



## REVIEW ARTICLE

Medicine Science 2022;11(1):429-32

# Role of screening in preventing diabetic foot storm

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Received 19 May 2021; Accepted 10 August 2021  
Available online 23.12.2021 with doi: 10.5455/medscience.2021.05.180

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### Abstract

With diabetes mellitus increasing at an alarming rate worldwide, so are its complications. A dreaded and neglected complication of diabetes is diabetic foot. Patients with diabetic foot are at risk of amputation which can lead to increase in morbidity and mortality adding further problems. This article aims to shed light on the new Amit Jain's classification of problems in diabetic foot and our understanding of the new term "Diabetic foot storm". It summarizes on the commonly available screening tool worldwide with focus on the Amit Jain's screening tool and need to use them as one of the strategies that can prevent a diabetic foot storm in patient's life.

**Keywords:** Diabetes, foot, storm, Amit Jain's, screening

### Introduction

It is estimated that by year 2020, there will be more than 700 million people living with diabetes [1]. This chronic non-communicable disease is a major global health problem affecting large segment of the population [2, 3]. In developing countries, it is seen that 75% of patients with diabetes are above 45 years age [2]. In India itself, there are around 40.9 million people with diabetes [4].

One such complication of diabetes is the diabetic foot that has significant impact on patient's quality of life [5, 6]. Such is the status of diabetic foot that, 15% of people with diabetes will be affected with ulcers during their life [7]. Around 2-6% of the patients will develop diabetic foot ulcers annually [8]. More than 50% of these ulcers will get infected and many may end up in some form of amputation [9].

It was seen in one of the authors earlier series that as high as 80% of patients in teaching hospital underwent some form of amputation [10]. Diabetic foot ulcers are known to precede in 85% of amputation in foot [11].

When there are so many bad news associated with diabetic foot, there is some good news too. One such good news is that more than 75% of amputation can be prevented through education and screening [12].

### The diabetic foot storm

A new classification for problems in diabetic foot was proposed that divided them into 6 simple categories [13]. Category 1 is the preponderant problem which is diabetes mellitus itself that causes the foot problems [Table 1]. Category 2 is the current problem which the patient may be suffering and they include ulcers, gangrene, cellulitis, abscess, etc [13, 14]. Category 3 is the concurrent problems. It is well known that diabetes have many other associated complications apart from diabetic foot [15]. Often, they can occur together in same patient. Some of the known concurrent problems that can occur in diabetic foot patient are hypertension, stroke, chronic kidney disease, etc [13]. Category 4 is the recurrent problems in diabetic foot patients. They include re-ulcerations, readmission, recurrent cellulitis, reamputation, etc [13, 16]. For example, a study by Skoutas et al showed that 21.5% of patients had reamputations within 18 months of follow-up [16].

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It is obvious that it is a vicious cycle that is often interconnected when patients end in recurrent problems. For example, reulceration could lead to recurrent admission and reamputations. Category 5 is subsequent problems. Often, it is seen that patients when getting treated for diabetic foot problems will have subsequent

problem too. Examples include prosthesis related issues, mortality following amputations, bed sores, DVT, etc [13, 14]. Category 6 is supplement problems that can be due to diabetic foot like job loss, cost of treatment leading to financial losses, etc [13, 17].

**Table 1.** The new Amit Jain's classification of problems in diabetic foot

Categories of foot problems	Type	Examples
Category 1	Preponderant	Diabetes mellitus
Category 2	Current	Ulcer, Gangrene, Abscess, etc
Category 3	Concurrent	Hypertension, CKD, IHD, etc
Category 4	Recurrent	Re-amputation, Re-ulceration, Re-admissions, etc
Category 5	Subsequent	Mortality, Major amputations, etc
Category 6	Supplement	Depression, Loss of job, Financial issues, etc

Based on this Amit Jain's classification of problems in diabetic foot, the author had coined a new term "Diabetic foot storm" that would play an important role in creating global awareness of this disease [14, 17].

If a patient has gone through any of the 5 or more problems, then he is considered to have gone through diabetic foot storm in his life [17]. Patients who have gone through 3 problems should be warned of a storm (Figure 1) and those who have gone through 4 problems, have an impending storm in their life [14, 17].

professionals [18]. Studies have shown that foot was evaluated in diabetics only in 12-20% of the times [9, 19].

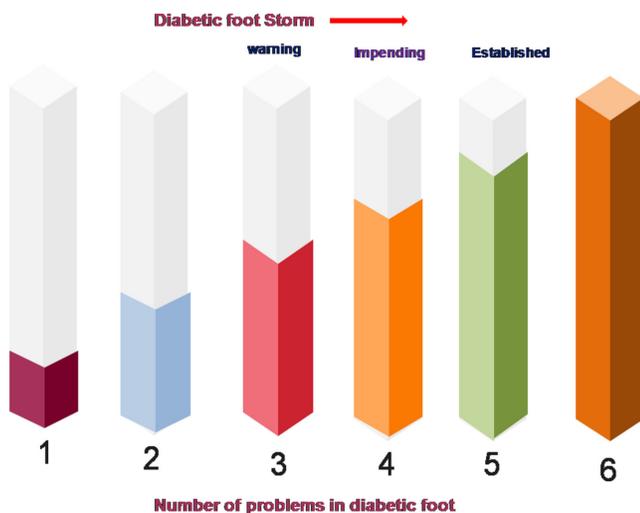
Screening of the foot plays a vital role in reducing the diabetes related foot problems like ulcers, amputations, morbidities, ulcer recurrences, etc [20]. It is recommended that every person who has diabetes has to be screened at-least annually [21].

The 3 screening tool that are known in diabetic foot are the In-low's screening tool, simplified 60 second screening tool and Amit Jain's screening tool [22, 23].

Each screening tool has their own merits and demerits and the clinician can choose which ever suits in his region and in his population but the aim is to ensure that the screening is done for the diabetic foot and it should not be neglected. Developing original screening tools especially that eases a clinician's life is difficult, though it is easy to condemn any screening tool.

The In-low's 60 second screening tool comprises of around 12 items that are scored from 0 to 25 [24, 25]. This screening tool helps clinicians to identify the risks of diabetic foot [24]. However, it was noted that this screening tool required longer time to perform than it stated and it ranged from 2 to 21 minutes [26]. Subsequently, a simplified 60 second diabetic foot screening tool was developed [26]. This screening tool was stated to be user-friendly and was developed for low and middle income countries and can be used in high income countries also [26]. Both these screening tool however requires chart as they are difficult to be remembered even by specialist foot surgeon leave apart the general doctors or paramedical health workers.

Another screening tool that was recently proposed was the Amit Jain's screening tool (Figure 2) which is also known as Amit Jain's triple assessment, Amit Jain's LFT screening tool, etc [18, 22, 23]. This screening tool is extremely simple, easy to perform, practical, economical, can be remembered and done by any health care professional in any part of the world [22, 23]. This screening tool addresses the triopathy efficiently through its 3 components namely the Look component, the Feel component and the Test



**Figure 1.** The diabetic foot storm based on Amit Jain's classification of problems in diabetic foot

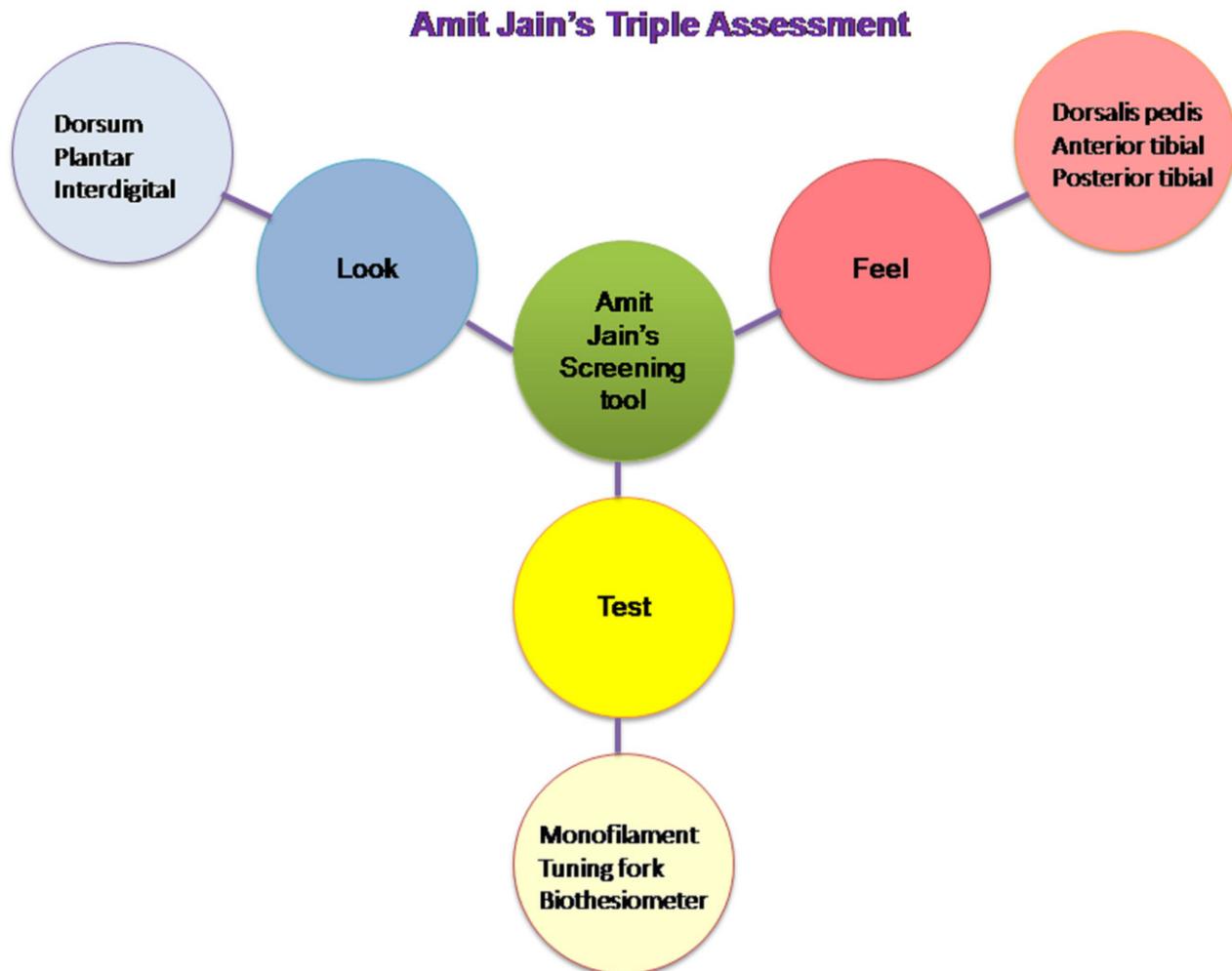
### Diabetic foot screening

There are distinct prevention strategies that can be employed to prevent or delay the diabetic foot storm. Of all such known strategies, diabetic foot screening should be considered to be a cornerstone among healthcare providers.

In spite of knowing the benefits of screening in prevention of diabetic foot problems, it is often omitted by health care

component [22]. This screening tool also has a simple scoring system that was recently validated and it divided the patient into low risk and high risk category [16]. The Amit Jain's triple

assessment for foot was derived from concept of triple assessment of breast followed universally for a breast lump and this screening tool was also aimed to be followed in similar lines [27].



**Figure 2.** Amit Jain's Linear Foot Test which is also known as Amit Jain's triple assessment

## Conclusion

Diabetic foot is a common complication of diabetes that adds burden to patient and their family. There are numerous problem associated with diabetic foot and if a patients develop 5 or more such problems, then a diabetic foot storm is said to have occurred in patient's life. Screening plays an important role in detections of problems early and timely intervention can prevent diabetic foot storm. Any healthcare professional can do screening of foot and one can use any screening tool of his choice but the aim should be that the foot should be evaluated periodically to prevent complications and subsequent amputations.

### Conflict of interests

*The authors declare that they have no competing interests.*

### Financial Disclosure

*All authors declare no financial support.*

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