Psychological support and outcomes for ICU patients

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ABSTRACT

Aims and objectives: To critically review evidence on the effects of psychological support during intensive care unit (ICU) treatment on adult ICU patients' psychological and physiological outcomes. Evidence from intervention studies on imagery and relaxation has been included, as well.

Background: Stress and negative emotions may have both immediate, as well as long-term effects on ICU patients' psychological and physical well-being, and they are linked to delayed physical recovery.

Design, methods: A narrative critical review methodology was employed. Databases searched included Medline, CINAHL, PubMed, PsychInfo and the Cochrane Library. Experimental, quasi-experimental or pretest-posttest peer-reviewed intervention studies published since 1970 were included.

Results: Fourteen studies: seven on nurse led relaxation, three on guided imagery, one on nurse-patient interaction, two on physician-patient interaction and one correlational study on perceived social support were included. The results suggest significant improvements in patients' outcomes: improved vital signs, decrease in pain ratings, anxiety, rate of complications and length of stay, and improved sleep and patient satisfaction. Eight studies employed randomized experimental, four quasi-experimental and two descriptive correlational designs. Two studies explored effects on patients' sleep, and two on procedure-related pain.

Conclusions: The literature is limited in exploring the effects of nurse-patient interactions. The amount and quality of psychosocial support in the ICU, as well as imagery and relaxation techniques, are linked to short-term and long-term patients' outcomes.

Relevance to clinical practice: ICU nurses need to engage in psychological support in a systematic way, and to acknowledge the high priority of support interventions.

Key words: Imagery • Intensive care nursing • Nurse-patient interaction • Psychosocial support • Relaxation • Stress

INTRODUCTION

Patients in intensive care experience multiple, acute, and often overwhelming and recurring stressors. Their response and ability to cope depends upon a variety of cognitive and neurophysiological functions (Rolls, 1999; Schulkin, 1999), as well as, on the degree of emotional and social support they receive (Grendell, 1998). Stress and negative emotions may have both immediate, as well as long-term effects on patients' psychological and physical well-being (Deja *et al*. 2006), and have been linked to delayed physical recovery (Sukantarat *et al*., 2007). The provision of psychological/emotional support is one of the traditional nurses' roles (Marriner, 1986). Within the context of holistic nursing, psychological support is viewed as a prerequisite for healing (Bartol and Courts, 2000; Papathanassoglou, 2006), whereas, not meeting the psychological needs of patients has been suggested to prolong intensive care unit (ICU) stay and to be a factor in delirium-related psychotic symptoms (Price, 2004). Despite a recognized need for emotional support (Wilkin and Slevin, 2004), the constituents, strategies and effectiveness of such support in intensive care are poorly defined.

The aim of this paper is to critically review evidence on the effects of psychological support on adult intensive care patients' psychological and physiological outcomes. The focus is on support delivered during the ICU stay and on the related intensive care outcomes. Evidence from intervention studies on imagery and relaxation has been included, also, based on the assumption that such approaches encompass supportive nurse-patient interactions, which may raise hope and positive emotions, similar to the presumed effects of psychological support. This assumption is corroborated by qualitative (Heinschel, 2002) and biological data (Jacobs, 2001).

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REVIEW OF BACKGROUND LITERATURE

Psychobiology of stress and relaxation responses in intensive care

Stress is a potent pathogenetic factor because of the hormonal, inflammatory and neuroendocrine responses it elicits; which may accentuate physiologic derangements. Stress stimuli are non-specific, that is, psychological stressors display similar neurohormonal and secretagogue patterns, as well as psycho-physiologic effects, as those described for physiological stressors (Scantamburlo *et al*., 2001). A large body of evidence on the impact of emotion, stress and coping style on physiology exists implying that stress and its molecules (neuropeptides, neurotransmitters and cytokines), through their peripheral receptors (Zukowska *et al*., 2003), may contribute to derangements prevalent in critical illness, including systemic inflammation (Elenkov *et al*., 2000), cellular stress and oxidative damage (Tanabe *et al*., 2001; Sivonová *et al*., 2004; Sobocanec *et al.,* 2005), endothelial dysfunction and coagulopathies (von Känel *et al*., 2001; Nemccsik *et al.,* 2004), which precipitate high mortality and morbidity. In addition, other evidence suggests that positive affective states, such as hope and relaxation may reverse these adverse consequences (DeWitt *et al*., 2000; Gitto *et al*., 2001; Meng *et al*., 2002). The intensity and prevalence of stressors and coping may be modulated by specific patient-centered nursing interventions.

The relaxation response is regarded as the opposite of the stress response. It is an integrated psycho-physiological reaction, primary elicited by the hypothalamus and limbic system sites (Jacobs, 2001). It leads to reduction and/or inhibition of sympathetic activity leading to decrease in oxygen consumption, blood pressure, heart rate and respiration, as well as anxiety, tension and stress (Mandle *et al*., 1996; Friesner *et al*., 2006).

Psychosocial alterations in the critically ill

Aside from pain and noxious stimuli in ICU, research points to fear, isolation, loss of control and negative expectations as major mediators of the high levels of stress (Table 1). Fear, anxiety, agony, self-concept alterations including body image, self-esteem and role performance disturbance, loneliness, depersonalization, along with perceived powerlessness, hopelessness, bewilderment and acute confusion, to terror attacks and panic are among the better documented psychosocial alterations in the critically ill (Grendell, 1998; Lusk and Lush 2005). A need to feel safe was identified as their primal need by ICU patients (Hupcey, 2000), whereas, the significance of emotional support by staff and family members has been emphasized (Geary *et al*., 1994, 1997).

Psychological/emotional support in nursing

The constituents of the supportive nurse-patient relationship, probably because of their interpersonal and subtle nature, are somewhat elusive. Research has identified specific supportive interventions: offering of explanations, giving advice, reassuring and raising faith and hopes, cheering-up, strengthening patients' self-esteem, giving emotional warmth, offering empathetic listening, (Motyka *et al*., 1997), and presence (Snyder *et al.,* 2000; Tanner *et al*., 1993). In intensive care, nurse-patient interactions, empathy and information delivery have been identified to be of prime importance (Wilkin and Slevin, 2004), along with emotional care (Hedlund *et al*., 2008). In two surveys of ICU nurses, anxiety management was deemed very important, and the most frequently used interventions were administration of antianxiety drugs, giving reassurance and information, speaking calmly, empathetic touch and spending extra time with patients (Frazier *et al*., 2003; Moser *et al*., 2003).

METHODS

A narrative critical review methodology was employed, based on peer-reviewed studies published since 1970 involving adult intensive care patients while still hospitalized in the ICU, regardless of their primary diagnoses. Databases searched included Medline, CINAHL, PubMed, PsychInfo and the Cochrane Library. No language limitations were set, although all articles located were in English. Because of the scarcity of relevant studies the quality criteria employed were not strict. The review focused on articles containing evaluation of psychosocial interventions, either through an experimental or quasi-experimental control group design, or pretest-posttest comparisons. No sample size or outcome measures limitations were set. Studies were retrieved through online database searches, by using the following key words/and or truncated wildcard searches: 'emotion*', 'psycho*', 'critical*', 'relaxation', 'imagery', 'prayer', 'meditation', 'intensive', 'ventila*' 'coma*', 'ARDS', 'respiratory distress', 'wean*'. References of identified studies were also checked for relevancy. Studies on interventions for support of family alone, along with case studies and studies about music, massage, or other complementary therapy alone, without interaction with staff or family, and without use of psychological relaxation techniques were excluded, because of their complex nature incorporating both somatic and psychological parameters.

Definitions

Psychological/emotional support was defined as the motivation of a sense of control, positive emotions and

Table 1 Selected research studies on psychosocial alterations of adult critically ill individuals based on a literature search in MEDLINE and CINAHL

Authors/year	Study design	Population	Main psychological symptoms reported
Cuthbertson *et al.*, 2004	Prospective cohort study 3 months after ICU	Critical illness survivors	Post-traumatic stress disorder (PTSD)
Nelson *et al.*, 2004	Prospective, follow-up (3–6 months after discharge) descriptive study	Chronically critically ill individuals	Severe sadness, anxiety, pain
Jones *et al.*, 2003	Qualitative case study	Critical illness survivors	Negative death anxiety, frightening dreams
Jones *et al.*, 2003	Randomized controlled trial	Critical illness survivors	Depression, PTSD, anxiety, delusional memories
Novaes *et al.*, 1997	Cross-sectional survey	Randomly selected ICU patients	Loss of control, helplessness, high levels of stress related to therapeutic interventions/instruments, social isolation
Cochran and Ganong, 1989	Cross-sectional correlational study	ICU patients 1–2 days after transfer from ICU	High levels of stress related to therapeutic interventions/instruments
Soehren, 1995	Descriptive survey	Cardiac surgery patients after transfer from ICU	Loss of control, social isolation, high levels of stress related to therapeutic interventions/instruments
Swaiss and Badran, 2004	Descriptive survey based on interviews	ICU patients 1 and 5 days after discharge	Anxiety, fear, social isolation, dreams and hallucinations
Nickel *et al.*, 2004	Cross-sectional correlational study	Critical illness survivors	PTSD
Rattray *et al.*, 2004	Cross-sectional survey aiming to instrument development	Critical illness survivors	Short- and long-term depression, stress
Schelling *et al.*, 2003	Prospective cohort study	Cardiac surgery survivors	Chronic stress, PTSD, pain, anxiety, nightmares, traumatic memories
Rotondi *et al.*, 2002	Prospective cohort study	Critical illness survivors	Fear, anxiety, loss of control, loneliness, nightmares, spells of terror, feeling nervous
Hunt, 1999	Qualitative study with thematic analysis	Critical illness survivors	Fear, anxiety, apprehension, confusion, hallucinations
Tanimoto *et al.*, 1999	Prospective, descriptive study	Healthy volunteers hospitalized in ICU	Depression, fatigue, confusion

attenuation of anxiety by means of the whole spectrum of the interventions and interactions embedded in the interpersonal caring relationship between the nurse and the patient.

Relaxation and imagery are regarded as mind-body interventions and they are based on the tenet that alterations in the psychological and mental aspects of consciousness modulate physiological responses. *Relaxation* is defined as absence of physical, mental and emotional tension (Benson *et al*., 1977). Relaxation responses may be elicited by progressive muscle relaxation, breathing exercises, repetitive prayer and meditation practice and imagery (Dusek *et al*., 2008). *Imagery* is defined as a way of purposefully diverting and focusing one's thoughts (Tusek and Cwynar, 2000). It may be viewed of as a deliberate daydream of positive sensory images encompassing sights, sounds, smells or tastes (Halpin *et al*., 2002), and it is usually preceded by relaxation. Individuals may practice under guidance of a person who suggests the specific contents of the imagery, and prompts them to connect to the images with all their senses. Images may be specific to the situation, that is, include parts of the body involved in disease, or unspecific, such as beautiful scenery.

RESULTS

Fourteen studies on psychosocial support interventions were included. No comprehensive reviews or meta-analyses were retrieved. Most studies exploring support during the ICU stay focused on relaxation and guided imagery techniques, and they involved coronary or cardiac surgery patients. The results suggest favourable effects on physiological outcomes (Table 2). In the majority of studies, qualitative results revealed that patients viewed such interventions as helpful to extremely helpful.

Seven studies on nurse led relaxation techniques, three studies on guided imagery, one study on nurse-patient interaction, two studies on physician-patient interaction, and one correlational study on social support as recalled by the patients were located. In most studies, the relaxation/imagery technique was administered under guidance or presence of a nurse, while the control group did not receive the same amount of nursing attention. Therefore, the

Table 2 Summary of psychosocial intervention studies in intensive care

Authors/year	Type of study	Main intervention	Patients	Main physiological outcomes
Relaxation techniques				
1. Guzzetta, 1989	Randomized controlled trial	Guided relaxation and music therapy	Eighty coronary care patients randomized into two intervention (relaxation, music) and one control group	Lowered heart rate, lowered temperature and decreased cardiac complications in both relaxation and music therapy groups. Increased patient satisfaction with intervention.
2. Miller and Perry, 1990	Pretest and post-test quasi-experimental study	Deep-breathing relaxation technique	Convenience sample of 29 cardiac surgery patients	Lowered blood pressure, heart rate, respiratory rate and pain
3. Hattan *et al.*, 2002	Pretest and post-test experimental study	Guided relaxation or foot massage	Twenty-five cardiac surgery patients randomized to either one of two intervention groups or to a control group	No significant differences between physiological parameters. A trend for higher levels of calm in the relaxation group.
4. Richards, 1998	Experimental design	Six-minute back massage or a teaching session on relaxation and relaxation audiotape	Sixty-nine older ICU patients with a cardiovascular illness	Significant improvement of sleep quality measured by polysomnography between the back massage and control group
5. Richardson, 2003	Experimental design	Relaxation and imagery	Thirty-eight critically ill randomized into two groups to determine the effects of relaxation and imagery on sleep	Improved subjective quality of sleep
6. Friesner *et al.,* 2006	Pretest and post-test quasi-experimental study	Slow deep-breathing relaxation as an adjunct to opioid analgesics	Forty CABG patients during chest tube removal	Decreased pain ratings immediately after and 15 min postchest tube removal
7. Houston and Jesurum, 1999	Quasi-experimental study	Quick relaxation as an adjunct to opioid analgesics	Twenty-four CABG patients during chest tube removal	No significant decrease in pain ratings immediately after and 30-min postchest tube removal. Trend for decreased pain in older male patients, and for increased pain in older female patients.
Imagery techniques				
8. Tusek *et al.,* 1999	Randomized controlled trial	Guided imagery	Sixty-five cardiac surgery patients randomized into one intervention and one control group	Decreased pain and length of stay
9. Deisch *et al.,* 2000	Quasi-experimental prospective study	Guided imagery	Convenience sample of 100 cardiac surgery patients	Reduced pain, fatigue, narcotic use and decreased length of stay
10. Halpin *et al.,* 2002	Retrospective review of patient data	Guided imagery with music	One hundred and thirty-four non-randomized critically ill patients having participated in guided imagery compared with 655 normal care patients.	Decreased length of stay Decrease in required pain medication not statistically significant
Interaction with health care professionals				
11. Hwang *et al., 1*998	Prospective randomized study	Tape-recorded message from physician which provided information and emotional support	Convenience sample of 60 postoperative cardiac surgery patients	Increased peripheral temperature, decreased pain, tension, anxiety and depression. Patient expressed a high need for this support program
12. Bergmann *et al.,* 2001	Prospective randomized study	Preoperative extensive information in combination with personal attention from the surgeon	Convenience sample of 60 patients undergoing cardiac surgery	No effects on the perioperative psychoendocrinologic course of stress (plasma and salivary cortisol and anxiety reports)

Table 2 (Continued)

Authors/year	Type of study	Main intervention	Patients	Main physiological outcomes
13. Henneman, 1989	Prospective randomized study	Touch and verbal interaction during ventilator weaning	Twenty-four mechanically ventilated patients randomized to one intervention and one control group	No differences in heart rate, arterial pressure and respiratory rate
Long-term effects of psychosocial support				
14. Deja *et al*., 2006	Prospective correlational study to explore the effect of recalled social support while in the ICU	None	Sixty-five ARDS survivors	Perceived social support was associated with a reduction in PTSD symptoms and improved health-related quality of life

ARDS, Adult respiratory distress syndrome; CABG, coronary artery by-pass graft; PTSD, post-traumatic stress disorder.

effect of nurses' supportive attendance cannot be differentiated from the net effect of the technique explored. Nonetheless, this methodological limitation does not jeopardize the scope of this review, because the intended focus was on psychological support.

Two studies explored effects on patients' sleep, and two on procedure-related pain.

Eight out of the fourteen studies employed randomized experimental designs, four quasi-experimental designs and two studies were descriptive correlational. All intervention studies were single-centre and a convenience sampling method was employed. Therefore, the representativeness of samples cannot be assured and some selection bias cannot be excluded. Sample sizes of the intervention studies were quite small, ranging from 9 up to 50 in each group. It is noteworthy that the effect size of the intervention in all studies was medium to large, which raises hopes for the effectiveness of such interventions if incorporated in standard care.

Relaxation

In an early pretest-posttest experimental study with acute myocardial infarction patients while still hospitalized in the coronary ICU, Guzzetta (1989) was able to exhibit improved vital signs and lower rate of complications in patients randomized to a relaxation group, compared with a standard care group. Almost all patients rated the intervention as extremely helpful to helpful. The results in the relaxation group were similar to those of patients randomized to a music therapy group. Benson's (Bagheri-Nesami *et al*., 2006) relaxation method was employed, which involves conscious focused attention on a word. The relaxation sessions were short: 20 min twice a day, for a total of three sessions over a 2-day period. Physiological measurements included heart rate, peripheral temperature (as a measure of peripheral vasodilation) and incidence of cardiovascular complications. A notable finding was that, despite the short relaxation training, cumulative effects over time were seen, such that heart rates were lower after the third session than after the first two sessions. This may imply that the relaxation response persists over time, and/or that patients become more proficient in eliciting this response with practice. Moreover, it is noteworthy that the relaxation took place under guidance of a nurse. Nurses' presence with the patient is regarded as a supportive intervention in itself (Snyder *et al*., 2000). Further, the sound of nurse's voice may had had additional effects on patients' responses, because the human voice is one of the principle conveyers of social and affective communication (Johnstone *et al*., 2006). It would be interesting to compare the effect of relaxation with and without interaction, and/or presence of a nurse.

Miller and Perry (1990) tested the effects of a relaxation technique based on slow deep breathing on the postoperative pain of coronary artery by-pass graft (CABG) patients. They applied a quasi-experimental pretest-posttest design to compare 15 patients who received relaxation training on the evening before surgery and performed this technique after surgery to 14 standard care patients. Significant decreases were demonstrated in blood pressure, heart rate, respiratory rate and pain ratings. Patients found the technique to be helpful and simple. Nonetheless, the validity of these results is limited by the lack of random assignment. In a small pretest, post-test experimental study, Hattan *et al*. (2002) randomized 25 cardiac surgery patients to either foot massage or relaxation or to a control group. The relaxation instructions were delivered through listening to an audio tape. They did not observe any differences in physiological parameters, and only a trend for decreased anxiety in the relaxation group. Nonetheless, the power to detect significant differences was very limited.

Two studies explored the impact of support on sleep quality. Richardson (2003) conducted an experimental study to explore the effects of autogenic relaxation

combined with imagery, delivered on two evenings, on the subjective quality of sleep. The improvement on patients' sleep appeared to be cumulative overtime. Remarkably, men responded immediately to the intervention with improved sleep, while women showed a delayed improvement after an initial perceived deterioration. These findings suggest that gender, as well as time, must be taken into account in the design and analysis of such studies.

Richards (1998) also explored support interventions for the improvement of sleep in intensive care patients. Sixty-nine subjects were randomly assigned to a 6-min back massage, a teaching session on relaxation and a 7·5-min relaxation audiotape at bedtime, or the usual nursing care. Polysomnography, which measures sleep stages by recording brain waves, electrical activity of muscles, eye movement, vital signs and blood oxygen saturation, was used to measure one night of sleep. Relaxation alone did not appear to exert any significant effect on the quality of sleep. The credibility of these findings is enhanced by the use of objective polysomnographic measures, however, an association with objective ratings of sleep quality is missing. A limitation was that both intervention and measurement were limited to one night only, given that effects on sleep may need longer to develop (Richardson, 2003).

In two quasi-experimental studies the effect of relaxation on pain as an adjunct to opioid therapy during chest tube removal in CABG patients was tested. Friesner *et al*. (2006) explored the effect of a slow deep-breathing relaxation in 40 CABG patients non-randomly assigned to an experimental and a control group. Remarkably, with the adjunctive use of relaxation, pain ratings in the experimental group were approximately 2 cm lower at a 10-cm visual analogue scale compared with the control group, both immediately after and 15-min postchest tube removal. Nonetheless, in an earlier study, Houston and Jesurum (1999), despite a trend for lower pain ratings in older male patients, did not report any significant effect of a quick relaxation technique on pain during chest tube removal in CABG patients. It is likely that the discrepancy in these findings may be attributed to either the difference in the relaxation technique, and/or the increased amount of nurse attendance in the study by Friesner *et al*. (2006). The effect of patients' gender is in accordance with the findings by Richardson (2003).

Guided imagery

Three studies – two intervention studies, one retrospective descriptive study – exploring the effects of guided imagery in ICU patients were located. Tusek *et al*. (1999) were able to exhibit decreased pain ratings and length of stay in cardiac patients randomized to a guided imagery intervention administered via an audio tape. Deisch *et al*. (2000) replicated Tusek's study employing a prospective repeated measures quasi-experimental design with 100 patients undergoing CABG. Data were collected preoperatively and 7 days postoperatively. Patients listened to the guided imagery tapes twice a day throughout the study. Findings demonstrated reduced pain, anxiety, fatigue, narcotic usage and length of stay and increased patient satisfaction in the experimental group.

Halpin *et al*. (2002) conducted a retrospective patients' data review, 1 year after the implementation of guided imagery by their hospital's cardiac surgery team. One hundred and thirty-four patients electing to participate in guided imagery were compared with 655 patients declining participation. Patients in the guided imagery group had a shorter length of stay, a decrease in average direct pharmacy costs and pain medication costs, while maintaining high overall patient satisfaction. The intervention was perceived as emotionally supportive by the participants. Despite methodological limitations of such retrospective studies and a selection bias threat, these results support the widespread implementation of guided imagery as a standard of care.

Physician-patient interaction

In an experimental study involving cardiac surgery patients (Hwang *et al*., 1998) effects similar to those of Guzzetta (1989) in terms of peripheral vasodilation – but not of heart rate – plus a decrease in pain, tension, anxiety and depression were attained merely through listening to a physician's tape-recorded message, which provided information and emotional support. Moreover, patients viewed this intervention as very helpful. It would be helpful to explore to what extend such results may be attributed to the supportive suggestions alone, unconfounded by the effect of information. Bergman *et al*. (2001), in a study with cardiac surgery patients, did not observe any effect of preoperative oral information combined with more personal attention by the surgeon on patients' stress indices. These results may imply that in order for support to be effective, it has to be sustained during the course of ICU stay.

Nurse-patient interaction

Despite the belief in the therapeutic potential of nurse-patient interactions, only one intervention study exploring such effects was located. Henneman (1989)

undertook a prospective randomized design to determine the effect of direct nursing contact on the stress of patients being weaned from mechanical ventilation. Twenty-six patients being weaned via T-piece for the first time were randomly assigned to either an experimental or a control group. Patients in the experimental group received touch and verbal interaction during weaning, whereas the control group did not. No significant differences were observed in heart rate, respiratory rate and mean arterial pressure. Qualitative data were not reported. Although the effect of nurse-patient interaction was not supported by these results, outcome measures may have not been appropriate to test the effect of the intervention and the power was limited because of the small sample size.

Long-term effects of psychosocial support

Deja *et al*. (2006) conducted a prospective correlational study to evaluate the influence of perceived social support during ICU treatment on post-traumatic stress disorder (PTSD) symptoms and health-related quality of life in adult respiratory distress syndrome (ARDS) survivors. The study involved 65 participants, 5 years, on the average, after discharge. The risk for PTSD was significantly associated with anxiety, psychological morbidity and reduced health-related quality of life. Increased perceived social support was associated with a reduction in PTSD symptoms. The authors concluded that social support from family members might improve coping in critically ill individuals. The amount and type of support from caregivers, or the delivery of psychosocial counselling while in the ICU were not made explicit.

DISCUSSION

Despite the popular tenet regarding the importance of supportive nurse-patient interactions for the enhancement of patients' well-being (Redfern and Norman, 1999; Zhang *et al.,* 2001), studies exploring psychological support interventions for ICU patients are very scarce. To decipher the effects of psychological support, the scope of this integrative review was expanded to include intervention studies on relaxation and imagery based on the assumption that such interventions may both encompass psychological support, as well as they may mimic its effects through triggering a relaxation response. Emotional support has been linked to positive health outcomes (Reblin and Uchino, 2008). Nonetheless, the psychophysiology of receiving emotional support – in terms of the neural circuitry and/or neuropetides/neurotransmiters activated – has not been explored. Therefore, one may only presume that either one, or both psycho-cognitive events take place when one receives emotional support: (a) a relaxation response through reassurance and provision of information, and (b) a rise of hope and positive emotions through perceiving positive emotional cues by the person engaging in empathetic communication (Preston *et al.,* 2007). Such responses are expected to trigger specific hypothalamic and limbic regions of the brain and to modulate physiologic as well as psychological processes of the individual (Sinha *et al.,* 2004; Carter and Pelphrey, 2008).

Only three intervention studies exploring the effect of patient-caregiver interactions were located, of which in only one a positive effect on patients' physiological and psychological measures was elicited through listening to a tape-recorded message. Although it is disheartening that the only study on nurse-patient interactions did not yield any significant results, an estimation of the effect size revealed that significance would be reached with a larger sample, of approximately 40 patients per group. Besides, a German prospective study by Deja *et al*. (2006) provided some convincing evidence on the effect of psychosocial support while in the ICU on the long-term health related and psychiatric morbidity outcomes of ICU ARDS patients. These conclusions are in accordance with reports that exposure to high stress in the ICU may have negative effects of health-related quality of life (Schelling *et al*., 2003), and that the subjective interpretation of the ICU experience predicts both short-term and long-term adverse emotional outcomes (Rattray *et al.,* 2005). Taken together such results may provide preliminary evidence for psychosocial intervention studies.

A limitation of the intervention studies reviewed is that in all, but one, coronary or cardiac surgery patients were studied, which may limit the applicability of the conclusions to general ICU patients' populations, because the association of heart disease and function with stress and the activation of the sympathetic neural system is one of the better documented (Santos and Spadari-Bratfisch 2006; Thrall *et al*., 2007). Therefore, the question remains: *does psychosocial support affect patients' outcomes in intensive care?*

The evidence provided by the relaxation and guided imagery studies is quite compelling. Overall, in all intervention studies involving approximately 15 or more patients per group, significant improvements in physiological and psychological measurements were exhibited, such as improvements in vital signs, decrease in pain ratings, in rate of complications and length of stay, and improved sleep and patient satisfaction. Based on such evidence on may presume that the effect of relaxation and imagery, at least

on the anxiety and pain of cardiac patients, is quite powerful, and it warrants further investigation and possibly widespread application in coronary/cardiac units. In fact, in a recent survey (Tracy *et al*., 2005) more than 55% of intensive care nurses in the United States reported that patients and their families most commonly requested relaxation techniques, as well as prayer, massage or counselling from their nurse. Such mind-body techniques have been practiced by advanced practice nurses (Heath, 1992), and have been applied by specialized centres in intensive care patients for at least a decade (Whitworth *et al*., 1998). Nonetheless, the literature is limited in systematically evaluating their effectiveness, as well as patients' and nurses' experience. In a qualitative study on the guided imagery experience, the central role of the nurse guiding the imagery, and the importance of the relationship of trust and support are emphasized (Heinschel, 2002).

Another worth-noticing finding, although reported by two groups only, is the discrepant results in male and female subjects. Apparently, women's responses were delayed or different than those of male patients. Recent evidence illustrating differences in the neural circuitry activated, and heightened sensitivity for the identification of negative emotions in females (Li *et al*., 2008) provides some insight for such differential responses, and may suggest that women may need more focused and personalized interventions, compared with male patients.

Recent studies shed some light onto the neural circuitry of relaxation and imagery, and provide preliminary evidence on the potential mechanisms involved in the modulation of psychological and physiological responses by such techniques. Topographic electroencephalographic (EEG) mapping during relaxation through standard audiotape material revealed modulation of EEG activity, and a hypoactive central nervous system state similar to stage 1 sleep (Jacobs and Friedman, 2004; Jacobs *et al*., 1996). Moreover, imagery appears to activate the hippocampus, also involved in emotionality, and higher order association regions (Lou *et al*., 2005). In a recent critical review, an association between guided imagery/relaxation and the functioning of the immune system was documented (Trakhtenberg, 2008), whereas, relaxation has been reported to elicit specific gene-expression changes (Dusek *et al*., 2008).

CONCLUSION AND IMPLICATIONS

This integrative review on the impact of psychosocial support during ICU treatment summarized evidence emphasizing the effectiveness of relaxation and imagery interventions, especially for cardiac ICU patients' outcomes. Although effect sizes of relaxation and imagery interventions are quite large, suggesting potentially favourable results if incorporated in care protocols, the literature is limited in exploring the effects of nurse-patient interactions, whereas, studies involving patients other than cardiac patients are very scarce. Nonetheless, based on the studies reviewed it is concluded that the levels of patients' relaxation and the amount and quality of psychosocial support while in the ICU are linked to short-term and long-term patients' outcomes. Future research needs to address the effect of planned emotional support by nurses on patients' outcomes, both through randomized clinical trial and interpretive designs. Outcome measures have to be expanded to include other relevant biological markers, such as stress hormones, salivary amylase, neuroendocrine markers (Mellott *et al*., 2008) and possibly cellular stress markers and immunological measures. Patient populations, other than cardiac patients have to be explored, and the issues of gender, diagnoses, as well as the effect of time on outcomes have to be taken into account. Based on evidence from psychoneuroimmunology (Kang, 2003), the possibility of conditioned modulation of physiological responses upon encountering recurrent aversive or positive stimuli in the ICU has to be explored.

Deciphering the effects of social support on patients with diminished level of consciousness pauses some methodological challenges, nonetheless, inclusion of such patients in standard randomized designs is very plausible, and physiological outcome measures may be collected. Evidence shows processing of both aversive and positive emotions in the unconscious state (Etkin *et al*., 2004) elicited by either visual or auditory stimuli (Bekinschtein *et al*., 2004).

Based on these results, ICU nurses need to engage in patients' psychological support in a systematic way, and they need to acknowledge the high priority of support interventions. Such support will need to be systematically prescribed and planned for, and it has to be documented, along with patients' responses, on patients' charts. This will allow nurses to allocate appropriate priority to supportive interventions, it will ensure continuity and consistency of support, and will contribute to the professional development and empowerment of nurses.

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WHAT IS KNOWN ABOUT THIS TOPIC

- Stress is a potent pathogenetic factor in intensive care because of the hormonal, inflammatory and neuroendocrine responses it elicits.
- The provision of psychological/emotional support is one of the traditional nurses' roles, and it is viewed as a prerequisite for healing.
- Not meeting the psychological needs of patients has been suggested to prolong intensive care unit stay and to be a factor in delirium-related psychotic symptoms.

WHAT THIS PAPER ADDS

- This integrative review on the impact of psychosocial support during ICU treatment summarizes evidence emphasizing the effectiveness of relaxation and imagery interventions, especially for cardiac ICU patients' outcomes.
- The literature is limited in exploring the effects of nurse-patient interactions, whereas, studies involving patients other than cardiac patients are very scarce.
- Future research needs to address the effect of planned emotional support by nurses on patients' outcomes, both through randomized clinical trial and interpretive designs. Outcome measures have to be expanded to include other relevant biological markers.

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