

# Diabetic Foot Influencers on Twitter: A Cross-sectional Study

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## ABSTRACT

**Introduction:** Apart from the general usage of media as an effective tool for communication, network building, or branding, its relevance in the medical sector is becoming increasingly pertinent. Diabetic foot is a highly prevalent and serious complication of diabetes, which contributes massively to morbidity, fatality, or amputations worldwide every minute. However, awareness and understanding of proper foot care practices disseminated through massive outreach platforms like Twitter can significantly improve its management and decrease the social, economic, and medical burden due to amputations.

**Aim:** To identify Twitter influencers discussing diabetic foot.

**Materials and Methods:** This cross-sectional study was conducted from March 2022 to July 2022 to characterise the top 38 diabetic foot influencers on Twitter. The influencers were identified using proprietary software, Cronycle (London, UK), which uses a proprietary algorithm to calculate an influencer score based on engagement metrics such as retweets, likes, and views. This score determines the “influence” of a Twitter account within a specific topic of discussion. By leveraging its proprietary

algorithm, Cronycle, powered by Right Relevance (a subsidiary), provides a platform to assess the influence of an influencer on a particular topic. It offers a normalised subject score ranging from 10 to 100. The search term “Diabetic foot” was queried within the Cronycle platform, leading to the generation of a dataset that was subsequently analysed using Microsoft Excel.

**Results:** The analysis identified 38 influencers, consisting of 19 (50%) medical practitioners, 39% diabetic advocates, and 11% researchers. The research productivity could be reflected in the h-index for 17 influencers, which ranged from 1 to 84. Geographically, the majority of the influencers were from the US and UK.

**Conclusion:** The study identified the credibility of influencers with mass influence on Twitter for diabetic foot. More inclusive participation from healthcare providers of all nationalities, especially from developing countries, can be of paramount importance in raising awareness of diabetic foot among the medical and general population. It can serve as a source of education and potentially lead to a reduction in diabetic foot complications.

**Keywords:** Amputations, Hirsch index, Podiatry

## INTRODUCTION

As one of the fundamental requisites for human growth, prosperity, and protection, healthcare is a pivotal sector integral to improving the quality of life globally. Nonetheless, the correct dissemination of information from expert healthcare providers to the general public using appropriate health information technologies can play a critical role in increasing the outreach and effectiveness of any healthcare program [1]. Especially during the pandemic and post-pandemic era, social networking sites have emerged as unprecedented sources for disseminating health-related information to the masses, some of which may benefit or further spread misinformation [2,3].

Amidst the plethora of digital platforms, Twitter is one of the highly engaging social platforms where succinct information with hashtags can be an instrumental tool for amplifying medical outreach, engagement, and network building [4]. Twitter can offer a worthwhile alternative to complex and costly academic resources, providing easy and free accessibility to reliable medical information, but only if advocated by expert medical professionals. Therefore, it becomes imperative to identify and evaluate the impact of healthcare providers in harnessing ubiquitous social media for healthcare improvement.

In the perspective of assessing digital impact and consumer engagement, the term “influencer” is commonly used to gauge the impact of their digital footprint. The impact of an influencer in creating trends or driving thoughts can be supported by statistics, with the influencer marketing industry worth \$16.4 billion [5]. Excluding the monetary economics, it is worthwhile to understand that incorporating top medical professionals as influential voices in

their respective expert fields can have a high impact on improving healthcare [6,7]. In a similar context, the present study aims to address the impact of influencers in disseminating credible information and building engagement in one of the gravest areas of concern globally, chronic diseases i.e., Diabetes and the subsequent complication of diabetic foot syndrome.

Diabetes Mellitus (DM) poses a challenging health problem, with over ~463 million adults known to have the condition, and it is expected to increase to 700 million by 2045 [8]. One of the common yet complex complications of DM is foot-related disorders, constituting infection, ulceration, sepsis, or gangrene. The diabetic foot affects up to 25% of all diabetic patients, and foot-related disorders result in morbidity as well as mortality [9]. The financial impact is also detrimental as diabetic foot conditions lead to hospitalisation in approximately 20% of affected patients. Moreover, non-healing wounds contribute to 25%-90% of diabetes-related amputations [8]. Consequently, people with diabetes are 10 times more susceptible to amputations compared to those without diabetes [10].

However, awareness and proper foot care management can significantly improve infectious complications and reduce the risk of amputation. The use of social media for disseminating simple strategies for effective diabetic foot management, especially among socio-economically disadvantaged or marginalised populations, can be an easy and economically feasible approach.

The main objective of this study is to draw attention to the issue of diabetic foot and identify the key influencers on Twitter who actively engage in discussions regarding this global challenge. The study

aims to understand the potential effects of social influence from major stakeholders in mitigating foot complications and preventing amputations related to the diabetic foot by recognising their presence.

## MATERIALS AND METHODS

This cross-sectional study was conducted from March 2022 to July 2022, considering the time period from March 30, 2021, to March 30, 2022. The list of the top 38 diabetic foot influencers was extracted from Cronycle (Right relevance API) [11]. Cronycle utilises a proprietary algorithm to generate a Twitter topic score for individuals and organisations based on their engagement, determining their overall “influence” within a specific topic of discussion. By leveraging machine learning, semantic analysis, and natural language processing, Cronycle employs graph partitioning techniques to calculate a numerical score of “influence” based on connections (followers/following) to other influencers in the same topic, as well as engagement metrics such as views, likes, and retweets, which represent the authority of an influencer within the community [11]. Previous studies have employed this unique methodology to determine the top influencers in fields like colorectal surgery [12], gastroenterology [13], and critical care medicine [14]. The survey excluded organisational accounts.

By offering a normalised subject score ranging from 10 to 100, the Cronycle application, led by Right Relevance (a subsidiary of Cronycle), offers a platform to assess the impact of influencers on a specific topic. The resulting dataset was saved and analysed in Microsoft Excel using the keyword “diabetic foot.” To minimise inaccuracies, additional data for individual accounts, such as gender, professional association, and practice location, was obtained and verified from various sources, including LinkedIn, Google Scholar, Twitter accounts, institutional websites, and others.

To determine the h-index (a measure of productivity in terms of number of publications and their impact through citations), confirmed author profiles were searched on Scopus (Reed Elsevier, London, United Kingdom).

## STATISTICAL ANALYSIS

All data processing, visual display, and statistical analyses were performed using Microsoft Excel.

## RESULTS

The analysis of results obtained using Cronycle led to the identification of 38 individual influencers, which are listed in descending order of rank and topic score. Among these influencers, 19 (50%) were medical practitioners with a medical degree, while 4 (11%) were researchers with a PhD degree. Interestingly, 15 (39%) of the influencers were diabetic patients with various occupations but connected by a strong advocacy for topics related to diabetes, including diabetic foot- [Table/Fig-1].

Overall, the study revealed a gender disparity in participation, with only 4 females actively working as clinicians or researchers in the field of diabetic foot, compared to 19 male physicians or researchers. However, there was greater female participation in diabetic advocacy, resulting in an overall distribution of 39% female and 61% male participants for the diabetic foot. Additionally, the academic h-indices for the reported Twitter influencers, including advocates, ranged from 1 to 84 (mean, 14.71; median, 5.5) [Table/Fig-1].

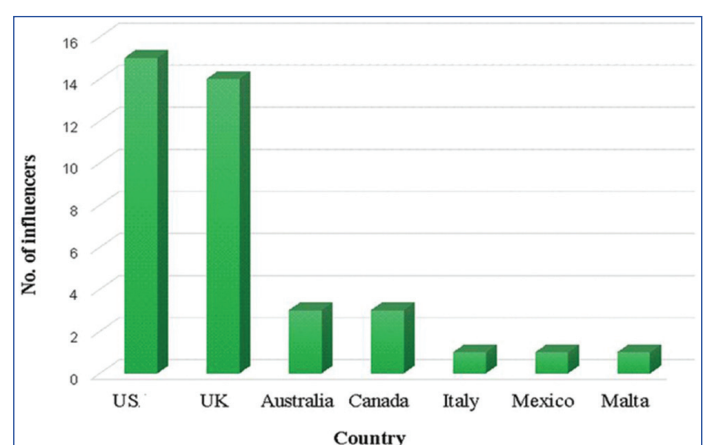
Regarding demographics, the location distribution of the influencers is depicted in [Table/Fig-2], showing active participation from the US and UK regions, followed by Canada and Australia. There were also single representations from Italy, Mexico, and Malta.

## DISCUSSION

Twitter has been suggested to be highly conducive for medical discussions, and many recent studies have used this platform to

S. No.	Topic score	Background/Occupation	h- index
1	98	Surgeon	84
2	86	Vascular surgeon	53
3	84	Orthopaedic surgeon	1
4	84	Podiatrist	1
5	83	Podiatrist	-
6	83	Surgeon	20
7	81	Podiatrist	-
8	79	Diabetes advocator	-
9	77	Podiatrist	-
10	77	Podiatrist (Phd)	9
11	73	Bioengineer (Phd)	40
12	73	Diabetes advocator	-
13	73	Podiatrist	-
14	73	Surgeon	5
15	73	Diabetes advocator	-
16	70	Diabetes advocator	-
17	70	Podiatrist	-
18	70	Vascular surgeon	9
19	67	Diabetes advocator	1
20	63	Diabetes advocator	-
21	63	Podiatrist	30
22	59	Diabetes advocator	-
23	59	Podiatrist	5
24	54	Diabetes advocator	-
25	48	Diabetes advocator	-
26	48	Podiatrist	-
27	38	Infectious disease specialist	6
28	38	Nutritional Biochemist (phd)	15
29	38	Diabetes advocator	-
30	38	Renal Physiologist (phd)	18
31	38	Diabetes advocator	-
32	38	Diabetes advocator	-
33	38	Diabetes advocator	-
34	36	Cardiologist	48
35	36	Diabetes advocator	-
36	36	Physician	8
37	36	Veterinarian	-
38	36	Diabetes advocator	-

[Table/Fig-1]: Overview of individual influencers tweeting on diabetic foot.



[Table/Fig-2]: Geographical distribution of Twitter influencers of diabetic foot.

identify the most influential voices in various critical domains, such as radiation oncology [15], gastroenterology [13], cardiology [16], colorectal surgery [12], neurosurgery [17], etc.

Along similar lines, the present study aimed to evaluate awareness of the management of diabetic foot to prevent amputations by identifying and characterising the influencers leading the discussion on this topic. The results presented in [Table/Fig-1] showed a heterogeneous group of influencers, but with a dominance of male participants. The dominance of male physicians among the top Twitter influencers has also been reported in radiation oncology [15], colorectal surgery [12], cardiology [16], and gastroenterology [13]. These trends reflect the existing gender inequity in the medical sector and the need to advocate for and implement policies to address this issue.

In recent times, the h-index has become one of the common metrics used to benchmark academic or research productivity. Therefore, many recent studies have hypothesised a strong positive correlation between active social engagement and a higher academic h-index. This can be attributed to two-way benefits, as the promotion of research on Twitter may lead to higher outreach and citations, consequently leading to a higher h-index. Additionally, profiles with a higher h-index garnering more followers due to their expertise, gauged in higher numerical values [16-18]. This mutually beneficial relationship between social media influence and academic productivity was clearly reflected in the top two influencers in the present study [Table/Fig-1], where the top two medical practitioners excelled in both the topic score and h-index. However, no statistically significant correlation could be observed when evaluating all socially active scientific researchers or medical practitioners in the present study. This could be attributed to the scattered distribution of data due to the wide disparity in the level of engagement in research by active clinicians or researchers. Similarly, a study by Beroual et al., on radiation oncology Twitter influencers reported no significant correlation between Twitter metrics and h-index [19].

The dominance of top medical influencers from the US has also been reported in Twitter analyses in the areas of general surgery [18], orthopaedic surgery [20], neurosurgery [17], and cardiology [16]. This trend of developed nations being forerunners was also highlighted in a bibliometric analysis of global research on diabetic foot ulcers, where the US accounted for one-third of all publications among the top 10 countries [21]. Therefore, the present study also reinforces the serious concern about the lack of participation from other nations, particularly developing countries, where the scarcity of resources coupled with a higher prevalence makes foot management more difficult.

Especially in the framework of low-middle-income countries, the need for advocating proper care for diabetic foot becomes critical as it can prevent the draining of medical, social, and economic resources due to amputation. The gravity of this issue can be understood in the context of India, a developing Asian nation, where 80% of amputations are attributed to diabetic foot ulcers, and the treatment may cost an average patient's income for 5.7 years [8]. Nevertheless, the critical role played by patient education was also reflected in a study done in South India, where significant improvement in physical and mental health was observed in diabetic foot patients after six months of health education [22].

Considering the ubiquitous prevalence of diabetic foot complications and the profound impact social media can have on its management, the present report demonstrates an organised view of heterogeneous individuals contributing to its advocacy and the prevention of amputations. The positive implications of this work are supported by various previous studies [11,23,24] that highlight illiteracy or lack of awareness about diabetic foot care as major impediments to reducing the risk of amputations or fatalities. A consistent set of guidelines is required due to disparities in the Indian healthcare system in order to prevent the spread of diabetic foot and its complications.

Effective interventions for intensive patient-centered management of diabetic foot complications among practitioners are essential to prevent patient readmission to hospitals and ensure prompt care

for a better prognosis of foot problems. It is crucial to comprehend and establish effective communication between diabetologists and/or practitioners [25-27].

This research offers a novel perspective on how Twitter can assist individuals with diabetic foot difficulties in managing such issues. By examining Twitter users who discuss diabetic foot, this research examines the impact of social media on healthcare. It provides a comprehensive analysis of how influential individuals contribute to raising awareness, sharing information, and advocating for preventative measures regarding complications and amputations caused by diabetic foot issues. This study contributes to the body of knowledge on diabetic foot care by highlighting the significance of leaders and the positive change they may affect. It also provides useful information on how to leverage social media platforms for public health initiatives.

### Limitation(s)

The first limitation is the dependency on the algorithm of Cronycle. Although this sophisticated software uses many metrics instead of simple ranking based on tweets or followers, the use of any other application may yield some variation in ranks. Furthermore, social media is a very dynamic platform, and since these results represent data collected over a certain period, the influencer ranks may differ on a day-to-day basis. Nonetheless, once credibility is built with expertise, it is less likely to be significantly toppled, and thus, the presented results can be anticipated to remain relevant over extended periods.

Moreover, the study was confined to one platform, Twitter, and a single queried hashtag of diabetic foot. Thus, the chances of active participation on other platforms, along with usage of other related topics to address diabetic foot, cannot be ruled out but are considered out of scope for the present work.

### CONCLUSION(S)

The information disseminated through a ubiquitous platform like Twitter can have a significant positive impact on healthcare by reaching people beyond journal paywalls or complex scientific jargon. However, to prevent the detrimental effects of misinformation, it is important to identify the credibility of influencers who have a mass influence on medical aspects. In this context, the present study helped establish the credibility of active voices on Twitter focusing on diabetic foot. It also drew attention to the urgent need for more active participation from developing nations and the importance of collective task-sharing among physicians, researchers, and advocates. Overall, the study highlighted that social media can play a crucial role in providing people with up-to-date and accurate guidelines on diabetic foot care management to prevent lower-extremity amputations.

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