Selective decontamination of the digestive tract in surgical patients: a systematic review of the evidence

Nathens A B, Marshall J C

Authors' objectives
To determine the relative efficacy of selective decontamination of the digestive tract in critically ill surgical and medical patients, and in selected sub-groups of surgical patients with pancreatitis, major burn injury, and those undergoing major elective surgery or transplantation.

Searching
MEDLINE was searched from January 1966 to December 1996 using the following keywords: 'decontamination or prophylaxis', 'intensive care units' and 'antibiotics'. Titles and abstracts over this period were searched for the word 'decontamination'. Additional citations were obtained from several recent meta-analysis and through personnel communication with other investigators involved in primary studies.

Study selection
Study designs of evaluations included in the review
Prospective randomised or consecutive trials on the use of SDD in critically ill surgical or medical patients were included. Studies using historical controls were included only in patient populations where limited data exists. Studies were considered to have enrolled surgical patients if at least 75% of subjects were admitted to intensive care following trauma or major surgery. Studies were considered to have enrolled medical patients when fewer than 25% of subjects met this criteria.

Specific interventions included in the review
Selective decontamination of the digestive tract (SDD) was studied. The standard SDD regime consists of 2 components: topical nonabsorbed polymixin E, tobramycin and amphotericin B; plus intravenous cefotaxime administered till surveillance cultures demonstrate adequate decontamination of the gastrointestinal tract. SDD is initiated as soon as possible following admission and is continued till cessation of mechanical ventilation or discharge from the intensive care unit (ICU). SDD regimes used in the included studies were not specified.

Participants included in the review
Critically-ill surgical and medical patients, patients with pancreatitis or major burn injury and patients undergoing major elective surgery including cardiac surgery and liver transplantation were included. Patients were in ICUs.

Outcomes assessed in the review
Outcomes included mortality and the following nosocomial infections: pneumonia; bacteraemia; urinary tract infection; and wound infection.

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

Assessment of study quality
Validity was assessed using the model described by Heyland that has the following criteria: randomisation (not randomised vs truly randomised); blinding (not blinded vs double blinded); analysis (ITT vs other); patient selection (selected or can't tell vs consecutive); comparability at baseline (no or not sure vs yes); extent of follow-up (100% vs < 100%); treatment protocol (poorly vs reproducibly described); cointerventions (not described, described but not equal vs described and equal); and crossovers (not described vs > 10 vs < 10) (see Other Publications of Related Interest). The authors do not state how the papers were assessed for validity, or how many of the authors performed the validity assessment.
Data extraction
The authors do not state how the data were extracted for the review, or how many of the authors performed the data extraction.

Methods of synthesis
How were the studies combined?
Pooled odds ratios (OR) and 95% confidence intervals were estimated using the Mantel-Haenszel method.

How were differences between studies investigated?
Validity score between medical and surgical trials were compared. Results of individual studies were graphically presented.

Results of the review
SDD in critically ill surgical patients: 11 RCTs.

SDD in critically ill medical patients: 10 RCTs.

SDD in liver transplantation patients: 3 RCTs.

SDD in cardiac surgical patients: 3 RCTs.

SDD in acute pancreatitis patients: 1 RCT
SDD in critically ill surgical patients: Statistically significant reduction in mortality with SDD: overall OR = 0.70 (95% CI: 0.52, 0.93); topical and systematic OR = 0.60 (95% CI: 0.41, 0.88); topical only OR = 0.86 (95% CI: 0.51, 1.45). Reduction in pneumonia, bacteraemia and urinary tract infection. Pneumonia OR = 0.19 (95% CI: 0.15, 0.26). Bacteraemia OR = 0.51 (95% CI: 0.34, 0.75). Urinary tract infection OR = 0.51 (95% CI: 0.34, 0.76). No statistically significant difference on incidence of wound infection: OR = 0.56 (95% CI: 0.23, 1.37).

SDD in critically ill medical patients: Statistically significant reduction in pneumonia, and urinary tract infection. Pneumonia OR = 0.45 (95% CI: 0.33, 0.62). Urinary tract infection OR = 0.51 (95% CI: 0.32, 0.82). Non significant reduction in mortality with SDD: overall OR = 0.91 (95% CI: 0.71, 1.18); topical and systematic OR = 0.75 (95% CI: 0.53, 1.06); topical only OR = 1.14 (95% CI: 0.77, 1.68). No significant reduction in bacteraemia OR = 0.77 (95% CI: 0.43, 1.36) or length of stay in intensive care (16.7 +/- 16 days for controls vs 16.8 +/- 13 days for SDD).

Methodological scores were similar in medical (7.7 +/- 1.9) and surgical trials (7.9 +/- 2.3).

SDD in liver transplantation patients: No significant reduction in mortality with SDD: OR = 0.29 (95% CI: 0.06, 1.47). Statistically significant reduction in infection with SDD: OR = 0.44 (95% CI: 0.23, 0.87).

SDD in cardiac surgical patients: No significant reduction in mortality with SDD: OR = 0.68 (95% CI: 0.19, 2.50). Statistically significant reduction in infection with SDD: OR = 0.28 (95% CI: 0.12, 0.67).

No prospective RCTs were found that evaluated SDD in thermal injury patients.

SDD in acute pancreatitis: reduction in the incidence of infected pancreatic necrosis with SDD treatment (SDD 38% vs no-SDD 18%).

Cost information
With currently available data it was not possible to assess the cost-effectiveness of SDD in infection prevention.
Authors' conclusions
Selective decontamination of the digestive system notably reduces mortality in critically ill surgical patients while critically ill medical patients derive no such benefit.

CRD commentary
The aims and inclusion criteria were defined. Heterogeneity was explored graphically for mortality in surgical and medical patients.

By limiting the literature search to English language publications listed in MEDLINE, some other relevant studies may have been omitted. No detail were given of methods used to select primary studies, assess validity or extract data. Fuller details of the primary studies would have been welcome such as sample size, the actual SDD regimes used, interventions in control groups, definitions and ascertainment of outcomes, and results of validity assessment.

Without more comprehensive information on the primary studies the evidence presented should be interpreted with caution.

Implications of the review for practice and research
Practice: The authors consider that the use of selective decontamination of the digestive tract should be limited to those populations in whom rates of nosocomial infection are high and in whom infection contributes notably to adverse outcome.

Research: The authors consider that further studies are required of the efficacy of SDD in liver transplant and other solid organ transplant and in thermal injury patients.

Bibliographic details

PubMedID
10025458

Original Paper URL
http://archsurg.ama-assn.org

Other publications of related interest

This additional published commentary may also be of interest. Nissen N, Angus DC. Review: selective decontamination of the digestive tract reduces mortality and some nosocomial infections in critically ill surgical patients. ACP J Club 1999;131:37.

Indexing Status
Subject indexing assigned by NLM

MeSH
Antibiotic Prophylaxis; Critical Illness; Digestive System; Elective Surgical Procedures; Humans; Organ Transplantation; Pancreatitis /surgery; Prospective Studies; Randomized Controlled Trials as Topic; Surgical Procedures, Operative
AccessionNumber
11999000414

Date bibliographic record published
30/06/2000

Date abstract record published
30/06/2000

Record Status
This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.