

# INPLASY

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## The Timing Dilemma: A Systematic Review and Meta-analysis of Short-Term Mortality in COVID-19 Patients Undergoing Tracheostomy with Varied Definitions of Early, Including 7, 10, and 14 Days

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### ADMINISTRATIVE INFORMATION

**Support** - None.

**Review Stage at time of this submission** - Data analysis.

**Conflicts of interest** - None declared.

**INPLASY registration number:** INPLASY2023120030

**Amendments** - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 07 December 2023 and was last updated on 07 December 2023.

### INTRODUCTION

**Review question / Objective** P) COVID-19; I) tracheostomy; C) early vs late; O) short-term mortality.

**Condition being studied** This study explores the timing of tracheostomy in COVID-19 patients amid the global pandemic, particularly focusing on the uncertainties surrounding the benefits of early tracheostomy (ET). Analyzing 3,466 patients from 12 studies, the overall mortality did not significantly differ between ET and late tracheostomy (LT) at 7 and 14 days. However, at 10 days, LT showed a lower mortality rate, suggesting subtle timing differences may impact short-term outcomes in COVID-19 patients. Additional research is needed to find an optimal timing that reduces mortality cost-effectively, considering the longer mechanical ventilation and ICU stay in the LT group.

### METHODS

**Participant or population** COVID-19 patients.

**Intervention** Undergoing tracheostomy.

**Comparator** Early vs late tracheostomy.

**Study designs to be included** We will include various study designs such as randomized controlled trials (RCTs), cohort studies, case-control studies, and observational studies to comprehensively address the objectives of our review.

**Eligibility criteria** This study included cases that met specific inclusion criteria: it focused on confirmed COVID-19 patients, provided short-term mortality data for those undergoing ET or LT, and involved patients requiring mechanical ventilation with either percutaneous or open surgical

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tracheostomy for respiratory failure. Exclusion criteria involved irrelevant publication types, outcomes misaligned with the analysis scope, and unclear or non-compliant timing of tracheostomy.

**Information sources** We systematically searched the following databases: PubMed, Embase, Cochrane Library, Web of Science, and Scopus, using Boolean operators such as AND, OR, or NOT to refine and broaden search results.

**Main outcome(s)** Short-term mortality.

**Additional outcome(s)** Duration of mechanical ventilation; length of ICU stay; hospital day.

**Quality assessment / Risk of bias analysis** Using the Newcastle-Ottawa Scale.

**Strategy of data synthesis** The study utilized odds ratios for dichotomous outcomes and weighted mean differences for continuous outcomes. Heterogeneity was assessed with  $I^2$ , applying a random-effects model for significant heterogeneity ( $I^2 \geq 50\%$ ) and a fixed-effects model otherwise. Sensitivity analyses involved stepwise removal of studies, starting with the highest  $I^2$ . Publication bias was assessed through funnel plots with a significance threshold of  $P < 0.05$ . Analyses were performed using Review Manager 5.2 and R version 4.3.1.

**Subgroup analysis** In the subgroup analysis, "early" was defined based on different time points, specifically at 7 days, 10 days, and 14 days. This stratification allowed for a detailed examination of the impact of early tracheostomy at varying stages in the patient's clinical course.

**Sensitivity analysis** Sensitivity analyses were conducted by removing one study at a time, starting with the study with the highest  $I^2$ , to assess its impact on heterogeneity.

**Language restriction** English restriction.

**Country(ies) involved** Republic of Korea (1 Division of Pulmonary, Allergy, and Critical Care Medicine, Department of Internal Medicine, Korea University College of Medicine, Korea University Ansan Hospital, Ansan, Republic of Korea 2 Medical Science Research Center, Korea University College of Medicine, Seoul, Republic of Korea 3 Division of Pulmonology, Department of Internal Medicine, Yonsei University College of Medicine, Gangnam Severance Hospital, Seoul, Republic of Korea).

**Keywords** SARS-CoV-2; Intensive Care Units; respiratory insufficiency; respiration, artificial; Tracheotomy; airway management.

#### **Contributions of each author**

Author 1 - Beong Ki Kim.

Author 2 - Hangseok Choi.

Author 3 - Chi Young Kim.

