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Burnout, Technology Use, and ICU Performance

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> A stranger on entering an ICU is at once bombarded with a massive array of sensory stimuli, some emotionally neutral but many highly charged. Initially the greatest impact comes from the intricate machinery with its flashing lights, buzzing and beeping monitors, gurgling suction pumps and whooshing respirators Simultaneously one sees many people rushing around busily performing life saving tasks. The atmosphere is not unlike that of a tension charged strategic war bunker. One becomes aware of desperately ill, sick and injured human beings and they are hooked up to the machinery. And in addition to the mechanical stimuli one can discern moaning, crying, screaming and the last gasps of life. Sights of blood, vomitus, excreta, exposed genitals, mutilated and wasted bodies, and unconscious and helpless people assault the sensibilities. Many are neither alive nor dead Most have tubes in every orifice. Their sounds and action or inaction are almost inhuman. (Hay & Oken, 1972, p. 112)

This vivid, impressionistic observation suggests that working in an intensive care unit (ICU) is stressful. ICU staff are confronted with human suffering, grief, and death and are exposed to distasteful, degrading, and sometimes even disgusting sights. What is perhaps even more characteristic for ICUs, however, is the surreal environment that is dominated by sophisticated equipment. More than other hospital wards, ICUs have developed into high-tech environments that require complex cognitive skills such as monitoring the equipment and responding to alarms, in addition to traditional nursing (Fitter, 1987).

Aside from emotional demands and the use of advanced technology, various stressors have been identified in ICUs, such as conflicting communications with physicians, administrators, and other nurses; heavy workload; inadequate knowledge and skill; ethical problems; and responsibility for life and death decisions (for a review, see Caldwell & Weiner, 1981). Viewed from this perspective, it is not surprising that, one decade ago, burnout was listed among the top research priorities for ICUs (Lewandowski & Kositsky, 1983).

Burnout is considered to be a long-term stress reaction (Maslach & Schau-

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feli, 1993). Although different definitions of burnout exist, it is most commonly described as

> a psychological syndrome of emotional exhaustion, depersonalization, and reduced personal accomplishment that can occur among individuals who work with other people in some capacity Emotional exhaustion refers to feelings of being emotionally overextended and depleted of one's emotional resources Depersonalization refers to a negative, callous, or excessively detached response to other people, who are usually the recipients of one's services or care Reduced personal accomplishment refers to a decline in one's feelings of competence and successful achievement in one's work (Maslach, 1993, pp 20–21)

Despite the claims that nursing in ICUs is particularly stressful, and thus causes burnout, comparisons with other hospital wards are inconclusive. Harris (1989) reviewed 23 studies that compared ICUs and non-ICUs on several stress-related outcomes (e.g., job dissatisfaction, burnout, turnover, alienation, and diminished organizational commitment) that were measured by self-reports. Fifteen studies found no differences between ICUs and non-ICUs, 3 studies reported fewer stress reactions in ICUs, and only 5 studies indicated higher stress-related outcomes in ICUs. Nevertheless, Harris (1989) observed some interesting patterns across all units:

> Nurses who are burned out have less hardiness; have higher stress, anxiety, and turnover; are younger, less experienced, more hassled, less educated, less involved with working conditions, and less able to anticipate problems at work, and have feelings of alienation, powerlessness, and lack of control, as well as somatic complaints (pp 24–25)

In summary, the evidence that levels of experienced stress, including burnout, are higher among ICU nurses than among non-ICU nurses is inconclusive. However, consistent relationships have been reported between burnout and other variables in ICUs and non-ICUs Accordingly, it appears that burnout is a general problem in nursing, rather than a specific problem in ICUs.

Unlike other (e.g., clerical and blue-collar) jobs, the impact of technology on stress has barely been studied in ICUs (for a review, see Kumashiro, Kamada, & Miyake, 1989) This is all the more surprising because the use of medical technology is considered to be one of the most typical stressors in ICUs (Huckaby & Jagla, 1979) In their review of the literature, Karasek and Theorell (1990) concluded that the introduction of new technologies has led to increased stress because of "deskilling" and reduction of decision latitude, particularly in lower status administrative, technical, and manufacturing jobs The report of the European Foundation for the Improvement of Living and Working Conditions (1988), concerned with the impact of new technology on workers in health care, concluded that nurses are increasingly dependent on the technology. According to the report, this deskilling has "particularly stressful consequences in the event of machine unreliability or breakdown, when a nurse might have difficulty switching from a passive role to active responsi-

bility for patients" (European Foundation for the Improvement of Living and Working Conditions, 1988, p 54).

More specifically, Fitter (1987) reviewed six case studies about the impact of technology use in ICUs that were performed in several European countries (Denmark, Ireland, Italy, the United Kingdom, The Netherlands, and Germany). He identified four common stress factors that are directly related to the use of new technology. enhanced cognitive demands (e.g , constant vigilance), poor design and equipment failures (e.g , false alarms), lack of adequate training, and ethical dilemmas (e.g , euthanasia). Accordingly, intensive use of technology can be considered a specific indicator of qualitative workload Following this line of reasoning, it can be hypothesized that burnout is positively associated with the use of technology in ICUs.

It is expected that depersonalization occurs in ICUs where much sophisticated equipment is used. Depersonalization is considered to be a way of coping with emotional exhaustion through mental distancing (Maslach, 1993). Following this line of reasoning, it is likely that the use of advanced equipment fosters a detached and impersonal attitude toward patients.

Burnout and Job Performance

As Maslach and Schaufeli (1993) pointed out in their recent review of the historical and conceptual development of burnout, from the onset, it was postulated that workers who feel burned out are not able to perform on an adequate level. Some authors have even considered poor performance to be an aspect of burnout, rather than its consequence (e.g., Pearlman & Hartman, 1978). At any rate, the relevance of burnout for organizations is largely determined by the crucial assumption that it impairs job performance. However, empirical tests of this assumption are generally lacking. To date, the burnout–performance relationship is still a blind spot, which is illustrated by Kahill (1988), who concluded in her review of empirical burnout research, "The impact of burnout on job performance . . . is the area with perhaps the greatest practical and ethical implications, and has been addressed frequently in the anecdotic literature, yet has been largely neglected by researchers" (p. 295).

As far as human services are concerned, only three studies on burnout included job performance. Lazaro, Shinn, and Robinson (1985) studied 82 childcare workers from several agencies and found that burnout was more strongly (negatively) associated with self-rated performance than with supervisor-rated performance. Unfortunately, they used an unusual composite burnout score that included scales for job alienation, job satisfaction, psychological symptoms, and somatic symptoms. A more appropriate operationalization of burnout was used by Randall and Scott (1988), who used the well-known Maslach Burnout Inventory (MBI; Maslach & Jackson, 1986). In their study of 248 nurses at a general hospital, they found that burnout was related to poor self-rated performance, whereas its relationship with supervisor-rated performance was nearly absent. Finally, and most interestingly, Roelens (1983) investigated 261 ICU and non-ICU nurses. As predicted, burnout—as measured with the MBI—was negatively related to the nurses' own ratings of their performance. Quite

remarkably, performance ratings by the head nurse agreed with this pattern in non-ICU settings, but in ICUs supervisor ratings were positively related to burnout. So, the better the nurses performed according to the assessment of their superior, the higher their burnout scores. Roelens speculated that in dehumanizing settings of the ICU, depersonalization may be an effective coping strategy, allowing nurses to focus on the technical aspects of their jobs. In other words, dehumanizing patients—a crucial aspect of burnout—is necessary for ICU nurses to survive psychologically.

Unfortunately, these three studies used subjective assessments of job performance that are plagued by many shortcomings. As far as we know, only one study used objective criteria of performance in relation to burnout. Golembiewski and Munzenrider (1988) studied the productivity of 48 work units of a U.S. federal service agency. In addition to individual performance ratings, assessments of qualitative and quantitative performances of work units were included. Qualitative performance was measured by headquarters ratings and by clients assessments of the quality of the services provided by the unit. Quantitative performance was calculated by multiplying all activities of the unit's members by their corresponding standard times (e.g., answering an incoming phone call was assigned a standard time of 4 min). Next, these multiplicands were added and divided by the total time resources that were allocated to that unit. Accordingly, an objective measure of unit effectiveness was constructed. Golembiewski and Munzenrider found mixed results regarding productivity when comparing units where more than 50% of the employees were in advanced stages of burnout with more healthy units. Work units with many burned-out employees were assessed significantly less productive by the headquarters and by the employees themselves. Besides, the qualitative performance (i.e., unit effectiveness) of these units was slightly, but nonsignificantly, poorer than that of the units with less burned-out workers No differences were found in clients' assessments of the quality of the services provided. Interestingly, the employee's subjective performance rating was unrelated to the other more objective performance measures, except the clients' ratings ($r = .20$).

In summary, burnout is consistently associated with poor self-rated performance, whereas its relationship to performance appraisals of others (i.e., supervisors, clients, and headquarters) is much weaker or inconsistent. Furthermore, some very limited indications were found that burnout is associated with poor objective performance.

The General Research Model

To date, burnout is predominantly studied in relation to other self-reported variables (cf. Maslach & Schaufeli, 1993). Because similar subjective methods are used to measure the antecedents, symptoms, and consequences of burnout, common method variance that inflates relationships cannot be ruled out. Only objective measures avoid what has been called "the triviality trap." Therefore, in our study, the focus was on objective measures of work demands and performance that were assessed independently from the participant. A general

model was explored that assumes that the nurses' level of burnout plays an intermediate role between particular job demands (e.g., the intensive use of technology) and ICU performance. It is expected that the higher the demands (e.g., the more intensively sophisticated the technology), the higher the level of burnout and the lower the unit's performance. In addition to the indirect relationship to burnout, the model assumes that high job demands may have a direct negative effect on unit performance. In our model, excessive use of technology is considered to be an indicator of qualitative work overload that impairs work performance. Several reasons have been suggested for the negative relationship between stress and performance (Cohen, Evans, Stokolos, & Krantz, 1986). For instance, overload causes a narrowing of attention that can result in poor judgment, a high propensity to commit errors, and an inability to distinguish the trivial from the important. This view is compatible with Jamal (1984), who suggested that coping with stress drains nurses' energy that is needed for maximum performance on the job. Although our research model suggests causal relationships, the current study can offer only cross-sectional evidence.

Method

Participants

The data used in our study are part of a larger investigation that was conducted among 39 Dutch ICUs that contain 21% of all 317 ICU beds in the country (Reis Miranda & Spangenberg, 1992). Because 200 or more admissions per ICU are needed as an adequate sample size for calculating the objective performance criteria (Zimmerman, 1989), 19 ICUs had to be excluded because of a failure to meet minimum patient admissions. Accordingly, 20 ICUs with 210 beds remained, covering 14% of the national ICU capacity. In the 7 months of data collection from February to August 1990, 7,126 patients were admitted to these ICUs.

Moreover, self-report data are available from 508 ICU nurses (43% men, 57% women) who voluntarily completed a questionnaire (response rate: 75%). To investigate the representativeness of the present subsample, the nurses who were included in our study ($N = 508$) were compared with the nurses ($N = 262$) from the 19 ICUs that were not included in the study. No significant differences were found for age, $t(768) = 0.02$ (*ns*), sex, $\chi^2(1) = .04$ (*ns*), proportion of part-time employed nurses, $\chi^2(1) = 0.61$ (*ns*), proportion of registered nurses, $\chi^2(1) = 1.48$ (*ns*), emotional exhaustion, $t(768) = 1.42$ (*ns*), depersonalization, $t(768) = 0.21$ (*ns*), and personal accomplishment, $t(768) = -0.36$ (*ns*). Only one significant difference between the two subsamples was observed: Nurses included in the present study perceived their units to be more effective than their colleagues who were not included in the study, $t(768) = -2.68$, $p < .01$. The present sample consisted of 43% male and 57% female nurses, of whom about 60% worked full time. The mean age of the sample was 33.4 years ($SD = 5.5$). About 90% were registered as an ICU nurse.

Measures

The use of technology in an ICU is reflected by the percentage of patients who were given mechanic ventilation during the period of investigation. The nursing of these patients is particularly demanding because their respiration is executed by sophisticated equipment. In intensive care medicine, this measure is generally considered to be an objective indicator of the technological demands ICU nurses are facing (Spangenberg, Van der Poel & Gaetano, 1990).

Burnout was assessed with the MBI (Maslach & Jackson, 1986), which consists of three subscales: Emotional Exhaustion (9 items; Cronbach's α = .84), Depersonalization (5 items; α = .65), and Reduced Personal Accomplishment (8 items; α = .75). Scores range from *never* (0) to *every day* (6). Recently, Schaufeli and Van Dierendonck (1993) demonstrated that the reliability and construct validity of the Dutch version is comparable to the original American version. The MBI was completed by each nurse individually, but the three burnout scores were aggregated on unit level by computing means per ICU.

ICU performance was measured both objectively and subjectively. Two objective indicators of performance were calculated: effectiveness and efficiency. *Effectiveness* refers the degree to which goals and objectives are successfully met. This is assessed by the standard mortality ratio (SMR), which is the ratio of observed versus predicted death rates (Zimmerman, 1989). The predicted mortality is based on a comparison with a U.S. reference group that includes more than 17,000 ICU patients. SMR explicitly controls for a number of medical, physiological, and biographical characteristics. Hence, SMR is an indicator of clinical effectiveness that is adjusted for several patient characteristics such as the severity of the illness, age, chronic health status, and medical diagnosis.[1] For the purpose of this study, SMR scores have been reversed, so that scores greater than 1.0 indicate good performance; the observed death rate of the ICU is smaller than the predicted death rate.

Efficiency refers to the degree to which goals and objectives are met at low costs (Scott & Shortell, 1988). This is estimated by the patient's length of stay The shorter patients stay at an ICU, the more efficient the ICU is operating Like mortality, length of stay has to be standardized for illness-related patient characteristics because, for instance, more severely ill patients are likely to stay longer than less severely ill patients. Accordingly, a standardized length-of-stay ratio (SLR) was computed similar to the SMR. SLR is the ratio of observed versus predicted length of stay. Again, the predicted length of stay is based on the American reference group and controls for several patient

[1]More particularly, the predicted death rate is derived from the Acute Physiology and Chronic Health Evaluation, Version 3 (APACHE III) predictive equations (Zimmerman, 1989) APACHE III is designed to provide accurate relative risk stratification for acutely ill hospitalized adults with medical and surgical diagnoses The APACHE III score consists of a cardinal index risk number varying from 0 to 299 points Points are tabulated from weights assigned to acute physiologic derangements (0 to 252 points), significant comorbidities influencing a patient's immunologic status (0 to 23 points), and the patient's chronological age (0 to 24 points)

The statistical evaluation of the patient data and the calculation of the mortality and length of stay ratios have been conducted by APACHE Medical Systems, Inc (Reis Miranda & Spangenberg, 1992)

characteristics such as the severity of the illness, age, chronic health status, and medical diagnosis. An SLR greater than 1 indicates good ICU efficiency; patients stay a shorter time than was predicted.

Perceived unit effectiveness (PUE) is measured by asking the nurses to what extent they believe their unit is successful in achieving several goals (e.g., "Our unit is capable of reaching its goals in relation with patient care"; Shortell, Rousseau, Gillies, Devers, & Simons, 1991). For psychometric reasons, three original items had to be deleted. The remaining five items—scored on a 5-point rating scale ranging from *completely agree* (1) to *completely disagree* (5)—constitute an internally consistent scale (α = .70) Similar to burnout, the nurses' perceived effectiveness scores were aggregated on unit level.

Results

Table 1 shows the levels of burnout among ICU nurses in comparison to a sample of non-ICU nurses from several health care settings (N = 667): general hospitals (15%), mental hospitals (25%), hospices (17%), community nursing (31%), institutions for people with mental retardation (9%), and other health care institutions (2%). Although this composite sample is not likely to represent all types of other nursing, it is homogeneous as far as levels of burnout are concerned. Only one significant difference was observed between the subsamples: Psychiatric nurses report stronger feelings of diminished accomplishment than do community nurses (Schaufeli & Peeters, 1990). Compared with nurses from other fields, the ICU nurses in the present study reported significantly more feelings of depersonalization and lower levels of personal accomplishment. Accordingly, they exhibited more burnout symptoms on two of the three dimensions.

Table 2 shows the means, standard deviations, and correlations between the aggregated variables at unit level. The pattern of correlations displayed in Table 2 is investigated with the LISREL VII computer program. A so-called linear structural model is tested that is based on our general research model. In this model, burnout is considered to be a latent variable or hypothetical construct that is measured by three manifest variables (i.e., emotional exhaustion, depersonalization, and reduced personal accomplishment). Moreover, ICU performance is assessed by three different kinds of indicators that are

Table 1. Burnout Among ICU Nurses (N = 508) and Non-ICU Nurses (N = 667)

	ICU nurses		Non-ICU nurses		
Variable	*M*	*SD*	*M*	*SD*	*t*
EEX	16.3	6.9	16 7	8 5	−0 86
DEP	7 2	3.7	5 9	3 9	5 8*
PAC	30 4	3.6	32 4	4 9	−7 8*

Note ICU = intensive-care unit; EEX = emotional exhaustion, DEP = depersonalization, PAC = personal accomplishment

*$p < 001$

Table 2. Means, Standard Deviations and Correlations Between Variables in the Model (N = 19)

			Product–moment correlations					
Variable	*M*	*SD*	MVT	EEX	DEP	PACr	SUE	SMR
MVT	23.0	21.9	1.00					
EEX	14 9	2.9	30	—				
DEP	7.0	1 0	.48	57	—			
PACr	30.5	1 8	.40	65	.75	—		
PUE	3.8	0 2	− 50	− 44	− 36	−.41	—	
SMR	1.3	0.5	−.13	26	.12	−.01	− 31	—
SLR	1.0	0.2	−.30	.49	.17	18	.01	.48

Note MVT = mechanical ventilation (%), EEX = emotional exhaustion; DEP = depersonalization, PACr = personal accomplishment (reduced), PUE = perceived unit effectiveness, SMR = standardized mortality ratio, SLR = standardized length of stay ratio, for $r > 45$, $p < 05$, for $r > 57$, $p < 01$; for $r > 66$, $p < 001$

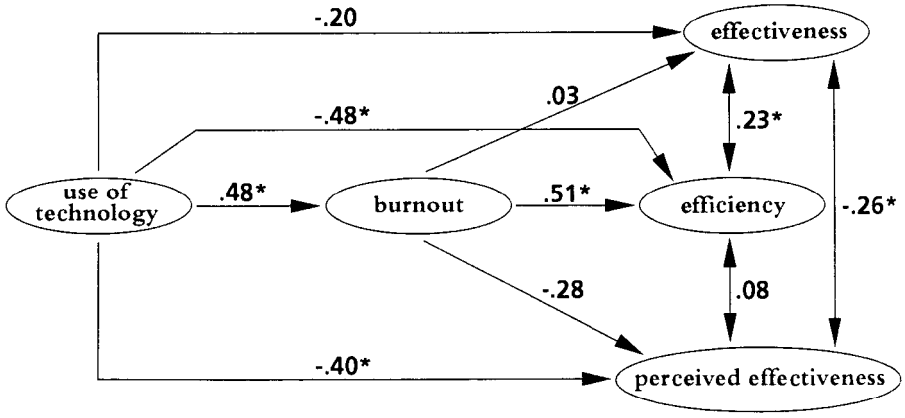

Figure 1. Use of technology, burnout, and intensive-care unit–performance (standardized LISREL solution)

supposed to be weakly positively related: effectiveness (SMR), efficiency (SLR), and a subjective indicator (PUE). Although the model is tested on only 19 cases, the aggregated data come from samples that include more than 500 nurses and more than 7,000 patients. Consequently, the aggregated variables in the model can be considered reliable estimates.

According to the chi-square goodness-of-fit statistic, the postulated model fits well to the empirical data, $\chi^2(11) = 16.60$, $p = .177$. Low values of chi-squares that produce high probability values are indicative of a good fitting model. It should be noted, however, that the chi-square index of fit depends on the sample size. The smaller the sample, the less powerful the statistic Nevertheless, the model explains substantial percentages of variance in performance measures: effectiveness (31%), efficiency (43%), and perceived effectiveness (46%). Figure 1 shows the path coefficients (standardized regression coefficients β) that result from the LISREL analysis. For reasons of economy, only latent variables are displayed However, the three manifest burnout di-

mensions are closely related to the underlying construct as is shown by their significant standardized regression coefficients. emotional exhaustion (β = .75), depersonalization (β = .88), and reduced personal accomplishment (β = 89).

The path coefficients between the latent variables show that, as expected, the use of technology is positively related to the nurses' level of burnout. However, contrary to expectations, the path coefficients in Figure 1 show that technology use is negatively related to two of the three performance indicators (i.e., efficiency and perceived effectiveness). Accordingly, the higher the technological demands, (a) the higher the mean level of nurse burnout, which is particularly because of depersonalization (see Table 2); (b) the less efficient the ICU operates (the longer the patients stay); and (c) the poorer the effectiveness of the ICU is evaluated by the nurses. Unfortunately, the negative relationship with the objectively assessed effectiveness criterion (SMR) does not reach significance. It should be noted that the objective performance criteria are adjusted for several patient characteristics such as severity of illness and medical diagnosis. Accordingly, the finding that the length of stay is longer in ICUs where a high proportion of patients are mechanically ventilated cannot be explained by the fact that more seriously ill patients are treated in these units.

Burnout relates differently to each of the three performance indicators As expected, burnout is related negatively to subjective performance. Unfortunately, the path coefficient just failed to reach significance. Nurse burnout is unrelated to effectiveness; in ICUs where nurses are more burned out about as many patients die (according to the SMR) than in ICUs where nurses are less burned out. Quite surprising, and somewhat counterintuitive, burnout is positively related to the units' efficiency; in ICUs where nurses report higher levels of burnout, patients stay for a shorter period.

Instead of being weakly positively related, the relationships among the three performance indicators are more complex. This is caused by the nurses' perceived unit effectiveness; both objective measures (i.e., SMR and SLR) are, as expected, weakly but significantly positively related. Thus, in ICUs where fewer patients die than is expected on statistical grounds, patients stay for shorter periods. Again, it should be noted that both performance measures are standardized for patient characteristics. Somewhat surprising, the nurses' perceived unit effectiveness is unrelated to ICU efficiency and negatively related to objectively assessed ICU effectiveness.

In summary, burnout plays a mediating role in the job demands–performance relationship, but only as far as efficiency is concerned. However, this role is unexpected because nurse burnout that results from qualitative workload seems to have a positive rather than a negative impact on ICU efficiency.

Discussion

In this final section, five main conclusions are discussed that can be drawn from the current study on burnout, use of technology, and ICU performance

First, the use of technology—an objective measure of qualitative workload—is positively related to burnout. In ICUs where technology is more intensively used, nurses are more likely to experience burnout symptoms. As expected, this is particularly true for depersonalization (see Table 2). In units where many patients are mechanically ventilated, nurses tend to view their patients as impersonal objects. In contrast to Roelens (1983), we do not believe that nurses use depersonalization as an effective coping strategy to deal with the emotional demands of their jobs. Rather, we consider depersonalization as an obvious response to the highly technological environment where patients, particularly when they are mechanically ventilated, are easily regarded as merely extensions of the medical equipment. The major reason behind this interpretation is the fact that ICU nurses do not experience higher levels of emotional exhaustion than non-ICU nurses, although their depersonalization scores are significantly higher (see Table 1). However, some caution has to be taken because the composite sample of non-ICU nurses is not representative for other types of nursing.

Second, as expected, the use of technology has a direct negative impact on subjective and objective performance and most notably on perceived unit effectiveness and on efficiency (i.e., the patient's length of stay). Obviously, a high qualitative workload (i.e., an intensive use of sophisticated technology) puts high pressure on the nurse, so that as a result not only the perceived effectiveness but also the units' objectively assessed efficiency declines (i.e., the patient's length of stay increases). Following Cohen et al. (1986), it can be speculated that nurses under pressure make more mistakes and their communication and coordination with other team members is impaired, which might result in less efficient unit performance. Indeed, unfamiliarity with sophisticated equipment, lack of adequate training in handling advanced technology, and interpersonal difficulties among ICU team members are among the major stressors that have been identified by ICU nurses (Caldwell & Weiner, 1981).

Third, the nurses' level of burnout is not significantly related to the unit's objectively measured effectiveness In fact, this result agrees with Golembiewski and Munzenrider (1988), who conducted the only other study in which an objective performance criterion (i.e , unit effectiveness) was used in relation to burnout. Although the authors claimed throughout their book that burnout affects productivity, close inspection reveals that differences in performances between units with many and those with few burned-out employees are nonsignificant, with one exception· the headquarters' rating of the unit (Golembiewski & Munzenrider). It is unlikely that the nonsignificant relationship between burnout and effectiveness is due to measurement problems because the validity of the Dutch version of the MBI (Schaufeli & Van Dierendonck, 1993) and the SMR (Keijsers et al., 1994) has been convincingly demonstrated.

Fourth, contrary to expectations, burnout is positively related to ICU efficiency; the higher the burnout levels, the more efficient the ICU operates A tentative explanation is that nurses in the more efficient ICUs are in the process of burning out because of the high qualitative job demands they are facing. It is likely that social affiliation and comparison processes foster the

development of burnout symptoms in ICUs. Recently, Buunk and Schaufeli (1993) found that nurses under stress who perceive symptoms of burnout among their colleagues take on these symptoms, reasoning that these symptoms are apparently normal given their stressful job situation. This process of symptom contagion might explain the virulent nature of burnout that has also been observed in work units of a U.S. federal service agency (Golembiewski & Munzenrider, 1988). According to Golembiewski and Munzenrider, the burnout process usually starts when feelings of depersonalization develop. Beyond some undefinable point, depersonalization undercuts personal accomplishment and eventually leads to growing emotional exhaustion. This interpretation is supported by the finding that the ICU nurses who are included in the present study show significantly more feelings of depersonalization and reduced personal accomplishment compared to nurses from other fields, whereas no differences in emotional exhaustion were observed (see Table 1). However, despite the fact that ICU nurses might have entered an early phase of burnout, their negative mental state does not impede the medical performance of the ICU. Although their levels of burnout lead the nurses to evaluate the effectiveness of their units negatively (albeit not significantly), their objective performance in terms of effectiveness and efficiency is not impaired. Quite to the contrary, they perform well, particularly in term of efficiency. One can speculate that the units' performance improves as a result of the same process of social affiliation that is responsible for the spreading of burnout symptoms. It is plausible that social affiliation facilitates coordination and communication between ICU staff, hence improving the units' performance. For instance, Knaus, Draper, Wagner, and Zimmerman (1986) found that objectively assessed ICU performance was positively related to the interaction and coordination between nurses and physicians. Accordingly, the unexpected finding that burnout is positively related to ICU efficiency might be explained by referring to social affiliation processes within ICUs that simultaneously produce higher burnout levels and higher efficiency rates.

Fifth, subjective and objective measures of performance seem to tap different aspects of reality. Both objective performance measures (i.e., effectiveness and efficiency) share a relatively small but significant percentage of their variances (23%). This is likely to be caused by a third variable. For instance, it could be speculated that a favorable organizational climate, including adequate nurse–physician coordination, fosters the unit's effectiveness as well as its efficiency. The unexpected negative relationship between objective and subjective effectiveness might look somewhat puzzling at first glance. In units that are less effective according to our objective criterion (SMR), nurses believe that their unit is more effective, and vice versa. However, keep in mind that the objective performance criterion is unobservable by the nurses by its very nature. Instead of a distal and calculated SMR, nurses observe actual mortality. It is remarkable that the unstandardized morality rate (i.e., the number of patients who have actually died) is significantly and positively correlated with the nurses' perceived unit effectiveness ($r = .47$, $p < .05$). Thus, the more patients who actually die in an ICU, the less effective this unit is evaluated by the nurses. This clearly makes sense from a psychological point of view.

Obviously, by standardizing actual mortality rates and transforming them into an abstract output ratio, the measure is disposed of its psychological quality.

So, taken together, a high qualitative workload has a direct negative effect on ICU efficiency as well as an indirect positive effect. However, this positive effect has its price—nurse burnout. This conclusion is tentatively supported by the observation that the total costs that are spent per ICU bed are positively correlated with objective ICU performance (SMR: $r = .78$; SLR: $r = .38$) and with burnout ($.46 < r < .62$).[2] Accordingly, allocating more financial resources to ICUs might increase medical performance as well as burnout.

Although our study is unique by including standardized objective performance indicators, it also has two weak points. First, only a limited number of ICUs are included, so the power of the statistical tests is weak. Second, the present study is cross sectional, so that no causal relationships between the variables can be studied. For instance, an alternative explanation can be given for the unexpected positive relationship between burnout and efficiency by reversing the causal order. It can be speculated that in the presence of a challenge, ICU nurses rise to the occasion and work more efficiently, but in the process of doing so they are likely to experience burnout.

Nevertheless, our study has demonstrated the fruitfulness of including simultaneously objective indicators of job demands and organizational performance and subjective experiences (i.e., burnout). In doing so, we hope that this investigation has contributed to the illumination of a blind spot in burnout research.

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