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Review Literature

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An Evaluation of Prolonged Occupational Sitting in One Office Setting

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Abstract

As the fourth leading modifiable risk factor for global mortality, sedentary behaviors adversely impact glucose and lipid metabolism, blood pressure, and adiposity with detrimental health consequences including kidney failure, heart disease, cancer, and premature death (World Health Organization [WHO], 2018; Dempsey et al., 2018). Objective: To answer the following question: What is the physical activity of employees at one Midwest call center? The aim of this quality improvement project was to examine physical inactivity and identify risks for a wide spectrum of chronic diseases. Pender's Health Promotion Model (HPM, 2016) was intentionally used to guide this project in order to identify unhealthy behaviors as a means to secure a pathway towards improved health. Design: Fifty-six employees completed the Occupational Physical Activity Questionnaire (OPAQ) to assess risk for occupational inactivity. Results: Employees reported little to no physical activity during work in their 8-hour day, five days a week. These findings demonstrate that this employee population is at risk for diabetes, cardiovascular disease, and cardiovascular events (Wei et al., 2019). Conclusions: Nurses must educate patients who experience prolonged occupational sitting and advocate for health policies that support workplace wellness and health.

Keywords: Interventions; Prolonged occupational sitting; Sedentary behaviors

Introduction

Modern technology has undoubtedly enriched personal lifestyle and business through efficient communication, accessible learning, and data storage/retrieval yet at the expense of the damaging effects from sedentary leisure activities and prolonged occupational sitting (American Heart Association News, [1-5]. As the fourth leading modifiable risk factor for global mortality, sedentary behaviors adversely impact glucose and lipid metabolism, blood pressure, and adiposity with detrimental health consequences including kidney failure, heart disease, cancer, and premature death [5-10]. Shockingly, 22.9% of Americans age 18-64 do not engage in leisure time physical activity and along with tobacco use, poor diet, excessive alcohol consumption, uncontrolled blood pressure, and hyperlipidemia these factors contribute to chronic disease burden and cost $117 billion annually. Centers for Disease Control and Prevention [CDC], 2019; U.S. Department of Health and Human Services [USDHHS], 2018). During the coronavirus pandemic, stay at home practices reduced the risk of morbidity and mortality from COVID-19 yet staying physically inactive while in self-isolation placed patients with chronic conditions at increased risk for cardiovascular death, heart attack, heart failure, stroke, decreased functionality, increased mental distress, and poor overall quality of life. By adding 75-150 hours of low to moderate physical activity or 150-300 hours of moderate physical activity, each week can increase health benefits including cognitive function and muscle strength while reducing risks for falls and all-cause mortality [11-15]. Responsible, accountable business corporation's large, small, and insurance providers must partner together and offer employees alternatives to prolonged occupational sitting to increase wellbeing and offset the harm caused by sedentary behaviors.

A decline in occupational activity is well documented and translates into decreased energy expenditure with negative health effects [16-20]. One in four US adults sit for more than 8-hours a day, 4 out of 10 is physically inactive, and 1 out of 10 report

both [21]. From 2001 to 2016, prolonged sitting outside of work including watching television or videos significantly increased by more than one hour across all age groups [22]. Further, national and international targets to reduce inactivity have not been achieved and in fact project increased heart attacks, strokes, and all cause mortality globally [23]. Evidence-based strategies and workplace policies are critically needed to reduce sitting time and increase physical activity in adults.

Prolonged sitting is associated with an increased risk for obesity, cardiovascular disease, diabetes, cancer, and mortality [20]. Domain specific sedentary behaviors including watching television or playing video games adds to these deleterious health risks. Correlates of prolonged occupational sitting and domain specific sedentary behaviors can inform evidence-based strategies that offer healthy, accessible choices with long-term health benefits. The voice of the healthcare provider must proactively motivate adults to become physically active, 'sit less,' and 'move more.' Further, providers can recommend safe, accessible physical activity programs easily retrievable on Smartphone apps [21].

Currently, understanding the collective impact of prolonged occupational sitting and alternatives to physical inactivity would enrich employee health. Further, contextual evidence would allow for an organizational specific approach to be launched that promotes physical activity (computer alerts, elevated desks). Most employees are interested in becoming more physically active during the workday [22]. Thus, the purpose of this quality improvement project was to evaluate the risk of physical inactivity in employees whose job requires prolonged occupational sitting at one office. The researchers set out to answer the following question: What is the physical activity of employees at one Midwest call center? The aim of the project was to examine physical inactivity and identify risks for a wide spectrum of chronic diseases. Beyond the scope of this project, findings will be used to inform an education intervention that promotes physical activity strategies that empower employees to make better choices and develop habits that lead to healthier lifestyles, and improved health and quality of life.

Theoretical Framework

Pender's Health Promotion Model (HPM, 2016) was intentionally used to guide this project in order to identify unhealthy behaviors as a means to secure a pathway towards improved health. Promotion of desired behaviors is directly related to successful self-management. Transforming the workplace environment to interrupt prolonged sitting and elicit intermittent physical activity can positively impact employee health. Thus, employees who experience prolonged occupational sitting could optimize their health in the workplace with computer alerts, hourly breaks, and sitting on gym balls that mobilize frequent use of physical exertion or movement.

Pender's HPM was utilized to measure employees' health beliefs before and after an education intervention on the benefits of physical activity. Perceptions of employees significantly improved on benefits of physical activity including obesity prevention, reducing lipidemia, improving happiness, and muscle strengthening [23]. Generally, before the education intervention, the experimental group scored low on physical activity (18.5%), medium (53.8%), and high (28.7%); after the education intervention, the experimental group reported physical activity levels at medium (33.8%) and high (66.2%) with p=0.002. Mean scores on activity in the control group showed no significant difference after the education intervention. Another study using the HPM showed the determinants that influenced stretching exercises of office staff the most included self-efficacy, commitment to plan, interpersonal influences, and stimulus control [24]. Support from fellow employees and managers is key for a successful sit less, move more at work approach that promotes wellness and reverses the negative health effects from prolonged sitting [25].

Summary

Employee health can be supported, maintained, improved through intentional physical activities including brisk walks or resistance activities to interrupt prolonged sitting times at work. Pender's HBM showed significant outcomes in office staff when used as a proactive guide on the benefits of physical activity. Further, strategies that interrupt prolonged sitting at work can be applied in the home environment. Barriers to physical activities at work, including social support, accessible facilities, and time must be considered.

Literature Review

The phenomenon of prolonged occupational sitting is linked to long-term negative health consequences and relying on intermittent moderate exercise does not counteract the detrimental effects of sedentary behavior (Pinto et al., 2020). With more work being mentally demanding rather than physically demanding, it is critical for healthcare providers, employers, and employees to understand the risks of prolonged sitting and utilize strategies that offset a trajectory of disease and disability. A healthier workforce is possible through intentional physical activities planned during the workday. The following themes were identified from a review of the literature: (a) occupational sitting, correlates, and health outcomes, (b) measures for sedentary behavior, (c) and education interventions.

Occupational Sitting, Correlates, and Health Outcomes: Prolonged occupational sitting is a critical public health concern supported by occupational health and safety laws to promote "sit less, move more, and move often" recommendations to improve cardio-metabolic biomarker profiles. To achieve these desired behavioral changes and long-term health outcomes interventions must consider contextual factors (office layout, outside environment) and employers/employees perceptions [26] evaluated qualitative studies for acceptability and feasibility of reducing sedentary behaviors of desk-based workers. Key facilitators to reduce sitting time were identified as support from co-workers and managers and barriers were identified as work pressures and social norms that discourage movement and disturbing others. Further, standing desks or sitting on a ball while a good financial investment in a competitive market may be cost prohibitive to most businesses [27] uncovered employee confusion related to differentiating between interrupting sitting time and reducing sitting time and on the appropriate ratio of sitting time and activity. German men and women reported a positive attitude towards prolonged sitting and others considered standing as an aggressive or very domineering behavior [28]. However, one study showed no negative health effects from sitting behaviors.

While context, culture, and gender must be considered when creating sustainable interventions, sedentary behaviors may have positive correlates not previously considered. Further, employees that move from sedentary to more physical occupations decrease leisure time exercises and increase physical activities when moving to occupations with prolonged sitting [29]. It makes sense in today's work environment for employers to offer their employees options or discuss ways to reduce prolonged occupational sitting in order to maintain or improve health outcomes.

Measures of Sedentary Behavior: Frequently utilized in research are physical activity assessment tools including the National Health and Nutrition Examination Survey (NHANES), International Physical Activity Questionnaire (IPA-Q), Occupational Physical Activity Questionnaire (OPA-Q), and other theory based questionnaires [30]. These instruments have good reliability and validity ranges (i.e., NHANES intraclass correlation coefficient ranging from 0.32 to 0.69; IPA-Q validated at 0.45 to 0.71; OPA-Q reliability ranging from 0.55 to 0.91) and are frequently used to measure hours of type, frequency, and duration of physical activity at work. Theory based models that utilize researcher-made questionnaires do well when added constructs are considered including barriers to commitment, interpersonal influences, and stimulus control. Inclinometers such as the ActiGraph and the activPAL are objective measures used to determine differences in occupational sitting and standing times. In one study, the activPAL showed a higher responsiveness compared to the ActiGraph on intervention-induced changes thus establishing the activPAL as the preferred instrument. Further, the self report Workforce Sitting Questionnaire (WSQ) and Occupational Sitting and Physical Activity Questionnaire (OSPAQ) were compared and the OSPAQ showed better estimates for tracking time spent standing, making this instrument an inexpensive alternative to objective assessment strategies.

Interventions: Reducing sitting time in the workplace requires creative intervention strategies. De Cocker and colleagues (2015) surveyed employees who recommended a variety of strategies targeting sitting time: standing during calls/meetings, personal computer (PC) reminders, increasing bathroom use by drinking more water, active sitting furniture, standing desks, rearranging the office, lunch breaks, physical activity, movement breaks, and standing tables. Perceived barriers to implementing these activities included decreased productivity, awkwardness of standing, and breaking the habit of sitting. Active meetings or standing meetings were well liked by employees, considered more feasible than walking meetings, and associated with reduced sitting time. Moreover, when resources including height adjustable workstations, and feedback or progress charts are provided, employees reported feeling healthier, more energetic, productive, and cognitively alert, and fewer aches and pains.

Lennefer and colleagues (2020) utilized a cognitive-behavioral approach with an activity tracker and online coach who supported goal setting, coping strategies, four day step challenges, and found that high-risk employees benefitted from increased health perception and reduced body mass index (BMI). Overall, it is essential to have a thorough understanding of each office setting and participation process in order to select the most appropriate interventions that can reduce sedentary behaviors [31].

Other considerations to reduce prolonged occupational sitting are air quality and use of masks. The primary source of volatile organic compounds (VOCs) found in the indoor air of office environments is exhaled air, personal care produces, building materials, and office furniture. Ventilation mode, re-circulated filtered air, and occupancy must be analyzed for indoor pollutants. Pedal desks may be a feasible method to reduce sedentary behavior yet this activity may have unintended health outcomes. Finally during the COVID-19 pandemic, the popular use of N95 masks while reducing exposure to particulate matter can increase respiratory resistance and dead space.

Summary

A review of the literature reveals prolonged occupational sitting should be intermittently interrupted to offset a trajectory of disability and disease. A myriad of interventions exist that be considered based on the culture and context of the work environment. Currently, there is a paucity of research on prolonged sitting of call center workers that measures their inactivity and provides education and behavior interventions to increase physical activity. The aim of this project is to perform an activity assessment to evaluate a population of employees at risk for sedentary behavior at work. Beyond the scope of this project, findings will inform an education and behavioral intervention to meet the physical activity needs of this employee population.

Methodology: Occupational sitting has shown to increase risk for cardiovascular disease yet there is evidence that by interrupting prolonged sitting through physical activity, employees work related well being and physical health improves [32]. In order to better understand the risk for prolonged sitting, one Midwest call center was evaluated using the Occupational Physical Activity Questionnaire (OPAQ) survey. Below is a presentation of this project's methodology.

Sample and Setting: Fifty-six employees were recruited from one Midwest call center where the work day consisted of talking to customers by phone while logging information into a computerized database. The minimum population size of 52 participants was determined using a power (1-β) of 0.9504 and a 5% Type I error rate (http://powerandsamplesize.com/Calculators/Test-1-Mean/1-Sample-Equality). Participants included male or female, full-time employees over the age of 18 who were able to complete the OPAQ survey.

Ethics: Collaborative Institutional Training Initiative (CITI) training was completed and an institutional review board (IRB) approval was provided by Maryville University in order to protect the rights of human subjects prior to the implementation of the quality improvement project. Aggregate results were shared with the call center's management, containing no identifiable employee information. During the project, no managers were involved in the enrollment process in order to minimize coercion. There was a minimum risk to a breach in confidentiality. The findings of this project will be used to benefit this employee population with evidence based educational interventions to increase physical activity and improve health outcomes.

Instrument and Data Collection Procedures: The Occupational Physical Activity Questionnaire (OPAQ) was utilized for this project for its ability to identify the average time per week spent

in occupational sitting or standing, walking, and heavy labor activities. Employees at one Midwest call center were provided with an implied consent and have their questions answered before deciding to participate in the project. Once employees agreed to take the OPAQ survey, the employee was provided a private designated area in the break room. The employer granted exclusive use of this break room during this project. Employees were asked to complete a OPAQ survey that contained 11 questions and an estimated 10-15 minute time frame to complete. The OPAQ survey included the researcher's five demographic questions and six physical activity questions from the OPAQ survey. The primary investigator (PI) was available, in a separate room, in close proximity to answer employee questions or available if the employee wished to withdraw from the project; no employees withdrew. Employees completed their OPAQ surveys and were returned as directed, ensuring implied consent. The completed OPAQ surveys were secured in a locked box to assure confidentiality. Demographic data and OPAQ survey results were transferred onto a password protected Excel spreadsheet for data analysis.

Prospective Summary: The findings from this quality improvement project on occupational sitting are presented in Chapter Four. Findings are presented in table format. These results identify the demographic make up of this employee population and provide the OPAQ survey results.

Results

Findings are presented from the fifty-six employees who completed demographic questions and the OPAQ survey. The aim of this quality improvement project was to evaluate the risk for physical inactivity that could lead to development or exacerbation of acute or chronic illness. Beyond the scope of this project, these findings will inform an education intervention to promote physical activity strategies and guide employees towards healthier choices to improve health and quality of life.

Demographics: Employees from the call center included 57.1% (32) males and 42.9% (24) females with age ranges reported as follows: 55% (31) were age 25-34, 21.4 % were age 45-54, 7.2% were reported in two age groups of 18-24 and 55-64, and 6.1% were age 35-44. More than half of the employees (64.3%, 36) were Caucasian, 23.2% (13) African American, 5.4% (3) American Indian, and 3.6% (2) Asian, and 3.6% (2) Hispanic. Eighty-six percent (48) of the employees identified as full time call center employees and 14% (8) identified being contingent employees. Ninety-six percent (54) of employees identified English as their primary language and 4% (2) of employees identified Spanish as their preferred language.

OPAQ Survey: Employees responded to 'do you walk at work?' as mostly not walking while at work 92.9% (52). This indicates that employees spend a majority, if not all, of their reported 8-hour days sitting at their desks. Of the 7.1% (4) employees who reported walking at work, employees reported walking 2 hours a day at work out of an eight hour day. All fifty-six (100%, 56) employees work five days per week and 8-hours per day. Finally, employees were asked about performing heavy labor and if so, how many hours of heavy labor is performed. None of the employees reported performing heavy labor at work.

Summary

In this quality improvement project, employees at one Midwest call center reported little to no physical activity during work in their 8-hour day, five days a week. These findings demonstrate that this employee population is at risk for diabetes, cardiovascular disease, and cardiovascular events [32]. Each employee setting has different behavioral determinants of health therefore interventions unique to that context must be considered.

Discussion

Prolonged occupational sitting continues to be a growing problem not only in the United States of America, but worldwide . Efforts to help decrease excessive occupational sitting must include education support of employees, and education and training of occupational health clinicians, in order to reach goals for optimal occupational activity. Additional factors that need to be addressed with employees include workplace health and wellbeing intervention (WHWI) options that identify risks associated with prolonged occupational sitting. COVID-19 complicates regular physical activities at work. The aim of this study was to evaluate employees at risk for prolonged occupational sitting. The project was successful in the sense that prolong occupational sitting was identified, placing the call center employees at risk for poor health outcomes. The findings of this quality improvement project were discussed with the employer and beyond the scope of this project, next steps discussed are to implement an education intervention to decrease inactivity using the current evidence and occupational friendly activity strategies.

Advanced practice nurses are at the forefront of disease prevention and health promotion and wellness. Nurse practitioners enter the workplace environment and promote health and wellness through an assessment of sedentary behaviors then implement behavior and workplace culture changes that support health to reduce risk [33]. It is critical to use evidence to support health of at-risk populations and advocate for the health of employees who experience prolonged occupational sitting.

Conclusion

Physical inactivity is one of the leading causes of death in the United States of America, trailing only to heart disease (CDC, 2015). Morbidity or worsening of many chronic diseases and health conditions can be linked to physical inactivity. Prolonged sedentary behaviors are modifiable risk factors associated with adverse outcomes. The American Heart Association reports a great decline in the workplace serving as a source of physical activity due to contemporary work activities requiring prolonged sitting. Physically demanding occupations have seen a decline and today's employee has been tasked to data entry work, focused on speed, rapid communication, efficiency, and productivity [34,35].

Nurses must educate their patients and advocate for health policies to reverse sedentary work behaviors that place employees at risk for prolonged occupational sitting at risk. Low cost, no cost solutions are evidence based to interrupt prolonged sitting. This simple activities like a brisk walk or resistance activities can improve work place health, wellness, and quality of life. The

results of this quality improvement project should be the impetus for change.

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