Increasing Use of the Surveillance, Epidemiology, and End Results (SEER) Database in Otolaryngology

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Abstract

Educational Objective: At the conclusion of this presentation, the participants should be able to understand the limitations of studies using large medical registries and become aware of possible discrepancies between results drawn from registries when compared to randomized controlled studies.
Objectives: The Surveillance, Epidemiology, and End Results (SEER) database is a large registry containing cancer related demographics and health data. The number of studies utilizing SEER data has increased in recent years. This study seeks to identify inconsistent results between SEER studies and prospective, randomized controlled studies that may affect real world practices.
Study Design: Literature review.
Methods: PubMed search of literature using the MeSH search terms ("SEER Program"[Mesh]) AND "Head and Neck Neoplasms"[Mesh]. Additional search terms ("SEER Program"[Mesh]) AND "Head and Neck Neoplasms/therapy"[Mesh] were used to identify articles pertaining to therapy. Searches for non-SEER studies were performed using an internet search engine. These studies were reviewed and the conclusions of SEER studies were compared to non-SEER studies.
Results: A total of 424 studies using the SEER database were identified on the PubMed database. Over half of the studies (242) were published between 2010 and 2014. We identified conclusions from the SEER database that contradicted conclusions from published prospective studies. Some conclusions from the SEER database were not corroborated by other papers using the same database.
Conclusions: The SEER database is a valuable tool utilizing a very large dataset. However, results from these studies should not replace prospective and randomized studies. Readers should carefully interpret results from SEER studies.

Introduction

Medical registries are collections of health and demographic data for specific health conditions. The Surveillance, Epidemiology, and End Results (SEER) database is a large medical registry that encompasses 26% of the US population, and collects information regarding cancer incidence and survival.

There has been a recent increase in the number of medical registries and publication utilizing registry data. These datasets can be useful because of their large size, diverse patient populations, and diverse geographical distribution. However, they are limited by selection bias, lack of standardized follow-up, missing or inaccurate data, and lack of exclusion criteria.[1] Without a properly designed study protocol, results and conclusions drawn from these datasets may not be consistent with those drawn from more rigorously designed studies.

Inconsistencies in these studies have been identified in other fields. Using SEER data, Bleyer and Welch showed increasing detection of early-stage breast cancer with only a small effect on the rate of death from breast cancer.[2] This was a controversial finding, as it disputed findings from multiple large population-based studies and randomized controlled trials (RCT) showing increased screening significantly decreased breast cancer mortality in screening groups compared to control groups. As it relates to otolaryngology, we sought to determine if SEER studies on head and neck cancer therapies draw conclusions contradicting prospective, randomized controlled studies.

Table 1. Number of overall SEER studies in head and neck malignancy.

Years	Number of studies
Before 2000	21
2000-2004	36
2005-2009	130
2010-2014	242

Methods and Materials

Study design: Literature Review.
Search criteria: A PubMed search was conducted using the following MeSH terms: ("Head and Neck Neoplasms"[Mesh]) AND "SEER Program"[Mesh], and ("SEER Program"[Mesh]) AND "Head and Neck Neoplasms/therapy"[Mesh]. All studies published before 1/1/2015 were included. A total of 424 studies were identified.
Literature review: SEER studies from 2010-2014 were analyzed. An internet search engine was used to identify prospective, randomized controlled trials (RCTs) examining the related topics as those in SEER studies published in over the same time period. A sample of 20 SEER studies was selected from the 127 SEER studies in the head and neck malignancy therapy group for comparison to non-SEER studies asking similar questions. Results and conclusions from these studies were summarized and compared.

Results

Table 1 shows the increasing overall number of SEER studies pertaining to head and neck malignancy. Table 2 shows the increasing number of SEER studies pertaining to therapy for head and neck malignancy. Table 3 shows the increasing percentage of SEER studies published in relation to the total amount of studies on head and neck malignancy.

A sample of 20 SEER studies was selected from the 127 SEER studies in the head and neck malignancy therapy group from 2010-2014 for comparison to non-SEER studies asking similar questions. Eighteen of 20 matched studies showed similar results, while 2 showed conflicting conclusions.

Sentinel lymph node biopsy (SLNB) in head and neck melanoma: A SEER study showed nor association with improved survival for patients with melanoma who undergo SLNB rather than nodal observation.[4] A RCT showed biopsy-based management prolongs survival for patients with nodal metastases from intermediate-thickness melanomas.[5]

Intensity-modulated radiation therapy (IMRT): A SEER study showed patients treated with IMRT experienced significant improvements in survival compared with patients treated with non-IMRT techniques.[6] A RCT showed no differences in survival or loco-regional control at 3 years.[7]

Table 2. Number of SEER studies in head and neck malignancy therapy.

Years	Number of studies
Before 2000	2
2000-2004	9
2005-2009	60
2010-2014	127

Table 3. Percentage of SEER studies in head and neck malignancy.

Years	SEER studies (% of total studies)	Total studies
2000-2004	9 (0.05%)	16,566
2005-2009	60 (0.3%)	21,479
2010-2014	127 (0.5%)	25,399

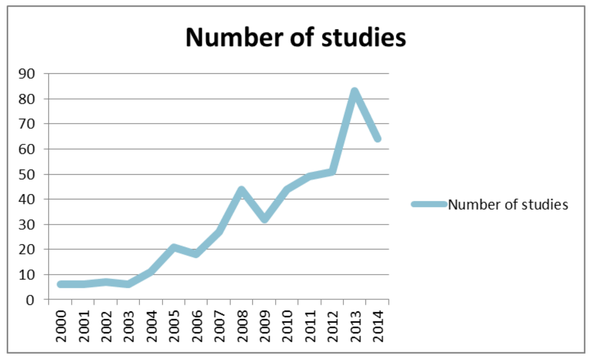

Figure 1. Number of overall SEER studies in head and neck malignancy

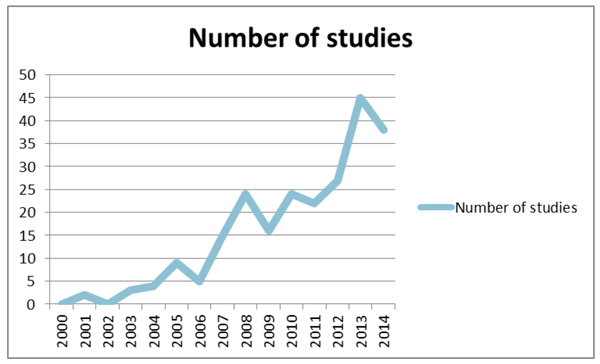

Figure 2. Number of SEER studies in head and neck malignancy therapy

Discussion

The increase in studies utilizing the SEER database is readily apparent. However, few studies have evaluated the accuracy of results and conclusions from SEER studies. In the head and neck literature, SEER data suggests the likelihood of extracapsular extension does not increase linearly with lymph node size, contrary to other reports in the literature.[3] In our review, most SEER studies agreed with non-SEER studies in the literature (90% in our limited sample). Few studies offered conflicting data.

Discrepancies identified in our study highlight some of the flaws of medical registries. SEER data showed no association between SLNB and improved disease specific survival in melanoma patients, contrary to a RCT which showed biopsy-based management improves survival.[4, 5] The mean age of patients in this SEER study was older (66.2 years vs. 52 years), which may reflect the lack of exclusion criteria for data entry. Additionally, patients are recruited from specific cancer centers, potentially creating a dataset from a heterogeneous patient population that may not be generalizable. Other flaws include inconsistent, missing, or incorrect data.

We performed a limited literature review of SEER studies and compared results and conclusions to recent RCTs. Differences we identified may be due to different study populations in each type of study. The vast scope of head and neck literature precluded a complete literature review.

Conclusion

Studies using large medical data registries are increasing in prevalence. The SEER database, in particular, is utilized frequently to study outcomes in head and neck malignancy. Though many of the results and conclusions agree with prospective studies, not all SEER studies agree with non-SEER studies. Care must be taken when interpreting results from medical registries.

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