

Hyperbaric Oxygen Therapy

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Definition

For the purposes of coverage by the Plan, hyperbaric oxygen therapy (HBOT) is a modality in which the entire body is exposed to pure oxygen (100%) under increased atmospheric pressure (> 1 atmospheres absolute [ATM]). The therapy is conducted in either a monoplace chamber (pure O₂ delivery under pressure) or in a larger multiplace chamber (O₂ delivery under pressure with compressed air where the patient receives pure O₂ by mask, head tent or endotracheal tube).

HBOT has been established as the primary therapy in treating medical disorders such as carbon monoxide poisoning and gas gangrene. The therapy is also considered acceptable in treating acute vascular compromise and as adjuvant therapy in the management of disorders that are refractory to standard medical and surgical care, including acute ischemic injury, crush injuries, acute peripheral arterial insufficiency, compromised skin grafts, osteomyelitis, radiation necrosis of bone or soft tissue and cyanide poisoning.

Guideline

(See also [Topical Oxygen Wound Therapy for Medicaid/FHP members](#))

Members are eligible for coverage of chamber-administered HBOT (including the one-man unit) for any of the following conditions:

1. Acute carbon monoxide intoxication
2. Decompression illness.
3. Gas embolism.
4. Gas gangrene.
5. Acute traumatic peripheral ischemia.
6. Crush injuries and suturing of severed limbs.
7. Progressive necrotizing infections (necrotizing fasciitis, Meleney's ulcer).
8. Acute peripheral arterial insufficiency.
9. Preparation and preservation of compromised skin grafts (not primary management of wounds).

10. Chronic refractory osteomyelitis unresponsive to conventional medical and surgical management. (Prerequisite — assessment of vascular status and correction of any vascular problems in the affected limb if possible; see [Chronic refractory osteomyelitis](#))
11. Osteoradionecrosis, as an adjunct to conventional treatment (including pre- and post-treatment for dental extractions or dental surgery)
12. Soft tissue radionecrosis, as an adjunct to conventional treatment.
13. Cyanide poisoning.
14. Actinomycosis, as an adjunct to conventional treatment.
15. Diabetic wounds of the lower extremities. (Prerequisite — assessment of vascular status including objective vascular testing, and correction of any vascular problems in the affected limb if possible; see [Diabetic wounds of the lower extremities](#))
16. Idiopathic sudden sensorineural hearing loss (ISSHL) when HBOT is initiated within 3 months after onset.

HBOT should not replace successful standard therapeutic measures. Depending upon the response of the member and the severity of the condition, treatment may range from < 1 week to several months. The average duration of HBOT is 2–4 weeks.

Suggested Protocols per Indication (Subject to demonstration of medical necessity; see [Documentation](#))

Actinomycosis

A bacterial infection caused by *Actinomyces israelii*; symptoms include slow growing granulomas that later break down, discharging viscid pus-containing minute yellowish granules. Treatment includes prolonged administration of antibiotics (penicillin and tetracycline); surgical incision and draining of accessible lesions may also be helpful. Only after the disease process has been shown refractory to antibiotics and surgery could HBOT be deemed medically necessary. HBOT must be utilized as an adjunct to conventional therapy.

Acute carbon monoxide poisoning (aka carbon monoxide intoxication)

Acute carbon monoxide poisoning induces hypoxic stress and may result in injury to the cardiac and central nervous systems. HBOT produces a higher rate of dissociation of carbon monoxide from hemoglobin than occurs at sea level pressure. Chamber-pressure should be between 2.5–3.0 ATA. Members with persistent neurological dysfunction may require subsequent treatments within 6–8 hours, continuing once or twice daily until there is no further improvement in cognitive functioning.

Acute traumatic ischemia

Treatment typically consists of three 1.5-hour treatment periods per day for the first 48 hours. An additional two 1.5-hour sessions per day for the next 48 hours may be also required. On days 5 and 6, one 1.5-hour session would typically be offered.

Chronic refractory osteomyelitis

Chronic refractory osteomyelitis persists or recurs following appropriate interventions, which include all of the following:

1. Antibiotic use (treatment course no < 90 days).
2. Abscess drainage.
3. Immobilization of the affected extremity.
4. Surgical débridements with removal of the sequestrum.

HBOT is an adjunctive therapy used with the appropriate antibiotics and surgical debridement to eliminate the dead bone. Antibiotics are chosen on the basis of bone culture and sensitivity studies.

HBOT can elevate the oxygen tensions found in infected bone to normal or above normal levels. This mechanism enhances healing and the body's antimicrobial defenses. It is believed that HBOT augments the efficacy of certain antibiotics (gentamicin, tobramycin and amikacin). Finally, the body's osteoclast function of removing necrotic bone is dependent upon a proper oxygen tension environment, which HBOT can provide.

HBOT is typically delivered daily at a pressure of 2.0–2.5 ATA for 90–120 minutes following major debridement surgery. The number of treatments required varies on an individual basis.

HBOT may be covered for members with for chronic refractory osteomyelitis who have been unresponsive to conventional medical and surgical management for three months.

Clostridial myositis and myonecrosis (gas gangrene)

Gas gangrene is an acute, rapidly growing invasive infection of the muscle characterized by profound toxemia, extensive edema, massive death of tissue and variable degree of gas production. The most prevalent toxin is the alpha-toxin, which is hemolytic, tissue-necrotizing and lethal.

The diagnosis of gas gangrene is based on clinical data supported by a positive gram-stained smear or culture obtained from tissue fluids. X-ray radiographs, if obtained, can visualize tissue gas.

Onset can occur one to six hours after injury and presents with severe and sudden pain at the infected area. The skin overlying the wound progresses from shiny and tense, to dusky, then bronze in color. Hemorrhagic vesicles may be noted. A thin, sweet-odored exudate is present. Swelling and edema occur. The noncontractile muscles progress to dark red to black in color. The infection can progress as rapidly as 6 inches per hour.

The goal of HBOT is to stop alpha-toxin production, thereby inhibiting further bacterial growth at which point the body can use its own host defense mechanisms.

HBOT is initiated as soon as the clinical picture presents (supported by a positive gram-stained smear) and is utilized as an adjunct to antibiotic therapy and surgery.

Initial surgery may be limited to opening the wound. Debridement of necrotic tissue can be performed between HBOT sessions when clear demarcation between dead and viable tissue is evident.

Treatment of HBOT typically consists of oxygen administered at 3.0 ATA for 90 minutes 3 times in the first 24 hours. Over the next 4–5 days, twice-daily sessions are usual. The earlier the HBOT-initiation, the better the outcome in terms of life, limb and tissue-sparing.

Compromised skin grafts

HBOT typically starts at 2 treatments per day and is then reduced to 1 per day when the graft appears stable. Treatment for normal, uncompromised skin grafts or flaps is not medically necessary.

Crush injuries and suturing of severed limbs, acute traumatic peripheral ischemia (ATI) and acute peripheral arterial insufficiency associated with arterial embolism and thrombosis

Acute traumatic ischemia is the result of injury by external force or violence compromising circulation to an extremity. The extremity is then at risk for necrosis or amputation. Secondary complications are frequently seen and include infection, non-healing wounds and non-united fractures.

The goal of HBOT is to enhance oxygen at the tissue level to support viability. When tissue oxygen tensions fall below 30mm Hg, the body's ability to respond to infection and wound repair is compromised. With treatment at 2–2.4 ATA, tissue oxygen tension is raised to a level such that the body's responses can become functional again. The benefits of HBOT for this indication are:

1. Increased oxygen delivery per unit of blood flow or enhanced tissue oxygenation.
2. Edema reduction and reduction in infection complication rates, nonunion and amputation.

Treatment typically consists of three 1.5 hour periods daily for the first 48 hours. Additionally, two 1.5 hour sessions daily for the next 48 hours may be required. On days 5 and 6, one 1.5 hour session is typically given. At this point, outcomes of restored perfusion, edema reduction and either demarcation or recovery would be sufficient to guide discontinuing further treatments.

For ATI, crush injuries and suturing of severed limbs, HBOT is a valuable adjunctive treatment in combination with accepted standard therapeutic measures when loss of function, limb or life is threatened. Arterial insufficiency ulcers may be treated by HBOT if they persist after reconstructive surgery has restored large vessel function.

Cyanide poisoning

Cyanide poisoning carries a high risk of mortality. Victims of smoke inhalation frequently suffer from both carbon monoxide and cyanide poisoning.

The traditional antidote for cyanide poisoning is the infusion of sodium nitrite. This treatment can potentially impair the oxygen carrying capacity of hemoglobin. Using HBOT as an adjunct therapy adds the benefit of increased plasma dissolved oxygen; however, its benefit for pulmonary injury related to smoke inhalation remains experimental.

Treatment typically consists of oxygen administration at 2.5–3.0 ATA for up to 120 minutes during the initial session. Most patients with combination cyanide and carbon monoxide poisoning require only one treatment.

Decompression illness

Gas bubbles in tissue or blood, in volumes sufficient enough to interfere with organ function or to cause alteration in sensation resulting from rapid decompression during ascent, presents clinical manifestations ranging from skin eruptions to shock and death.

HBOT with mixed gases is the treatment of choice. The result is immediate reduction in bubble-volume. The treatment prescription is highly variable and case-specific with depths that could range from between 60–165 feet of sea water for durations of 1.5 to > 14 hours. The member may or may not require repeat dives.

Diabetic wounds of the lower extremities

All 3 must be met:

1. Member has type I or type II diabetes with a lower extremity wound secondary to diabetes.
2. Wound classified as ≥ 3 on the [Wagner Scale](#).
3. Failure of adequate course of standard wound therapy, as defined by all of the following:
 - a. Assessment of vascular status and correction of any vascular problems in the affected limb if possible
 - b. Optimization of nutritional status
 - c. Optimization of glucose control
 - d. Debridement by any means to remove devitalized tissue
 - e. Maintenance of clean, moist bed of granulation tissue with appropriate moist dressings
 - f. Appropriate off-loading¹
 - g. Necessary treatment to resolve any infection that might be present

¹ For individuals with neuropathic diabetic foot ulcers, total contact casting (or devices where patient removal is detectable) has been shown to heal a higher proportion of wounds in a shorter amount of time than either patient removable cast walkers or half shoes. In practice, patients with patient removable devices were off-loaded for only 22% of steps taken. Failure to adequately off-load the foot exposes the wound to repetitive stress during activity. If, after evaluation at a tertiary care wound center, the patient is not considered a candidate for non-removable devices, then HBOT could be approved.

HBOT is indicated as an adjunctive therapy only when standard wound treatment has failed (failure is defined as no measurable signs of healing for at least 30 consecutive days).

Failure of transcutaneous oxygen measurements to demonstrate adequate local blood flow with which to effect improvement (within any 30-day treatment period) will result in continued treatments to be considered not medically necessary.

Gas embolism

Gas embolism occurs when gases enter the venous or arterial vasculature embolizing in a large enough volume to compromise organ or body-part function and results in ischemia to the affected areas.

Air emboli may occur as a result of surgical procedures (e.g., cardiovascular surgery, intra-aortic balloons, arthroplasties, or endoscopies), use of monitoring devices (e.g., Swan-Ganz introducer, infusion pumps), in nonsurgical patients (e.g., diving, ruptured lung in respirator-dependent patient, injection of fluids into tissue space) or traumatic injuries (e.g., gunshot wounds, penetrating chest injuries).

HBOT, the treatment of choice, is most effective when initiated early and is directed toward reducing the gas-bubble volume and increasing the diffusion gradient of the embolized gas. Treatment modalities range from high pressure to low pressure mixed gas dives.

Gas gangrene

HBOT typically consists of oxygen administration at 3.0 ATM for 90 minutes, three times in the first 24 hours. The frequency is decreased to twice daily over the next 4–5 days.

Osteoradionecrosis and soft tissue radionecrosis

HBOT for osteoradionecrosis and soft tissue radionecrosis is one part of an overall plan of care that also includes debridement or resection of nonviable tissue in conjunction with antibiotic therapy. Soft tissue flap reconstruction and bone grafting may also be indicated.

HBOT can be indicated in the preoperative and postoperative management of existing osteoradionecrosis or soft tissue radionecrosis and may be utilized prophylactically for dental procedures or as an adjunct to conventional therapy.

Patients who suffer from soft tissue damage or bone necrosis present with disabling, progressive, painful tissue breakdown (i.e., wound dehiscence, infection, tissue loss and graft or flap loss). The HBOT goal is to increase oxygen tension in both hypoxic bone and tissue in order to stimulate growth in functioning capillaries, fibroblastic proliferation and collagen synthesis.

Recommended daily treatment consists of 90–120 minutes at 2.0–2.5 ATA with treatment duration highly individualized and variable per case.

Progressive necrotizing infections (necrotizing fasciitis)

Principal treatment consists of surgical debridement and systemic antibiotics. HBOT is recommended as an adjunct only in those settings where mortality and morbidity are expected to be high despite aggressive standard treatment.

Progressive necrotizing fasciitis is a relatively rare infection that is usually a result of a group A streptococcal infection beginning with severe or extensive cellulitis that spreads to involve the superficial and deep fascia, producing thrombosis of the subcutaneous vessels and gangrene of the underlying tissues. A cutaneous lesion often serves as a portal of entry for the infection, but occasionally no such lesion is found.

The histologic hallmark is extensive inflammation and necrosis of the subcutaneous fat, fascia and muscle. Numerous polymorphonuclear leukocytes and mononuclear cells are present in the upper layers of the dermis.

HBOT may be a beneficial adjunct for a subset of patients with anaerobic gram negative necrotizing fasciitis. The recommended protocol is 90 minutes at 2.5 ATA every 8 hrs for the first day and then twice daily for a total or maximum of 10 treatments.

Preparation and preservation of compromised skin grafts

Note: HBOT does not apply to the initial preparation of a body site for a graft, nor is it considered medically necessary for normal, uncompromised skin grafts or flaps.

HBOT may be utilized for graft or flap salvage in cases where hypoxia or decreased perfusion has compromised viability. This indication is not for primary management of wounds. HBOT enhances flap survival.

Treatments are administered at a pressure of 2.0–2.5 ATA from 90–120 minutes; twice-daily is not atypical and is reduced to daily when the graft or flap appears stable. Should a graft or flap fail, HBOT may be used to prepare the already compromised recipient site for a new graft or flap.

Documentation

HBOT should not be a replacement for successful standard therapeutic measures. Treatment may range from < 1 week to several months in duration. The average treatment time frame is 2–4 weeks; however, duration is dependent upon the member's severity of illness and HBOT response. Documentation must clearly indicate the reason(s) why HBOT should continue for > 40 treatment sessions.

Documentation in the medical record should support medical necessity and must be submitted (inclusive of photos) upon request. The following information must be documented, as applicable, to the specific medical condition:

1. Initial assessment and medical history detailing the condition requiring HBOT and a physical exam. The history should list prior treatments including antibiotic therapy and surgical interventions.
2. Current adjunctive treatment that includes treatment-type and its effectiveness.
3. Physician progress notes and any communication between physicians detailing past or proposed treatments.
4. Established HBOT goals.
5. HBOT session records describing physical findings and treatment rendered (including ascent, descent and total compression times, oxygen dose, pressurization level, documentation of attendance and a recording of events).
6. Effect of treatment upon established HBOT goals.
7. Condition-specific information such as the following, as applicable:
 - a. Laboratory tests (positive Gram-stain smear or culture) to confirm gas gangrene diagnosis.
 - b. Radiographic tests to confirm gas gangrene clinical diagnosis.
 - c. Threatened loss of function, limb or life.
 - d. Surgical and pathology reports for treatment of necrotizing fasciitis.
 - e. Definitive radiographic findings or positive bone culture with sensitivity studies to confirm osteomyelitis diagnosis and failed antibiotic therapy and surgical management.
 - f. History of radiation therapy (including date and anatomical site) with documentation of fracture or resorption of bone and radiographic studies, if available, to confirm osteoradionecrosis diagnosis.
 - g. History of radiation therapy and clinical photographs of necrotic site in support of HBOT medical necessity for soft tissue radionecrosis.

- h. Presence of type I or type II diabetes with a lower extremity wound secondary to diabetes that is classified as ≥ 3 on the [Wagner scale](#) and which has failed to respond to an adequate course of [standard therapy](#).
- i. For treatment of diabetic wounds of the lower extremities, documentation must also reflect that there have been no measurable signs of healing for at least 30 consecutive days of treatment with standard wound therapy and that HBOT is used in addition to standard wound care with wound evaluation at least every 30 days during HBOT.

Table 1 – Wagner’s Classification

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| GRADE 0 | At-risk foot, preulcerative lesion (callus), healed ulcers, presence of bony deformity or cellulitis. |
| GRADE 1 | Superficial ulcer without subcutaneous tissue involvement. |
| GRADE 2 | Penetration through subcutaneous tissue: may expose bone, tendon, ligament, joint capsule or deep fascia without abscess or osteomyelitis. |
| GRADE 3 | Deep ulcer with abscess, osteomyelitis or joint sepsis. |
| GRADE 4 | Gangrene localized to a portion of the forefoot or heel. |
| GRADE 5 | Gangrene of the whole foot. |

Limitations/Exclusions

1. Topical oxygen application is not considered medically necessary, as its efficacy has not been established in the medical literature and it does not fall within the HBOT definition as put forth in the Definition section of this guideline. (See [Topical Oxygen Wound Therapy for Medicaid/FHP members](#))
2. HBOT is contraindicated during pregnancy, except in cases of carbon monoxide poisoning where it is specifically indicated.
3. HBOT is not considered medically necessary for any of the following conditions:
 - a. Acute cerebral edema
 - b. Acute or chronic cerebral vascular insufficiency
 - c. Acute thermal and chemical pulmonary damage, i.e., smoke inhalation with pulmonary insufficiency
 - d. Aerobic septicemia
 - e. Alzheimer’s disease
 - f. Anaerobic septicemia and infection other than clostridial
 - g. Arthritic diseases
 - h. Autism disorder
 - i. Cardiogenic shock
 - j. Chronic peripheral vascular insufficiency
 - k. Cutaneous, decubitus and stasis ulcers
 - l. Exceptional blood loss anemia
 - m. Hepatic necrosis
 - n. Korsakoff’s disease
 - o. Multiple sclerosis
 - p. Myocardial infarction
 - q. Nonvascular causes of chronic brain syndrome
 - r. Organ storage
 - s. Organ transplantation
 - t. Pick’s disease

- u. Pulmonary emphysema
- v. Senility
- w. Sickle cell anemia
- x. Skin burns (thermal)
- y. Systemic aerobic infection
- z. Tetanus

Applicable Procedure Codes

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| 99183 | Physician or other qualified health care professional attendance and supervision of hyperbaric oxygen therapy, per session |
| G0277 | Hyperbaric oxygen under pressure, full body chamber, per 30 minute interval |

Applicable ICD-10 Diagnosis Codes

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| A42.0 | Pulmonary actinomycosis |
| A42.1 | Abdominal actinomycosis |
| A42.2 | Cervicofacial actinomycosis |
| A42.81 | Actinomycotic meningitis |
| A42.82 | Actinomycotic encephalitis |
| A42.89 | Other forms of actinomycosis |
| A42.9 | Actinomycosis, unspecified |
| A43.0 | Pulmonary nocardiosis |
| A43.1 | Cutaneous nocardiosis |
| A43.8 | Other forms of nocardiosis |
| A43.9 | Nocardiosis, unspecified |
| A48.0 | Gas gangrene |
| B47.1 | Actinomycetoma |
| B47.9 | Mycetoma, unspecified |
| E08.51 | Diabetes mellitus due to underlying condition with diabetic peripheral angiopathy without gangrene |
| E08.52 | Diabetes mellitus due to underlying condition with diabetic peripheral angiopathy with gangrene |
| E08.59 | Diabetes mellitus due to underlying condition with other circulatory complications |
| E08.621 | Diabetes mellitus due to underlying condition with foot ulcer |
| E08.622 | Diabetes mellitus due to underlying condition with other skin ulcer |
| E08.628 | Diabetes mellitus due to underlying condition with other skin complications |
| E09.51 | Drug or chemical induced diabetes mellitus with diabetic peripheral angiopathy without gangrene |
| E09.52 | Drug or chemical induced diabetes mellitus with diabetic peripheral angiopathy with gangrene |
| E09.59 | Drug or chemical induced diabetes mellitus with other circulatory complications |
| E09.621 | Drug or chemical induced diabetes mellitus with foot ulcer |
| E09.622 | Drug or chemical induced diabetes mellitus with other skin ulcer |
| E09.628 | Drug or chemical induced diabetes mellitus with other skin complications |
| E10.51 | Type 1 diabetes mellitus with diabetic peripheral angiopathy without gangrene |
| E10.52 | Type 1 diabetes mellitus with diabetic peripheral angiopathy with gangrene |
| E10.59 | Type 1 diabetes mellitus with other circulatory complications |
| E10.618 | Type 1 diabetes mellitus with other diabetic arthropathy |

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| E10.620 | Type 1 diabetes mellitus with diabetic dermatitis |
| E10.621 | Type 1 diabetes mellitus with foot ulcer |
| E10.622 | Type 1 diabetes mellitus with other skin ulcer |
| E10.628 | Type 1 diabetes mellitus with other skin complications |
| E10.65 | E10.65 Type 1 diabetes mellitus with hyperglycemia |
| E10.69 | E10.69 Type 1 diabetes mellitus with other specified complication |
| E11.51 | Type 2 diabetes mellitus with diabetic peripheral angiopathy without gangrene |
| E11.52 | Type 2 diabetes mellitus with diabetic peripheral angiopathy with gangrene |
| E11.59 | Type 2 diabetes mellitus with other circulatory complications |
| E11.618 | Type 2 diabetes mellitus with other diabetic arthropathy |
| E11.620 | Type 2 diabetes mellitus with diabetic dermatitis |
| E11.621 | Type 2 diabetes mellitus with foot ulcer |
| E11.622 | Type 2 diabetes mellitus with other skin ulcer |
| E11.628 | Type 2 diabetes mellitus with other skin complications |
| E11.65 | E11.65 Type 2 diabetes mellitus with hyperglycemia |
| E11.69 | E11.69 Type 2 diabetes mellitus with other specified complication |
| E13.51 | Other specified diabetes mellitus with diabetic peripheral angiopathy without gangrene |
| E13.52 | Other specified diabetes mellitus with diabetic peripheral angiopathy with gangrene |
| E13.59 | Other specified diabetes mellitus with other circulatory complications |
| E13.618 | Other specified diabetes mellitus with other diabetic arthropathy |
| E13.620 | Other specified diabetes mellitus with diabetic dermatitis - |
| E13.621 | Other specified diabetes mellitus with foot ulcer |
| E13.622 | Other specified diabetes mellitus with other skin ulcer |
| E13.628 | Other specified diabetes mellitus with other skin complications |
| H91.20 | Sudden idiopathic hearing loss, unspecified ear |
| H91.21 | Sudden idiopathic hearing loss, right ear |
| H91.22 | Sudden idiopathic hearing loss, left ear |
| H91.23 | Sudden idiopathic hearing loss, bilateral |
| I70.231 | Atherosclerosis of native arteries of right leg with ulceration of thigh |
| I70.232 | Atherosclerosis of native arteries of right leg with ulceration of calf |
| I70.233 | Atherosclerosis of native arteries of right leg with ulceration of ankle |
| I70.234 | Atherosclerosis of native arteries of right leg with ulceration of heel and midfoot |
| I70.235 | Atherosclerosis of native arteries of right leg with ulceration of other part of foot |
| I70.238 | Atherosclerosis of native arteries of right leg with ulceration of other part of lower right leg |
| I70.239 | Atherosclerosis of native arteries of right leg with ulceration of unspecified site |
| I70.241 | Atherosclerosis of native arteries of left leg with ulceration of thigh |
| I70.242 | Atherosclerosis of native arteries of left leg with ulceration of calf |
| I70.243 | Atherosclerosis of native arteries of left leg with ulceration of ankle |
| I70.244 | Atherosclerosis of native arteries of left leg with ulceration of heel and midfoot |
| I70.245 | Atherosclerosis of native arteries of left leg with ulceration of other part of foot |
| I70.248 | Atherosclerosis of native arteries of left leg with ulceration of other part of lower left leg |
| I70.249 | Atherosclerosis of native arteries of left leg with ulceration of unspecified site |

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| 170.25 | Atherosclerosis of native arteries of other extremities with ulceration |
| 170.331 | Atherosclerosis of unspecified type of bypass graft(s) of the right leg with ulceration of thigh |
| 170.333 | Atherosclerosis of unspecified type of bypass graft(s) of the right leg with ulceration of ankle |
| 170.334 | Atherosclerosis of unspecified type of bypass graft(s) of the right leg with ulceration of heel and midfoot |
| 170.335 | Atherosclerosis of unspecified type of bypass graft(s) of the right leg with ulceration of other part of foot |
| 170.338 | Atherosclerosis of unspecified type of bypass graft(s) of the right leg with ulceration of other part of lower leg |
| 170.339 | Atherosclerosis of unspecified type of bypass graft(s) of the right leg with ulceration of unspecified site |
| 170.341 | Atherosclerosis of unspecified type of bypass graft(s) of the left leg with ulceration of thigh |
| 170.343 | Atherosclerosis of unspecified type of bypass graft(s) of the left leg with ulceration of ankle |
| 170.344 | Atherosclerosis of unspecified type of bypass graft(s) of the left leg with ulceration of heel and midfoot |
| 170.345 | Atherosclerosis of unspecified type of bypass graft(s) of the left leg with ulceration of other part of foot |
| 170.348 | Atherosclerosis of unspecified type of bypass graft(s) of the left leg with ulceration of other part of lower leg |
| 170.349 | Atherosclerosis of unspecified type of bypass graft(s) of the left leg with ulceration of unspecified site |
| 170.431 | Atherosclerosis of autologous vein bypass graft(s) of the right leg with ulceration of thigh |
| 170.433 | Atherosclerosis of autologous vein bypass graft(s) of the right leg with ulceration of ankle |
| 170.434 | Atherosclerosis of autologous vein bypass graft(s) of the right leg with ulceration of heel and midfoot |
| 170.435 | Atherosclerosis of autologous vein bypass graft(s) of the right leg with ulceration of other part of foot |
| 170.438 | Atherosclerosis of autologous vein bypass graft(s) of the right leg with ulceration of other part of lower leg |
| 170.439 | Atherosclerosis of autologous vein bypass graft(s) of the right leg with ulceration of unspecified site |
| 170.441 | Atherosclerosis of autologous vein bypass graft(s) of the left leg with ulceration of thigh |
| 170.443 | Atherosclerosis of autologous vein bypass graft(s) of the left leg with ulceration of ankle |
| 170.444 | Atherosclerosis of autologous vein bypass graft(s) of the left leg with ulceration of heel and midfoot |
| 170.445 | Atherosclerosis of autologous vein bypass graft(s) of the left leg with ulceration of other part of foot |
| 170.448 | Atherosclerosis of autologous vein bypass graft(s) of the left leg with ulceration of other part of lower leg |
| 170.449 | Atherosclerosis of autologous vein bypass graft(s) of the left leg with ulceration of unspecified site |
| 170.531 | Atherosclerosis of nonautologous biological bypass graft(s) of the right leg with ulceration of thigh |
| 170.533 | Atherosclerosis of nonautologous biological bypass graft(s) of the right leg with ulceration of ankle |
| 170.534 | Atherosclerosis of nonautologous biological bypass graft(s) of the right leg with ulceration of heel and midfoot |
| 170.535 | Atherosclerosis of nonautologous biological bypass graft(s) of the right leg with ulceration of other part of foot |
| 170.538 | Atherosclerosis of nonautologous biological bypass graft(s) of the right leg with ulceration of other part of lower leg |
| 170.539 | Atherosclerosis of nonautologous biological bypass graft(s) of the right leg with ulceration of unspecified site |
| 170.541 | Atherosclerosis of nonautologous biological bypass graft(s) of the left leg with ulceration of thigh |
| 170.543 | Atherosclerosis of nonautologous biological bypass graft(s) of the left leg with ulceration of ankle |
| 170.544 | Atherosclerosis of nonautologous biological bypass graft(s) of the left leg with ulceration of heel and midfoot |
| 170.545 | Atherosclerosis of nonautologous biological bypass graft(s) of the left leg with ulceration of other part of foot |
| 170.548 | Atherosclerosis of nonautologous biological bypass graft(s) of the left leg with ulceration of other part of lower leg |
| 170.549 | Atherosclerosis of nonautologous biological bypass graft(s) of the left leg with ulceration of unspecified site |
| 170.631 | Atherosclerosis of nonbiological bypass graft(s) of the right leg with ulceration of thigh |
| 170.633 | Atherosclerosis of nonbiological bypass graft(s) of the right leg with ulceration of ankle |
| 170.634 | Atherosclerosis of nonbiological bypass graft(s) of the right leg with ulceration of heel and midfoot |
| 170.635 | Atherosclerosis of nonbiological bypass graft(s) of the right leg with ulceration of other part of foot |
| 170.638 | Atherosclerosis of nonbiological bypass graft(s) of the right leg with ulceration of other part of lower leg |

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| I70.639 | Atherosclerosis of nonbiological bypass graft(s) of the right leg with ulceration of unspecified site |
| I70.641 | Atherosclerosis of nonbiological bypass graft(s) of the left leg with ulceration of thigh |
| I70.643 | Atherosclerosis of nonbiological bypass graft(s) of the left leg with ulceration of ankle |
| I70.644 | Atherosclerosis of nonbiological bypass graft(s) of the left leg with ulceration of heel and midfoot |
| I70.645 | Atherosclerosis of nonbiological bypass graft(s) of the left leg with ulceration of other part of foot |
| I70.648 | Atherosclerosis of nonbiological bypass graft(s) of the left leg with ulceration of other part of lower leg |
| I70.649 | Atherosclerosis of nonbiological bypass graft(s) of the left leg with ulceration of unspecified site |
| I70.731 | Atherosclerosis of other type of bypass graft(s) of the right leg with ulceration of thigh |
| I70.733 | Atherosclerosis of other type of bypass graft(s) of the right leg with ulceration of ankle |
| I70.734 | Atherosclerosis of other type of bypass graft(s) of the right leg with ulceration of heel and midfoot |
| I70.735 | Atherosclerosis of other type of bypass graft(s) of the right leg with ulceration of other part of foot |
| I70.738 | Atherosclerosis of other type of bypass graft(s) of the right leg with ulceration of other part of lower leg |
| I70.739 | Atherosclerosis of other type of bypass graft(s) of the right leg with ulceration of unspecified site |
| I70.741 | Atherosclerosis of other type of bypass graft(s) of the left leg with ulceration of thigh |
| I70.743 | Atherosclerosis of other type of bypass graft(s) of the left leg with ulceration of ankle |
| I70.744 | Atherosclerosis of other type of bypass graft(s) of the left leg with ulceration of heel and midfoot |
| I70.745 | Atherosclerosis of other type of bypass graft(s) of the left leg with ulceration of other part of foot |
| I70.748 | Atherosclerosis of other type of bypass graft(s) of the left leg with ulceration of other part of lower leg |
| I70.749 | Atherosclerosis of other type of bypass graft(s) of the left leg with ulceration of unspecified site |
| L08.1 | Erythrasma |
| L59.8 | Other specified disorders of the skin and subcutaneous tissue related to radiation |
| M27.2 | Inflammatory conditions of jaws |
| M72.6 | Necrotizing fasciitis |
| M86.30 | Chronic multifocal osteomyelitis, unspecified site |
| M86.311 | Chronic multifocal osteomyelitis, right shoulder |
| M86.312 | Chronic multifocal osteomyelitis, left shoulder |
| M86.319 | Chronic multifocal osteomyelitis, unspecified shoulder |
| M86.321 | Chronic multifocal osteomyelitis, right humerus |
| M86.322 | Chronic multifocal osteomyelitis, left humerus |
| M86.329 | Chronic multifocal osteomyelitis, unspecified humerus |
| M86.331 | Chronic multifocal osteomyelitis, right radius and ulna |
| M86.332 | Chronic multifocal osteomyelitis, left radius and ulna |
| M86.339 | Chronic multifocal osteomyelitis, unspecified radius and ulna |
| M86.341 | Chronic multifocal osteomyelitis, right hand |
| M86.342 | Chronic multifocal osteomyelitis, left hand |
| M86.349 | Chronic multifocal osteomyelitis, unspecified hand |
| M86.351 | Chronic multifocal osteomyelitis, right femur |
| M86.352 | Chronic multifocal osteomyelitis, left femur |
| M86.359 | Chronic multifocal osteomyelitis, unspecified femur |
| M86.361 | Chronic multifocal osteomyelitis, right tibia and fibula |
| M86.362 | Chronic multifocal osteomyelitis, left tibia and fibula |
| M86.369 | Chronic multifocal osteomyelitis, unspecified tibia and fibula |

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| M86.371 | Chronic multifocal osteomyelitis, right ankle and foot |
| M86.372 | Chronic multifocal osteomyelitis, left ankle and foot |
| M86.379 | Chronic multifocal osteomyelitis, unspecified ankle and foot |
| M86.38 | Chronic multifocal osteomyelitis, other site |
| M86.39 | Chronic multifocal osteomyelitis, multiple sites |
| M86.40 | Chronic osteomyelitis with draining sinus, unspecified site |
| M86.411 | Chronic osteomyelitis with draining sinus, right shoulder |
| M86.412 | Chronic osteomyelitis with draining sinus, left shoulder |
| M86.419 | Chronic osteomyelitis with draining sinus, unspecified shoulder |
| M86.421 | Chronic osteomyelitis with draining sinus, right humerus |
| M86.422 | Chronic osteomyelitis with draining sinus, left humerus |
| M86.429 | Chronic osteomyelitis with draining sinus, unspecified humerus |
| M86.431 | Chronic osteomyelitis with draining sinus, right radius and ulna |
| M86.432 | Chronic osteomyelitis with draining sinus, left radius and ulna |
| M86.439 | Chronic osteomyelitis with draining sinus, unspecified radius and ulna |
| M86.441 | Chronic osteomyelitis with draining sinus, right hand |
| M86.442 | Chronic osteomyelitis with draining sinus, left hand |
| M86.449 | Chronic osteomyelitis with draining sinus, unspecified hand |
| M86.451 | Chronic osteomyelitis with draining sinus, right femur |
| M86.452 | Chronic osteomyelitis with draining sinus, left femur |
| M86.459 | Chronic osteomyelitis with draining sinus, unspecified femur |
| M86.461 | Chronic osteomyelitis with draining sinus, right tibia and fibula |
| M86.462 | Chronic osteomyelitis with draining sinus, left tibia and fibula |
| M86.469 | Chronic osteomyelitis with draining sinus, unspecified tibia and fibula |
| M86.471 | Chronic osteomyelitis with draining sinus, right ankle and foot |
| M86.472 | Chronic osteomyelitis with draining sinus, left ankle and foot |
| M86.479 | Chronic osteomyelitis with draining sinus, unspecified ankle and foot |
| M86.48 | Chronic osteomyelitis with draining sinus, other site |
| M86.49 | Chronic osteomyelitis with draining sinus, multiple sites |
| M86.50 | Other chronic hematogenous osteomyelitis, unspecified site |
| M86.511 | Other chronic hematogenous osteomyelitis, right shoulder |
| M86.512 | Other chronic hematogenous osteomyelitis, left shoulder |
| M86.519 | Other chronic hematogenous osteomyelitis, unspecified shoulder |
| M86.521 | Other chronic hematogenous osteomyelitis, right humerus |
| M86.522 | Other chronic hematogenous osteomyelitis, left humerus |
| M86.529 | Other chronic hematogenous osteomyelitis, unspecified humerus |
| M86.531 | Other chronic hematogenous osteomyelitis, right radius and ulna |
| M86.532 | Other chronic hematogenous osteomyelitis, left radius and ulna |
| M86.539 | Other chronic hematogenous osteomyelitis, unspecified radius and ulna |
| M86.541 | Other chronic hematogenous osteomyelitis, right hand |
| M86.542 | Other chronic hematogenous osteomyelitis, left hand |
| M86.549 | Other chronic hematogenous osteomyelitis, unspecified hand |

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| M86.551 | Other chronic hematogenous osteomyelitis, right femur |
| M86.552 | Other chronic hematogenous osteomyelitis, left femur |
| M86.559 | Other chronic hematogenous osteomyelitis, unspecified femur |
| M86.561 | Other chronic hematogenous osteomyelitis, right tibia and fibula |
| M86.562 | Other chronic hematogenous osteomyelitis, left tibia and fibula |
| M86.569 | Other chronic hematogenous osteomyelitis, unspecified tibia and fibula |
| M86.571 | Other chronic hematogenous osteomyelitis, right ankle and foot |
| M86.572 | Other chronic hematogenous osteomyelitis, left ankle and foot |
| M86.579 | Other chronic hematogenous osteomyelitis, unspecified ankle and foot |
| M86.58 | Other chronic hematogenous osteomyelitis, other site |
| M86.59 | Other chronic hematogenous osteomyelitis, multiple sites |
| M86.60 | Other chronic osteomyelitis, unspecified site |
| M86.611 | Other chronic osteomyelitis, right shoulder |
| M86.612 | Other chronic osteomyelitis, left shoulder |
| M86.619 | Other chronic osteomyelitis, unspecified shoulder |
| M86.621 | Other chronic osteomyelitis, right humerus |
| M86.622 | Other chronic osteomyelitis, left humerus |
| M86.629 | Other chronic osteomyelitis, unspecified humerus |
| M86.631 | Other chronic osteomyelitis, right radius and ulna |
| M86.632 | Other chronic osteomyelitis, left radius and ulna |
| M86.639 | Other chronic osteomyelitis, unspecified radius and ulna |
| M86.641 | Other chronic osteomyelitis, right hand |
| M86.642 | Other chronic osteomyelitis, left hand |
| M86.649 | Other chronic osteomyelitis, unspecified hand |
| M86.651 | Other chronic osteomyelitis, right thigh |
| M86.652 | Other chronic osteomyelitis, left thigh |
| M86.659 | Other chronic osteomyelitis, unspecified thigh |
| M86.661 | Other chronic osteomyelitis, right tibia and fibula |
| M86.662 | Other chronic osteomyelitis, left tibia and fibula |
| M86.669 | Other chronic osteomyelitis, unspecified tibia and fibula |
| M86.671 | Other chronic osteomyelitis, right ankle and foot |
| M86.672 | Other chronic osteomyelitis, left ankle and foot |
| M86.679 | Other chronic osteomyelitis, unspecified ankle and foot |
| M86.68 | Other chronic osteomyelitis, other site |
| M86.69 | Other chronic osteomyelitis, multiple sites |
| M86.8X0 | Other osteomyelitis, multiple sites |
| M86.8X1 | Other osteomyelitis, shoulder |
| M86.8X2 | Other osteomyelitis, upper arm |
| M86.8X3 | Other osteomyelitis, forearm |
| M86.8X4 | Other osteomyelitis, hand |
| M86.8X5 | Other osteomyelitis, thigh |
| M86.8X6 | Other osteomyelitis, lower leg |

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| M86.8X7 | Other osteomyelitis, ankle and foot |
| M86.8X8 | Other osteomyelitis, other site |
| M86.8X9 | Other osteomyelitis, unspecified sites |
| N30.40 | Irradiation cystitis without hematuria |
| N30.41 | Irradiation cystitis with hematuria |
| S35.511 A | Injury of right iliac artery, initial encounter |
| S35.512 A | Injury of left iliac artery, initial encounter |
| S45.011 A | Laceration of axillary artery, right side, initial encounter |
| S45.012 A | Laceration of axillary artery, left side, initial encounter |
| S45.091 A | Other specified injury of axillary artery, right side, initial encounter |
| S45.092 A | Other specified injury of axillary artery, left side, initial encounter |
| S45.111 A | Laceration of brachial artery, right side, initial encounter |
| S45.112 A | Laceration of brachial artery, left side, initial encounter |
| S45.191 A | Other specified injury of brachial artery, right side, initial encounter |
| S45.192 A | Other specified injury of brachial artery, left side, initial encounter |
| S45.211 A | Laceration of axillary or brachial vein, right side, initial encounter |
| S45.212 A | Laceration of axillary or brachial vein, left side, initial encounter |
| S45.291 A | Other specified injury of axillary or brachial vein, right side, initial encounter |
| S45.292 A | Other specified injury of axillary or brachial vein, left side, initial encounter |
| S47.1xxA | Crushing injury of right shoulder and upper arm, initial encounter |
| S47.2xxA | Crushing injury of left shoulder and upper arm, initial encounter |
| S47.9xxA | Crushing injury of shoulder and upper arm, unspecified arm, initial encounter |
| S57.00xA | Crushing injury of unspecified elbow, initial encounter |
| S57.01xA | Crushing injury of right elbow, initial encounter |
| S57.02xA | Crushing injury of left elbow, initial encounter |
| S57.80xA | Crushing injury of unspecified forearm, initial encounter |
| S57.81xA | Crushing injury of right forearm, initial encounter |
| S57.82xA | Crushing injury of left forearm, initial encounter |
| S67.20xA | Crushing injury of unspecified hand, initial encounter |
| S67.21xA | Crushing injury of right hand, initial encounter |
| S67.22xA | Crushing injury of left hand, initial encounter |
| S67.30xA | Crushing injury of unspecified wrist, initial encounter |
| S67.31xA | Crushing injury of right wrist, initial encounter |
| S67.32xA | Crushing injury of left wrist, initial encounter |

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| S67.40xA | Crushing injury of unspecified wrist and hand, initial encounter |
| S67.41xA | Crushing injury of right wrist and hand, initial encounter |
| S67.42xA | Crushing injury of left wrist and hand, initial encounter |
| S67.90xA | Crushing injury of unspecified part(s) of unspecified wrist, hand and fingers, initial encounter |
| S67.91xA | Crushing injury of unspecified part(s) of right wrist, hand and fingers, initial encounter |
| S67.92xA | Crushing injury of unspecified part(s) of left wrist, hand and fingers, initial encounter |
| S75.011 A | Minor laceration of femoral artery, right leg, initial encounter |
| S75.012 A | Minor laceration of femoral artery, left leg, initial encounter |
| S75.021 A | Major laceration of femoral artery, right leg, initial encounter |
| S75.022 A | Major laceration of femoral artery, left leg, initial encounter |
| S75.091 A | Other specified injury of femoral artery, right leg, initial encounter |
| S75.092 A | Other specified injury of femoral artery, left leg, initial encounter |
| S77.00xA | Crushing injury of unspecified hip, initial encounter |
| S77.01xA | Crushing injury of right hip, initial encounter |
| S77.02xA | Crushing injury of left hip, initial encounter |
| S77.10xA | Crushing injury of unspecified thigh, initial encounter |
| S77.11xA | Crushing injury of right thigh, initial encounter |
| S77.12xA | Crushing injury of left thigh, initial encounter |
| S77.20xA | Crushing injury of unspecified hip with thigh, initial encounter |
| S77.21xA | Crushing injury of right hip with thigh, initial encounter |
| S77.22xA | Crushing injury of left hip with thigh, initial encounter |
| S85.011 A | Laceration of popliteal artery, right leg, initial encounter |
| S85.012 A | Laceration of popliteal artery, left leg, initial encounter |
| S85.091 A | Other specified injury of popliteal artery, right leg, initial encounter |
| S85.092 A | Other specified injury of popliteal artery, left leg, initial encounter |
| S87.00xA | Crushing injury of unspecified knee, initial encounter |
| S87.01xA | Crushing injury of right knee, initial encounter |
| S87.02xA | Crushing injury of left knee, initial encounter |
| S87.80xA | Crushing injury of unspecified lower leg, initial encounter |
| S87.81xA | Crushing injury of right lower leg, initial encounter |
| S87.82xA | Crushing injury of left lower leg, initial encounter |
| S97.00xA | Crushing injury of unspecified ankle, initial encounter |
| S97.01xA | Crushing injury of right ankle, initial encounter |
| S97.02xA | Crushing injury of left ankle, initial encounter |
| S97.101 A | Crushing injury of unspecified right toe(s), initial encounter |
| S97.102 A | Crushing injury of unspecified left toe(s), initial encounter |

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| S97.109 A | Crushing injury of unspecified toe(s), initial encounter |
| S97.111 A | Crushing injury of right great toe, initial encounter |
| S97.112 A | Crushing injury of left great toe, initial encounter |
| S97.119 A | Crushing injury of unspecified great toe, initial encounter |
| S97.121 A | Crushing injury of right lesser toe(s), initial encounter |
| S97.122 A | Crushing injury of left lesser toe(s), initial encounter |
| S97.129 A | Crushing injury of unspecified lesser toe(s), initial encounter |
| S97.80xA | Crushing injury of unspecified foot, initial encounter |
| S97.81xA | Crushing injury of right foot, initial encounter |
| S97.82xA | Crushing injury of left foot, initial encounter |
| T57.3X1 A | Toxic effect of hydrogen cyanide, accidental (unintentional), initial encounter |
| T57.3X2 A | Toxic effect of hydrogen cyanide, intentional self-harm, initial encounter |
| T57.3X3 A | Toxic effect of hydrogen cyanide, assault, initial encounter |
| T57.3X4 A | Toxic effect of hydrogen cyanide, undetermined, initial encounter |
| T58.01x A | Toxic effect of carbon monoxide from motor vehicle exhaust, accidental (unintentional), initial encounter |
| T58.02x A | Toxic effect of carbon monoxide from motor vehicle exhaust, intentional self-harm, initial encounter |
| T58.03x A | Toxic effect of carbon monoxide from motor vehicle exhaust, assault, initial encounter |
| T58.04x A | Toxic effect of carbon monoxide from motor vehicle exhaust, undetermined, initial encounter |
| T58.11x A | Toxic effect of carbon monoxide from utility gas, accidental (unintentional), initial encounter |
| T58.12x A | Toxic effect of carbon monoxide from utility gas, intentional self-harm, initial encounter |
| T58.13x A | Toxic effect of carbon monoxide from utility gas, assault, initial encounter |
| T58.14x A | Toxic effect of carbon monoxide from utility gas, undetermined, initial encounter |
| T58.2X1 A | Toxic effect of carbon monoxide from incomplete combustion of other domestic fuels, accidental (unintentional), initial encounter |
| T58.2X2 A | Toxic effect of carbon monoxide from incomplete combustion of other domestic fuels, intentional self-harm, initial encounter |
| T58.2X3 A | Toxic effect of carbon monoxide from incomplete combustion of other domestic fuels, assault, initial encounter |
| T58.2X4 A | Toxic effect of carbon monoxide from incomplete combustion of other domestic fuels, undetermined, initial encounter |
| T58.8X1 A | Toxic effect of carbon monoxide from other source, accidental (unintentional), initial encounter |
| T58.8X2 A | Toxic effect of carbon monoxide from other source, intentional self-harm, initial encounter |
| T58.8X3 | Toxic effect of carbon monoxide from other source, assault, initial encounter |

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| A | |
| T58.8X4 | Toxic effect of carbon monoxide from other source, undetermined, initial encounter |
| A | |
| T58.91x | Toxic effect of carbon monoxide from unspecified source, accidental (unintentional), initial encounter |
| A | |
| T58.92x | Toxic effect of carbon monoxide from unspecified source, intentional self-harm, initial encounter |
| A | |
| T58.93x | Toxic effect of carbon monoxide from unspecified source, assault, initial encounter |
| A | |
| T58.94x | Toxic effect of carbon monoxide from unspecified source, undetermined, initial encounter |
| A | |
| T65.0X1 | Toxic effect of cyanides, accidental (unintentional), initial encounter |
| A | |
| T65.0X2 | Toxic effect of cyanides, intentional self-harm, initial encounter |
| A | |
| T65.0X3 | Toxic effect of cyanides, assault, initial encounter |
| A | |
| T65.0X4 | Toxic effect of cyanides, undetermined, initial encounter |
| A | |
| T66.xxxA | Radiation sickness, unspecified, initial encounter |
| T70.3xxA | Caisson disease [decompression sickness], initial encounter |
| T79.0xxA | Air embolism (traumatic), initial encounter |
| T80.0xxA | Air embolism following infusion, transfusion and therapeutic injection, initial encounter |
| T86.820 | Skin graft (allograft) rejection |
| T86.821 | Skin graft (allograft) (autograft) failure |
| T86.822 | Skin graft (allograft) (autograft) infection |
| T86.828 | Other complications of skin graft (allograft) (autograft) |
| T86.829 | Unspecified complication of skin graft (allograft) (autograft) |
| T87.0X1 | Complications of reattached (part of) right upper extremity |
| T87.0X2 | Complications of reattached (part of) left upper extremity |
| T87.0X9 | Complications of reattached (part of) unspecified upper extremity |
| T87.1X1 | Complications of reattached (part of) right lower extremity |
| T87.1X2 | Complications of reattached (part of) left lower extremity |
| T87.1X9 | Complications of reattached (part of) unspecified lower extremity |
| T87.2 | Complications of other reattached body part |

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