Effectiveness and cost of selective decontamination of the digestive tract in critically ill intubated patients: a randomized, double-blind, placebo-controlled, multicenter trial

Record Status
This is a critical abstract of an economic evaluation that meets the criteria for inclusion on NHS EED. Each abstract contains a brief summary of the methods, the results and conclusions followed by a detailed critical assessment on the reliability of the study and the conclusions drawn.

Health technology
Using selective decontamination of the digestive tract (SDD) to prevent the incidence of ventilator-associated pneumonia (VAP) in mechanically ventilated, critically ill patients.

Type of intervention
Primary prevention.

Economic study type
Cost-effectiveness analysis.

Study population
Mechanically ventilated, critically ill patients (aged 16 or older) requiring intubation for a minimum of 48 hours.

Setting
Hospital. The economic study was carried out in Madrid, Spain.

Dates to which data relate
Dates were not reported.

Source of effectiveness data
Effectiveness data were derived from a single study.

Link between effectiveness and cost data
The costing was performed prospectively on the same patient sample as that used for the effectiveness analysis.

Study sample
Power calculations were used to determine the sample size (for the detection of a reduction from 30% to 15% in VAP between the groups with a statistical power of 0.80 and a two-sided test at the 0.05 significant level, a sample size of 295 patients was required).271 patients were randomly assigned to either the SDD-treated group receiving antibiotic prophylaxis (n=131, average age of 55 years (SD, 18.7)) or to the placebo group (n=140, average age of 55.1 years (SD, 18.3)).

Study design
The study was a double-blind, randomised, placebo-controlled trial, carried out in five centres. The duration of the
follow-up was until discharge or death. A total of 9 patients in the SDD-treated group and 16 patients in the control group were lost to follow up. Patients were stratified by centres.

**Analysis of effectiveness**

The analysis of effectiveness was based on intention to treat. The health outcome measures were the incidence of VAP, the incidence of non-respiratory infections, mortality rate, and colonisation with resistant gram-positive strains. The groups were shown to be comparable in terms of baseline characteristics except that a significantly higher number of patients experienced chronic renal failure in the SDD-treated group. An adjustment was made for the effects of confounding variables including APACHE II score on admission, and for the effects on mortality of study group, receiving the intravenous component of the protocol (ceftriaxone), age, and centre.

**Effectiveness results**

The incidence of VAP was 11.4% in the SDD-treated group versus 29.3% in the control group (p<0.001; 95% CI: 7.8 - 27.9); non-respiratory infections occurred in 19.1% and 30.7% of patients, respectively, (p=0.04; 95% CI: 0.7 - 22.7); mortality occurred in 38.9% and 47.1% of patients, respectively, (p=0.57). The SDD-treated group had more cases of colonisation with resistant gram-positive strains, (p<0.05).

**Clinical conclusions**

The study revealed that SDD was highly effective in preventing secondary infections in a mixed population of ventilated patients at high risk for infection. The authors observed no resistant gram negative bacilli or superinfections following failures of SDD. However, colonisation, although not infection, with intrinsically resistant gram-positive cocci was increased in the treated group, and close microbiologic surveillance is therefore mandatory with the use of SDD.

**Measure of benefits used in the economic analysis**

The main measure of benefit was survival rate.

**Direct costs**

Cost discounting was not required as the study period was less than one year. Quantities were not systematically reported separately from the costs. Cost items were reported separately. Cost analysis covered the costs of ICU stay (fixed costs, nutrition, and drug costs), costs of antibiotics, diagnostic procedure of infection, and surveillance cultures. The perspective adopted in the cost analysis was not explicitly specified. The price date was 1993.

**Statistical analysis of costs**

Statistical analysis (Student’s t test for normally distributed variables and Wilcoxon’s rank-sum test for non-parametric variables) was performed to compare the differences between the groups in terms of cost categories.

**Indirect Costs**

Not considered.

**Currency**

US dollars ($). A conversion was carried out from Spanish Pesetas (Pta) to US dollars based on an exchange rate of $1 = Pta150.
Estimated benefits used in the economic analysis
The survival rate was 61% (80 of 131 patients) in the SDD-treated group versus 53% (74 of 140) in the control group, (p=0.57).

Cost results
The average total cost was $8,840 (range: 4,837 - 16,861) in the SDD-treated group versus $9,318 (range: 5,084 - 18,470) in the placebo group, (p=0.3).

Synthesis of costs and benefits
Incremental analysis was deemed not applicable since the reduction in infectious morbidity due to the use of SDD was accompanied by lower treatment costs. The average cost-effectiveness ratio was estimated by calculating the average total cost per survivor to be $21,507 for the SDD-treated group versus $27,250 for the placebo group.

Authors' conclusions
In a mixed population of intubated patients, SDD was associated with a significant reduction of morbidity at a reduced cost. The authors' findings support the use of SDD in this high-risk group.

CRD COMMENTARY - Selection of comparators
The reason for the choice of the comparator is clear.

Validity of estimate of measure of benefit
The internal validity of the estimate of benefit is likely due to the randomised design used in the effectiveness analysis.

Validity of estimate of costs
Resource utilisation was not systematically reported separately from the costs but adequate details of the methods of cost estimation were given. It is not clear whether cost data were collected prospectively or retrospectively. The sources of cost data were not clearly specified.

Other issues
The issue of generalisability to other settings or countries was not addressed. No dates were given for the effectiveness, resource use, and price data.

Source of funding
Supported in part by a grant from Productos Roche SA, Spain.

Bibliographic details

PubMedID
9731025

DOI
10.1164/ajrccm.158.3.9712079

Original Paper URL
http://ajrccm.atsjournals.org/cgi/content/abstract/158/3/908?maxtoshow=&amp;
Indexing Status
Subject indexing assigned by NLM

MeSH
Bacteria /drug effects; Bacterial Infections /prevention & control; Cause of Death; Ceftriaxone /therapeutic use;
Cephalosporins /therapeutic use; Colony Count, Microbial; Confidence Intervals; Critical Care; Critical Illness;
Digestive System /microbiology; Double-Blind Method; Drug Therapy, Combination /economics /therapeutic use;
Female; Gram-Negative Bacteria /drug effects; Gram-Positive Bacteria /drug effects; Health Care Costs; Humans;
Incidence; Intubation, Intratracheal /adverse effects; Length of Stay; Male; Middle Aged; Oropharynx /microbiology;
Placebos; Pneumonia, Bacterial /etiology /prevention & control; Respiration, Artificial /adverse effects; Survival Rate

AccessionNumber
21998001451

Date bibliographic record published
30/09/1999

Date abstract record published
30/09/1999