DOI: 10.1111/dme.12450

Short Report: Care Delivery

The Ipswich Touch Test: a simple and novel method to screen patients with diabetes at home for increased risk of foot ulceration

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Accepted 20 March 2014

Abstract

Aims The Ipswich Touch Test is a novel method to detect subjects with diabetes with loss of foot sensation and is simple, safe, quick, and easy to perform and teach. This study determines whether it can be used by relatives and/or carers to detect reduced foot sensation in the setting of the patient's home.

Methods The test involves lightly and briefly (1–2 s) touching the tips of the first, third and fifth toes of both feet with the index finger. Reduced foot sensation was defined as ≥ 2 insensate areas. Patients due to attend clinic over a 4-week period were invited by post. The invitation contained detailed instructions and a sheet for recording the results. The findings were compared with those obtained in clinic using the 10-g monofilament at the same six sites.

Results Of 331 patients (174 males), 25.1% (n = 83) had ≥ 2 insensate areas to 10-g monofilament testing. Compared with this, the Ipswich Touch Test at home had a sensitivity of 78.3% and a specificity of 93.9%. The predictive values of detecting 'at-risk' feet were positive at 81.2% and negative at 92.8%. The likelihood ratios were positive at 12.9 and negative at 0.23.

Conclusions With clearly written instructions, this simple test can be used by non-professionals to accurately assess for loss of protective sensation. We believe that the Ipswich Touch Test may also be a useful educational adjunct to improve awareness of diabetes foot disease in patients and relatives alike and empower them to seek appropriate care if sensation was found to be abnormal.

Diabet. Med. 31, 1100–1103 (2014)

Introduction

Patient's awareness of their risk and of the protective measures that they can take is important in preventing diabetes-related foot ulceration, as shown in recent Cochrane database reviews [1,2]. Moreover, in its recently published *Standards of Medical Care in Diabetes—2013*, the American Diabetes Association recommend self-monitoring of foot health and family involvement as useful strategies for improving diabetes healthcare outcomes [3].

In the UK, diabetes foot surveillance is mainly performed by the primary care health professionals and forms a part of their Quality and Outcomes Framework (QOF) programme. But, the 2010 National Health Survey (NHS) Diabetes-led patient survey showed that more than 50% of people with diabetes claimed not to recollect having had their feet examined or being given any advice related to foot care [4]. This disparity suggests that the examination had either not been performed and/or the patients had not been engaged in the purpose and the findings of the foot examination. To address this and to empower patients, we wondered whether it was possible for relatives and carers to screen for loss of foot sensation at home.

Pressure perception using the 10-g monofilament is the most commonly used screening test in primary care as it is relatively simple and an abnormal result has been found to be associated with a 7.7-fold increased ulceration risk [5]. It could potentially be used by non-professional such as relatives, as it is quick to perform; however, it requires some training and supplying a device for each patient to be screened. It appeared to us that the Ipswich Touch Test, which we recently described, would be ideal for use by non-professionals as it requires no special instruments, and requires little training, just simple written instructions. The test was initially developed for use in hospital to enable any

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What's new?

- The Ipswich Touch Test is a novel, yet simple and safe method of detecting people with diabetes with 'at-risk' feet and demonstrates excellent correlations with the 10-g monofilament and vibration perception thresholds.
- This study demonstrates that the Ipswich Touch Test can be proficiently performed by relatives and friends of patients with diabetes to screen for loss of foot sensation at home.
- By doing so, the Ipswich Touch Test helps in the early detection of 'at-risk' feet and serves as a useful educational tool to improve awareness of diabetes foot disease.

healthcare professional to identify patients with loss of foot sensation who need foot protection in order prevent inpatient-acquired foot lesions. The test has a sensitivity and specificity of 76% and 90%, respectively, when compared with the 10-g monofilament [6].

The aim of this study was to determine whether the Ipswich Touch Test could be reliably used by a non-professional in the home, as well as to determine the acceptance of home testing and patient's perceived value of such 'self' testing in increasing their awareness of diabetes-related foot disease.

Methods

Participant selection and instructions for Ipswich Touch Test

The study included 331 people with diabetes randomly selected from the Diabetes Clinics at Ipswich Hospital NHS Trust. Amputees and those unable to comply were excluded. Ethical approval was granted by the Proportionate Review Service of NHS Research Ethics Committee.

Two weeks prior to their clinic appointments, patients were sent by post an invitation to take part, as well as written instruction on how to undertake the Ipswich Touch Test for one of their friends, relatives or carers to follow (see also Supporting Information, Fig. S1). The instruction was to lightly touch the tips of the first, third and fifth toes of each foot, for 1–2 s, with the tip of the index finger. They were not to push, prod, tap or poke, because this may elicit a sensation other than light touch. With their eyes closed, the patient was instructed to say yes whenever they felt the touch. A foot diagram on which they were to record their observations was provided (Supporting Information, Fig. S1).

Clinic validation

At the patients' subsequent clinic visit, the Ipswich Touch Test and the 10-g monofilament (Neuropen®; Owen Mumford, Chipping Norton, UK) were performed on the same toes by the healthcare professional whom they had been previously booked to see. This could be a diabetologist, diabetes specialist nurse or podiatrist, all of whom were previously trained to perform both tests. They were asked not to look at the patient's home assessment prior to their performance of the Ipswich Touch Test and the 10-g monofilament test.

Post-clinic feedback

A week after the above clinic appointment, a simple questionnaire was sent to all participants, to be shared with the person who performed the test, requesting feedback regarding the simplicity of the test and whether it improved their awareness of diabetes-related foot disease.

Statistical analysis

Patients were considered to have 'at-risk' feet if unable feel at two or more of the six sites using the standard 10-g monofilament. Concordance between the Ipswich Touch Test carried out at home and that in the clinic was determined using Cohen's kappa statistic (κ), with $0.61 < \kappa < 0.80$ indicating 'substantial agreement' and $0.81 < \kappa < 1.0$ indicating 'almost perfect agreement' as per Koch *et al.* [7]. The sensitivity, specificity, positive predictive value, negative predictive value, positive likelihood ratio and negative likelihood ratio were also measured for both the Ipswich Touch Test carried out at home and that in the clinic against the 10-g monofilament standard using the method of Altman and Bland [8,9]. All analyses were performed using SPSS 19.0 for Windows (SPSS Inc., Chicago, IL, USA) and GraphPad InStat (La Jolla, CA, USA).

Ethical approval

The protocol for undertaking this study was granted ethical approval by the Proportionate Review Service of NHS Research Ethics Committee.

Results

The mean age of the study population was 59.6 years and 52.5% were men. Based on the 10-g monofilament as a standard, 25.0% had evidence of 'at-risk' feet. Table 1 displays sensitivities, specificities and predictive values for the Ipswich Touch Test carried out at home and that in the clinic. Direct comparison of the test carried out at home with that carried out in the clinic showed near perfect agreement, with discordance in only seven of 331 patients ($\kappa = 0.98$, $P = < 0.0001$). Receiver operating characteristic areas under the curve for the test carried out at home and that from the clinic when compared with the10-g monofilament were 0.87 and 0.97 respectively.

Table 1 Sensitivity, specificity, predictive values and likelihood ratios for the Ipswich Touch Test carried out at home and the Ipswich Touch Test carried out in the clinic against the 10-g monofilament as standard

	Using the 10-g monofilament as standard	
	Ipswich Touch Test carried out at home	Ipswich Touch Test carried out in the clinic
Sensitivity (%)	78.3	81.2
Specificity (%)	93.9	96.4
Positive predictive value	81.2	89.9
Negative predictive value	92.8	96.9
Likelihood ratio (+)	12.9	15.0
Likelihood ratio (–)	0.23	0.05

Feedback from the questionnaires is shown in Fig. 1. Additionally, following the Ipswich Touch Test carried out at home, our respondents felt that their knowledge base about diabetes-related foot problems increased from 76.4% to 96.8%.

Discussion

This study assesses the applicability of the Ipswich Touch Test in the home environment in order to address three important issues. Firstly, an NHS Diabetes-led patient survey [4] emphasized the need for a test that was not only widely applicable but was also not operator-dependent; i.e. did not need a qualified health professional to perform and interpret the results. Secondly, as widely quoted in literature, improved patient education and awareness are important determinants of diabetes foot ulceration and, in this study, we have shown that the Ipswich Touch Test has potential benefits in these aspects. Finally, engagement of patients and their families alike in performing the test themselves would not only facilitate the above, but also empower them to be in control of their condition and report to their healthcare providers should they find any abnormalities.

The study demonstrates that laypersons, namely relatives, friends or carers, were capable of performing the Ipswich Touch Test and were able to identify those with 'at-risk' feet with a similar sensitivity, specificity and operating characteristic as the healthcare professionals. Indeed, the Ipswich Touch Test carried out at home and that carried out in the clinic were found to have near perfect concordance. This supports our belief that the Ipswich Touch Test is such a simple test that, given written instruction, it can be performed by anyone in a variety of environments, including diabetes clinics, as inpatients and at home, with a high degree of sensitivity and specificity. In our study, all patients and most friends and relatives found it not only acceptable to undertake but also easy to understand and perform.

To conclude, we believe that, apart from its ability to detect 'at-risk' diabetes feet, the Ipswich Touch Test can also serve as a useful educational tool to improve patients' and carers' awareness of diabetes-related foot disease. This should empower them to further engage with their diabetes healthcare professionals in the prevention of diabetes foot ulcers. It is important to emphasize that the Ipswich Touch Test remains a tool for detection of 'at-risk' feet; i.e. patients with advanced neuropathy. Hence, we do not advocate its use to diagnose early neuropathy or painful neuropathy. Its obvious advantages lie in its simplicity, easy availability and reproducibility amongst both healthcare professionals and patients and their relatives alike, making it an excellent tool for screening, education and improving patient empowerment. We also believe that this simple, freely available test may also be of value in enhancing level of diabetes foot care in developing countries where there are limited resources.

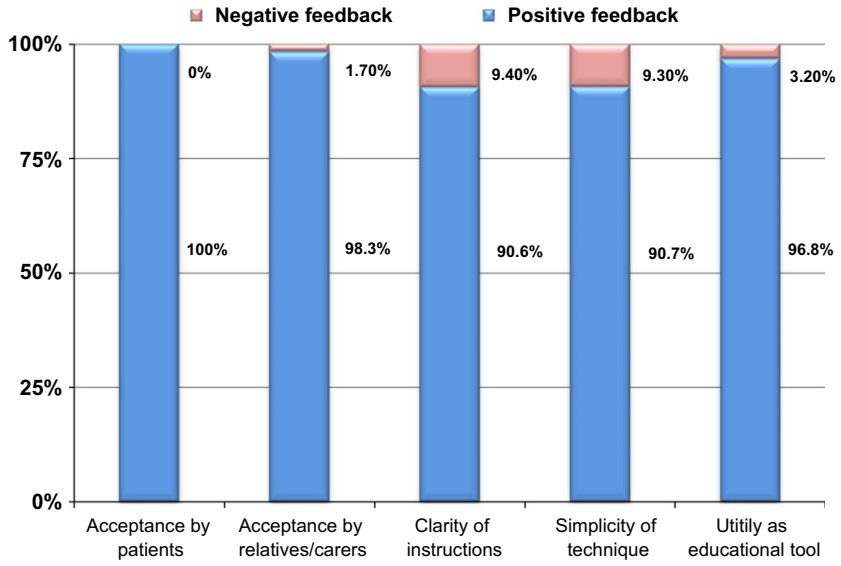

FIGURE 1 Feedback from respondents regarding the Ipswich Touch Test carried out at home.

Funding sources

This research was self-funded by the Diabetes Research Unit, Ipswich Hospital and sponsored by the Research and Development department of The Ipswich Hospital NHS Trust.

Competing interests

None declared.

Acknowledgments

We thank patients and clinical staff at the Diabetes Centre and Diabetes Research Unit, Ipswich Hospital NHS Trust for their participation and cooperation during this study.

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Supporting Information

Additional Supporting Information may be found in the online version of this article:

Figure S1. Data recording sheet for both the Ipswich Touch Test carried out at home and the Ipswich Touch Test carried out in the clinic.