INPLASY

Meta-analysis of the effectiveness and influencing factors of preoperative inspiratory muscle training in preventing postoperative pulmonary complications in cardiac surgery

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ADMINISTRATIVE INFORMATION

Review Stage at time of this submission - The review has not yet started.

Conflicts of interest - None declared.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 27 February 2024 and was last updated on 27 February 2024.

INTRODUCTION

*R*eview question / Objective To evaluate the prophylactic effects of inspiratory muscle training (IMT) in reducing postoperative pulmonary complications and to identify influencing factors.

Condition being studied Despite significant advancements in perioperative care, cardiac surgeries are still associated with a concerning incidence of postoperative pulmonary complications (PPCs). Existing research on the effect of preoperative inspiratory muscle training (IMT) in preventing PPCs in those patients has yielded inconsistent conclusions. Although several meta-analyses have been conducted on this topic, but they included limited articles and lacked optimized protocol analysis. Therefore, we conducted a comprehensive meta-analysis to assess the intervention effects and influencing factors of preoperative IMT in reducing PPCs in patients undergoing cardiac surgeries.

METHODS

Participant or population Patient scheduledfor cardiacsurgery.

Intervention Inspiratory muscle training (IMT)conducted before cardiac surgery.

Comparator Usual care or sham intervention.

Study designs to be included Randomized controlled trial.

Eligibility criteria (1) randomized controlled trial(RCT); (2) comparison of inspiratory muscle training(IMT) with usual care or sham

interventionconducted before cardiac surgery; (3) reportingone or more of the following outcomes: incidencerate of postoperative pulmonary complications(PPCs), length of stay (LOS); (4) sufficient datareported to calculate risk ratios (RRs) orstandardized mean difference (SMD) with a 95%confidence interval (95%CI).

Information sources Relevant literature was retrieved from electronic databases including PubMed, Web of Science, Embase, and the Cochrane Library, without language restrictions. Additionally, the reference lists of identified studies and meta-analyses were also reviewed to select relevant articles. Authors of included studies were contacted to obtain additional information.

Main outcome(s) Postoperative pulmonary complications (PPCs).

Quality assessment / Risk of bias analysis The Cochrane Collaboration's tool was used to evaluate the quality of RCTs in our research, which includes seven major sources of bias and three tests were used to investigate publication bias when the number of studies was more than ten. Grades (yes, no, and unclear). Begg's and Egger's tests were used to investigate publication bias when the number of studies was more than ten.

Strategy of data synthesis For each study, heterogeneity was quantified using the I2 test and χ2-based Q statistics. If I2 > 50% or P < 0.1, significant heterogeneity was considered, and a random-effects model (DerSimonian and Laird's method) was adopted23. Otherwise, a fixed-effects model (Mantel-Haenszel's method) was used24. For studies with zero events in one or both groups, 0.5 was added to each cell for the effect measure25. The effect sizes of binary outcomes were presented as risk ratios (RRs), and the results for continuous outcomes were expressed as standardized mean difference (SMD) with 95% CI. The reliability of available results was evaluated using leak-one-out sensitivity analysis. Begg's and Egger's tests were used to investigate publication bias when the number of studies was more than ten26. All of the above analyses were performed using STATA 12.0 software, using two-sided P values.

Subgroup analysis Subgroup analyses based on type of cardiac surgery, IMT duration, and risk category were performed for PPCs.

Sensitivity analysis The reliability of available results was evaluated using leak-one-out sensitivity analysis.

Country(ies) involved China.

Contributions of each author
Author 1 - Qianqian Liu - designed the study, collected, arranged, and analyzed the data, and drafted the manuscript.
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