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SUPPLEMENT ARTICLE

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Definitions and criteria for diabetic foot disease

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Abstract

Multiple disciplines are involved in the management of diabetic foot disease, and a common vocabulary is essential for clear communication. Based on the systematic reviews of the literature that form the basis of the International Working Group on the Diabetic Foot (IWGDF) Guidelines, the IWGDF has developed a set of definitions and criteria for diabetic foot disease. This document describes these definitions and criteria. We suggest these definitions be used consistently in both clinical practice and research to facilitate clear communication between professionals.

1 | INTRODUCTION

Multiple disciplines are involved in the management of diabetic foot disease, and interdisciplinary treatment is the cornerstone of its management and prevention. With all these disciplines involved, a common vocabulary is essential for clear clinical communication purposes. For research purposes, clear and unequivocal definitions are imperative for study methodology to be comparable between studies and repeatable in different settings.

Since its inception in 1999, the International Working Group on the Diabetic Foot (IWGDF) has created a set of core definitions related to diabetic foot disease, its diagnoses, and interventions. These definitions were published online or as addendum to the systematic reviews.[1] Further, the "Reporting standards of studies and papers on the prevention and management of foot ulcers in diabetes"[2] also noted that these definitions should be used to facilitate uniform reporting.

In this paper, we provide an update of all definitions and criteria for diabetic foot disease based on the systematic reviews of the literature that form the basis of the 2019 IWGDF Guidelines.[3-9] Where possible, we have retained the definitions from previous versions[1] to facilitate consistent comparison with older studies. We have only made changes when the evidence necessitated updates of older definitions. When no previous definition was available, we developed a definition based on the literature findings. To indicate the changes in this list of definitions and criteria, we have denoted new definitions with an asterisk (*) and updated definitions with an obelisk (†).

This paper is limited to general definitions and criteria for diabetic foot disease. Further specific definitions can also be found in the glossary of 2019 IWGDF guidelines, such as in the prevention and offloading guidelines.[4,5] We do not provide definitions on diabetes or on other (chronic) diseases unless it is specifically relevant to the topic (eg, for peripheral artery disease [PAD]-related definitions). Finally, it should be noted that the definitions in this paper are limited by being primarily based on expert opinion, and no formal methodology has been used in this definition development.

We suggest the definitions in this paper be used consistently in both clinical practice and research to facilitate clear communication between professionals.

2 | DIABETIC FOOT DISEASE-RELATED DEFINITIONS

2.1 | Diabetic foot

Infection, ulceration, or destruction of tissues of the foot of a person with currently or previously diagnosed diabetes mellitus, usually accompanied by neuropathy and/or PAD in the lower extremity.

2.2 | Diabetic neuropathy

The presence of symptoms or signs of nerve dysfunction in a person with (a history of) diabetes mellitus after exclusion of other causes.

2.3 | Loss of protective sensation

A sign of diabetic neuropathy, characterized by an inability to sense light pressure, for example, as applied with a 10 g Semmes-Weinstein monofilament.

2.4 | Neuro-osteoarthropathy (Charcot-foot)

Noninfectious destruction of bone and joint(s) associated with neuropathy, which, in the acute phase, is associated with signs of inflammation.

2.5 | Person at risk*

A person with diabetes who is at risk of developing a foot ulcer by minimally having diabetic neuropathy or PAD.

3 | FOOT-RELATED DEFINITIONS

3.1 | Forefoot*

The anterior (distal) part of the foot, that is, composed of the metatarsal bones, the phalanges, and associated soft tissue structures.

3.2 | Midfoot*

The part of the foot that is composed of the cuboid, navicular, and cuneiform bones, and associated soft tissue structures.

3.3 | Rearfoot or hindfoot*

The posterior (proximal) part of the foot that is composed of the talus and calcaneus and associated soft tissue structures.

3.4 | Plantar foot surface*

The underside or weight-bearing surface of the foot.

3.5 | Nonplantar foot surface*

All other surfaces of the foot not defined as a plantar foot surface.

3.6 | Dorsal foot surface*

The upper side of the foot, opposite of the plantar foot surface.

3.7 | Foot deformity

Alterations or deviations from normal shape or size of the foot, such as hammer toes, mallet toes, claw toes, hallux valgus, prominent metatarsal heads, pes cavus, pes planus, pes equinus, or results of Charcot neuro-osteoarthropathy, trauma, amputations, other foot surgery or other causes.

3.8 | Limited joint mobility

Reduced mobility of the joints of the foot, including the ankle, caused by changes in joints and associated soft tissues.

3.9 | Callus

Hyperkeratosis caused by excessive mechanical loading.

3.10 | Plantar pressure*

The distribution of forces over a given plantar foot surface, mathematically defined as "force divided by the contact area." Often expressed as peak pressure or pressure-time integral.

4 | FOOT ULCER-RELATED DEFINITIONS

4.1 | Foot ulcer†

A break of the skin of the foot that involves as a minimum the epidermis and part of the dermis.

4.2 | Diabetic foot ulcer*

Foot ulcer in person with currently or previously diagnosed diabetes mellitus and usually accompanied by neuropathy and/or PAD in the lower extremity.

4.3 | Healed foot ulcer

Intact skin, meaning complete epithelialization without any drainage of a previous foot ulcer site.

4.4 | Foot in remission*

Intact skin and absence of infection of the complete foot after healing of any foot ulcer(s).

4.5 | Pre-ulcerative lesion*

Foot lesion that has a high risk of developing into a foot ulcer, such as intra-cutaneous or subcutaneous haemorrhage, blister, or skin fissure not penetrating into the dermis in a person at risk.

4.6 | Foot lesion

Any abnormality associated with damage to the skin, nails, or deep tissues of the foot.

4.7 | First-ever foot ulcer†

A foot ulcer occurring in a person who has never before had a foot ulcer.

4.8 | Recurrent foot ulcer

New foot ulcer in a person who has a history of foot ulceration, irrespective of location and time, since previous foot ulcer.

4.9 | Superficial foot ulcer†

A foot ulcer not penetrating any structure deeper than the dermis.

4.10 | Deep foot ulcer†

A foot ulcer penetrating below the dermis into subcutaneous structures, such as fascia, muscle, tendon, or bone.

4.11 | Ulcer-free survival days*

Days that a person is alive and without a foot ulcer.

5 | PAD-RELATED DEFINITIONS

5.1 | Peripheral artery disease

Obstructive atherosclerotic vascular disease with clinical symptoms, signs, or abnormalities on noninvasive or invasive vascular assessment, resulting in disturbed or impaired circulation in one or more extremities.

5.2 | Claudication

Pain in the thigh or calf that occurs during walking and is relieved by rest and is caused by PAD.

5.3 | Rest pain

Severe and persistent pain localized in the foot caused by PAD that may be relieved by putting the foot in a dependent position.

5.4 | Angioplasty†

An endovascular technique used to re-establish the patency of an artery by percutaneous transluminal or subintimal procedures.

5.5 | Neuro-ischaemic foot ulcer†

An ulcer in the presence of both diabetic neuropathy and PAD.

6 | INFECTION-RELATED DEFINITIONS

6.1 | Infection

A pathological state caused by invasion and multiplication of microorganisms in host tissues accompanied by tissue destruction and/or a host inflammatory response.

6.2 | Superficial infection

An infection of the skin not extending to any structure deeper than the dermis.

6.3 | Deep infection

An infection that extends deeper than the dermis that may include abscess, septic arthritis, osteomyelitis, septic tenosynovitis, or necrotising fasciitis.

6.4 | Erysipelas*

An infection of the upper part of the skin (epidermis and dermis, not hypodermis) manifested by one or more of the following: induration, erythema, warmth, pain, or tenderness.

6.5 | Cellulitis†

An infection of the skin (epidermis and dermis and hypodermis [subcutaneous fat and connective tissue]) manifested by one or more of the following: induration, erythema, warmth, pain, or tenderness.

6.6 | Septic arthritis*

An infection of the joint and joint capsule.

6.7 | Osteomyelitis

An infection of the bone with involvement of the bone marrow.

6.8 | Pathogen*

A microorganism that is considered to be causing an infection, as opposed to colonizing or contaminating tissue.

7 | AMPUTATION-RELATED DEFINITIONS

7.1 | Amputation

Resection of a segment of a limb through a bone or through a joint.

7.2 | Major amputation

Any resection proximal to the ankle.

7.3 | Major amputation levels

TT = transtibial amputation: amputation through the tibia and fibula (frequently referred to as “below knee amputation”).

KD = knee disarticulation: amputation through the knee (frequently referred to as “through knee amputation”).

TF = transfemoral amputation: amputation through the femur (frequently referred to as “above knee amputation”).

7.4 | Minor amputation

Any resection through or distal to the ankle.

7.5 | Minor amputation levels

1. Toe amputation
2. Metatarsal-phalangeal disarticulation
3. Distal transmetatarsal amputation
4. Proximal transmetatarsal amputation
5. Tarso-metatarsal disarticulation
6. Midtarsal disarticulation
7. Ankle disarticulation

8 | MISCELLANEOUS DEFINITIONS

8.1 | Interdisciplinary (or multidisciplinary) clinical team*

A grouping of people from relevant clinical disciplines, whose interactions are guided by specific team functions and processes to achieve team- and person-defined favourable outcomes. (Based on Moore et al[10]:).

8.2 | Necrosis

Devitalised (dead) tissue.

8.3 | Gangrene†

A condition that occurs when body tissue dies because of insufficient blood supply, infection or injury. Without infection this generally results in dry and black tissue, frequently called dry gangrene; when the tissue is infected, with accompanying putrefaction and surrounding cellulitis, it is often called wet gangrene.

8.4 | Oedema of the lower limb

Swelling of the leg or foot caused by increased interstitial fluid.

8.5 | Erythema†

A pink or red discoloration that blanches to some degree on compression, caused by increased blood flow to the involved tissue.

8.6 | Debridement†

The removal of callus or dead tissue that can be surgical ("sharp") or nonsurgical (eg, abrasion, chemical).

8.7 | Offloading

The relief of mechanical stress (pressure) from a specific region of the foot.

8.8 | Offloading intervention

Any intervention undertaken with the intention of relieving mechanical stress (pressure) from a specific region of the foot (includes surgical offloading techniques, offloading devices, footwear, and other offloading techniques).

9 | CRITERIA FOR DIABETIC FOOT DISEASE

9.1 | Diabetic foot ulcer risk

Criteria for foot ulcer risk in people with diabetes are defined in the IWGDF Risk Stratification system; please see the IWGDF Prevention Guideline for these criteria and their details.[4]

9.2 | Peripheral artery disease

Criteria for diagnosing peripheral artery disease in people with diabetes and a foot ulcer are defined in the PAD Guideline; please see the IWGDF PAD Guideline for these criteria and their details.[6]

9.3 | Foot infection

Criteria for diagnosing foot infection in people with diabetes are defined in the IWGDF/IDSA foot infection classification system; please see the IWGDF Infection Guideline for these criteria and their details.[7]

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CONFLICT OF INTEREST

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All individual conflict of interest statement of authors of this guideline can be found at https://iwgdfguidelines.org/about-iwgdf-guidelines/biographies/.

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