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# Delayed referral of patients with diabetic foot ulcers across Europe: patterns between primary care and specialised units

**Objective:** Diabetic foot ulceration (DFU) has the potential to deteriorate rapidly without prompt assessment and treatment. The aim of this study was to assess the referral patterns for DFU, from primary care to specialised diabetes foot care units.

**Method:** A two-part, quantitative, online questionnaire was administered to GPs across four countries in Europe: France, the UK, Germany and Spain. The first part entailed a survey of GPs' perceptions of referrals for DFU. The second part of the questionnaire collected data on recently managed DFU cases.

**Results:** There were 600 questionnaires collected in the first part of the study (150 per country), and 1188 patient cases of DFU management were included in the second part. Up to 95% of patients had type 2 diabetes. Patients' complaints led to diagnosis, on average, 60% of the

time, and the diagnosis was an incidental finding during a consultation 13–28% of the time. On average, only 40% of GPs completely agreed that they have clearly identified DFU clinical practitioners working in a hospital facility. In 55–66% of cases, the duration of DFU was unknown or DFU diagnosis was delayed more than three weeks from the onset of the wound. On average, 48% of patients were referred after an unknown duration or more than one month from the onset of DFU.

**Conclusion:** Despite differences in health-care structures across Europe, delays in referral to specialist foot care teams seems to be a common theme. There is an ongoing need to educate GPs, nurses and patients to be more aware of the risk of DFU, and the need for prompt referral to specialist diabetic foot teams.

**Declaration of interest:** This study was funded by URGO Medical.

diabetic foot • Europe • primary care • referral • ulceration

According to the International Diabetes Federation, it is projected that 552 million people worldwide will have diabetes by 2030.<sup>1</sup> About 25% of patients with diabetes mellitus are also expected to develop a foot ulcer within their lifetime.<sup>2</sup> Of those with ulceration, up to 60% could go on to develop infection, with an increased risk of developing osteomyelitis and amputation.<sup>3,4</sup> This is partly because of three main pathologies—neuropathy, ischaemia and immunopathy—all of which come together in the diabetic foot.<sup>5</sup> As a result of these three pathologies, ulceration or infection may spread rapidly, leading to overwhelming tissue destruction and amputation.

Thus, the diabetic foot ulcer (DFU) has the potential to deteriorate rapidly without prompt referral to appropriate specialist care for assessment and treatment, indeed, 85% of amputations are preceded by an ulcer.<sup>6</sup> Furthermore, published evidence suggests that the cost of treating DFUs increases as the ulcer severity increases.<sup>7</sup> The severity of ulcers also increases with duration and a longer delay in presentation to a foot specialist. It is therefore important that patients are referred promptly to a specialist multidisciplinary team (MDT), to reduce the risk of amputation and cost of treatment. There remains a prevalence of 5.5% of patients with DFU within Europe.<sup>8</sup> Despite the different health-care structures across Europe, general practitioners (GPs) usually have a key role in coordinating patient care. GPs are usually the first point of contact for patients in need of medical assistance, thus acting as gatekeepers of patient access to other specialist care.

The aim of this study was to assess the referral patterns from GPs to specialised diabetes foot care units across Europe, to analyse differences and commonalities between GPs' perceptions of the need for referral, and to review how they manage DFU cases with regard to referral patterns.

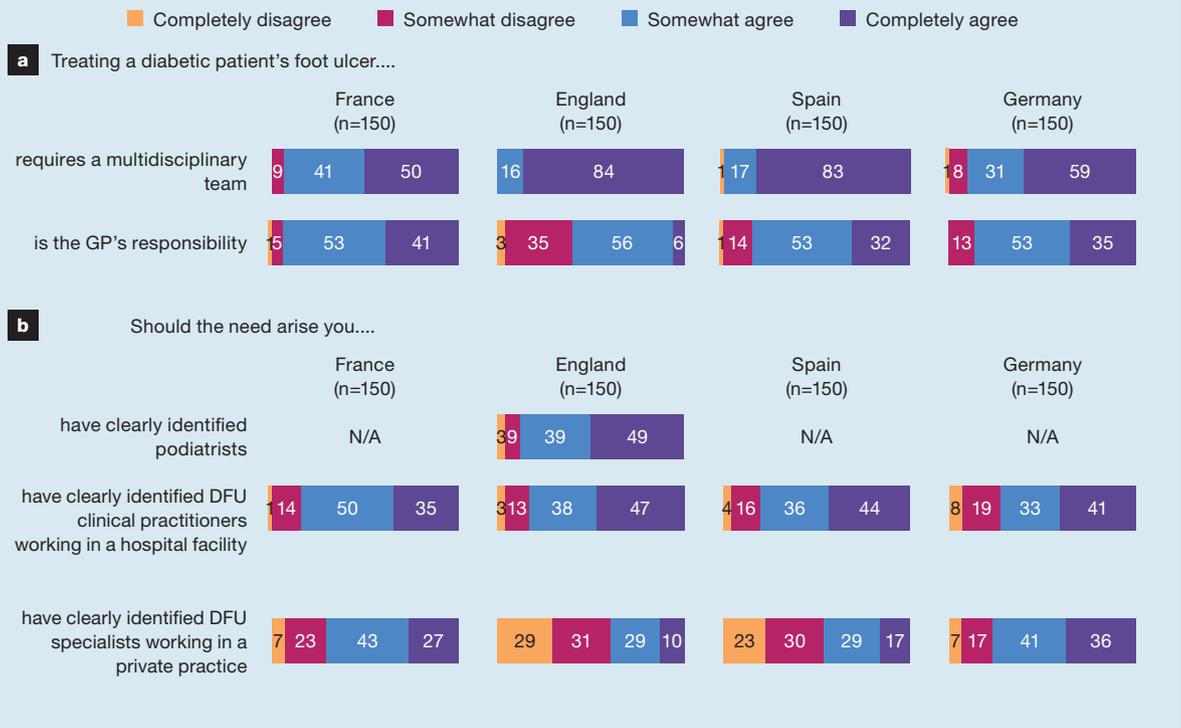
## Methods

The research was conducted in two steps. The first phase was a qualitative approach, to explore the various facets of care by GPs of patients with DFU. This phase

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**Fig 1.** GP responses to statement on care responsibilities (a) and the availability of specialist care for referral (b). Numbers in figures denote the percentage of GP responses, as to whether they 'completely agree', 'somewhat agree', 'somewhat disagree', or 'completely disagree' with the statement posed. Only 59% of GPs in Germany 'completely agreed' that care requires a multidisciplinary team compared with 84% and 83% of GPs in the UK and Spain, respectively (a)



was carried out from December 2014 to February 2015. We completed 80 individual interviews in four countries, namely France, the UK, Germany and Spain, among 40 GPs, 30 nurses and 10 podiatrists. We investigated health professionals' level of knowledge about DFUs, to understand their perceptions of DFUs, determine how they manage DFUs, and their various referral habits and roles. The results of this qualitative work in the first phase provided the exploration data used to precisely define and validate the research sample targets for the second phase, as well as the qualitative data used to finalise a questionnaire for the second phase of the research.

The second phase of the study was a quantitative survey conducted between August to September 2015, among 600 GPs in the same four countries as the first phase, with 150 participants from each country. The data for the second phase were collected via a 45-minute online questionnaire consisting of 73 multiple choice questions, which was also divided into two parts.

- The first part (questions 1 to 23) collected data about GPs' awareness, knowledge and image of DFU with respect to DFU referrals
- The second part (questions 24 to 73) collected data on the management of sample DFU patient cases. In this part, GPs were asked to describe the cases of two patients with DFU that they had recently managed. Information was collected regarding GPs' referral

habits, including cases of DFU, whether amputation was undertaken, and whether there was revascularisation. However, information about simple cracks, blisters, hyperkeratosis without wounds, and venous leg ulcers was excluded.

**Data analysis**

We analysed the data collected in both parts of the questionnaire to elaborate the referral patterns of GPs for their patients with DFU. This information included the pattern of patients' initial presentation to a GP, and pattern of referrals from the GP to specialist foot services.

We analysed data of the first part of the questionnaire querying GPs' perception of referrals. For the second part, querying aspects of patient cases regarding referral patterns, we analysed the following:

- Patient profile, including sex, age and educational level
- Patient history of diabetes and DFU diagnosis, as follows: type of diabetes, date of diagnosis, date when DFU or wound was discovered, context of diagnosis and time between wound onset and diagnosis
- DFU management and treatments, as follows: time between wound onset and referral to a hospital.

We cross-tabulated responses to all open and closed-ended questions as well as responses among various questions. Results were presented at the country level; significant differences between countries were analysed using a confidence interval of 95% (CI 95%).

**Fig 2.** Illustrating the likelihood of GPs to refer sample DFU presentations. Numbers in figures denote the percentage of GP responses, as to whether they ‘systematically’, ‘quite often’, ‘sometimes’, or ‘rarely or never’ refer. The results demonstrate the clinical presentations for which GPs are more likely or would systematically refer (a) compared with the presentations that GPs would rarely or only sometimes consider referring for specialist care (b)



**Results**

A total 600 questionnaires were collected from GPs, with 150 questionnaires per country. We collected data on a total 1,188 DFU patient cases: 295 in France, 298 in the UK and Spain, and 297 in Germany. Upon review of the questionnaires, the results for GP referral patterns were reported according to:

- GPs’ awareness and perception of DFU referrals
- GPs’ access to specialist diabetic foot centres for referrals
- Possible reasons for referral
- Summary of patient cases.

**GPs’ awareness and perception towards DFU referrals**

All GPs in the UK and Spain ‘somewhat’ or ‘completely’ agreed that treating foot ulcers must involve a multidisciplinary approach; however, only 59% of GPs in Germany and 50% in France completely agreed with this statement (Fig 1a). Only 6% of GPs in the UK completely agreed that the care and management of patients with DFU should be the responsibility of the

GP; nearly a third of GPs from the remaining three countries felt that the management of DFU should be the responsibility of the GP.

**GPs’ access to specialist diabetic foot care teams for referral**

The role of a podiatrist was mainly relatable to that of GPs in the UK; however, only 49% of GPs in that country stated that, should the need arise, they have access to a clearly identified podiatrist for referral. On average, only 40% of all GPs stated that they have access to clearly identified DFU clinical practitioners working in a hospital facility, with the highest percentage among GPs in the UK (47%) and the lowest among those in France (35%), as shown in Fig 1b. Access to a clearly identified DFU specialist working in private practice was very low in the UK and Spain, with only 10% and 17% of GPs, respectively, reporting access to an identifiable private practitioner. However, this was much higher in France (27%) and Germany (37%). In the UK, 90% of GPs reported having a diabetic foot clinic or hospital service close to their place of practice (mainly less than

**Table 1. Summary of demographics of patient cases presenting with a diabetic foot ulcer (DFU). The majority, 91%, have type 2 diabetes, and 62% are male. The UK had a higher proportion (57%) of patients under the age of 69 years, and Spain had the highest number of patients (58%) over the age of 70 years, as well as the highest proportion with a 94% with 'low' or 'middle' education level**

		France	UK	Spain	Germany
Number of DFU Cases		295	298	298	297
Type of diabetes (%)	Type 2	88	90	91	95
	Type 1	11	10	9	4
	Other	1	–	–	1
Sex male (%)		64%	63%	62%	61%
Age	>80yrs	19%	13%	19%	14%
	70–79yrs	29%	31%	39%	38%
	60–69yrs	33%	31%	27%	33%
	<60yrs	19%	26%	16%	15%
Educational level (%)	Don't know	13	28	2	8
	High	8	8	4	6
	Middle	35	37	26	44
	Low	44	27	68	41

six miles). This was 80% for GPs in Germany, 71% for GPs in France, and only 55% for GPs in Spain.

**Possible reasons for referral**

When GPs were presented with various clinical states of DFU, referral to a hospital was most often considered for complications such as gangrene, osteomyelitis, ischaemia and necrosis, which would prompt a referral by nearly 90–95% of GPs in all four countries (Fig 2a). However, the presence of deformed foot (Charcot), infection with pus, deep wounds, non-healing wounds, or patients with poor diabetes control were all less likely to prompt a referral (Fig 2b). There was a larger number of situations for which more than 40% of GPs in the UK would consider sending a patient to a specialist service within a hospital.

**Summary of patient cases**

Patient characteristics and referral patterns are presented below, according to patient profile and history of diabetes, diagnosis and referrals.

**Patient profile**

As per Table 1, most patients were men, ranging from 61% in Germany to 64% in France. Patients with DFU in the UK were younger and more active, with 26% less than 60 years of age, followed by those in France where 19% were under the age of 60 years. The majority of DFU patients were over 60 years of age, and Spain had the largest proportion of older patients, with 58% over 70 years of age. Most patients had a 'low' or 'middle' education level, with Spain having the most patients with 'low' education levels (68%).

**History of diabetes, diagnosis and referrals**

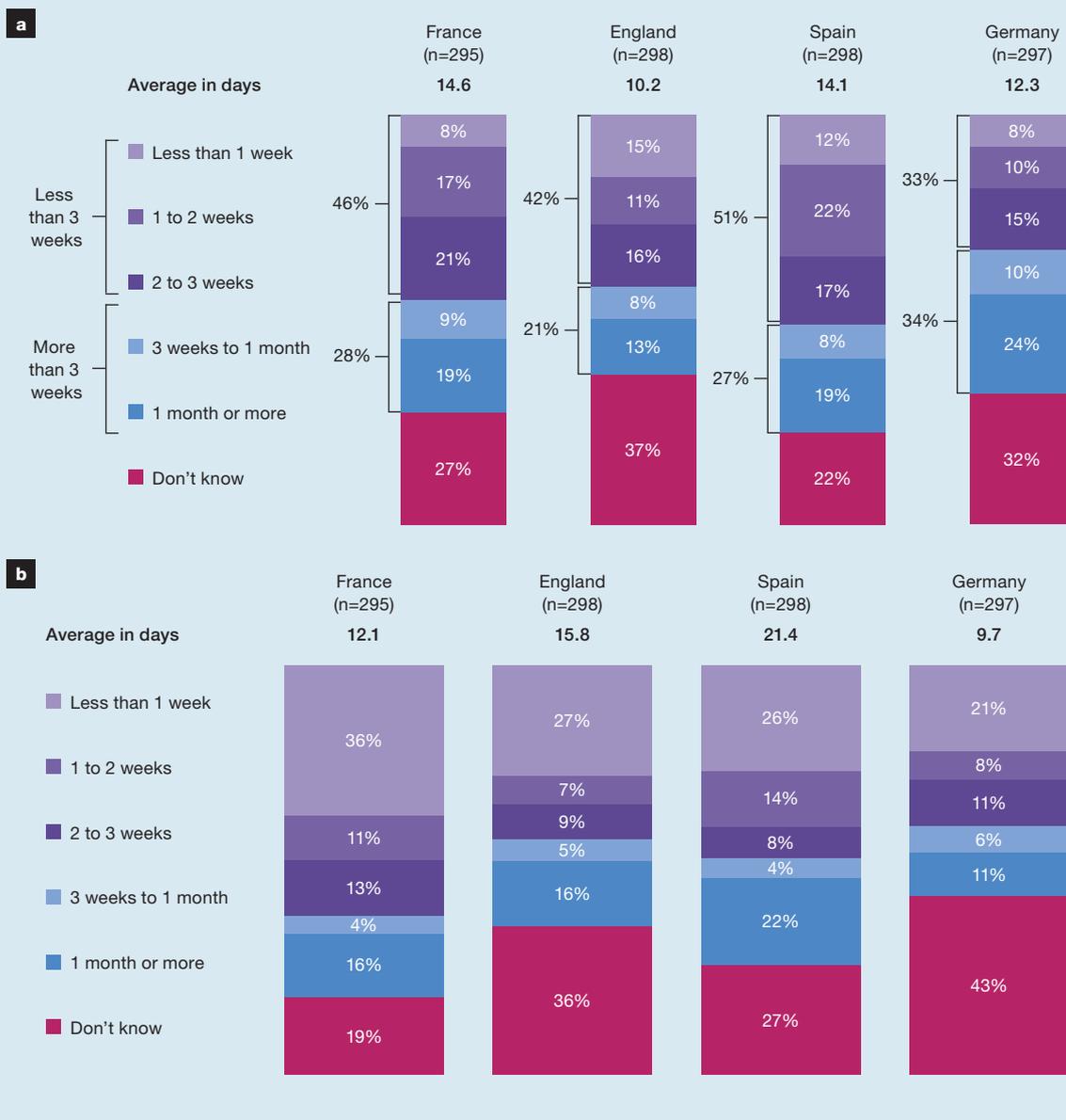
More than 88% of patients had type 2 diabetes, and 63% of these were men, as summarised in Table 1. Average HbA1c was 8.3%, but 34% in the UK and Spain had an HbA1c of more than 9% at the time of DFU diagnosis. For Spain, Germany and France, most diagnoses of DFU (58%, 61% and 64%, respectively) were made by the GP following a complaint from the patient or during consultation for another reason. In the UK, diagnosis was made by the GP in only 45% of cases; in other countries, there was a more even distribution among other health professionals in making the initial diagnosis. In 55–66% of cases, the duration of DFU was unknown or it took more than three weeks from onset of the wound for a diagnosis of DFU to be made (Fig 3a). A significant proportion of GPs, from 19% in France to 43% in Germany, did not know how much time had passed after wound onset before the patient was referred (Fig 3b). On average, 48% of patients were referred after an unknown duration or more than one month from the onset of DFU.

**Discussion**

Since the first multidisciplinary foot clinic was established in 1981,<sup>9</sup> it has been well documented that the advent of such clinics has resulted in a significant decrease in rates of diabetic foot amputation. The concept and impact of these multidisciplinary clinics have led to a worldwide decrease in the rates of diabetic foot amputation.<sup>10–12</sup> It is therefore interesting to note that, as of 2015, there remains a significant degree of discrepancy among GPs surveyed across Europe as to the necessity or benefit of involving a multidisciplinary team in the management of DFUs. Whereas a significant proportion of GPs in Spain and the UK seem to prefer a multidisciplinary approach to managing their patients with DFU, GPs in France and Germany seem to favour a more autonomous approach, as they consider the GP to be the leading clinician responsible for the treatment of DFU patients. Nevertheless, a multidisciplinary team is thought to be a good management option in all participating countries. In Spain, and especially in the UK, GPs' opinions seemed to be focused on a shared responsibility between different health professionals in the care of patients with diabetic foot.

A positive finding is that nearly 80% of GPs in all countries stated that they have a clearly identified DFU clinician working in a hospital facility, to whom they can refer patients should the need arise. This fact ought to facilitate referrals to hospitals or specialist teams when necessary. However, delays remain in the referral pathways of the four countries surveyed. Regarding the impact of neuropathy in the trio of pathologies involved in the diabetic foot, it is necessary for these patients to undergo regular wound and callus debridement by a specialised podiatrist, who can also have a significant role in patient education and early referral to a multidisciplinary team. However, the possible role of specialised podiatrists was more clearly

**Fig 3.** Time between the onset of the wound and the diagnosis (a) and of how much time went by before the patient was referred after the onset of the wound (b). The delay in diagnosis of the DFU, highest in Germany (56%) where patients had their DFU for more than one month or for an unknown duration before presenting to the GP for formal diagnosis (a). Of the patients from Spain 22% were not referred until one or more month after diagnosis (b)



identified by GPs in the UK, which seems to be more consistent with their ethos of a more multidisciplinary approach in the management of DFU. In the same sense, one thing that could improve the care of patients with DFU is the presence of local structures dedicated to diabetic foot management. However, there were significant differences regarding proximity to a local specialist foot centre that was accessible to the GPs surveyed. Evidently, this could be a factor in Germany, France and Spain where between 15% and 25% of GPs surveyed had no knowledge about the location of such specialised foot centres. It is clearly important for GPs

to have established access to a specialist foot centre or multidisciplinary foot clinic, but that alone is not enough. Other health professionals and physicians must know that these centres are available and patient referrals to them must be made more easily and quickly; otherwise, it will be impossible to fully benefit from the existence of specialist foot centres. Perhaps the country with the best organisation concerning specialised diabetic foot structures is the UK, where up to 90% of primary care professionals know about the existence of centres, which are less than 12 miles away in 85% of cases. Nevertheless, even in the UK, more work is

needed to improve the referral pattern to specialist centres. Our data is in keeping with the UK data from the National Diabetes Foot Care Audit in England,<sup>13</sup> which includes data on 11,073 patients who underwent first-expert assessments between 2014 and 2016 for 13,034 new ulcer episodes, it demonstrated that excluding self-referrals, 40% of ulcer episodes had an interval of two or more weeks delay before first diabetic foot expert assessment.<sup>14</sup>

Another of the most relevant findings in our analysis of this portion of the data was that 22% of UK GPs do not personally make the diagnosis of DFU. In such cases, the diagnosis is usually made by a district nurse (27% of cases). This may partly reflect the multidisciplinary nature of care in the UK, but it also underscores the importance of extending education aimed at improving DFU referrals not only to GPs but also to nurses and other health professionals.

For all countries, the most common indication of a diagnosis of DFU is a complaint from the patient or their family. However, it must be considered that some patients (between 6% in Spain and 14% in the UK) do not understand the potential severity of their DFU or foot disease diagnosis. This means that there are a significant proportion of patients who will not pay enough attention to the care of their feet, partly owing to neuropathy. For this reason, these patients would already be presenting late to a GP, meaning that the GP or clinician must take action to assess the need for referral more rapidly, to help address the issue of delayed presentation and referral for DFU.

Evidently, regardless of the differences in health care structures of different countries, this survey demonstrated that delays in access to specialist foot care teams seem to be a common theme across Europe. The delays in referral are also contributed to by late, or delayed patients' presentation to the GP and other health professional such as a nurse, as the GP was not

the only health professional responsible for making a DFU diagnosis. There is thus an ongoing need to raise awareness and to educate GPs, nurses and patients to be more mindful of the risks of DFU, and the need for prompt referral to a specialist diabetic foot team.

### Limitations

This is a survey of the practices of 600 GPs in four countries across Europe. Although it is not a complete representation of practices across the whole of Europe, it is certainly the largest survey of its kind. The sample size in this study was not set for the determination of statistical significance but was selected to have an equal and broad representation of GPs' perspectives and day-to-day practice. However, the practices of 150 GPs in four countries may also not fully represent practices across the respective countries, as different regions may have different legislation and care pathways. However, this study represents a comprehensive pool of data and overview of practice, providing a good platform for use as a baseline for comparison. Our findings highlight a profound need for national and local improvements in education about diabetic foot care pathways.

### Conclusions

Although different care structures exist within the countries studied, the theme of delayed diagnosis and delayed referral for DFU is common. The results of this study clearly demonstrate that more must be done to improve the management of patients with DFU as well as to improve referral pathways. Our results provide greater insight into some possible problems that may lead to undesirable clinical outcomes in DFU care. These findings could help raise awareness among legislators and health authorities about the need to improve foot care pathways, to review the policies regarding diabetic foot care, and referral pathways within each country. **JWC**

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### Reflective questions

- Which aspects of GP's perspective on the management of DFU, may contribute to delay in referral?
- What are the factors that prompt GPs to refer a DFU for further specialist input?
- How do the delays in DFU referrals compare across Europe?