Development and Implementation of a Clinical Pathway for Patients Undergoing Total Laryngectomy: Impact on Cost and Quality of Care

Ehab Hanna, MD; Susan Schultz, HT(ASCP), DC, MHSA; Donnella Doctor, RN, MNSc; Emre Vural, MD; Scott Stern, MD; James Suen, MD

Background: The current health care climate demands the provision of quality patient care in a cost-effective manner. Clinical pathways define the essential components of care that are provided to patients with a specific diagnosis to achieve a desired outcome within a predetermined period. Development and implementation of clinical pathways streamline the provision of quality care in the most cost-effective manner.

Objectives: To develop a clinical pathway for patients undergoing total laryngectomy and to evaluate its impact on the cost and quality of care provided to these patients.

Setting: A tertiary care academic medical center.

Patients and Methods: A total of 45 patients were included in the study. The clinical pathway was implemented for 15 patients, while the other 30 patients were treated without the implementation of the pathway guidelines.

Main Outcome Measures: Length of hospital stay, readmission rate, and hospital variable costs.

Results: The clinical pathway affected all cost outcome measures. Length of stay decreased by 2.4 days (29%; \( P = .001 \)), and the average hospital variable cost decreased from $3992 to $3419 per case. This represents a 14.4% reduction in cost associated with pathway implementation (\( P = .02 \)). The standardization of care eliminated unnecessary variation and repetition in resource usage, resulting in overall cost reduction. Pathway implementation resulted in a lower readmission rate (7% [1/15]) than that of patients treated prior to protocol implementation (23% [7/30]).

Conclusion: Implementing a carefully developed clinical pathway may reduce cost without compromising the quality of care for patients undergoing total laryngectomy.


The increasing shift in health care systems toward managed care places significant demands on health care providers to streamline resources and provide quality care in the most cost-effective fashion. One method used to achieve this goal is the development and implementation of clinical pathways. The concept of clinical pathways emerged in the late 1980s as a component of managed care. Clinical pathways are developed by compiling multidisciplinary input that defines health care events provided to patients with a specific diagnosis. The goal of the pathway is that patients achieve predetermined outcomes within a specified time frame. Although this concept can be developed for any diagnostic or therapeutic clinical scenario, it has been most widely applied to surgical procedures.

Recently, several studies have been performed to develop and implement clinical pathways for various surgical procedures (eg, prostatectomy, radical cystectomy and urinary reconstruction for bladder cancer, lung surgery, vascular access, coronary artery bypass surgery, total joint replacement, and mastectomy). These studies demonstrated that implementing clinical pathways resulted in a reduction of the overall cost without compromising the quality of care provided to these patients. In one study, for example, the average cost for an inpatient vascular access procedure ranged from $10,000 to $20,000. After a clinical pathway was implemented for the treatment of these patients, 95% of the procedures were done on an outpatient basis, and the average cost decreased to between $4000 and $5000. The results of a subjective survey in this study revealed an
PATIENTS AND METHODS

CLINICAL PATHWAY DEVELOPMENT AND IMPLEMENTATION

A multidisciplinary team reviewed the current clinical practice involved in the care of patients admitted to our hospital for total laryngectomy with or without a neck dissection. The team consisted of 3 head and neck surgeons, a clinical nurse-manager, a clinical financial analyst, and representatives from the departments of speech and language pathology, nutritional services, physical and occupational therapy, pharmacy services, respiratory therapy, social work, and nursing. Biweekly meetings were attended by members of the team to identify patterns and areas of variance in the current clinical care for patients undergoing total laryngectomy. The team then developed a clinical pathway to provide care for this patient population in a “standardized” fashion. Input from each member of the team was considered in the development of the pathway, and the rationale for their recommendations was carefully evaluated by the whole team. Specific events outlined in the clinical pathway included preoperative workup and operating room equipment, supplies, and instrumentation. Postoperative care guidelines included time-specific events relating to recovery room care, intensive care unit (ICU) care, laboratory tests, ambulation, enteral feeding, management of drains and tubes, patient education, wound care, and medications. Guidelines for consultations, such as respiratory therapy, nutritional services, speech therapy, and social work, were also outlined in the pathway. All of these patient care events were plotted against a specified time frame, and an overall length of hospital stay was recommended. Variance from recommended pathway protocols was allowed based on individual patient needs but was clearly documented and monitored on a monthly basis. At 3-month intervals, a variance report was generated to identify patterns and causes of noncompliance, which were then addressed by pathway modification, personnel education, or both.

The “Laryngectomy Pathway” was prospectively implemented from November 1996 through September 1997. A total of 15 patients admitted for total laryngectomy were included in the clinical pathway group (pathway group). Qualified patients were those who were assigned International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM), procedure code 30.30 (total laryngectomy) or 30.40 (total laryngectomy with neck dissection). Patients who required flap reconstruction as part of the surgical procedure were not included in the study. The data of a similar group of 30 patients who underwent total laryngectomy (with or without neck dissection) in fiscal year 1995-1996 (prior to pathway implementation) (prepathway group) were retrospectively reviewed. Data reviewed for both groups included patient demographic characteristics, treating physician, length of hospital stay, postoperative complications, and hospital cost. Readmission rates (readmission within 30 days after discharge from the hospital) were calculated for both groups. Line-item charges for services were generated to show resource usage and to provide data for financial analysis. The hospital's cost accounting system was used to determine the fixed and variable hospital cost per patient, reimbursement, and payer mix. The fixed hospital cost was defined in terms of fixed expenses that were not directly influenced by any specific patient's care (such as human resources, utilities, fixed equipment, or administration). The variable hospital cost was defined in terms of expenses that were more directly influenced by the choice of patient care events (such as laboratory testing, medication, recovery, or supplies). The outcome measures used to evaluate the impact of the laryngectomy pathway were length of hospital stay, readmission rate, and variable hospital cost. The rationale for choosing variable hospital cost is that it more accurately reflects the impact of a clinical pathway on the overall cost of patient care. The t-test was used for statistical analysis of comparison data.

RESULTS

The prepathway and pathway groups were comparable with regard to patient demographic characteristics, disease stage, and payer mix. The mean length of hospital stay was 8.3 days for the prepathway group and 5.9 days for the pathway group (P = .001). This represented a 29% (2.4 days) reduction of average length of hospital stay associated with the implementation of the clinical pathway. Similarly, the average hospital variable cost per case decreased from $3992 (prepathway group) to $3419 (pathway group). This represented a 14.4% reduction in cost associated with pathway implementation (P = .02). Cost reduction was achieved across various hospital services and was not only a reflection of the reduced length of stay. For example, only 3 (21%) of 15 patients in the pathway group were taken to the ICU, compared with 14 (47%) of 30 patients in the prepathway group. Other areas showing pathway-related cost reductions include the hospital pharmacy, radiology, nutritional, and central supply services (Figure). The cost savings for vari-

ous pathway-driven hospital services are shown in the Table. No additional cost (additional personnel, full-time equivalents, etc) was incurred with the implementation of the pathway.

Pathway implementation did not result in compromise of quality of care. The readmission rate was 23% (7/30) in the prepathway group and 7% (1/15) in the pathway group. There was no difference in the number of wound infections, fistulae, or systemic infections in the prepathway and pathway groups.

**COMMENT**

Health care providers are challenged today more than ever to provide quality care in the most cost-effective manner. Some of the driving forces behind this challenge are the increased complexity of health care systems; the high cost of medical equipment, supplies, and technology; and the expectation of higher standards of medical care. Consequently, there has been a shift toward managed care to face these challenges. The development of clinical pathways has paralleled the national movement to control health care costs. Clinical pathways, properly developed and implemented, can help health care professionals to provide higher-quality care at a lower cost.

Clinical pathways have maximal impact on medical problems associated with high volume and increased complexity. The economic impact of a clinical pathway on a medical problem that is infrequently encountered or requires simple treatment is minimal. Medical problems with high complexity usually require multidisciplinary care that, by its very nature, uses increased resources. This is perhaps most apparent in patients treated primarily with a complex major surgical procedure. In such patients, multidisciplinary input is frequently required to optimize preoperative preparation, surgical recovery, and postoperative rehabilitation. Patients undergoing total laryngectomy for the treatment of advanced laryngeal cancer typify this clinical scenario. They often exhibit significant comorbid conditions, such as chronic obstructive pulmonary disease, ischemic heart disease, or hepatic dysfunction from alcohol abuse, all of which may further complicate their course of treatment. Respiratory treatment, cardiac and hemodynamic monitoring, and alcohol withdrawal precautions are frequently needed throughout the treatment process. Speech therapy, nutritional management, occupational therapy, and social services are needed almost routinely for the full rehabilitation of the patient who has undergone laryngectomy. This multidisciplinary use of hospital resources provides an ideal setting for the implementation of a clinical pathway. Clinical pathways can streamline the usage of hospital resources and reduce costs without compromising care by outlining the sequence and timing of interventions and defining desired outcomes within a specified period. Our findings support this hypothesis, demonstrating a reduction in overall variable hospital costs for patients in the pathway group of almost 15%.

Several factors were implicated in this overall cost reduction in our study. The most obvious factor was the...
reduction of the length of hospital stay by almost 30%. This was directly related to a change in the criteria for discharging patients from the hospital. Prior to pathway implementation, patients were discharged only after the discontinuation of enteral feeding and the initiation of oral feeding. Patients treated according to pathway guidelines were discharged prior to the initiation of oral feeding. However, one of the pathway’s primary goals was patient (or family) education about enteral feeding, and patients (or their families) had to demonstrate successful use of enteral feeding equipment and supplies prior to discharge from the hospital. Almost all patients (or their families) achieved this goal within the period specified in the pathway, and no readmission because of difficulty with enteral feeding at home was encountered in the pathway group.

Another major area of cost reduction was in the use of ICUs, amounting to savings of 22.5%. Prior to pathway implementation, patients in the immediate postoperative period and for the first 24 hours frequently recovered in the ICU (47% [n = 14] in the prepathway group). Pathway guidelines recommended that patients with otherwise uncomplicated conditions recover in a step-down unit or, if needed, in the recovery room overnight. This is evidenced by increased usage of the recovery room by pathway patients (Figure and Table). Patients were only transferred to the ICU when there were specific indications for such a level of care (eg, respiratory or hemodynamic instability). This approach did not result in more morbidity or mortality in pathway patients than in prepathway patients.

Significant savings (16.9%) were achieved in operating room costs by using the pathway’s recommended preassembled “laryngectomy instrument set.” This consisted of surgical instruments and supplies that were considered adequate for total laryngectomy by the 3 head and neck surgeons involved in the development of the pathway. This eliminated variability in the use of intraoperative instruments and supplies among different surgeons, which frequently necessitated the opening of multiple presterilized surgical instrument sets per case, increasing costs.

Cost savings were also achieved by reducing the use of pharmaceutical supplies, which resulted in a 17% reduction in hospital pharmacy costs and a 2.6% reduction in outpatient pharmacy costs. Prior to pathway development, prescribing patterns among different physicians were inconsistent. For example, different physicians prescribed intravenous antibiotic prophylaxis for 24 hours, 2 days, 5 days, or until drains were removed. Some physicians prescribed a single antibiotic; others prescribed a combination of 2 antibiotics. Several well-executed published studies have indicated that the routine use of more than 1 antibiotic or the use of antibiotic prophylaxis for more than 24 hours significantly increased cost without any added reduction in postoperative infections.11-13 Following the recommendations of these studies, the pathway specified the use of antibiotics that were available in the operating room and for 24 hours postoperatively. Unless otherwise indicated, a single antibiotic with broad coverage (primarily against gram-positive and anaerobic organisms) was recommended. There was no difference in the number of wound infections, fistulae, or systemic infections between patients in the prepathway and pathway groups.

Interestingly, implementation of the pathway resulted in the increased use of occupational therapy and speech therapy services. This may indicate that, prior to pathway implementation, consultation with and use of these services was not a routine practice in the rehabilitation of patients who have undergone laryngectomy. Conceivably, the pathway may have improved the rehabilitative care delivered to such patients despite overall cost reduction.

The findings in our study agreed with those of similar studies of clinical pathways that were implemented for patients who underwent head and neck surgery. Cohen and colleagues14 developed, implemented, and evaluated the effectiveness of clinical pathways for head and neck oncologic care. In their study, patients were assigned to 1 of 4 clinical pathways: chemotherapy, clean head and neck surgery, clean contaminated head and neck surgery, or clean contaminated head and neck surgery with reconstructive flap. The length of hospital stay for the clean contaminated group without flap reconstruction decreased by 1.5 days, and costs decreased by $7407 per patient (t test, P < .05). The length of stay decreased by 1.6 days in the clean contaminated group with flap reconstruction, and costs decreased by $9845 per patient (t test, P < .05). As in our study, Cohen and colleagues concluded that the implementation of critical pathways resulted in a decreased overall length of stay and cost of hospitalization.14 However, the results of these studies (including the current study) should be interpreted with caution in light of recent changes in the health care industry. Increasing general trends toward managed care (regardless of pathway implementation) may have been responsible, at least in part, for the reduction in the use of hospital resources and costs.

In addition to cost reduction, there are several advantages to the implementation of clinical pathways. The display of interventions and measurable patient outcomes across a time line establishes a visible guide for planning and providing patient care. It also allows better interdisciplinary coordination and documentation of patient care events and improves continuity and quality of care.1,14 Despite these advantages, the translation of pathways from concept to reality is predictably difficult. Differences in organizational, personal, and professional perspectives of the various individuals involved in providing care to a specific patient population may constitute barriers to the development of a common tool.15 The commitment of all participants to achieve positive patient outcomes is critical to the success of clinical pathway development.3 Those charged with pathway development must commit to the planning and establishment of clear economic and quality-of-care goals. Creating an understanding of the purpose behind the development of pathway guidelines is one of the most critical issues. With multidisciplinary input, all parties have a vested interest in promoting the success of the established clini-
Physician involvement and leadership support are also essential to the successful implementation of clinical pathways. Finally, any clinical pathway should provide enough flexibility to allow for individual patient variability. Each patient has unique needs, and the individual concerns and problems of each patient should never be overlooked while providing a standard of care.

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Corresponding author: Ehab Hanna, MD, Department of Otolaryngology—Head and Neck Surgery, University of Arkansas for Medical Sciences, 4301 W Markham St, Slot 543, Little Rock, AR 72205-7199.

REFERENCES