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SDD, SOD, or oropharyngeal chlorhexidine to prevent pneumonia and to reduce mortality in ventilated patients: which manoeuvre is evidence-based?

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Dear editor: We read with interest the editorial by Segers and de Mol on the prevention of ventilator-associated pneumonia (VAP) after cardiac surgery [1]. We would like to comment on the authors' statements on the use of selective digestive decontamination (SDD), selective oropharyngeal decontamination (SOD), and oropharyngeal chlorhexidine, as they are based on inaccurate interpretation of the evidence.

The authors refer to a large SDD/SOD study [2] which showed a significant reduction in the odds for mortality of SDD and SOD compared to standard care of 16% (odds ratio [OR] 0.835, 95% confidence interval [CI] 0.72–0.968, $P = 0.016$) and 14% (OR 0.858, 95% CI 0.739–0.996, $P = 0.045$), respectively. The reduction in mortality was higher in the SDD group than in the SOD group, albeit not significantly. There are nine randomized controlled trials (RCTs) evaluating the impact of SOD on lower respiratory tract infection and mortality. We performed a meta-analysis of those RCTs showing that SOD significantly reduces lower respiratory tract infections, but not mortality (Table 1). Contrastingly, there is robust evidence from the literature which indicates that the full SDD regimen of parenteral and enteral antimicrobials significantly reduces morbidity, i.e. pneumonia [3] and bloodstream infection [4], and mortality [3, 5].

The authors advocate the use of SOD instead of SDD "because it does not include widespread systemic prophylaxis with cephalosporins and involves a lower volume of topical antibiotics, thus minimizing the risk of development of antibiotic resistance". However, the Dutch study [2] clearly shows that patients with Gram-negative bacteria in rectal swabs resistant to the marker antibiotics are lower with SDD than with SOD. These results confirm that the resistance problem is not a function of intestinally applied volume of antimicrobials, but of systemically administered antibiotics. Remarkably, the use of all systemic antibiotics was higher in the SOD group than in the SDD group. Finally, the Dutch study confirms the findings that SDD does not increase the resistance problem, but actually reduces it [3].

The authors recommend the use of oropharyngeal chlorhexidine in cardiac surgery. Of the five meta-analyses of oropharyngeal chlorhexidine, three demonstrated a significant reduction in pneumonia, but none showed a significant reduction in mortality (see S1 in the Electronic Supplementary Material). The meta-analysis of the only three RCTs of chlorhexidine in cardiac surgery shows that chlorhexidine significantly reduces lower respiratory tract infections (Table 1). However, this result should be cautiously interpreted, as the duration of mechanical ventilation was short, and those studies reported the incidence of nosocomial pneumonia, not that of VAP, e.g. most patients received only few doses of the oral rinsing agent because extubation occurred within 4–12 h after surgery. Again, mortality is not significantly reduced by chlorhexidine.

Therefore, although we welcome the authors' claim of "prepare and defend", we advocate prevention of pneumonia using evidence based medicine (EBM) manoeuvres. SDD is the only EBM manoeuvre which has been shown to significantly reduce severe infections, i.e. pneumonia and bloodstream infection, and mortality, whilst SOD and oropharyngeal chlorhexidine still require further investigation.

References

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Table 1 Meta-analysis of randomized controlled trials evaluating the impact of selective oropharyngeal decontamination (SOD) and topical oropharyngeal chlorhexidine in cardiac patients on lower respiratory tract infection and mortality

Manoeuvre First author Total	Year	Population	Lower respiratory tract infection			Mortality		
			Test	Control	OR (95% CI)	Test	Control	OR (95% CI)
SOD								
Abele-Horn	1997	Trauma	13/58	24/30	0.07 (0.02–0.21)	11/58	5/30	1.17 (0.37–3.75)
Bergmans	2001	Mixed	9/87	38/139	0.31 (0.14–0.67)	25/87	53/139	0.65 (0.37–1.17)
de Smet	2009	Mixed	NA	NA	–	416/1904	443/1990	0.98 (0.84–1.14)
Gosney	2006	Stroke	1/103	7/100	0.13 (0.02–1.08)	9/103	11/100	0.77 (0.31–0.96)
Laggner	1994	Mixed	1/33	4/34	0.23 (0.02–2.22)	9/33	14/34	0.54 (0.19–1.50)
Pneumatikos	2002	Trauma	5/40	16/39	0.21 (0.07–0.64)	5/40	7/39	0.65 (0.19–2.27)
Pugin	1991	Surgery/trauma	4/25	21/27	0.05 (0.01–0.22)	7/25	7/27	1.11 (0.33–3.79)
Rios	2005	Mixed	15/47	13/49	1.30 (0.54–3.14)	18/47	21/49	0.83 (0.37–1.87)
Rodriguez-Roldan	1990	Mixed	3/13	14/15	0.02 (0.00–0.24)	4/13	5/15	0.89 (0.18–4.38)
All studies[a]			51/406	137/433	0.17 (0.07–0.43)	504/2310	566/2423	0.93 (0.81–1.07)
Chlorhexidine								
deRiso	1996	Cardiac	3/173	9/180	0.35 (0.10–1.27)	2/173	10/180	0.20 (0.04–0.92)
Houston	2002	Cardiac	4/270	9/291	0.49 (0.15–1.56)	6/270	3/291	2.18 (0.54–8.81)
Segers	2006	Cardiac	45/485	74/469	0.55 (0.37–0.81)	8/485	6/469	1.29 (0.45–3.76)
All studies[b]			52/928	92/940	0.52 (0.36–0.74)	16/928	19/940	0.88 (0.24–3.17)

Results are presented as odds ratios with 95% confidence interval using the random effects model. The Cochran Q statistic for heterogeneity was used for all outcome measures. Heterogeneity was considered to be significant if the P value was < 0.10. I^2 measure of inconsistency was also evaluated with the formula 100% x (Q−df)/Q, where Q is Cochran's Q statistic and df is the degree of freedom (number of studies−1). Negative values of I^2 are put equal to 0%; zero percent indicates no observed heterogeneity, whilst an I^2 of <30% indicates mild heterogeneity, 30–50% moderate, and >50% severe heterogeneity

OR odds ratio, *CI* confidence interval, *SOD* selective oropharyngeal decontamination, *NA* not available

No significant heterogeneity was found in all comparisons

References of SOD and chlorhexidine trials are reported in S2 in the Electronic Supplementary Material

[a] $P < 0.001$ for lower respiratory tract infection, $P = 0.327$ for mortality

[b] $P < 0.001$ for lower respiratory tract infection, $P = 0.84$ for mortality

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