Work-Related Musculoskeletal Disorders of Perioperative Personnel in the Netherlands

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Editor's note: *In the Netherlands, personnel working in the OR typically are not nurses. Personnel who want to work in the scrub, circulating, or first assistant roles undertake a three-year education program, after which they become operatieassistenten (singular: operatieassistent). This term has been used throughout the article to clarify that these OR personnel perform many of the duties that perioperative nurses perform in the United States, but they are not RNs.*

Approximately one-third of all cases of sick leave for health care workers are related to musculoskeletal disorders (MSDs) originating in the neck, shoulders, and back. The causes of these disorders are mainly related to the high exposure to heavy physical loads involved in work in health care.[1] The percentage of sick leave among hospital staff members in the Netherlands was 7.8% in 1999, and thus considerably higher than the mean for the working population as a whole (ie, 5.4%).[2] This finding resulted in an agreement between the Dutch Ministry of Social Affairs and Employment; the Ministry of Health, Welfare, and Sport; and health care employers and unions to try to reduce the incidence of sick leave and the number of worker's compensation claims in hospitals and create a safe and pleasant working environment for hospital staff members.

Earlier studies of perioperative personnel have focused mainly on the causes of physical pain and measures for prevention.[3-6] The purpose of this study was to gain insight into the nature and scope of MSDs. It is necessary to gather epidemiological information on the nature and scope of MSDs to ascertain whether they are more prevalent in perioperative settings than in the general population. Based on this information, causes can be explored and preventive measures can be sought and implemented. This study also provides reference data that could be of use in testing the effectiveness of prevention policies.

Two specific research questions and a third more general research question were asked.

- What is the prevalence of MSDs among operatieassistenten in the Netherlands?
- What percentage of sick leave can be attributed to MSDs among operatieassistenten in the Netherlands?
- What causes and possible preventive measures do operatieassistenten themselves perceive with regard to MSDs?

To answer the research questions, the

ABSTRACT

APPROXIMATELY ONE-THIRD of all cases of sick leave for health care workers are related to musculoskeletal disorders (MSDs) originating in the neck, shoulders, and back.

A CROSS-SECTIONAL MULTICENTER SURVEY based on the Nordic Questionnaire for Analysis of Musculoskeletal Symptoms investigated the nature and scope of MSDs among Dutch OR personnel.

THE THREE-MONTH PREVALENCE RATES for MSDs in OR personnel were found to be high compared to MSDs in the general population and comparable to rates in other strenuous professions in health care, industry, and construction. The causes of MSDs that participants mentioned were summarized into four main categories: prolonged standing, awkward postures, lifting and pushing; and climactic conditions. ***AORN J*** **86 (August 2007) 193-208.**

researchers chose to use a self-administered questionnaire to efficiently gather anonymous results that are generalizable at a national level.[7]

Design

The study was a cross-sectional multicenter survey. Data were collected on a one-time basis in 16 operating departments in 16 hospitals, by means of a questionnaire consisting of closed and open-ended questions.

Instrument

The questions used in this study were based on the Nordic Questionnaire for Analysis of Musculoskeletal Symptoms.[8] This questionnaire has been tested by other authors and found to have good reliability and validity.[8,9] There is also abundant reference material available about the instrument.[8,9] The same types of questions have been asked in ergonomic studies for more than 15 years. This form of questioning avoids diagnostic labeling and enables comparison of various groups irrespective of, for example, level of education or potential diagnoses. Another advantage of using the Nordic questionnaire is that the influences of possible bias within this questionnaire are similar in other studies using the same questionnaire, so comparisons between groups can easily be made.

Hildebrandt[9] concludes that there is sufficient correlation between pain experienced and the results of a standardized clinical examination; Kuorinka et al[8] describe this as well. The degree to which a person's own report agrees with the opinion of the physiotherapist after examination varies from 87% to 100%. This means that the answers that 87% to 100% of the participants give on the Nordic questionnaire match the physiotherapist's findings on examination. These findings support the validity of the questionnaire. Kuorinka also studied response stability by asking a group of 25 nurses the same questions again two weeks later (ie, test-retest), and at least 96% of the answers were the same.

A factor that can jeopardize the reliability of results is nonresponse. For example, a distorted view can be given if only people suffering from MSDs complete the questionnaire and people who do not have any pain do not do so. This is called selective response, and the Nordic questionnaire appears to be sensitive to it.[10] To minimize the effects of this kind of selection, every effort was made to ensure that all the questionnaires that had been distributed were completed and returned. A minimum response rate of 80% for questionnaires like the Nordic is desirable.[10]

For an additional guarantee of reliability and validity, a small pilot study was conducted among operatieassistenten (N = 10). The questionnaire was complemented with specific questions on the working situation of operatieassistenten. These questions were mainly intended to explore any topics that the main questionnaire might have missed. Experts in the subject matter were closely involved in the drafting of the questions. After the questionnaire was completed, participants were asked to indicate the time it took them to complete the questionnaire, and short interviews were used to check that the questions, including the open-ended ones, were clear. The questionnaire was then adjusted on the basis of the feedback.

Sample

There are 110 hospitals in the Netherlands. The aim of this study was to include 10% of these hospitals in order to generalize to a national level. An appeal was placed in the magazine *Operationeel* of the Landelijke Vereniging Van Operatieassistenten (LVO [Dutch Organization of Operatieassistenten]). Sixteen operatieassistenten with an interest in research and physical stress who were working in 16 hospitals spread throughout the Netherlands responded that they were willing to participate in the research group, so 16 participating hospitals each had a delegate member on the research team. The group was assisted by a project leader, two human movement scientists, and an epidemiologist. A valuable combination of science, research, and professional knowledge on the part of operatieassistenten was thus created.

Ten meetings were organized with this team. During the meetings, the research project was prepared, processed, and discussed. The members of this research team were

involved in drafting, distributing, and collecting the questionnaires. They also made valuable contributions to the processing and discussion of the results. This organizational approach meant that it was possible to conduct a large-sample survey. Personal supervision by members of the research team ensured a good response, swift data collection, and objective instructions to the participants during the study. Full privacy protection was offered to all participants.

Selection of participating hospitals. The selection of the 16 participating hospitals had been a mix of convenience and chance, so the researchers discussed the participating hospital sample and compared basic characteristics with the general national situation. They found the sample to be a good representation of Dutch hospitals. The researchers also were able to test the data from this study against data from a sample of operatieassistenten from a previously performed national survey for the operatieassistenten labor market in 2001.[11] The distribution of small, medium, and large hospitals in this study is similar to the national distribution.

Selection of operatieassistent sample. The members of the research team were instructed to stimulate the response, but at the same time not to compromise the representative nature of the sample. The number of participants could vary from one hospital to another, with no minimum and maximum numbers set. In situations where it was not possible to include the whole ward in the study, the members of the research team received instructions to avoid unconscious selection effects by selecting participants by the drawing of lots. Only qualified operatieassistenten or operatieassistenten in training (ie, students) were approached and asked to fill out the questionnaire.

Privacy and confidentiality. Together with the questionnaires, the participants received an information and instruction form in which the purpose and procedure of the study were explained. Participation was voluntary without any consequences for a participant. In the Netherlands, only research studies involving patients as participants or studies involving some kind of intervention must be reviewed by a hospital ethics committee. In this case, consent forms were not necessary. The completed questionnaires were collected in closed envelopes. This means that it would be nearly impossible to trace results back to individuals, small groups in hospitals, or separate hospitals, and no insight into the data set would be given to third parties. The questionnaires are kept in a safe and will be destroyed after three years.

Data Analysis

The data from the closed questions were processed using SPSS PC+ 11.0.[12] These are mainly descriptive statistics with means and frequency data. The chi-square test and *t* test were used for questions of difference. Differences were regarded as significant when a *P* value of ≤ .05 was attained.

Results

The population data for the participating hospitals were compared with a more general reference file[11] on the perioperative profession from 2001 with labor market data on 80% of all operating departments in the Netherlands (Table 1). Furthermore, from a geographical point of view, the hospitals were well distributed across the Netherlands, and there was a mix of general, specialized, and university hospitals.

Response. In total, 615 questionnaires were distributed, of which 463 were returned. The response rate was 75% and varied per hospital from 47% to 100%, for a mean of 29 participants per hospital (standard deviation [SD] = 8.2) (Figure 1). In general, there was a good correspondence between the size of the hospital and the number of participants per hospital. The total number of qualified operatieassistenten participants was 403, and the total number of student operatieassistenten participants was 60.

General group characteristics. The majority of the respondents were women (85.1%). The mean age was 36 years (SD = 10.3), and the mean number of years of work experience for the qualified operatieassistenten was 15.1 years (SD = 8.9).

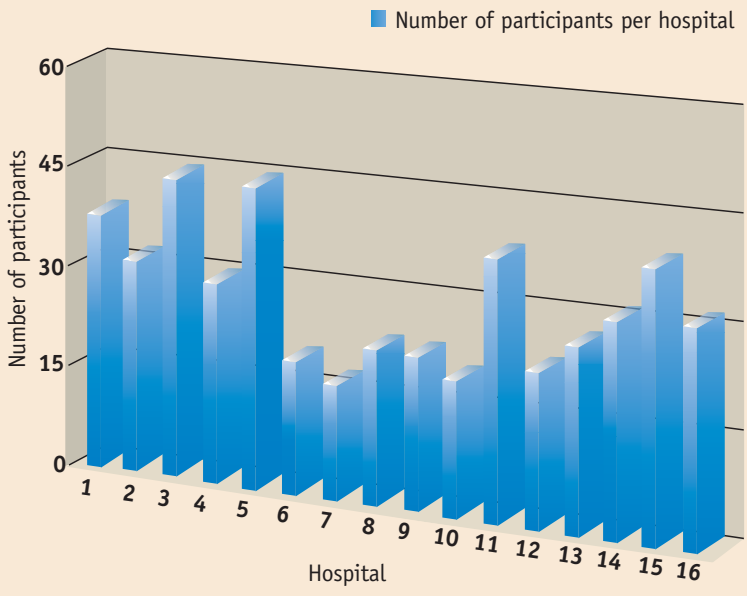
Hours worked. The number of working hours per week for both operatieassistenten and student operatieassistenten is given in Table 2.

TABLE 1
Comparison of the Survey Sample With the Total Population of Operatieassistenten

Points of comparison	Population (ie, in the Netherlands)[1]	Sample for this study
Total number of operatieassistenten	4,700	463
Mean age in years	38	36
Ratio of men to women	11:89	15:85
Ratio of qualified operatieassistenten to student operatieassistenten	82:18	87:13
Mean length of working week	28.4 hours	30.6 hours

1. van der Windt W, Steenbeck R, van Eijk W, Talma HF. Inspanning Beloond? Onderzoek Naar de Arbeidsmarkt van Operatieassistenten en Anesthesiemedewerkers [A Labour Market Study into the General Professional Context of the Work of Operatieassistenten and Anesthesia Personnel]. *Utrecht, the Netherlands: Prismant; 2002:25-40.*

FIGURE 1



Student operatieassistenten have, on average, more contract hours (t = -5,875; df = 465; $P < .05$) and work less overtime (t = 3,579; df = 396; $P < .05$) than qualified operatieassistenten; however, the length of a normal working day is similar for both groups. In Dutch hospitals, personnel typically work either eight- or nine-hour days, but shorter workday lengths are also possible.

BREAKDOWN OF TIME SPENT ON TASKS AND SPECIALIST DUTIES. Broadly speaking, the duties of operatieassistenten in the Netherlands comprise three tasks. In the circulator role, they accompany the patient in all phases of the surgical procedure and are the link between the sterile team and the environment. In the scrub person role, they pass instruments as members of the sterile team. As first assistants, they assist the surgeon in the procedure itself. Questions on the duties to which time is devoted reveal that scrubbing accounts for most of the working time (ie, 39%), followed by circulating (ie, 35%), first assistant roles (ie, 16%), and miscellaneous tasks (ie, 10%). There are minor differences between student operatieassistenten and qualified operatieassistenten in regard to the amount of time spent on specific duties.

CHANGES EXPERIENCED IN THE PHYSICAL DEMANDS OF THE WORK. Participants were asked about any changes experienced in the physical demands of their work during the preceding three months. This is an important question for evaluating

TABLE 2
Hours Worked

	Total group (N = 463)	Qualified operatieassistenten (n = 403)	Student operatieassistenten (n = 60)
Number of contract hours per week	30.5	29.7*	35.6*
Number of overtime hours per week	3.3	3.5*	2.0*
Hours per normal working day	8.5	8.4	8.5

** significant difference (t test, P < .05)*

TABLE 3
Physical Stress Experienced in the Preceding 3 Months

Physical stress experienced in the preceding 3 months	Total group (N = 463)	Qualified operatieassistenten (n = 403)	Student operatieassistenten (n = 60)
Has become greater	19.1%	17.3%	31.7%
Has remained the same	78.9%	80.8%*	66.7%*
Has become lighter	1.7%	1.8%*	1.7%*

** significant difference (Chi-square test, P < .05)*

prevention programs[1] because an increase in physical demands resulting from an increase in workload will impede the effect of a prevention program, the very aim of which is to reduce the physical demands placed on staff members. The trend toward an increase in physical demands will first have to be reversed before a decrease in stress can occur. When answering this question, respondents also could give a possible reason for the change.

Student operatieassistenten were more inclined to report an increase in physical stress than qualified operatieassistenten ($X^2 = 6.96$, $df = 2$, $P < .05$) (Table 3). Student operatieassistenten reported that the reasons are related to the fact that they are in training and, for example, have to spend more time passing instruments, perform more standing work, and get used to the physical demands of the job. The reasons cited by qualified operatieassistenten for the increased physical stress of the work were varied. An increase in the number of working hours from eight to nine hours per day was the most often cited, along with more general comments such as "it's getting busier."

BACK PAIN. Respondents were asked about back pain they had experienced in the preceding 12 months. The 12-month prevalence for back pain among operatieassistenten was 58%. That is significantly higher than in the general population in the Netherlands with the same age and gender characteristics (ie, 40% to 43%).[13] Table 4 gives the figures in greater detail for qualified operatieassistenten and student operatieassistenten. It appears that the prevalence among student operatieassistenten

TABLE 4
Back Pain in the Preceding 12 Months and Absence From Work Because of Back Pain

	Total group (N = 463)	Qualified operatieassistenten (n = 403)	Student operatieassistenten (n = 60)
Experienced back pain in the preceding 12 months	267 (58%)	236 (59%)	31 (52%)
Reported an absence from work because of back pain	36 (8%)	34 (8%)	2 (3%)

TABLE 5
Back Pain Prevalence and Absence Among Operatieassistenten With Back Pain in the Preceding 3 Months

	Total group (N = 463)	Qualified operatieassistenten (n = 403)	Student operatieassistenten (n = 60)
Experienced back pain in the preceding 3 months	211 (46%)	184 (46%)	27 (45%)
Continued working despite back pain	190 (90% of 211)	167 (90% of 184)	23 (85% of 27)
Reported an absence from work because of back pain	19 (9% of 211)	18 (10% of 184)	1 (4% of 27)

also is high, with more than half of the student operatieassistenten reporting back problems (52%). The percentage of those who took sick leave because of back pain, however, is fairly low. Only 3% to 8% of those with a back pain felt it was necessary to take sick leave.

A second indicator frequently used to outline the problem is the three-month back pain prevalence. This indicator is more sensitive to changes that may occur during the course of a prevention project. With 46% of the respondents having experienced back pain in the previous three months, the rate was comparable to other physically strenuous professions in the health care sector. For physically demanding departments in hospitals and nursing homes and home care in general, percentages between 37% and 46% are reported.[14] The mean three-month prevalence for back pain in the Dutch hospital population as a whole is 39%.[1] Table 5 shows again that the problem is just as serious among the student operatieassistenten. Almost all staff members (ie, 85% to 90%) continued to work despite having back pain.

OTHER PAIN. Other MSDs such as headaches, neck and shoulder pain, arm and wrist pain, leg and foot pain, and knee pain also can arise because of the physical burden placed on the individual at work. Headaches were included here because they may be related to neck and

TABLE 6
Other Musculoskeletal Disorders During the Preceding 3 Months

Other musculoskeletal disorders suffered in the last 3 months:	(N = 463)	Those who called in sick because of this	Those who think this pain is related to their work	Prevalence in the population at large (last 3 months)[1]
Headaches	222 (48%)	36 (16% of 222)	114 (51% of 222)	
Neck/shoulder pain	243 (53%)	8 (3% of 243)	188 (77% of 243)	20%
Pain in the arms/hands	63 (14%)	4 (6% of 63)	41 (65% of 63)	
Pain in the legs/feet	197 (43%)	13 (7% of 197)	179 (91% of 197)	12%
Pain in the knees	101 (22%)	8 (8% of 101)	63 (62% of 101)	

1. Bakker RHC, Knibbe JJ, Friele RD. Rugklachten en andere klachten aan het bewegingsapparaat van het verzorgend en verplegend personeel van verzorgingshuizen [Back pain and musculoskeletal disorders in Dutch nurses]. Tijdschrift voor Sociale Gezondheidszorg: TSG. *1997;75(6):333-338.*

shoulder pain, although the literature on this subject is not unanimous.[4,15]

Table 6 and Figure 2 present the percentages of participants who reported having had pain. Those who reported pain perceived a clear connection between the pain and their work. The percentage of sick leave caused by these kinds of MSDs is relatively low, except for headaches. Headaches are quite prevalent, but far fewer participants saw them as work-related. Neck and shoulder pain was cited by 53%, more than three-quarters of whom reported that the disorder was work-related. The percentage of participants reporting leg and foot pain (ie, 43%) is high compared to the figure for the population as a whole (ie, 12%).[14] Furthermore, the operatieassistenten themselves tended to regard these problems as being very much work-related (ie, 91% of those suffering pain in the legs and feet). The responses to the open-ended questions clearly reveal that the qualified operatieassistenten considered these disorders to be linked to prolonged standing, with swollen feet and sometimes varicose veins causing the problems.

In all disorder categories, the student operatieassistenten reported pain rates at least as high as those of qualified operatieassistenten. Only in the area of pain affecting the feet and

Figure 2 • Percentage of participants reporting pain in various parts of the body during the preceding three months.

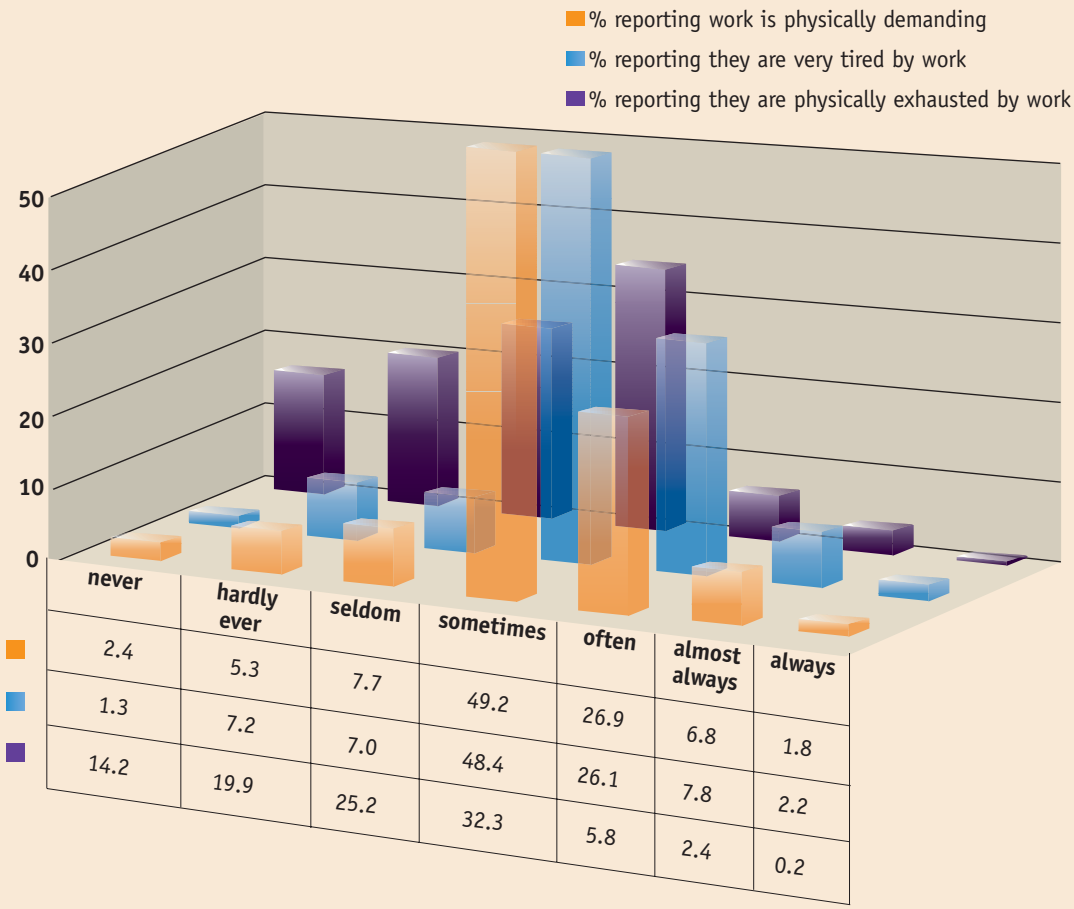
legs was a significant difference found. Here the rate of student operatieassistenten with pain was 57%, and the rates of qualified operatieassistenten with pain was 40% ($\chi^2 = 468$; $df = 1$; $P < .05$).

General tiredness. Apart from the MSDs, questions inquiring about general fatigue also were included. General fatigue can be a sign that an operatieassistent is gradually being exposed to too much physical strain that does not necessarily result in specific pain such as back trouble. The questionnaire gave respondents the opportunity to report on a scale of 1 to 7 whether they judged their work to be "physically demanding" and how often they felt "very tired" or "physically exhausted" as a result of the work. Approximately half of the participants considered the work to be "sometimes" demanding and tiring; one-third regarded it as being demanding and tiring "often," "almost always," or "always"; and nearly one-third found it "sometimes" exhausting (Figure 3).

Procedures causing disorders or thought to be physically demanding. Many people are able to describe clearly and sometimes in great detail the moments when they first became aware of some form of pain arising while they were working. Although work may not be the only cause, this information does contribute to the risk profile of the work and can be of help in outlining risk activities and designing preventive interventions.

In answer to the question, "Did your problems start during work? If so, please briefly describe how that happened," 51% (ie, 49% of

Figure 3



	never	hardly ever	seldom	sometimes	often	almost always	always
% reporting work is physically demanding	2.4	5.3	7.7	49.2	26.9	6.8	1.8
% reporting they are very tired by work	1.3	7.2	7.0	48.4	26.1	7.8	2.2
% reporting they are physically exhausted by work	14.2	19.9	25.2	32.3	5.8	2.4	0.2

the qualified operatieassistenten and 58% of the student operatieassistenten) gave an affirmative answer. The answers to this open-ended question can be categorized into three groups of causes:

- static stress, including
  - prolonged standing and remaining in the same position for long periods;
  - having to stand in complex and unfavorable positions during certain surgical procedures;
  - sometimes standing for a long time in lead aprons;
  - varicose veins or tired, swollen legs caused by prolonged standing; and
  - holding equipment (eg, retractors, instruments) during certain surgical procedures,
- movement/lifting/pushing/pulling, including
  - lifting instrument sets;
  - transferring patients;
  - lifting heavy equipment (eg, supports, parts of the OR bed); and
  - performing the same tasks repeatedly and having to do so quickly, and
- air flow/air conditioning/draft, including
  - draft or downflow while working in awkward positions and
  - headache, sometimes caused by the air conditioning or smoke (eg, electrosurgical smoke).

Scores for physical stress prevention policies. As a general indicator, operatieassistenten were asked to give a score for the physical stress prevention policy in their own surgical facility. In this study, the mean score was 5.2 on a scale of 1 to 10, in which scores lower than 6 are considered unsatisfactory. Not one operating ward in this study received a mark higher than 5.9.

Presence of aids, appliances, and materials for work. When asked whether the ergonomic aids, appliances, and materials for work were sufficient, approximately 45% of respondents answered in the affirmative. The answers to the accompanying open-ended question revealed that there was a need for more or better equipment, although respondents had no idea what that should be or where to look for it. Ignorance of the possibilities for solutions and perhaps also the still somewhat limited availability of ergonomic equipment on the market may have influenced the answers to this question, but there seems to be a perceived need for these kind of solutions.

Other suggested solutions. For the question on other suggested solutions, consideration was given not only to the total number of answers but also to their relevance. The comments in Table 7 are merely a reflection of the survey. The researchers emphasize that the potential effects of such solutions should always be evaluated carefully.

Many participants saw solutions in their own behavior. Mention was often made of ideas such as adopting a good posture during work; keeping one's back straight while working; and changing position regularly, for example, by shifting weight from leg to leg. Comments such as "sitting down more often" were occasionally made.

There also was a sizable group, however, that sought solutions concerning material adaptations: platforms for members of the sterile team to stand on, better climate control, lighter OR-bed accessories, and lighter instrument trays. Adaptations to the logistical process also were cited (eg, not having to bend over instrument trays).

Others sought solutions in the organization of the work: discussing and agreeing with the surgeon on table height, planning and more alternation in the work duties, providing for and training enough people, and organizing the work area more conveniently. Relationships between colleagues also play a part (eg, being able and allowed to give each other tips and advice more easily).

A large group of participants also looked for solutions in areas such as information, training, fitness, and exercise, and reference also was made to solutions like massages. Consulting specialists such as occupational therapists also were mentioned.

Limitations

The sample proved largely to agree with the population data pertaining to operatieassistenten in the Netherlands, comprised 10% of all Dutch operatieassistenten, and was geographically well-distributed and contained a mix of hospital types. On the other hand, the sample

TABLE 7
Suggested Solutions

Instruments
Lighter sets of instruments and instrument trays
Better retractor systems
Equipment and furniture
High sitting/standing support for the scrub person
Better instrument tables
Platforms
Several monitors for viewing procedures
Better ways to operate equipment (eg, monitors, OR lamps)
More convenient storage systems for instrument sets
OR beds with lighter tops that are easier to assemble and disassemble
Wheels for heavy equipment, including arm tables
Patient beds that can be easily approached from the side (ie, are less wide) so that stooping is not required when lifting a patient
Beds that are light and easily maneuverable
Transfer devices for lifting patients horizontally
Climate
Not so cold
Solution for the cold air stream (ie, downflow) from the ceiling

was not made at random, and selection effects cannot be ruled out completely. The response rate (ie, 75%) was high for this type of study but is still slightly below the ideal value of more than 80%. These factors may limit generalization to the Dutch population of operatieassistenten and the use of the data as a reference file for future comparison. In addition, generalization to the situation in the United States should be made with great caution since, besides the limitations mentioned, the professional situation of perioperative nurses is different, and the content of their work may be different. When comparing the data, the researchers therefore recommend comparing the time spent with different tasks, especially the ratio of scrubbing to circulating.

DISCUSSION

The prevalence of MSDs reported by operatieassistenten is comparable to that of other professions in the health care sector and physically demanding professions in industry and construction.[16,17] The 58% figure for 12-month back pain prevalence is high compared to that found in other professions. The back pain prevalence for qualified operatieassistenten was comparable to that of health care staff members in the home care sector, in nursing homes, and in some hospital nursing wards (ie, orthopedics, neurology), where percentages of 56% to 60% are cited.[14,18] The figures also are comparable to those for other physically demanding professions such as steel workers (ie, 59%) and forklift truck drivers (ie, 65%).[16] Many other professions have back pain prevalence rates around 27% to 34% (eg, cleaning personnel, office workers). The percentages also are well above the Dutch mean of 40% to 43% for MSDs in the general population.[13]

Relatively high pain percentages also were noted in questions about three-month prevalence; 53% of the operatieassistenten reported neck and shoulder pain, 48% reported headaches, and 43% noted pain relating to the legs and feet. The three-month prevalence for back pain was 45%. Neck and shoulder pain in particular were higher than the values found elsewhere. Values of 34.9% were reported in the home health care sector, and the mean in the Dutch population is 20%.[17] Rates for pain affecting the legs and feet also are relatively high compared to general population values.

A range of risk factors exist for back problems and neck and shoulder pain, including static positions, poor postures during work, and heavy lifting.[19] Certainly static stress is still an often-underestimated form of physical exposure. This could originate from the process of passing instruments and providing assistance

during surgical procedures. Pain in the feet and legs also may point to static stress. Research in recent years shows that great attention needs to be paid to this kind of stress, certainly with respect to employees in the care sector, in order to lower the incidence of MSDs and the resulting degree of absence through illness.[1,4]

Dynamic stress results from pushing, pulling, or lifting activities. The dynamic stress resulting from lifting was assessed in two unpublished pilot studies conducted in 2004, using the National Institute for Occupational Safety and Health guidelines for manual handling.[20] Acceptable limits were seldom exceeded and, therefore, are not considered to be a major cause of the disorders.

In the literature, mention also is made of psychosocial risk factors that play a part in physical disorders and resulting absence because of illness.[21] These include, for example, the pressure of work, lack of support from colleagues or managers, and lack of control over the work. Little attention has been paid to psychosocial risk factors in this study; however, no suggestions pointing to psychosocial factors were made by the participants in response to the open-ended questions of the study. Perhaps this is an area for further research.

The relatively low percentage of staff members calling in sick is seen throughout the entire health care sector.[1,14,17] Only 9% of operatieassistenten with back problems called in sick because of back pain, in contrast to the percentages seen in other physically demanding professions in, for example, the construction industry. A positive explanation could be that staff members in this sector share a feeling of comradeship and are duty-bound by a sense of responsibility. This trend can lead to extra physical demands being placed on colleagues, however, or the worsening of an individual's own disorders. In the data set for this study, there are some hints of longer-term absence.

Traditionally, a high use of sick leave often is the first solid argument for enacting a cost-effective prevention policy. The operatieassistenten suffering from MSDs did report a clear connection between MSDs and their work (ie, 51% to 91%), and compared with many other professions, the prevalence of MSDs is high. In spite of this, use of sick leave for MSDs remains relatively low; therefore, there is a danger of the problem being underestimated and not enough attention being paid to preventive measures. This also is apparent from the scores that operatieassistenten gave for their facilities' prevention policies, with not a single ward in the study receiving a satisfactory mark. For that matter, it would be good to have a prevention policy oriented toward reducing not only sick leave incidences and disability claims, but also the prevalence of MSDs, along with the exposure to physical stressors. This suggests less traditional arguments for a prevention policy, such as less tiredness at the end of the working day, a greater chance of staff members continuing to work willingly at an older age, and an improvement of the profession's image and professionalism.[22]

Student operatieassistenten reported having almost as many MSDs as qualified operatieassistenten. In itself, this seems strange since these typically are young people who should be able to tolerate a good deal of physical stress. The student operatieassistenten reported having experienced a considerable increase in physical stress after they started working on the surgical ward. High MSD prevalence in student operatieassistenten has been reported previously, whereas this prevalence is lower in the general population.[17] This again points to occupational risk factors.

The use of standardized questions, the involvement of experts in the study, and conducting the small pilot study provided a sufficient guarantee of the study's reliability and validity. By using standardized questions, the bias in various groups is considered equal and as a result, good comparisons are possible.

In the section containing open-ended responses, questions were raised about the causes and preventive measures that operatieassistenten themselves believed were relevant. This led to a wide range of problems and causes being cited and a collection of ideas and tips. Prolonged standing and the necessity of sometimes having to stand in uncomfortable positions was given prominent mention. Lifting situations and climate also were reported as aggravating factors.

Intrinsically, no value judgment was attached

FIGURE 4

Compact Questionnaire for the Operating Department

1. Have there been any changes during the last three months in the physical demands placed on you by your work?
○ No, physical demands have remained the same.
○ Yes, the work has become more physically demanding because _____
○ Yes, the work has become less physically demanding because _____

2.

During the last 3 months, have you suffered from:		**Have you taken sick leave because of this?**	**Do you think the pain is related to your work?**
Headaches	Yes/No	Yes/No	Yes/No
Neck/shoulder pain	Yes/No	Yes/No	Yes/No
Pain affecting the arms/hands	Yes/No	Yes/No	Yes/No
Back pain	Yes/No	Yes/No	Yes/No
Pain affecting the legs/feet	Yes/No	Yes/No	Yes/No
Pain affecting the knees	Yes/No	Yes/No	Yes/No

3.	**never**	**hardly ever**	**seldom**	**some-times**	**often**	**almost always**	**always**
I am physically very tired after my work.	1	2	3	4	5	6	7
I feel physically exhausted by my work.	1	2	3	4	5	6	7
I find my work physically demanding.	1	2	3	4	5	6	7

4. What do you feel are the most obvious reasons for high physical demands during your work?
Materials _____
Work methods _____
Cooperation _____
Working conditions _____
Other _____

5. What are your suggestions for potential preventive solutions to this problem?
Materials _____
Work methods _____
Cooperation _____
Working conditions _____
Other _____

6. What score would you give your ward for the quality of its prevention policy? Please circle.
(No policy = x)

x 0 1 2 3 4 5 6 7 8 9 10

7. How old are you? _____

8. Are you an operatieassistent or a student operatieassistent?

to the answers to the open-ended questions in this study, although the answers are presented in the results section. This was considered important because in this way, it is possible to gain a good overview of the causes of the problems and possible solutions for them from the perspective of those most directly involved. Attaching importance to this information results in a significantly better chance of a good—and in particular wide-ranging—prevention policy than when only the more objective data are taken into account. It is important to make the observation that thought is being given to physical stress and that there also is an intention to find solutions.

Recommendations

Listening to the signals coming from the work floor and participation of employees in the design of the prevention program is essential for a successful prevention policy.[1,17] As mentioned, remarkably few psychosocial factors are highlighted, although it is generally known and also is cited in the literature that the psychosocial climate can affect physical disorders.[21] More attention could perhaps have been given to this aspect of this study, and it is recommended that this be the subject of further research.

The questionnaire used in this study could, in a more compact form, constitute part of a quick scan in every surgical ward. The questionnaire (Figure 4) can easily be analyzed manually or in a spreadsheet. The series of questions on three-month prevalence, sick leave, and the work-related nature of disorders generally are ideally suited for the assessment of the effect of preventive measures.

For an effective and efficient MSD prevention policy, it is worth looking for the most aggravating components of the problem. A well-known rule is Pareto's principle, also known as the 20-80 rule: often 20% of the causes are responsible for 80% of the effects.[23] It is essential to avoid taking expensive measures that scarcely have any effect while simple, effective measures are ignored. This can be avoided by objectively checking the results of all preventive measures. A prevention policy should lead to lower pain percentages, and the previously mentioned assessment method could play a part here.

Based on the results of this study, the researchers recommend that more attention be paid to the physical working conditions of perioperative personnel. The results point to the preventive relevance of including not only operatieassistenten already experiencing problems, but also student operatieassistenten in preventive interventions. To make changes and promote a supportive environment for change and a positive preventive culture, management support is essential. To study the effectiveness and cost-effectiveness of preventive interventions, longitudinal studies, preferably with a randomized control group, are strongly recommended. – AORN –

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References

1. Knibbe JJ, Hooghiemstra F, Knibbe NE. *Arboconvenant Ziekenhuizen: Stand der Techniek [Hospital Working Conditions: Present Situation and Recommendations for Change].* Doetinchem, the Netherlands: Elsevier Bedrijfsinformatie; 2001:2-5.
2. *Zorgnota 2001 [Government Care Policy].* Den Haag, the Netherlands: Tweede Kamer, Vergaderjaar; 2000-2001:178-191.
3. Kant IJ, de Jong LC, van Rijssen-Moll M, Borm PJ. A survey of static and dynamic work postures of operating room staff. *Int Arch Occup Environ Health.* 1992;63(6):423-428.
4. Meijsen P, Knibbe H, Knibbe N. *De Fysieke Belasting van de Instrumenterende Operatieassistent [The Physical Load of Operatieassistenten].* Utrecht, the Netherlands: van de Sectorfondsen Zorg en Welzijn; 2003:1-25.
5. Garb JR, Dockery CA. Reducing employee back injuries in the perioperative setting. *AORN J.* 1995; 61(6):1046-1052.
6. Owen BD. Preventing injuries using an ergonomic approach. *AORN J.* 2000; 72(6):1031-1036.
7. Polit DF, Hungler BP. *Nursing Research: Principles and Methods.* 6th ed. Philadelphia, PA: Lippincott; 1999:331-362.
8. Kuorinka I, Jonsson B, Kilbom A, et al. Standardised Nordic questionnaires for the analysis of musculoskeletal symptoms. *Appl Ergon.* 1987;18(3):233-237.

9. Hildebrandt VH. *Prevention of Work Related Musculoskeletal Disorders: Setting Priorities Using the Standardized Dutch Musculoskeletal Questionnaire.* Delft, the Netherlands: TNO Arbeid; 2001:45-53.
10. Dickinson CE, Campion K, Foster AF, Newman SJ, O'Rourke AM, Thomas PG. Questionnaire development: an examination of the Nordic Musculoskeletal questionnaire. *Appl Ergon.* 1992;23(3): 197-201.
11. van der Windt W, Steenbeck R, van Eijk W, Talma HF. *Inspanning Beloond? Onderzoek Naar de Arbeidsmarkt van Operatieassistenten en Anesthesiemedewerkers [A Labour Market Study into the General Professional Context of the Work of Operatieassistenten and Anesthesia Personnel].* Utrecht, the Netherlands: Prismant; 2002:25-40.
12. SPSS—Statistical Package for the Social Sciences. Version PC+ 11.0. Chicago, Ill: SPSS, Inc; 2003.
13. Picavet HSJ, van Gils HWV, Schouten JSAG. *Klachten van Het Bewegingsapparaat in de Nederlandse Bevolking, RIVM Rapport 266807 002 [National Statistics on Musculoskeletal Disorders in the Dutch Population].* Bilthoven, the Netherlands: RIVM; 2000:18-44.
14. Bakker RHC, Knibbe JJ, Friele RD. Rugklachten en andere klachten aan het bewegingsapparaat van het verzorgend en verplegend personeel van verzorgingshuizen [Back pain and musculoskeletal disorders in Dutch nurses]. *Tijdschrift voor Sociale Gezondheidszorg: TSG.* 1997;75(6):333-338.
15. Haldeman S, Dagenais S. Cervicogenic headaches: a critical review. *Spine J.* 2002;1(1):31-46.
16. Burdorf A. *Assessment of Postural Load on the Back in Occupational Epidemiology.* Rotterdam, the Netherlands: Erasmus Universiteit; 1992:111,141.
17. Knibbe JJ, Friele RD. Prevalence of back pain and characteristics of the physical workload of community nurses. *Ergonomics.* 1996;39(2):186-198.
18. Moens GF, Dohogne T, Jacques P, van Helshoecht P. Back pain and its correlates among workers in family care. *Occup Med (Lond).* 1993;43(2):78-84.
19. Chaffin DB, Andersson GBJ, Martin BJ. *Occupational Biomechanics.* 3rd ed. New York, NY: John Wiley & Sons, Inc; 1999:28-59.
20. Waters TR, Putz-Anderson V, Garg A. *Applications Manual for the Revised NIOSH Lifting Equation* [NIOSH publication no. 94-110]. Cincinnati, OH: US Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, Division of Biomedical and Behavioral Science; 1994.
21. Bongers P, Ariens G, van den Heuvel S, Miedema M, Douwes M. *Risicofactoren voor Nekklachten. [Risk Factors for Neck Pain].* Den Haag, the Netherlands: Elsevier Bedrijfsinformatie; 2000:42-43.
22. Knibbe JJ, Knibbe NE, Geuze L. *Werkpakket Beter! [Practical Tools for Ergonomic Preventive Interventions in Hospitals].* Utrecht, the Netherlands: Sectorfondsen Zorg en Welzijn; 2003:9-12.
23. Benjamin M, Shaw JG. Harnessing the power of the Pareto principle. 1993. Shaw Resources. http://www.shawresources.com/artpareto.html. Accessed February 5, 2007.

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