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Letter

Respiratory Critical Care Nurse Training Program is a paramount important factor to reduce mortality of patients who need to be hospitalized in the intensive care unit

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Abstract

Delay in the transfer of critically ill patients admitted to the emergency department to the intensive care unit (ICU) leads to worsening of their clinical outcomes. The long time from the beginning of the primary organ disorder to the appropriate interventions in critically ill patients has a direct impact on the survival rate of these patients because critically ill patients often need time-sensitive therapeutic interventions to reduce mortality. Shortening the admission time of critically ill patients who need to be hospitalized in ICU can be significantly decreased mortality in the patients. Different interventions can be done in this field. One of the most cost-effective measures to reduce the mortality of these patients is to preserve the golden and precious time to start the care and treatment process. Evidence-based and need-based training is always effective and beneficial. This letter highlights the crucial role of RCCN in emergency and critical care settings and emphasizes the need for a comprehensive training program to equip them with the necessary skills. By investing in the development of RCCN, we can enhance patient outcomes, reduce complications, optimize resource utilization, and ultimately save lives.

Keywords: Critical ill, Intensive Care Unit, Mortality, Respiratory Critical Care Nurse.

Dear Editor,

Delay in the transfer of critically ill patients admitted to the emergency department to the intensive care unit (ICU) leads to worsening of their clinical outcomes[1]. The long time from the beginning of the primary organ disorder to the appropriate interventions in critically ill patients has a direct impact on the survival rate of these patients because critically ill patients often need time-sensitive therapeutic interventions to reduce mortality [2]. The results of recent studies show that early admission of patients who need to be hospitalized in ICU has been associated with a decrease in the mortality of these patients [3]. The management of these conditions often requires urgent treatment and care, which leads to hospitalization in ICU, which, due to the limited access to intensive care beds, causes delays in the treatment of critically ill patients and increases the mortality rate [4]. In this situation, respiratory critical care nurse (RCCN) training can be a revolutionary step in facilitating the early treatment of critically ill patients who are delayed in admission to ICU. With the establishment of RCCN, the healthcare system can ensure that

critical patients receive timely and appropriate interventions to stabilize their condition and prevent its deterioration. This emergency and critical care is a very important in the resuscitation of unstable patients and provides the necessary time for recovery and optimization of the effect of these treatments to improve outcomes and prevent mortality [5]. In other words, until access to an intensive care bed, RCCN will provide intensive care to patients who need to be hospitalized in ICU, which can partially compensate for the lack of intensive care beds by simulating the environment of the ICU. Its consequence is to preserve the golden and precious time of treatment and care in acute conditions.

The search strategy intended to explore all available published studies from inception to January 28, 2024 and was employed in Scopus, PubMed, Web of Science, EMBASE, and Mag Iran databases. Moreover, reference lists of all identified reports and articles were scrutinized. The inclusion criteria were adults (≥18 years) and patients who need to be hospitalized in ICU. The investigated outcome included mortality in ICU and, if not reported, the mortality of the patient in the hospital. The shortest time between admission to the emergency department and hospitalization in ICU was considered as the exposed group and the longest time between admission to the emergency department and hospitalization in ICU was considered as the control group. The quality of evidence for each study was assessed using the Grading of Recommendations, Assessment, Development, and Evaluations (GRADE) framework. The meta-analysis was performed using STATA version 17 (Stata Corp; College Station; TX, USA).

A total of 1678 articles were retrieved from various electronic databases. After removing duplicates, 56 unique titles were identified. Among these, 26 titles met the inclusion criteria and were included in the analysis. The quality of evidence for the included studies was assessed as high according to GRADE (Table 1).

The meta-analysis results indicated that early ICU admission compared to delayed ICU admission was associated with decreased hospital mortality (OR: 0.55, 95%CI: 0.45-0.66, P<0.001), although significant heterogeneity was observed among the studies (I^2: 86.52%, P<0.001) (Figure 1).

Table 1: GRADE assessment for all included studies.

Certainty assessment							Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations		
26	non-randomized studies	not serious [a]	not serious [b]	not serious	not serious [c]	None [d]	⨁⨁⨁⨁ High	CRITICAL

Explanations

a, b. Some bias may have been introduced through the data collection or risk of bias assessment processes. The synthesis is likely to produce biased results, because (i) potential biases were ignored (within and/or across studies), (ii) important between-study variation was not accounted for; (iii) there were important inadequacies in the methodology; or (iv) findings are incompletely reported in a way that raises concerns.

c. Findings are incompletely reported in a way that raises concerns. In some studies, there is insufficient information reported to make a judgement on risk of bias.

d. Assessing applying any restrictions based on date, publication format, or language appropriate. The synthesis should generally seek to include all studies known to have collected data relevant to the question being addressed. Results from individual studies may be missing from the synthesis because the study is unknown to the reviewers. Assessing the robustness of finding through funnel plot, sensitivity analyses, sub-group analysis, and sub-categorization.

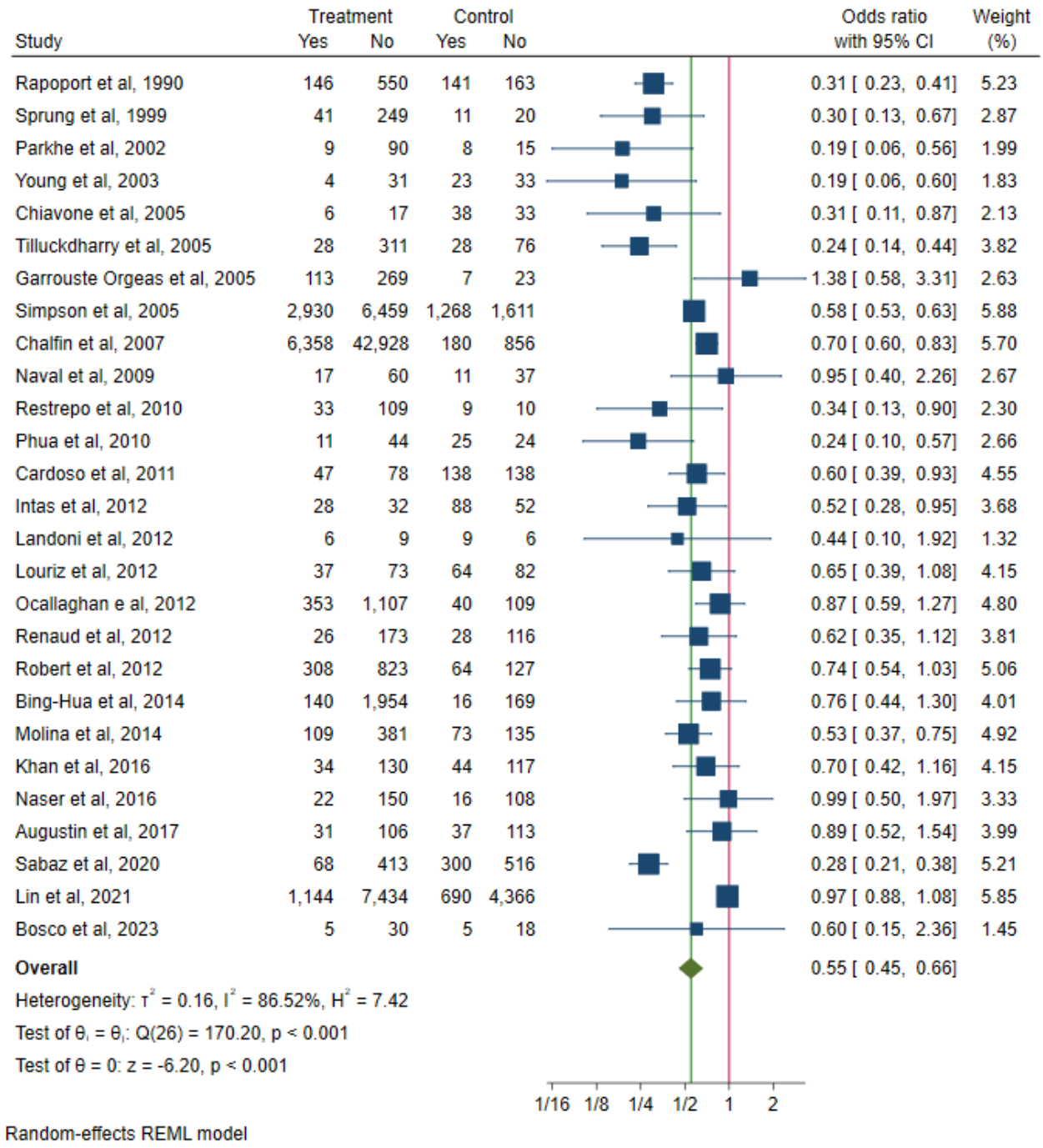

Figure 1: Forest plot showing the effect (odds ratio) of early ICU admission compared to delayed ICU admission on mortality.

Meta-regression analysis suggested that the year of publication contributed significantly to the observed heterogeneity (Supplementary file, Table S1), which was further supported by cumulative analysis (Supplementary file, Figure S1). Subgroup analyses based on publication year and sample size also identified these variables as sources of heterogeneity (Supplementary file, Figures S2-S3). The sensitivity analysis demonstrated that no single study had a disproportionate influence on the pooled effect sizes (OR) for the hospital mortality rate (Supplementary file, Figure S4). The Galbraith plot, used to assess heterogeneity, showed no

significant heterogeneity among the 26 included studies (Supplementary file, Figure S5). Funnel plot symmetry indicated no evidence of publication bias in the studies (Supplementary file, Figure S6A). This finding was supported by Egger's linear regression test (P=0.121) and Begg's rank test (P=0.587). The trim-and-fill method, employed to evaluate publication bias, demonstrated that the OR for the mortality rate remained unchanged, suggesting that publication bias did not impact the results (Supplementary file, Figure S6B).

Shortening the admission time of critically ill patients who need to be hospitalized in ICU can be significantly decreased mortality in the patients. Different interventions can be done in this field. One of the most cost-effective measures to reduce the mortality of these patients is to preserve the golden and precious time to start the care and treatment process. Evidence-based and need-based training is always effective and beneficial [6]. This letter highlights the crucial role of RCCN in emergency and critical care settings and emphasizes the need for a comprehensive training program to equip them with the necessary skills. By investing in the development of RCCN, we can enhance patient outcomes, reduce complications, optimize resource utilization, and ultimately save lives.

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Disclosure statement

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Authors' contributions

All authors equally contributed to this study.

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Table S1: Univariate and multivariate meta-regression results

Hospital mortality	Univariate Meta-regression Results		Meta-regression Results	
	β (95% CI)	P-value	β (95% CI)	P-value
Sample size	8.70 (-7.34 to 0.0000247)	0.288	9.63 (-4.42 to 0.0000237)	0.179
Year of publication	0.0302 (0.00628 to 0.05422)	0.013*	0.0310 (0.00751 to 0.05457)	0.010*

* P<0.05 considered as significant

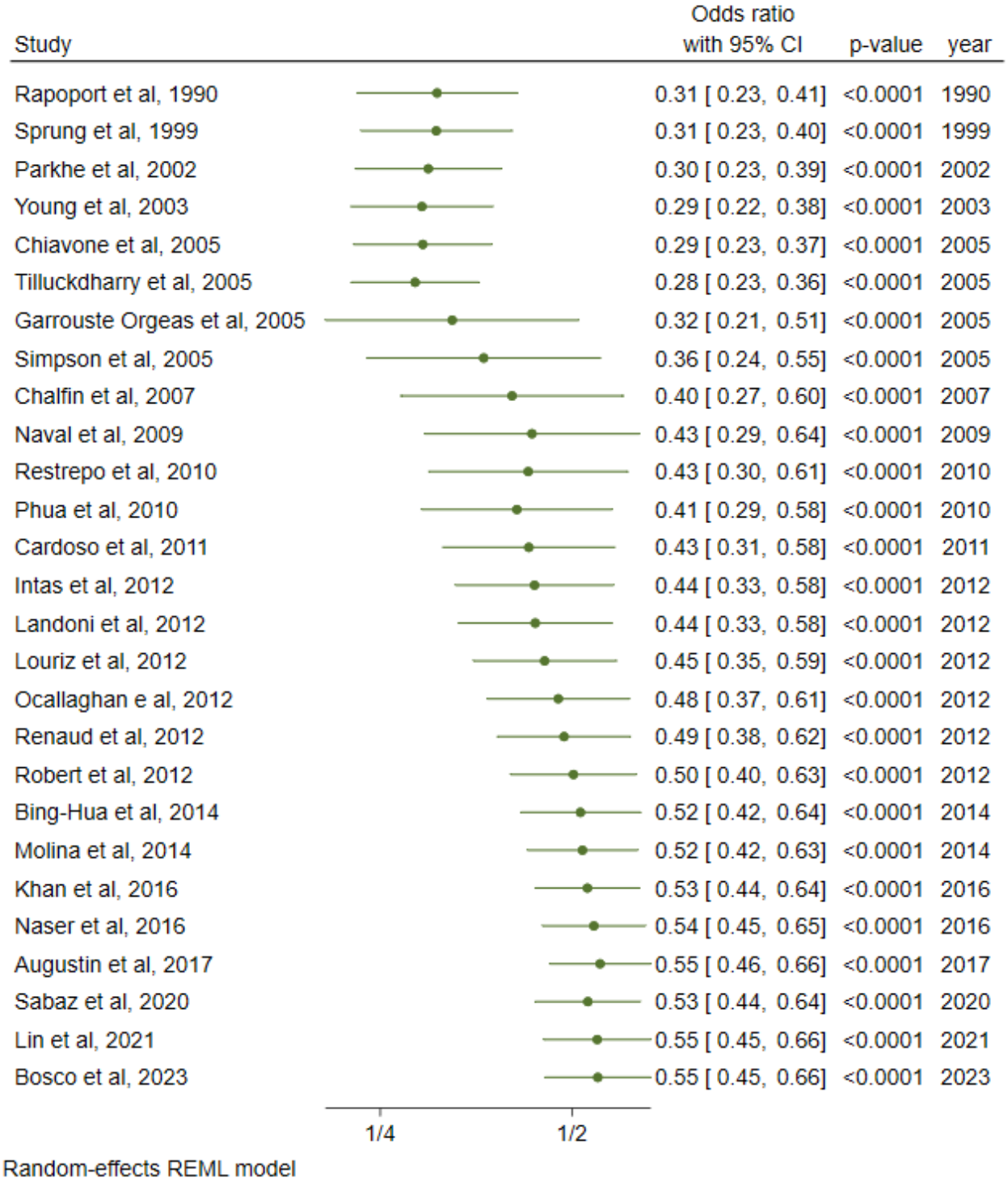

Figure S1: Cumulative analysis based on the year publication among included studies

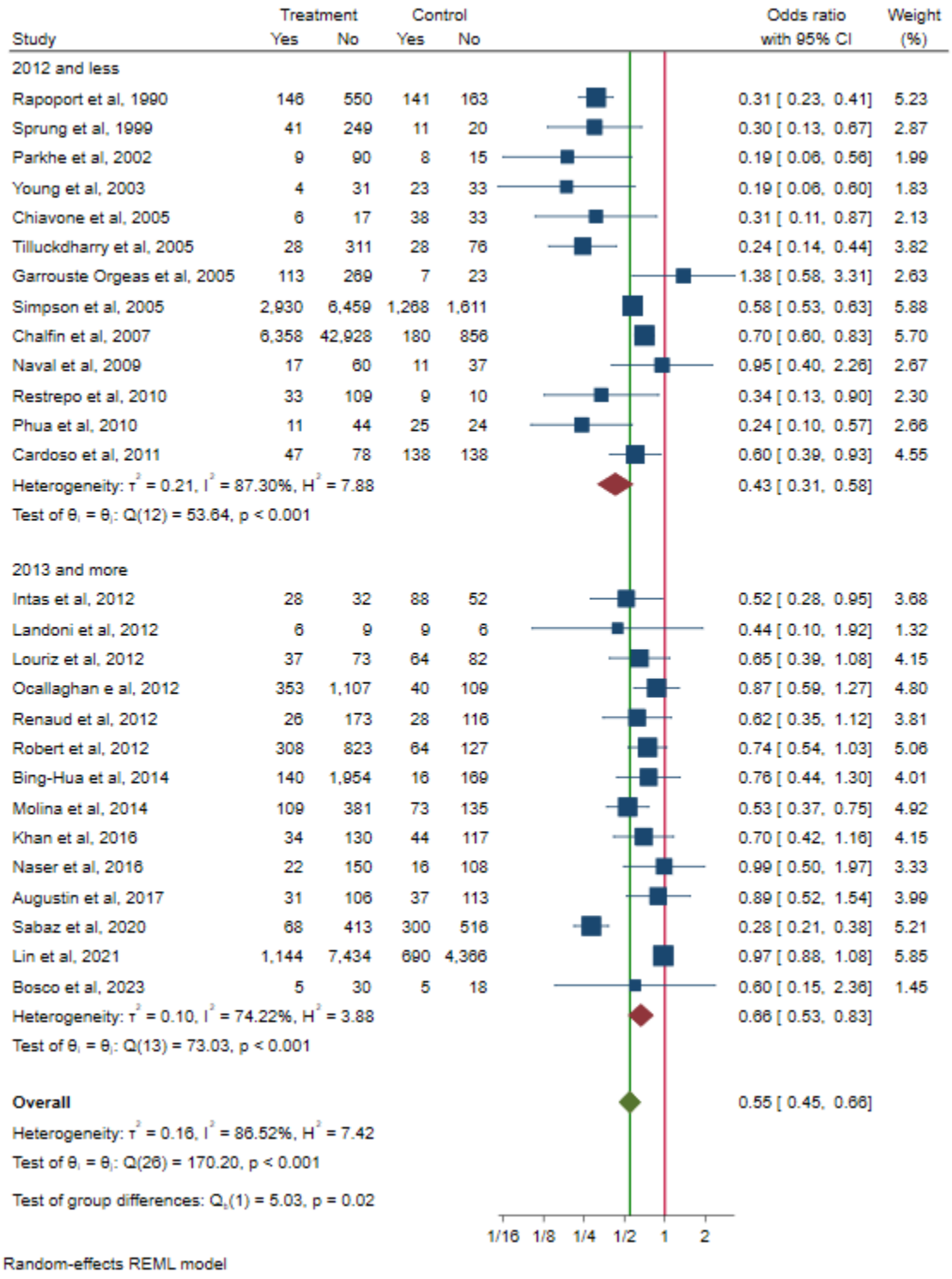

Figure S2: Subgroup analysis based on the year publication

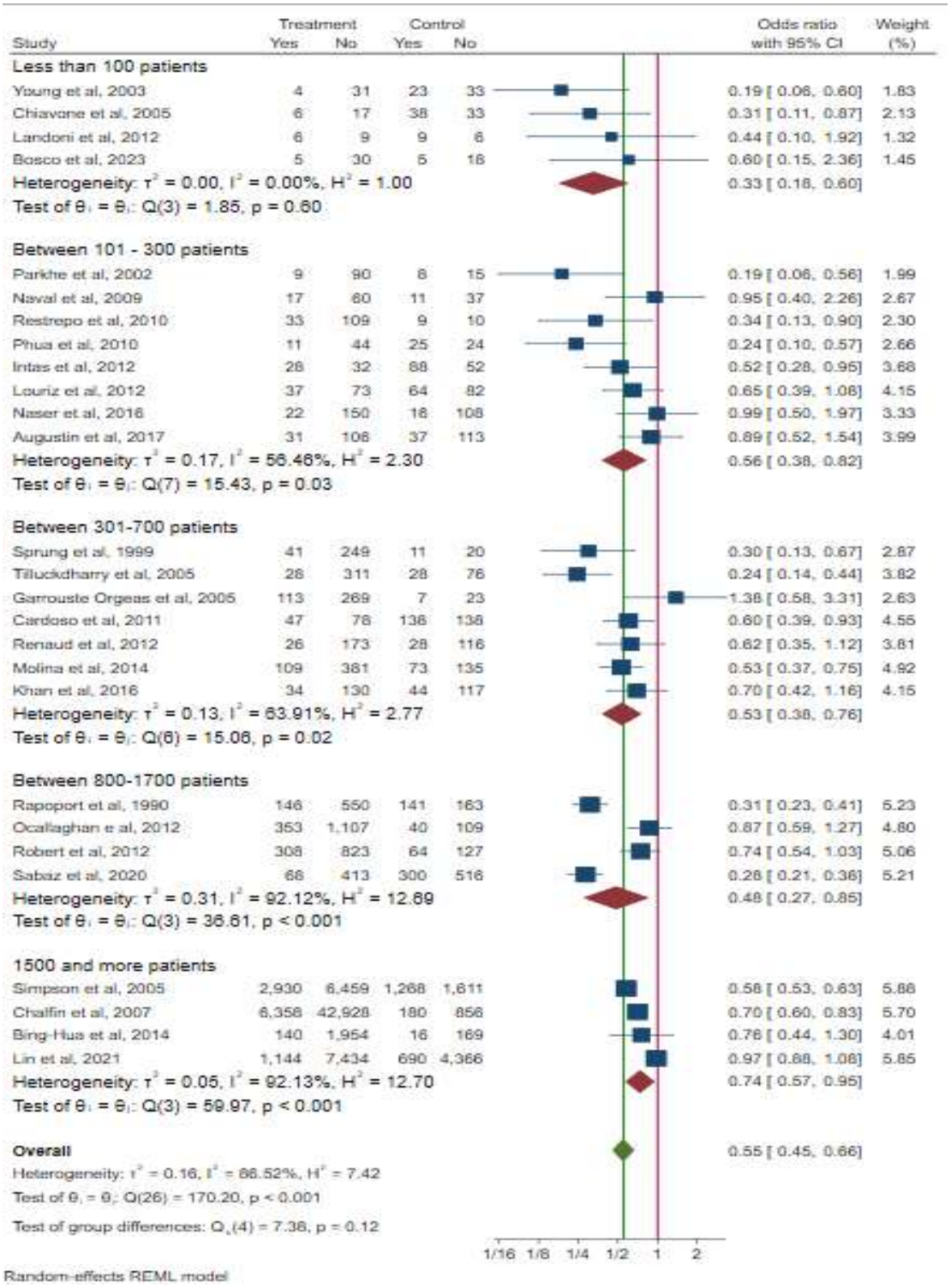

Figure S3: Subgroup analysis based on the sample size

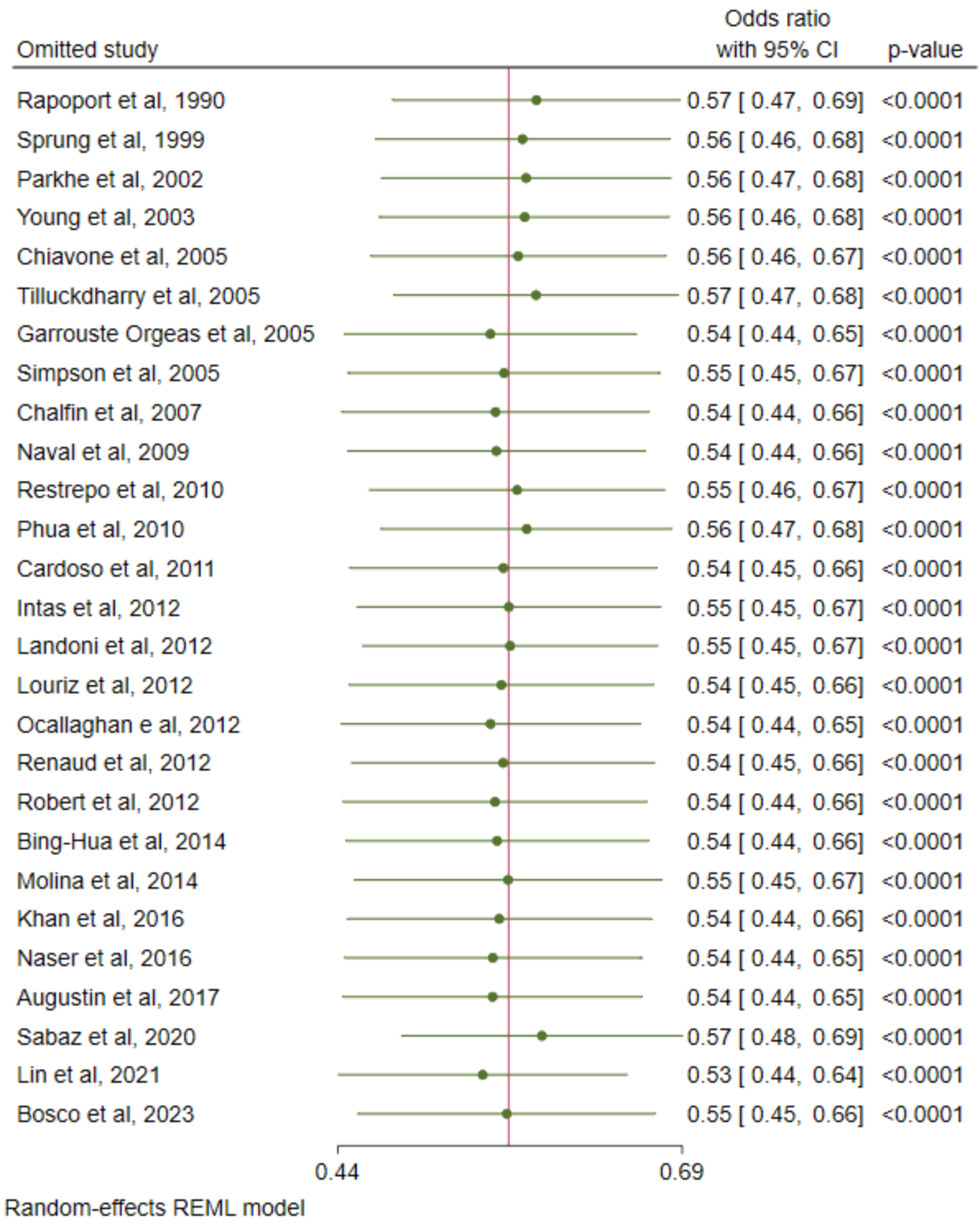

Figure S4: : Sensitivity analysis among included studies

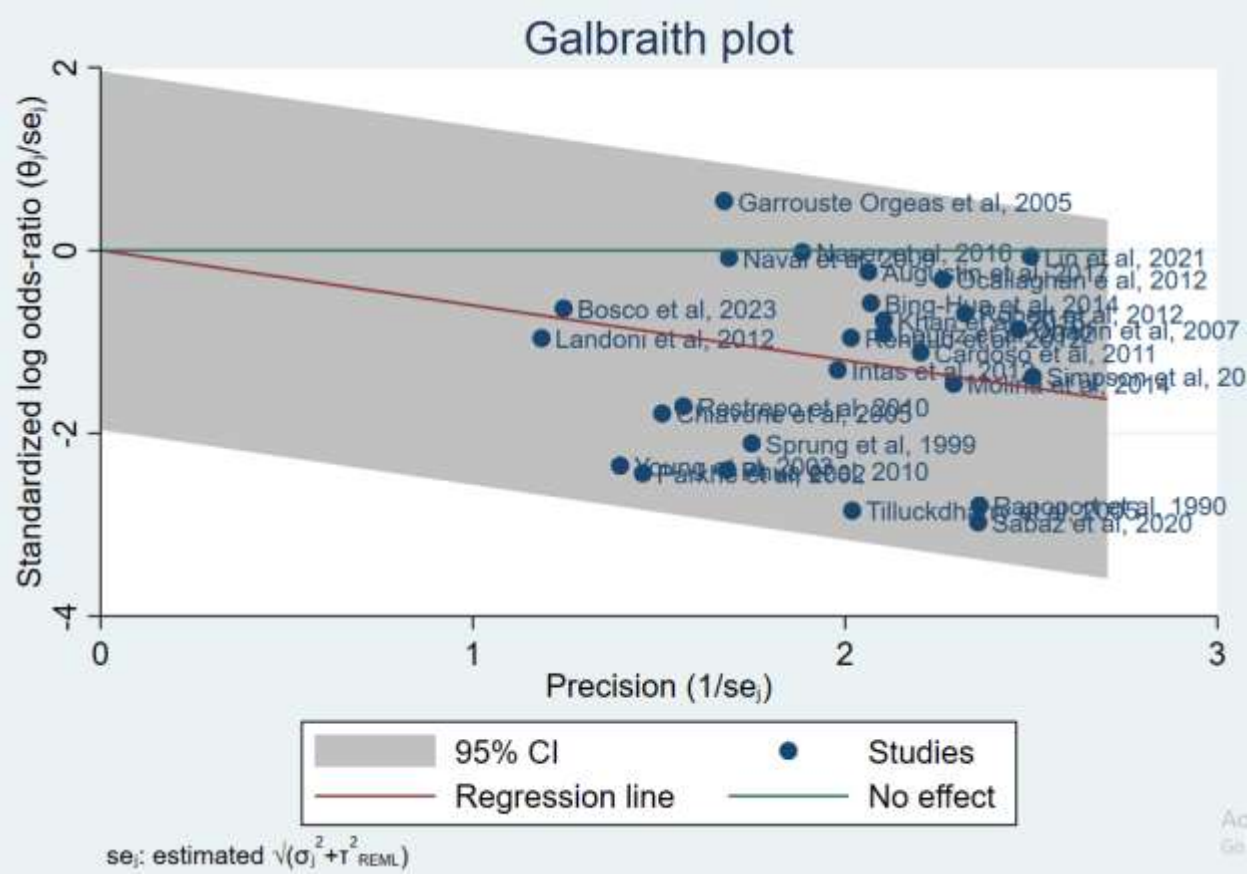

Figure S5: Galbraith plots to examine heterogeneity among included studies

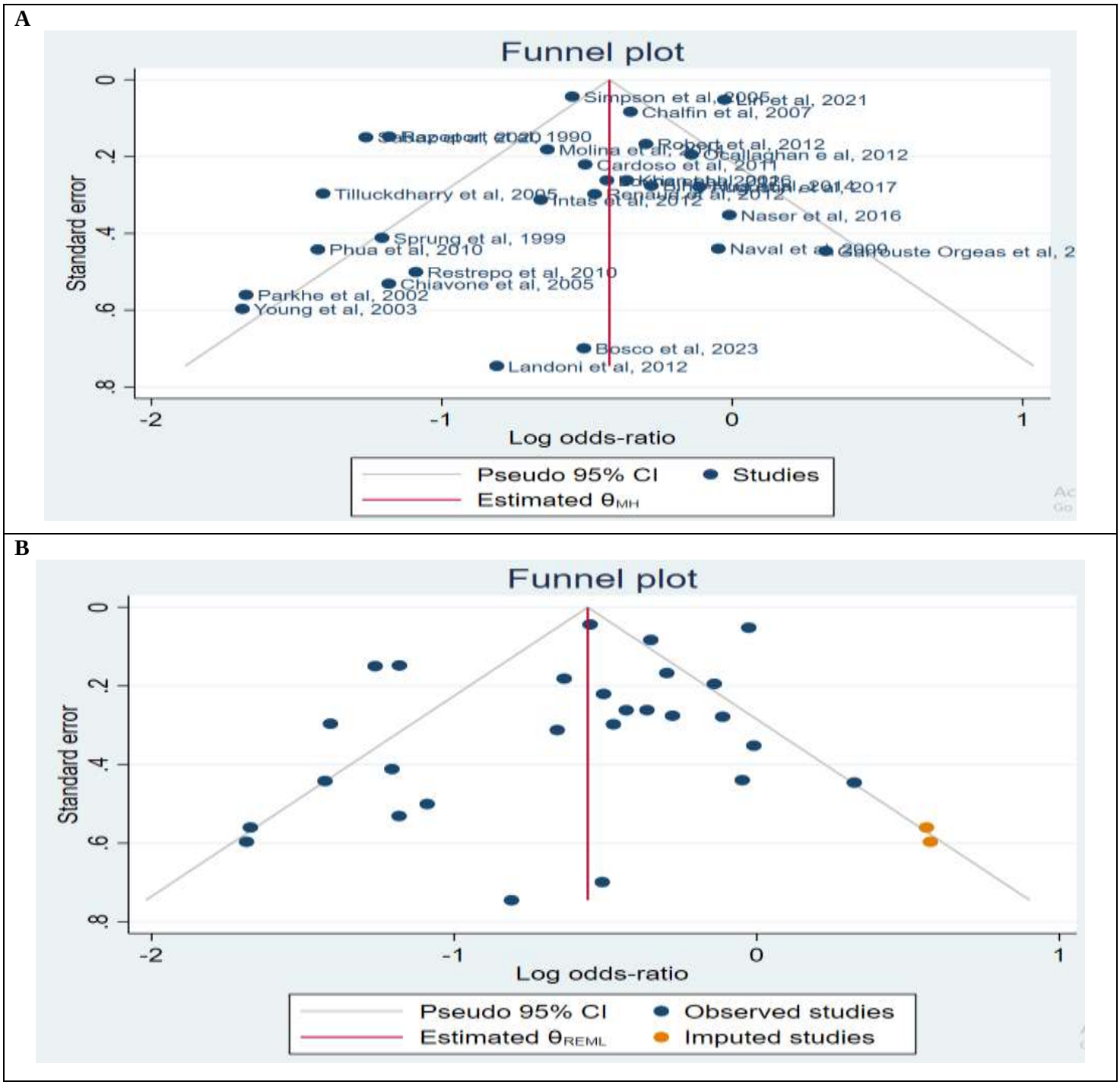

Figure S6: Publication bias assessment based on (A) funnel plot and (B) trim-and-fill method among included studies