Changes in mental status, mood, and cognition during corticosteroid therapy can be a source of distress for your patient. In this article, we’ll take a look at how corticosteroids impact the body, as well as activities of daily living (ADLs), and review strategies to ensure safe patient care.

Why corticosteroids?
Corticosteroids, often called glucocorticoids, are hormones produced by the adrenal cortex, which is a part of the adrenal glands. The anterior pituitary gland triggers the adrenal glands to perform its functions. The purposes of corticosteroids that are produced by the body are to: (1) regulate carbohydrate, protein, and lipid metabolism; (2) maintain fluid and electrolyte balance; (3) maintain functioning of the cardiovascular, endocrine, nervous, and immune systems, as well as the kidneys and skeletal muscle; and (4) assist the body to adapt to physical, psychological, and environmental stressors.

When the adrenal glands don’t produce sufficient corticosteroids naturally, the patient may be very thin and dehydrated, have hypoglycemia, experience weakness and fatigue, and have difficulty maintaining a normal BP due to hyponatremia. This is called Addison disease.

Conversely, when the adrenal glands produce excessive corticosteroids or a patient is receiving long-term moderate- to high-dose systemic corticosteroids for a medical condition, the patient may have fluid retention and weight gain, hypertension, hyperglycemia, and hyponatremia. This is called Cushing disease (endogenous) or Cushing syndrome (exogenous).

Synthetically prepared corticosteroids, such as prednisone, are used in a variety of medical conditions, particularly in the treatment of inflammatory and autoimmune diseases (see Who’s at risk for mental changes during systemic corticosteroid therapy?). Corticosteroids are very effective in reducing inflammation to preserve organ function and pain; they’re often life-saving. However, corticosteroids have many serious adverse reactions that are often challenging for the patient and healthcare team to manage (see supplemental content on the Nursing made Incredibly Easy! iPad app).

Although the physical adverse reactions of corticosteroids have been extensively studied and receive widespread attention, the neuropsychiatric reactions are frequently misunderstood, minimized, or overlooked.

Beyond mood changes
Corticosteroid-induced mental changes may range from subtle mood and memory deficits to psychoses and are usually dosage and time dependent. Preexisting psychiatric disorders and physical conditions must be evaluated when caring for patients with corticosteroid-induced mental status changes. It’s important to remember that mental status changes may occur at any dosage; however, it’s generally agreed on by most researchers that the greatest changes occur when the prednisone dose, or other corticosteroid dosage equivalent, is above 40 mg/day.

Clinically significant symptoms are those that interfere with the patient’s ADLs or cause them or those around them feelings of distress. Common symptoms occurring in approximately 79% of patients taking corticosteroids include, but aren’t limited to, agitation, anxiety, mild depression, restlessness, distractibility, and insomnia. These symptoms are generally mild and easily treatable to promote patient comfort.

The frequency of mania and/or hypomania in corticosteroid therapy is approximately 35% and closely parallels symptoms of bipolar disorder.
A manic response to corticosteroids is an abnormally elevated mood state characterized by such symptoms as:
• inappropriate elation
• increased irritability

Who’s at risk for mental changes during systemic corticosteroid therapy?

Respiratory
• moderate-to-severe asthma
• acute exacerbation of chronic obstructive pulmonary disease
• allergic rhinitis
• sarcoidosis
• anaphylaxis

Immune and rheumatology (autoimmune)
• rheumatoid arthritis
• systemic lupus erythematosus
• vasculitis
• Crohn disease
• ulcerative colitis
• autoimmune hepatitis
• multiple sclerosis
• polymyositis
• dermatomyositis
• polyarteritis
• pemphigus vulgaris (proteins attack the skin and lead to blisters)
• psoriasis
• eczema

Dermatology
• atopic dermatitis
• urticaria
Note: Many rheumatic conditions have dermatologic symptoms.

Endocrinology
• adrenal insufficiency (Addison disease)
Note: Patients require lifelong corticosteroid therapy if the adrenal glands and/or pituitary gland have been surgically removed. Corticosteroid dosing may need to be adjusted (reduced) when the patient has excessive circulating corticosteroids.

Hematology
• lymphoma
• leukemia
• hemolytic anemia
• idiopathic thrombocytopenic purpura

Ophthalmology
• uveitis
• keratoconjunctivitis

Other
• organ transplantation
• cerebral edema
• nephrotic syndrome
• Cushing disease
• Cushing syndrome
Note: Cushing disease is a result of excessive circulating corticosteroids due to a disease in the body and not from corticosteroid medication taken by the patient.

• severe insomnia
• grandiose notions
• increased speed and/or volume of speech
• disconnected and racing thoughts
• increased sexual desire
• markedly increased energy and activity level
• poor judgment
• inappropriate social behavior.

Conversely, patients who experience a hypomanic response to corticosteroids may experience many of the same signs and symptoms of mania, but to a milder degree, and are usually fully functional. Patients in a hypomanic state may appear quite happy, content, and confident when, in fact, they’re at an increased risk for severe depression and suicidal ideation.

In steroid psychosis, the patient loses contact with reality, which may include hallucinations and delusions. Most patients who develop steroid psychosis begin to manifest symptoms between 3 and 11 days after starting corticosteroid therapy. Many patients become overly excited, irritable, or depressed; others have rapid mood swings, and some become suicidal. Severely affected patients may hallucinate or lose contact with reality.

Biologic sex may play a role in determining who develops steroid psychoses. Research evidence indicates that females are more likely to develop psychoses than males. This may have to do with the fact that females are more likely than males to develop autoimmune diseases that require corticosteroid therapy.

The role of neurotransmitters
The pathophysiology underpinning the neuropsychiatric manifestations of corticosteroids points toward chemical changes in the brain. It’s fairly well known that neurotransmitters—chemicals that transmit signals from one nerve to another in the brain to perform specific functions—play a vital role.

Dopamine is one neurotransmitter that regulates mood, body movement, and posture. In the mental health and illness literature, it’s believed that excessive corticosteroids in the body increase the production
of dopamine, which leads to depression, mood swings, and psychoses.

Serotonin, another neurotransmitter, regulates mood, pain, sleep, and appetite. Normal levels of serotonin may also promote immune system function. The research evidence indicates that excessive levels of corticosteroids lower serotonin levels in the body, worsening the patient’s mental status changes.

Norepinephrine is a neurotransmitter and hormone that regulates emotions, alertness, sleeping, dreaming, and learning. It also helps maintain cardiovascular status. High corticosteroid levels tend to cause symptoms related to overstimulation of the sympathetic nervous system, including, but not limited to, a rapid heart rate, sweating, trembling or shaking, shortness of breath, dizziness, fear, and a sense of unreality.

Gamma-aminobutyric acid (GABA) is involved in a person’s level of excitability. Rather than encouraging communication between cells (as do dopamine, serotonin, and norepinephrine), GABA reduces, discourages, and blocks communication. This neurotransmitter is important in brain areas involving emotion and anxiety. Exogenous corticosteroids reduce the reuptake of GABA. In other words, a person may feel mentally unbalanced because of the decrease in utilization of GABA in the brain during corticosteroid therapy. This is what can happen in benzodiazepine withdrawal; GABA is the target neurotransmitter for benzodiazepines.

The hippocampus plays a part
The hippocampus is a small, curved formation in the brain that plays an important role in the formation of memory, learning, and emotion. Excessive corticosteroids are known to damage the functioning of the hippocampus. Research evidence indicates that there’s a relationship between dysfunction of the hippocampus and the development of neuroendocrine abnormalities found in mood disorders.

The role of the hippocampus in declarative memory, procedural memory, emotional processing, and vulnerability to stress has also been presented consistently in the literature. Declarative memory, sometimes called explicit memory, is the part of long-term memory that’s concerned with factual information. Procedural memory is the physical memory of how to perform a certain skill. For example, when a nurse administers an I.M. injection to a patient, procedural memory is the part of the memory that allows the nurse to remember how to administer the injection; declarative memory is where he or she stores the information.

Finally, there’s some research evidence indicating that high-dose corticosteroid therapy can cause cerebral atrophy, which may have detrimental effects on learning and memory.

How to help your patients
It’s important to carefully assess the mental status of your patient taking corticosteroids during the health history interview and head-to-toe assessment (see supplemental content on the Nursing made Incredibly Easy! iPad app). Teaching your patient about mental changes and the adverse reactions of corticosteroids should be a priority. Teach your patient that physical adverse reactions of corticosteroids have the potential to cause mental health issues. Knowing what to expect will reduce your patient’s anxiety.

Explain to patients that increasing amounts of corticosteroids in the blood...
cause imbalances of the chemicals in the brain, and weight gain from fluid retention and an increase in appetite can affect mood. Tell them that coping with physical pain and/or discomfort related to any disease process can also result in mood changes.

Patients may experience mental status changes causing them distress when there’s no nurse to observe them. Broach the topic of mental status changes during the health history interview and head-to-toe assessment. Listen to your patient carefully. Encourage patients to take corticosteroid medication in the morning to minimize insomnia. Explain that some exercise can also promote sleep and help minimize weight gain related to an increase in appetite. Melatonin may be helpful in some patients to help replenish serotonin in the brain. The healthcare provider may prescribe antidepressant medication to help achieve a balance of neurotransmitters in the brain. Antidepressants can relieve anxiety, depression, and pain, and help achieve an overall improved sense of mental stability and well-being.

Encourage your patient to journal about his or her experiences and join support groups to help cope with mental health adverse reactions of corticosteroids. Tell patients that talking with a family member, friend, or counselor may be helpful.

Distraction is a major concern for all patients taking corticosteroids. Tell patients to be much more cautious during certain activities such as driving. Patients may also experience cognitive difficulties, such as staying on one topic or tracking from one thought to the next. They may also have difficulty with fine motor movement, such as difficulty writing or holding objects.

Finally, the patient may be more agitated and/or argumentative than usual while taking corticosteroids. The patient is usually aware of these symptoms, which creates more emotional distress. Inform the patient and his or her significant others to contact the healthcare provider promptly if these symptoms don’t improve or are worsening with treatment.

**Preparation is key**
Corticosteroids do reduce mortality and morbidity related to acute and chronic healthcare conditions. However, the adverse reactions can increase morbidity (through fluid retention and osteoporosis) and mortality (through heart disease by increasing the rate of atherosclerosis). Nurses and other healthcare providers must make sure to monitor patients for serious adverse reactions. It’s also important to teach your colleagues and patients about the mental status changes that are expected to occur during corticosteroid therapy so that both parties are more prepared for treatment.

**REFERENCES**


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