Randomized controlled trial of physician-directed versus respiratory therapy consult service-directed respiratory care to adult non-ICU inpatients

Stoller J K, Mascha E J, Kester L, Haney D

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
Respiratory Therapy Consult Service (RTCS) directed care to implement Clinical Practice Guideline-based algorithms in adult non-intensive care unit (ICU) inpatients requiring specific respiratory care services.

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
Adult non-ICU inpatients requiring specific respiratory care services.

Setting
Hospital. The economic study was carried out in Cleveland, USA.

Dates to which data relate
Not specified.

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

Link between effectiveness and cost data
Costing was prospectively performed on the same patient sample as that used in the effectiveness analysis.

Study sample
(Retrospective) power calculations were performed, based on a pre-planned sample size of 75 patients per group and a 5% significance level with Wilcoxon's rank-sum test. The study had a power of 80% to detect a 15% difference between the study groups in terms of agreement with the 'standard respiratory care plan'. The study sample consisted of 145 patients randomly assigned to the intervention group (RTCS-directed respiratory care; n=71; mean (SD) age of 62.9 (15.9) years) or to the control group (physician-directed respiratory care; n=74; mean (SD) age of 60.1 (16.6) years). 2 patients refused to participate in the study after they were randomized to the intervention group. Housestaff physicians actually writing the respiratory orders were 97.3% in the control group and 91.4% in the intervention group. In the latter group the order of the RTCS therapist (who was blinded to the physician's order) pre-empted the physician's order.
Study design
Randomized controlled trial, carried out in single centre. The patients were stratified according to diagnostic category on admission. The RTCS had four components:

1. a set of algorithms indexed to respiratory signs and symptoms utilised for prescribing respiratory care treatment;
2. a triage score employed to stratify patients with respect to the severity of their respiratory conditions;
3. a group of therapist evaluators, and;
4. a group of implementing therapists.

The expert (one of the therapist investigators) who formulated the standard respiratory care plan based on the Clinical Practice Guideline-based algorithms was blinded to the RTCS care plan and to the patient's treatment group. The evaluation of patients and drafting of the care plan by the therapist investigator was performed within 6 hours of the actual respiratory care orders being written.

Analysis of effectiveness
The principle used in the analysis of effectiveness was intention to treat. The agreement between the patient's initial respiratory care plan (determined by the physician or by the RTCS) and a standard respiratory care plan, was the primary clinical outcome measure employed in the study. The agreement on 6 respiratory categories (including bronchodilator, bronchopulmonary hygiene, hyperinflation, supplemental oxygen, oxygen monitoring, and suctioning) was assessed based on two sets of criteria, (stringent and liberal). In the terms of stringent criterion, complete concordance on all categories and specific treatments was required, while the liberal criterion stipulated agreement on all categories of respiratory care but allowed discordance on specific treatments. The hospital mortality was reported as a secondary clinical outcome. The study groups were found to be comparable in terms of demographic characteristics, admission diagnostic category, smoking status, and triage score. A multivariate logistic regression model was used to adjust for the effects of potential confounders, and the adjusted outcome values were reported. When comparing the study groups in terms of agreement in individual respiratory category, a correction was made for multiple testing.

Effectiveness results
The rate of perfect agreement (agreeing on 6/6 modes) with the standard care in terms of the stringent criterion was 32% in the RTCS-directed group versus 9% in the physician-directed group, (p<0.001). The corresponding values for the liberal criterion was 44% in the RTCS-directed group versus 22% in the physician-directed group, (p<0.001).

The mean (SD) percent agreement in terms of the stringent criterion was 82% (17%) in the RTCS-directed group versus 64% (21%) in the physician-directed group, (p<0.001). The corresponding values in terms of the liberal criterion was 86% (16%) in the RTCS-directed group versus 72% (23%) in the physician-directed group, (p<0.001).

In terms of the stringent criterion, the RTCS group had an adjusted odds of perfect agreement 6.9 times higher than the control group (95% CI: 2.4 - 20), while the corresponding value in terms of liberal criterion was 3.4 times higher (95% CI: 1.5 - 7.6).

The RTCS group had an adjusted relative risk value of 3.8 (95% CI: 1.8 - 7.7) in terms of the stringent criterion, and 2.1 (95% CI: 1.3 - 3.5) in terms of the liberal criterion.

The hospital mortality rate was 5.7% in the RTCS-directed group versus 5.6% in the physician-directed group, (p=0.99), with a relative risk of 1.04 (95% CI: 0.27 - 4.0) in the RTCS group.

Clinical conclusions
The current study demonstrates that a Respiratory Therapy Consult Service can provide benefit by enhancing...
adherence to clinical practice guidelines for respiratory care.

**Measure of benefits used in the economic analysis**
No summary benefit measure was identified in the economic analysis, and only separate clinical outcomes were reported.

**Direct costs**
Costs were not discounted since the cost analysis was restricted to the hospitalisation period. Quantities were reported separately from the costs. Cost items were reported separately. Cost analysis covered the costs of services and supplies for each respiratory care modality. The perspective adopted in the cost analysis was not explicitly specified. Time-motion analyses were used to derive the actual costs of care. A computerised cost-accounting system was used to tally costs. A management information system for respiratory care was used to track the number and types of respiratory care provided. The date of the price data was not explicitly specified. The cost analysis did not cover the costs of implementing the RTCS programme, training the respiratory care practitioners, or the time spent by the evaluators for the RTCS-directed arm of the study. Nor did it include the costs of physician-related items for prescribing respiratory care such as physician time spent for respiratory care orders and evaluating and titrating the patients’ respiratory care needs, for the physician-directed arm of the study.

**Statistical analysis of costs**
Wilcoxon’s rank-sum test was used to compare the groups in terms of costs per patient.

**Indirect Costs**
Not considered.

**Currency**
US dollars ($).

**Sensitivity analysis**
No sensitivity analysis was conducted.

**Estimated benefits used in the economic analysis**
Not applicable.

**Cost results**
The mean (SD) cost per patient of respiratory care treatment was $235.70 ($242.70) in the RTCS group versus $255.70 ($274) in the physician-directed group, (p=0.61).

**Synthesis of costs and benefits**
Costs and benefits were not combined.

**Authors’ conclusions**
The authors concluded that "(1) compared with physician-directed respiratory care, the RTCS prescribed a similar number and duration of respiratory care services at a slight savings (that did not achieve statistical significance) and without any increased adverse events; and (2) compared with physician-directed respiratory care, RTCS-directed respiratory care showed greater agreement with Clinical Practice Guideline-based algorithms".
CRD COMMENTARY - Selection of comparators
The comparator chosen represented the usual practice in the context in question. You, the database user, should consider whether this applies to your own setting.

Validity of estimate of measure of benefit
The estimates of effectiveness are likely to be internally valid given the randomized design adopted, the power of the study, and the fact that effects of potential confounders were accounted for. The study may be regarded as a cost-consequences analysis.

Validity of estimate of costs
Quantities were reported separately from the costs and adequate details of methods of cost estimation were given. The validity of the cost results may have been affected by not including some of the important cost components (as acknowledged by the authors). The cost results may not be generalisable to other settings or countries.

Other issues
The authors' conclusion seems to be justified given the randomized design and the costing methodology adopted. The issue of generalisability was addressed by discussing some of the potential limitations of the study. For example, the study findings may not be generalisable to other medical settings with a different composition of housestaff, attending, and senior physicians. Also the study did not exclude other possible strategies including more intensive physician training. Adequate comparisons were made with other studies.

Implications of the study
A further study is needed to identify whether perceptions about the impact of the RTCS are real, in particular, whether house officers trained in institutions using respiratory care protocols have greater or poorer knowledge of respiratory care prescribing than others.

Source of funding
None stated.

Bibliographic details

PubMedID
9769262

DOI
10.1164/ajrccm.158.4.9709076

Original Paper URL
http://ajrccm.atsjournals.org/contents-by-date.0.shtml

Indexing Status
Subject indexing assigned by NLM

MeSH
Adult; Algorithms; Clinical Protocols; Cost Control; Cost Savings; Female; Health Care Rationing; Hospital Costs;