

Predictors of never events in patients undergoing radical dissection of cervical lymph nodes

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Objective. The aim of this study was to identify variables associated with infection-related never events in patients undergoing radical neck dissections for head and neck cancer.

Study Design. All hospitalizations with head and neck cancer that underwent radical dissection of cervical lymph nodes were selected from the Nationwide Inpatient Sample. Predictor variables included patient and hospital-level factors. Outcome variable was occurrence of ≥ 1 never events. Association between predictor and outcome variables was examined by using bivariate and multivariable logistic regression models.

Results. There were 10,660 hospitalizations. At least 1 never event occurred in 7.8% of hospitalizations. Teaching hospitals were associated with higher odds of having ≥ 1 never event compared with nonteaching hospitals (odds ratio 1.92; $P = .02$). Presence of comorbid conditions and race were other significant predictors of never events.

Conclusions. Teaching hospitals and presence of comorbid conditions were associated with higher odds of experiencing a never event. (Oral Surg Oral Med Oral Pathol Oral Radiol 2013;115:710-716)

According to the American Cancer Society, 34,300 new cases of oral and oropharyngeal cancers and 12,740 cases of hypopharyngeal and laryngeal cancers will have been diagnosed in the year 2011 in the United States.¹ Close to 10,500 people are likely to have died from these cancers.¹ Treatment for head and neck cancers with cervical node involvement includes radical dissection, which necessitates hospitalization.² To date, there are no nationally representative estimates of patient attributes and in-hospital outcomes, including complications, adverse events, and mortality in patients undergoing radical dissection procedures for head and neck cancers.

About \$9.3 billion is spent annually in hospitals to treat potentially preventable medical errors and/or adverse events among hospitalized patients in the United States.³ The National Quality Forum compiled a list of serious reportable events, or never events, with an aim "to increase public accountability and consumer access to critical information about healthcare performance."⁴ The updated list in 2006 includes 28 events, each classified under 1 of 6 categories: surgical, product/

device, patient protection, care management, environment, or criminal.⁴ Recently, the Center for Medicare and Medicaid Services (CMS) proposed that it would not reimburse hospitals for treating never events, which purportedly occur in hospitalized patients because of deficiencies in the process of care in hospital settings.⁵⁻⁷

Some never events, such as wrong-site surgery and accidentally leaving foreign bodies during surgery, are avoidable and may reflect poor processes of care in hospitals. However, there are other CMS-designated never events, including postoperative pneumonia, decubitus ulcers, postoperative infections, infection with microorganisms resistant to penicillin, and *Clostridium difficile* infections, that can not be entirely attributed to the lack of proper care in hospital settings.⁴⁻⁷ A substantial amount of resources is required to treat these events should they occur in hospitalized patients. Failure to reimburse hospitals may prevent hospitals from treating patients who may be predisposed to developing these events.⁵

The objective of the present study was to provide nationally representative estimates of occurrence of 5

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Statement of Clinical Relevance

Presence of certain comorbid conditions was associated with higher odds of experiencing a never event in hospitalizations undergoing radical neck dissection. High-risk patients undergoing this surgical procedure, especially in teaching hospitals, may need more attention in health care provision.

infection-related never events (postoperative pneumonia, decubitus ulcers, postoperative infections, infection with microorganisms resistant to penicillin, and *C. difficile* infections) in hospitalized patients undergoing radical dissections to excise cervical lymph nodes for head and neck cancer in the United States during the year 2008. We hypothesized that there is a set composed of ≥ 1 variables associated with these never events and that some of these variables may be modified to enhance outcomes of patients undergoing radical dissections of cervical lymph nodes. The specific aims of this study were: 1) to estimate the frequency of never events in a national sample of subjects undergoing radical dissection of cervical lymph nodes; and 2) to develop a multivariable regression model to identify factors associated with never events.

MATERIALS AND METHODS

Study design and sample selection

The investigators designed and implemented a retrospective cohort study. The study sample was derived from the 2008 Nationwide Inpatient Sample (NIS), a component of the Healthcare Cost and Utilization Project sponsored by the Agency for Healthcare Research and Quality (AHRQ). The NIS is the largest all-payer inpatient care database available in the United States.⁸ The NIS is a 20% stratified probability sample of all community hospitals in the United States. Each discharge or hospitalization in the NIS is assigned a weight variable, which can be used to provide estimates of $\sim 100\%$ of all hospitalizations in the United States. The 2008 NIS database provides data on almost 38 million weighted hospitalization visits across the United States. The American Hospital Association defines community hospitals as nonfederal, short-term, general, and other specialty hospitals, excluding hospital units of institutions. Available variables regarding the hospitalizations include age, sex, race, insurance status, primary reason for hospitalization, presence of comorbid conditions, procedures performed during hospitalization, disposition information, and several hospital-related characteristics (including teaching status and geographic region/location). In the present study, all hospitalizations with head and neck cancer that underwent radical neck dissection were included. The International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM), procedure codes were used to identify subjects hospitalized for radical neck dissections to excise cervical nodes. The codes selected for study inclusion were bilateral (40.42), unilateral (40.41), or undefined (40.40) radical neck dissections.

Data user agreement with AHRQ

One of the authors (V.A.) completed a data user agreement before obtaining and analyzing the NIS dataset. As per the data user agreement with AHRQ, individual cell counts of ≤ 10 were not reported, to preserve patient confidentiality. In the present study all individual cell counts ≤ 10 are denoted by "DS," meaning discharge information suppressed.

Study variables

Predictor variables. The predictor variables of interest included a set of patient- and hospital-related factors including age, sex, race/ethnicity, type of admission, insurance status, type of radical dissection of cervical lymph nodes, presence of comorbid conditions, hospital teaching status, and geographic region of hospital location. As per the NIS documentation, data on teaching hospitals was obtained from the American Hospital Association's annual survey of hospitals in the United States.⁸

Outcome variable. The outcome variable of interest in the present study was the occurrence of any of the 5 CMS-defined infection-related never events. The 5 never events—postoperative pneumonia (ICD-9-CM diagnosis codes 481, 482, 485, 486, and 507), decubitus ulcers (707), postoperative infection (998.59), infection with microorganisms resistant to penicillin (V09.0), and *C. difficile* infection (008.45)—were examined. The occurrence of these never events was identified by using the ICD-9-CM codes in the secondary diagnoses fields ($n = 14$ fields). It was coded as a binomial variable (yes/no).

Analytic approach

Descriptive statistics were used to summarize the demographic data of the subjects. The outcome variable of interest in both bivariate and multivariable models was the occurrence of ≥ 1 of the 5 never events. The odds of a hospitalization having ≥ 1 of the 5 never events was examined with bivariate and multivariable logistic regression approaches. The Taylor linearization method with replacement design was used to compute the variances. Each individual hospitalization was the unit of analysis, and the NIS hospital stratum was used as the stratification unit. The effects of clustering of outcomes within hospitals were adjusted in all analyses. All statistical tests were 2 sided, and a P value of $< .05$ was set a priori to be deemed statistically significant. All statistical analyses were performed with the use of SAS version 9.2 software (SAS Institute, Cary, NC) and SAS Callable Sudaan version 10.0.1 software.

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