

## The prevalence of hoarseness among the employees in primary health care units and hospitals - time trends and effect of remediation in working conditions in 2007-2018

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### Abstract

**Background** Hoarseness and voice problems are common in many occupations where continuous communication is needed. Especially teachers, employees in day care centers, journalists and artists are at risk. The risk factors for voice problems have been investigated mainly with cross-sectional studies. Are voice problems among adults increasing, and if yes why, remains unclear.

**Aim** The aim of this study was to investigate the time trends in the prevalence of hoarseness and changes in risk factors of hoarseness during the past twelve years in hospitals and in primary health care (PHC) units. A secondary aim was to investigate the effect of remediation of the building with indoor air quality (IAQ) problems to prevalence of hoarseness.

**Materials** In this series of surveys, we estimated the time trends in the prevalence of hoarseness among health care professionals in PHC units (N=1564) and hospitals (N=1208). The health status of employees in three PHC units were followed-up before and after the remediation of buildings and were compared with reference buildings. In all, 547 employees participated the intervention part of the study. The surveys cover the years 2007-2018. Similar questionnaires were used in all surveys, and all buildings were inspected by a trained building expert.

**Results** Hoarseness has not increased in work places with good IEQ. In the non-exposed reference building, the prevalence of hoarseness was 5% in the pilot study of PHC units and 5.4% in reference buildings at the end of the follow-up, respectively. In PHC units with IEQ problem, the prevalence of hoarseness was 21.2% prior to remediation. In a large hospital with severe problems of IEQ, the prevalence of hoarseness was 36% and in hospital buildings with milder exposure 22%. In a follow up study of four PHC units (three with exposure and one reference), the prevalence of hoarseness varied between 4.9% (no exposure, n=102) and 11.4% in PHC units after the remediation (n=328).

Work-related over-load/stress was on highest level (26.9%) in primary health care units (PHC units) with problems in indoor environment quality (IEQ), and lowest in the reference hospital (15%) and in reference PHC units 16.5%. Work overload and hoarseness correlate significantly before remediation in PHC units ( $n < 0.01$ ) but not as clearly after renovation ( $p = 0.08$ ).

The proportion of smokers has decreased from 13.2% to 10.0%, and the proportion of pet owners was steady in the follow-up (42.1% before repair and 38.9% at the end of the follow-up). Asthma, allergies, infections and indoor air quality are the most important risk factors for hoarseness and voice problems. The prevalence of asthma did not change during the follow-up. A thorough remediation of the building seems to decrease the prevalence of hoarseness. The logistic regression model showed a significant reduction of hoarseness associated with remediation, when age, gender, smoking, pet-owning, allergic rhinitis and asthma were controlled (OR 1.88, CI 1.36 – 2.59).

**Conclusions:** Good indoor environment and remediation of damaged buildings seem to promote the health of health care workers.