Burnout in ICU caregivers: a multicenter study of factors associated to centers

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Abstract
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Reference

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Burnout in ICU Caregivers
A Multicenter Study of Factors Associated to Centers

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Rationale: The stressful work environment of ICUs can lead to burnout. Burnout can impact on the welfare and performance of caregivers, and may lead them to resign their job. The shortage of ICU caregivers is becoming a real threat for health care leaders.

Objectives: To investigate the factors associated with burnout on a national level in order to determine potential important factors.

Methods: Prospective, multicenter, observational survey of all caregivers from 74 of the 92 Swiss ICUs, measuring the prevalence of burnout among the caregivers and the pre-specified center-, patient- and caregiver-related factors influencing its prevalence.

Measurements and Main Results: Out of the 4322 questionnaires distributed from March 2006 to April 2007, 3052 (71%) were returned, with a response rate of 72% by center, 69% from nurse-assistants, 73% from nurses and 69% from physicians. A high proportion of female nurses among the team was associated with a decreased individual risk of high burnout (OR 0.98, 95% CI: 0.97–0.99 for every %). The caregiver-related factors associated with a high risk of burnout were being a nurse-assistant, being a male, having no children and being under 40 years old.

Conclusions: The findings of this study seem to open a new frontier concerning burnout in ICUs, highlighting the importance of team composition. Our results should be confirmed in a prospective multicenter, multinational study. Whether our results can be exported to other medical settings where team-working is pivotal remains to be investigated.

Keywords: critical care; job satisfaction; multicenter; intensive care unit management; intensive care unit organization

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Author Contributions: P.M. participated in the design of the study, performed the statistical analysis, interpreted the data, and wrote the article. M.V. designed the study, collected data, and helped writing the manuscript. A.B., G.D., and H.P. collected data and helped write the manuscript. B.R. conceived the study, participated in the design of the study, had full access to and interpreted the data, and wrote the article. All authors read and approved the final manuscript.

This work was presented partially at the annual congress of the Swiss Society of Intensive Care Medicine in November 2007 and at the Annual Congress of the European Society of Intensive Care Medicine (ESICM) in Lisbon in 2008.

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I found myself looking at the body as a wonderful machine, but not as a creature with a soul—that worried me a bit. What in fact I had to do was consciously unlearn that sort of thing and look at human beings as human beings.—R. Richardson (1)

ICU caregivers work in a stressful environment that can lead to burnout syndrome. Stress occurs when there is a discrepancy between the demands and the resources of the individual (2). Burnout is a psychological syndrome that occurs in response to chronic emotional and interpersonal stressors at work (3). It can lead to emotional instability, difficulties to commit, a feeling of failure, and an urge to leave one’s job (4, 5). Burnout can affect up to 45% of the medical and nursing staff (6, 7). Consequences to caregivers’ health include insomnia, irritability, and depressive symptoms (7), which in turn can impact on the quality of the care they provide (8). From an institutional point of view, burnout is a target for improvement, as it can lead to absenteeism and resignation from jobs (9, 10). A shortage of ICU caregivers is already anticipated (4, 11), whereas the training of this highly specialized staff is costly. Therefore, every effort should be made to better understand what leads to burnout. The known factors associated with burnout, such as job dissatisfaction (12), end-of-life issues, conflicts (7), lack of recognition, or responsibility overload (6, 10), are difficult to correct.

In a previous single-center study, we demonstrated that the degree of stress and of burnout were great in a Swiss surgical ICU (13). In this multicenter study led at a Swiss national level, we sought to investigate specifically whether the characteristics related to centers, which we chose to name center-related...
factors, can be associated with burnout in ICUs, to determine potential targets for corrective action in the future. These factors were distinctly addressed as patient-related factors (mortality, length of stay) and as caregiver-related factors (the professional category, their sex, the number of children, whether they live alone or not, their age, and so on). Our secondary objective was to assess the distribution of stress and burnout in a multicultural country such as Switzerland, and to detect possible differences among the professional categories regarding the factors associated with burnout.

Some results of this study have been previously reported in abstracts presented at the Annual Congress of the European Society of Intensive Care Medicine (ESICM) in Lisbon in 2008 (14) and at the Annual Congress of the Swiss Society of Intensive Care Medicine in November 2007 (15, 16).

METHODS

The setting comprised all certified ICUs in Switzerland. Certification is provided by the Swiss Society of Intensive Care according to national regulation (17). The directors of all Swiss ICUs (three language regions: French-, Italian-, and German-speaking parts) were invited to participate in the study. The centers’ data were directly collected from the ICU directors who agreed to participate (see Table E1 in the online supplement), separately from the questionnaires distributed to the caregivers. Once the director had given consent, all caregivers, including physicians, nurses, and nurse-assistants, of the center received the questionnaire between March 2006 and April 2007. The “nurse team” was defined as the sum of the nurses working at a given center, without correcting for the percentage of work activity. In Switzerland, nurse-assistants are caregivers who help the nurses in the basic care of patients (washing, feeding, and voiding). They do not administer medication or set up mechanical ventilation.

The questionnaire, a simplified version of the questionnaire described in detail elsewhere (13; and in Table E1) was self-administered and anonymous. It comprised demographic data, personal characteristics, the risk of burnout according to the Maslach Burnout Inventory (MBI) in its Fontaine French version (18), and an evaluation of stress based on a national survey of Swiss workers led by the Swiss State Secretariat of Economic Affairs (19), based on a four-point Likert Scale (I feel stressed: never, sometimes, often, very often) (forced-choice Likert Scale) to minimize a central tendency bias (20). To confirm the previous assertion that repeated stress can lead to burnout, we included the evaluation of stress in our questionnaire. Because the burnout depends on the individual’s personal resources as well as his or her capacity to deal with stress, we assessed perceived stress. Objective stress is not pertinent in this field. A high degree of burnout. The mean MBI score was –15.6 ± 15 (mean ± SD), ranging from –50 to 73, with a median score of –17.0 (interquartile range, 20). High burnout was present in 48 of 117 nurse-assistants (41%), 683 of 2,415 nurses (28%), and 143 of 459 physicians (31%). The rate of high degree of burnout among the ICU centers ranged from 5 to 62%, with a mean of 28%. The overview of the percentage of burnout in the different caregivers in the three regions is shown in Table E2. Among the 3,052 questionnaires, 3,047 answers about stress were analyzed (99.8%).

Overall, 1,117 of the 3,047 (37%) caregivers working in Swiss ICUs who responded felt highly stressed.

The list of variables analyzed and the univariate results concerning burnout and stress are shown in Table E1. Results of the univariate analysis of the factors associated with burnout are shown in Table 2. An additional multivariate model that also includes the variable “feeling stressed” is shown in Table E3 and a model analyzing only female nurses is shown in Table E4. Results of the univariate analysis of the factors associated with burnout are shown in Table E5.

Center-related Factors

By univariate analysis (Table 2), a higher proportion of female caregivers among the nurses and among the physicians decreased the risk of burnout. By multivariate analysis a higher proportion of female nurses in the team was associated with decreased risk of high burnout (OR for every percentage, 0.985; 95% CI, 0.973–0.997), whereas caregivers working in German-speaking ICUs were associated with a high degree of burnout. The association between the proportion of female nurses and burnout in the multivariate model, performed only in female nurses (Table E4), was even stronger (OR for every percentage more of female nurses, 0.979; 95% CI, 0.964–0.994). Furthermore, this association was almost linear and no significant interaction between the type of caregiver or the sex and the female proportion was identifiable. This association could not be verified in specific models for physicians or for nurse-assistants only because of the small size of the two cohorts.
By univariate analysis (Table E5), the factors associated with increased risk of high stress were university hospitals, pediatric ICUs, the number of beds per unit, and a higher proportion of females among physicians whereas working in the German-speaking part of Switzerland was associated with decreased risk. By multivariate analysis (Table E5), working in a university hospital was independently associated with a high degree of stress. There was no association between the stress and the proportion of female nurses or physicians in a team.

No significant random “center effect” was identified in any of the mixed-effect logistic regression models (for burnout) with random effects on the intercept accounting for centers, whereas in the model analyzing stress there was a significant effect (Table E5). The multivariate logistic regression analyzing centers with burnout prevalence higher than the median (28.6%) value (Table E7) showed that only German-speaking centers (OR, 4.71; 95% CI, 1.09–20.363; \( P = 0.04 \)) were associated with an

![Figure 1. CONSORT (Consolidated Standards of Reporting Trials) diagram.](image)

### TABLE 1. CHARACTERISTICS OF CENTERS, PATIENT POPULATIONS, AND CAREGIVERS

<table>
<thead>
<tr>
<th></th>
<th>French-speaking Centers</th>
<th>Italian-speaking Centers</th>
<th>German-speaking Centers</th>
<th>All Centers</th>
</tr>
</thead>
<tbody>
<tr>
<td>University centers, n (%)</td>
<td>8 (47)*</td>
<td>0 (0)</td>
<td>9 (17)</td>
<td>17 (23)</td>
</tr>
<tr>
<td>Pediatric centers, n (%)</td>
<td>5 (29)*</td>
<td>0 (0)</td>
<td>4 (8)</td>
<td>9 (12)</td>
</tr>
<tr>
<td>Number of beds, m ± SD</td>
<td>12.2 ± 6.4</td>
<td>7.8 ± 2.5</td>
<td>9.5 ± 5.0</td>
<td>10.0 ± 5.5</td>
</tr>
<tr>
<td>Nurse/patient (daytime), mean ± SD</td>
<td>0.67 ± 0.19</td>
<td>0.65 ± 0.12</td>
<td>0.71 ± 0.13</td>
<td>0.70 ± 0.14</td>
</tr>
<tr>
<td>Nurse/patient (nighttime), mean ± SD</td>
<td>0.51 ± 0.14</td>
<td>0.48 ± 0.06</td>
<td>0.61 ± 0.14</td>
<td>0.57 ± 0.15</td>
</tr>
<tr>
<td>Nurse working hours, 8 h/12 h/night, mean/SD</td>
<td>3/10/4 (18/59/23)*</td>
<td>5/0/0 (100/0/0)</td>
<td>52/0/0 (100/0/0)*</td>
<td>60/10/4 (81/14/5)</td>
</tr>
<tr>
<td>Intern rotation (mo), mean ± SD</td>
<td>4.1 ± 2.5</td>
<td>5.4 ± 3.9</td>
<td>5.4 ± 3.1</td>
<td>5.1 ± 3.0</td>
</tr>
<tr>
<td>Percentage of females in the NA team (%), mean ± SD</td>
<td>91.7 ± 12.7</td>
<td>88.7 ± 13.1</td>
<td>80.9 ± 36.5</td>
<td>84.8 ± 30.0</td>
</tr>
<tr>
<td>Percentage of females in the nurse team (%), mean ± SD</td>
<td>82.2 ± 12.8</td>
<td>61.9 ± 7.5†</td>
<td>83.5 ± 10.8</td>
<td>81.7 ± 12.3</td>
</tr>
<tr>
<td>Percentage of females in the medical team (%), mean ± SD</td>
<td>40.5 ± 24.3</td>
<td>35.8 ± 15.1</td>
<td>38.9 ± 28.7</td>
<td>39.0 ± 26.8</td>
</tr>
</tbody>
</table>

### Caregivers

<table>
<thead>
<tr>
<th></th>
<th>Nurse-assistants</th>
<th>Nurses</th>
<th>Physicians</th>
<th>All Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female sex, n (%)</td>
<td>119 (87)</td>
<td>2,018 (82)</td>
<td>193 (42)*</td>
<td>2,331 (76)</td>
</tr>
<tr>
<td>Age &lt; 40 yr, n (%)</td>
<td>75 (55)*</td>
<td>1,740 (71)</td>
<td>321 (69)</td>
<td>2,136 (70)</td>
</tr>
<tr>
<td>Full time job, n (%)</td>
<td>66 (48)</td>
<td>1,054 (43)</td>
<td>400 (86)*</td>
<td>1,526 (50)</td>
</tr>
<tr>
<td>Years of experience in ICU, median [IQR]</td>
<td>5.5 [8]</td>
<td>8 [9.8]</td>
<td>2.4 [7.3]</td>
<td>7.5 [10]</td>
</tr>
<tr>
<td>No child, n (%)</td>
<td>58/136 (43)*</td>
<td>1,536/2,419 (63)*</td>
<td>273/463 (59)</td>
<td>1,868/3,020 (62)</td>
</tr>
<tr>
<td>Living alone, n (%)</td>
<td>46 (34)*</td>
<td>687/2,446 (28)</td>
<td>92 (20)*</td>
<td>826/3,050 (27)</td>
</tr>
</tbody>
</table>

**Definition of abbreviations:** ICU = intensive care unit; NA = nurse-assistant.

* \( P < 0.05 \), Fisher’s exact test or multiple chi-square test, compared with both other categories.

† \( P < 0.05 \), t test, compared with both other categories.

‡ \( P < 0.05 \), Mann-Whitney U test, compared with both other categories.
TABLE 2. UNI- AND MULTIVARIATE MIXED-EFFECTS LOGISTIC REGRESSION FOR FACTORS ASSOCIATED WITH BURNOUT, WITH RANDOM EFFECT BY CENTERS

<table>
<thead>
<tr>
<th>Center-related factors</th>
<th>Univariate Analysis</th>
<th>Multivariate Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OR</td>
<td>95% CI</td>
</tr>
<tr>
<td>University-nonuniversity</td>
<td>0.917</td>
<td>0.781–1.076</td>
</tr>
<tr>
<td>Pediatric ICUs–adult ICUs</td>
<td>0.619</td>
<td>0.483–0.793</td>
</tr>
<tr>
<td>Number of beds (per bed)</td>
<td>1.007</td>
<td>0.996–1.019</td>
</tr>
<tr>
<td>German-, French-, Italian-speaking part of Switzerland</td>
<td>1.125</td>
<td>0.952–1.330</td>
</tr>
<tr>
<td>Proportion of females in the nurse team (per %)</td>
<td>0.983</td>
<td>0.976–0.990</td>
</tr>
<tr>
<td>Proportion of females in the medical team (per %)</td>
<td>0.996</td>
<td>0.992–0.999</td>
</tr>
<tr>
<td>Patient-related factors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mortality rate (per %)</td>
<td>1.063</td>
<td>1.030–1.097</td>
</tr>
<tr>
<td>Length of stay (per day)</td>
<td>0.946</td>
<td>0.914–0.980</td>
</tr>
<tr>
<td>Caregiver-related factors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nurse-assistant–(nurse, physician)</td>
<td>1.725</td>
<td>1.183–2.515</td>
</tr>
<tr>
<td>Sex: male</td>
<td>1.484</td>
<td>1.241–1.774</td>
</tr>
<tr>
<td>No child</td>
<td>1.390</td>
<td>1.177–1.643</td>
</tr>
<tr>
<td>Living alone</td>
<td>1.130</td>
<td>0.948–1.347</td>
</tr>
<tr>
<td>Age &lt; 40 yr</td>
<td>1.340</td>
<td>1.122–1.599</td>
</tr>
</tbody>
</table>

Definition of abbreviations: CI = confidence interval; ICU = intensive care unit; OR = odds ratio.

Notes: n = 2,914. Random-effect parameter (center): estimate, 0.026; standard error, 0.013. Likelihood ratio versus logistic regression model: P = 0.08.

increased risk and that centers with a high percentage of female nurses were instead associated with a reduced risk of a high prevalence of burnout (OR, 0.943; 95% CI, 0.968–1.011; P = 0.04), reflecting the increased risk of males to have burnout at the individual level.

**Patient-related Factors**

By univariate analysis, the mortality rate and the length of ICU stay increased the risk of high burnout and high stress. By multivariate analysis, only the mortality remained significantly associated with high burnout (Table 2).

**Caregiver-related Factors**

Of 117 nurse-assistants, 48 (41%) had a high degree of burnout. This proportion was significantly higher (P = 0.004) compared with the 683 of 2,415 nurses (28%) and 143 of 459 physicians (31%). The total numbers differed slightly because of six caregivers who did not declare their professional specificity. Table E2 shows the details regarding the burnout of the three professional categories and of the three linguistic regions.

The distribution and characteristics of the various professional categories is summarized in Table 1. The proportion of nurse-assistants who felt highly stressed was not significantly greater than for physicians and nurses (41 vs. 36%; P = 0.27). Nurses were not significantly more stressed than the others (37 vs. 33%; P = 0.07). Fewer physicians said they were stressed compared with nurse-assistants and nurses (31 vs. 38%; P = 0.009). Most caregivers (64%) had difficulties reconciling work and private life.

In the univariate analysis (Table 2 and Table E5), having no child and being under 40 years old was associated with increased risk of high burnout and high stress. Age was first considered as a continuous variable and then in 5- and 10-year intervals. The nonlinear association of age with stress and burnout ultimately required its analysis as a dichotomized variable (more and less 40 yr).

Being a male increased the risk of burnout and decreased the risk of high stress. The activity rate of work influenced neither burnout nor stress. Being a nurse-assistant compared with being a nurse or a physician was associated with increased risk of high burnout. The number of years of experience in ICU was inversely correlated with burnout and was collinear with age.

The multivariate analysis (Table 2) showed that being a male, a nurse-assistant, having no children, and being under 40 years old was each independently associated with high burnout. Being a female, having no children, and not living alone were independently associated with high stress (Table E5). We did not identify significant interactions between variables.

When the factor “Feeling stressed” was added to the burnout multivariate analysis, it became the predominant independent factor that increased the risk of high burnout (OR, 3.72; 95% CI, 3.12–4.43; P < 0.001) (Table E3). Most factors determined in the previous model changed very little, except that the mortality rate stopped being significant.

An additional multivariate model (Table E4) considering only female nurses showed results that were almost identical to those in Table 2, except for the center mortality rate, which ceased being significant (OR, 1.06; 95% CI, 0.99–1.13; P = 0.07).

Table E6 compares the various multivariate models.

Among the caregivers who answered the questions about both burnout and stress (2,992), high burnout and high stress were differently distributed depending on the linguistic regions. Caregivers from the French-speaking region showed high stress (359 of 830; 40%), among whom 142 of 359 (40%) showed high burnout, whereas from the Italian- and German-speaking regions, 87 of 199 (44%) and 652 of 1,963 (33%), respectively, showed high stress, among whom 44 of 87 (51%) and 316 of 652 (48%), respectively, showed high burnout (P < 0.001 for high stress, P = 0.02 for high burnout; both test for independence).

High stress and high burnout were also differently distributed depending on the caregivers’ sex (overall, 2,987 caregivers responded to all questions). High stress was present in 229 of 715 (32%) male caregivers, among whom 131 of 229 (57%) showed high burnout, whereas 868 of 2,272 (38%) female caregivers showed high stress, among whom 371 of 868 (43%) showed high burnout (P = 0.0003 for high stress, P = 0.0001 for high burnout).

**DISCUSSION**

The major finding of this multicenter study was that a potentially important center-related factor, namely the increased proportion of female nurses among the caregivers, was associated with
decreased risk of high burnout. This could open a new era in managerial point of view for heads of ICUs. Indeed, we showed that the relation was almost linear, meaning that the risk of burnout among the whole ICU team may be affected by the composition of the team. The positive impact of the female proportion was even more pronounced among the nurses. Unfortunately, the effect could not be confirmed specifically in separate models including only physicians or nurse-assistants because of the small size of the two cohorts. Interestingly, the female proportion of nurses had the same effect on males and females in the global model concerning burnout.

Burnout is a preoccupying condition both for the employee and the manager: the employee suffering from burnout feels professionally exhausted, isolated, as having failed overall, and is less motivated to work, and the manager faces inefficiency, conflicting interaction, and absenteeism (3). Burnt-out physicians tend to care less for patients (8) and the number of medical errors increases with burnout (21). Burnout can lead to depressive symptoms and to premature resignation from the ICU (22). These consequences present a major threat from a managerial point of view in the present context of increasing deficit in critical care physicians (23) and nurses (24).

For the first time, we have indications that factors related to the center could be involved in the prevalence of high burnout. The high response rate from each center and the high participating rate of the centers (74 among 92; 80%) should have minimized the selection bias and allowed a fair analysis of the factors linked to the centers and the caregivers. The strengths of this work also reside in the inclusion of ICU caregivers from different backgrounds, and who speak different languages, and the high response rate that enhances the relevance of our findings as well as their generalizing quality for other ICUs. Many publications show that the burnout phenomenon is common throughout the world and is not exclusively found in wealthy countries (25–27). Furthermore, our results are applicable to ICUs of other countries because a number of multicenter European studies such as the Ethicus Study regarding end-of-life practices (28), the Conficus Study regarding conflicts in ICUs (29), and the SEE Study, a multinational Sentinel Events Evaluation (30) included Switzerland and the results showed that Switzerland is comparable to many surrounding countries. Results from Switzerland are also often similar to those found in North America, that is, SAPS (Simplified Acute Physiology Score) studies (31, 32).

The originality of this study resides in several other points. First, we took into account the feeling of stress and burnout together because burnout is the result of chronic stress (3). The fact that high stress was not always associated with high burnout in our study must be commented on. One explanation might be that being burned out may lessen the resistance to stress, and thus might contribute to a vicious cycle wherein the role of each factor might be confounding. Also, the apparent paradox that female subjects are more stressed yet less prone to burnout compared with the male subjects could be due to methodological bias. Indeed, female caregivers may have found it easier to admit their distress than the male caregivers did. The interesting finding in this context was that male caregivers were actually more in burnout than females, independent of their professional category. Men may be less inclined to express their distress and may be helped by being taught how to manage their feelings (33). Second, the difference between French- and German-speaking regions may be attributed to cultural differences. As a rule, caregivers speak the regional language to communicate with the patients and their families. The different languages clearly indicate singular cultures in Switzerland. Depending on cultural background, the feeling of stress and burnout may vary (34). Our study design does not allow explaining the relationship between the feeling of stress and burnout or the potential cultural impact. A qualitative approach of such questions might be of great interest.

In addition, the types of ICU, that is, university or pediatric ICU, were examined. Stress was felt more often in university and pediatric units, but it was not associated with burnout. The size of the units, the nurse-to-patient ratio, the 8- or 12-hour shifts, the size of the medical or nurse team, the number of patients per year, and the time spent working at the ICU had no impact on the prevalence of burnout in the multivariate analysis.

Last, the three professional categories (nurse-assistants, nurses, and physicians) were investigated simultaneously in each center. To our knowledge, the data regarding the nurse-assistants are new. A number of papers about stress or burnout of caregivers have been published throughout the world (10, 35, 36), but up to now none has given a whole picture of the subject in an entire country and allowed comparison of professional categories. The professional category at the highest risk of burnout was that of the nurse-assistants. Because the participation in end-of-life and postmortem care increases the psychological burden and the risk of burnout (7), and because these caregivers are usually less numerous in ICUs, the unavoidable consequence is that they are more frequently confronted with these difficult situations than are others. Our findings may prompt heads of ICUs to take particular care of this professional category (37).

The increased mortality rate in centers associated with high burnout is consistent with the findings of Embriaco and colleagues (6) and Poncet and colleagues (7), who demonstrated that the prevalence of burnout increased among physicians and nurses who had often been confronted with death or who had participated in decisions of foregoing life-sustaining therapy. In contrast, our results do not sustain the international and European guidelines proposing that ICUs should not exceed 16 beds (38, 39). These guidelines were based mostly on experts’ opinion and no data were available regarding the specific issue of the occurrence of burnout among caregivers and the size of the centers. The mortality rate was in no way related to the size of the ICUs.

Our study has some limitations. First, Switzerland is a small country with a unique organization of 26 cantons with 92 certified ICUs of 6 to 36 beds. However, the rate of burnout was overall similar to previous reports from other countries and the findings regarding the related factors may still be generalizable. Second, the number of nurses exceeded by far the number of physicians and nurse-assistants, which may have biased the results. However, the multivariate analysis allowed us to analyze the three professions at the same time accounting for their differences. Moreover, we did not identify significant interactions in our multivariate model indicating that the analysis or the models should be split. Third, a few of the variables in the analysis, such as the 12-hour shifts or the “mixed” shifts, were sparse and therefore the results are less dependable. Thus we cannot exclude that some other factors may be related to stress or burnout. Fourth, there was 29% nonrespondents. These may either be people who do not experience high rates of distress and are consequently less interested in completing a questionnaire about stress and burnout, or they could be those who were too affected by burnout to be interested in filling out a questionnaire. We have no way to obtain more information about this population. The results could therefore be modified if all caregivers had responded.

On the other hand, we were able to include 80% of all Swiss ICUs (compared with less than 60% of centers participating in other studies until now). This means that the data concerning
center characteristics should be less prone to bias selection (having included centers with high and low burnout) than the studies performed until now. Therefore, 71% of caregivers participating to the study representing 80% of centers seems acceptable, even if not totally free from potential bias. Fifth, we did not attempt to compare the degree of stress or burnout with other professions, because the reasons leading to burnout may differ. The aim of our study was to focus more on finding possibly modifiable factors that lead ICU caregivers to burnout. Besides the modification of team composition, promising solutions for caregivers would be team building (40), staff empowerment (41), development of a culture aimed at preventing conflicts (42), and “modification of the inner self” of the caregivers (43). Sixth, we did not evaluate all the possible confounders, in particular regarding the higher risk of burnout of younger caregivers. It is possible that caregivers with the lowest seniority were less able to schedule days off, were not invited to participate in the research group, took conflicts more personally, felt more inhibited in establishing working relationships with the physicians and head nurses, and were asked to work more night shifts and had less discretion over holiday time. Each of these relationships could be confounded by age and each of these established risk factors was not collected or evaluated as part of the multivariable modeling in our study. Seventh, the questionnaire used was a simplified form of the previously published questionnaire (13). Because the aim of our study was to investigate the potential factors related to the centers, we decided to simplify the questionnaire to increase the response rate to our questionnaire. This fact did not allow us to investigate all the previously detected concerns of the different caregivers. Last, we acknowledge that several known factors related to burnout such as conflicts, ability to schedule days off according to personal wishes, and relationships with physicians were not investigated in our study. In fact, our study was done during 2006–2007, and at that time the now well-known data from Emriaco and colleagues (6) and Poncet and colleagues (7) about burnout and about conflicts from Azoulay and colleagues (29) were not available.

In conclusion, the findings of this study suggest for the first time that the composition of the team, in our case the percentage of female nurses, could be one of the major determinants of burnout in ICUs. Even if these new results seem appealing, we must be careful before social “reengineering” of the workplace be undertaken. The main message of our study may be that we must now prospectively investigate and confirm in a multicenter multinational study team compositions and their impact on burnout and stress in ICUs. In the future it would be interesting to better analyze qualitatively ICU team composition.

The second message of this work could be that there is a subset of caregivers at higher risk of burnout such as young women alone, without children. Further studies into the possible reasons for burnout in this subset of caregivers are needed to optimally address the problem. In the meantime, the ICU heads should ascertain that personnel at higher risk are given particular care, and that resources should be provided to afford psychological support and promote a team culture. Although not proven yet, it may well be that the attitude of the leaders toward their collaborators concerning an acknowledgment of the high risk of burnout will induce a global cultural modification in the unit. Ideally, institutional approaches should be complemented by person-centered interventions, such as mindfulness meditation, self-awareness exercise, or narrative medicine (43, 44). This study seems to open a new frontier concerning burnout in ICUs, highlighting the importance of team composition. Our results should be confirmed in a prospective multicenter, multinational study. Whether the results can be exported to other medical settings where team-working is pivotal remains for the moment an interesting question to be investigated.


