

DEFINITION

Dehydration is an abnormal decrease in volume of circulating plasma. This requires consideration as to the underlying cause.

IMMEDIATE CONSULTATION REQUIRED IN THE FOLLOWING SITUATIONS

- Moderate dehydration (6-10% loss of body weight), if blood pressure and mental status do not stabilize in the normal range within 1 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
- Any significant co-morbidities (e.g., diabetes, congestive heart failure, renal disease) or immunocompromised clients

Refer to SRNA CDTs Gastroenteritis Adult and Diarrhea Adult as a follow-up to this CDT.

CAUSES

- Decreased fluid intake: gastrointestinal illness, immobility, loss of consciousness, cognitive impairment
- Increased output: vomiting, diarrheal illnesses, sweating, frequent urination
- Third spacing of fluids: effusions, ascites, capillary leaks from burns, or sepsis

Types:

Hypotonic Dehydration

- Primarily due to a sodium deficit (more salt than water being lost)

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- 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 isotonic or hypertonic dehydration (use estimated weight loss as a guide):
 - 3% = mild dehydration
 - 6% = moderate dehydration
 - 9% = severe dehydration
- Lethargy and irritability are common and vascular collapse can occur early

Isotonic Dehydration

- Combined water and sodium deficit (proportionate loss of water and salt)
- Symptoms less dramatic than in hypotonic dehydration (use estimated weight loss as a guide):
 - 5% = mild dehydration
 - 10% = moderate dehydration
 - 15% = severe dehydration

Hypertonic Dehydration

- 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
- Typical symptoms include thick, doughy texture to skin (tenting is uncommon), tachypnea, intense thirst
- Shock is a late manifestation

PREDISPOSING AND RISK FACTORS

- Elderly individuals at risk for volume depletion:
 - Kidney function, urine concentration, thirst sensation is significantly lowered with age
 - > 85 years of age, female, having four or more chronic illnesses, taking four or more medications, and being bedridden
 - Laxative use
- Hot weather, cold weather (increased indoor heating)
- Decreased cognition (dementia)
- Isolation

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- Fluid loss by diarrhea, fever, vomiting, bleeding
- Diabetes mellitus

HISTORY

- Fever
- Intake (including description and amount)
- Diarrhea (including duration, frequency, consistency, presence or absence of mucus or blood)
- Vomiting (including duration, frequency, consistency)
- Urination pattern
- Sick contacts
- Travel history
- Medication history (e.g., diuretics, laxatives)
- Exposure to heat and/or cold
- *Clostridium difficile* (*C. difficile*) risk factors:
 - > 65 years of age
 - Recent hospitalization
 - Broad-spectrum antibiotic
 - Recent gastrointestinal surgery
 - Use of gastric acid suppression therapy
 - Chemotherapy

Considerations in the elderly:

- Present with non-specific signs and symptoms
- There may be 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)
- At higher risk for hypernatremia due to impaired thirst stimulus and limitations to increased fluid intake due to immobility, impaired swallowing

PHYSICAL FINDINGS

- Begin by assessing level of dehydration
- Assess for orthostatic hypotension if supine blood pressure appears normal. Take supine blood pressure after the client is lying for 5-10 minutes, and then take the

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blood pressure as soon as the client sits or stands up, and again in this position after 2-3 minutes.

- A drop in systolic blood pressure ≥ 20 mm Hg or a drop in diastolic blood pressure ≥ 10 mm Hg from supine indicates orthostatic hypotension.
- Check weight and compare to pre-illness weight
- Mental status
- Mucous membranes: tacky, dry or parched
- Capillary refill: ranges from brisk to > 3 seconds

Elderly

- Classical signs of dehydration such as loss of skin turgor, increased thirst, and orthostatic hypotension have a low sensitivity in older adults.
- Abnormal skin turgor in the forearm or subclavicular area and a dry oral mucosa are better indicators.
- Dehydration causes atypical symptoms such as confusion, constipation, fever, falls.
 - Estimate volume deficit: 1 L loss equals about 1 kg of body weight

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Table 1

Physical Findings in Association with Degree of Dehydration

Clinical Sign	Mild Dehydration	Moderate Dehydration	Severe Dehydration
Fluid loss (% of body weight)	< 6%	6-10%	> 10%
Radial pulse	Normal	Rapid, weak	Very rapid, weak
Respiration	Normal	Deep	Deep, rapid
Systolic Blood Pressure	Normal	Low or orthostatic	Very low or undetectable
Skin Turgor	Retracts rapidly	Retracts slowly	Retracts very slowly
Eyes	Normal	Sunken	Very sunken
Mentation	Alert	Restless	Drowsy, comatose
Urine Output	Normal	Scant	Oliguria
Voice	Normal	Hoarse	Inaudible
Electrolyte Disturbance	None	Present	Present

Note. Adapted from the *First Nations Inuit health: Clinical practice guidelines for nurses in primary care*. p. 5-9, by Health Canada, 2011, Ottawa, ON: Health Canada.

DIFFERENTIAL DIAGNOSIS

It is imperative to determine the cause of dehydration and focus treatment with the underlying cause in mind.

Decreased intake:

- Inadequate thirst response
- Anorexia
- Malabsorption
- Metabolic disorder
- Obtunded state

Excessive losses:

- Gastroenteritis

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- Diarrhea
- Febrile illness
- Diabetes/diabetic ketoacidosis
- Diabetes insipidus
- Intestinal obstruction
- Inadequate intravascular volume
- Sepsis

COMPLICATIONS

- Seizures
- Renal failure
- Cardiovascular arrest

INVESTIGATIONS AND DIAGNOSTIC TESTS

- For mild dehydration: generally, not necessary
- For moderate to severe dehydration (transport out of community is likely):
 - Blood work including electrolytes, blood urea nitrogen, creatinine, and glucose
 - Urinalysis (specific gravity, hematuria, glucosuria)
- Stool testing for culture and sensitivity, ova and parasites, *C. difficile* toxin may be considered

MAKING THE DIAGNOSIS

- Abdominal tenderness with or without guarding should prompt consideration of other causes outside of gastroenteritis.
- Abdominal rash may indicate typhoid fever, whereas jaundice may indicate viral hepatitis.
- Frequent watery stools are more consistent with viral gastroenteritis.
- Stools with blood or mucus are indicative of a bacterial pathogen.
- Long duration of diarrhea (> 14 days) is more consistent with a parasitic or non-infectious cause of diarrhea.
- When symptoms of vomiting predominate, consider other causes such as gastroesophageal reflux disease (GERD), diabetic ketoacidosis, acute abdomen, or urinary tract infection (UTI).

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- Abdominal pain that precedes vomiting and diarrhea is more likely due to abdominal pathology.
- Presence of fever, chills, myalgia, rash, rhinorrhea, sore throat, and cough are indicative of systemic infection.
- History of recent antibiotic use increases likelihood of *C. difficile*.
- History of travel to endemic areas prompts consideration of parasitic disease.

MANAGEMENT AND INTERVENTIONS

Goals of Treatment

- Restore normal state of hydration
- Identify and rectify cause of dehydration

Appropriate Consultation

- Consult a physician/RN(NP) as soon as possible for any client with signs of moderate to severe dehydration. If the client has presented with severe signs (e.g., shock), prepare client for transfer to hospital.

Non-Pharmacological Interventions

General Principles of Rehydration:

- Therapy is dependent on the amount of fluid lost.
- Fluid therapy involves two components: maintenance (for ongoing fluid losses) and replacement (to correct water and electrolyte deficits).
- The search for the underlying cause of the dehydration should be concurrent with rehydration therapy to prevent the re-emergence of dehydration from ongoing fluid losses.
 - Be sure to calculate required fluid volume as:
 - Known losses (e.g., urine output, emesis) + maintenance fluids + replacement fluids.
 - If client is eating, calculate fluid intake at 75% of total.
 - If hypotonic or isotonic dehydration, calculate total fluids (maintenance + replacement) for the first 24 hours, and give half this amount over the next 8 hours, and the other half over the next 16 hours.
 - In hypertonic dehydration, correct the fluid deficits slowly (over 48 hours).

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Rehydration Methods:

- Oral rehydration therapy is the initial method of treatment unless oral intake is not feasible or the volume of the deficit and the resulting severity of symptoms make IV therapy necessary and transportation out of the community likely.
- Oral rehydration fluids are effective and thus rehydration should be attempted in clients with adequate blood pressure who are able to take fluids orally.
- There are instances where IV therapy is warranted to supplement oral rehydration therapy (e.g., persistent vomiting). Consult a physician/RN(NP) if dehydration is not resolved with oral rehydration and/or up to 1 L of appropriate IV fluid.

Oral rehydration fluids should contain both sodium and sugar to maximize absorption of these two components.

An oral rehydration solution can be made at home with table salt and sugar:

- 1 tsp (5 mL) salt, 8 tsp (40 mL) sugar, 4 cups (1 L) water
- Caution should be used when recommending this as there is potential for a mixing error to occur

Commercial prepared solutions are also available such as Gastrolyte.

Table 2

Conditions Modifying Daily Maintenance Fluid Requirements

Requirements Increased	Requirements Decreased
Fever, sweating	Renal failure
Ongoing significant vomiting or diarrhea	Edematous states (e.g., heart failure, cirrhosis)
Diabetes	Hypothyroidism
Burns	

Note. Adapted from the *First Nations Inuit health: Clinical practice guidelines for nurses in primary care.* p. 5-10, by Health Canada, 2011, Ottawa, ON: Health Canada.

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Replacement

- No formula accurately estimates fluid deficit unless the amount of weight lost 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 determine the degree of dehydration, see Table 1.

The following guidelines will have to be modified in states of hypernatremia and hyponatremia to ensure that no neurologic damage results.

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 initial deficit plus any ongoing loss of fluids through the gastrointestinal and genitourinary tracts and the skin.

Severe Dehydration

- Consultation on a treatment plan must occur with a physician/RN(NP).

Pharmacological Interventions

- The goal in management of dehydration is rehydration of the client. Medications such as anti-diarrheal agents are not generally recommended.
- Please refer to the SRNA CDTs Gastroenteritis Adult and Diarrhea Adult for pharmacological management of these conditions.

Client and Caregiver Education

- Handwashing with soap after toileting, before meals
- Water purification, boil water for 20 minutes or use chlorine tablets or solution
- Ensure meat is fully cooked
- Explain hygienic food preparation practices

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Monitoring and Follow-Up

- Re-evaluate the client with mild symptoms (treated at home) every 24 hours for 2 days. Be sure to recheck the client's weight. Ensure that the client is aware of the signs and symptoms of dehydration and instruct him or her to return immediately if dehydration worsens or if she/he cannot ingest an adequate quantity of fluid.

Referral

- Consult immediately with a physician/RN(NP) for any client with moderate to severe dehydration.
- Consult a physician/RN(NP) for a client with underlying comorbidity (e.g., diabetes, complex medical history) or when diagnosis of underlying cause is uncertain.

DOCUMENTATION

- As per employer policy

REFERENCES

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SASKATCHEWAN REGISTERED NURSES' ASSOCIATION

RNs WITH ADDITIONAL AUTHORIZED PRACTICE CLINICAL DECISION TOOL DECEMBER 1, 2016

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