encontro CIÊNCIA '21
ENCONTRO COM A CIÊNCIA E TECNOLOGIA EM PORTUGAL
28 a 30 JUNHO 2021
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Integrated shoe-upper system for accessing dorsal pressures in the diabetic foot: A preliminary approach

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Summary

THE PROBLEM

The Problem

- **Diabetic foot** is one of the most serious complications affecting the feet of diabetic patients;

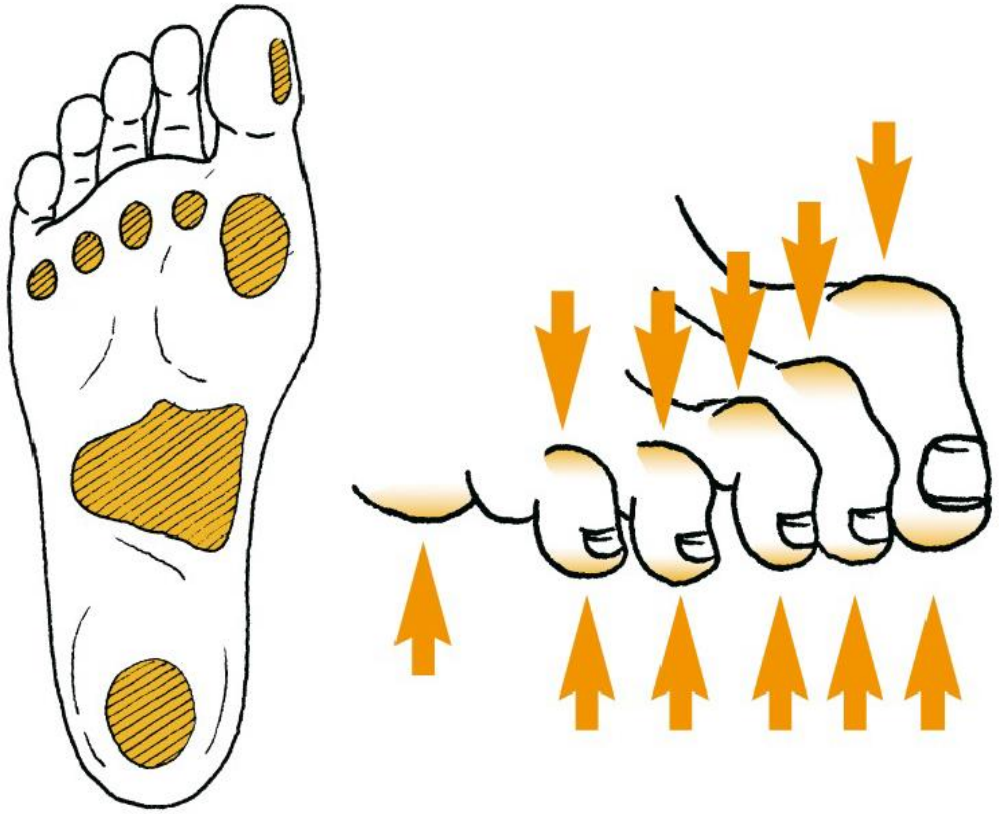
- These patients begin to lose protective skin sensitivity in their feet and are at risk for trauma, infection, ulceration and, in more serious cases, amputation [1].

Ulcers and amputation in critical areas of the feet.
[Source: APDP – Associação Protectora dos Diabéticos de Portugal. Available in: www.apdp.pt/diabetes/complicacoes]

The Problem

- The most critical pressure points, located in the plantar and dorsal region of the foot, are already well identified. The use of proper footwear is highly recommended [2];

- The pressures that shoes impose on the feet are extremely important. Plantar pressures are already well studied, but the **pressures involved between the shoe-upper and the dorsal region of the foot is still a little discussed topic** [3], [4].



Areas of high risk of ulceration in the diabetic foot.

[Source: Adapted from IWGDF Guidelines 2019 Update, International Working Group on the Diabetic Foot]

Main Goals

Study Interest

Our focus is only on the pressures involved between the dorsal region of the foot and the shoe-upper.

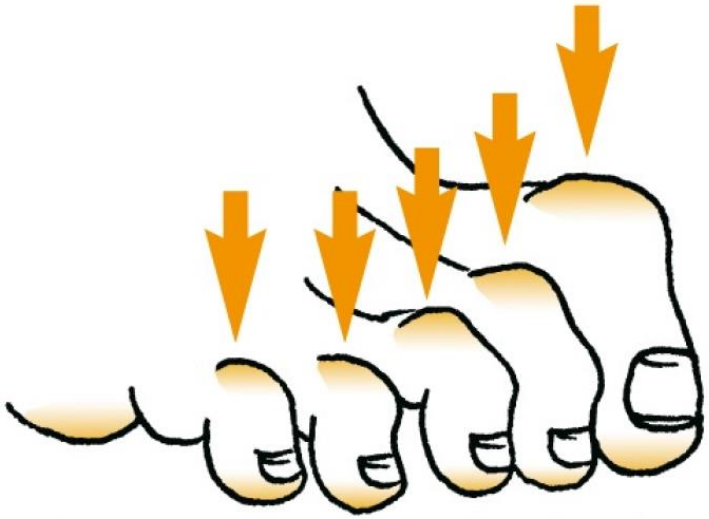
Main Goals

Propose a preliminary approach to:

1. measure dorsal foot pressures;
2. quantify relative levels of comfort and potential injury.

THE SOLUTION

The Solution



1

Critical points identified.

[Source: Adapted from IWGDF Guidelines 2019 Update, International Working Group on the Diabetic Foot]

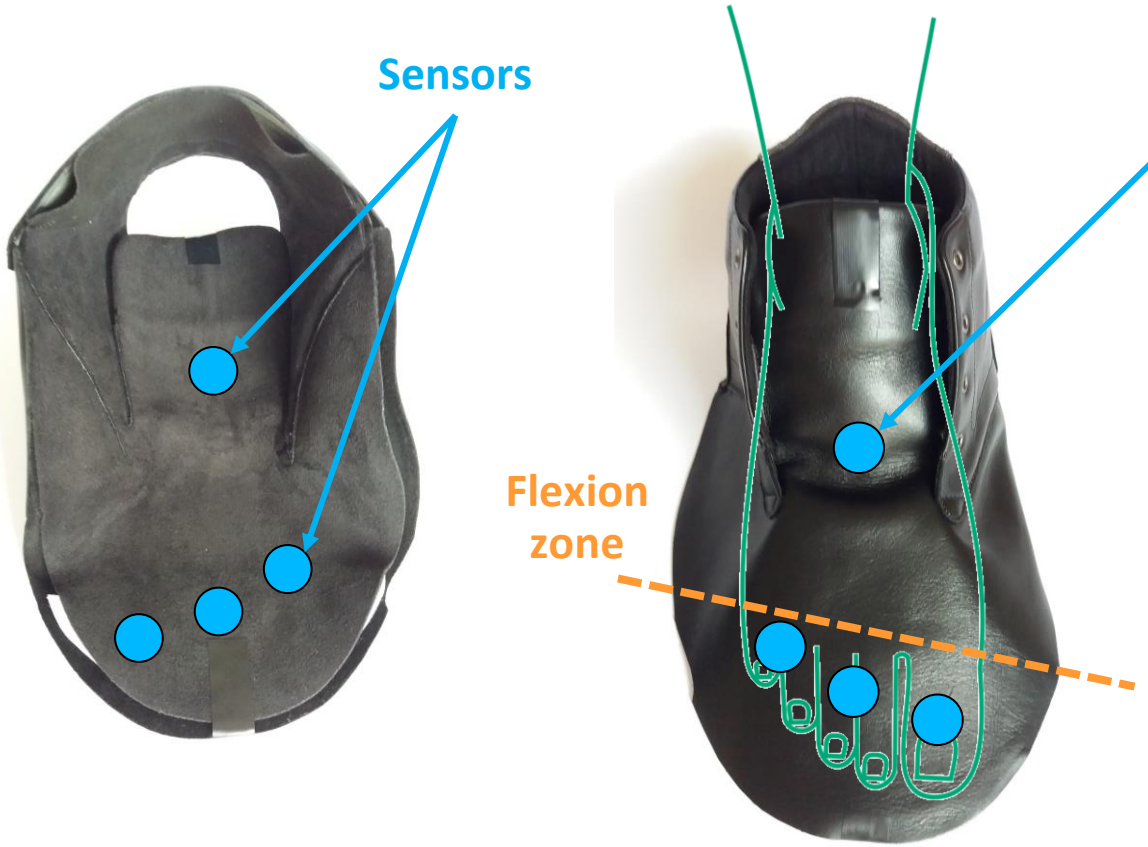
Shoe-upper

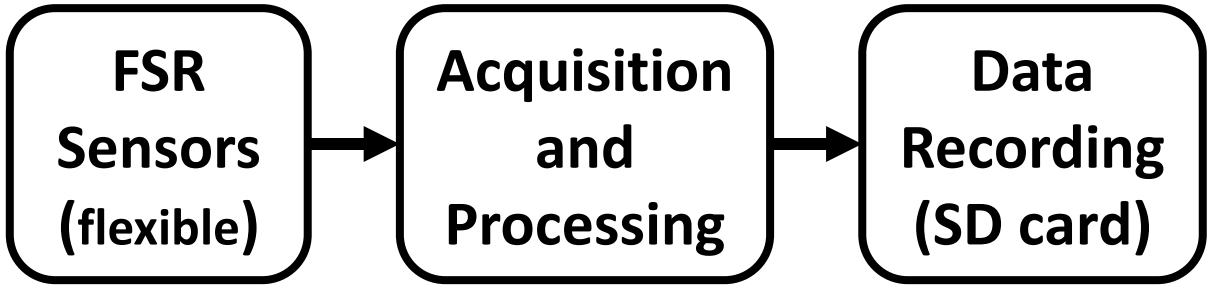
Inner lining

Flexible Force Sensitive Resistor (FSR)

2 Insertion of sensors in the inner lining of the shoe-upper.

The Solution

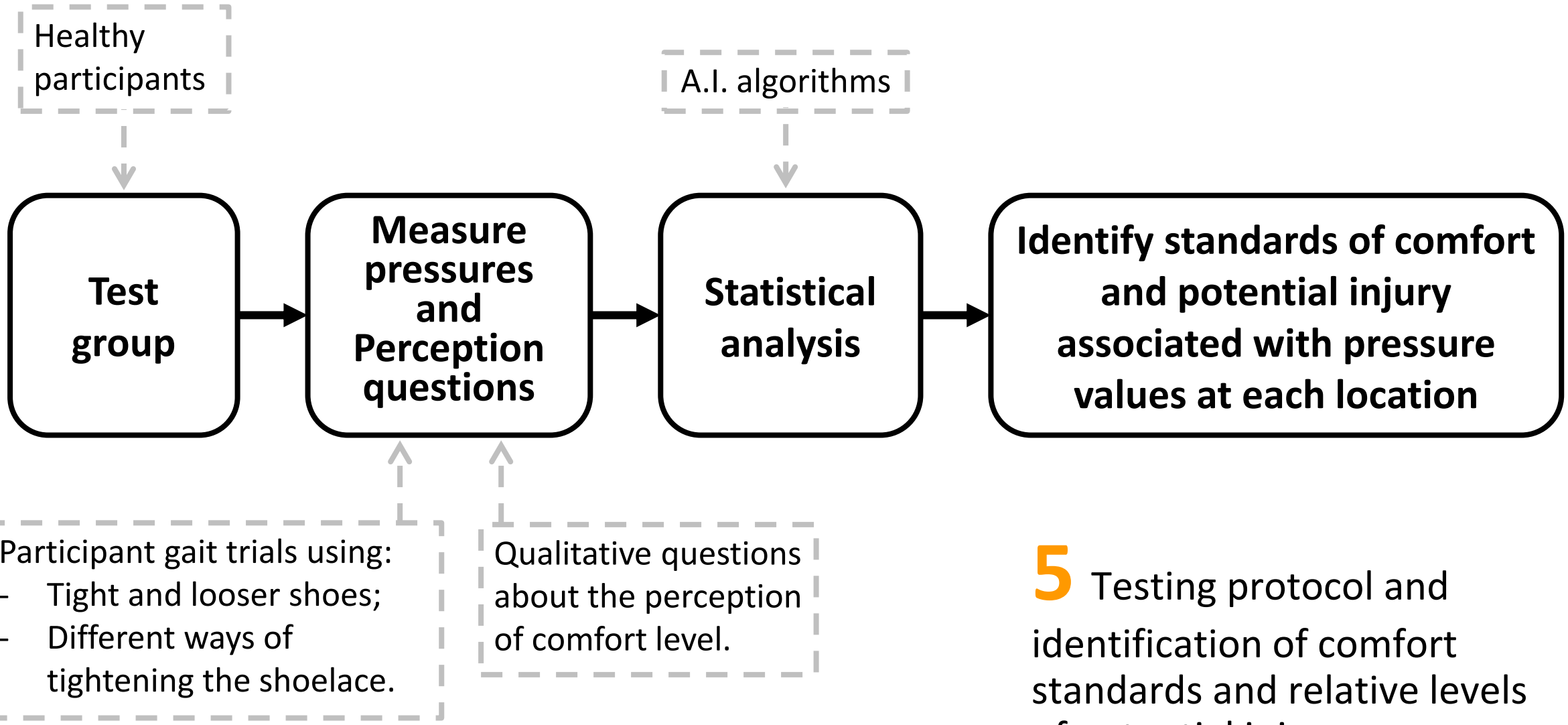




3 Location of sensors in the inner lining of the shoe-upper.

4 Method of pressure values acquisition.

The Solution



5 Testing protocol and identification of comfort standards and relative levels of potential injury.

DISCUSSION

Discussion

- This method is a practical approach to identify characteristic dorsal pressure thresholds in the foot associated with different comfort levels.
- It is important to identify if the pressure that will be considered as the injury threshold is the same for all users. The threshold that puts one patient at risk may be different from another.
- This quantitative approach is essential to obtain objective indicators for user perception related to the shoe-upper comfort.

REFERENCES & ACKNOWLEDGEMENTS

References & Acknowledgements

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Acknowledgements

This work was developed within the scope of a doctoral scholarship (Ref. UI/BD/151285/2021) supported by the Foundation for Science and Technology (Portugal) through multiannual funding for the R&D unit, Centro de Inovação em Engenharia e Tecnologia Industrial (CIETI, UIDB/04730/2020).

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Thank you for your attention!

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