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The Prevalence of Low Back Pain and Evaluation of Prevention Strategies among the Electrophysiology and Catheterization Laboratory Community (Physicians, Nurses, Technicians) in Rural Hospitals

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Abstract

Musculoskeletal disorders, such as low back pain, are a common and costly problem in today's workforce. Employees who work in a rural hospital's electrophysiology (EP) or catheterization lab (Cath lab) appear to be especially susceptible to injury. This increase in risk has been attributed to a shortage of physicians, less community-based resources available to hospital staff, and the forward-flexed postures EP/Cath lab professionals maintain for extended periods of time while working in the operating room. Traditionally, exercise and physical activity routines, health education, and continued management support have been promoted as low cost/low risk interventions to address low back pain. However, the extent to which hospital policy and culture enable these prevention strategies to be implemented is unknown. Thus, the objective of this study was to determine the prevalence of low back pain in rural EP/Cath laboratories and the significance of exercise and physical activity routines, health education, and continued management support as low back pain prevention strategies in the rural EP/Cath lab community.

Keywords: low back pain, rural hospitals, healthcare workers safety

1. Introduction

Hospital workers are highly susceptible to musculoskeletal disorders due to the regular lifting, positioning, and transporting of patients, combined with a fast pace work environment and a general collective temperament of putting their patients' health before their own [1]. Upon closer review, the EP/Cath lab subset of the rural hospital workforce appears to be especially susceptible to the specific musculoskeletal disorder of low back pain. This has been attributed to

the sustained forward-flexed postures they commonly maintain while working in the operating room [2], combined with a shortage of rural physicians and less community-based resources available to rural hospital staff as compared to their urban counterparts [3]. As a strategy to address this dilemma, exercise and physical activity routines, health education, and continued management support have been broadly promoted as cost-effective programs which are powerful enough to improve the health of the workforce, yet also produce a positive return on investment [4]. In theory the implementation of these low cost/low risk programs is a sound strategy based on evidence-based guidelines. The American College of Physicians strongly recommends nonpharmacologic treatments for chronic low back pain, including exercise and mindfulness-based stress reduction, because the benefits clearly outweigh the risk [5]. In practice, though, limited time and the inability to incorporate the program into everyday work routines have been found to be the two main reasons why these worksite-based fitness programs have failed to produce significant findings [6]. To overcome these barriers, hospital management must concurrently have the social, financial, and strategic investments in place which complement and support these specific wellness interventions to realize significant and lasting reductions in musculoskeletal disorders [7]. Unfortunately, the extent to which these investments have been made by hospital management, and thus perceived effective by the EP/Cath lab workforce, is unknown. Thus, the objective of this study was to determine the prevalence of low back pain in rural EP/Cath laboratories and the significance of exercise and physical activity routines, health education, and continued management support as low back pain prevention strategies in the rural EP/Cath lab community.

2. Methods and data collection

Those individuals who worked in the EP/Cath laboratories of two rural hospitals in the state Arkansas were eligible to participate in the study. A convenience sample design was used, and all research data were collected through the electronic transmission of a Qualtrics survey. The survey included three general sections: Nordic Musculoskeletal Questionnaire (NMQ), demographics/applicable work practice details, and low back pain prevention strategies. The first section featuring the NMQ was used to calculate the prevalence of musculoskeletal symptoms within the study population. The NMQ was developed for the analysis of musculoskeletal symptoms, [8] and has been validated and applied to a wide range of occupational groups, including nursing [9]. Additionally, the validity and reliability of the NMQ was assessed to be moderate to high and its use appropriate for epidemiological research related to musculoskeletal disorders [10]. The second section on demographics/applicable work practice assessed height, weight, gender, age, number of years worked in an EP/Cath lab setting, number of hours per week in a lead apron, and percentage of average shift spent standing in the lab. The third section on low back pain prevention strategies assessed exercise and physical activity routines, health education, and continued management support. These questions were developed through the examination of peer-reviewed journal articles, scientific posters, and government websites which promote specific behaviors or actions that had the potential to prevent or reduce low back pain [11].

A total of 45 participants were invited to participate in the study. Upon receiving IRB approval, the survey was sent to the work email address of all study participants. Data were deidentified and summarized using Microsoft Excel. Analysis showed fifteen individuals either selected they did not want to participant in the study or did not complete the survey in its entirety and thus, were omitted from the

final data set. Ultimately, a total of 30 completed surveys were included in the final data set for analysis.

3. Results

The first section of the survey featuring the NMQ assessed the prevalence of musculoskeletal symptoms in nine different regions of the body. The largest group, 18 (60%), stated they experienced pain in the lower back (L4 to S1) spinal level, while 12 (40%) reported no low back pain. Among the 60% of respondents who have experienced low back pain, eight (26.67%) had trouble in the last week and six (20%) were prevented from doing their normal work (at home or away from home) (**Table 1**).

Region of Body	Recorded “Yes” (n = 30)
Neck	46.67%
Trouble in the last 12 months	14
Prevented from normal work	1
Trouble in the last 7 days	4
Shoulders	40.00%
Trouble in the last 12 months	12
Prevented from normal work	2
Trouble in the last 7 days	4
Elbows	13.33%
Trouble in the last 12 months	4
Prevented from normal work	1
Trouble in the last 7 days	1
Wrists/Hands	13.33%
Trouble in the last 12 months	4
Prevented from normal work	1
Trouble in the last 7 days	1
Upper Back	36.67%
Trouble in the last 12 months	11
Prevented from normal work	1
Trouble in the last 7 days	3
Lower Back	60.00%
Trouble in the last 12 months	18
Prevented from normal work	6
Trouble in the last 7 days	8
Hips/Thighs	26.67%
Trouble in the last 12 months	8
Prevented from normal work	3
Trouble in the last 7 days	2
Knees	23.33%
Trouble in the last 12 months	7

Region of Body	Recorded “Yes” (n = 30)
Prevented from normal work	2
Trouble in the last 7 days	4
Feet/Ankles	30.00%
Trouble in the last 12 months	9
Prevented from normal work	1
Trouble in the last 7 days	5
Per Person Mean and SD	4.57 ± 4.03

Table 1.
Nordic musculoskeletal questionnaire number of recorded “Yes’s”.

4. Discussion

When we compare our study to a sample of Radiologic Technologists study who similarly wear lead aprons¹, the current study showed a higher overall pervasiveness of low back pain (60% to 47.62%) but less low back pain symptoms on the short-term basis (33.33% to 26.67%). Despite these discrepancies, low back pain was found to be the most prevalent musculoskeletal symptom recorded in both studies. Another significant finding in this study is the data showed an increase in the prevalence of low back pain once five years of service in an EP/Cath lab setting has been completed (58–61%) (**Table 2**). To provide a sense of comparison, Goldstein, et al. in (2004) likewise reported an upward trajectory in the prevalence of low back pain among Interventional Cardiologists as the number of years of service increased [12].

Finally, the top two prevention strategies reported by those with low back pain were “regularly complete at least 150 minutes per week of moderate-intensity aerobic physical activity” and “if a worksite-based fitness program will be offered to you at your department, will you be interested on joining it for at least a year” (**Table 3**).

	Total	LBP	No LBP
Number	30	18	12
Height (inches)	67.30 ± 5.47	67.28 ± 5.54	67.33 ± 5.61
Weight (pounds)	196.17 ± 31.79	194.44 ± 36.58	198.75 ± 24.16
Gender (% male)	46.67	44.44	50.00
Age	40.93 ± 11.92	38.67 ± 9.93	44.33 ± 14.20
Years working in EP/Cath lab setting	9.53 ± 9.79	8.22 ± 6.60	11.50 ± 13.36
under 5	12	7	5
5–10	8	6	2
11–16	4	2	2
17–20	4	3	1
21 or more	2	0	2
Hours per week in lead apron	18.13 ± 10.45	16.17 ± 10.53	21.08 ± 10.02
% of shift spent standing in lab	60.50 ± 24.96	59.44 ± 26.51	62.08 ± 23.50

Table 2.
Demographics/applicable work practice details stratified by the presence or absence of low Back pain (LBP).

Prevention Strategy	LBP (n = 18)	No LBP (n = 12)
Currently participate in early morning fitness program	6	5
Yes: Includes strength training exercises	6	4
Yes: Includes stretching exercises	5	5
Yes: Overall do you do your fitness program regularly	5	4
Worksite-based fitness program currently offered to dept	4	5
Yes: Occurred on company-time	0	0
Yes: Each class included exercises targeting the various muscle groups of the body	4	5
Yes: Customized around dept's specific needs, preferred communication methods, and resources available to the employees to help create a sense of ownership	2	1
If a worksite-based fitness program will be offered to you at your department, will you be interested on joining it for at least a year	10	1
Yes: How often to hold class (days/week)	3 Responses: Daily 6 Responses: 3x 1 Response: 1x	1 Response: Daily
Yes: How long to hold class (minutes)	2 Responses: 10–15 6 Responses: 15–20 2 Responses: Other	1 Response: 10–15
Yes: Led by a faciliator or instructor	7	1
Ergonomic-related topics discussed during team meetings	0	1
Yes: Includes discussion on poor posture(s)	0	1
Yes: Includes discussion on stress management	0	1
Yes: Includes discussion on active coping strategies	0	1
Yes: Strategies developed to overcome limited time to stretch	0	1
Yes: Strategies developed to overcome lack of regular breaks	0	1
Yes: Strategies developed to overcome requirement to keep the body in a sustained forward-flexed posture during surgery	0	1
Regularly complete at least 150 minutes per week of moderate-intensity aerobic physical activity	10	3
Regularly complete stretching exercises	6	6
Regularly complete strength training exercises two or more days/week	8	4
Yes: Systematically change number of sets, reps, or weight used in strength training program	7	4
Yes: Know how to engage the deep core muscles	7	4
Hospital management believes improvements in physical conditioning will help to prolong career	6	5
Low back pain and other musculoskeletal symptoms periodically evaluated	0	0
Functional Movement Screen or another validated screening tool periodically used to identify faulty movement patterns or muscular imbalances	1	2

Table 3.
Prevention strategies completed by EP/Cath lab physicians, managers, and technicians stratified by the presence or absence of low Back pain (LBP).

As motivation to exercise appears to be high, interestingly no responses were recorded when asked if their worksite-based fitness program occurred on company time or if low back pain and other musculoskeletal symptoms were periodically evaluated. In addition, only one response was recorded when asked if ergonomic-related topics were discussed during team meetings. These findings suggest it is the cultural norm of the EP/Cath lab community to believe it is the personal responsibility of the employee rather than shared responsibility of the employee and hospital (EP/Cath lab) management to address the widespread low back pain present in the workforce, personified by only 36.67% of respondents reporting “hospital management believes improvements in physical conditioning will help to prolong career.”

5. Conclusion

The primary goal of this study was to illustrate the prevalence and generalized characteristics of back pain among EP and Cath laboratories in rural hospital settings. Conclusions that may be drawn from this study are the prevalence of low back pain demonstrated within this study were consistent when compared to available studies, low back pain is a common condition among EP and Cath lab employees, and several low cost/low risk preventative strategies for reducing musculoskeletal symptoms in the workforce are not currently being completed by those who participated in the study.

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