Usefulness of the NC-stat DPNCheck nerve conduction test in a community pharmacy as an educational tool for patients with diabetes

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Introduction

Diabetic peripheral neuropathy (DPN) is a disabling long-term microvascular complication of diabetes mellitus. It is estimated that 40% to 50% of people with diabetes will have detectable DPN within 10 years of diagnosis.[1] Patients with diabetes with peripheral neuropathy are at an increased risk for foot ulceration that, if untreated, could result in amputation and neuropathic pain that can cause significant morbidity. Chronic sensorimotor DPN is the most commonly seen neuropathy in diabetes. Patients may experience symptoms such as burning pain, electrical or stabbing sensations, paresthesia, hyperesthesia and deep aching pain.[2]

The Canadian Diabetes Association Clinical Practice Guidelines (CDA CPG) 2013 recommends that people with type 2 diabetes should be screened for DPN at diagnosis and then annually thereafter.[1] Patients with type 1 diabetes should be screened 5 years after the postpubertal duration of diabetes and then annually thereafter.[1] Screening for DPN can be conducted using a 10 g Semmes-Weinstein monofilament or a 128-Hz tuning fork.[1]

The early detection and control of DPN are crucial because up to 50% of patients may be asymptomatic.[2] This puts patients at risk for developing unnoticed injuries to their feet, leading to foot ulcers.[2] A large number of patients with DPN are not identified, and they are likely to miss early intervention to prevent the progression of DPN.[3]

NC-stat DPNCheck, manufactured by NeuroMetrix Inc. (Waltham, MA), is a point-of-care device that measures sural nerve conduction velocity (CV) and sensory nerve action potential (SNAP) amplitude. Sensory nerve action potential amplitude and CV have been shown to be sensitive indicators of nerve degeneration in patients with diabetes and have been used to detect DPN.[4] Diabetic peripheral neuropathy is associated with low SNAP amplitude and CV.[4] This instrument has been shown to have a sensitivity of 92% and a specificity of 82% when compared to traditional nerve conduction studies in patients with DPN, with reproducible results.[5,6]

This article reports the use of the NC-stat DPNCheck testing device in the community pharmacy setting as an assessment tool for pharmacists when educating patients regarding DPN and glycemic control.

Methods

The Shoppers Drug Mart pharmacy in Hamilton, Ontario, offers a diabetes education clinic once a week. All patients enrolled in the clinic underwent MedsCheck for diabetes and diabetes-related educational needs assessment. A point-of-care A1C test was performed at the pharmacy during the first enrolment using the Bayer A1CNow Self-check kit (Sunnyvale, CA). On subsequent visits, all the patients were given an opportunity to undergo a sural nerve conduction test using the NC-stat DPNCheck device. All patients provided verbal consent to participate in the program.

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TABLE 1. Demographic and clinical characteristics of study cohort

Characteristic	Value
No. of patients	28
Mean age, y	64 ± 10
Mean duration of diabetes, y	8 ± 6
HbA1C level, %	
<7%	28
7%-8.9%	57
≥9%	14
Stage of DPN, %	
Normal	29
Mild conduction abnormality	25
Moderate conduction abnormality	32
Severe or undetectable	14
Patient-reported symptoms of DPN, *n* (%)	
Yes	15 (54)
No	13 (46)
Conduction abnormality found in patients without symptoms, *n* (%)	8 (61)

DPN, diabetic peripheral neuropathy.

Pharmacists performing the tests were provided with training in using the device and interpreting the results by a chiropractor experienced in the testing method. All the patients underwent bilateral sural nerve conduction testing using the device. The test was performed by stimulating the sural nerve with stainless steel probes, just posterior to the lateral malleolus. Sural nerve CV and SNAP amplitude were recorded on both legs of each patient. Patients were also asked about symptoms of DPN during the consultation. The following questions were asked:
Do you experience

1) any pain or burning in your feet?
2) any numbness or tingling in your feet?
3) any feeling of pins and needles in your feet?
4) any trouble feeling your feet when you walk?
5) any discomfort or pain in your feet?

Sural nerve CV and SNAP amplitude were plotted on a reference chart to identify the stage of DPN. Patients with an A1C level above 7% were provided with lifestyle and drug therapy interventions to reduce their A1C level and with education on proper foot care. Detailed reports with test results and pharmacist recommendations for drug therapy interventions were communicated to the patient's primary care physician.

A brief survey was also conducted among the pharmacists who participated to gather their feedback about the test. Survey questions included the 1) mean time taken for each test, 2) ease of use, 3) ease of interpretation, and 4) usefulness for patient education and drug therapy intervention.

Results

The NC-stat DPNCheck sural nerve conduction test was performed on 28 patients. The CV or SNAP amplitude could not be obtained on 3 patients, as their feet were very cold. The demographics and clinical data of these patients are summarized in Table 1. The mean (±standard deviation) age of the patients was 64 ± 10 years, and the mean duration of diabetes of the patients was 8 ± 6 years.

The point-of-care A1C test revealed that 28% of patients had an A1C level below 7%, 57% of patients between 7% and 8.9% and 14% of patients ≥9%. Fifty-four percent of patients reported ≥1 symptoms of DPN, and 46% of patients reported no signs or symptoms of DPN. Twenty-nine percent of patients showed normal nerve conduction, 25% of patients had mild conduction abnormality, 32% of patients

had moderate conduction abnormality and 14% of patients had severe or undetectable nerve conduction.

A total of 5 pharmacists participated, and the mean time taken for each test was 5 ± 0.82 minutes. All the pharmacists agreed that the test was easy to perform and that the results were easy to interpret. The test results were useful in helping the pharmacist educate patients regarding the relationship between good glycemic control and DPN.

Discussion

The purpose of this article was to report on our experience with the use of NC-stat DPNCheck as a testing tool for pharmacists' physical assessment of patients with diabetes. Sural nerve conduction is a quantitative biomarker that helps to identify DPN in the absence of signs and symptoms.[7] It also confirms clinically evident DPN and helps to stage its severity.[8]

Thirteen patients (46%) did not report symptoms of neuropathy, and of these, normal nerve conduction was detected in 5 patients (39%), and nerve conduction abnormality was detected in 8 patients (61%). This may be of relevance because up to 50% of patients may not show any symptoms of neuropathy,[2] and we observed a similar trend.

NC-stat DPNCheck is an easy-to-use point-of-care DPN detection device that can be used by the pharmacist during initial or follow-up MedsCheck of diabetes. Pharmacists can use the results of the test to educate patients on achieving glycemic control and the importance of foot self-care to avoid future foot ulcers and potential amputation. Studies have shown that patients who underwent foot assessment by a health care professional and who were provided with education for foot self-care performed better foot care.[9-11] There are no specific disease-modifying treatments available for neuropathy. The CDA CPG 2013 recommends that intensive glycemic control is the most effective intervention for the primary and secondary prevention of neuropathy in type 1 and type 2 diabetes. This clearly indicates the need for the early detection and management of DPN.

The CDA CPG 2013 recommends that patients with type 1 or type 2 diabetes aim for a target HbA1C level of ≤7%. In our patient population, only 28% met this target, leaving a large proportion of patients at risk of developing long-term microvascular complications.

As the expanded scope of pharmacy practice evolves, pharmacists are now increasingly incorporating physical assessment tools and point-of-care screening tools as part of drug and disease monitoring. The NC-stat DPNCheck testing device is an excellent physical assessment screening tool that pharmacists can use in community pharmacy settings to identify and educate patients regarding DPN and glycemic control. Pharmacists are in an ideal position to identify and monitor patients with diabetes, provide patient education and offer drug therapy interventions to achieve HbA1C targets, thereby reducing the risk of developing long-term diabetic neuropathy complications. Future studies are planned to follow these patients to measure the outcome of pharmacists' interventions.

This test has various limitations. It is more expensive than conventional monofilament testing. Pharmacists need training in proper testing techniques with the NC-stat DPNCheck device. Testing will be affected by the foot temperature. A private counselling room is needed to administer the test.

Conclusion

Pharmacists can easily incorporate the point-of-care NC-stat DPNCheck test to rapidly screen for DPN as part of MedsCheck for diabetes. This simple test gives pharmacists excellent data to categorize their patients' neuropathy severity and counsel and intervene accordingly to prevent any long-term neuropathy-related complications.

We also found that a large number of patients at our clinic were not at their target A1C level. Pharmacist monitoring of A1C values during MedsCheck for diabetes and providing proper interventions if their value is not at target would also benefit the patient. Pharmacists can play a major role in the regular assessment of diabetes and provide proper education and therapeutic interventions. ■

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