The Impact of Clinical Pathways on the Practice of Head and Neck Oncologic Surgery

The University of Texas M. D. Anderson Cancer Center Experience

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Objective: To assess the impact of clinical pathways on the practice of head and neck oncologic surgery in an academic center.

Design: Cross-sectional study.

Setting: Cancer treatment center.

Patients: The study population consisted of 3 groups of patients who underwent unilateral neck dissection and were treated in the Department of Head and Neck Surgery of the University of Texas M. D. Anderson Cancer Center, Houston. Additional procedures which may have been performed were direct laryngoscopy, rigid esophagoscopy, and/or dental extractions. Ninety-six patients treated during 1993-1994 prior to the implementation of the clinical pathway (historical control group) were compared with 94 patients treated during 1996-1998, 64 who were not (contemporaneous nonpathway group) and 30 who were managed on the clinical pathway (pathway group). Patients from 1995 were excluded since the pathway was in the planning stages then.

Main Outcome Measures: Median length of stay; median total costs of care.

Results: The median length of hospital stay of the historical control, contemporaneous nonpathway, and pathway groups decreased from 4.0 to 2.0 days ($P < .001$). The total median costs of care were less in the pathway group as compared with the historical control group ($6227 and $8459, respectively, $P < .001$) and also less in the contemporaneous nonpathway group compared with the historical control group ($6885 and $8459, respectively, $P < .001$). Mean and median length of hospital stay and costs were lower in the pathway group as compared with the nonpathway group but not significantly ($P = .11$ and $P = .07$, respectively) The contemporaneous nonpathway and pathway groups did not differ in complications or readmissions.

Conclusions: Development and implementation of this clinical pathway played a statistically significant role in decreasing length of hospital stay and total costs of care associated with neck dissection between nonpathway and pathway patients. Thus, a more cost-effective practice environment has resulted for all of our patients.


The challenge of providing consistently high-quality care and of being cost-efficient is a major emphasis of the medical community especially in this age of managed care. In particular, tertiary care centers have been under increasing pressure to reduce costs. Clinical pathways were first implemented in engineering fields in an effort to maximize efficiency in resource allocation and to provide guidelines for timely job completions. As defined by Coffey et al, a clinical pathway is an “optimal sequencing and timing of interventions by physicians, nurses, and other staff for a particular diagnosis or procedure.”

Ideally, as guided by a clinical pathway, patients receive necessary and essential aspects of care at the appropriate sequence of time, resulting in maximum efficiency of the delivery system.

The median ages on hospital admission for the historical control group and the contemporaneous nonpathway and pathway groups were 60 years (range, 17-89 years) and 59 years (range, 16-88 years), respectively.

RESULTS

The median ages on hospital admission for the historical control group and the contemporaneous nonpathway and pathway groups were 60 years (range, 17-89 years) and 59 years (range, 16-88 years), respectively.
The clinical pathway was developed systematically (Figure 1). First a core group determined which pathways were to be developed. A disease site working group was then organized to draft the pathway. The proposed pathway was then reviewed by all members of the core team. Any revisions were supported by peer-reviewed literature. A final draft was then approved by the disease site working group and presented to the Guideline Review Committee for approval. After the Guideline Review Committee granted approval, the pathway was then implemented.

Implementation of the pathway was performed only after the care team involved in processing the patient on the pathway was educated. Several conferences and seminars were conducted for outpatient and inpatient health care teams working with the disease site working group. Physicians were also briefed on the pathway. Enrollment commenced after education of the health care workers was complete. Patients who were enrolled on the pathway between September 1, 1996, and August 31, 1998, were included in this study's analysis. The details of the neck dissection clinical pathway are demonstrated in the Table.

Clinical and financial data were reviewed for each patient. Main outcome measures that were evaluated were length of hospital stay and total costs, including hospital and professional fees. Costs were also compared within categories as designated on the pathways based on type of resource use. These categories included surgery-related costs, treatment-related costs, medications, consultations, and assessment and diagnostic tests. Diagnostic tests were further broken down into pathology, laboratory test, and diagnostic imaging.

The hospital-related costs were calculated using the institution's cost-accounting software (Hospital Cost Consultants, Pleasanton, Calif). The costs for professional fees were calculated using average cost per procedure. Hospital and professional costs were then combined into one model that has been developed to set them constant over time. Charges reflect the amount that is billed to the consumer. Costs reflect the indirect and direct resources used by the hospital. Costs, rather than charges, were compared because costs were set constant over time. Thus, with a single established cost model, comparisons among groups can be made.

Data were analyzed using Minitab 11.12 (Minitab Inc, State College, Pa). Nonparametric tests were used because of the large numbers of outliers relative to the small sample size. Differences in median length of stay and total median costs among the 3 groups were tested for significance using the Kruskal-Wallis test. The Mann-Whitney test was used to test median differences separately between historical control group (prepathway group) and each of the contemporaneous groups (nonpathway and pathway).
Figure 1. Development and implementation of a clinical pathway.
See “Clinical Pathway Development” subsection of the “Patients, Materials, and Methods” section for detailed explanation.

**Neck Dissection Clinical Pathway of the University of Texas M. D. Anderson Cancer Center, Houston**

<table>
<thead>
<tr>
<th>Category of care</th>
<th>Initial Evaluation</th>
<th>Preoperative Visit</th>
<th>Same Day Admit Surgery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessment/evaluation</td>
<td>History and physical examinations (focused head and neck examination); obtain insurance authorization</td>
<td>Review tests with patient and determine disposition; verify insurance authorization</td>
<td>Wound check</td>
</tr>
<tr>
<td>Consult</td>
<td>Internal Medicine, if indicated; x-ray film, if indicated; dental consultation, if indicated; pathology review, if prior biopsy; and additional consultations as indicated per multidisciplinary screening criteria</td>
<td>Surgery scheduling</td>
<td></td>
</tr>
<tr>
<td>Diagnostic test</td>
<td>Levels of CBC,* total protein level, albumin, calcium, phosphate, glucose, serum urea nitrogen, uric acid, creatinine, total bilirubin, alkaline phosphatase, LDH,* ALT,* CXR,* ECG*—60 y or history of heart disease; CT* scan or MRI,* angiography, carotid artery studies (if needed)</td>
<td>Review test results</td>
<td></td>
</tr>
<tr>
<td>Treatment</td>
<td>Incision care; drains to bulb suction with drain care? Empty and record output every 6 h TCDB* every 2 h</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medication</td>
<td>5% Dextrose in ½ normal saline solution 1000 cc with 20 mEq potassium chloride each 100 cc/h; heparin lock after nausea; MS 2 mg IV piggyback every 4 h as needed for severe pain; Lortab 1-2 tablets orally every 4 h as needed for mild pain; promethazine hydrochloride, 12.5 mg IV, every 6 h as needed for nausea; IV antibiotics as indicated ×24 h HOB* at 45°; out of bed to chair; and ambulate to bathroom and pacing on demand</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Performance status/activity</td>
<td>Determined baseline</td>
<td>Baseline maintained</td>
<td></td>
</tr>
<tr>
<td>Nutrition</td>
<td>Determined baseline</td>
<td>Baseline maintained; nothing by mouth after midnight; diet as tolerated; Instructions on TCDB</td>
<td></td>
</tr>
<tr>
<td>Teaching/psychosocial</td>
<td>Assess patient for barriers to learning; provide educational materials; needs assessment; and new clinic visit orientation</td>
<td>Preoperative teaching and teaching of wound and drain care</td>
<td></td>
</tr>
<tr>
<td>Discharge planning</td>
<td>Needs assessment validated</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outcome criteria</td>
<td>Discharge criteria: afebrile with stable vital signs; physical examination at preoperative baseline; incision clean and without signs or symptoms of infection; drain removed or patient instructed on drain care or removal criteria; tolerating diet; activity appropriate for discharge from the hospital</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* CBC indicates complete blood count; LDH, lactate dehydrogenase; ALT, alanine aminotransferase; CXR, chest x-ray film; ECG, electrocardiogram; CT, computed tomography; MRI, magnetic resonance imaging; TCDB, turn, cough, and deep breath; IV, intravenously; and HOB, head of bed.

COMMENT

Several methods have been used to decrease variance among physicians’ practices and to decrease costs. Utilization review is one such method. This method, however, is performed from the perspective of the reviewers and thus may be very different from the perspective of physicians and the perspective of patients. Another disadvantage of utilization review is that it relies on claims data that are not based on the idea of properly allocating health care dollars. It also is not based on clinical outcomes.

The decrease in the length of hospital stay. Other important decreases (~16% each) occurred in surgery-related costs and diagnostic test costs. There was no statistically significant difference between the contemporaneous nonpathway and pathway groups for costs or length of hospital stay.

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Managing outcomes may be most effectively performed by the use of practice guidelines and clinical pathways. In the practice of surgical oncology, several studies have evaluated the effects of clinical pathways. Leibman et al reported on the impact of a clinical pathway for radical retropubic prostatectomy. Average hospital charges and average length of stay were lowered significantly with the implementation of the clinical pathway. Koch and Smith reported that their pathway resulted in a decrease in length of stay and charges for their patients undergoing radical prostatectomy as well. Morris et al determined that the use of a clinical pathway for total abdominal hysterectomy and oophorectomy with pelvic and para-aortic node sampling for endometrial cancer decreased costs and the length of stay. Incremental improvements were also measured during the planning stage of the clinical pathway.

The steps of development of a clinical pathway are crucial to the success of implementation as well as the successful enrollment of patients (Figure 1). At M. D. Anderson Cancer Center, the Practice Outcomes Program was implemented in 1996 to oversee the development and implementation of clinical pathways. This oversight assisted in continuity and consistency of the pathways that have been developed for use by the center.

We have demonstrated that the development and implementation of a clinical pathway has resulted in a decrease in median length of hospital stay and a decrease in median costs of treatment. Some limitations of our study exist, however. First, the number of pathway-managed patients is smaller than the other groups. This may lead to an increase in type II error in our study. Future studies are necessary that include more patients handled using the clinical pathway, so that we can increase the power of the study and decrease type II error. Second, the costs may have been trending downward before the implementation of the clinical pathway. Thus, the percentage of decrease in costs may be different than that documented in this article. This
may also explain why the costs are not significantly different between the contemporaneous nonpathway and the pathway-managed patients. Third, selection bias may have affected our results although this bias was minimized by several methods. One way to minimize bias was choosing patients during 1993 and 1994 as the historical control group enrollees, thus assuring that any discussion regarding clinical pathways had not been formally begun. Another method was to use the same inclusion criteria for each group; ie, only patients who had unilateral neck dissection; unilateral neck dissection with DL and RE; or unilateral neck dissection with DL, RE, and dental extractions were included for costs analysis. This study is limited by the fact that the patients were not randomized to either the contemporaneous nonpathway group or the pathway-managed group, thus, selection bias may exist for these groups of patients.

CONCLUSIONS

Although it is difficult to distill the effects of the clinical pathway into direct and indirect effects, overall, the benefits have been worthwhile. Because cooperation and assistance of all aspects of patient care were sought, an improved atmosphere of camaraderie has developed and has resulted in improved efficiency and cost-minimization. We have demonstrated that the development and implementation of a clinical pathway has resulted in a decrease in median length of hospital stay as well as a decrease in median costs of treatment. Furthermore, the process of thinking about and developing clinical pathways benefits all patients, whether or not they were managed on the pathway. Although a decrease in costs and a decrease in length of hospital stay are indicators of efficiency, future research is necessary so that outcomes such as variance from the clinical pathway, complications of surgery, and patient satisfaction can be measured. Outcomes such as readmissions, deaths, complications of surgery, and patient satisfaction need to be measured as well so that the impact of clinical pathways on quality of life can be assessed.

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REFERENCES