



Postoperative physiotherapy interventions in hospitalized adults undergoing pulmonary resection surgery. A protocol for a scoping review [☆]

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ABSTRACT

Patients undergoing lung resection surgery (LRS) may experience various postoperative complications, which can be prevented or managed through physiotherapy interventions. The current evidence concerning physiotherapy interventions for individuals undergoing LRS is inconsistent and disorganised. Our objective is to outline the methods we will employ to collect, describe, and analyse studies that have assessed the effects of physiotherapy interventions in the immediate postoperative period for hospitalized adults undergoing LRS. We will conduct our scoping review following the Joanna Briggs Institute. We will include primary studies that have enrolled hospitalized adults undergoing LRS where the effects, efficacy, effectiveness or cost-effectiveness of postoperative physiotherapy interventions has been evaluated. A systematic search of MEDLINE (Ovid), Embase (Ovid), CENTRAL (Cochrane Library), CINAHL (EBSCOhost), LILACS (BVS), and PEDro will be carried out. Additionally, we will perform forward and backward citation searches. Data selection and extraction will be done in duplicate. Conflicts will be resolved by consensus or through a third reviewer. We will utilise the Word Frequency Analyser, The Polyglot Search Translator, Citationchaser, and Catchii tools to enhance the efficiency of our review. Outlining our strategies to conduct our review will help uphold scientific rigour and enable readers to identify any deviations from our plan.

- We will conduct our scoping review following the Joanna Briggs Institute. We will include primary studies that have enrolled hospitalized adults undergoing LRS and evaluated post-operative physiotherapy interventions' effects, efficacy, effectiveness or cost-effectiveness.
- To enhance the efficiency of our review, we will use artificial intelligence tools such as Word Frequency Analyser, The Polyglot Search Translator, Citationchaser, and Catchii.
- Understanding applications of postoperative physiotherapy interventions in hospitalized adults undergoing LRS can aid in implementing treatment strategies. It will also highlight existing research gaps that require attention from primary studies.

[☆] **Related research article:** None.

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Specifications table

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Reagents/tools:	Not applicable
Experimental design:	Not applicable
Trial registration:	We register prospectively on the International Platform of Registered Systematic Review and Meta-analysis Protocols (INPLASY) under INPLASY202520056.
Ethics:	Our study describes a protocol for conducting secondary research. No animal experiments are performed, and human subjects are not involved. In addition, data collection from social networks is not included.
Value of the Protocol:	• We hope to identify, analyse, and organise the evidence from primary studies concerning postoperative physiotherapy interventions employed in hospitalized adults undergoing LRS. • Outlining our strategies for our scoping review will help uphold scientific rigour and enable readers to identify any deviations from our plan. • Understanding applications of postoperative physiotherapy interventions in hospitalized adults undergoing LRS can aid in implementing treatment strategies. It will also highlight existing research gaps that require attention from primary studies.

Background

Lung resection surgery (LRS) is a procedure often performed on individuals with lung cancer [1,2]. Additionally, this intervention is used, albeit to a lesser extent, to reduce lung volume in cases of emphysema [3,4] and remove areas of the lung parenchyma that have been damaged or that promote a recurrent infectious process [5–7]. Lung resection involves removing areas of the lung that participate in gas exchange. The procedure depends on the size of the lesion, with small regions being excised via nodular, wedge, or segmental resection and larger areas through lobar, bi-lobar, or even pneumonectomy [5,8,9].

The LRS is typically carried out in two ways, which can be performed traditionally or with robotic assistance. Thoracotomy is the more invasive method, requiring access to the rib cage through an incision between the ribs [10]. In contrast, video-assisted thoracoscopy (VATS) involves creating small incisions through which various instruments are introduced [11]. The VATS technique is less invasive, resulting in fewer pulmonary and extra-pulmonary complications in the immediate postoperative period [12,13].

Patients undergoing LRS may experience many complications in the postoperative period. Atelectasis, pleural effusion, and pneumonia are the most common pulmonary complications. Arrhythmias, pressure injuries, and hypotension are frequent extrapulmonary issues [14,15]. These complications can prolong patients’ hospital stays [16], elevate healthcare costs, and limit access to healthcare services for other patients in high-demand settings.

The Enhanced Recovery After Surgery (ERAS®) protocol is well established in specialities such as colorectal surgery. It is implemented by adopting various evidence-based perioperative strategies to reduce postoperative organ dysfunction while promoting quick recovery. The ERAS® protocol for lung surgery recommends early preventive mobilisation within the first 24 hours (immediate postoperative period) [17]. However, it indicates that the benefit of using incentive spirometry devices is uncertain and that non-invasive mechanical ventilation should not be employed routinely for all patients [17].

The current evidence regarding postoperative physiotherapy interventions for hospitalized adults undergoing LRS could be scant, of variable quality, and inconsistent. Although systematic reviews exist to determine the effectiveness of specific interventions on various short- and long-term clinical outcomes [3,18,19], little has been explored to understand and summarise in detail the design and implementation of these interventions. In addition, physiotherapy interventions are generally delivered as multimodal or multicomponent interventions, so primary studies considering this approach could have been excluded from systematic reviews. Our protocol aims to outline the methods and strategies we will employ to collect, describe, and analyse studies that have evaluated the effects of physiotherapy interventions in the immediate postoperative period for hospitalized adults undergoing LRS.

Our scoping review aims to address the following research questions:

- What postoperative physiotherapy interventions for patients undergoing LRS have been evaluated in the immediate postoperative phase until hospital discharge?
- What are the characteristics, dosage, and strategies for implementing postoperative physiotherapy interventions for patients undergoing LRS in the immediate postoperative period until hospital discharge?
- Is the description of postoperative physiotherapy interventions in the studies comprehensive enough to replicate their implementation in research or clinical settings?
- What outcomes and outcome measures are reported in studies assessing postoperative physiotherapy interventions’ effects, efficacy, effectiveness or cost-effectiveness?
- Do postoperative physiotherapy interventions differ based on the income levels of the countries where the studies are conducted?

Description of protocol

We will carry out our scoping review following the recommendations of the Joanna Briggs Institute (JBI) [20]. We present our protocol following the Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols (PRISMA-P) statement [21], which we register prospectively on the International Platform of Registered Systematic Review and Meta-analysis Protocols (INPLASY) under the number INPLASY202520056.

Eligibility criteria

We established our study eligibility criteria based on the participants, concept, and context (PCC) approach [20]. Furthermore, we considered the type of resource as a criterion for selection. Studies must meet the following four conditions:

Participants

We will include studies that have enrolled hospitalized adults (over 18 years) undergoing LRS and will accept studies that include a maximum of 20 % of patients aged 15–18. Surgery may be indicated for lung cancer, reduced lung volume, removal of a damaged area of the lung, a persistent infection, or any other causes reported in the studies.

The approach to LRS (thoracotomy, VATS or robotic) and the type of resection (nodular, wedge, segmental, lobar, bi-lobar, or pneumonectomy) will not restrict the inclusion of studies. Furthermore, physical activity level, frailty, and comorbidities will not be considered selection criteria.

Concept

We will include studies that have assessed the short-term effects, efficacy, effectiveness or efficiency (cost-effectiveness) of postoperative physiotherapy interventions for hospitalized patients undergoing LRS. The immediate postoperative period will be considered from admission to the hospitalization unit until discharge, regardless of the length of stay. Interventions may incorporate but are not limited to actions or therapies designed to prevent or improve impairments in respiratory, cardiovascular, neuromusculoskeletal and movement-related functions, as well as associated pain management.

The characteristics of postoperative physiotherapy interventions, including the dosage of exercise-based interventions (frequency, intensity, timing, and type), the programming of physical agent-based therapy equipment, the use of instrumental respiratory physiotherapy devices, and the type of non-invasive ventilatory or respiratory support employed, will not restrict the inclusion of studies. Furthermore, the completeness of the description of interventions will not be regarded as a selection criterion.

Context

We will include studies conducted whole or partly in a hospital setting. We will consider the immediate postoperative phase following LRS until hospital discharge, irrespective of the hospitalisation unit (intensive care, intermediate, acute, basic, recovery unit, among others). We will consider multicentre or one-centre-based studies conducted in any country.

Resource type

We will include primary observational, quasi-experimental, or experimental studies. These may have any design (clinical trials, cohort, case-control, cross-sectional, case series, and case reports, among others), and temporality (prospective or retrospective). The existence of a control group and the number of patients included in the study will not be considered as selection criteria. Additionally, we will consider qualitative and mixed methods studies.

We will exclude studies for which only the abstract has been reported in conference proceedings. Additionally, we will not impose restrictions on including studies regarding the language or date of publication.

Search strategy

Our search strategy will consist of a three-stage process [20]. The first and second steps have already been completed:

Step 1: We conduct an exploratory search in PubMed and Google Scholar to identify the ‘seed references’ to begin constructing our search strategy. These ‘seed references’ pertain to studies that fulfil the eligibility criteria of our scoping review.

Based on the studies identified in this initial phase, we utilised the Word Frequency Analyser tool from The Evidence Review Accelerator (TERA) to determine the most frequently occurring words or concepts [22]. We configured this tool to disregard standard terms (‘the’, ‘and’, ‘he’, ‘she’, and others) and numbers. We also permitted sentences of up to three words and limited concept identification to a minimum of three occurrences. Furthermore, we assigned similar weights to words depending on whether they appeared in the title, abstract, or keywords. These concepts were supplemented with those suggested by ChatGPT®.

Step 2: Utilising the concepts identified in the initial phase, we devised our search strategy for MEDLINE (Ovid). This strategy was formulated by a researcher specialising in systematic searches and reviewed by another expert methodologist in evidence synthesis studies. Through an iterative process, we reached a consensus on the search strategy for MEDLINE (Ovid), as illustrated in Table 1. This search strategy for MEDLINE (Ovid) comprised terms for study participants (LRS) and physiotherapy interventions (exercise, rehabilitation, breathing exercises, and early mobilisation, among others).

Subsequently, we adapted the search strategy for MEDLINE (Ovid) to the Embase (Ovid), CENTRAL (Cochrane Library), CINAHL (EBSCOhost), LILACS (BVS), and PEDro databases. Wherever feasible, we utilised TERA’s The Polyglot Search Translator tool for adaptations [23], which we reviewed and amended as necessary.

All search strategies employed a combination of controlled vocabulary (MeSH, Emtree, CINAHL Subject Headings, DeCS) and keywords. We did not restrict our search regarding language, date, publication status, or study design.

Step 3: We will conduct forward and backward citation searches, considering studies that meet the eligibility criteria for our scoping review. For this purpose, we shall use the Citationchaser® web tool (<https://estech.shinyapps.io/citationchaser/>) [24].

Table 1
Search strategy for MEDLINE (Ovid)*.

Index	Term
1	exp Pulmonary Surgical Procedures/
2	exp Thoracoscopy/
3	exp Thoracotomy/
4	exp Pneumonectomy/
5	(thoroscop\$ or video-assist\$ thorascopi\$ or VATS).ti,ab.
6	thoracotom\$.ti,ab.
7	pneumonectom\$.ti,ab.
8	((lung\$ or pulmon\$) adj (resect\$ or surger\$)).ti,ab.
9	((((lung\$ or pulmon\$) adj (tumo?r\$ or nodule\$)) and (resect\$ or surger\$ or remove\$ or excise\$)).ti,ab.
10	((lung\$ or pulmon\$) and lobectom\$).ti,ab.
11	((lung\$ or pulmon\$) and (bi-lobectom\$ or bilobectom\$)).ti,ab.
12	((lung\$ or pulmon\$) and segmentectom\$).ti,ab.
13	or/1–12
14	Exercise/
15	exp Exercise Therapy/
16	exp Rehabilitation/
17	exp Physical Therapy Modalities/
18	early ambulation/
19	mobili#at\$.ti,ab.
20	((fast-track or early) adj4 (rehabilitation and exercise)).ti,ab.
21	((fast-track or early) adj6 (walk or walking or ambulation or gait)).ti,ab.
22	(physical adj4 (exercise or training or therap\$)).ti,ab.
23	(exercise adj3 therapy).ti,ab.
24	shoulder\$ adj2 (exercise\$ or therap\$ or rehabilitat\$).ti,ab.
25	(kinesiotherap\$ or physiotherap\$).ti,ab.
26	exp Breathing Exercises/
27	((respir\$ or inspirat\$ or expiratory or ventilatory or chest) adj4 (training or exercise\$ or therap\$)).ti,ab.
28	or/16–27
29	14 and 28

* OVID Medline Epub Ahead of Print, In-Process & Other Non-Indexed Citations, Ovid MEDLINE® Daily and Ovid MEDLINE®.

Study selection

After conducting the first two phases of our search strategy, we will download the .ris files containing the records from each database. To remove duplicate records, we will import these files into TERA's The Deduplicator tool [25]. In this tool, we will utilise the 'Relaxed' algorithm. This algorithm is designed to minimise the time spent manually checking the results. It does not mislabel non-duplicates to the detriment of missing a small number of duplicates.

We will then review all studies in duplicate. First, we will check the titles and abstracts of the records, rating them as included or excluded. Records voted as included by at least one of the reviewers will proceed to the full-text reading phase. A researcher will retrieve the full manuscripts and identify those that could not be obtained.

Two reviewers will also do the full-text check. We will check the eligibility criteria against the information reported in the manuscripts, excluding those that do not meet all of them. At this stage, we will assign a reason for excluding studies, which may be by Participants, Concept, Context, or Resource Type. The first one to be met, in the above order, will be the reason for exclusion that we will report. At this stage, we will resolve conflicts by consensus or a third-party reviewer.

We will use the Catchii® tool [26] to screen studies by title/abstract and full text.

Data extraction

We will conduct data extraction in duplicate. The unit of analysis will be the study, meaning that records or reports corresponding to the same study will be grouped. For the extraction, we will utilise the most recent report of the study; however, if we uncover any information in previous versions of the study, these will also be considered.

Through discussions among the researchers, we have developed a standard form for data extraction, which will be uploaded to the Catchii tool [26]. We will retrieve information regarding the year of publication, study design, whether the study was multicentre, the countries involved, participant inclusion and exclusion criteria, the number of participants included, and a description of participants (age, sex, and cause and type of LRS), postoperative physiotherapy interventions, as well as the outcomes and outcome measures reported. We will use the PROGRESS framework to assess the reporting of social stratification factors that may determine health inequities. For this, we extracted information on 1) place of residence, 2) race, ethnicity, culture and language, 3) occupation, 4) gender and sex, 5) religion, 6) education, 7) socioeconomic status, and 8) social capital [27]. In addition, we will use the TIDieR checklist to assess the description and replication potential of physiotherapy interventions [28]. All reviewers participating in the data extraction process will be piloted at this stage, using five studies. We will make any necessary adjustments to the extraction form to enhance the reliability of the process. Disagreements will be resolved by consensus or through a third reviewer.

Data analysis and presentation

We will present the findings of our scoping review following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) [29]. The search strategy will be detailed following the PRISMA Statement for Reporting Literature Searches in Systematic Reviews (PRISMA-S) [30]. At the same time, the study selection process will be explained in narrative form along with a PRISMA-type selection flowchart [31].

We will detail the results of the included studies, categorised by the countries involved and based on World Bank income level data. We will generate figures illustrating the study designs and postoperative physiotherapy interventions reported. In addition, we will report study characteristics, such as participant description, study design, and adherence to the PROGRESS framework and the TIDieR checklist, using absolute and relative values.

Any changes we introduce in our scoping review process will be reported in the publication of our study results.

Dissemination plan

The results of our review will be presented at conferences focused on physiotherapy, thoracic surgery, or respiratory diseases. Furthermore, these findings will be published in one or more articles in peer-reviewed scientific journals.

Protocol validation

We register prospectively on the International Platform of Registered Systematic Review and Meta-analysis Protocols (INPLASY) under INPLASY202520056.

Limitations

Not applicable.

CRediT author statement

Ruvistay Gutierrez-Arias, Javier Fernández-Fuentes, Javiera Ríos-Ossandón, Felipe Vásquez-Gatica, and Maxximiliano conceptualised the research idea. Ruvistay Gutierrez-Arias established the methodology and drafted the manuscript. The methodology was reviewed by Natalia Guajardo-Latorre, Ariela Moreno-Huircaleo, Francisco Salinas-Barahona, and Pamela Seron. All authors reviewed the manuscript and approved its final version.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

No data was used for the research described in the article.

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