would never have happened before”* (ANP).

## **Discussion**

The SOLACE project was developed to provide peri-operative lung cancer patients in a high resection rate thoracic surgery unit with a support service for their physical and emotional needs, and to promote survivorship following their lung cancer surgery and beyond. All participants reported a positive experience of the SOLACE service, including improved emotional wellbeing and physical health outcomes. As with any new service, it was envisaged that its development would be a process which would be improved by reflection and data analysis. Challenges to the service were identified, which included variability in the frequency and type of referrals made and a lack of awareness of the service by some patients.

The personalised approach to patient care provided by SOLACE was valued by most participants; this is something that has previously been found to be effective and acceptable to patients (Davies & Batehup, 2011). Nurse led patient education programmes for surgery for lung cancer have the potential to improve wellbeing outcomes and enhance recovery (Li et al., 2020; White & Dixon, 2015). A study assessing the effectiveness of nurse led follow up in the management of patients with lung cancer compared with conventional medical follow up (Moore, 2002) found nurse led initiatives enabled care to be more responsive to patients’ needs, increased patient satisfaction and reduced the burden of hospital visits and investigations. Our findings reinforce the value of this personalised approach and demonstrate the benefits of continuous and sustained input from multidisciplinary team members in improving patients’ experiences of care; this is a key driver of cancer care initiatives (NHS England, 2015).

Patients who participated in the SOLACE exercise classes reported benefits to emotional and physical wellbeing. However, the long-term sustainability of these classes needs determining, and may be susceptible to resource pressures. Furthermore, the impact of the COVID-19 pandemic has radically changed how HCPs provide support to patients, through the use of telemedicine and virtual care (Bokolo, 2020). Developing and evaluating home and virtual-based exercise programmes may prove useful and would remove the travel and parking difficulties involved in attending hospital-based classes, as well as being a safer option for the older population during the pandemic. There are an increasing number of technology based exercise interventions for cancer survivors (Arthur et al., 2016; Phillips et al., 2017; Puzskiewicz et al., 2016), with a growing acceptance of their value and feasibility in delivering remote exercise interventions (Phillips et al., 2017). Home-based programmes may provide another alternative to implementing community rehabilitation for individuals with lung cancer in pre- and post-operative care. However, supporting lung cancer patients to exercise at home may be challenging, as our study results highlighted difficulties that patients faced in maintaining motivation to continue the exercise regime without encouragement and supervision from HCPs and peer support networks. Previous studies have provided evidence that home-based exercises (aerobic and resistant exercises) significantly improves the exercise capacity and quality of life of patients with lung cancer (Bade et al., 2015; Yang et al., 2020). One study highlighted the importance of HCPs, such as nurses, regularly following up with patients doing home based exercises to guide patients, regulate their behaviours and ensure their safety and compliance; this may help facilitate adherence to home based exercising (Yang et al., 2018; Yang et al., 2020).

Patient experience is key in assessing and developing quality healthcare interventions (Garratt et al., 2008). A qualitative study reporting on ways to improve the delivery of physical activity services in lung cancer (Granger et al., 2019) identified that patients wanted increased access to health/exercise professionals particularly after treatment. They also wanted access to physical activity information in multiple formats (e.g. paper, electronic, face-to-face and telephone support) and access to group based programmes that incorporated supervision and the utilisation of behavioural change strategies to sustain increases in physical activity. Whilst SOLACE met many of the patient preferences identified, Granger et al's (2019) study highlights the importance of continuously reviewing and considering appropriate behaviour change strategies which can be incorporated into pre and post rehabilitation programmes to improve adherence to physical activity in the longer term. Changing behaviour is challenging, particularly for individuals who lead a sedentary lifestyle, however behavioural change interventions can be effective in increasing physical activity across a variety of chronic conditions (Avery et al., 2015; Bluethmann et al., 2015; O'Halloran et al., 2014).

Self-management strategies to aid patients in sustainably changing physical activity behaviours may also be helpful for long term improvements to quality of life (Spruit et al., 2013). A feasibility study was conducted exploring the effectiveness of a self-management programme aiming to increase physical activity levels of patients undergoing surgery for lung cancer (Granger et al., 2018). The programme included a prescription of an unsupervised home aerobic exercise programme (initially taught face to face), and follow up with weekly telephone consultations. This was supplemented with patient education, behaviour change techniques (coaching, physical activity self-monitoring, and addressing patients specific goals and barriers), and provision of an activity monitor (Fitbit). The results found that patients had succeeded in maintaining their physical activity levels eight weeks after surgery (Granger et al., 2018). Future pre and post rehabilitation services that incorporate an inter-disciplinary approach through physical activity training/advice from physiotherapists, in addition to lifestyle behavioural change techniques from psychologists, may be beneficial to patients and aligned with a personalised approach.

The study is not without its limitations. The views of patients who did not participate in the exercise classes (level 1 intervention) were not represented in the interviews. This means that it was not possible to explore the reasons why this patient group chose not to participate in the classes and the barriers and motivators influencing their decision-making. Individuals that did participate in the exercise programme were more likely to be highly motivated to participate and a comparison between these groups of lung cancer patients would have proved beneficial. The study was also limited in that the views of a physical therapist was not captured as part of the HCP interviews. Participants were also limited in ethnically diverse representation.

## **Conclusion**

The implementation and evaluation of a pre and post-operative rehabilitation service has highlighted positive changes for lung cancer patients who engaged with the service. Patients reported benefits in physical and psychosocial outcomes. Challenges exist in ensuring that patients who live at a distance can receive equality of access to the service; this may be addressed by the development of virtual classes.

## **Relevance to clinical practice**

The study has demonstrated the importance of increasing the profile of new services, to raise awareness of them to patients and nurses who are at the forefront of patient care. This can be done by updating and informing patients about the service at every stage of their treatment pathway, to ensure they have multiple access opportunities, feel well supported and have appropriate care plans

in place. The promotion of new services can also be facilitated using health promotion materials (leaflets, online information) across the treatment pathway and through service endorsements from nurses and other HCPs. Clear communication between new teams and the wider multidisciplinary team to raise awareness of the service and what it has to offer can ensure that consistent, clear messages are delivered to patients. In addition, clear and consistent communication methods can help to decrease repetition, reduce errors and increase service efficiency and patient care outcomes (Propp et al., 2010). Initiating regular service updates for staff may be pertinent in aiding this process.

An important resource implication relates to the length of time rehabilitation classes are made available for and how long patients can be supported in follow-up. Whilst it is important that the continuation of networks between NHS and community services are in place, the cost-benefit ratio for this needs further examination. There is also merit in exploring the feasibility of offering the current structured exercise programme virtually.

#### **What does this paper contribute to the wider global community?**

- Pre- and rehabilitation services can help improve patients' perceived physical and psychological health and build self-confidence in their ability to self-manage.
- Strategies and interventions to promote virtual pre and post rehabilitation services for lung cancer patients need are required.
- There is a need to consider ways to enable prolonged access to rehabilitation services (including sustained contact with a physiotherapist) for lung cancer patients entering the follow-up stages of their care.

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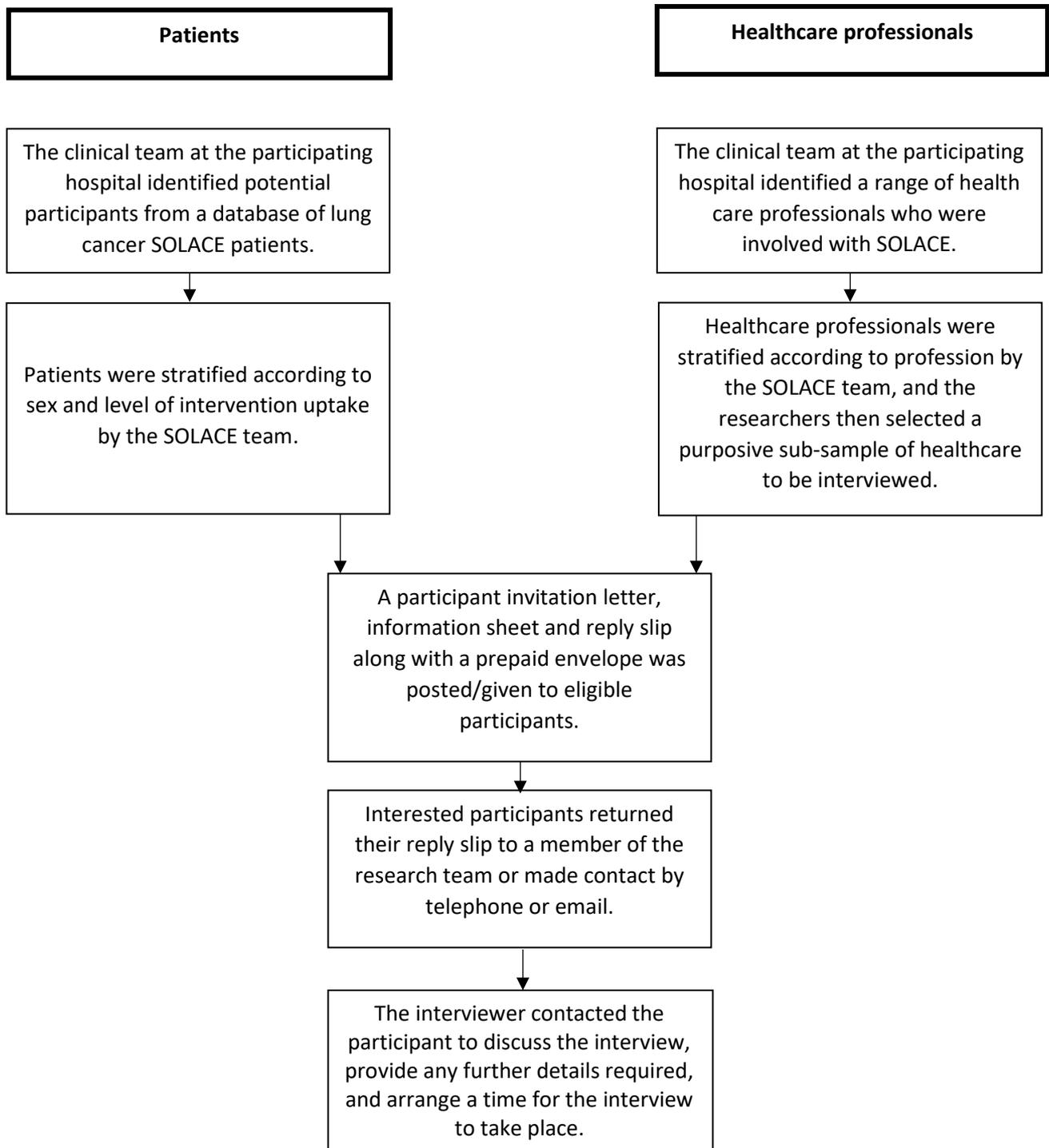
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**Table 1. Services offered by SOLACE pre and post-operatively**

<b>Services</b>
Patient education/written information on recovery from lung cancer surgery
Smoking cessation advice
Nutritional advice
Information regarding thoracic surgical pathways
Psychological support
Pain management
Financial help
Links to other NHS, Macmillan and external support agencies
Pre and rehabilitation hospital based exercise classes
Local exercise referrals
Rehabilitation DVDs

**Figure 1. Recruitment process of patients and healthcare professionals**



**Table 2. Interview topic guide**

<b>Patients</b>
<p>Can you tell me a bit about the process/your experience from when you were diagnosed with lung cancer right through to the current day?</p> <p>How prepared did you feel for surgery (mentally, physically, emotionally)? How informed did you feel?</p> <p>Were you given enough information and/or support? Written/verbal? Were you aware of who to contact if you had any problems/concerns etc.?</p> <p>Did you contact anyone? How comfortable did you feel about contacting the team?</p> <p>How were your concerns/needs addressed (when you had contacted the team)?</p> <p>What was your experience of the thoracic surgical pre/rehabilitation classes?</p> <p>What was your experience of being in a class with others?</p> <p>How helpful was the information available/provided on (stopping smoking, managing stress, financial support and benefits, dietary advice, managing pain, medication advice)? Was the information appropriate in addressing your needs/concerns?</p> <p>How confident did you feel at the end of rehab course of 8 weeks to continue exercising on your own?</p> <p>Do you feel the 8 weeks of rehab is enough?</p> <p>How well supported did you feel by the health care professionals caring for you?</p> <p>What was good about the service?</p> <p>What could be improved about the service?</p> <p>How do you feel the service has contributed to your wellbeing, quality of life, confidence in managing self-care? What difference has it made to you?</p> <p>How much do you feel the service was tailored to meet your individual care needs?</p>
<b>Healthcare professionals</b>
<p>Can you please describe the aims of the SOLACE project to me as you see it?</p> <p>Can you talk me through the process please and explain your specific role in the project? And, what happens in the education component?</p> <p>What were the main challenges you came up against when delivering the service? How were these challenges overcome/resolved?</p> <p>Do you think you have good buy in from your colleagues regarding the importance of the service? Are they all referring to you as you would like? If no, why do you think this is? How could this be improved?</p> <p>What proportion of patients turn down the offer of rehab? Why do you think this is? [depending on answer to last question], how could this be improved/addressed?</p>

What proportion come to exercise sessions at the hospital? Are they a range of ages / fitness levels etc?

How well do participants engage with the service? How helpful do you think they find these sessions?

Which bits of the education provided do you think they find most helpful?

Are there any particular questions or advice participants commonly ask/seek? If yes, what are they?

How much written information do you give them? Do you know how they find this?

What proportion of participants do you refer to address other specific concerns they may have? Do you know if they follow up on this referral and how helpful this is for them?

What proportion of patients choose to take information/DVDs away to do exercises at home?

What about long term follow-up, are you able to offer this? How important do you think that is?

What changes would you like to make, if any, to how the service is currently operating?

What, if anything, is stopping these changes being made?

How easily do you think your service can be extended to other settings (e.g. other cancers)?

**Table 3 Interview participant characteristics**

Characteristics		Number (%)
<b>Age group (years)</b>	40-49	1 (6%)
	50-59	0 (0%)
	60-69	4 (24%)
	70-79	9 (53%)
	80-89	3 (17%)
<b>Gender</b>	Female	10 (59%)
<b>Ethnic Group</b>	White	17 (100%)
<b>Type of lung cancer (self-reported)</b>	Non-small cell	12 (70%)
	Small cell	1 (6%)
	Don't know	4 (24%)
<b>Treatment</b>	Surgery	15 (88%)
	Surgery &	2 (12%)
	Chemotherapy	
<b>Level of Intervention</b>	1	0 (0%)
	2	1 (6%)
	3	6 (35%)
	4	10 (59%)
<b>Attendance for pre/post surgical rehabilitation</b>	Pre-rehabilitation	3 (30%)
	Rehabilitation	6 (60%)
	Both	1 (10%)
<b>Healthcare professionals</b>		
<b>Gender</b>	Female	7 (87.5%)
<b>Occupation</b>	Nurse	4 (50%)
	Advanced Therapist	1 (12.5%)
	Practitioner	
	Surgeon	1 (12.5%)
	Respiratory Physician	1 (12.5%)
	Care Support Worker	1 (12.5%)

<b>Years working in profession</b>	1-5 years	1 (12.5%)
	6-10 years	0 (0%)
	11-15 years	2 (25%)
	>15 years	3 (37.5%)
	Missing	2 (25%)