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ORIGINAL ARTICLE

Understanding stress factors for scrub nurses in the perioperative period: A cross-sectional survey

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KEYWORDS
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Mental stress;
Disruptive behaviour;
Patient safety;
Non-technical skills;
The human factor

Summary
Purpose of the study: To assess the stress factors affecting operating theater nurses during the perioperative period.
Patients and methods: The study was conducted as a cross-sectional survey by means of a specifically drawn-up questionnaire based on the data available in the literature. Stress was measured on a 0/100 visual analogue scale (VAS).
Results: Six hundred and twelve (612) persons responded. Stress associated with an operation amounted to 31.8; it was higher at the time of the procedure (49.6) and immediately beforehand (39.4), particularly among the least experienced nurses. The most widely represented stress factors were associated with the surgical team (perceived incompetence, lack of confidence), relational problems with regard to the surgeon, and team members' disruptive behavior. By contrast, familiarity with the team or the procedure seemed to shield the nurses from stress. Feelings of stress had a relatively frequent impact on quality of life (33%), family and personal life (26%), with chronic (recurrent or constant) stress symptoms reported among 20% of respondents.
Conclusion: Among operating theater nurses, stress associated with an operation was particularly strong among the least experienced professionals, when the type of procedure or the other team members were unfamiliar, and in the event of disruptive behavior. Stress factor improvement should be a priority, the objective being to enhance professional and personal quality of life, while better ensuring patient safety.

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Introduction

A successful surgical procedure and patient safety depend on technical as well as non-technical parameters. Interactions of professionals among one another and in their workaday environment may be grouped together and considered as non-technical skills. In an operating theater, so-called ''scrub'' nurses assume a major role in the surgical process. Up until now, the stress they may endure has seldom been studied, perhaps due to it's being exceedingly hard to objectively measure [1].

In the literature, there is a lack of consensus regarding the factors generating the most stress among operating theater nurses [2], some of them being related to cultural and geographical differences. Among them, we will take into consideration those associated with [1] patients: comorbidities and type of operation; [2] the workaday environment: pressure connected with time constraints and equipment problems [3]; [3] interprofessional interactions: problems of communication and [4] surgeons' negative attitudes [5]. We will likewise take into account inadequate preparation for the procedure [6,7] as well as distractions and interruptions during an operation [8]. Taken together, previously published studies are heterogeneous and have not been highlighted by systematic inventory of salient stress factors. The results concerning stress perception [5–7,9,10] and patient safety [11] are similarly divergent.

The objective of our study was to assess stress factors for operating theater nurses in the perioperative period by means of an exhaustive questionnaire developed speficially for the study of the data in the literature.

Patients and methods

Identification of the potential stress factors found in the literature

The studies included were written in French or English and published between 2000 and 2019; they dealt with nurses in the operating theater and dwelt upon stress, including the stress generated by workload and work as part of a team. The excluded studies dealt with the effects of robots, the impact of checklists, student stress or stress among surgeons, anesthetists or patients alone. The literature search was carried out from the Psychinfo, Pubmed, Scopus and Sciencedirect data bases.

Construction of the questionnaire

A specific questionnaire was designed on the basis of the factors found in the literature via LimeSurvey® (https://sites.uclouvain.be/smcs-gateway/index.php?page=documentation&spage=logiciels&id=9&l=fr).

The document included 79 questions, bringing together sociodemographic and professional data and focusing on moments when stress was experienced in a precise context. Stress factors were classified as follows: workload, work team, communication, disruptive behaviors and facilitating factors. Disruptive behaviors were characterized as at least one of the following factors: [12,13]: perception of other persons' stress, cries, insults, threats, degrading or deragatory remarks, physical violence. Facilitating factors were: work in a familiar group; routine procedure, pre and postoperative briefing, checklist use, operation in one's own specialty. Stress repercussions were likewise evaluated. Participant responses were quantified using graduated visual analogue scales (0 to 100) or by means of time-based appraisal (never/rarely/sometimes/often/always). The complete questionnaire is available in an electronic appendix.

Population

The questionnaire was distributed by e-mail to nursing unit heads, directly to nurses or via a nurse association in or near an operation room, and also via specialized schools, nurse training centers, and Facebook groups for nurse networking. In addition, the e-mail or post was shared by nurses wishing to persuade their colleagues to participate. The questionnaire was rendered accessible to all registered nurses with activity in an operating theater and was expected to take 10 minutes to fill out. Data collection took place from 08/02/2019 to 12/03/2019. Operating theater nurses were directly targeted. Only the questionnaires completed by persons having agreed to their being used for the purposes of publication were retained for analysis (exclusion of 4 questionnaires).

Statistics

The data were described (number and frequency, mean + standard deviation) and analyzed using IBM SPSS Statistic 25 ® software. Stress factors were evaluated in terms of the 0/100 visual analogue scale (VAS). The groups were compared with the *t*-test, the Kruskal–Wallis test and one-way ANOVA. A threshold inferior to $P < 0.05$ was considered as significant.

Results

Description of the population

All in all, 612 persons responded; the overwhelming majority (89.2%) were female; average age was 40.4 ± 9.9 years. More than half (59.6%) of the participants had over 10 years of experience. They worked in different types of hospitals: private (42.8%), public (30.3%) and university (26.9%). Close to half of the respondents were multi-skilled (40.1%). Among the specialized respondents, 42.2% worked in general, digestive and endocrine surgery, and 41.0% in orthopedic surgery. The other specialties were transplantation surgery (1.9%), pediatric surgery (10.6%), neurosurgery (12.2%) and ear, nose and throat (ENT) surgery (22.4%). Some of the nurses worked in several specialties.

The majority of the nurses in our study sample were French (69.3%) or Belgian (27.8%).

Perceived stress associated with a surgical procedure

All in all, perceived stress associated with the totality of a surgical procedure came to 31.8 ± 23.1.

It did not significantly differ according to gender, nationality, number of dependent children or type of hospital (public, university, private). Perceived stress was at its highest during (49.6 ± 24.3) and immediately before (39.4 ± 26.0) a procedure.

The nurses with little experience (less than a year) felt particularly stressed the day before an operation (42.7 ± 28.4; $P < 0.01$), during the preoperative

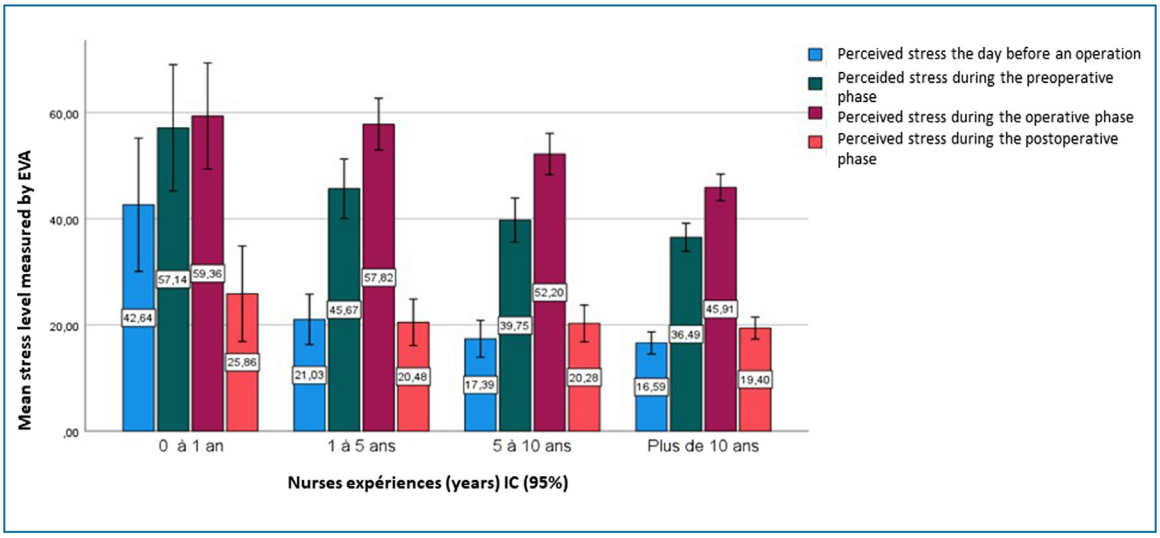

Figure 1. Stress décrit par les instrumentistes selon leur expérience et les différentes phases péri-opératoires évalué par échelle visuelle analogique (EVA)/100.

Table 1 Stress factors associated with workload and procedure.

Stress factors: % of stress	Mean (± standard deviation)
Pressure to work more quickly	73.2 (24.3)
Due to missing equipment	70.9 (21.9)
After accidents/incidents during surgery	70.2 (21.9)
During an unknown procedure	68.7 (24.1)
During a non-specialized procedure	68.3 (23.3)
Due to inadequate equipment	67.5 (21.9)
Associated with staff shortage	69.4 (27.0)
Due to non-programmed surgery (emergency)	59.8 (25.7)
Due to the number of operations carried out daily	55.4 (29.3)
Due to risk factors and patient comorbidities	53.1 (25.6)
Following a request for participation in continuous training	42.9 (25.1)
Due to lengthy surgery	37.8 (25.2)

Stress levels are measured by visual analogue scales (from 0 to 100) 612 respondents.

Table 2 Stress factors associated with a team.

Stress factors	Mean (± standard deviation)
Lack of confidence in the team	81.4 (23.2)
A team member is incompetent	77.4 (22.2)
Stress due to the surgical staff	74.8 (27.4)
Because the surgeon raises his voice/yells	69.7 (27.8)
Due to previous relational problems with a team member (surgeon)	68.6 (30.5)
Due to the surgeon's moods	68.1 (27.8)
Due to overcrowding in the operating theater	61.4 (26.4)
Due to previous relational problems with a team member (nurse)	58.4 (28.4)
Due to previous relational problems with a team member (anesthetist)	52.7 (28.3)
Because the surgeon does not answer your questions	52.3 (29.0)
Not the usual surgeon	43.4 (25.4)
Not the usual surgical team	48.7 (31.4)
Not the usual anesthetist	30.0 (23.3)
Due to the hierarchy in the operating theater	29.7 (29.9)
Asking the surgeon a question	19.8 (27;6)
Asking the anesthetist a question	14.7 (19.5)

Stress levels are measured by visual analogue scales (from 0 to 100). 612 respondents.

phase (57.1 ± P < 0.01) and during the operative phase (59.5 ± 22.6; P < 0,01, see Fig. 1).

Stress factors

Workload

The main factors leading to increased stress were pressure to work quickly or without adequate resources (lack of equipment, staff shortage). An unfamiliar, urgent procedure, or an operation outside a nurse's field of comptence led to increased stress, as did a perioperative incident (see Table 1).

Team characteristics

Stress due to the surgical team (surgeon, anesthetist, nursing or paramedical staff) was characterized as the most elevated, especially when a member of the team was perceived as incompetent and when there was a lack of confidence within the team. Previous relational problems with surgeons brought about higher levels of stress than relational problems with anesthetists, especially when the surgeons sounded off or were in a bad mood (see Table 2).

Table 3 Stress factors associated with communication.

Stress factors	Mean (± standard deviation)
Not understanding the surgeon's expectations	72.4 (27.9)
Deficient surgeon communication skills	72.4 (28.6)
Inability to anticipate the surgeon's requests	71.9 (20.0)
Information is not being shared	70.8 (27.8)
The teams are not being coordinated	63.4 (34.3)
The surgeon's vision is not being shared (it is not understood)	60.2 (29.5)
Deficient anesthetist communication skills	54.93 (26.7)

Stress levels are measured by visual analogue scales (from 0 to 100). 612 respondents.

Table 4 Stress due to disruptive behaviors.

Disruptive behaviors	Mean (± standard deviation)	*N**
Derogatory comments on the quality of your work	86.6 (18.4)	312
Physical violence (for example: pushing, kicking, striking, throwing surgical instruments..)	84.6 (33.1)	145
Being threatened	80.4 (32.8)	80
Being shouted at	80.0 (24.5)	382
Being insulted	73.6 (33.1)	141
Perception of operating room stress	73.3 (22.2)	367
Degrading remark	72.4 (33.7)	331

Stress levels are measured by visual analogue scales (from 0 to 100). N*: number of respondents

Communication

The following parameters were the most indicative: inadequate comprehension of the surgeon's expectations, inability to anticipate his wishes, insufficiently shared information, inadequate team coordination (see Table 3).

Disruptive behaviors

All in all, 517 (84.5%) respondents had witnessed or been victimized by disruptive behaviors. Among the different parameters evaluated in our survey, the disruptive behaviors provoking the most elevated levels of stress were: derogatory remarks, physical violence, threats, cries, degrading comments and perception of stress in the operating theater (see Table 4). All in all, 295 (58.3%) respondents were persuaded that disruptive behaviors had an impact on their self-image, and 48.2% felt that they affected their quality of life.

Table 5 Facilitating factors.

Facilitating factors	Mean (± standard deviation)
Being specialized with regard to a given operation	88.4 (25.0)
Working on a usual operation	86.0 (25.1)
Working with one's usual team	83.0 (25.0)
Using a checklist	79.6 (24.8)
Being briefed before an operation	75.1 (29.5)
Being briefed after an operation	65.5 (32.8)

Stress levels are measured by visual analogue scales (from 0 to 100). 612 respondents.

Facilitating factors

Facilitating factors were likewise inventoried (see Table 5). Work in accordance with habitual conditions (team, procedure) was the preponderant factor, followed by checklist use and preoperative briefing.

Discussion

Our study demonstrated that stress associated with surgical intervention is most strongly perceived by inexperienced professionals, when they are unfamiliar with the type of procedure or the other team members, or in the event of disruptive behavior. Perceived stress also has an impact on the private sphere and quality of life. Competence and quality of interpersonal communication seem to be key elements conducive to stress attenuation.

The questionnaire proposed in this study (and provided as supplementary material), which not only exhaustively inventories stress factors but also touches upon quality of life issues, could serve as a foundation for future studies. Moreover, our study involved a large number of participants representative of the operating theater nurse population, especially in terms of their fields of activity. As for the limits inherent to this type of questionnaire, they have primarily to do with the subjective nature of the nurses' perceptions and the absence of qualitative analysis, which due to the high number of respondents could not be carried out.

Disruptive behaviors in the operating theater appeared frequent. In our study, 84.7% of the sample (84.4% of the nurses) said they had witnessed or been victimized by these behaviors, a finding in agreement with the results reported by Maddineshat and his co-authors [14]. For the so-called ''scrub nurse'', a surgeon's failing to answer her questions is a stress factor. For some of them, this is particularly disturbing insofar as they feel ignored or neglected; indeed, having one's opinion ignored was the most frequently reported negative factor [15]. Given the deleterious repercussions for the nurse [16] and in terms of patient safety [15], it would be important to address this issue. Due to their hierarchical status, surgeons with their moods and tone of voice are largely responsible for creating a climate in the operating theater [17], and it can have an impact on the nurses' desire and ability to communicate [18]. According to the literature, nurses' communication skills are more developed than surgeons' [8]; the disparity results from different perceptions and expectations with regard to communication.

As a general rule, our study shows that inadequate exchange of information is closely associated with stress among nurses. The facilitating factors in need of reinforcement include interpersonal communication, surgery specialization, familiarity with the surgical team, and sharing of expertise by its most experienced members. During all phases of an operation, stress among nurses was directly proportional to unfamiliarity with the procedure and lack of specialization with regard to the operation; only when they had a chance to show their skills were they recognized by surgeons [2,19]; to conclude, absence of relevant specialization was a potential stress factor. Conversely, familiarity with the procedure and specialization with regard to an operation were highly significant stress reducers.

The above variables should be taken into account when assigning operating room nurses [20]. As is the case with age, the literature on a possible association between experience and stress is highly divergent. As in our study (see Figure 1), some investigators have concluded that experience decreases stress [6,21], while for others, it has little if any impact [2]. As for familiarity with the surgical team, it is recognized as entailing a wide range of positive consequences (enhanced performance, patient safety, well-being...) [22]. Conversely, unfamiliarity has been associated with negative repercussions, including communication errors [23], increased workload [22] and a lack of collaboration [24]. Our results appear to corroborate the hypothesis that operating room nurses experience additional stress when having to work with a new surgeon [25].

Various methods designed to reduce or manage stress are worthy of encouragement: briefings, debriefings, checklists, teaching emphasizing the importance of human factors in health care, and simulation-based study and analysis of relevant behaviors. Our survey shows that preoperative briefing, followed by checklisting and postoperative briefing, is the most effective of these methods. On the other hand, it may be difficult, embarrassing and contrary to professional culture for operating room nurses to speak out [26]. It would be interesting to try to determine the extent to which a sharing-based discussion group with other ''scrub'' nurses would be more advantegeous.

As a conclusion, it would behoove the interested parties to privilege communication skills and the quality of interpersonal communication [27], the twin objectives being to reinforce patient safety and to enhance workplace quality of life.

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Disclosure of interest

The authors declare that they have no competing interest.

Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at https://doi.org/10.1016/j.jviscsurg.2021.06.010.

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