



Waiting for the Referral: Diagnostic Delay in Diabetes-Related Foot Ulceration and What It Costs the Limb

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Received: 10 January 2022; Accepted: 18 May 2022; Published: 29 September 2022

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Abstract

A foot ulcer in a person with diabetes deteriorates on a timescale measured in days, and the interval before it reaches a specialist team is measured in weeks to months. Surveys across Europe report that the duration of the ulcer was unknown or the diagnosis delayed beyond three weeks in 55 to 66 per cent of cases, and that on average 48 per cent of patients reached a specialist unit either after an unknown interval or more than a month from onset. Against that background a fast-track pathway was developed, defining referral windows by ulcer severity: within 24 hours for abscess, wet gangrene or fever, within four days for ischaemic, deep or mildly infected ulcers, and within two weeks for uncomplicated non-healing ulcers. In a series of 200 patients assessed against those thresholds, referral inside the window was associated with healing in 89.9 against 41.5 per cent, healing in 10 against 16 weeks, minor amputation in 17.6 against 75.6 per cent, major amputation in 0.6 against 36.6 per cent, admission in 47.1 against 82.9 per cent and death in 4.4 against 19.5 per cent. This review sets out where the interval accrues, why primary care is poorly placed to close it, and why effect sizes of that magnitude should be read with care rather than quoted at face value.

Keywords: Diabetic foot ulcer; Referral delay; Fast-track pathway; Amputation; Primary care

Introduction

Foot ulceration is among the most consequential complications of diabetes, preceding the large majority of lower limb amputations and carrying a mortality that exceeds many cancers [1,2,3]. National population data confirm the association with amputation and death at scale [30], and structured prevention in the healed foot is a separate discipline of its own [29]. What distinguishes it from most chronic complications is its tempo: an ulcer that is superficial and uninfected on Monday can be a deep infected ulcer with spreading cellulitis by the end of the week [4,5].

Specialist multidisciplinary foot services improve outcomes, and that is not seriously disputed [6,7,8]. The question this review addresses is narrower and less comfortable: how long it takes to reach one of those services, where the interval accumulates, and what is lost while it does [9,10].

For more than three decades the delayed referral of people with diabetes and foot ulceration has been documented as harmful, with repeated calls for education, refined pathways and simplified access [8,11,12,34]. Services that established a team reported falling amputation rates [31,32]. That the problem has been described for so long without resolving is itself the finding worth examining.

Material and Methods

Search strategy: PubMed and the archives of the major diabetes, wound care, vascular and podiatry journals were searched for studies of referral timing in diabetes-related foot ulceration. Search terms combined diabetic foot ulcer with referral delay, time to specialist, fast-track pathway, primary care, amputation and healing. Reference lists of international guidance [13,14] were screened by hand for primary sources.

Eligibility: Studies were included if they quantified the interval from ulcer onset to specialist assessment, characterised the knowledge or behaviour of referring clinicians, or reported outcomes stratified by timeliness of referral. Studies of the multidisciplinary team model are cited to establish what referral leads to and are identified as such.

Data extraction and handling: Design, setting, sample size, how the referral interval was defined and the reported estimate were extracted as published. Whether the comparison was randomised or observational is stated alongside every outcome, because the principal comparison in this field is observational and confounding by ulcer severity runs through it. No pooling or re-analysis was performed. Figures 1 to 6 and Tables 1 to 3 reproduce published values only. This is a narrative synthesis and was not registered as a systematic review.

Results

How long patients wait: A survey conducted by the International Diabetic Foot Care Group and D-Foot International across European practice reported that in 55 to 66 per cent of cases the duration of the ulcer was unknown at first consultation, or the diagnosis was delayed by more than three weeks from the onset of the wound (Figure 2). On average 48 per cent of patients were referred to a specialist either after an unknown interval or more than one month after the ulcer appeared (Figure 1) [9,15].

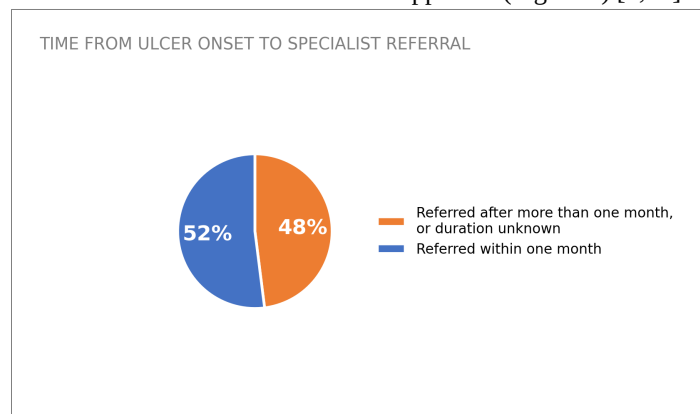


Figure 1: Interval from ulcer onset to specialist referral across European practice [9]

A prospective European picture: A prospective observational study of consecutive patients presenting with a new foot ulcer to nine specialist centres across France, Germany, Italy, Spain and the United Kingdom found that the proportion referred more than three months after the ulcer began remained high throughout Europe. Patients with severe ulceration were, however, referred more quickly by front-line professionals [16]. Severity accelerates referral, which matters for how the outcome data below should be read.

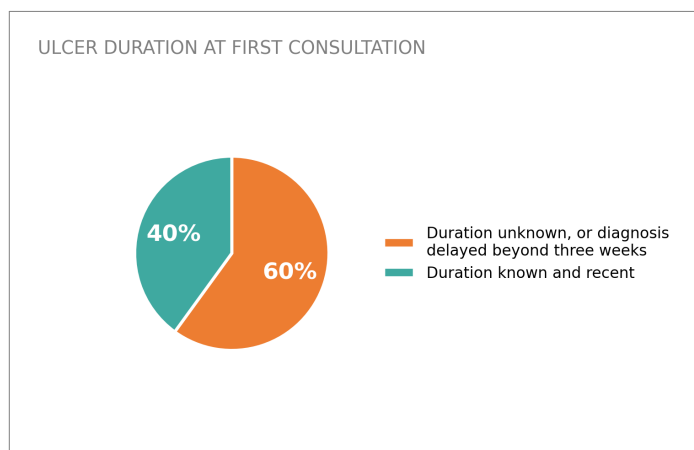


Figure 2: Whether ulcer duration was known at the first consultation [9,15]

Why primary care struggles: The behaviour is not explained by indifference. In the same survey work, only about 40 per cent of general practitioners could clearly identify which clinicians were responsible for diabetic foot management in their local services, and around 40 per cent reported that they were not adequately trained in ulcer management (Figure 6) [9,17]. A clinician who cannot name the receiving team cannot make a prompt referral to it.

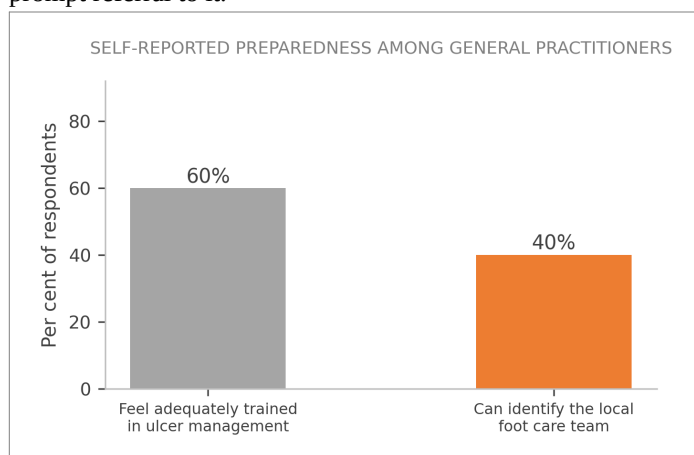


Figure 6: Self-reported preparedness among general practitioners managing diabetes-related foot ulceration [9,17]

The pathway that followed: In response, the International Diabetic Foot Care Group and D-Foot International produced a fast-track pathway intended for non-specialist clinicians, which grades ulcer severity and attaches a referral window to each grade (Figure 3, Table 2). Severely complicated ulcers, meaning abscess, wet gangrene or fever, should reach a specialist within 24 hours; complicated ulcers, meaning ischaemic, deep or mildly infected, within four days; and uncomplicated non-healing ulcers within two weeks [12,18].

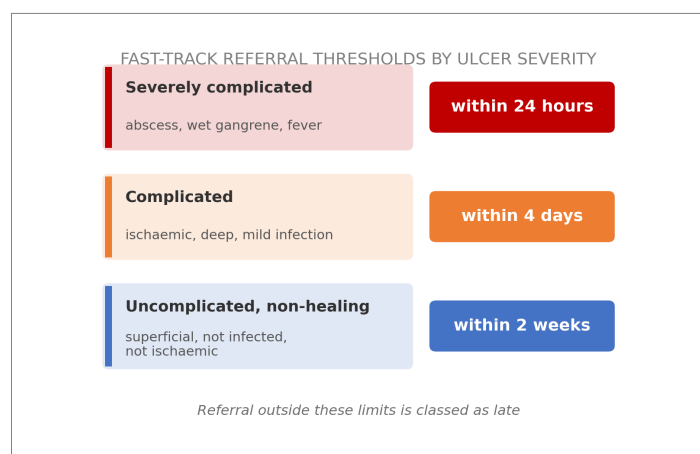


Figure 3: Fast-track pathway referral windows by ulcer severity [12,18]

Ulcer severity	Clinical features	Referral window
Severely complicated	Abscess, wet gangrene, fever	Within 24 hours
Complicated	Ischaemic, deep, or mild infection	Within 4 days
Uncomplicated, non-healing	Superficial, not infected, not ischaemic	Within 2 weeks
Any grade beyond the window	Classified as late referral	—

Table 2: Fast-track pathway thresholds used to classify referral as early or late [12,18]

What timeliness was associated with: Two hundred patients managed under the pathway were classified as early or late referrals according to whether the severity-specific window was respected, and followed for six months. Mean age was 70 (SD 13), 62.5 per cent were men, and 91 per cent had type 2 diabetes of mean duration 18 years (SD 11). Ulcers healed in 89.9 per cent of the early group against 41.5 per cent of the late group ($p = 0.001$). Minor amputation occurred in 17.6 against 75.6 per cent and major amputation in 0.6 against 36.6 per cent (both $p < 0.0001$). Admission to hospital occurred in 47.1 against 82.9 per cent ($p = 0.001$) and death in 4.4 against 19.5 per cent ($p = 0.02$) (Figure 4, Table 3) [18,19].

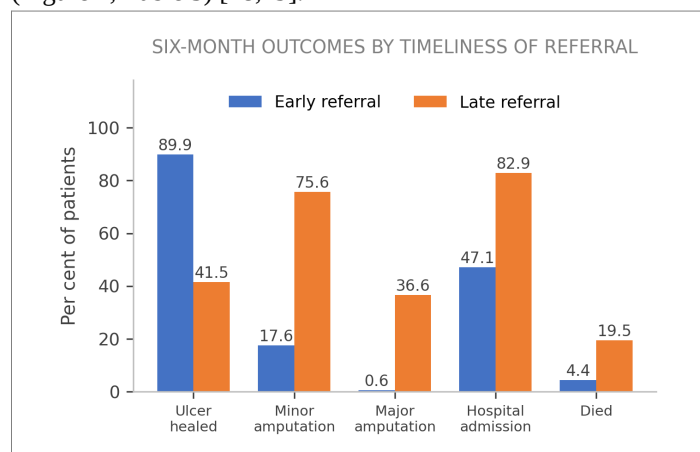


Figure 4: Six-month outcomes in 200 patients classified by timeliness of referral [18,19]

Time to healing: Among ulcers that healed, median healing time was 10 weeks in the early referral group against 16 weeks

in the late group ($p = 0.0002$) (Figure 5) [18]. Six additional weeks of an open foot wound is six more weeks of infection risk, immobility and offloading, and it falls on a population whose median age is over 70. The physical and psychological toll of a long-open wound is substantial and poorly captured by healing rates [33].

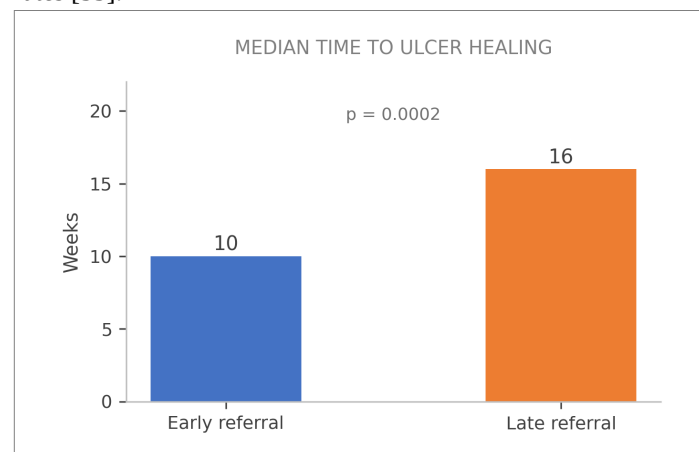


Figure 5: Median time to ulcer healing by timeliness of referral [18]

Outcome	Early referral	Late referral	p
Ulcer healed	89.9%	41.5%	0.001
Median healing time	10 weeks	16 weeks	0.0002
Minor amputation	17.6%	75.6%	<0.0001
Major amputation	0.6%	36.6%	<0.0001
Hospital admission	47.1%	82.9%	0.001
Death within 6 months	4.4%	19.5%	0.02

Table 3: Six-month outcomes by timeliness of referral, as reported by the original investigators [18]

What referral actually leads to: The value of arriving quickly depends on there being something to arrive at. Multidisciplinary foot services combining podiatry, vascular surgery, diabetology, orthotics and infection expertise are associated with reduced major amputation rates, and services that introduced such a team have reported falls in amputation over subsequent years [6,7,31,32]. Systematic review of team-based care supports the direction of that association while noting that the studies are almost entirely observational and that team composition varies widely between centres [6,32]. The historical account of how these teams developed makes clear that the model was assembled pragmatically rather than trialled [24].

What delay costs beyond the limb: Foot ulceration and amputation account for a substantial share of diabetes-related expenditure, with national estimates placing the cost to a single health service in the hundreds of millions annually [25]. Ulceration is also associated with mortality exceeding that of several common cancers, and with the loss of independence that follows major amputation [1,3,30]. These are the outcomes that make an interval measured in weeks consequential rather than merely inefficient.

Study	Design	Principal reported finding
Manu et al. 2018 [9]	Survey across European practice	Duration unknown or delayed >3 weeks in 55-66%; 48% referred late
Garcia-Klepzig et al. 2018 [17]	GP survey, four European countries	About 40% report inadequate training in ulcer management
European referral study 2021 [16]	Prospective, 9 centres, 5 countries	Referral beyond 3 months common; severe ulcers referred faster
Meloni et al. 2019 [12]	Fast-track pathway development	Severity-graded referral windows for non-specialists
Meloni et al. 2021 [18]	200 patients, 6-month follow-up	Major amputation 0.6% early vs 36.6% late referral
Faglia et al. 2006 [20]	Cohort, ischaemic and infected ulcers	Late referral influences prognosis
Prompers et al. 2008 [10]	Eurodiale prospective cohort	Severity at presentation and outcome across Europe

Table 1: Principal studies reviewed, with the finding as reported by the original investigators

Discussion

The effect sizes in the fast-track series are extraordinary. A major amputation rate of 0.6 per cent against 36.6 per cent is not a difference one expects from the timing of a referral letter, and the first responsible reaction to a sixty-fold difference is suspicion rather than enthusiasm [18].

The obvious objection is confounding by severity: patients referred late might simply have worse disease. The pathway design partly anticipates this, because early and late are defined against severity-specific windows rather than a single interval, so a severe ulcer referred in 24 hours and a superficial one referred in two weeks both count as early [12,18]. That is a genuine strength and it does not dispose of the problem. Lateness is not randomly distributed. It tracks neuropathy dense enough that the ulcer was painless, living alone, poor eyesight, cognitive impairment and distance from services, and every one of those independently predicts a worse outcome [10,21,22,26]. Standardised wound classification exists precisely because severity drives prognosis [27].

So the honest reading is that the true effect of timely referral is somewhere below what these numbers suggest, and nobody knows how far below, because the trial that would settle it cannot ethically be run. What supports the direction rather than the magnitude is mechanism: infection and ischaemia progress with time, and both are what take the limb [4,5,23]. The economic consequence of the resulting admissions and amputations is large enough to be measurable at national level [28].

The more actionable finding is the one about primary care preparedness. If only around four in ten general practitioners can name their local foot service, then education about the importance of early referral addresses the wrong deficit [9,17]. The barrier is not primarily motivational. A referral pathway that is unambiguous about where to send the patient, and by when, is

what the fast-track tool actually supplies, and its value may lie as much in removing that uncertainty as in any triage precision [12,24].

A final point concerns the denominator. The European data show that patients with severe ulceration are already referred faster [16]. The population left waiting is therefore weighted towards ulcers that look unimpressive at first inspection, which is precisely the presentation the fast-track pathway classifies as needing referral within two weeks rather than immediately. Getting that group right is harder than getting wet gangrene right, and it is where most of the avoidable delay sits.

A further consideration concerns which patients the two-week category captures. Severe ulceration is referred quickly because it is alarming, and the European data confirm that front-line clinicians act faster when the foot looks bad [16]. The uncomplicated non-healing ulcer is the harder case: it does not look urgent, the patient is often not in pain because of neuropathy, and the two-week window is therefore the one most likely to be missed. Any intervention aimed at reducing delay should be judged on whether it moves that group, not on the aggregate interval, because the aggregate is dominated by patients who were already being referred promptly [12,16,18].

It is also worth separating two propositions that are often merged. That multidisciplinary foot services improve outcomes is supported, if observationally, by a considerable body of work [6,7,32]. That referring to them sooner improves outcomes by the magnitude reported in the fast-track series is a separate and weaker claim. Both can be true, and the second can be substantially smaller than reported, without undermining the case for building the service in the first place.

Study limitations

The limitations belong to the underlying literature. The principal outcome comparison is observational, from a single service, with 200 patients and six months of follow-up [18]. Allocation to early or late referral is determined by referrer behaviour, which is associated with patient characteristics that independently predict outcome, so residual confounding is likely and its size unknown [10,21]. Survey data on referral intervals depend on recall of ulcer onset by patients whose ulcers are frequently painless, and a substantial share of responses recorded the duration as unknown, which is itself informative but not quantifiable [9,15]. Practitioner self-report of training and confidence is not a measure of competence [17]. Health system structures, funding and access to specialist units differ markedly across the countries surveyed, so pooled European figures conceal wide variation [16,25]. And the evidence comes almost entirely from high-income European settings [9,16].

Conclusion

People with diabetes-related foot ulceration reach specialist care late, and they have done so for as long as the interval has been measured. Around half arrive more than a month after the ulcer appeared or after an interval nobody recorded, and the outcomes reported for those referred within severity-specific windows are dramatically better across healing, amputation, admission and survival. Those differences are almost certainly larger than the causal effect of referral timing alone, because the patients who arrive late differ from those who arrive early in ways that matter. What survives the caveat is the mechanism and one practical observation: a substantial minority of referring clinicians cannot say who their local foot team is, and no amount of exhortation about early referral will fix that particular problem.

Acknowledgements

The authors thank the investigators whose surveys and pathway evaluations are drawn together in this article, and the podiatry and vascular teams whose referral records make the interval measurable at all.

Funding

No dedicated funding from public, commercial or charitable sources supported the preparation of this review.

Conflict of Interest

The authors declare no competing interests.

Ethics Statement

This article reviews previously published studies only. No new patient data were collected and no participants were recruited, so ethical approval was not required.

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Citation: Sartori M, Falk K, Moriarty D. "Waiting for the Referral: Diagnostic Delay in Diabetes-Related Foot Ulceration and What It Costs the Limb". DOI: 10.5281/zenodo.22238741