

Swiss Interprofessional Guidance of Good Practice of Acute and Complicated Diabetic Foot Syndromes – a National Project

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Background

Diabetic foot syndromes (DFS) have multiple negative outcomes in a patient population marked with co-morbidities and frailty. Their management requires a quality of care consisting of evidence-based, practical guidance tools for primary care providers together with the implementation of an interprofessional care system including nationally standardized diagnose-relevant best practice recommendations. In order to address this gap, the interprofessional non-profit association QualiCCare invited all relevant stakeholders to participate in the creation of national guidances for the timely and quality treatment of acute and complicated diabetic foot syndromes and ulcers (DFU). All addressed national societies accepted to collaborate.

Methods

The goal was to have all relevant professions work together to establish nationally validated recommendations, so QualiCCare officially invited all professional societies to delegate a representative, while ensuring a balanced mix in regards to gender and language representation. The experts worked in subgroups of 6–8 persons on specific topics according to their expertise and preference. In a second step, the results from these subgroups were discussed and validated in the plenary. Parallel to working on the specific diagnostic topics, three levels of DFS care provision were defined according to the severity (and urgency) of the syndrome, the need and the availability of resources in Switzerland. In order to test the practicality and feasibility of the implementation broadly, we chose to pilot the guidances in three Swiss regions representing very different settings in regards to available resources, context and language.

Results

Twenty experienced stakeholders from 12 different professions issued four protocols for various aspects of DFS between March 2018 and January 2020 and defined criteria for the triage and treatment in primary care as well as the timely referral of patients with DFS and DFU to interprofessional footcare centers. The resulting guidances were endorsed by all involved national professional societies.

We propose a framework for primary care, specialized footcare networks as well as interprofessional footcare centers. The piloting of the proposed concepts is in preparation.

Conclusion

We provide evidence-based tools for Swiss primary care providers and specialists while increasing the accessibility for patients to specialized care of DFS.

References

- Rogers LC, et al. The Charcot foot in diabetes. *Diabetes Care*. 2011 Sep;34(9):2123-9.
- Rogers LC, Frykberg RG. The Charcot Foot. *Med Clin North Am*. 2013;97(5):847-56.
- Molines L, Darmon P, Raccach D. Charcot's foot: newest findings on its pathophysiology, diagnosis and treatment. *Diabetes Metab*. 2010 Sep;36(4):251-5.
- Schade VL, Andersen CA. A literature-based guide to the conservative and surgical management of the acute Charcot foot and ankle. *Diabet Foot Ankle*. 2015 Mar 19;6:26627.
- Bus SA, et al. International Working Group on the Diabetic Foot. Footwear and offloading interventions to prevent and heal foot ulcers and reduce plantar pressure in patients with diabetes: a systematic review. *Diabetes Metab Res Rev*. 2016;32 Suppl 1:99-118.
- Holmes C, et al. Charcot stage 0: A review and considerations for making the correct diagnosis early. *Clin Diabetes Endocrinol*. 2015 Dec 18;1:18.
- Wukich DK, et al. Surgical management of Charcot neuroarthropathy of the ankle and hindfoot in patients with diabetes. *Diabetes Metab Res Rev*. 2016;32 Suppl 1:292-6.
- Chantelau EA, Grütner G. Is the Eichenholtz classification still valid for the diabetic Charcot foot? *Swiss Med Wkly*. 2014;144:w13948.

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Diabetic Foot Syndrome (DFS) – First Line Management Guidance according to Risk

Pertinent history assessment (see appendix)	
Clinical evaluation: Risk-Stratification → Signs of Neuropathy? If yes: Is acute Charcot Foot / diabetic neuro-osteoarthropathy possible? → follow Charcot/offloading guidance and seek expert opinion (Level 2/3 care) To relief pressure from neuropathic-/angiopathic ulcers refer to Charcot guidance → Is there an ulcer / multiple ulcers? If yes: assess severity according to depth and size (please refer to appendix), photo doc required → Suspected Peripheral arterial disease (PAD)? → follow PAD guidance → Signs of Infection/Inflammation? → follow infection guidance	
«SIMPLE» low risk All of: - Superficial wound (grade 1) - No infection - No arteriopathy (PAD) - No Neuropathy/NP without deformity	Level 1: Primary care
«COMPLEX» intermediate risk Any of: - Deep wound (≥ grade 2) - No improvement/worsening - Signs of infection - Arteriopathy (PAD) - Neuropathy with deformity - History of ulcer or amputation	Level 2: DFU Specialists
«EMERGENCY» high risk Any of: - Cellulitis - Gangrene - Systemic infection - Acute limb ischemia - Acute Charcot Foot	Level 3: Footcare team
Doubt about severity Not confident in evaluation Refer to Level 2/3	

Level 1 A – DFS Management

Criteria permitting standard care (1–2 weeks) → Grade 1 ulcer (see appendix) → Duration < 1 week → Not on pressure exposed location (not on plantar surface) → NO Neuropathy (Monofilament = 4/4, Pallesthesia > 4/8) → No PAD (= 2 foot pulses perceptible, ABI ≥ 0.9) → No infection (IDSA* Grade 1)	Level 1B
1. Thorough History and Examination 2. Standard wound care 3. Follow up within 1 week mandatory → Neuropathy → Signs of mild infection (rubor 0.5–2 cm; IDSA 2) → Ulcer duration > 1 week → Past amputations / DFU → Deformity → Suspected PAD (< 2 foot pulses perceptible, ABI < 0.9) → Ulcer duration > 4 weeks → Multiple ulcers → Deep ulcer (≥ grade 2) and/or plantar ulcer (pressure exposed) → Worsening findings or inadequate progress (woundsize reduction < 10% / week)	
RED FLAGS → Endstage renal disease (dialysis) → Suspected critical ischemia* emergency → Consider if Grade 3 ulcer (see appendix) → Worsening findings or no adequate progress (woundsize reduction < 50% within 4 weeks) → Signs of severe infection (fever, IDSA 4) → Suspected necrosis (black wound) → Deformity needing surgical correction → Suspected Charcot → Acute painful neuropathy	Level 3 care

* Infectious Diseases Society of America
** ABI < 0.5, tPO2 < 25mmHg, toe pressure < 30mmHg

Level 2 – DFS Management

Criteria suggesting need of structured care plan: → Past amputations / DFU → Deformity → ≥ Grade 2 ulcer (see appendix) and/or plantar ulcer (pressure exposed) → No improvement after 4 weeks under optimal care on Level 1 → Signs of moderate infection (rubor > 2 cm, IDSA Grade 3) → Intervention requiring vascular imaging	Level 3 care
1. Thorough History and Examination 2. Standard wound care 3. Targeted and effective Offloading 4. Thorough vascular specialist work up 5. At least weekly follow up mandatory RED FLAGS → Endstage renal disease (dialysis) → Suspected critical ischemia* emergency → Consider if Grade 3 ulcer (see appendix) → Worsening findings or no adequate progress (woundsize reduction < 50% within 4 weeks) → Signs of severe infection (fever, IDSA 4) → Suspected necrosis (black wound) → Deformity needing surgical correction → Suspected Charcot → Acute painful neuropathy	

Diabetic Foot Syndrome (DFS) – First Line Management according to Risk

Standard Wound Care possible	
«SIMPLE» low risk Level 1: Primary care 1 A: Pharmacist, medical technician, Podiatrist, nurse, woundcare nurse 1 B: GP	
«COMPLEX» intermediate risk Level 2: Off-site network of DFU Specialists GP, angiologist, diabetologist, infectious, interventional radiologist, technical orthopaedist, orthopaedic surgeon, podiatrist, specialised woundcare nurse, vascular surgeon & others as needed	Need for structured care plan: • Diagnostic OFFLOADING • Efficient OFFLOADING • Appropriate treatment of → Infection • Arteriopathy (PAD) • Infection • Specialized wound care
«EMERGENCY» high risk Level 3: On-site IP footcare team On-site interprofessional diabetic foot care team, comprising outpatient and inpatient management	Need for emergency care plan Same as Level 2, plus: • Fast-track Revascularization • Orthopedic surgery • Iv. antibiotics • Strict offloading
Doubt about severity Not confident in evaluation Refer to Level 2/3	

Close follow-up is mandatory at each level (at least weekly)!
Re-assess for improvement under current care, or appearance of RED FLAGS* requiring referral to highest level of care (Level 3).

* any of the criteria listed above under COMPLEX and EMERGENCY, definitions see next pages

Level 1B – DFS Management

Criteria permitting standard care (max 3–4 weeks) → Grade 1 ulcer (see appendix) → Duration < 4 weeks → Not on pressure exposed location (not on plantar surface) → NO Neuropathy (Monofilament = 4/4, Pallesthesia ≥ 5/8) → No PAD (= 2 foot pulses perceptible, ABI ≥ 0.9) → No or mild Infection (IDSA Grade 1 and 2)	Level 2
1. Thorough History and Examination 2. Standard wound care 3. Targeted and effective Offloading 4. At least weekly follow up mandatory → Past amputations / DFU → Deformity → Suspected PAD (< 2 foot pulses perceptible, ABI < 0.9) → Ulcer duration > 4 weeks → Multiple ulcers → Deep ulcer (≥ grade 2) and/or plantar ulcer (pressure exposed) → Worsening findings or inadequate progress (woundsize reduction < 10% / week) → (Consider: if fix of past amputation/severe deformity, chronic charcot, Grade 3 ulcer)	
RED FLAGS → Endstage renal disease (dialysis) → Suspected critical ischemia* emergency → Consider if Grade 3 ulcer (see appendix) → Worsening findings or no adequate progress (woundsize reduction < 50% within 4 weeks) → Signs of severe infection (fever, IDSA 4) → Suspected necrosis (black wound) → Deformity needing surgical correction → Suspected Charcot → Acute painful neuropathy	Level 3 care

* ABI < 0.5, tPO2 < 25mmHg, toe pressure < 30mmHg

Appendix

Assessing the severity of an ulcer*

→ Grade 1 ulcer: superficial, full thickness lesion not deeper than dermis (= epidermis to dermis)
→ Grade 2 ulcer: penetrating to subcutaneous structures, involving fascia, muscle, tendon joint capsule
→ Grade 3 ulcer: involving bone / joint

Pertinent History

→ Diabetes: type, duration, level of control, treatment, complications
→ Co-morbidities: cardiovasc. disease, incl. PAD revascularization, renal function, visual impairment, smoking history, obesity
→ Ulcer History: past ulcer, amputations, location, number of ulcers, cause, duration, treatment
→ Social situation: (housing conditions, mobility, support)