

# INPLASY

## Prevalence and risk factors for ventilator-associated pneumonia after cardiac surgery: A systematic review and meta-analysis

INPLASY202420081

doi: 10.37766/inplasy2024.2.0081

Received: 19 February 2024

Published: 19 February 2024

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### ADMINISTRATIVE INFORMATION

**Support** - None.

**Review Stage at time of this submission** - Completed but not published.

**Conflicts of interest** - None declared.

**INPLASY registration number:** INPLASY202420081

**Amendments** - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 19 February 2024 and was last updated on 19 February 2024.

### INTRODUCTION

**Review question / Objective** In this study, we aimed to assess the incidence and risk factors of Ventilator-associated pneumonia (VAP) in postoperative cardiac patients to provide a basis for further prevention and treatment of VAP.

**Condition being studied** Ventilator-associated pneumonia (VAP) poses a significant threat postoperatively in cardiac patients, impacting prognosis. Despite this, reported VAP incidence among these patients varies significantly, and associated risk factors remain contentious.

### METHODS

**Search strategy** ("Ventilator-associated pneumonia" OR VAP OR "Pneumonia, Ventilator-Associated" [MeSH] OR "Pneumonia, Ventilator-Associated/epidemiology" [MeSH]) AND ("Cardiac surgery" OR "Cardiac surgical patient" OR "Cardiac surgical patients" OR "heart surgery" OR

"cardiovascular surgery" OR CCU OR CICU OR "cardiac intensive care unit" OR "Thoracic Surgery" [MeSH] OR "Cardiac Surgical Procedures" [MeSH] OR "myocardial revascularization" [MeSH] OR "Coronary Care Units" [MeSH]).

**Participant or population** Adult patients undergoing cardiac surgery.

**Intervention** Risk factors should be reported  $\geq$  two studies.

**Comparator** Reference for specific risk factors.

**Study designs to be included** Retrospective case-control and prospective studies.

**Eligibility criteria** The specific inclusion criteria were as follows: (1) patients: adult patients undergoing cardiac surgery; (2) exposure: risk factors should be reported  $\geq$  two studies; (3) outcomes: the incidence of VAP or effect estimate

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for the risk of VAP; and (4) study design: retrospective case-control and prospective studies.

**Information sources** PubMed, EMBASE, and Cochrane Library databases.

**Main outcome(s)** The incidence of VAP or effect estimate for the risk of VAP.

**Data management** Data extraction from the included studies was independently conducted by two authors. When discrepancies were observed in the extracted results, the corresponding author consulted the relevant literature to determine the final content.

**Quality assessment / Risk of bias analysis** The Newcastle-Ottawa Scale (NOS), which has been partially validated for assessing the quality of observational studies in meta-analyses, was used to assess the methodological quality of the included studies.

**Strategy of data synthesis** The random-effects models with a logit transformation were utilized to aggregate the overall incidences of VAP, and the restricted maximum likelihood estimation was employed to fit all models by applying a classic continuity correction of 0.5 for zero cells and sample sizes. Odds ratios (OR) with 95% confidence intervals (CI) were used to explore potential risk factors for VAP after cardiac surgery, and pooled analyses were performed using random effects models.

**Subgroup analysis** Subgroup analyses for the VAP rate were also performed according to region, and the differences between subgroups were compared using the interaction t test, which assumes that the data were normally distributed.

**Sensitivity analysis** Sensitivity analyses were performed to assess the stability of the pooled conclusions by sequentially removing a single study.

**Language restriction** English and Chinese.

**Country(ies) involved** China.

**Keywords** ventilator-associated pneumonia; cardiac surgery; risk factor; prevalence; systematic review; meta-analysis.

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