

## **HYPONATREMIA; EXERTIONAL**

### **Background**

This case definition was developed by the Armed Forces Health Surveillance Branch (AFHSB) for the purpose of epidemiological surveillance of exertional hyponatremia. The case definition is intended to cases potentially preventable through well-known measures to safeguard healthy service members training or carrying out their duties under conditions associated with high ambient temperature and strenuous exertion.

### **Clinical Description**

Hyponatremia is defined as a low concentration of sodium in the blood (i.e., serum sodium concentration  $<135\text{mEq/L}$ ); it can have serious and sometimes fatal clinical effects. In otherwise healthy, physically active adults (e.g., long distance runners, military recruits), hyponatremia is often associated with excessive water consumption during prolonged physical exertion (exertional hyponatremia), particularly during heat stress.<sup>1</sup>

### **Case Definition and Incidence Rules**

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

- *One hospitalization or outpatient medical encounter* with a case defining diagnosis of exertional hyponatremia (see ICD9 and ICD10 code lists below) in the *primary* diagnostic position.
- *One hospitalization or outpatient medical encounter* with a case defining diagnosis of exertional hyponatremia in *any* diagnostic position PLUS *at least one* 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 defining diagnosis of exertional hyponatremia.
- An individual is considered an incident case only *once per calendar year*.

#### **Exclusions:**

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

<sup>1</sup> Armed Forces Health Surveillance Center. Update: Exertional Hyponatremia, Active Component, U.S. Armed Forces, 1999-2010. *Medical Surveillance Monthly Report (MSMR)*. March 2011 Vol 18(3): 12-15.



## 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)

## Associated Conditions

Condition	ICD-10-CM Codes	ICD-9-CM Codes
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)	- 780.01 (coma)
	R40.2 (coma)	
	- R40.20 (unspecified coma)	
	- R40.21^ (coma scale, eyes open)	
	- R40.211^ (coma scale, eyes open, never)	
	- R40.212^ (coma scale, eyes open, to pain)	
	- R40.213^ (coma scale, eyes open, to sound)	
	- R40.214^ (coma scale, eyes open, spontaneous)	
	- R40.22^ (coma scale, best verbal response)	
	- R40.221^ (coma scale, best verbal response, none)	
	- R40.222^ (coma scale, best verbal response, incomprehensible words)	
- R40.223^ (coma scale, best verbal response, inappropriate words)		
- R40.224^ (coma scale, best verbal response, confused conversation)		
- R40.225^ (coma scale, best verbal response, oriented)		



	- R40.23^ (coma scale, best motor response)	
	- R40.231^ (coma scale, best motor response, none)	
	- R40.232^ (coma scale, best motor response, extension)	
	- R40.233^ (coma scale, best motor response, abnormal)	
	- R40.234^ (coma scale, best motor response, flexion withdrawal)	
	- R40.235^ (coma scale, best motor response, localizes pain)	
	- R40.236^ (coma scale, best motor response, obeys commands)	
	- R40.24^ (Glasgow coma scale, total score)	
	- R40.241^ (Glasgow coma scale score 13-15)	
	- R40.242^ (Glasgow coma scale score 9-12)	
	- R40.243^ (Glasgow coma scale 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)	
	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)

**Exclusions: Complicating Diagnoses**

**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)
G00.^ - G09.^ (inflammatory diseases of the central nervous system)	320.* - 326.* (inflammatory diseases of the central nervous system)



G10.^ - G13.^ (systemic atrophies primarily affecting the central nervous system)	330.* - 337.* (hereditary and degenerative diseases of the central nervous system)
G20.^ - G32.^ (extrapyramidal and movement disorders, other degenerative diseases of the nervous system)	
J12.^ - J18.^ (pneumonia)	480.* - 486.* (pneumonia)
K20.^ - K31.^ (diseases of the esophagus, stomach, duodenum)	530.* - 539.* (diseases of esophagus, stomach and duodenum)
K35.^ - K38.^ (diseases of the appendix)	540.* - 543.* (appendicitis)
K50.^ - K52.^ (noninfectious enteritis and colitis)	555.* - 558.* (noninfectious enteritis and colitis)
K55.^ - K64.^ (other diseases of intestines)	560.* - 569.* (other diseases of intestines and peritoneum)
K65.^ - K95.^ (diseases of the peritoneum and retroperitoneum, diseases of the liver, disorders of gallbladder, biliary tract and pancreas, and other diseases of the digestive system)	570.* - 579.* (other diseases of digestive system)
N00.^ - N23.^ (glomerular disease, renal tubule-interstitial diseases, acute kidney failure and chronic kidney disease, urolithiasis)	580.* - 589.* (nephritis, nephrotic syndrome, and nephrosis)
N25.^ - N39.^ (other disorders of kidney and ureter, other diseases of the urinary system)	590.* - 599.* (other diseases of urinary system)
N70.^ - N77.^ (inflammatory diseases of female pelvic organs)	614.* - 616.* (inflammatory disease of female pelvic organs)
N80.^ - N99.^ (noninflammatory disorders of female genital tract, intraoperative and postprocedural complications and disorders of genitourinary system, not elsewhere classified)	617.* - 629.* (other disorders of female genital tract)
O00.^ - O9A.^ (pregnancy, childbirth, and the puerperium)	630.* - 679.* (complications of pregnancy, childbirth, and the puerperium)
P00.^ - P96.^ (certain conditions originating in the perinatal period)	760.* - 779.* certain conditions originating in the perinatal period)
S^2^ (fractures)	800.* - 829.* (fractures)
S03.0^ - S03.2^ (dislocations head) S13.0^ - S13.2^ (dislocations neck) S23.0^ - S23.2^ (dislocations thorax) S33.0^ - S33.4^ (dislocations lumbar spine and pelvis) S43.0^ - S43.3^ (dislocations shoulder girdle) S53.0^ - S53.3^ (dislocations elbow and forearm) S63.0^ - S63.4^ (dislocations wrist, hand, fingers) S73.0^ - S73.4^ (dislocations hip and thigh) S83.0^ - S83.3^ (dislocation joints and ligaments of knee)	830.* - 839.* (dislocations)

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^T^S, T^T^S (injury, poisonings and certain other consequences of external causes, <i>sequela</i> )	905.* - 909.* (late effects of injuries, poisonings, toxic effects and other external causes)
S^1^ <ul style="list-style-type: none"> <li>- S01.^ (open wound of head)</li> <li>- S11.^ (open wound of neck)</li> <li>- S21.^ (open wound of thorax)</li> <li>- S31.^ (open wound of abdomen, lower back, pelvis and external genitals)</li> <li>- S41.^ (open wound of shoulder and upper arm)</li> <li>- S51.^ (open wound of elbow and forearm)</li> <li>- S61.^ (open wound of wrist, hand, fingers)</li> <li>- S71.^ (open wound of hip and thigh)</li> <li>- S81.^ (open wound of knee and lower leg)</li> <li>- S91.^ (open wound of ankle, foot and toes)</li> </ul>	870.* - 897.* (open wounds)
S[1-9]5^ <ul style="list-style-type: none"> <li>- S15.^ (injury of blood vessels at neck level)</li> <li>- S25.^ (injury of blood vessels of thorax)</li> <li>- S35.^ (injury of blood vessel sat abdomen, lower back, and pelvis level)</li> <li>- S45.^ (injury of blood vessels at shoulder and upper arm level)</li> <li>- S55.^ (injury of blood vessels at forearm level)</li> <li>- S65.^ (injury of blood vessels at wrist and hand level)</li> <li>- S75.^ (injury of blood vessels at hip and thigh level)</li> <li>- S85.^ (injury of blood vessels lower leg level)</li> <li>- S95.^ (injury of blood vessels at ankle and foot level)</li> </ul>	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)
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 nonmedicinal as to 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. In the summer of 1997, 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.<sup>2</sup>

### Case Definition and Incidence Rule Rationale

- Cases of hyponatremia that are less susceptible to prevention through organized procedures and practices may be associated with alcohol/illicit drug abuse, mental disorders, endocrine disorders, kidney diseases, infectious diseases, cancers, major traumatic injuries, or complications of medical care (see complete, detailed list under *Exclusions: Complicating Diagnoses* [above]) and are excluded from this definition. The exclusionary conditions have been expanded for this case definition and are more numerous than the conditions previously used for this definition.

### Code Set Determination and Rationale

- The diagnostic code specific for rhabdomyolysis, (i.e., 728.88) was added to the ICD-9-CM in 2004. Therefore, it may not be possible to detect cases of hyponatremia associated with rhabdomyolysis prior to that time if the hyponatremia diagnosis was not in the first diagnostic position and there were no other associated conditions documented in the record.
- The case definition includes codes with 7<sup>th</sup> digits “A” (initial encounter), “D” (subsequent encounter) and “S” (sequela). Analyses using these codes might increase the sensitivity of case-finding in health care records. Given that the incidence rules permit an individual to be considered an incident case *only once per calendar year*, it would be unlikely for combinations of diagnoses with A, D, and S 7<sup>th</sup> digits in a patient’s record to be counted as repeat events.

<sup>2</sup> 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. *Medical Surveillance Monthly Report (MSMR)*. 1997 Sep; 3(6): 2-8.



---

**Reports**

---

AFHSB reports on hyponatremia in the following reports:

- Annual *MSMR* update. The most recent update was in March 2017.<sup>3</sup>

---

**Review**

---

Mar 2017	Case definition reviewed and updated by the 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 and reviewed by the AFHSC <i>MSMR</i> staff.

---

**Comments**

---

None

---

<sup>3</sup> Armed Forces Health Surveillance Branch. Update: Exertional hyponatremia, active component, U.S. Armed Forces, 2001 - 2016. *Medical Surveillance Monthly Report (MSMR)*. 2017 March; Vol 24 (3)19-23.

