

THE INTERRELATIONSHIP BETWEEN PHYSIOLOGICAL STRESS RESPONSES, MENTAL HEALTH OUTCOMES, AND NURSE-LED INTERVENTIONS IN HOSPITALIZED PATIENTS: A REVIEW

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ABSTRACT

Hospitalization exposes patients to multiple physiological and psychological stressors that may influence recovery, treatment engagement, and post-discharge outcomes. This review examines the interrelationship between physiological stress responses, mental health outcomes, and nurse-led interventions in hospitalized patients. Hospital-related stress may arise from acute illness, invasive procedures, pain, sleep disruption, environmental noise, isolation, uncertainty, loss of autonomy, and separation from social support. These stressors activate neuroendocrine, autonomic, inflammatory, metabolic, and behavioral pathways, including hypothalamic-pituitary-adrenal axis activity, sympathetic nervous system activation, altered cortisol regulation, immune dysregulation, and sleep disturbance. These physiological processes are closely linked with anxiety, depression, fear, post-traumatic stress symptoms, impaired coping, delirium risk, and reduced quality of life. The relationship is bidirectional, as psychological distress may intensify pain perception, autonomic arousal, sleep fragmentation, inflammatory burden, and reduced participation in care, while physiological instability may increase emotional vulnerability. Nurse-led interventions provide a practical strategy for addressing this combined burden through continuous assessment, therapeutic communication, psychoeducation, sleep promotion, pain support, relaxation techniques, mindfulness-based strategies, music therapy, early mobilization, family involvement, and multidisciplinary coordination. Integrating physiological and mental health assessment into routine nursing practice may improve patient-centered inpatient care, reduce stress-related morbidity, and support recovery across medical, surgical, critical care, pediatric, oncological, and chronic disease populations.

KEYWORDS: physiological stress, mental health outcomes, nurse-led interventions, hospitalized patients, psychological distress

INTRODUCTION

Hospitalization is well-recognized as an integral part of diagnosis, treatment, monitoring, and recovery, but the inpatient setting could add a unique burden to the patient. In addition to the impact of the current illness, hospitalised patients are also subjected to unfamiliar environments, decreased independence, disruption of their daily lives, disturbed sleep, multiple health evaluations, invasive procedures, distressing pain, uncertainty, and the loss of their normal social support. These exposures may create a nosocomial stress state, where the hospital setting itself becomes a new source of physiological and psychological stress and strain, apart from providing care delivery [1]. The significance of recognizing hospitalisation as a stressful event is highlighted because stress reactions could impact the recovery course, satisfaction, functionality, and post-hospitalisation adjustment.

The impact of hospitalisation is emotionally and psychologically very widespread and clinically significant. Inpatients of any age exhibit anxiety, fear, sadness, helplessness, loneliness, uncertainty, and a diminished sense of control. These responses do not have to be seen if the patient is diagnosed with a psychiatric disorder; they can be seen in patients who have been admitted for other reasons, such as medical, surgical, oncological, cardiovascular, or critical care. Hospitalization can also exacerbate pre-existing psychological vulnerability, particularly for individuals with low coping capacity, low health literacy, poor family support, past adverse health sector experiences, and/or high burden of chronic diseases. A review of the literature concerning the emotional and psychological impact on adult patients shows that hospital admission has a range of interacting pathways of impact, such as the severity of the illness, stressors in the environment, communication problems, and threats to identity and independence [2].

Hospitalization could have a significant impact on clinical outcomes through its physiological stress responses. The adverse patient outcomes observed with in-hospital stress indicate that the psychological and biological stressors should not be considered a low priority in inpatient care. Hospital-related stress can influence perception of pain, sleep, immune

system, blood pressure, blood sugar control, drug compliance, and healing from acute illness. The clinical importance of in-hospital stress and the need to measure and manipulate stress as a measurable and modifiable patient outcome factor are supported by evidence from systematic review and meta-analysis [3].

There is a clear linkage between periods of acute illness and psychological distress and recovery, especially following sudden and life-threatening events. For patients who have survived sudden cardiac arrest, for instance, they might find that they have significant psychological problems, such as anxiety, depressive symptoms, and post-traumatic stress symptoms. These symptoms can negatively impact rehabilitation, compliance with medication regimens, quality of life, and confidence in a return to a normal lifestyle. The pattern represents a general inpatient phenomenon: physiological crisis and psychological distress are often interwoven, and each may influence the other during the process of recovery [4].

The basis of this interaction is ultimately biological and based on stress response due to acute and critical illness. When we become severely ill, the neuroendocrine, autonomic, metabolic, and inflammatory systems are activated to maintain homeostasis during a threat. There are pathways of activation of the hypothalamo-pituitary-adrenal axis, sympathetic nervous system, cytokine networks, and metabolic stress pathways that are adaptive in the short-term. This activation can lead to immune dysfunction, hypercatabolism, cardiovascular instability, risk of delirium, impaired tissue repair, and prolonged recovery if activated for too long or if it is dysregulated [5]. These mechanisms give a physiological basis for the effects of emotional stress in hospitalisation that could go beyond its emotional effects.

The relationship between mental state and physical healing is also addressed in a new way by the field of psychoneuroimmunology. Psychological stress can affect the function of the immune system, inflammatory mediators, neuroendocrine function, and autonomic balance. Psychological factors can influence the biological response and recovery within critical care environments where there is high-level monitoring and invasive support, pain, disturbance of sleep, and fear of death. This view calls for a more comprehensive approach to mental health and physiological care in which psychological functioning is considered a continuum of physiological functioning, and vice versa [6].

ICU patients are a highly susceptible group of patients. Psychological support in critical care has been shown to correlate with various outcomes, including anxiety reduction, coping, communication, reorientation, and recovery after critical care. Patients who have been admitted to the ICU might not communicate well, experience a delirium or recall frightening experiences, and may have psychological effects in the long-term. Within this context, the nursing profession plays a key role, since being continuously near the patients, the nurses are the first health care workers to observe feelings of distress, disorientation, fears, pain, sleep disturbance, and inability to cope [7].

Other stressors, such as procedure-specific and condition-specific, should be considered. For example, when a stoma is created, patients may be concerned with the change in their body image, how they'll eliminate, how they'll have to manage themselves, how they'll feel about themselves socially, and what the future of their lives will be like. These examples demonstrate that psychological distress can last beyond the acute period of the disease and involves feelings of loss of identity, loss of function, loss of social participation, and adaptation to the illness in the long-term [8]. These stressors can exacerbate levels of physiological arousal and make it more difficult to recover from the stress without assistance.

Nurse-led interventions can be easily implemented and provide a clinically relevant way of reducing stress burden in hospitalized patients. The psychological nursing interventions can enhance depression, anxiety, and mental health resilience, which helps to strengthen the role of nurses in providing specialized emotional support, education, reassurance, coping strategies, and communicating with patients [9]. Nursing interventions can also include actions to improve a person's environment and social environment, which can cause distress for a person, such as isolation. Isolation precautions are a critical strategy to prevent infection, but may have detrimental outcomes, including loneliness, decreased contact, anxiety, depression, and care dissatisfaction. The results highlight the importance of nursing practices that focus on safety, emotional support, dignity, communication, and human connection, while at the same time caring for the patient's mental needs [10].

This review compares and contrasts the interrelationship among physiological stress response, mental health outcome, and nurse-led interventions in hospitalized patients. It draws together the latest research on stressors related to hospitalization, how the body reacts to stress, psychological effects of stress, patient susceptibility factors, assessment methods, and nursing interventions. The review will bring together the physiological and psychological approaches to health, which can be used to create a more holistic framework of inpatient care, where stress recognition and stress-reduction are central to recovery-oriented nursing care.

Objectives of the review:

1. To examine physiological stress responses among hospitalized patients.
2. To assess mental health outcomes associated with hospitalization-related stress.
3. To evaluate nurse-led interventions for reducing stress and improving recovery.

2. Conceptualizing Stress in Hospitalized Patients

Stress experienced by hospitalised patients should be viewed as a multi-dimensional response, with physiological activation, psychological distress, cognitive appraisal, behavioural adaptation, and environmental burden all considered. Hospitalization places patients in new and different clinical environments, in an environment where they have less autonomy, are subjected to new invasive procedures, experience pain, experience a disruption of sleep, and are faced with diagnostic uncertainty and the disruption of their usual social roles. These can be exacerbated in the severely ill patient who often suffers from confusion, delirium, may be frightened, has limited ability to communicate, is mechanically ventilated, and feels a loss of life. The feasibility study and cluster randomized trial of the POPPI intervention identified the clinical relevance of preventive psychological support for patients in the intensive care unit (ICU), because they recommended that it should focus on post-traumatic stress symptoms experienced in the context of admission to intensive care.

Stress that occurs at the hospital can go beyond just a passing emotional discomfort and cause clinically significant symptoms of post-traumatic stress disorder. Interventions by the nurse have been investigated as systematic measures to decrease post-traumatic stress symptoms in inpatients, and a stress reaction in a hospital setting can be identified, monitored, and modified if necessary, through nursing care [12]. It contributes to the view of stress as a psychological response as well as a clinical response that is needs sensitive.

This is particularly important for intensive care survivors who can suffer from psychological, cognitive, and physical problems related to the hospitalization process, known as post-intensive care syndrome. Nurse-led interventions that focus on these domains indicate that the responses to stress are not limited to the acute admission period and can have an impact on recovery, long-term functional independence, and quality of life [13]. Physiological vulnerability also plays a role in affecting stress responses: In patients with adrenal insufficiency or adrenal exhaustion, acute illness may trigger stress-related decompensation that needs prompt recognition and treatment, with profound effects [14]. Figure 1 shows the stress responses to hospitalization and the support from the nurse.

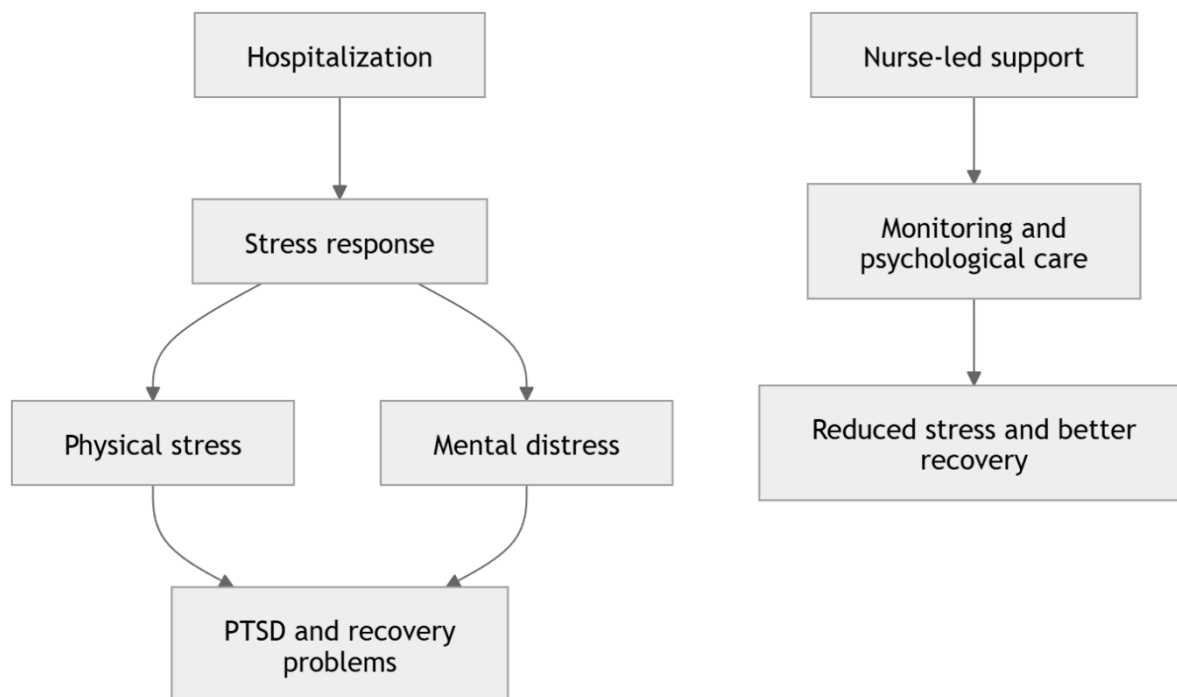


Figure 1. Conceptual model of hospitalization-related stress responses and nurse-led support in hospitalized patients

3. Physiological Pathways of the Stress Response

Neuroendocrine, autonomic, immune, and behavioral mechanisms are the major pathways involved in physiological stress responses in hospitalized patients. A central mechanism is activation of the hypothalamic-pituitary-adrenal axis that is responsible for the release of corticotropin-releasing hormone, adrenocorticotropic hormone, and cortisol in response to threat (perceived or actual). Additionally, dysregulated functioning of the hypothalamic-pituitary-adrenal axis can affect arousal, fear processing, sleep, intrusive memories, and post-traumatic stress symptoms, and thus, biological stress response to trauma is tied to mental health. Furthermore, changes in hypothalamic-pituitary-adrenal axis function can affect arousal, fear processing, sleep, intrusive memories, and post-traumatic stress symptoms, which can link biological stress response to trauma with mental health consequences [15].

Adrenal function and dynamics can be further disrupted by critical illness. Increased cortisol release is largely adaptive in response to acute physiological stress; however, during chronic illness, the adrenal system can become dysregulated, resulting in tissue-level glucocorticoid resistance, changes in the metabolism of cortisol, and loss of feedback control. These changes may impact cardiovascular stability, immunity, metabolic control, inflammation, and recovery of severely ill patients [16]. Clinically, some mechanisms are important because the patient in the hospital can be under disease-induced physiological stress as well as environment-induced psychological stress.

The hypothalamic-pituitary-adrenal axis is also involved in the activation of the sympathetic nervous system in critical illness. Hyperactivity of the catecholamines can lead to tachycardia, hypertension, hyperglycemia, elevated oxygen demands, changes in sleep, and increased vigilance. These responses could be exacerbated with pain, mechanical ventilation, alarms, sedations, invasive procedures, and the uncertainty of survival or recovery in intensive care settings [17].

Small nonpharmacological nursing care can be used to help reduce physiological arousal and psychological distress. The application of music therapy in nursing practice as an inhibition of pain and anxiety in intensive care has been described as a sensory modulation and relaxation-based approach that can affect stress physiology and enhance emotional comfort [18]. Table 1 conceptually and physiologically explains the stress reactions of hospitalized patients.

Table 1. Conceptualization and Physiological Basis of Stress in Hospitalized Patients

Review focus	Core concept	Hospital-related relevance	Clinical implication	Reference
Hospitalization-related stress	Hospitalization may act as an independent stressor beyond the primary illness.	Loss of autonomy, unfamiliar environment, pain, uncertainty, and routine disruption may increase distress.	Stress should be assessed as a modifiable inpatient care factor	[1]
Emotional effects of hospitalization	Adult inpatients may develop anxiety, sadness, helplessness, and reduced control.	Psychological distress may occur across medical, surgical, oncological, and critical care settings.	Emotional well-being should be integrated into routine inpatient assessment.	[2]
In-hospital stress and outcomes	Stress during admission may influence clinical recovery and patient outcomes.	Stress may affect sleep, pain perception, immune regulation, glycemic control, and adherence.	Stress measurement should be included in recovery-oriented care models	[3]
Critical illness stress response	Severe illness activates neuroendocrine, autonomic, inflammatory, and metabolic pathways.	Prolonged activation may contribute to immune dysfunction, delirium risk, and delayed recovery.	Physiological stress responses require early recognition and clinical management.	[5]

4. Mental Health Outcomes Associated With Hospitalization

Patients hospitalized with a mental health condition frequently experience anxiety, depressive symptoms, fear, uncertainty, disruption of sleep, lowered coping ability, and a perception of a lack of control. These can be due to sudden illness, pain, procedures, new surroundings, changed body image, reliance on medical personnel, and fear of prognosis or recovery. Psychological distress, in the form of anxiety and/or pain, can often be a clinically relevant symptom of the cancer experience and a factor that strengthens anxiety in cancer patients. Emotional stress and physical pain are related to inpatient care, as therapeutic massage has also been utilized as a nursing intervention in the management of anxiety and perception of cancer pain [19].

Anxiety is likely to be particularly strong before surgical and/or invasive procedures. Anesthetic patients may be afraid of being anaesthetised, experience pain after the operation, operation complications, diagnosis, disability, or death. Music interventions have been assessed as an intervention to alleviate preoperative anxiety, and it has been considered that a structure-based intervention, which incorporates sensory and relaxation aspects, can contribute to emotional stability before treatment [20]. These interventions are relevant because anxiety can be associated with an increase in sympathetic arousal, the enhancement of pain perception, and a decrease in cooperation with care.

Patients in hospital or those who are medically vulnerable can also suffer from symptoms of depression and autonomic imbalance due to stress. Inhalation therapy with aromas is linked to psychological effects such as stress, anxiety, and depression, as well as to measurable physiological regulation, in high-risk pregnant women, thus indicating possible psychological connotations with measurable physiological regulation [21]. This highlights the importance of measuring emotional symptoms in addition to biological measures of stress.

Another high-risk group in which psychological distress, immune health, and burden of treatment converge is patients with cancer. The psychological and immune support interventions employed in the nursing care can also be used to alleviate stress factors other than tumour biology, suggesting that a holistic approach toward care should be taken for mental health outcomes rather than focusing on them as secondary concerns [22]. Table 2: Mental health outcomes and groups of vulnerable patients in a hospital setting.

Table 2. Mental Health Outcomes and Vulnerable Patient Groups During Hospitalization

Patient group or condition	Mental health concern	Contributing factors	Nursing relevance	Reference
Sudden cardiac arrest survivors	Anxiety, depression, and post-traumatic stress symptoms	Life-threatening event, fear of recurrence, impaired confidence, and recovery uncertainty	Psychological screening may support rehabilitation and adherence	[4]
ICU patients	Fear, delirium, frightening memories, and post-ICU psychological sequelae	Mechanical ventilation, sedation, communication barriers, and perceived threat to life	Nurses are central in detecting distress and providing psychological support	[7]
Stoma surgery patients	Body image distress, uncertainty, and social anxiety	Altered elimination, self-care burden, embarrassment, and identity changes	Structured education and emotional support may improve adaptation	[8]
Isolated hospitalized patients	Loneliness, anxiety, depression, and reduced satisfaction	Reduced contact, restricted interaction, infection-control barriers, and perceived abandonment	Nursing strategies should balance infection prevention with human connection	[10]

5. The Bidirectional Link Between Physiological Stress and Mental Health

There is a close linkage between physiological stress and mental health in hospitalized patients, especially for those who have chronic inflammatory, autoimmune, and trauma-based diseases. The nurse-led care in inflammatory bowel disease has been linked with the improvement of disease management, patient education, symptom monitoring, adherence to treatment, and the support of self-management. These outcomes are clinically relevant as it has been suggested that disease activity, abdominal pain, fatigue, uncertainty, and re-hospitalization can exacerbate anxiety and depressive symptoms, and psychological distress can lead to more symptoms being perceived and less uptake of treatment [23].

This is reflected in systemic autoimmune rheumatic diseases (SARDs): Inflammation, pain, fatigue, functional limitation, and burden of long-term treatment can cause emotional distress. Nursing care in these diseases can involve patient education, symptom management, coordination of care, and psychosocial support, suggesting that this care can impact physical health burden as well as psychological adaptation [24]. This confirms the bi-directional nature of the relationship between physiological instability and mental health, and between mental health status and coping, adherence, and perceived illness severity.

The findings for the nursing-sensitive outcomes in adult inflammatory bowel disease also demonstrate that clinical improvement should not be based only on biological disease markers. The section of the patient population living with chronic inflammatory illness is very wide, and outcomes like quality of life, self-efficacy, symptom burden, satisfaction with care, and psychological status take into account the overall impact of nursing care on the patient [25]. The measures are crucial in hospitalised patients as physiological symptoms and emotional distress frequently change concurrently in the acute exacerbation.

Another example of this interaction is with the hospitalized trauma survivors. Psychological screening and/or treatment after traumatic injury are critical to provide, as psychological symptoms can affect recovery, participation in rehabilitation, and long-term functional outcomes [26]. As shown in Figure 2, there is a bi-directional association between physiological stress, symptoms of mental health, and the care received from nurses.

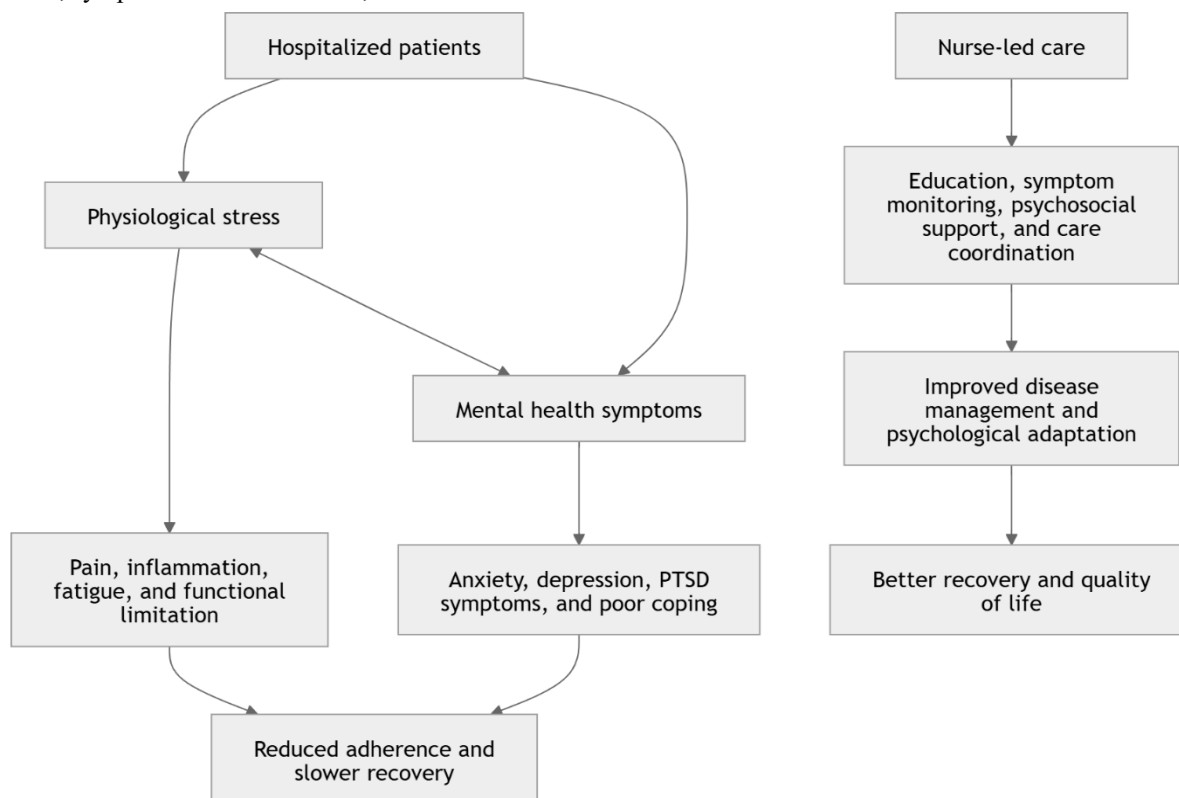


Figure 2. Bidirectional relationship between physiological stress, mental health symptoms, and nurse-led care in hospitalized patients

6. Patient-Related Factors Influencing Stress Responses

The physiological and psychological stress and distress experienced by patients during hospitalization are heavily affected by patient-related factors. Patients undergoing surgery might be especially susceptible due to the physical stress of surgery, exposure to anesthetics, pain, surgical uncertainty, fear of complications, and concerns about recovery. The importance of psychological support in the nursing process is mentioned in cardiac surgical patients, in which it is emphasized that anxiety, emotional distress, coping capacity, and adjustment are important aspects of the potential high-risk treatment pathway from the operating room to recovery.

Stress reactions can also be exacerbated for cancer patients because of the uncertainty about diagnosis, treatment load, fatigue, pain, changes to body image, fear of recurrence, and life-threatening perception. Mindfulness-based stress reduction (MBSR) has been studied as a supportive therapy in cancer care and indicates that patients' coping style, attention regulation, emotional processing, and appraisal of stress may be factors influencing psychological adaptation during illness and treatment [28]. The results are in favour of implementing coping-oriented interventions in inpatient nursing practice.

Other factors also influence the nature of stress associated with hospitalization, such as developmental stage and family context. Young children might feel separated from home, out of their schedule, scared of procedures, or not know the health care staff. For young children hospitalized in interventions with parents, parental involvement in care, emotional support, education, and presence with children have been associated with decreases in distress and adaptation for families and children [29].

Children who are not hospitalized with caregivers are especially vulnerable, as fear, loneliness, communication difficulties, and emotional insecurity can be exacerbated by not having a caregiver in the hospital. The findings of this integrative review revealed the importance of social support deficiencies and child-specific social support needs during the hospitalisation process for children without parents or caregivers [30]. Figure 3 shows that patient factors that affect stress and psychological distress in the hospital.

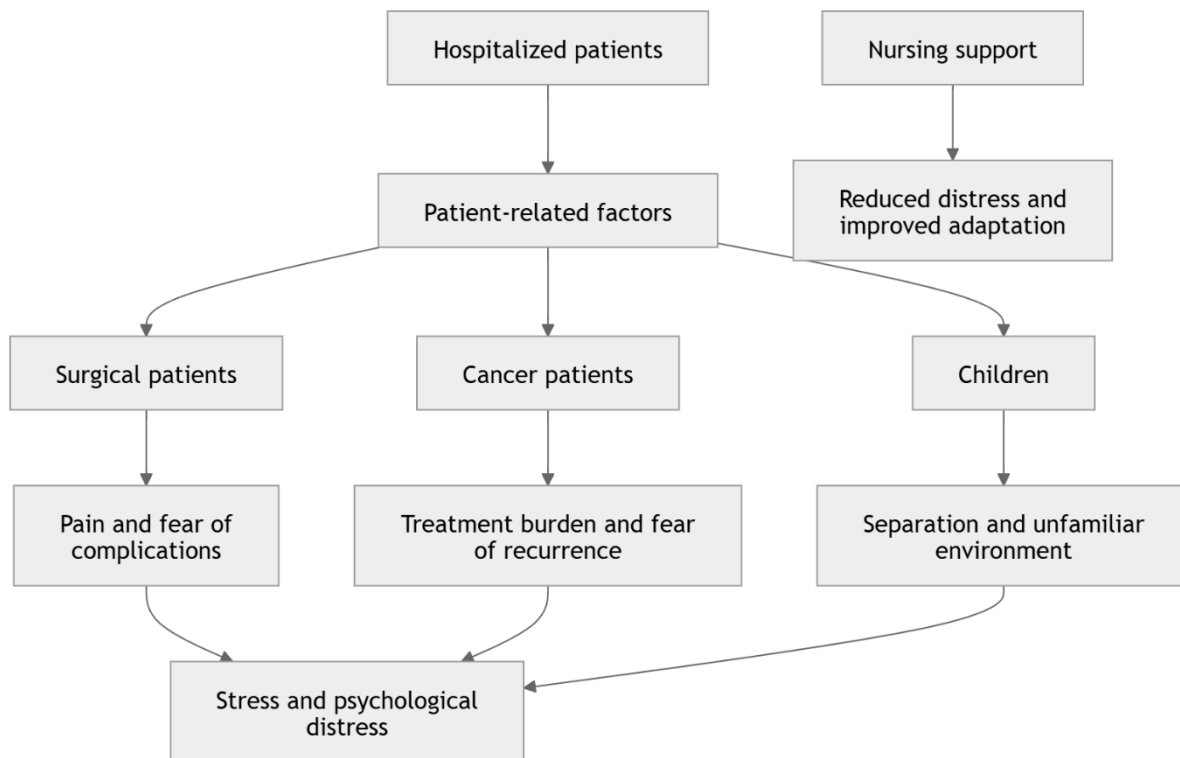


Figure 3. Patient-related factors influencing stress and psychological distress during hospitalization

7. Hospital Environmental and Care-Related Contributors to Stress

Physiological, environmental, and care-related factors within the hospital setting may exacerbate the physiological stress response and psychological distress experienced by patients, especially those who have sustained severe injury, critical illness, long hospital stays, and/or complex care requirements. Postintensive care syndrome and posttraumatic stress disorder can occur in individuals who have survived a major injury and intensive care unit treatment, and are caused by the pain, invasive treatment, frightening memories, immobility, sedation, delirium, and perceived threat to survival. The results suggest that the hospital setting has an impact on both the immediate recovery and post-hospital psychological adjustment [31].

Another group of children who are at risk for stress in hospitals is those with medical complexity and their parents. Admission to any hospital facility can affect family routines, burden caregivers, result in multiple procedures for children, affect prognosis, treatment, and discharge planning. A scoping review of the medical complexity of children and their parents highlights the importance of hospitalisation on patients' health and family functioning, and the nurses' role in providing emotional support, communication, continuity, and family-centered care for these families [32].

Sleep loss is a very common and potentially modifiable stressor in hospitalized patients. Frequent alarms, lights, noises, clinical aspects, medication routines, pain and anxiety, unfamiliar beds, and ward activity can disrupt sleep and therefore interfere with recovery. Loss of sleep increases fatigue, irritability, increased sensitivity to pain, decline in immune function, cognitive performance, and emotional regulation, thus being a major factor in both physical and psychological stress [33].

There have been numerous approaches to sleep promotion with complementary and alternative therapies in the critically ill, such as relaxation-based and environmental. The strategies listed indicate that nursing care can help decrease environmental exposure to stress through providing rest, comfort, circadian stability, and recovery-focused inpatient routines [34]. Table 3 illustrates sources of stress thought to be related to the patient and to the environment as these relate to hospitalization.

Table 3. Patient-Related and Environmental Contributors to Stress

Stress contributor	Affected population	Main clinical concern	Nursing implication	Reference
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Cardiac surgery pathway	Cardiac surgical patients	Anxiety, fear of complications, pain, and recovery uncertainty	Integrative psychological support should extend from the operating room to recovery	[27]
Cancer-related burden	Patients with cancer	Diagnostic uncertainty, treatment burden, pain, fatigue, and fear of recurrence	Coping-oriented interventions may support psychological adjustment	[28]
Pediatric hospitalization	Hospitalized young children	Separation, fear of procedures, unfamiliarity, and routine disruption	Parental involvement and family-centered education may reduce distress	[29]
Sleep deprivation	General hospitalized patients	Fatigue, irritability, pain sensitivity, cognitive impairment, and delayed recovery	Sleep should be treated as a modifiable nursing-sensitive outcome	[33]

8. Assessment of Physiological and Psychological Stress in Clinical Practice

Evaluation of patient stress in the hospital should include objective signs and symptoms as well as subjective psychological responses. Sleep disturbance is a clinically relevant marker and is a symptom that could be a reflection of pain, anxiety, environmental disruption, disease severity, and/or neuroendocrine activation. Sleep-promoting nursing care in hospital wards has been systematically reviewed, and emphasises the importance of structural nursing assessment of sleep quality, night disturbances, noise exposure, comfort, and patients' perception of sleep restfulness [35].

Lack of sleep can also affect the ability to recover from illness and surgery because of its influence on immune regulation, pain sensitivity, metabolism, cognition, mood, and physical rehabilitation. Assessment should therefore involve a regular assessment of sleep duration, sleep fragmentation, fatigue and delirium risk, analgesic requirements, and environmental barriers to sleep. Sleep-related assessment can be useful in determining modifiable stressors in surgical and medically ill patients that may lead to delayed recovery or emotional deterioration [36].

Evaluation of psychological stress is also crucial before procedures and during recovery. Preoperative anxiety could affect surgical results as a result of elevated sympathetic arousal, elevated perceived pain, decreased cooperation, and decreased postoperative adjustment. Nurse-led educational interventions were reported to be effective strategies for reducing preoperative anxiety, so that the patient's understanding of the procedures, perceived preparedness, level of anxiety, and coping strategy were included in the assessment of such interventions [37].

Another focus of stress assessment is the assessment of pain, especially in cancer patients. The nurse-led nonpharmacological pain interventions have been found relevant for the alleviation of pain and supportive care, confirming the relevance of assessing the intensity of pain, emotional distress, functional impairments, relaxation needs, and patient preference in the expression of pain. Integrated nursing assessment can thus link the physiological signs with the psychological symptoms, sleep quality with pain burden, and individual intervention planning [38]. Figure 4 shows the integrated nursing assessment of sleep, anxiety, and pain-related stress.

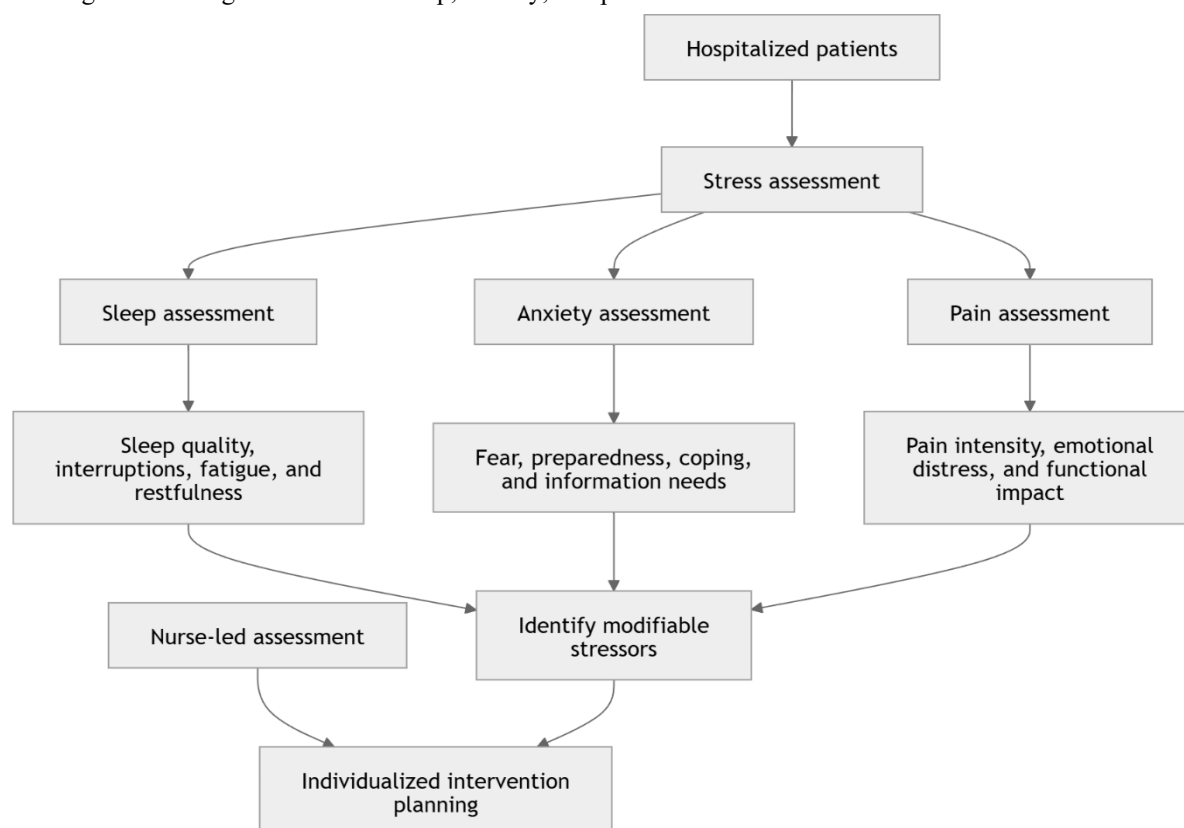


Figure 4. Integrated nursing assessment of sleep, anxiety, and pain-related stress in hospitalized patients

9. Nurse-Led Interventions for Reducing Physiological Stress

Physiological stress can be decreased by nurse-led interventions, which involve symptom monitoring, patient education, behavioral support, care coordination, and multidisciplinary referral. Physiological stress can be experienced by hospitalized patients as pain, sleep disturbance, increased heart rate, blood pressure fluctuations, tiredness, hyperarousal, and decreased functional capacity. The role of the nurse as a facilitator of integrated care for managing physical symptoms, social, emotional, and lifestyle issues, and continuity of care is highlighted, and nurse-led multidisciplinary interventions have proven to be effective in primary health care. While inpatient settings are different from primary care, the principles that apply to coordinating individualized care plans, assessing for stress-related symptoms, and connecting patients with medical, psychological, rehabilitation, and social support services are the same.

Additionally, interventions delivered by mental health nurses also offer an opportunity to decrease the physiological activation associated with stress. In the context of mental health clinical care models, there is evidence that mental health nurses can provide structured psychological/behavioural interventions, based on randomized controlled trials of interventions [40]. These interventions can include ways to decrease physiological arousal, which may involve improving emotional regulation, supporting coping, decreasing anxiety, and supporting treatment adherence. These techniques can be used in a hospital to include relaxation training, breathing techniques, psychoeducation, reassurance, de-escalation, orientation, and early detection of severe distress.

Anxiety, sleep, and well-being are nursing domains of care that are relevant and are known to directly interact with physiological stress regulation. A scoping review of nursing interventions for mental health promotion highlights interventions for reducing anxiety, promoting sleep, and overall mental health [41]. Some immediate inpatient uses involve decreasing the disruption of sleep, encouraging rest, decreasing environmental stimulation, ensuring comfort, teaching patient relaxation exercises, and promoting patient participation in care. These interventions can be useful to break the relationship between psychological distress and activation of the physiological systems. Table 4 depicts assessment strategies and priorities for the nursing care of physiological and psychological stress.

Table 4. Assessment Strategies and Integrated Nursing Care Priorities

Assessment or care priority	Related stress domain	Nursing action	Expected care benefit	Reference
Sleep assessment	Physiological and psychological stress	Assess sleep quality, interruptions, noise, comfort, fatigue, and restfulness.	Identifies modifiable barriers to recovery and emotional regulation	[35]
Preoperative anxiety assessment	Psychological stress and sympathetic arousal	Evaluate fear, preparedness, information needs, and coping style	Supports targeted education and anxiety reduction before surgery	[37]
Nonpharmacological pain assessment	Pain-related stress and emotional distress	Assess pain intensity, functional impact, relaxation needs, and preferences.	Links symptom control with psychological support	[38]
Early rehabilitation	Physical and mental recovery	Support mobility, orientation, functional participation, and multidisciplinary coordination	May reduce impairment and improve recovery confidence after critical illness	[44]

10. Nurse-Led Interventions for Improving Mental Health Outcomes

The nurse-led intervention for mental health in the hospitalized patient should focus on anxiety, emotional problems, fear, sleep disturbances, a decrease in coping, pain-related distress, and perceived loss of control. One nonpharmacologic approach relevant to advanced nursing practice, which is beneficial in attention regulation, emotional awareness, relaxation, symptom control, and coping in patients with a chronic illness or a burden of symptoms associated with stress, is mindfulness-based stress reduction (MBSR) [42]. In the inpatient environment, mindfulness-inspired nursing care might involve brief grounding exercises, education regarding relaxation and breath, and reassurance, as well as guided breathing, for patients with anticipatory anxiety, pain, uncertainty, or emotional overload.

Another nursing intervention that can be performed is music listening, which can benefit patients' health by decreasing anxiety, promoting relaxation, distracting from pain, and providing a relaxing therapeutic atmosphere [43]. The appeal of this resource is that it is a low-cost, non-invasive format and can be used with various inpatient populations. Care routines can include patient-preferred music, especially before procedures, when patients are resting or are restless, anxious, or having trouble sleeping.

Physical function and experiences of recovery also affect mental health outcomes. The early rehabilitation programme in the intensive care unit has been associated with prevention of physical and mental morbidity, suggesting that the promotion of mobility, orientation, participation in care, and restoration of functional capacity could decrease psychological morbidity in critical illness [44]. The provision of nurse-led support for early mobilization, patient education, reassurance, sleep promotion, family engagement, and multidisciplinary coordination can therefore help to improve mental health outcomes, alleviate helplessness, increase confidence in recovery, and restore patient autonomy during hospitalisation. The nurse-led interventions used to manage both psychological and physiological stress in hospitalized patients are presented in Table 5.

Table 5. Nurse-Led Interventions for Psychological and Physiological Stress Reduction

Intervention type	Target outcome	Mechanism of benefit	Application in hospitalized patients	Reference
Preventive psychological intervention	Post-traumatic stress symptoms	Early psychological support, orientation, and coping support	Useful for critically ill patients during and after ICU admission	[11]
Music therapy	Pain and anxiety	Sensory modulation, relaxation, distraction, and emotional comfort	Can be used before procedures, during recovery, or in intensive care settings	[18]
Therapeutic massage	Anxiety and cancer pain perception	Relaxation, tactile comfort, reduced arousal, and symptom relief	May support patients with cancer-related pain and emotional distress	[19]
Aroma inhalation therapy	Stress, anxiety, depression, and autonomic regulation	Relaxation response and modulation of the autonomic nervous system activity	May support medically vulnerable patients experiencing anxiety and stress	[21]

LIMITATIONS AND FUTURE DIRECTIONS

There are several caveats to this review. The evidence provided is varied in terms of the type of patient, setting, role(s) of the nurse, and intervention, which may result in some difficulty in direct comparison between studies. Many interventions include a blend of psychological, educational, environmental, and physical components, so it is difficult to isolate the individual effect of each nursing intervention. Different outcome measures, time periods, and stress assessment may also contribute to a lack of consistency in the findings. There is a possibility that not all inpatient populations are representative of the intensive care patient, oncology, surgical, paediatric, and chronic disease populations.

Well-designed prospective studies and randomized controlled trials of standardized nurse-led stress management protocols should be the focus of future research. Physiological outcome measures, mental health scales, sleep measures, pain measures, patient-reported outcomes, and post-discharge follow-up should be included in studies. There is an increased focus on high-risk groups such as critically ill, older children, older people, isolated patients, and people with pre-existing mental health issues. Future inpatient stress reduction strategies could be enhanced with the use of digital monitoring, structured screening pathways, and multidisciplinary models.

11. CONCLUSION

Hospitalisation can create a clinically significant state of stress where there is interplay between physiological activation and psychological stress during the course of the illness, treatment, and recovery. Pain, invasive procedures, environmental disruption, uncertainty, isolation, decreased autonomy, and severity of disease could exacerbate the neuroendocrine, autonomic, inflammatory, metabolic, and sleep-related stress response. These physiological changes have been linked to mental health issues like anxiety, depression, fears, post-traumatic stress symptoms, poor coping, and diminished quality of life. The relationship is two-way, such that emotional vulnerability could exacerbate increased pain perception, sleep disturbance, increased autonomic arousal, decreased treatment engagement and recovery, and physiological instability could increase emotional vulnerability. This multifaceted burden can be addressed by nurse-led interventions in hospitalized patients. Continuous evaluation and assessment, therapeutic communication, psychoeducation, sleep promotion, pain support, relaxation-based approaches, music therapy, mindfulness-informed care, early mobilization, family involvement, and multidisciplinary coordination can help to alleviate exposure to the stressors and promote psychological resilience in the care provided by nurses. Incorporating PMA into normal ward activities could help to enhance patient-centred, recovery-oriented outcomes in the hospital setting.

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