

Medical Costs and Productivity Costs Related to Voice Symptoms in Colombian Teachers

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Summary: Objectives. To investigate the medical costs and productivity costs of voice symptoms among teachers and to assess the contribution of the characteristics of voice symptoms, sociodemographic characteristics, health conditions, and work-related factors to these costs.

Study design. This is a cross-sectional study.

Methods. In 2012, we conducted a longitudinal study in 12 public schools in Bogotá D.C., Colombia. This study is focused on cross-sectional results obtained in the first stage of the data collection process. Participants filled out a questionnaire on sociodemographics, voice symptoms, work-related conditions, use of health care, productivity loss at work, and sickness absence. Multiple logistic regression analysis was used to explore associations among health care use, voice-related absenteeism and productivity loss with duration and severity of voice symptoms, sociodemographic characteristics, health conditions, and work-related factors.

Results. In total, 621 Colombian teachers participated in this research, 438 of whom had self-reported voice complaints and who therefore made up the study population. Total medical costs and productivity costs due to presence of voice symptoms among teachers with voice complaints equaled around 37% of their monthly wage. Approximately, 3% of the costs were direct costs for health care use, and 97% were indirect costs for productivity losses. Severity of voice symptoms was significantly associated with health care use and absenteeism.

Conclusions. Voice symptoms among teachers have important economic consequences because of health care use, voice-related absenteeism, and productivity loss at work.

Key Words: Voice symptoms–Health care costs–Absenteeism–Productivity loss–Teacher.

INTRODUCTION

Various studies have reported a high occurrence of voice disorders among teachers ranging from 9%¹ to 94%.² A recent systematic review showed that this large variation could partly be attributed to large differences in criteria for determining the presence of a voice disorder and differences in the established recall periods.³ Publications that used general terms, such as voice symptoms, reported a higher prevalence of 80%⁴ compared with publications using a specific definition of a voice disorder that reported prevalence of 15%.⁵ Publications that used longer recall periods, such as lifetime or unspecified recall period, reported a higher prevalence of 94%² compared with publications reporting point prevalence of 9%.¹ It is of interest to note that most studies focused on reporting the presence of voice disorders with little attention of severity and duration of these disorders. In addition, there was little information on consequences of voice disorders among teachers for functioning in daily life.^{6,7}

Few studies have provided information on consequences of voice disorders among teachers for health care use and functioning at work. Two cross-sectional studies reported that teachers had more missed workdays because of their voice symptoms than other occupational groups with odds ratios (ORs) ranging from 2.98² to 10.31.⁸ In addition, some studies have reported the contribution of several work-related factors to sickness absence.^{6,9} Teachers who reported high noise (OR,

2.01), poor acoustics (OR, 1.53), and dry or moist humidity in their workplaces (OR, 1.55) were more likely to miss workdays because of voice symptoms. Two cross-sectional studies also indicated that teachers with voice complaints used health care services more often than nonteachers.^{7,8} Health care use may be prompted by severity of voice disorders.⁷ This merging evidence is difficult to interpret because most studies on health care use and sickness absence do not distinguish occurrence of voice disorders from its consequences, for example, by reporting on determinants of sickness absence due to voice disorders among teachers with and without voice disorders. There is also a lack of studies that systematically evaluate economic consequences of voice disorders for health care use, voice-related absenteeism, and productivity loss at work.

To address these issues, we conducted a cross-sectional study, as part of a larger longitudinal study, among teachers with voice symptoms in the public school system in Bogotá D.C., Colombia, with two aims: (1) to investigate the direct and indirect costs of voice symptoms, in terms of health care use, voice-related absence, and productivity loss at work, and (2) to assess the contribution of the duration and severity of voice symptoms, sociodemographic characteristics, health conditions, and work-related factors to the direct and indirect costs of these disorders among teachers.

METHODS

This study is part of a larger longitudinal study among teachers in the public school system in Bogotá D.C., Colombia. More detailed information on the sampling process, the questionnaire, and the definition of voice symptoms has been described in previous publications.^{10,11}

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Design and participants

In 2012, we conducted a longitudinal study in 12 public schools in Bogotá D.C., Colombia. This study is focused on cross-sectional results on economic consequences obtained in February and March (at the start of the school year).

After power calculations to determine the minimal sample size required, 12 participant schools were selected by convenience sampling by the Department of Education of Bogota ($n = 1446$ teachers). After approval by the school board, at each school, group and individual meetings were held to inform the teachers about the general aims of the study. Subsequently, all personnel were asked to participate in the study. Teachers who decided to take part in this study filled out a questionnaire. This study was approved by the Medical Ethics Committee of the Universidad del Rosario in Colombia. Specific results on other analyses of this study have been presented in previous publications^{10,11} or are under review.¹²

Data collection procedures

Questionnaire. In this study, we designed a questionnaire on the basis of previous publications.^{1,9,13} This questionnaire was administered to determine the occurrence of voice disorders, their associated factors, and their consequences for care use and productivity losses. We included questions on the presence of voice symptoms in the past month and their characteristics; working conditions, such as noise and acoustic conditions; and costs of voice symptoms, namely health care use, voice-related absence, and reduction in productivity at work.

Voice symptoms. For the purpose of this study, we defined the presence of voice symptoms by the single question “Have you had voice symptoms in the past month?” We also included a list of 11 symptoms whereby teachers could indicate how many and what kind of symptoms they had had in the past month. Questions on severity and duration of symptoms were also included in the characterization of voice symptoms.

Direct and indirect costs of voice symptoms. The medical costs and productivity costs distinguished between direct costs for health care use and indirect costs for productivity losses due to a reduced performance at work and voice-related sickness absence. We defined costs of voice symptoms using six questions on whether participants had sought medical care because of their voice symptoms during the past month and which health professional they had consulted.¹⁰ The medical costs were delimited to the total cost of an appointment with one or more health care providers. Teachers were also able to indicate whether they were absent from work during the past month because of voice disorders and for how long. Concerning the productivity losses at work, participants indicated how much their voice disorders interfered with their productivity at work. A 0- to 10-point scale was used to determine the productivity loss at work, in which 0 = “no interference at work” and 10 = “complete interference at work.”¹⁴ In addition, they also indicated how long they experienced interference of voice disorders with their productivity at work in the past month. Because the frequency of answers for some

categories was low, in further analyses, “occurrence of productivity loss at work” was used as dichotomous variable, with subjects who answered any interference of the voice disorder with productivity at work (score ≥ 1) considered as being exposed.

Calculations to determine direct and indirect costs because of voice symptoms were based on legal rates in Colombia (see [Table 1](#) for approximate rates in US dollars). To calculate direct costs (health care use), we added up to the cost per consultation for each health professional per teacher with voice symptoms in the past month. To calculate voice-related absenteeism costs, we multiplied the number of workdays missed due to voice symptoms per teacher by the wage per day. Calculations to determine productivity loss were done by multiplying the number of days worked with less productivity with the fraction of productivity loss due to voice symptoms per teacher by the wage per day.

Health-related conditions. Previous studies have reported associations between specific health conditions and occurrence of voice disorders.^{9,15,16} Therefore, participants were also asked to fill in a short survey on the presence of respiratory diseases, gastrointestinal diseases, and hearing impairment.¹⁰

Statistical analysis

Epi Info 3.5.3 software developed by Centers for Disease Control and Prevention in Atlanta, USA,¹⁷ was used for data entry, and *SPSS* 20 software, one of the brands under IBM software Group’s Business Analytics Portfolio in New York, USA,¹⁸ was used for statistical analysis. Because some variables had up to 3% missing values, multiple imputation was performed with the fully conditional specification method. This method imputes data on a variable-by-variable basis by specifying an imputation model per variable, allowing flexibility in creating multivariate models.¹⁹ Descriptive statistics were used for

TABLE 1.
Prices Used in the Productivity and Medical Cost Analysis

Item	Costs (US\$)
Teacher wage*	
Average salary per month of teachers without specialization	1014
Average salary per month of teachers with specialization	1117
Average salary per month of teachers with master degree	1603
Average salary per month per teacher	1245
Net salary costs of a teachers’ hour in Colombia	12
Medical costs[†]	
General practitioner consultation	12
Ear, Nose and Throat specialist	18
Speech therapist	8

* According with Decree 0826/2012.

[†] According with Decree 2423/2006 up to date (2012).

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