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Current asthma and asthma-like symptoms among workers at a Veterans Administration Medical Center

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ABSTRACT

Introduction: Healthcare workers are at increased risk for respiratory disorders. The purpose of our respiratory health survey was to estimate the prevalence of current asthma and asthma-like symptoms and their association with workplace exposures and tasks among healthcare workers at a Veterans Administration (VA) Medical Center.

Material and methods: Information on respiratory health and work characteristics, including tasks performed, products used, and exposures, were collected by questionnaire from a convenience sample of workers employed at the VA Medical Center during 2012–2014. Associations of asthma and asthma-like symptoms with cleaning and disinfecting tasks and products as well as exposure to dampness and molds, and construction dust were evaluated using log-binomial regression.

Results: The prevalence of current asthma was 17.6% and almost half of all workers reported asthma-like symptoms. We observed elevated prevalence of current asthma among the VA healthcare workers compared to the U.S. general and working adult populations. Asthma and asthma-like symptoms were significantly associated with mold, dampness, and construction material exposures; cleaning and disinfecting products; and cleaning or disinfecting tasks.

Conclusions: Workplace exposures and tasks associated with current asthma and asthma-like symptoms were identified but further research is needed to investigate the temporal association between workplace exposures and current asthma and asthma-like symptoms.

1. Introduction

Asthma is a chronic inflammatory disorder of the airways and includes variable and recurring respiratory symptoms (NAEPP, 2007). An estimated 9.7% of ever-employed adults with current asthma in the U.S. have work-related asthma (WRA), which is potentially preventable by reducing exposure to asthmagens in the workplace (Knoeller et al., 2011). Healthcare workers are at an increased risk for WRA, asthma caused by or existing asthma made worse by workplace conditions (Delclos et al., 2007; Pechter et al., 2005; Tarlo et al., 2008), and allergic respiratory diseases (Mazurek and Weissman, 2016). Healthcare workers may be exposed to a variety of agents in the healthcare setting associated with asthma and/or asthma-like symptoms. These agents include latex, indoor air pollution, pharmaceuticals (administering), and chemical products used to disinfect, sterilize, or clean instruments or surfaces (Arif and Delclos, 2012; Delclos et al., 2007; Mirabelli et al., 2007; Pechter et al., 2005; Tarlo et al., 2008). Surveillance data from four states (California, Massachusetts, Michigan, and New Jersey) indicated that healthcare workers accounted for 15.6% of reported WRA cases but represented only 8.0% of the total workforce in those states (Pechter et al., 2005). Specific healthcare occupations have a higher risk of WRA including nurses, nursing aides/technicians, radiology technicians, laboratory workers and cleaners/housekeepers (Mirabelli et al., 2007; Quinn et al., 2015).

In 2000, the U.S. Department of Veterans Affairs and the Centers for Disease Control and Prevention's National Institute for Occupational Safety and Health (NIOSH) collaborated to examine hypersensitivity to latex proteins in healthcare workers at three Veterans Administration (VA) Medical Centers (Sussman, 2003; Zeiss et al., 2003). Results from the study indicated few symptomatic participants were sensitized to latex, but the prevalence of current asthma was 8.8% (95% CI = 7.6–10.1) and varied by occupation ranging from 0% for dental

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professionals to 21.4% among respiratory therapists. In 2012, we administered a respiratory health questionnaire survey at one of the three VA Medical Centers to gain insight into the prevalence of current asthma and asthma-like symptoms by occupational group as well as the prevalence of workplace exposures and tasks and their association with current asthma and asthma-like symptoms among participating healthcare workers.

2. Materials and methods

2.1. Study population and data collection

Information on respiratory health and work characteristics was collected by questionnaire from workers employed at the VA Medical Center. Participation in the cross-sectional study was open to all current employees from July 2012 through August 2014. Workers were invited to complete the questionnaire either during normal work hours or on their own time. Attempts were made to enroll workers through employee email, in person outreach, and general advertisements. The participating VA Medical Center and NIOSH human subjects committees approved survey protocol. By completing the questionnaire, the participants indicated consent to take part in the survey.

Questionnaire data were securely collected, entered, stored, and managed using the internet-based Research Electronic Data Capture (REDCap) system. Questionnaire data were directly entered into REDCap by participants completing the computer-based questionnaire or by study coordinators when a participant completed a paper questionnaire. A total of 687 questionnaires were received, of which 44 were excluded because the participant did not consent to participate or did not provide complete data. Eighty one participants submitted more than one questionnaire and only the most complete, earliest dated questionnaire was analyzed for a total of 562 participants.

2.2. Questionnaire

We updated a previously used questionnaire that collected details about demographic characteristics, respiratory health, and occupational characteristics to include questions on workplace exposures and tasks (Zeiss et al., 2003). Participants provided their age at the time of the survey, sex, and race. Race was defined as white, African-American, Asian, American Indian or Alaska Native, Native Hawaiian or other Pacific Islander, and other. We categorized cigarette smoking status as never smoker if workers "smoked less than 100 cigarettes during your lifetime", former smoker if they "ever smoked cigarettes regularly" but do not "still smoke cigarettes", and current smoker if they "ever smoked cigarettes regularly" and "still smoke cigarettes".

Participants provided the total years they worked or trained in healthcare ("seniority"), the number of days per week working at this VA Medical Center, their primary work building, and their current occupation. The VA Medical Center includes multiple buildings of various sizes (ranging from < 50 to > 500 workers), functions (e.g., office building, rehabilitation services, art therapy), and conditions. We limited our analysis to a large subsample of participants working in the main hospital building (n = 347) because the main hospital includes healthcare workers of diverse occupations and recruiting efforts were focused on the main hospital employees. Results for participants working in the other buildings are reported in the Supplemental Material (Supplement Tables 1–3, Fig. 1). Due to small sample size, we combined the current occupations into ten occupational groups: clinical nurses (e.g., non-operating room clinical nurse, clinical nurse specialist, registered nurse) (n = 105), office and administrative support (e.g., administrator, dietician, office/medical records worker, psychologist, social worker, ward clerk) (n = 95), patient care (e.g., nurse practitioner, nursing assistant, occupational therapist, physician assistant, non-surgical physician, physical therapist) (n = 51), clinical and medical laboratory (n = 33), medication dispensing and administration (n = 18), cleaning, laundry, disinfection, and food services (n = 14), facility maintenance and safety (n = 11), surgical (n = 4), technicians/technologists (n = 6), and other occupations (n = 9). We focused our analyses on the three occupational groups in the main hospital with the highest participation: clinical nurses, office and administrative support, and patient care. Participants also reported workplace sterilizing, disinfecting, or cleaning tasks; mold, dampness, and construction material exposure; and sterilizing, disinfecting, or cleaning product use.

Table 1
Demographic and Occupational Characteristics Overall and by Select Occupational Groups (n = 347).

	All participants N (%)	Clinical nurses N (%)	Office and administrative support N (%)	Patient care N (%)
Total	347 (100.0)	105 (30.3)	95 (27.4)	51 (14.7)
Age quartile				
21–37 years	89 (25.7)	25 (23.8)	22 (23.2)	13 (25.5)
38–49 years	90 (25.9)	29 (27.6)	22 (23.2)	17 (33.3)
50–56 years	94 (27.1)	32 (30.5)	29 (30.5)	9 (17.7)
57–73 years	74 (21.3)	19 (18.1)	22 (23.2)	12 (23.5)
Sex	*	*	*	*
Female	271 (78.1)	94 (89.5)	83 (87.4)	41 (80.4)
Male	76 (21.9)	11 (10.5)	12 (12.6)	10 (19.6)
Race[b]	*	*	*	*
White	312 (91.2)	100 (95.2)	87 (91.6)	43 (86.0)
Other[b]	30 (8.8)	5 (4.8)	8 (8.4)	7 (14.0)
Smoking status[a]	*	*	*	*
Never smoker	210 (60.9)	58 (55.8)	58 (61.1)	36 (70.6)
Former smoker	96 (27.8)	33 (31.7)	29 (30.5)	11 (21.6)
Current smoker	39 (11.3)	13 (12.5)	8 (8.4)	4 (7.8)
Seniority quartile[a]				
< 1–7 years	87 (25.1)	18 (17.1)	27 (28.7)	12 (23.5)
8–19 years	88 (25.4)	27 (25.7)	29 (30.9)	8 (15.7)
20–29 years	86 (24.9)	24 (22.9)	20 (21.3)	17 (33.3)
30–50 years	85 (24.6)	36 (34.3)	18 (19.2)	14 (27.5)
Days per week working[a]	*	*	*	*
≤4 days	51 (14.9)	22 (21.0)	9 (9.6)	9 (18.8)
> 4 days	291 (85.1)	83 (79.1)	85 (90.4)	39 (81.3)

N, number.
[a] In all participants, demographic and occupational data were missing for race (n = 5), smoking status (n = 2), seniority (n = 1), and days per week working (n = 5). Demographic and occupational characteristics by occupational group may not add up to the total number in the occupational group due to missing values.
[b] "Other" race category includes African American, Asian, American Indian or Alaska Native, Native Hawaiian or other Pacific Islander, and other.
* p- value < 0.05 based on Pearson's chi-square or Fisher's exact test.

Current asthma was defined as a positive response to each of the following three questions: "Have you ever had asthma?", "Was your asthma confirmed/diagnosed by a doctor or a healthcare professional?", and "Do you still have asthma?" [(DHHS, 2015; CDC, 2015)]. Participants reported asthma-like symptoms including "wheezing or whistling in your chest at any time", "woken up with a feeling of tightness in your chest first thing in the morning", "attack of shortness of breath when not doing anything strenuous", "attack of shortness of breath that came on after you stopped exercising", and "woken up at night by an attack of shortness of breath" within the 12 months prior to and also the 4 weeks prior to the administration of the questionnaire. Participants answering "yes" to any of the above asthma-like symptoms questions, having an attack of asthma at any time in the last 12 months or 4 weeks, or currently taking medicines for asthma were considered to have "breathing problems". Evidence of possible work-relatedness was assessed among participants reporting breathing problems by asking about the status of breathing problems when away from work (i.e., on