

Dehydration: Adult

Gastrointestinal

Clinical Decision Tools for RNs with Additional Authorized Practice [RN(AAP)s]

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Background

Fluid loss reduces extracellular fluid volume and can occur in a variety of clinical disorders (Sterns, 2017). Dehydration implies loss of water from both extracellular (intravascular and interstitial) and intracellular spaces and most often leads to elevated plasma sodium and osmolality. Hypovolemia is a generic term encompassing volume depletion and dehydration. Volume depletion is the loss of salt and water from the intravascular space (Huether, 2019). The mechanisms of dehydration may be broadly divided into three categories 1) increased fluid loss, 2) decreased fluid intake, or 3) both (Sterns, 2017). Adult dehydration is frequently the result of increased output from gastrointestinal losses including vomiting, diarrhea, bleeding, and external drainage (Sterns, 2017). Other causes of fluid loss may include renal (e.g., due to diuretics, hypoaldosteronism), cutaneous (e.g., excessive sweating, fever, burns), or third-space losses (e.g., bowel obstruction, ileus, crush injury) (Sterns, 2017). Dehydration can be classified as hypotonic, isotonic, or hypertonic, depending on the change in concentration of electrolytes in relation to water (Huether, 2019). A brief overview of the classifications is provided below as described by Huether (2019); however, this Clinical Decision Tool focuses on the assessment and management of hypovolemia in general.

Immediate Consultation Requirements

The RN(AAP) should seek immediate consultation from a physician/NP when any of the following circumstances exist:

- moderate dehydration (six to 10% loss of body weight), and blood pressure and mental status do not stabilize in the normal range within one hour of initiating rehydration therapy;
- severe dehydration (> 10% loss of body weight);
- high fever and appears acutely ill;
- severe headache;
- altered mental status;

- tachycardia or palpitations;
- hypotension;
- bloody stools or rectal bleeding;
- severe abdominal pain;
- bowel sounds are absent;
- abdominal distension;
- > 65 years of age; or
- any significant comorbidities (e.g., diabetes, congestive heart failure, renal disease) or immunocompromised clients (Interprofessional Advisory Group [IPAG], personal communication, October 2, 2019).

The RN(AAP) should initiate an intravenous fluid replacement as ordered by the physician/NP or as contained in an applicable RN Clinical Protocol within RN Specialty Practices if any of the Immediate Consultation circumstances exist.

Classification of Dehydration

Hypotonic	Isotonic	Hypertonic
<ul style="list-style-type: none"> • primarily due to a sodium deficit (more salt than water being lost); • may result from replacing gastrointestinal losses (vomiting and diarrhea) with low-solute fluids such as dilute juice, cola, and weak tea; • client may appear symptomatic earlier than in isotonic or hypertonic dehydration; and • lethargy and irritability are common and vascular collapse can occur early. 	<ul style="list-style-type: none"> • combined water and sodium deficit (proportionate loss of water and salt), and • symptoms less dramatic than in hypotonic dehydration. 	<ul style="list-style-type: none"> • primarily due to a water deficit (more water than salt being lost); • may occur as a result of using high solute fluid as replacement, renal concentration with large free-water losses (diuretics), large insensible water losses (heat exposure), diabetes insipidus, infections, fever; and • typical symptoms include thick, doughy texture to skin (tenting is uncommon), tachypnea, intense thirst.

(Hazinski, Mondozi, & Urdiales-Baker, 2019)

Predisposing and Risk Factors

Predisposing and risk factors for dehydration in adult clients include:

- older age;
- infection;
- trauma;

- hot weather, cold weather (increased indoor heating);
- decreased cognition (dementia);
- social isolation;
- diabetes mellitus;
- vomiting or diarrhea; or
- condition or illness that results in increased fluid loss, decreased fluid intake, or both (Huether, 2019).

Health History and Physical Exam

Subjective Findings

The circumstances of the presenting complaint should be determined. These include:

- history of fever;
- fluid intake, including description, amount, frequency;
- urine output, including frequency, appearance, hematuria;
- diarrhea, including duration, frequency, consistency, presence or absence of mucus or blood;
- vomiting, including duration, frequency, consistency;
- sick contacts;
- travel history;
- underlying illnesses (e.g., hyperthyroidism, renal disease, cystic fibrosis, diabetes);
- medication history (e.g., recent antibiotic use, diuretics, laxatives);
- exposure to heat and/or cold;
- weight loss; and
- potential ingestions (e.g., drugs) (Huang, 2018).

The RN(AAP) should consider the following if the client is elderly:

- non-specific signs and symptoms;
- other explanations for findings that suggest hypovolemia (e.g., dry mouth may be due to medication, muscle weakness may be associated with disuse, and atrophy); and
- higher risk for hypernatremia due to impaired thirst stimulus and limitations to increased fluid intake due to immobility, impaired swallowing, etc. (Huang, 2018; Kennedy-Malone, Martin-Plank, & Duffy, 2019; Sterns, 2017).

Objective Findings

The physical examination findings, although frequently nonspecific, may help support a diagnosis of dehydration and include:

- altered mental status;
- decreased capillary refill;

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- decreased skin turgor which is tested on inner aspect of thighs or the skin overlying the sternum, and is less reliable in older clients due to decreased skin elasticity with age;
- dry mucous membranes of the tongue and oral mucosa;
- orthostatic hypotension, which is determined by taking supine blood pressure after the client is lying for five to 10 minutes, and then taking the blood pressure as soon as the client sits or stands up, and again in this position after two to three minutes.
- a drop in systolic blood pressure ≥ 20 mm Hg or a drop in diastolic blood pressure ≥ 10 mm Hg from supine indicates orthostatic hypertension; and
- weight loss (Sterns, 2017).

The RN(AAP) should be cognizant that:

- classical signs of dehydration such as loss of skin turgor, increased thirst, and orthostatic hypotension have a low sensitivity in older adults.
- dehydration may cause atypical symptoms such as confusion, constipation, fever, and falls (Huang, 2018; Kennedy-Malone et al., 2019; Sterns, 2017).

The following table can assist in determining the level of dehydration in adult clients, noting that moderate and severe dehydration require immediate consultation to a physician/NP.

Physical Findings in Association with Degree of Dehydration

Clinical Sign	Mild Dehydration	Moderate Dehydration	Severe Dehydration
Estimated fluid loss (% of body weight)	< 6%	6-10%	> 10%
Level of consciousness	alert	lethargic	obtunded or comatose
Capillary refill	2 sec	2-4 sec	> 4 sec, cool limbs
Mucous membranes	normal	dry	parched, cracked

Clinical Sign	Mild Dehydration	Moderate Dehydration	Severe Dehydration
Heart rate	normal or slightly increased	increased	very increased
Respiratory rate/pattern	normal	increased	increased and hyperpnea
Blood pressure	normal	normal, but abnormal orthostatic	decreased
Pulse	normal	thready	faint or impalpable
Skin turgor (over sternum or inner aspect of thigh)	normal	slow	Tenting
Eye appearance	normal	sunken	very sunken
Urine output	decreased	oliguria	oliguria/anuria

(Huang, 2018)

Differential Diagnosis

Dehydration is always a sign or symptom of an underlying disorder (Huang, 2018). The causes listed above must be included in the differential diagnosis for dehydration.

Making the Diagnosis

The diagnosis of dehydration is based on clinical evaluation as a combination of signs and symptoms are used to assess the degree of dehydration (Huang, 2018). A reason for the dehydration should be given as a contributing factor (e.g., gastroenteritis, diarrhea).

Investigations and Diagnostic Tests

Laboratory testing for mild dehydration is not usually necessary, especially when the underlying cause is apparent (Huang, 2018). Tests related to the underlying cause may be required to identify and treat the primary cause of dehydration (e.g., stool cultures). Blood work including complete blood count, electrolytes, blood urea nitrogen, creatinine, glucose, and urinalysis (specific gravity, hematuria, glucosuria) may be considered (Huang, 2018).

Management and Interventions

Goals of Treatment

The primary goals of immediate treatment are to rehydrate the client, maintain fluid requirements, and prevent ongoing losses (Huang, 2018).

Non-Pharmacological Interventions

The RN(AAP) should recommend, as appropriate, rehydration with oral fluid therapy (see below). This approach is effective, safe, and inexpensive compared to intravenous therapy (Huang, 2018).

General Principles of Rehydration

Therapy is dependent on the amount of fluid lost with oral rehydration therapy as the initial method of treatment for mild to moderate dehydration. Oral rehydration fluids should contain both sodium and glucose to maximize absorption of these two components. There are instances where IV therapy is warranted (e.g., persistent vomiting). Consult a physician/NP if dehydration is not resolved with oral rehydration and/or up to 1 litre of appropriate IV fluid as ordered by the physician/NP or as contained in an applicable RN Clinical Protocol within RN Specialty Practices.

Rehydration involves replacement of fluid and electrolyte deficits, maintenance needs, and ongoing losses (Dynamed, 2019).

To determine fluid replacement:

- calculate known losses (e.g., urine output, emesis).
- determine maintenance needs (1500 mL plus 20 mL/kg for every kg over the base weight of 20 kg; e.g., 60 kg client would require 1500 mL plus 800 mL for maintenance in a 24-hour period).
- add maintenance requirements plus replacement requirements for losses (emesis, urine, etc.). This is the amount the RN(AAP) wants to replace in a 24-hour period (Dynamed, 2019).
- if the client is eating, calculate fluid replacement at 75% of total.
- if the client is diagnosed with hypotonic or isotonic dehydration, calculate total fluids (maintenance plus replacement) for the first 24 hours, and give half this amount over the next eight hours, and the other half over the next 16 hours.
- in hypertonic dehydration, correct the fluid deficits slowly over 48 hours.

Oral Rehydration Solutions

An oral rehydration solution can be made at home with table salt and sugar using the following ingredients, ½ teaspoon of salt, 6 teaspoons of sugar, 4 cups (1 litre) of water (World Health Organization, 2008). Caution should be used when recommending this as there is potential for a mixing error to occur. Commercially prepared solutions, such as Gastrolyte™, are available and the recommended option.

There is no formula to accurately estimate fluid deficit unless the amount of weight loss is known. Clinical indicators such as blood pressure, skin turgor, mental status, and urine output are used to

estimate the volume lost. Replacement therapy depends on the extent of dehydration. To estimate the degree of dehydration, refer to the Physical Findings in Association with Degree of Dehydration table above.

Management of Mild to Moderate Dehydration

Administer 50-100 mL per hour orally, if possible, in addition to any continued losses (e.g., emesis, urine output, and diarrhea). Give fluid frequently, and in small amounts. Fluid intake in the first 24-48 hours should be enough to replace the initial deficit plus any ongoing loss of fluids through the gastrointestinal and genitourinary tracts and the skin.

Pharmacological Interventions

Management focuses on rehydration of the client. Medications such as anti-diarrheal agents are not generally recommended (Huang, 2018). If oral rehydration is not appropriate (e.g., persistent vomiting), the RN(AAP) should consider arranging for and administering intravenous fluid replacement) (Dynamed, 2019).

Client and Caregiver Education

The RN(AAP) provides client and caregiver education as follows:

- Encourage handwashing with soap after toileting and before meals.
- Advise about water purification as appropriate, which is to boil water for 20 minutes or use chlorine tablets or solution.
- Ensure meat is fully cooked.
- Avoid foods with excessive sugar, high-fat, and fried foods until condition resolved.
- Explain hygienic food preparation practices.
- Provide information on any other factors that may be contributing to dehydration (Huang, 2018; Huether, 2019).

Monitoring and Follow-Up

Re-evaluate the client with mild symptoms (treated at home) every 24 hours for two days. Be sure to recheck the client's weight. Ensure the client is aware of the signs and symptoms of dehydration and to return immediately if dehydration worsens or if unable to ingest an adequate quantity of fluid.

Complications

The following complications can occur as a result of unmanaged dehydration in adults:

- seizures,
- renal failure, or
- cardiovascular arrest (Huang, 2018).

Referral

Refer to a physician/NP if client presentation is consistent with those identified in the *Immediate Consultation Requirements* section or when diagnosis of underlying cause is uncertain (IPAG, personal communication, October 2, 2019).

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