The role of selective digestive tract decontamination on mortality and respiratory tract infections: a meta-analysis

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Authors' objectives
To assess the role of selective digestive decontamination (SDD) on mortality and respiratory tract infections in patients requiring intensive care.

Searching
MEDLINE was searched for articles published in the English language. The bibliographies of relevant original investigations and review articles were also searched.

Study selection
Study designs of evaluations included in the review
Prospective randomised controlled trials (RCTs) that studied the use of SDD in ICU patients were included if they used patient mortality as an outcome, and if the sample sizes were greater than ten per randomised group. Parallel group and crossover designs were also included. Studies with historical controls were excluded.

Specific interventions included in the review
SDD. No details were given of therapy used to decontaminate the digestive system.

Participants included in the review
Medical, surgical or trauma patients in the intensive care unit (ICU) were included. Organ transplant and burns patients were excluded.

Outcomes assessed in the review
The primary outcomes assessed were total mortality, mortality due to acquired nosocomial infection, pneumonia, and tracheobronchitis.

How were decisions on the relevance of primary studies made?
The author does not state how the papers were selected for the review, or how many of the reviewers performed the selection.

Assessment of study quality
The author does not state that they assessed validity.

Data extraction
A data extraction form was used to extract the data.

Methods of synthesis
How were the studies combined?
Cumulative risk differences were calculated for each outcome. A chi-squared analysis was used to compare the hospital mortality rates and respiratory infection rates for patients receiving SDD and control patients.

How were differences between studies investigated?
A sensitivity analysis was conducted by re-estimating the mortality related to acquired nosocomial infection after excluding one study that reported a high mortality rate.
Results of the review
Total mortality was assessed using 14 RCTs (N=2,270).

Mortality related to acquired nosocomial infection was assessed using 7 RCTs (N=778).

Pneumonia was assessed using 14 RCTs (N=2,128).

Bacteriological data for those patients acquiring pneumonia was assessed using 7 RCTs (N=1,306).

Tracheobronchitis was assessed using 7 RCTs (N=1,043).

Acquired infection rates were assessed using 11 RCTs (N=2,151).

Mixed bacterial infections were assessed using 6 studies (N=1,128).

Mortality: the mortality rate was 0.243 in SDD-treated patients compared with 0.262 in control patients (P=0.291). The risk difference was 0.019 (95% confidence interval, CI: -0.016, +0.054). The power of the sample size was estimated to be 0.84 (using an alpha-value of 0.05).

Mortality related to acquired nosocomial infection: the mortality rate was 0.050 in SDD-treated patients, compared with 0.101 in control patients (P=0.007). The risk difference was 0.051 (95% CI: 0.015, 0.089). After omitting one study with a high mortality, the difference was non significant (P=0.074).

Pneumonia: the rate of developing pneumonia was 0.074 in SDD-treated patients, compared with 0.219 in control patients (P<0.001). The risk difference was 0.145 (95% CI: 0.116, 0.174). The incidence of acquired pneumonia due to Gram-negative bacteria in the SDD-treated group (rate 0.019) was less than that in the control group (rate 0.138; P<0.0001). The occurrence of acquired pneumonia due to Gram-positive bacteria was similar in the two groups: the rate was 0.033 for both the SDD and control groups (P=0.933).

Tracheobronchitis: the rate of developing tracheobronchitis was 0.065 in SDD-treated patients, compared with 0.117 in control patients (P=0.004). The risk difference was 0.052 (95% CI: 0.017, 0.087).

Acquired infection rates: the rates for Gram-positive infections were 0.171 and 0.206 in the SDD and control groups, respectively (P=0.038); the rates for Gram-negative infections were 0.087 and 0.355 in the SDD and control groups, respectively (P<0.0001).

Mixed bacterial infections: the rate was 0.022 in the SDD group, compared with 0.081 in the control group (P<0.0001).

Authors' conclusions
SDD appeared to decrease respiratory infection rates despite there being no demonstrable effect on overall patient mortality. In the light of this, the routine use of SDD in critically-ill patients cannot be recommended.

CRD commentary
This was a clearly written and presented review that included a discussion of the possible reasons for the observed discrepancy between patient mortality rates and the rates of acquired respiratory infections. The discussion also mentioned the following limitations of the review: the inclusion of heterogeneous patient populations, limiting the generalisability of any findings to any specific ICU population; the lack of clear guidelines in the primary studies for establishing causal relationships between acquired infection and mortality; the possibility of patient selection bias; and the lack of consideration of outcomes such as length of hospital stay and ICU costs.

There were limited details of the literature search strategy and the included studies. The definitions used for the outcomes 'pneumonia' and 'tracheobronchitis' were omitted, and details of the decontamination regimes used were not provided. No details were given of the methods used to select the studies for inclusion or to extract the data. The review lacked the following: an assessment of the validity of the primary studies; a determination of statistical heterogeneity.
among studies; and a discussion of clinical heterogeneity among studies. Sensitivity analyses could have been used to assess the effect of different decontamination regimes, the effect of quality on the results, and to determine whether the responses differed according to the patient population.

There was evidence to support the lack of effect of SDD on unselected ICU populations. The effectiveness of the decontamination of pneumonia and tracheobronchitis was dependent upon a consistent definition being used across the studies.

**Implications of the review for practice and research**
The authors suggest that future research examining SDD should be carefully designed to: (1) determine the contribution of Gram-positive bacteria and antibiotic resistance bacteria to patient outcome; (2) define specific patient populations that may benefit from the digestive contamination; and (3) assess the effect of decontamination on length of hospital stay and costs.

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