

Prevalence and Occupation of Patients Presenting With Dysphonia in the United States

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Summary: Objective. Voice disorders are common conditions that may have a significant impact on patient quality of life, yet their prevalence and epidemiology are poorly documented. In this study, we estimated the prevalence, demographics, and occupation of patients with dysphonia.

Methods. Using the Commercial and Medicare MarketScan databases of 146.7 million lives (2008–2012), the prevalence of dysphonia was estimated. Patient demographics and industry occupation were evaluated. Prevalence estimates overall and by industry were made using Medical Expenditure Panel Survey. Industry estimates were compared with US government employment statistics to assess differences between dysphonia and the general population.

Results. A gradual increase in the diagnosis of dysphonia was noted from 1.3% to 1.7% of the population from 2008 to 2012, with an associated increase in the diagnosis of acute laryngitis, the largest diagnostic category. A strong correlation was present between diagnosis and age, with acute laryngitis more common in the younger populations and malignancies in older ages. Benign neoplasms were more prevalent in the service industry, with 2.6 times increased likelihood compared with the general population, and malignancies were more prevalent in the manufacturing industry, with 1.4 times increased likelihood. Almost 3 million laryngoscopies and stroboscopies were performed with \$900 million in costs.

Conclusion. Prevalence rates of the diagnosis of dysphonia are increasing and are associated with large healthcare costs. Prevalence rates also differ somewhat between industries, and there appears to be a higher percentage of malignant neoplasms in the manufacturing industry and benign neoplasms in the service industry.

Key Words: Dysphonia–Prevalence–Etiology–Industry–Occupation.

INTRODUCTION

Voice disorders are relatively common and can have a significant impact on patient quality of life and healthcare costs.^{1,2} Although there has been significant work within the voice care community to evaluate quality of life and outcomes, there has been a paucity of data related to general prevalence rates and overall costs.^{2–6} With an estimated prevalence of approximately 1% in the US population, dysphonia's most prevalent manifestation is acute laryngitis, with a relatively small proportion of patients experiencing far more debilitating conditions such as laryngeal malignancies.² A telephone survey of 1326 patients in Iowa and Utah has shown that 29.9% of the population has a lifetime history of dysphonia, with 6.6% of patients having a current voice disorder.³ These prevalence estimates are not noted in larger claims-based diagnostic prevalence rates. Utilizing the 2012 National Health Interview Survey, an estimated 17.9 million adult patients reported a voice problem affecting approximately 1 in 13 US adults. Despite this, only 10% sought care from a healthcare worker. Proper diagnosis and evaluation of the underlying causes of dysphonia often requires diagnosis and

management by an otolaryngologist. Recent studies have shown that patient diagnoses often change as patients transition from primary to subspecialty care, and increased time in nonspecialist care results in greater healthcare cost, potentially due to delays in targeted treatments.^{7,8} Direct yearly expenditures for a voice problem were \$300 million.⁵

Despite these efforts to assess prevalence, impact, and cost, there are notable limitations in the information available related to dysphonia, in part due to limitations in the data and potentially in the methodology of the evaluations. In addition, there has not been good data developed in relationship to different voice disorder diagnoses or variations by age and sex. Because there is an impact on work activity,³ a better understanding of prevalence and specific diagnosis based on the industry in which the patient works would be expected to be valuable. The at-risk population for vocal disorders may significantly vary based on etiology.

This preliminary study was thus designed to evaluate changes in prevalence of dysphonia from 2008 to 2012, by etiology, and evaluate demographic as well as occupational profiles of patients presenting with various conditions, to start understanding the impact of various dysphonia diseases on patients. Because of the large prevalence of disease in the >65-year-old population, both the Commercial and Medicare MarketScan databases were queried, and a projection methodology was used to estimate nationwide counts of disease on a yearly basis.

METHODS

The study is a retrospective analysis of a large administrative database designed to collect and pay for medical and drug claims (aka claims-based analysis), with no identification of individual

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patients and therefore was exempt from the need to obtain an institutional review board approval.

Databases

The Truven Health MarketScan Commercial Claims and Encounter Database (Truven Health Analytics, Ann Arbor, MI) as well as the MarketScan Medicare database were queried. These very large databases (in 2013: Commercial: 36.7 million; Medicare: 3.2 million) track patients longitudinally across all sites of care over multiple years. Recently, Truven Health researchers developed a projection methodology to allow estimates of US-wide frequencies of diagnoses or procedures from those obtained directly from the databases, making these databases invaluable tools to estimate prevalence and incidence of disease and procedures. These databases have recently been used for a number of healthcare cost and epidemiology studies for dysphonia and other general otolaryngological conditions.^{2,8,9}

Dysphonia disease identification

All patients with a primary or secondary diagnosis of dysphonia, in both outpatient and inpatient care, were identified from 2008 to 2012.

Projection methodology

Nationwide projections were obtained using a proprietary methodology developed by MarketScan. Briefly, the MarketScan population was subdivided into 72 demographic cells linked to similar subpopulations from the Medical Expenditure Panel Survey (MEPS).¹⁰ Each cell within the MEPS survey includes a number of people with similar characteristics. A weight factor was assigned to each cell, such that the weight would be equal to the ratio of the MEPS-estimated population for that particular cell, divided by the MarketScan sample size for that cell. In our analyses, patients with 12 months of consecutive enrollment in MarketScan were included to avoid the potential of statistical noise. Each calendar year was analyzed separately. Unique patient diagnostic categories were counted only once in a given calendar year, such that a patient with, for example, two diagnoses of acute laryngitis only accounted for one count of prevalence for acute laryngitis. Compounded annual growth rates for each dysphonia disease type were estimated from 2008 to 2012.

Using the MEPS methodology allowed for projection of patient counts to the entire population covered via Commercial or Medicare supplemental insurance. To further project to nationwide estimates, all prevalence counts were further multiplied by the respective ratios that accounted for all other patients. (For younger than 65 years old, the additional ratio was equivalent to: (total population under 65) / (MarketScan projected commercial population). For those older than 65 years old, the additional ratio was equivalent to: (total population over 65) / (MarketScan projected Medicare population).

Cohort analyses

All patients identified in the prevalence analysis were further characterized by age, work status (employed vs not employed), and industry affiliation. The ratio of patients with dysphonia by work status and industry affiliation was compared with those obtained from the overall projected MarketScan population.

Statistical analyses

Continuous variables were shown as means and standard deviations. Proportions were calculated for all categorical variables and presented as ratios with confidence intervals. To evaluate statistical differences between proportions, *t* tests for unpaired cohorts were conducted ($\alpha = 0.05$). All statistical analyses were performed using SAS EG 4.3 (SAS Institute, Inc., Cary, NC).

RESULTS

The total volume of covered lives in the MarketScan Commercial and Medicare databases increased from 36.8 million in 2008 to 56.1 million in 2012. Of these populations, 343,364 patients in 2008 and 661,578 patients in 2012 presented with dysphonia. Using the projection methodology described above, the overall prevalence for each dysphonia diagnosis was projected for the US-wide population (304.3 million in 2008 and 313.8 million in 2012). The results are shown in Table 1. Briefly, acute laryngitis represented approximately 54% of all cases of dysphonia, followed by general “dysphonia” diagnoses (22%) and chronic laryngitis (6%). All other diseases were fairly rare, accounting for less than 200,000 patients per year and thus falling under the “orphan disease” definition (according to US criteria, a disease that affects fewer than 200,000 people).

TABLE 1.
Prevalence Estimates and Compound Annual Growth Rates (CAGR) for All Conditions From 2008 to 2012

	2008	2009	2010	2011	2012	CAGR (%)
Acute laryngitis	2,206,593	2,604,168	2,530,288	2,650,974	2,754,056	5.7
Dysphonia	760,265	951,775	1,068,905	1,134,977	1,247,471	13.2
Other	341,549	389,834	437,986	489,226	565,490	13.4
Chronic laryngitis	248,846	293,151	310,972	325,397	342,601	8.3
Malignant neoplasm of larynx	104,009	97,814	103,084	105,131	108,209	1.0
Edema of larynx	78,142	92,839	113,531	123,482	130,184	13.6
Vocal fold polyps	74,177	77,137	83,030	85,104	88,694	4.6
Paralysis	69,390	76,452	81,167	88,945	94,418	8.0

The CAGR of the US population over the same time period was estimated at 0.8%.

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