

The management of diabetic foot ulcers in Danish hospitals is not optimal

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ABSTRACT

INTRODUCTION: The diabetic foot is a complicated health issue which ideally involves several different specialists to ensure the most effective treatment. The Danish Health and Medicines Authority recently published a national guideline to address the implementation of multidisciplinary teams in the treatment. The objective of this study was to describe the treatment practices at the time the guidelines were launched.

METHODS: A questionnaire-based survey was conducted among Danish hospital departments working with diabetic feet. All public departments were invited by e-mail to participate and the participant answering the questionnaire was identified as knowledgeable about the department's procedures on treatment of diabetic feet. Only one questionnaire per department was allowed.

RESULTS: A total of 62 questionnaires were sent out. We achieved a response rate of ~37% (n = 23). Respondents (n = 13) were mostly orthopaedic surgeons. A classification system of the diabetic foot was rarely or never used, and eight respondents (42%) reported having a multidisciplinary team in accordance with the national guidelines. 73% of the respondents performed some form of surgical intervention on diabetic feet, mainly minor procedures.

CONCLUSION: The study demonstrated that several areas of treatment practices relating to the diabetic foot had potential for improvement as they did not adhere to national Danish guidelines. A follow-up survey, allowing time for local implementation, seems warranted.

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Foot disorders are one of the most serious complications to diabetes mellitus. It is a leading source of morbidity and represents a substantial cost for both the individual patient and for Danish health care [1, 2]. The incidence of foot ulcers in diabetics is uncertain, but is reported to range between 1-6% [3, 4] with a prevalence in the 3-10% range. The lifetime risk of developing a foot ulcer for diabetics may be as high as 15-20% [4, 5]. Diabetes continues to be the leading cause of non-traumatic lower limb amputations in the Western World [2].

The "diabetic foot" is defined as an infection, ulceration and/or deep tissue defect in the foot of a diabetes patient (WHO, 1995). Diabetic foot is associated with

vascular pathology in the lower limb and with peripheral neuropathy [6-8]. A diabetic foot ulcer can be described as any skin defect on the foot of a person suffering from diabetes mellitus [3, 9].

Diabetic foot ulcers easily become infected [10] and the condition is often aggravated by long-term diabetic complication [11].

Due to the complex nature and pathogenesis of diabetic foot ulcers, treatment will invariably also become multifaceted. The condition may therefore be more easily managed by a multidisciplinary team (MDT); and treatment should include preventive measures, patient education and multifactorial treatment of the ulcers [2]. Using an MDT may lower the frequency of amputations by up to 50% [12].

To handle the challenges associated with diabetic foot ulcers, the Danish Health and Medicines Authority published a complete national assessment on the issue in 2011 [3]. In 2013, the assessment was followed by a national clinical guideline describing how to handle the diabetic foot in a clinical setting [9]. Both of these materials underline the importance of the aforementioned MDT.

We set out to evaluate how well the guidelines have been integrated into practical clinical care in Denmark, in particular with regards to the use of an MDT. To assess this, we conducted an online survey among leading Danish health-care professionals working with the diabetic foot.

METHODS

The survey was conducted using a free online software (SurveyMonkey). The questionnaire was created for the study by author KKM and sent out to health-care professionals, primarily doctors, working with diabetic feet in public Danish health care. A single copy was initially sent to each department of endocrinology and orthopaedic surgery in Denmark, as well as to three centralised wound treatment centres (Marselisborg, Odense and Bispebjerg). Author KKM selected the recipients by identifying the doctor responsible for coordination of the treatment of diabetic foot ulcers at each department. In case of no response, the questionnaire was sent again, but to another doctor at the same department.

The survey included a total of nine questions and

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included a combination of open-ended and closed-ended items. Six questions contained multiple choice options with items that were not mutually exclusive. Not all respondents answered all questions; and as it was possible for the same respondent to provide several answers to some of the questions, summation of the total number of replies recorded for each question may exceed the total number of respondents.

Trial registration: not relevant.

FIGURE 1

Diabetic foot referrals. Where do you receive your referrals from? (N = 23).

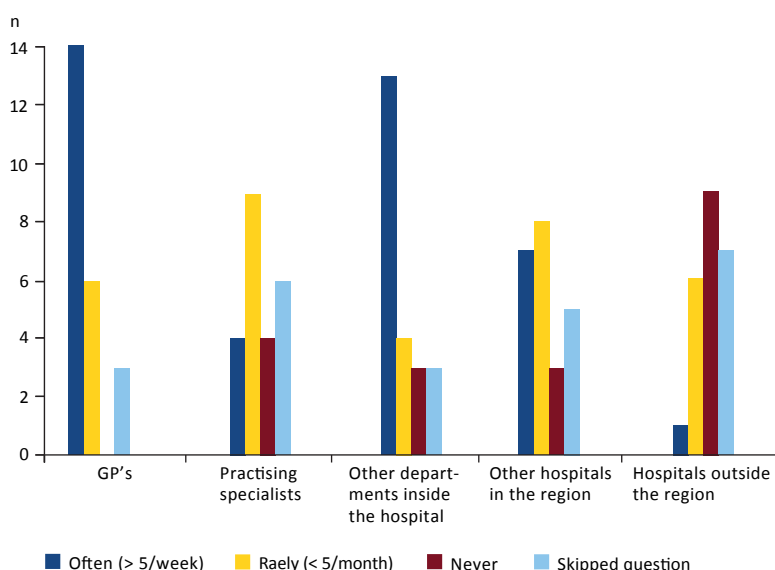
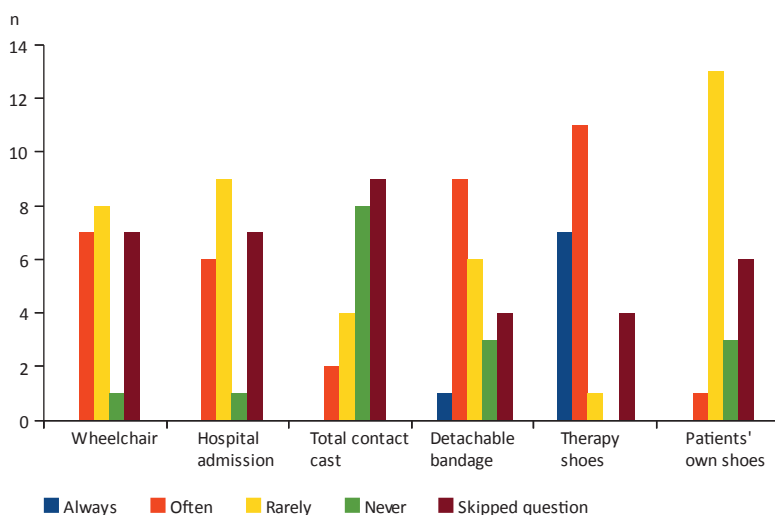


FIGURE 2

Offloading of diabetic feet. Which method for offloading of diabetic feet do your department employ? (N = 23).



RESULTS

General treatment of diabetic foot ulcers

A total of 62 questionnaires were sent out and 23 health professionals replied, corresponding to a ~37% response rate. No personal data were gathered on the respondents apart from their department. No single department replied more than once. Out of the 23 responses, 19 confirmed that they are treating diabetic foot ulcers.

As just over 50% (12 out of 23) of the answering departments were designated as diabetes foot centres, data represent a cross-section of both standard and specialised units. The geographical distribution is skewed with The Capital Region of Denmark representing eight respondents, and the two other regions with large university hospitals (Region of Southern Denmark and the Central Denmark Region) representing six respondents each. The largest group of respondents was orthopaedic surgeons (n = 13); the rest were mainly endocrinologists (n = 5) and vascular surgeons (n = 3).

The departments were distributed as: 13 departments of orthopaedic surgery, five departments of internal medicine or endocrinology, three departments of vascular surgery, and in two cases the department's speciality was not reported.

Referrals of diabetic foot ulcers

Most referrals were from general practitioners (GP), which is in accordance with the model used in Denmark where most diabetics have their diabetes monitored by their local GP. Furthermore, patients are also referred from other departments at the hospitals. Patient referral between regions was less frequent, with nine departments reporting that they never receive referrals from another region. See Figure 1.

Classification of diabetic foot ulcers

Classification systems are rarely used. Only the Wagner system is occasionally used (with five of the respondents always using it, four using it often and two rarely). There is a discrepancy between the number of responders reporting that they do not use any classification system, and the number of reported users of the various systems. It is unknown whether this means that some respondents are using another classification method or whether this finding reveals a low data consistency due to the setup of the questionnaire.

Patient offloading

Most of the offloading methods are in use to some extent. In general, some form of offloading is employed. Thus, 16/17 of our respondents answered that they always use other methods than the patients' own shoes. The most common choice is therapy shoes and detachable bandages. The options are not mutually exclusive,

e.g., wheelchair and hospital admission for offloading may have some overlap. See **Figure 2**.

Health professionals involved

The most common permanent team members are wound specialist nurses (n = 15), orthopaedic surgeons (n = 11) and podiatrists (n = 10). Endocrinologists and diabetes specialist nurses are either permanent team members (n = 7 and 6, respectively) or on call on short notice (n = 8 in both cases).

Other medical specialties, such as vascular surgeons, microbiologist and plastic surgeons are most often used as external consultants, as are bandagers and shoemakers. The least involved specialists are dermatologists and infectious disease specialists (n = 9 and 10, respectively). See **Figure 3** and **Table 1**.

Operations on the diabetic foot

A total of 14 of the responding departments perform some kind of surgery in relation to the diabetic foot. Such surgery is mostly minor surgery (n = 14) as well as acute surgery (n = 14) in relation to infections and amputations. Departments who perform reconstructive surgery (n = 6) mainly use plaster casts and internal fixation post-operatively.



TABLE 1

Team composition (in the 19/23 departments treating diabetic feet).

	n
With both an endocrinologist <i>and</i> an orthopaedic surgeon as a permanent member	6
With both an endocrinologist <i>and</i> an orthopaedic surgeon as either a permanent member <i>or</i> on short notice call	15
With vascular surgeon as a permanent member <i>or</i> on short notice call	9
With a foot therapists as a permanent member	10
With a diabetes specialist nurse as a permanent member	6
With a wound specialist nurse as a permanent member	15
With both a diabetes specialist nurse <i>and</i> a wound specialist nurse as a permanent member <i>or</i> on short call	11
Consisting of an orthopaedic <i>or</i> vascular surgeon, an endocrinologist, wound <i>and</i> diabetes specialist nurses and a foot therapist Members as either a permanent member <i>or</i> on short notice call	8

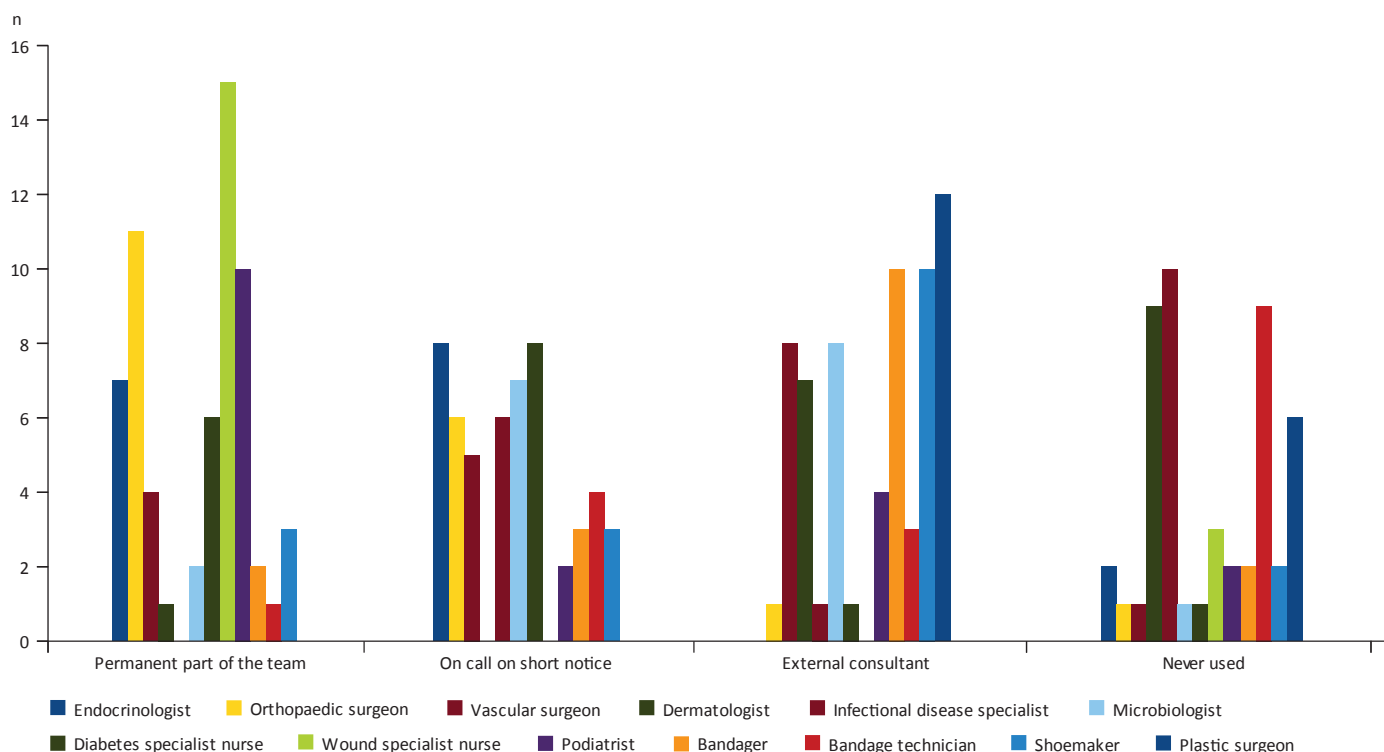
DISCUSSION

The survey data presented give an overview of the management of diabetic foot ulcers in Denmark, especially with respect to the MDT. However, due to the low response rate, the results may not represent treatment practices across Denmark. Furthermore, the responses



FIGURE 3

Team members in 23 departments. What specialists are involved in the treatment of the diabetic foot at your department?



are unevenly distributed across the country, with most responders working at hospitals near the two largest cities in Denmark (Copenhagen and Aarhus). This may, however, just reflect that these cities have the largest concentration of departments working with diabetic foot ulcers. On the other hand, it is also possible that the non-responders on average have less focus on this particular area and therefore did not reply to the questionnaire either. This would skew the results “positively” by showing a higher awareness of this field than is actually present among the invited participants as a whole.

Overall, data indicate that, although some elements of the national clinical guidelines [9] seem well established, several areas do not currently follow the guidelines:

- Regarding referrals, the guidelines recommend a referral to an MDT in case of infection or other complications. Data show a general trend that the hospital departments receive most referrals locally, and that there are few referrals between country regions. Since over 50% of the responders confirmed that their department is a diabetic foot centre, and thus should be an MDT, we can probably assume that each region treats diabetic foot ulcers itself (Denmark counts a total of five regions).
- The guidelines recommend that all patients with a diabetic foot ulcer have their ulcer evaluated according to an established classification system (e.g. Wagner). The survey data, however, show that most responders do not use this formalised evaluation.
- In relation to offloading, it is recommended that detachable bandages and therapy shoes are used as first-choice, which is reflected in the survey. However, it is also pointed out in the guidelines that there is no evidence that total offloading (hospital admission, wheelchair) has added benefits over the more flexible solutions, although they are still used in some departments.
- The guidelines recommend that the following personnel form part of the MDT:
 - Endocrinologists
 - Surgeon with special experience in wound treatment
 - Podiatrist or similar
 - Diabetes specialist nurse
 - Wound specialist nurse
 - Beyond this, the team needs access to patient hospitalisation and microbiological, radio logical and laboratory support.

In addition, the team needs access to assistance from

specialists in the areas of orthopaedic and vascular surgery, pain relief management and orthotic technicians.

Furthermore, it is recommended that glycaemic control is performed simultaneously with the ulcer treatment. The survey shows that, while the diabetes specialists are not part of the permanent team as often as the other recommended groups, they are on “short notice” call. This could mean that the diabetes control intended in the guidelines is being followed.

Data suggest that there were several shortcomings in the treatment of diabetic feet at the time of the survey compared to the recommendations in the national clinical guidelines. However, this survey was performed shortly after the publication of the guidelines, which left little time for implementation. A follow-up survey with more information and a higher response rate seems warranted before any definitive conclusions can be drawn.

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