



## Original Article

# Work–Family Conflict, Task Interruptions, and Influence at Work Predict Musculoskeletal Pain in Operating Room Nurses



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## ABSTRACT

**Background:** The aim of this study is to examine the prevalence of musculoskeletal complaints in Swiss operating room (OR) nurses, and to investigate how work–family conflict, work interruptions, and influence at work are related to lumbar and cervical back pain.

**Methods:** Participants in this correlational questionnaire study included 116 OR nurses from eight different hospitals in Switzerland.

**Results:** We found that 66% of the OR staff suffered from musculoskeletal problems. The most prevalent musculoskeletal complaints were lumbar (52.7%) and cervical pain (38.4%). Furthermore, 20.5% reported pain in the mid spine region, 20.5% in the knees and legs, and 9.8% in the hands and feet. Multiple linear regression analyses showed that work–family conflict ( $p < 0.05$ ) and interruptions ( $p < 0.05$ ) significantly predicted lumbar and cervical pain in OR nurses, while influence at work ( $p < 0.05$ ) only predicted lumbar pain.

**Conclusion:** These results suggest that reducing the work–family conflict and interruptions at work, as well as offering opportunities to influence one's workplace, help to promote OR nurses' health.

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## 1. Introduction

In Switzerland, musculoskeletal disorders (MSD) are responsible for causing economic costs of 3.3 billion and 0.97 billion Swiss francs, due to loss of productivity and absence from work, respectively [1]. Back pain alone, for example, entails costs of between 6 billion and 14 billion Swiss francs, which amounts to 1.3–3.2% of the gross domestic product in Switzerland (Schweizerischer Nationalfonds SNF 2009). More specifically, low back pain is responsible for about 3.2 billion Swiss francs in direct costs, and its direct medical costs make up 6.1% of the total healthcare expenditure in Switzerland [2]. Intangible costs should not be underestimated either, even if they are extremely difficult to estimate. They include psychosocial burdens, such as job stress, suffering, family stress, and economic stress, which all result in a reduced quality of life [3]. Taking a closer look at the general prevalence of MSD, Elfering and Mannion [3] estimated that the yearly

prevalence of back pain ranges from 25% to 45% in Europe, and from 15% to 20% in the United States, whereas the prevalence of low back pain in Switzerland increased from 13% in 1984 to 21% in 1998 [4].

Not every profession seems to be equally affected by MSD. According to the Bureau of Labour Statistics, nurses are at an especially high risk of developing musculoskeletal problems [5]. Overall, the annual occurrence of MSD for registered nurses ranged from 30% to 60%, depending on the specific body region involved [6]. An even higher prevalence is found for operating room (OR) nurses. Studies dealing with the specific occupational group of OR nurses found that in different studies, the majority of the OR nurses reported shoulder and lower back pain in the last 12 months, with frequencies ranging from 58% to 90% [7–10]. In Choobineh et al [8], lower back symptoms were found to be the most prevalent musculoskeletal problem in OR nurses.

It is suggested that repetitive movements and remaining in a static position [11,12] for hours when holding and reaching the

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surgical instruments are reasons for this high occurrence. Indeed, research shows that the typical working life of nursing staff is characterized by unusual motions and postures [13,14], and that being exposed to physical risks like repetitive motions, excessive work load, bad posture, vibrations, motions, lifting and bearing heavy things increased the risk of developing musculoskeletal problems in general [4]. The mentioned physical risks are also found to be associated with back pain in particular [15].

The psychosocial aspects of work that contribute to MSD in OR nurses have rarely been investigated so far. Such factors found in the literature include: shift work, conflicting demands, time pressure, and static stress [8,11,12]. This means that the more affected OR nurses were by these factors, the higher/more often their reported musculoskeletal complaints were.

To the knowledge of the authors, important and frequent work stressors, including work–family conflict and interruptions at work, have not been investigated yet in OR nurses, although a recent meta-analysis underlined the impact of the work–family conflict and privacy-work conflict on wellbeing and health [16]. Grzywacz et al [17] found that work–family conflict was a previously neglected, but salient, problem among nurses, as 50% reported chronic work interference with family, meaning that conflicts occur at least once a week because of it. Even though the work–family conflict seems to affect one's health, it has rarely been studied in association with pain [18]. According to the study by Hämmig et al [19], employees who were most frequently exposed to the work-to-life conflict were also most at risk for developing low back pain and neck/shoulder pain. Furthermore, having a variable work schedule was found to be an important predictor of work-to-life conflict [19]. Variable work schedules are common factors in the typical work life of OR nurses [8,9]. Thus, the current study assumes that the work–family conflict might be an important work stressor for OR nurses and will therefore predict significantly and positively lumbar and cervical musculoskeletal pain (Hypothesis 1).

Another common stressor in healthcare is interruption at work [20]. According to Elfering et al [21], interruptions at work may trigger failure in action regulation. Thus, interruptions during an OR nurse's work represent a threat to surgery outcomes and patient safety, and are stressful for OR nurses. Stress, in turn, is related to MSD [3,22–25] via a variety of mental (e.g., pain-related fear or individual coping styles) and bodily mechanisms (e.g., dysfunction of the hypothalamic–pituitary–adrenal axis or stress-induced changes in the temporal lobe) [25]. Therefore, the current study suggests that interruptions at work, as a work stressor, may be significantly and positively associated with lumbar and cervical musculoskeletal pain (Hypothesis 2).

In addition to work stressors promoting MSD, the authors of the current study were also interested in the nurse's influence at work as a psychosocial factor that can prevent someone from developing musculoskeletal symptoms or disorders. Eatough et al [26] found that having influence over how to perform one's job and whether or not one had the opportunity to make decisions relevant to one's job reduced the perceived strain, which in turn decreased pain in the lower back, shoulders, wrists, and hands. The review of publications on psychosocial factors at work and musculoskeletal disease from Bongers et al [27] concluded that having low influence on one's job was connected with more MSD, and alternatively, experiencing a high level of job control served as a buffer for MSD. These findings are widely shared because lack of control at work is often associated with pain in the lower back, shoulders, neck, knees, and forearms [28–31], as well as with shrinkage of spinal discs throughout the working day [32]. In nurses, lack of influence was determined to be a risk factor for the development of musculoskeletal complaints, and especially for the chronicity of musculoskeletal pain [33]. The influence to decide on when and in what

sequence to do specific tasks was shown to be a resource factor in young nurses, as it was negatively associated with low back pain and catecholamines during work [34]. Bos et al [7] state that OR nurses perceive less job influence as compared with registered nurses. Therefore, the authors assume that influence at one's work significantly and negatively predicts the extent of lumbar and cervical musculoskeletal complaints in OR nurses (Hypothesis 3).

In summary, OR nurses have not been investigated very often in previous studies and the determined number of factors associated with musculoskeletal pain in this cohort is still low. However, evidence is mounting that OR nurses are more affected by musculoskeletal pain (with a 1 year prevalence ranging from 58% to 90%) than is the general population (with yearly occurrence of 25–45%) or nonspecialized nurses (annually 30–60%) [7]. Lumbar back pain (lower back, loins, hips, small of the back, and pelvis) and cervical back pain (pain in the neck and shoulders) seem to occur most frequently [8,9]. The aim of the current study is to investigate the distribution of MSD in general, and especially of lumbar and cervical back pain in OR nurses in Switzerland, because no corresponding Swiss studies can be found in the current body of literature. Another goal is to look more closely at the influence of factors, such as work–family conflict, interruptions, and influence at work, on predicting lumbar and cervical pain.

## 2. Materials and methods

### 2.1. Sample

The study population consisted of 116 employees of eight different hospitals from around the Canton of Bern in Switzerland. The group of eight hospitals was composed of a large university hospital, three other public hospitals, two smaller and more regional semi-private hospitals, and two smaller and more regional private hospitals. This common mixture of different types of hospitals is therefore representative within Switzerland. A total of 312 questionnaires were distributed, and 133 were returned. This resulted in a response rate of 42.6%.

All participants gave their informed consent and the study was carried out in accordance with the Code of Ethics of the World Medical Association (Declaration of Helsinki), and was approved by the Ethics Committee of the Canton of Bern, Switzerland (KEK No. Z001/13). Seventeen questionnaires had to be excluded due to missing data, so the final sample included 116 employees. The 97 women and 19 men were aged between 21 and 63 years old [mean = 39.9, standard deviation (SD) = 11.9], and each member of the sample group worked amongst others in the OR, with most of them assisting the surgeons by holding and reaching for the surgical instruments or by positioning the patient during surgery. About 64% of the respondents worked between 90% or full-time (42 contracted h/wk), 25% worked part-time hours of > 50% but < 90%, and 11% worked ≤ 50%. Their job tenure averaged 15 years (SD = 10.6). The authors have no information about the non-responders. During data collection, the author's impression was that some of the later nonresponders might have been too busy to answer the questionnaire. Literature shows that nurses are often under time pressure or work overtime [8,11,35]. If time pressure and work overload had triggered nonresponse, it could most likely be that those would also report more work–family conflicts than the responders. Therefore, our results presumably underestimate the extent of work–family conflicts in OR nurses.

### 2.2. Study setting

After contacting the managers of each team from the eight different hospitals represented in our study, we presented our

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