



Practical clinical reviews

Clinical relevance of masks in the operating room? A systematic review

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ABSTRACT

Background: Face masks are recommended for sterile procedures, while the data supporting this recommendation is lacking. Here we systematically review randomized control trials on mask efficacy in the operating room as a means to preventing surgical site clinical infection.

Methods: PubMed, Google Scholar, Web of Science, and National Institute for Occupational Safety and Health Publications and Products were searched and articles were included if they fit the criteria of 1) randomized control trial, 2) clinical patient outcomes, 3) mask efficacy, 4) surgery setting, 5) in vivo, and 6) article was in English.

Results: The results indicate no difference in surgical site infections between the operations where masks were worn versus the operations where no mask was worn.

Conclusion: With such limited evidence and the great cost that accrues from purchasing face masks for all surgical staff, we hope for larger, well designed randomized control trials to evaluate the true clinical efficacy of surgical masks in the operating room.

Introduction

In the era of COVID-19, we are stimulated to know what is known about the established efficacy of masks. Face mask use in the operating room dates back to Germany in the nineteenth century (Matuschek et al., 2020). Current recommendations are for all persons to be masked for sterile procedures (Siegel et al., 2007). While many studies have explored the microbiology of wearing a mask in the (OR) (McLure et al., 1998; Howard et al., 2020), few have explored their clinical relevance. Here we systematically review randomized control trials on mask efficacy in the operating room as a means to preventing surgical site clinical infection.

Materials and methods

The Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) guidelines were followed for this systematic review (Moher et al., 2009).

Search strategy

A literature search utilized PubMed, Google Scholar, Web of Science,

and National Institute for Occupational Safety and Health Publications and Products on March 1st, 2021 using the search terms “mask use” and “surgical site” and “infection”, “face mask use” and “surgeons”, and “mask” and “splash” and “surgery”.

Eligibility

Articles were included if they fit the criteria of 1) randomized control trial, 2) clinical patient outcomes, 3) mask efficacy, 4) surgery setting, 5) in vivo, and 6) article was in English.

Data screening

Title and abstract screening was completed using Covidence. References from the included articles were checked and included if they met the inclusion criteria.

Data extraction

Data was extracted on study and patient characteristics, type of surgery, proportion of emergent procedures, primary outcomes, and results.

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Table 1
Data Extraction Results.

Author	Date	Surgical Fields	Patients (No.)	Age	Sex	Emergent	Primary outcome	Results
Neil Orr (Orr, 1981)	1981	General Surgery	NR	NR	NR	NR	Surgical Site Infection	No increase in wound infections with a significant ($p < 0.05$) decrease in SSI with no mask.
Th. Göran Tunevall (Tunevall, 1991)	1991	General Surgery	3088	58 years mask, 57 year in unmasked	NR	6% masked and 5.4% not masked	Surgical Site Infection	No statistically significant differences in wound infection rates ($p > 0.5$). In the masked group, the infection rate was 4.7% (3.7–5.8%, 95% CI) and in the unmasked group, 3.5% (2.6–4.5%, 95% CI)
Joan Webster et al. (Webster et al., 2010)	2009	Gynecology, Obstetric, General Surgery, and Urology	827	45.4 years no mask, 44.7 years mask	Male: 18.1% in no mask, 21.4 % in mask	23.4% in no mask, 23.8% in mask	Surgical Site Infection	11.5% infection rate in mask group and 9.0% infection rate in no mask group, but the difference was not statistically significant (OR 0.77 95 CI 0.49–1.21)
Geoffery V. Chamberlain and Elizabeth Houang (Chamberlain and Houang, 1984)	1984	Gynecology	9	NR	100% Female	NR	Surgical Site Infection	3/5 patients in the no mask group had an infection and 0/4 in the mask group had an infection. The study was discontinued due to the 3 infections occurring early in the study.

Results

There were 717 articles uploaded and 201 duplicates were removed. There were 516 titles and abstracts screened with 488 being found irrelevant and 68 were screened for full text. After full text, two articles filled the inclusion criteria and an additional two articles were included based on findings in the references. Table 1 summarizes the results. The findings with NR stand for not related.

Overall, the results indicate no difference in surgical site infections between the operations where masks were worn versus the operations where no mask was worn. However, this is of limited evidence as there have been few studies that were randomized control trials focused on clinical outcomes. There were 3, 924 patients between all of the studies combined, a small amount when considering that surgical masks have been around since the nineteenth century.

Webster et al. combined the studies of theirs and Tunevall et al and found a statistically significant result that favored not wearing a mask.

Discussion

For something that is recommended in every day practice, there is little evidence to support the continued use of surgical face masks in the operating room from an infection standpoint. Orr (Orr, 1981) found that there was actually a decrease in surgical site infection. One proposed hypothesis that masks may actually increase surgical site infections by the rubbing of the mask against skin releasing organisms such as staphylococci (Tunevall, 1991), a known cause of surgical site infections (Anderson and Kaye, 2009). With such limited evidence and the great cost that accrues from purchasing face masks for all surgical staff, we hope for larger, well designed randomized control trials to evaluate the true clinical efficacy of surgical masks in the operating room.

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.

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