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Overcoming Barriers to Diabetic Polyneuropathy Management in Primary Care

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Abstract

Diabetic polyneuropathy is a highly prevalent and costly complication of diabetes that is frequently underdiagnosed and undertreated in primary care settings. In this article, we discuss challenges in the management of diabetic polyneuropathy symptoms, including diagnostic complexity, the limited efficacy and high side effect rates associated with available treatments and the time constrained primary care visit. We call for the development of novel patient-centric, system-level strategies that engage patients between physician visits in order to facilitate timely communication of symptoms and treatment response and to promote patient-centered care.

Keywords

diabetes; neuropathy; primary care

An estimated 15 million people in the U.S. and more than 200 million across the globe are likely to develop nerve damage associated with diabetes called diabetic polyneuropathy (DPN).¹ DPN accounts for nearly one-third of all diabetes related expenditures in the U.S., which are estimated at close to \$250 billion per year.² While DPN is not curable, progression can be slowed through improved glycemic control and long term impact may be reduced through effective treatment of symptoms.^{3,4}

Most patients with DPN experience sensations of pain, numbness, tingling, electronic shock, and/or pins and needles (paraesthesia) that initiate in the toes and feet and spread to the upper limbs in a “stocking and “glove pattern.^{1,5} The burden associated with these symptoms has a dramatic negative impact on patient quality of life, health status and functioning.⁶ While pharmacologic and other interventions are available to treat these symptoms, there is growing evidence that DPN is underdiagnosed and undertreated in primary care settings.^{7,8} In this article, we highlight three factors that contribute to suboptimal management of DPN symptoms and encourage the development of novel

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system-level strategies to re-prioritize DPN symptom management within the broader context of diabetes management.

1) Diagnostic Complexity:

There is no single test a provider can order to definitively diagnose DPN.^{1,3} Instead, physicians must be guided by a combination of physical exam and patient symptom reports. Nerve conduction studies rarely change the clinical management of patients with suspected DPN, and likely should be reserved for those with atypical features (asymmetry, non-length dependence, motor predominance, acute/subacute presentation).^{9,10} Surprisingly, neuroimaging studies are frequently performed, but also are unlikely to change management strategies.⁹⁻¹¹ Current guidelines recommend serologic testing with a fasting glucose, glucose tolerance test, serum protein electrophoresis with immunofixation, and B12 for patients with polyneuropathy, but whether any serologic testing in those with known diabetes is needed is unknown.^{3,12} Clinical guidelines recommend screening at diagnosis and annually thereafter;³ though DPN may also appear among those with prediabetes.^{1,13}

Screening tests (e.g., 10g Semmes-Weinstein monofilament test) may help primary care physicians screen for neuropathy.³ Yet, recent studies suggest that the monofilament test, which is considered the cornerstone for assessing the quality of diabetes foot care in many settings, exhibits considerable variability in sensitivity and specificity.^{14,15} Given the limitations of this and other screening tests, validated questionnaires and examination tools are likely the best way to screen for DPN.⁵

Despite the importance of frequent patient-provider communication,^{1,3,5} there are considerable barriers to effective DPN symptom assessment in practice, such as low health literacy, language barriers and patients' reluctance to discuss pain symptoms.^{8,16} In addition, the increasingly time constrained primary care visit may contribute to communication barriers and resulting diagnostic errors.¹⁷⁻¹⁹ For conditions like DPN, missed opportunities for clinical recognition during primary care visits can have devastating downstream consequences.

2) Heterogeneity of Treatment Response:

Once recognized, a major challenge to effective treatment of DPN symptoms is the lack of robust clinical evidence regarding which treatment options are likely to work best for which patients.^{1,3,5,20} There is a wide range of efficacious medications, including tricyclic antidepressants, voltage gated calcium channel ligand agonists, and serotonin norepinephrine reuptake inhibitors.^{1,3,5,20} However, there is considerable variation in patient tolerability of side effects and costs, as well as a lack of evidence regarding the comparative efficacy of these therapies over the short and long term.^{3,20}

As a consequence, effective treatment strategies often require intensive step-wise up-titration and medication changes to reach a dose that optimally balances medication benefit and burden.^{1,3,5,20} Recent studies suggest that combination therapy may be more effective than monotherapy for patients who do not respond to first line treatment.²¹ Moreover, the

identification of specific genetic markers associated with DPN progression suggest that personalized pharmacotherapies may be forthcoming.^{1,5}

While intensive glycemic control has been associated with a lower incidence of DPN, there is insufficient evidence to support it as a viable intervention for symptom management.⁵ Recently, a Veterans Administration study demonstrated that intensive cognitive behavioral therapy may be effective as an adjunct to traditional pharmacotherapy for some patients, though more studies are needed to confirm this finding.²² Importantly, the generalizability of these and other clinical trial findings to real world populations is unknown and patient and provider knowledge of available treatments is limited; thus hindering progress toward rational decision-making.^{7,8}

3) System-Level Barriers:

Perhaps the biggest barrier to optimizing DPN management lies in how health systems prioritize DPN symptoms in the larger context of diabetes management. The reality for patients and providers alike is that provider performance and subsequent payment are linked to tangible, objective measures of diabetes management and control (e.g., A1c), not symptoms. Yet, glycemic control, undeniably an important target for care intervention,³ is a poor indicator of pain interference, quality of life, functioning and other patient-valued outcomes.¹⁷ Overcoming the unique challenges posed by DPN management will require a paradigmatic shift at the health system level toward management strategies that prioritize patient-valued outcomes at least as much as clinical markers.

Retinopathy screening, which has been shown to be cost-effective in preventing sight loss for diabetes patients, may represent a strong example of what could be possible with DPN.²³ Like retinopathy, DPN screening can be easily conducted using exam or validated questionnaire and, therefore, monitored and linked to reimbursement or financial incentives. However, unlike retinopathy, the next step of assessment of neuropathic pain and treatment decisions are harder to identify in the medical record in an automated way. Identifying methods for systematizing the process of pain assessment and automating data collection are critical in the development of effective and sustainable strategies for promoting high quality DPN management in primary care practice.

Toward for a Patient-centered System-Level Approach

There is mounting evidence that a one size fits all approach to diabetes management may limit the ability of physicians to focus on the needs of individual patients.^{17,24} For example, many patients with DPN symptoms may benefit more from an immediate focus on current symptom management than on efforts directed towards long-term prevention. Such a patient-centered approach will require new and innovative strategies to align patient, provider, and health system priorities toward doing what is best for the individual patient.

Patients with DPN have complex clinical profiles and many are already the target of health system outreach interventions due to poorly controlled HbA1c, cardiovascular risk factors, opioid use, and fall risk.^{1,5,6} Therefore, making even small adjustments to the focus and

content of existing outreach interventions for complex patients to include DPN symptom recognition and treatment may have a substantial impact among patients with DPN.

Technology-enabled strategies, such as interactive automated phone calls, on-line patient portals, emails and text messaging, hold considerable promise for augmenting patient-provider communication outside of primary care clinic visit.²⁵ Additional advantages of these technologies include the ability to tailor educational messaging about foot care for patient language preference and health literacy levels and to systematically engage patients in discussions about symptoms, treatment goals and effectiveness to facilitate timely diagnosis, treatment initiation and treatment changes.^{17,25,26} Several short questionnaires have now been validated among patients with DPN for use in practice for both diagnostic and symptoms monitoring purposes.²⁷⁻³¹ In addition, patient-reported information about symptoms and treatment side effects has the potential to facilitate clinically appropriate and timely treatment adjustments.²⁶

Health systems with integrated electronic medical records may hold a strategic advantage in leveraging technology to facilitate the collection and feeding back of patient reported data. For example, EMR data can be used to develop risk models to identify patients at high risk for adverse drug events related to DPN medications or to identify those patients at high risk for catastrophic health events such as falls, foot ulceration and lower extremity amputation.³² In addition, EMRs that are integrated across settings of care can aid in communication between primary care and specialty care providers (e.g., podiatry, endocrinology, neurology) to promote care coordination.³³

However, technologically-based interventions are not a panacea for complex clinical management. Consistent, strong research evidence from diverse healthcare systems is needed to evaluate the utility of these and other strategies for patients, providers and health systems in the context of real world clinical practice.^{33,34} Importantly, such technology-enabled interventions should enhance rather than detract from the patient-provider relationship.

In summary, DPN is a highly prevalent condition affecting many patients with diabetes.^{1,6} Effective symptom management is associated with higher patient quality of life and lower health care costs.^{1,2} The diagnostic complexity of DPN, variation in patient response to DPN treatment, and regulatory pressures to meet data-driven quality metrics for diabetes management all likely contribute to the under-diagnosis and treatment of DPN in clinical practice. We argue that an alternative patient-centered strategy that prioritizes DPN symptom relief is needed.^{2,17,24} In particular, technology-facilitated interventions that allow for systematic intervention with patients between visits are promising in their ability to overcome system level barriers.^{25,26} Patients may be most likely to take advantage of these strategies if doing so enriches their connection with an empathetic clinician and care teams that are actively engaged in helping patients meet their goals related to DPN symptom control and functioning.

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