

# Evidence-Based Management of Tracheostomies in Hospitalized Patients

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## Introduction

### The Evidence Base Regarding Tracheostomy Summary

**There is little evidence-based literature on the management of tracheostomized patients. The existing data relate to the role of tracheostomy in specific disease states, the timing of tracheostomy, and comparison of open surgical to percutaneous tracheostomy. Tracheostomy protocols are under development. A recent series of 1,130 patients who underwent tracheostomy had a combined procedural, early, and late complication rate of approximately 4%, which is an improvement from the earlier complication rate. In the recent series, tracheal stenosis overtook hemorrhage as the leading complication, by 2 to 1. Tracheal stenosis accounted for nearly half of the complications. Half of the tracheal stenoses required surgical correction. All the patients who developed tracheal stenosis had endotracheal tubes for > 12 days before tracheostomy. Key words: tracheostomy, tracheal stenosis, complications, evidence-based management, inpatient, acute care, intensive care unit. [Respir Care 2005;50(4):516–518. © 2005 Daedalus Enterprises]**

## Introduction

“Evidence-based medicine is the conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients. The practice of evidence-based medicine means integrating individual clinical expertise with the best available external clinical evidence from systematic research.”<sup>1</sup> This definition by Sackett et al emphasizes the inherent tension that must be addressed in today’s attempts to define and implement best practices. Personal experience and expertise are individualized, but also influenced to some greater or lesser

extent by institutional environments and culture. The results of systematic research are specifically intended to be generally applicable across as many such variations as possible. Best practice, as defined above, is a set of processes that are uniquely individualized to practitioner, patient, and institution, while grounded in the generalized outcomes of research. This means that best practice may not be, and should not always be, identical from hospital to hospital.

## The Evidence Base Regarding Tracheostomy

Regarding the hospitalized patient with a tracheostomy, most practitioners have developed, with training and with experience, patterns of practice. (Issues such as timing and environment for first tube changes vs later changes, routine care of the early and matured tracheostomy, and appropriate level of in-patient monitoring for the patient with a new tracheostomy are examples.) There is, unfortunately, little evidence-based literature in the management of tracheostomized patients to serve as a guide.

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## EVIDENCE-BASED MANAGEMENT OF TRACHEOSTOMIES IN HOSPITALIZED PATIENTS

Table 1. Several Prominent Sources for Evidence-Based Clinical Data (Listed Alphabetically)

Source or Agency	Internet Address	Description and/or Comments
Agency for Healthcare Research and Quality (AHRQ)	<a href="http://www.ahrq.gov/clinic">http://www.ahrq.gov/clinic</a>	Evidence reports from AHRQ's evidence-based practice centers and a link to National Guideline Clearinghouse.
American College of Physicians (ACP) Journal Club	<a href="http://www.acpj.org">http://www.acpj.org</a>	Individual articles are evaluated and clinical recommendations are made by the ACP reviewers.
Bandolier	<a href="http://www.jr2.ox.ac.uk/bandolier">http://www.jr2.ox.ac.uk/bandolier</a>	Individual articles are evaluated for their impact on evidence-based medicine. Has grown from an Oxford University project with initial publication in February 1994.
Centre for Evidence Based Medicine (CEMB)	<a href="http://www.cebm.net/">http://www.cebm.net/</a>	Oxford Radcliffe Hospital Clinical School site with links to journals and teaching materials.
Clinical Evidence by the British Medical Journal	<a href="http://www.clinicalevidence.org">http://www.clinicalevidence.org</a>	Presents current evidence for treatments and evaluates effectiveness of interventions.
Cochrane Database of Systematic Reviews	<a href="http://www.cochrane.org">http://www.cochrane.org</a>	Evidence reviews from the Cochrane Group, with assessment of available data for its adequacy in supporting evidence-based guidelines.
Database of Abstracts of Reviews of Effectiveness (DARE)	<a href="http://www.york.ac.uk/inst/crd/darehp.htm">http://www.york.ac.uk/inst/crd/darehp.htm</a>	Clinical implications of individual articles are discussed by the University of York Centre for Reviews and Dissemination reviewers.
Evidence-Based Medicine	<a href="http://www.evidence-basedmedicine.com">http://www.evidence-basedmedicine.com</a>	Individual articles are summarized and commentary is provided.
InfoPOEMs	<a href="http://www.infopoems.com">http://www.infopoems.com</a>	Patient-Oriented Evidence that Matters (POEMs) database accessed through proprietary search engine.

There is a particular dearth of information that applies uniquely to the patient who is both hospitalized and whose artificial airway is specifically a tracheostomy tube. Representative sources for the practitioner interested in evidence-based medicine are listed in Table 1. Searches of such sources return data predominately related to the role of tracheostomy in specific disease states, the proper timing of tracheostomy, and the comparison of open surgical versus percutaneous tracheostomy.

This is not to say the hospitalized, tracheotomized patient is ignored in evidence-based databases. The Cochrane Collaboration has relevant protocols, for example, which are assessing clinical data as they become available. One protocol accepts as already proven the need for humidification of inspired gases in the patient with an endotracheal tube or tracheostomy and has focused on the value of heated humidification as opposed to heat-and-moisture exchangers.<sup>2</sup> A second protocol<sup>3</sup> has been developed to compare the use of closed-system versus open suction of the patient with an endotracheal or tracheostomy tube. Other areas of interest under investigation include measures to reduce ventilator-associated pneumonia and hypoxemia with suctioning. It is important to note that, while these protocols have not yet reached completion, they may still be of great value to the clinician. Protocols such as the ones discussed above often include a concise history of the clinical question at hand, as well as the bibliography of literature designated by the reviewers as pertinent to the topic.

The clinician need not fall back upon such practices as those humorously designated with labels like "eminence-

Table 2. Complications of Tracheotomy in a Series of 1,130 Patients

Complication	No. of cases	Percent of Total Outcome
Tracheal stenosis	21	1.85
Hemorrhage	9	0.87
Tracheocutaneous fistula	6	0.53
Infection	5	0.44
Pneumothorax	3	0.26
Tube decannulation/obstruction	1	0.08
Subcutaneous emphysema	1	0.08
Tracheoesophageal fistula	1	0.08

(Data from Reference 5.)

based" or "vehemence-based" medicine<sup>4</sup> simply because the evidence-based databases are not yet conclusive. In such a situation, it is important to first assess the overall risks of tracheostomy and then to direct one's attention to issues that invite improvement. In terms of assessing the current complication risk of tracheostomy, the largest recent single-institution experience available<sup>5</sup> deserves mention. As reported by Goldenberg et al, this series of 1,130 patients undergoing tracheostomy had a combined procedural, early, and late complication rate of approximately 4%, which reflects a continued improvement from earlier eras.<sup>5,6</sup> Interestingly, tracheal stenosis overtook hemorrhage as the complication of leading incidence by a 2-to-1 margin in the more recent report. Stenosis, hemorrhage, and the remaining complications and their incidence are pre-

sented in Table 2. This experience may serve as a reasonable benchmark for clinicians and institutions in reviewing their own outcomes and thus provides the first opportunity for improvement in local practices.

Globally, the apparent success reflected in improvement of overall complications generally, and hemorrhagic complications specifically, presents a new challenge. The incidence of tracheal stenosis represents nearly one half of the complications noted in Table 2, and it is a complication that represents risk of morbidity and mortality to those patients affected. Indeed, in this series, half of the patients with tracheal stenosis required surgical correction, and 4 of these patients required the very substantial surgical intervention of resection of the stenotic lesion with end-to-end anastomosis. (Goldenburg et al noted that all patients who developed stenosis had endotracheal tubes for more than 12 days before tracheostomy and felt that this may have been related to the subsequent complication.)<sup>5</sup>

### Summary

Evidence-based medicine, then, has not reached maturity in the specific area of managing tracheostomies in hospitalized patients. The interested clinician should monitor databases such as those listed in Table 1 for continued

evolution of data, consider outcomes of large modern series such as those summarized in Table 2 as benchmarks by which to compare outcomes, and focus particularly upon trials that address the complications of relevance to his or her own practice and patients.

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