

HYPONATREMIA; EXERTIONAL

Background

This case definition was developed by the Armed Forces Health Surveillance Division (AFHSD) for the purpose of epidemiological surveillance of exertional hyponatremia among active duty service members. The methodology is intended to capture cases that are preventable through established safety measures designed to mitigate heat-related illness associated with strenuous exertion and inadequate hydration in high ambient-temperature environments.¹

Clinical Description

Hyponatremia is clinically defined as a serum sodium concentration <135mEq/L. If untreated, the condition can result in potentially severe or fatal neurological complications due to hyponatremic encephalopathy. In otherwise healthy, active individuals (e.g., military recruits, endurance athletes), hyponatremia is often the result of excessive intake of hypotonic fluids (water) during prolonged physical exertion and heat stress.²

Case Definition and Incidence Rules (September 2026 - present)

For surveillance purposes, a case of exertional hyponatremia is defined as:

- *One hospitalization* with a case-defining diagnosis of exertional hyponatremia (see ICD9 and ICD10 code lists below)...
 - in the *first* diagnostic position; or
 - in diagnostic positions 1-3; AND at least one “hyponatremia-associated condition” (see ICD9 and ICD10 code lists below) in diagnostic positions 1-3; or
- *One outpatient or Theater Medical Data Store (TMDS) medical encounter* with a case-defining diagnosis of exertional hyponatremia (see ICD9 and ICD10 code lists below)...
 - in the *first* diagnostic position; or
 - in diagnostic positions 1-3; AND at least one “hyponatremia-associated condition” (see ICD9 and ICD10 code lists below) in diagnostic positions 1-3.

Incidence rules:

For individuals who meet the case definition:

- The incidence date is considered the date of the first hospitalization or outpatient medical encounter that includes a case-defining diagnosis of exertional hyponatremia.
- An individual is considered an incident case *once per calendar year*.

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¹ Armed Forces Health Surveillance Center. Update: Exertional Hyponatremia, Active Component, U.S. Armed Forces, 1999-2010. *MSMR*. 2011; 18(3): 12-15.

² Armed Forces Health Surveillance Branch. Update: Exertional Hyponatremia, Active Component, U.S. Armed Forces, 2001-2016. *MSMR*. 2017; 24(3): 19-23.



Case Definition and Incidence Rules *(continued)*

Exclusions:

- Cases of exertional hyponatremia that include any of the “complicating diagnoses” (see ICD9 and ICD10 code lists below) in *any* diagnostic position.

Codes

The following ICD9 and ICD10 codes are included in the case definition:

Condition	ICD-10-CM Codes	ICD-9-CM Codes
Hyponatremia	E87.1 (hypo-osmolality and/or hyponatremia)	276.1 (hypo-osmolality and/or hyponatremia)

Hyponatremia-Associated Conditions

Condition	ICD-10-CM Codes (^ = all digits)	ICD-9-CM Codes
[A] initial encounter, [D] subsequent encounter, [S] sequela		
Fluid overload, somnolence, stupor and coma.	<i>E87.7 (fluid overload)</i>	276.69 (fluid overload)
	- E87.70 (fluid overload, unspecified)	
	- E87.79 (other fluid overload)	
	<i>R40 (somnolence, stupor and coma)</i>	<i>780.0 (alteration of consciousness)</i>
	R40.0 (somnolence)	- 780.09 (other alteration of consciousness)
	R40.1 (stupor)	
	R40.2 (coma)	- 780.01 (coma)
	- R40.20 (unspecified coma)	
	- R40.21^ (coma scale, <i>eyes open...</i>)	
	- R40.211^ (never)	
	- R40.212^ (to pain)	
	- R40.213^ (to sound)	
	- R40.214^ (spontaneous)	
	- R40.22^ (coma scale, <i>best verbal response...</i>)	
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	- R40.221^ (none)	
	- R40.222^ (incomprehensible words)	
	- R40.223^ (inappropriate words)	
	- R40.224^ (confused conversation)	
	- R40.225^ (oriented)	
	- R40.23^ (coma scale, <i>best motor response...</i>)	
	- R40.231^ (none)	
	- R40.232^ (extension)	
	- R40.233^ (abnormal)	
	- R40.234^ (withdrawal)	
	- R40.235^ (localizes pain)	
	- R40.236^ (obeys commands)	
	- R40.24^ (Glasgow coma scale, <i>total score...</i>)	
	- R40.241^ (score 13-15)	
	- R40.242^ (score 9-12)	
	- R40.243^ (score 3-8)	
	- R40.244^ (other coma, without documented Glasgow coma scale score, or with partial score reported)	
	R40.3 (persistent vegetative state)	- 780.03 (persistent vegetative state)
	R40.4 (transient alteration of awareness)	- 780.02 (transient alteration of awareness)
	R41.82 (altered mental status, unspecified)	- 780.97 (altered mental status)
	R56.9 (unspecified convulsions)	- 780.39 (convulsions)
Effects of heat and light	<i>T67 (effects of heat and light)</i>	<i>992 (effects of heat and light)</i>
	T67.0 (heatstroke and sunstroke...)	992.0 (heat stroke and sunstroke)
	- T67.0XX [A,D,S] (initial encounter, subsequent encounter, sequela)	
	T67.1 (heat syncope...)	992.1 (heat syncope)
	- T67.1XX [A,D,S] (initial encounter, subsequent encounter, sequela)	
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	T67.2 (heat cramp...)	992.2 (heat cramps)
	- T67.2XX [A,D,S] (initial encounter, subsequent encounter, sequela)	
	T67.3 (heat exhaustion, anhydrotic...)	992.3 (heat exhaustion, anhydrotic)
	- T67.3XX [A,D,S] (initial encounter, subsequent encounter, sequela)	
	T67.4 (heat exhaustion due to salt depletion...)	992.4 (heat exhaustion due to salt depletion)
	- T67.4XX [A,D,S] (initial encounter, subsequent encounter, sequela)	
	T67.5 (heat exhaustion, unspecified...)	992.5 (heat exhaustion, unspecified)
	- T67.5XX [A,D,S] (initial encounter, subsequent encounter, sequela)	
	T67.6 (heat fatigue, transient...)	992.6 (heat fatigue, transient)
	- T67.6XX [A,D,S] (initial encounter, subsequent encounter, sequela)	
	T67.7 (heat edema...)	992.7 (heat edema)
	- T67.7XX [A,D,S] (initial encounter, subsequent encounter, sequela)	
	T67.8 (other effects of heat and light...)	992.8 (other specified heat effects)
	- T67.8XX [A,D,S] (initial encounter, subsequent encounter, sequela)	
	T67.9 (effect of heat and light, unspecified...)	992.9 (unspecified effects of heat)
	- T67.9XX [A,D,S] (initial encounter, subsequent encounter, sequela)	
Rhabdomyolysis	M62.82 (rhabdomyolysis)	728.88 (rhabdomyolysis)

Complicating Diagnoses (Exclusions)

ICD-10-CM Codes (^ = all digits)

ICD-9-CM Codes (* = all digits)

A00.^ - A09.^ (intestinal infectious diseases)	001.* - 009.* (intestinal infectious diseases)
C00.^ - D49.^ (neoplasms)	140.* - 239.* (neoplasms)
E00.^ - E36.^ (disorders of thyroid gland, diabetes mellitus, other disorders of glucose regulation and pancreatic internal secretion, and disorders of other endocrine glands.	240.* - 259.* (diseases of thyroid and other endocrine glands)
F01.^ - F99.^ (mental, behavioral and neurodevelopmental disorders)	290.* - 319.* (mental, behavioral and neurodevelopmental disorders)
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S83.0^ - S83.3^ (dislocation joints and ligaments of knee) S93.0^ -S93.3^ (dislocation ankle, foot and toe)	
S06.^ (intracranial injury)	85.1* - 854.* (intracranial injury, excluding those with skull fracture) Note: Does not include 850 (concussion)
S27.^ (injury of other and unspecified intrathoracic organs)	860.* - 869.* (internal injury of thorax, abdomen, and pelvis)
S~~~~S, T~~~~S (injury, poisonings and certain other consequences of external causes, <i>sequela</i>)	905.* - 909.* (late effects of injuries, poisoning, toxic effects and other external causes)
S^1~~~~ - S01.^ (open wound of head) - S11.^ (open wound of neck) - S21.^ (open wound of thorax) - S31.^ (open wound of abdomen, lower back, pelvis and external genitals) - S41.^ (open wound of shoulder and upper arm) - S51.^ (open wound of elbow and forearm) - S61.^ (open wound of wrist, hand, fingers) - S71.^ (open wound of hip and thigh) - S81.^ (open wound of knee and lower leg) - S91.^ (open wound of ankle, foot and toes)	870.* - 897.* (open wounds)
S[1-9]5~~~~ - S15.^ (injury of blood vessels at neck level) - S25.^ (injury of blood vessels of thorax) - S35.^ (injury of blood vessel sat abdomen, lower back, and pelvis level) - S45.^ (injury of blood vessels at shoulder and upper arm level) - S55.^ (injury of blood vessels at forearm level) - S65.^ (injury of blood vessels at wrist and hand level) - S75.^ (injury of blood vessels at hip and thigh level) - S85.^ (injury of blood vessels lower leg level) - S95.^ (injury of blood vessels at ankle and foot level)	900.* - 904.* (injury to blood vessels)
T16.^ - T19.^ (effects of foreign body entering through orifice)	931.* - 939.* (effects of foreign body entering through orifice)
T20.^ - T32.^ (burns and corrosions)	940.* - 949.* (burns)

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T36.^ - T50.^ (poisoning by, adverse effect of and under-dosing of drugs, medicaments and biological substances)	960.* - 979.* (poisoning by drugs, medicinal and biological substances)
T51.^ - T65.^ (toxic effects of substances chiefly non-medicinal as source)	980.* - 989.* (toxic effects of substances chiefly nonmedicinal as to source)
T80.^ - T88.^ (complications of surgical and medical care, not elsewhere classified)	996.* - 999.* (complications of surgical and medical care, not elsewhere classified)
Z08.^ - Z09.^ (encounter for follow-up examination after completed treatment for malignant neoplasm, encounter for follow-up examination after completed treatment for conditions other than malignant neoplasm)	V67.0 (examination following surgery)
Z40.^ - Z51.^ (encounters for other specific health care)	V50-V56 (health services for specific procedures and aftercare)
Z98.^ (other postprocedural states)	V45 (other postprocedural states)

Development and Revisions

- In March of 2017 the case definition was updated to include ICD10 codes.
- This case definition was originally developed in 1997 by the Army Medical Surveillance Activity (AMSA) for an article on hyponatremia. Interest in the condition developed in the summer of 1997 when Army training centers reported eight hospitalizations of soldiers for hyponatremia secondary to excessive water consumption during military training in hot weather—one case was fatal, and several others required intensive medical care.³ The Armed Forces Health Surveillance Center (AFHSC) further developed the case definition in March 2011.

Case Definition and Incidence Rule Rationale

- *Exclusions:* Cases of hyponatremia associated with substance abuse, mental disorders, endocrine disorders, kidney disease, infectious disease, cancer, major trauma, or complications of medical care are excluded from the definition. These cases are outside the intended scope of the definition and are less preventable through standard safety protocols. To ensure comprehensiveness, the exclusion criteria for the case definition were expanded in 2011.

Code Set Determination and Rationale

- An ICD9 code specific for rhabdomyolysis (728.88) was added to the ICD-9-CM in 2004. Consequently, identifying historical cases of rhabdomyolysis-associated hyponatremia prior to this update is challenging, unless the hyponatremia is in the first diagnostic position and other associated conditions are explicitly documented in the medical record.
- *ICD10 7th position character codes:* To maximize case-finding sensitivity, the case definition includes codes with “A” (initial encounter), “D” (subsequent encounter) and “S” (sequela) in the 7th position. While including subsequent encounter and sequela codes could overestimate incident cases by counting follow-up care as new events, the risk is mitigated by the *once per calendar year* incidence rule.

³ Army Medical Surveillance Activity. Hyponatremia associated with heat stress and excessive water consumption: Fort Benning, GA; Fort Leonard Wood, MO; Fort Jackson, SC June -August 1997. *MSMR*. 1997; 3(6): 2-8.



Reports

The AFHSD reports on hyponatremia in the following reports:

- Periodic *MSMR* articles.

Review

Sep 2026	Case definition reviewed and updated by <i>MSMR</i> staff; approved by the AFHSD Surveillance Methods and Standards (SMS) working group.
Mar 2017	Case definition reviewed and updated by the Armed Forces Health Surveillance Branch (AFHSB) Surveillance Methods and Standards (SMS) working group.
Jul 2011	Case definition reviewed and adopted by the AFHSC Surveillance Methods and Standards (SMS) working group.
Mar 2011	Case definition developed by the AFHSC <i>MSMR</i> staff.

Comments

None

