Stress is a common phenomenon in the intensive care unit for both patients and nurses. Critical care nurses may experience many forms of stress, including physical, psychological, and moral stress or distress. The physiological stress response traditionally associated with the hypothalamic-pituitary-adrenal axis has been expanded to include a new model, called tend and befriend, that has been linked to females of different species, including humans. Studies have shown that stress also affects immune function. Although commonly associated with adverse outcomes, stress can lead to personal growth. The tend and befriend strategy is an intervention that was developed to help nurses increase their ability to grow from stressful situations, especially those related to moral distress. (Critical Care Nurse. 2012;32[3]:25-34)
Initially, the body responds to acute stress by using the fight or flight mechanism. If the stress continues for more than several hours and/or repeats itself over time, however, then the stress is considered chronic. The bodily response to chronic stress is the stimulation of the hypothalamus, leading to a cascade of hormonal responses, starting with the release of corticotropin-releasing hormone, stimulating the pituitary gland to release adrenocorticotropic hormone, which in turn stimulates the adrenal cortex to release corticosteroids. This cascade of responses occurs within what is called the hypothalamic-pituitary-adrenal or HPA axis, and the hormones released are called stress hormones.

The term allostasis has been used to describe the active process by which the body responds to acute stress in order to maintain homeostasis. In this case, the body would react according to the fight or flight mechanism. However, if the stress continues, the level of stress is high, or if the body cannot turn on or off the appropriate mechanisms to deal with the stress, then the body reacts by using the HPA axis mechanism. In the case of chronic stress, the allostatic load is increased, leading to wear and tear on the body, causing damage to various bodily systems. For example, immune functioning would be impaired.

The Female Response to Stress

The research that was conducted to develop this physiological stress response model used mostly males (animals and humans) as subjects. In a review of 200 studies of physiological and neuroendocrine responses to stress, conducted between 1985 and 2000, 66% of the 14,548 subjects were males, whereas only 17% of participants in similar laboratory studies before 1995 were female. This period was when these theories were tested empirically. Usually males were investigated because the female reproductive system is based on cyclical hormonal variations. These hormonal changes were considered an intervening variable that might interfere with the measurement of hormonal responses to stress. One way to control for reproductive hormonal variations was to exclude females from these studies, thereby eliminating this potential intervening variable.

Based on a comprehensive review and synthesis of several unrelated bodies of literature, Taylor and colleagues postulated a new biobehavioral alternative theory to the fight or flight stress response that is, in their opinion, more appropriate for females. That theory is called “Tend and Befriend.” According to this postulated theory, females are seen as the primary caregivers. Therefore it is traditionally their responsibility to feed and protect the young. These authors contend that if a mother were to respond to a threatening attack with aggressive behavior against the predator, the offspring would be left unprotected, thereby decreasing the species’ chance of survival. They claim that neuroendocrine mechanisms could have evolved to facilitate maternal behaviors such as calming the offspring and quieting them, protecting them, or getting them out of harm’s way. “Tending” was defined as quieting and caring for the offspring and blending into the environment in case of threat. This behavior is seen as evolutionarily adaptive to the species, as women who are pregnant and/or have young children cannot effectively fight or flee.

Another line of evidence for this theory has shown that the primarily male hormones, such as testosterone, are associated with hostility and aggressive behavior in animals and humans. Testosterone is released by males in response to stress. Stress hormones have inhibitory effects on sexual activity and sex hormone release, including testosterone. This interaction is reciprocal, where testosterone can act at several levels of the HPA axis and inhibit its function. Taylor and colleagues have also suggested that female aggressive behavior is not associated with testosterone or with sympathetic arousal.

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Taylor and coauthors also hypothesized that attempts to be members of a social group as opposed to being alone would better protect females against their enemies. Taylor and colleagues use the term “befriend” as the creation of associations that provide resources and help protect the female and her young from threat.12

These authors cite animal studies showing that levels of stress hormones in female rats and prairie voles decrease with increased crowding of female animals whereas male hormone levels increase. They also cite a range of studies on humans that support the conclusion that females, significantly more than males, seek and receive social support under conditions of stress. Females are also more involved in social networks that tend to be small groupings oriented around specific tasks. A large range of human studies have shown that social support has significant mental and physical health benefits, including decreasing mortality.15,16 Therefore, in response to threat, females would tend and befriend as opposed to fight or flight.

Others17 have commented that males can also respond to stress with tend and befriend. They added to Taylor’s theory by stating that a combination of hormonal and other interpersonal factors can suppress male testosterone levels, resulting in less fight or flight behavior among males and increased male tending behavior of the young. These authors bring evidence showing that men who “tend” appear to have lower testosterone levels that may decrease their tendency to respond to stress with a fight or flight response. They also show that males can “befriend,” forming social coalitions. They state that in some species, males befriend other males, forming coalitional competition or a balance between cooperative and competitive behavior. Eisler and Levine18 expand upon this conclusion. They state that females have evolved biochemical patterns that are associated with their traditional caregiving role. However oxytocin is found in both males and females and provides the same positive effects to both sexes. Although differences in tending and befriending are found on average between the sexes, cultural institutions and individual variations can enhance or inhibit these behaviors in both men and women.

Taylor and colleagues12,15 also hypothesize that oxytocin decreases stress and anxiety. Oxytocin may both calm the female who is aroused by a stressor and promote affiliative behavior (befriend) and maternal behavior toward offspring (tend). This hormone is associated with parasympathetic functioning, modulates the HPA axis response, and its effect is modulated by estrogen. Oxytocin was found in several studies to decrease responsiveness of the HPA axis to stress.19 The majority of these studies were conducted among lactating and pregnant humans and animals.19 In a study20 of healthy human males, intranasal administration of oxytocin made the men feel less anxious. Half of the subjects were asked to bring along a friend to test the influence of social support on the effects of oxytocin. The researchers found that the combination of social support and oxytocin was associated with the lowest levels of cortisol during stress.20

In a review of a series of experiments on rats, Uvnas-Moberg21 concluded that nonnoxious stimulation associated with friendly interaction (such as befriending) induces a psychophysiological response pattern that includes sedation, relaxation, and decreased sympathetic and HPA axis activity that is mediated by oxytocin at the hypothalamic level. The effects of oxytocin have also been described as promoting well-being, calm, and positive social interactions associated with decreased cardiovascular activity, muscle relaxation, and increased digestion.6 Several reviews19-22 of the effects of oxytocin in humans and animals have concluded that it is an important modulator of social and emotional responses in both males and females. Thus the behaviors of fight or flight usually found in males and tend and befriend usually found in females have a physiological basis.

According to Taylor’s theory, females have a strong tendency to affiliate under conditions of stress. For example, women are more likely to seek and obtain social support than men. I cannot help but recall the popular book Men Are From Mars, Women Are From Venus by John Gray.24 One of Gray’s conclusions is that men, on average, when stressed “enter their caves” and want to find solutions to their problems, whereas women usually prefer to ventilate, talk, and share their emotions and problems. Perhaps this difference is based on physiological tendencies that form the differences in the traditional male and female responses to stress. Therefore, evidence indicates that behavior can be associated with the physiological stress response, and this response may differ between males and females.
because of their different psycho-physiological mechanisms.

**ICU Stress**

The stress response is initiated when an individual perceives a threat, which may be either physical or psychological. Several sources of stress have been associated with intensive care nursing. These include high workloads, quick working pace, unsatisfying tasks, lack of clear work directives, poor communication, need for an extensive knowledge base, the ICU environment, personal sense of insecurity, and issues related to death and dying. Improvements in technology have led to increased survival rates for patients, causing increased pressure or stress on staff to “save” lives. In addition, life and death decisions must be made quickly with little time for reflection. Caregivers, including ICU nurses, who work under extremely stressful conditions exhibit symptoms similar to those seen in persons who personally underwent a severe trauma. This response has been labeled secondary posttraumatic stress disorder.

**Moral Distress**

The practice of nursing, including ICU nursing, can be viewed as a moral enterprise where nurses are morally engaged with their patients. Moral issues such as respect and quality of care are inherent to nursing practice. Although ICU clinical decisions are based on scientific evidence, whether the decision “ought” to be carried out is a moral or ethical question. As a result, many but not all stressful ICU situations have an ethical component. Moral distress involves stressful situations in which moral values are challenged. Moral distress can therefore be seen as a type of stress associated with intensive care nursing and is a major source of stress for ICU nurses. The case study below can be used as an example of a nurse experiencing moral distress.

**Stress and Immune Function**

If the situation presented in the case study were a 1-time occurrence, then Nurse N would be considered to be suffering from acute stress. However if those feelings continue over time, then Nurse N is under chronic stress. It is generally agreed that short-term, acute stressors are associated with increased immune functioning whereas long-term or chronic stressors can lead to decreased immune functioning.

Dhabhar categorizes immune function into 3 types of responses: immunoprotective, immunopathological, and immunoregulatory. When being protective, the immune system conducts active surveillance against foreign substances, promotes a rapid immune response to the “foreigners,” efficiently clears pathogens

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**CASE STUDY**

Nurse N has been working in the ICU for 8 months. She reports to work for the day shift and receives a patient assignment that includes 2 patients: Mr A and Mrs B.

Mr A is a 74-year-old man with a history of chronic obstructive pulmonary disease and class IV congestive heart failure who was admitted from the emergency department with pneumonia. Within several days, Mr A is intubated and ventilated with multisystem failure and sepsis. His 2 sons cannot agree as to whether Mr A should receive all possible care. Neither one has discussed end-of-life decisions with their father.

Mrs B is a 93-year-old woman transferred from the orthopedic department after becoming hemodynamically unstable. She has 3 children who are perceived by the nurses as being hostile to the unit’s staff. Nurses are reluctant to spend time and care for Mrs B because of their perception of her children’s constant negative presence.

As Nurse N leaves the staff room, her charge nurse tells her that a nurse colleague has just called in sick and that she is also temporarily assigned to Mrs C, a 64-year-old hemicolecotomy patient who is stable and will soon be transferred to the surgical care area. As Nurse N begins to gather her thoughts and contemplates her nursing care for the upcoming shift, she cannot help but feel moral distress. She knows that she morally should give the best nursing care possible, which includes dealing with complicated end-of-life decisions, calming family members, and decreasing patients’ transfer anxiety. However, the constraints of time and acuity will not allow her to accomplish all of these goals at the level of care that she feels she should morally and professionally deliver.
from the body, and rapidly resolves inflammation. These actions are necessary for fighting infection, healing wounds, clearing the body of cancerous cells, and promoting a response to vaccination. Leucocytes are recruited into the site where they are needed and increase their proliferation. For example, when a person is wounded, white blood cells leave the spleen and travel into the blood system and then to the skin. T cells (a type of lymphocyte), especially T helper cells (called CD4+), secrete cytokines (a type of protein) that promote cell-mediated immunity and prompts B cells (another type of lymphocyte) to proliferate and produce antibodies. B cells mount a response where they engulf the foreign antigen, digest it, and then present it to other T cells. Natural killer cells, a type of cytotoxic T lymphocyte that kills virally infected cells and cancer cells, also are activated.

When in pathological mode, the immune system turns against itself, leading to autoimmune disease and chronic inflammation. In this situation, both T helper cells and cytotoxic T cells (CD8+) secrete cytokines that are proinflammatory. These include interleukins 1 and 6 and tumor necrosis factor-α.  

Immunoregulation occurs when immune cells and other factors such as cytokines inhibit other immune functions and keep other responses in check. This can lead to positive outcomes, such as decreased chronic inflammation, or to negative outcomes, such as decreased destruction of cancer cells. Examples of this type of cytokine are interleukin 10 and transforming growth factor-β.

These 3 basic mechanisms are extremely complex. They interact with one another and with other mechanisms in the body, such as the HPA axis, in a nonlinear manner. Certain factors have been described as influencing which mechanism is employed in the body’s immune response to stress. These include the duration, nature, number, timing, and persistence of the stressor. Another important factor in the determination of the outcome of immune functioning after stress is the concentration and differing effects of glucocorticoids. Glucocorticoids released during the stress response are present in every organ system in the body. They play a pivotal role in the synchronization of different networks of mechanisms in the body, including stress and inflammation. Many types of tissues have receptors on their cell membranes that bind to the glucocorticoids. Upon binding, the glucocorticoid receptor dissociates from its protein complex and then translocates to the nucleus, where it binds to specific DNA sequences and modulates gene transcription. Approximately 20% of all genome expression is affected by these molecules.  

Under certain conditions, glucocorticoids enhance immune function and act synergistically with cytokines. Dhabhar postulates that this process may be mediated by glucocorticoid-induced up-regulation of cytokine receptors on target cells. However, glucocorticoids are usually considered to be immunosuppressors because of the negative feedback loop between the immune system and the HPA axis. The mechanisms or factors that determine when glucocorticoids and other stress hormones are immunoprotective or immunosuppressive have yet to be elucidated.

Stress hormones can also significantly affect the immune system, causing decreased tolerance to new illnesses, inducing the progression of existing illnesses, or causing latent illnesses to resurface. Many illnesses have been linked to interactions between psychosocial factors and the immune system, including depression, heart disease, infectious disease, and cancer. Behavioral interventions that reduce stress or anxiety have an effect on neuroendocrine responses. Therefore, a strong relationship and direct communication exist between emotions, the brain, and the immune system.

A summary of the overall effect of stress on immune function can be seen in the Figure. Psychological stress is perceived by the brain via the limbic system and cortex. These brain regions send signals to the hypothalamus and other areas of the brain. The HPA axis response can be attenuated by testosterone or oxytocin. Responses to stress stimulation come in many forms, depending on the stressor and the individual. The brain can either release different substances such as cytokines or hormones, or it can innervate other cells such as those of the autonomic nervous system. These responses can lead to changes in the functioning of immune cells (T, B, monocyte, and natural killer cells) and the release or lack of release of cytokines (such as interleukins 1 and 6 and tumor necrosis factor-α), thereby leading to immune dysfunction as demonstrated by increased inflammation, disease pathogenesis, autoimmune disease, increased susceptibility to infection, and decreased wound repair.
Positive Consequences of Stress: Posttraumatic Growth

Stress does not necessarily have to lead to negative consequences. One model, developed by Tedeschi and Calhoun, describes posttraumatic growth as the positive psychological changes occurring in people after experiencing a significant stress or trauma.44-45 An extremely stressful encounter causes a person to feel more vulnerable and to perceive the world as more dangerous and unpredictable. The individual struggles with these feelings in light of their previous understanding of the world. This struggle can result in feelings of having “survived the worst,” with the emergence of a feeling of growth. These authors describe 5 major areas in which growth can be categorized, including increased personal strength, awareness of new possibilities, improved relating to others, increased appreciation of life, and spiritual change. Such experiences have been recorded among survivors of cancer and war as well as other traumas.44-47

Calderon-Abbo and colleagues48 have suggested that measures can be taken to foster posttraumatic growth among health care providers in areas of extreme stress such as the planning of preventive and posttraumatic interventions for caregivers during disaster planning. These authors suggest primary, secondary, and tertiary strategies to

Figure Mechanism by which stress leads to immune dysfunction. Solid arrows indicate stimulates or releases; dashed arrows indicate attenuates or inhibits.

Based on data from Marketon and Glaser9 and McEwen.11

Stress

Testosterone

Oxytocin

Testosterone

Stress hormones (corticotropin-releasing hormone, corticotropin, cortisol)

Cytokines and other products

e.g., interleukins, interferons, tumor necrosis factor, transforming growth factor

Immune dysfunction

Inflammation, disease pathogenesis, autoimmune disease, increased susceptibility to infection, decreased wound repair

Immune cells
e.g., T, B, and natural killer cells, monocytes

Other substances (e.g., prolactin, growth hormone)

Epinephrine/norepinephrine

Direct lymph node innervation

Autonomic nervous system

Hypothalamic-pituitary-adrenal axis

Brain

Cortex, limbic system, other structures

Brain

Cortex, limbic system, other structures
reduce stress. These strategies are aimed at the individual, the organization, and at systems of care and policy. At the individual level, the authors recommend stress management regimens that are individually tailored and are implemented with the support of supervisors and colleagues. They also suggest self-care and personal activities such as healthy eating, sleeping, and exercise. Stress reduction programs at the organizational level are also recommended. Institutions should be encouraged to nonjudgmentally support and meet the needs of staff and provide a healthy work environment, including encouraging teamwork and open communication. Institutions should allow some flexibility to support team members’ natural coping mechanisms such as allowing members to take time off, change shifts, or converse with peers. Stigmas associated with admitting stress and anxiety should be decreased and staff members should be encouraged to seek psychological support when necessary. At the policy level, these authors suggest that universal standards of care be developed and implemented, such as during disaster planning. They also suggest that self-care activities related to stress management be mandated as a core proficiency area necessary for institutional accreditation.

Decreasing Stress

One model introduced by the American Association of Critical-Care Nurses (AACN), called “AACN’s Model to Rise Above Moral Distress” was developed by the Ethics Work Group FY 04 of AACN to help nurses when personally confronted with stress, especially moral distress. Moral distress is defined as the painful feelings and psychological disequilibrium experienced when a person knows the appropriate or right thing to do in a given situation but cannot carry out that action because of various obstacles or constraints. The model is based on 4 major actions: ask, affirm, assess, and act.

Ask

The first action to decrease moral distress is to ask. When experiencing feelings of stress such as anger or frustration, the nurse should ask questions of him/herself in order to understand the situation. Some of the relevant questions to ask are, “What are these feelings?”, “What are the dimensions of the situation?”, “Who are the relevant stakeholders?”, “What is the extent of my responsibility in this situation?”, “What risks am I willing to take to advocate for what I believe is right?”, and “Are others also experiencing such feelings?” Nurse N, in the case study described earlier in the article, should ask herself what she is feeling as she leaves the break room. For example, she might be feeling frustration at her inability to accomplish her goals or anger at the nurse who called in sick. Perhaps she should consider whether she should appeal her assignment with the charge nurse.

Affirm

The next step in the AACN model is to affirm the distress and make a commitment to take care of oneself. This process includes nurses
validating their feelings with others and gaining support from colleagues and friends. Others recommend open communication with nursing peers and with other members of the health care team. Communication and collaboration between the patient, the patient’s family, and all members of the health care team, including management, can improve the decision-making processes related to patient care and nursing administration issues and provide support for nurses, patients, and patients’ families.

Support groups where members can share their feelings and experiences can be developed. Role models for nurses may also be very beneficial in such circumstances. This step of the AACN model is similar to the model of “tend and befriend,” where stress is relieved when shared with others. Nurse N might approach other nurses on her shift or later on, especially those nurses whom she admires and thinks of as role models. She could ask them how they would handle such an assignment and whether they would also feel frustrated and angry. Nurse N might suggest to the head nurse that a support group be established for nurses to share and explore their feelings. She might also want to make sure that she attends any family conferences between other staff members such as physicians and her patients’ families.

**Assess**

The next phase of the AACN model is to assess. The source of the distress and its severity should be identified, and the nurse should assess her readiness to act while weighing the risks and benefits of such actions. Given the information that she has received from others and from her own self-reflection, Nurse N should now be able to assess what is her best course of action.

**Act**

The last step of the AACN model is to act. When taking action, one must be ready for setbacks and should have developed strategies for coping with them. Action could include communication with the relevant parties, developing educational strategies for future situations, and even leaving the present place of employment. By choosing to act, the nurse decreases the negative impact of distress and uses the feelings as a motivation for change. Nurse N might choose to take the assignment she was given, but when given a chance, she might discuss her situation with the charge nurse, and if she is not satisfied, she might go further and talk with her head nurse.

Several other sources have recommended actions on a unit or organizational level in order to decrease stress and moral distress. Unit managers are recommended to create a positive care environment or culture where ethical practice is considered standard practice. An ethical work environment is described as a unit where trust, respect, and open communication are used to create a sense of equality and shared decision making among members, thereby removing a sense of imbalance of power. In the example with Nurse N, if she worked in what she considered an ethical environment, she would feel free to discuss openly her workload concerns with her nursing superiors and end-of-life decisions with the medical staff. Others recommend that the structure of the management of the unit become more open via a shared governance model, thereby increasing feelings of autonomy and empowerment among health workers. The actions taken on an organizational level are also similar to the tend and befriend model in a nursing work setting as they encourage nurses to tend and befriend one another by creating a supportive work environment.

Examples of actions to be taken on an organizational level were presented previously.

In summary, ICU nurses live in a work environment filled with stress. Each of us has a choice. We can either use this stress as a means to grow and improve ourselves and our profession or we can let the stress affect our health by its interference with optimal functioning of the immune system. By using known models that incorporate tend-and-befriend strategies, we can harness our own neuroendocrine systems to improve our health and aim to decrease stress for ourselves and our colleagues.

**References**

1. Sabin-Farrell R, Turpin G. Vicarious traumatization: implications for the mental health
1. Differentiate the “fight or flight” from the “tend and befriend” stress response
2. Recognize the effects of stress on the immune system
3. Discuss individual and group level strategies to overcome stress

7. Which of the following is considered an effect of oxytocin?
   a. Increased hypothalamic-pituitary-adrenal axis responsiveness to stress
   b. Increased anxiety
   c. Increased stress
   d. Increased affiliative behavior

8. Which of the following lymphocytes produce antibodies during the immune response?
   a. T helper cells
   b. Natural killer cells
   c. B cells
   d. T cells

9. What type of immune function response occurs when immune cells inhibit other immune functions and keep others in check?
   a. Immunoprotective
   b. Immunopathological
   c. Immunoregulation
   d. Immunoprecipitation

10. Which of the following is classified as an immunoregulatory cytokine?
    a. Interleukin 1
    b. Transforming growth factor-β
    c. Interleukin 6
    d. Tumor necrosis factor-α

11. Which of the following strategies fosters posttraumatic growth among health care providers at the individual level?
    a. Self-care activities
    b. Nonjudgmental support of staff needs
    c. Provision of a healthy work environment
    d. Universal standards of care implementation during disaster planning

12. Which step of the “American Association of Critical-Care Nurses Model to Rise Above Moral Distress” is similar to the “tend and befriend” model?
    a. Ask
    b. Affirm
    c. Assess
    d. Act
Tend and Befriend in the Intensive Care Unit
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