

THE SENSOR SOCK

FEASIBILITY STUDY ON THE DEVELOPMENT OF A SENSOR SOCK BY VOETENCENTRUM WENDER AND PARTNERS

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PUBLIC SUMMARY

PROJECT BACKGROUND

The core activity of Voetencentrum Wender is the medical profession of podiatry. Because of an extensive partner network, with among others PLT Products, Voetmax Orthopedie and Kievit Schoenen, Voetencentrum Wender is capable of providing total footcare, as illustrated in Figure 1.

PLT Products produces lasts, therapeutic slippers and the soles that a podiatrist prescribes. The orthopaedic shoemakers at Voetmax prescribe customly made shoes and Kievit Schoenen is a shoe shop with semi-orthopaedic shoes and confection shoes with a removable footbed.

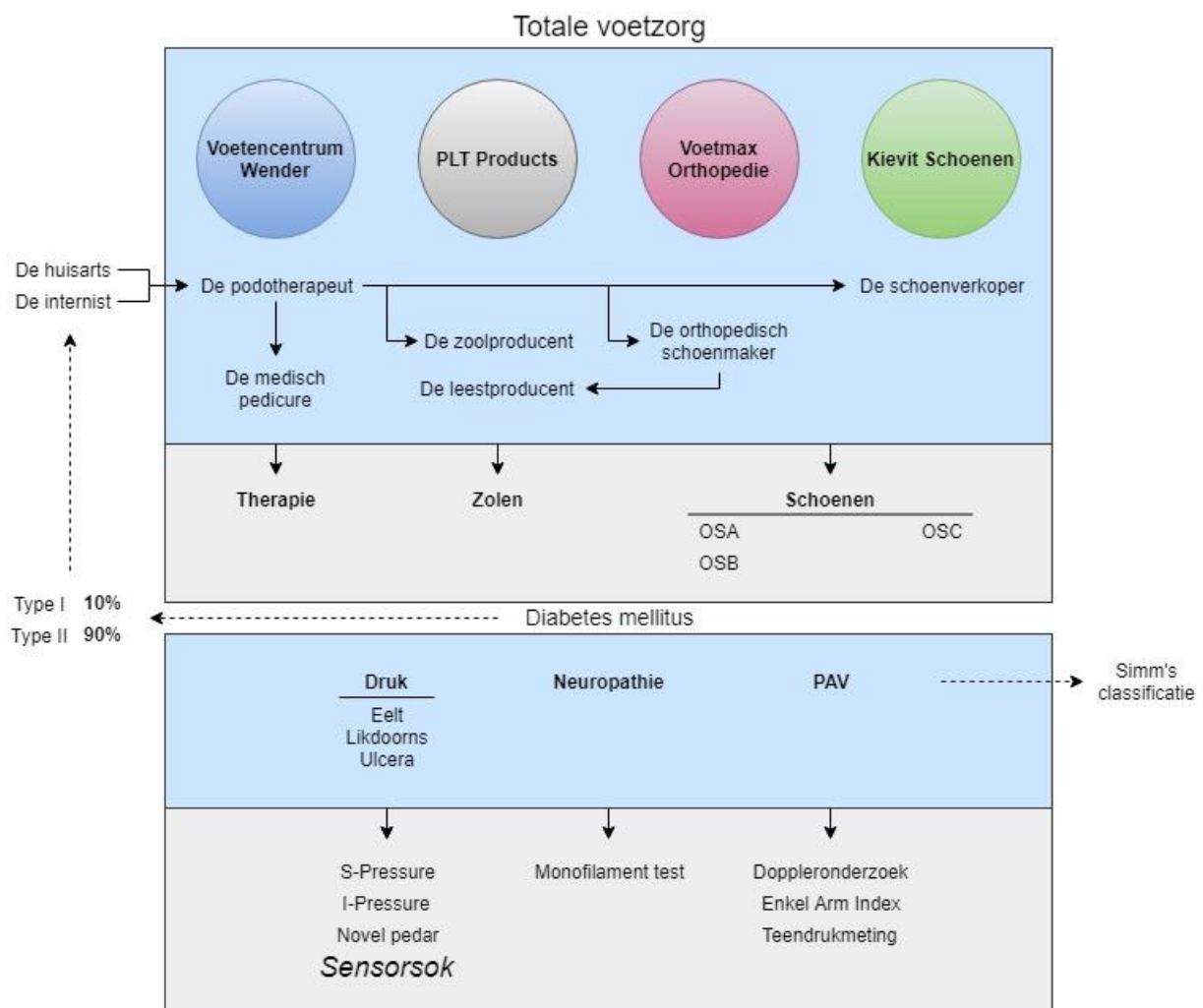


Figure 1. The total footcare provided by Voetencentrum Wender and partners

A big part of the patients of Voetencentrum Wender are diabetics. Diabetic people are unable to regulate their blood sugar levels, which can lead to foot problems. A too high blood sugar level can cause nerve damage, that makes that pain, pressure areas or temperature changes are not always noted.

Diabetes can also lead to fat deposits in the arteries, which is called 'perifeer arterieel vaatleiden' (PAV) when it occurs in the legs. PAV can be the cause of wounds on the foot not healing properly and therefore the occurrence of ulcers. To prevent ulcers, soles and shoes with as few as possible high pressure areas are prescribed.

RELEVANCE

In order to find these areas with high pressure, measuring instruments are needed (Bus, 2014). Several measuring instruments exist, but they only measure plantar pressures (on the bottom of the feet). Pressure areas occur on the dorsal (top), medial (sides) and lateral (back) side of the foot as well. Multiple researchers have looked into the mapping of pressures around the complete foot (Alpha-Fit GmbH, n.d.) (Fraunhofer-Gesellschaft, 2015) (Herbaut, Simoneau-Buessinger, Barbier, Cannard, & Gueguen, 2016) (Lin & Seet, 2017), , but this has not lead to an available product yet.

RESEARCH QUESTION

Therefore, the research question for this study is drawn up as follows:

Is it, within the possibilities of Voetencentrum Wender and current or new partners, feasible to develop a system that can measure pressures over the complete foot, in such a way that better fitting therapeutic soles and shoes can be prescribed in order to prevent diabetic foot ulcers?

APPROACH

After an analysis of the current situation and the currently used measuring instruments, it was first investigated if similar products to a sensor sock are on the market. A couple products were found, that can either be regarded as competitors or possibilities for cooperation. Of the companies that target the European market, it was also looked into whether they have requested patents for their product and whether it is to be expected that the patent will be granted.

In a Program of Wants and Needs it was determined what the design proposal should adhere to. Next to that, a decision was made of which functions the product should fulfil. In a morphological map the possibilities for the fulfilment of each function were set out. By examining the pros and cons of each possibility, a choice between these possibilities could be made and a design proposal was visualised.

RESULTS

Figure 2 shows the design proposal. It contains pressure sensors, integrated into the textile of the sock. A detachable Control Unit regulates the system and sends the measurement information to a separate device for real-time evaluation.

CONCLUSIONS AND RECOMMENDATIONS

The answer to the main research question is:

Yes, it is possible to develop a system that can measure the pressures over the complete foot, in order to prescribe better fitting therapeutic soles and shoes for the prevention of diabetic foot ulcers.

Voetencentrum Wender and her partners however, currently do not own the possibilities for producing textiles or sensors. They are not intending to set up this production in-house, so will be looking for new partners in both fields.



Figure 2. Visualisation of the design proposal

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