

box 30-10 Examples of Nursing Diagnoses for the Patient Undergoing Diuretic Therapy

- Impaired Gas Exchange related to increased pulmonary hydrostatic pressure secondary to congestive heart failure
- Potential for Deficient Fluid Volume related to effect of diuretic therapy
- Risk for Electrolyte Imbalance
- Risk for Cognitive Impairment related to electrolyte imbalance

and may be either absolute or relative. Medications, such as diuretics, put patients at increased risk of fluid imbalance. Infection increases metabolic demand and insensible loss, and fluid volume deficits may develop. Regardless of patient diagnosis, assessment of fluid balance (see Chapter 28) and careful management are mainstays of patient care in the critical care setting.

Fluid Volume Deficit

When fluid loss exceeds intake, a fluid volume deficit exists. A fluid volume deficit is a physiological situation in which fluids are lost in an isotonic fashion (both fluid and electrolytes are lost together). Dehydration is the loss of water alone, resulting in a hyperosmolar state. Although the critically ill patient typically can have both a fluid volume deficit and dehydration states simultaneously, this discussion is limited strictly to disorders of fluid volume deficit.

Several patient populations are particularly vulnerable to development of fluid volume deficits. Young children at prespeech developmental levels cannot communicate thirst; therefore, during times when fluid requirements increase, they do not increase their fluid intake of their own accord. Debilitated patients, such as patients after stroke, may not be able to communicate their needs or have swallowing disturbances and cannot manage their own intake of fluid. Elderly patients are at particular risk of a fluid volume deficit because of the multisystem changes associated with aging. For a review of the changes associated with aging and nursing implications for fluid volume assessment and management, see Table 30-2.

CAUSES

Gastrointestinal Loss

Physiologically, the body produces approximately 5 L of gastrointestinal fluid. In the gastrointestinal tract, fluids help to act as a carrier of important enzymes and buffers to aid in digestion. In the distal small intestine and large intestine, fluid is reabsorbed, leaving only approximately 150 mL lost through the stool daily.

Excess loss from any site from which fluids are ordinarily lost may cause a fluid imbalance. Conditions such as vomiting and diarrhea may cause an increase beyond the typical 150 mL and result in a fluid volume deficit. In addition, surgically placed drainage tubes and nasogastric tubes used for suction may cause such a deficit.

Infection

Infection causes fluid deficits in several ways:

1. Infection can increase metabolic demand, increasing insensible water loss. When patients are not critically ill, they often mitigate this imbalance by increasing fluid intake. When they have widespread infections or a self-care deficit, which may occur in the elderly, fluid intake may not be sufficient to restore fluid balance.
2. Mediators are released as part of the immune response. These mediators cause a loosening of the capillary tight junctions, resulting in the third-spacing of fluids.
3. Carbon dioxide production increases due to increased metabolism. To maintain pH balance, tachypnea may develop. Although only a very small amount of fluid is lost daily through the respiratory tract, water loss may become clinically significant when the respiratory rate is greater than 35 breaths per minute.

Renal Loss

The kidneys filter approximately 180 L per day. However, urine output is only 1% to 2% of total blood volume filtered (see Chapter 28). Reabsorption of fluid is influenced by a complex regulatory system that includes the actions of aldosterone, angiotensin, and antidiuretic hormone (ADH). A defect in any one of the regulatory functions can cause a disruption in renal fluid balance.

Several endocrine disorders may disrupt the renal regulatory system. Adrenal insufficiency, the absence of glucocorticoids and aldosterone, can cause a reduction in the absorption of sodium, thereby promoting water loss. Diabetes insipidus is a profound reduction in ADH, which reduces the amount of fluid reabsorbed at the distal convoluted tubule. Water loss predominates in diabetes insipidus, and therefore volume imbalance is related to dehydration.

Serum osmolarity is predicted by sodium, glucose, and blood urea nitrogen. Normally, glucose does not influence the overall osmolarity. However, in profound hyperglycemia, the influence of glucose increases greatly. Serum osmolarity increases and is sensed by the osmoreceptors, thereby pulling fluids into the vascular space and initiating an osmotic diuresis. Two conditions that pathologically increase glucose are diabetic ketoacidosis (DKA) and hyperglycemic, hyperosmolar, and nonketotic (HHNK) coma. Both of these disorders are discussed in more detail in Chapter 44.

Diuretic therapy is intended to treat fluid volume excess. However, overadministration of diuretics may result in a fluid volume deficit. It is important to recognize the immediate onset that diuretics can have when administered intravenously, initiated for the first time, or adjusted in dosage (see Table 30-5 for more information).

Third-Spacing of Fluid

Third-spacing of fluid is the movement of fluid from the vascular space to the interstitial space. To create a movement of fluid between body compartments, there is an alteration in capillary permeability because of inflammation, ischemia, or injury. Causes of third-spacing of fluids