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*Nursing Best Practice Guideline*  
*Shaping the future of Nursing*

# *Reducing Foot Complications for People with Diabetes*





*Greetings from Doris Grinspun  
Executive Director  
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It is with great excitement that the Registered Nurses Association of Ontario (RNAO) disseminates this nursing best practice guideline to you. Evidence-based practice supports the excellence in service that nurses are committed to deliver in our day-to-day practice.

We offer our endless thanks to the many institutions and individuals that are making RNAO's vision for Nursing Best Practice Guidelines (NBPGs) a reality. The Ontario Ministry of Health and Long-Term Care recognized RNAO's ability to lead this project and is providing multi-year funding. Tazim Virani – NBPG project director – with her fearless determination and skills, is moving the project forward faster and stronger than ever imagined. The nursing community, with its commitment and passion for excellence in nursing care, is providing the knowledge and countless hours essential to the creation and evaluation of each guideline. Employers have responded enthusiastically to the request for proposals (RFP), and are opening their organizations to pilot test the NBPGs.

Now comes the true test in this phenomenal journey: Will nurses utilize the guidelines in their day-to-day practice?

Successful uptake of these NBPGs requires a concerted effort of four groups: nurses themselves, other healthcare colleagues, nurse educators in academic and practice settings, and employers. After lodging these guidelines into their minds and hearts, knowledgeable and skillful nurses and nursing students need healthy and supportive work environments to help bring these guidelines to life.

We ask that you share this NBPG, and others, with members of the interdisciplinary team. There is much to learn from one another. Together, we can ensure that Ontarians receive the best possible care every time they come in contact with us. Let's make them the real winners of this important effort!

RNAO will continue to work hard at developing and evaluating future guidelines. We wish you the best for a successful implementation!

Doris Grinspun, RN, MScN, PhD (candidate)



Executive Director  
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## How to Use this Document

**This nursing best practice guideline** is a comprehensive document providing resources necessary for the support of evidence-based nursing practice. The document needs to be reviewed and applied, based on the specific needs of the organization or practice setting/environment, as well as the needs and wishes of the client. Guidelines should not be applied in a “cookbook” fashion but used as a tool to assist in decision making for individualized client care, as well as ensuring that appropriate structures and supports are in place to provide the best possible care.

Nurses, other health care professionals and administrators who are leading and facilitating practice changes will find this document valuable for the development of policies, procedures, protocols, educational programs, assessment and documentation tools, etc. It is recommended that the nursing best practice guidelines be used as a resource tool. It is not necessary or practical to have every nurse have a copy of the entire guideline. Nurses providing direct client care will benefit from reviewing the recommendations, the evidence in support of the recommendations and the process that was used to develop the guidelines. However, it is highly recommended that practice settings/environments adapt these guidelines in formats that would be user-friendly for daily use. This guideline has some suggested formats for such local adaptation and tailoring.



Organizations wishing to use the guideline may decide to do so in a number of ways:

- Assess current nursing and health care practices using the recommendations in the guideline.
- Identify recommendations that will address identified needs or gaps in services.
- Systematically develop a plan to implement the recommendations using associated tools and resources.

RNAO is interested in hearing how you have implemented this guideline. Please contact us to share your story. Implementation resources will be made available through the RNAO website to assist individuals and organizations to implement best practice guidelines.



# *Reducing Foot Complications for People with Diabetes*

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# *Reducing Foot Complications for People with Diabetes*

## **Disclaimer**

*These best practice guidelines are related only to nursing practice and not intended to take into account fiscal efficiencies. These guidelines are not binding for nurses and their use should be flexible to accommodate client/family wishes and local circumstances. They neither constitute a liability or discharge from liability. While every effort has been made to ensure the accuracy of the contents at the time of publication, neither the authors nor RNAO give any guarantee as to the accuracy of the information contained in them nor accept any liability, with respect to loss, damage, injury or expense arising from any such errors or omission in the contents of this work. Any reference throughout the document to specific pharmaceutical products as examples does not imply endorsement of any of these products.*

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## Summary of Recommendations

	RECOMMENDATION	*LEVEL OF EVIDENCE
Practice Recommendations	1.0 Physical examination of the feet to assess risk factors for foot ulceration/ amputation should be performed by a health care professional.	lb
	1.1 This examination should be performed at least annually in all people with diabetes over the age of 15 and at more frequent intervals for those at higher risk.	IV
	2.0 Nurses should conduct a foot risk assessment for clients with known diabetes. This risk assessment includes the following: <ul style="list-style-type: none"> <li>■ History of previous foot ulcers;</li> <li>■ Sensation;</li> <li>■ Structural and biomechanical abnormalities;</li> <li>■ Circulation; and</li> <li>■ Self-care behaviour and knowledge.</li> </ul>	IV
	3.0 Based on assessment of risk factors, clients should be classified as “lower” or “higher” risk for foot ulceration/amputation.	IV
	4.0 All people with diabetes should receive basic foot care education.	lb
	4.1 Foot care education should be provided to all clients with diabetes and reinforced at least annually.	IV
	5.0 Nurses in all practice settings should provide or reinforce basic foot care education, as appropriate.	IV
	5.1 The basic foot care education for people with diabetes should include the following six elements: <ul style="list-style-type: none"> <li>■ Awareness of personal risk factors;</li> <li>■ Importance of at least annual inspection of feet by a health care professional;</li> <li>■ Daily self inspection of feet;</li> <li>■ Proper nail and skin care;</li> <li>■ Injury prevention; and</li> <li>■ When to seek help or specialized referral.</li> </ul>	IV

\*See pg.14 for details regarding “Interpretation of Evidence”

## Reducing Foot Complications for People with Diabetes

	RECOMMENDATION	LEVEL OF EVIDENCE
	5.2 Education should be tailored to client's current knowledge, individual needs, and risk factors. Principles of adult learning must be used.	IV
	6.0 Individuals assessed as being at "higher" risk for foot ulcer/amputation should be advised of their risk status and referred to their primary care provider for additional assessment or to specialized diabetes or foot care treatment and education teams as appropriate.	IV
Education Recommendations	7.0 Nurses need knowledge and skills in the following areas in order to competently assess a client's risk for foot ulcers and provide the required education and referral: <ul style="list-style-type: none"> <li>■ Skills in conducting an assessment of the five risk factors;</li> <li>■ Knowledge and skill in educating clients; and</li> <li>■ Knowledge of sources of local referral.</li> </ul>	IV
	8.0 Educational institutions should incorporate the RNAO Nursing Best Practice Guideline <i>Reducing Foot Complications for People with Diabetes</i> into basic nursing education curriculum as well as provide continuing education programs in this topic area.	IV
Organization & Policy Recommendations	9.0 Organizations should develop a policy that acknowledges and designates human and fiscal resources to support nursing's role in assessment, education, and referral of clients for appropriate foot care. It is the organization's responsibility to advocate with policy makers and develop policy that facilitates implementation.	IV
	10.0 Organizations should ensure that resources for implementation are available to clients and staff. Examples of such resources include policies and procedures, documentation forms, educational materials, referral processes, workload hours, and monofilaments.	IV
	11.0 Organizations should work with community partners to develop a process to facilitate client referral and access to local diabetes resources and health professionals with specialized knowledge in diabetes foot care.	IV
	12.0 Organizations are encouraged to establish or identify a multidisciplinary, inter-agency team comprised of interested and knowledgeable persons to address and monitor quality improvement in diabetes foot complication prevention.	IV

	RECOMMENDATION	LEVEL OF EVIDENCE
	<p>13.0 Organizations should consult an infection control team to define appropriate care, maintenance, and replacement of the Semmes-Weinstein monofilament. Such a process may include setting up a protocol for the appropriate maintenance and replacement of the monofilaments.</p>	IV
	<p>14.0 Organizations should advocate for strategies and funding to assist clients to obtain appropriate footwear and specialized diabetes education. For example, the inclusion of funding support through the Assistive Devices Program (ADP) for appropriate footwear and orthotics.</p>	IV
	<p>15.0 Organizations should advocate for an increase in the availability and accessibility of diabetes care and education services for all residents of Ontario.</p>	IV
	<p>16.0 Nursing best practice guidelines can be successfully implemented only where there are adequate planning, resources, organizational and administrative support, as well as appropriate facilitation. Organizations may wish to develop a plan for implementation that includes:</p> <ul style="list-style-type: none"> <li>■ An assessment of organizational readiness and barriers to education.</li> <li>■ Involvement of all members (whether in a direct or indirect supportive function) who will contribute to the implementation process.</li> <li>■ Dedication of a qualified individual to provide the support needed for the education and implementation process.</li> <li>■ Ongoing opportunities for discussion and education to reinforce the importance of best practices.</li> <li>■ Opportunities for reflection on personal and organizational experience in implementing guidelines.</li> </ul> <p>In this regard, RNAO (through a panel of nurses, researchers and administrators) has developed the <i>Toolkit: Implementation of Clinical Practice Guidelines</i> based on available evidence, theoretical perspectives, and consensus. The <i>Toolkit</i> is recommended for guiding the implementation of the RNAO guideline <i>Reducing Foot Complications for People with Diabetes</i>.</p>	IV



## Interpretation of Evidence

The recommendations made in this best practice guideline have been critically reviewed and categorized by level of evidence. The following taxonomy provides the definitions of the levels of evidence and the rating system.

**LEVEL Ia:** Evidence obtained from meta-analysis of randomized controlled trials, plus consensus.

**LEVEL Ib:** Evidence obtained from at least one randomized controlled trial, plus consensus.

**LEVEL II:** Evidence obtained from at least one well-designed controlled study without randomization or evidence obtained from at least one other type of well-designed quasi-experimental study, plus consensus.

**LEVEL III:** Evidence obtained from well-designed non-experimental descriptive studies, such as comparative studies, correlation studies and case studies, plus consensus.

**LEVEL IV:** Evidence obtained from expert committee reports or opinions and/or clinical experiences of respected authorities, plus consensus.





## *Responsibility for Development*

**The Registered Nurses Association of Ontario (RNAO)**, with funding from the Ministry of Health and Long-Term Care, has embarked on a multi-year project of nursing best practice guideline development, pilot implementation, evaluation, and dissemination. In this third cycle of the project, one of the areas of emphasis is reducing the risk of foot complications for people with diabetes. This guideline was developed by a panel of nurses and researchers convened by the RNAO, conducting its work independent of any bias or influence from the Ministry of Health and Long-Term Care.

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## *Purpose and Scope*

Best practice guidelines are systematically developed statements to assist decision making by health care organizations, practitioners and clients about appropriate health care (Field & Lohr, 1990). Guidelines need to be locally adapted and interpreted based on the strengths and needs of each practice setting (refer to “How to Use this Document”, pg. 1). The focus of this best practice guideline is to support nurses as they help people with diabetes reduce their risk of foot complications. Specifically, this guideline assists nurses who are not specialists in diabetes care to:

- Conduct a risk assessment for foot ulcers;
- Provide basic education for prevention of foot ulcers for all clients with diabetes; and
- Implement appropriate interventions when clients are assessed as higher risk for foot ulcers and/or amputations.

This guideline focuses its recommendations on three areas: (1) Practice recommendations directed at the nurse; (2) Education recommendations directed at the competencies required for practice; (3) Organization and Policy recommendations addressing the importance of a supportive practice environment as an enabling factor for providing high quality nursing care, which includes ongoing evaluation of guideline implementation.

This guideline contains recommendations for Registered Nurses (RNs) and Registered Practical Nurses (RPNs). Although these guidelines are written for the nurse, reduction of foot

complications in people with diabetes is an interdisciplinary and community wide endeavour. Organizational commitment and support for implementation is critical for success. Many settings have formalized interdisciplinary teams and the development panel strongly supports this structure. Collaborative assessment and planning with the client is essential. The recommendations made are not binding for nurses and should accommodate client/family wishes and local circumstances.

It is the intention of this guideline to identify best nursing practices to help people with diabetes reduce their risk of foot complications. It is acknowledged that individual competencies of nurses vary between nurses and across categories of nursing professionals (RPNs and RNs) and are based on knowledge, skills, attitudes and judgment enhanced over time by experience and education. It is expected that individual nurses will perform only those aspects of diabetes foot assessment and education for which they have appropriate education and experience. Further, it is expected that nurses, both RPNs and RNs, will seek consultation in instances where the client's care needs surpass the individual nurse's ability to act independently.

It is acknowledged that effective care depends on a coordinated interdisciplinary approach incorporating ongoing communication between health professionals and clients, ever mindful of the personal preferences and unique needs as well as the personal and environmental resources of each individual client.



## Development Process

In February of 2001, a panel of nurses with expertise in diabetes care, education, and research representing institutional, community, and academic settings was convened under the auspices of the RNAO. The first task of the group was to review existing clinical practice guidelines in order to build on the current understanding of diabetes care and management, and to reach consensus on the scope of the guideline. A search of the literature for clinical practice guidelines, systematic reviews, relevant research articles and websites was conducted. See Appendix A for a detailed outline of the search strategy employed.

A total of eight existing clinical practice guidelines for diabetic management were identified that met the initial inclusion criteria:

- published in English;
- developed 1998 or later;
- strictly about the topic area;
- evidence-based; and
- accessible as a complete document.

Members of the development panel critically appraised these eight guidelines using the “Appraisal Instrument for Clinical Guidelines” from Cluzeau et al. (1997). This instrument allows for evaluation in three key dimensions: rigour, content and context, and application. From this appraisal process, four documents were identified as high quality, relevant guidelines and were selected as “foundation” documents for this guideline:

American Diabetes Association (2001). Clinical practice recommendations 2001. *Diabetes Care*, 24(Suppl.1), S1-133.

Canadian Diabetes Association (1998). 1998 clinical practice guidelines for the management of diabetes in Canada. *Canadian Medical Association Journal*, 159(Suppl.8), S1-S29.

Institute for Clinical Systems Improvement (2000). *Health care guideline: Management of type 2 diabetes mellitus*. [Online]. Available: [www.icsi.org](http://www.icsi.org).

New Zealand Guidelines Group (2000). *Primary care guidelines for the management of core aspects of diabetes care*. [Online]. Available: [www.nzgg.org.nz/library.cfm](http://www.nzgg.org.nz/library.cfm).

At a later date, the panel was able to identify one additional existing guideline that was also added for the purpose of ensuring content clarity as well as currency of the recommendations. This fifth guideline was:

Hutchinson, A. et al. (2000). *Clinical guidelines and evidence review for type 2 diabetes: Prevention and management of foot problems*. Royal College of General Practitioners. [Online]. Available: [www.rcgp.org.uk/rcgp/clinspec/guidelines/diabetes/index.asp](http://www.rcgp.org.uk/rcgp/clinspec/guidelines/diabetes/index.asp)

After reviewing the existing guidelines, the panel decided to focus the scope of their work on reducing the risk of foot complications for people with diabetes. This preventable problem is serious as well as costly, and there is potential for all nurses to contribute to risk reduction.

A second phase to the literature search was required, as many of the issues relevant for nursing practice were not sufficiently addressed in the existing guidelines. A critique of systematic review articles, technical reviews, and other pertinent literature was conducted to update and/or validate recommendations in the existing guidelines.

The first strategy undertaken to develop the recommendations was a review of the literature to identify risk factors for diabetes foot complications that were consistently supported by research studies utilizing strong methodologies. Once the panel identified the risk factors, small task groups were formed to further study each of the risk indicators. The small groups conducted an in-depth search for evidence to validate the risk factors, as well as to identify evidence-based processes for risk assessment. The sub-groups further identified assessment tools, mechanisms, and/or educational resources for each of the risk factors. Through an iterative process of discussion and validation, consensus was reached on the final draft recommendations for the guideline.

This draft document was submitted to a set of external stakeholders for review and feedback – a listing and acknowledgement of these reviewers is provided at the front of this document. Stakeholders represented various health care professional groups, clients and families, as well as professional associations. External stakeholders were asked to provide feedback using a questionnaire consisting of open and closed-ended questions. The results were compiled and reviewed by the development panel – discussion and consensus resulted in revisions to the draft document prior to pilot testing.

A pilot implementation practice setting was identified through a “Request for Proposal” (RFP) process. Practice settings in Ontario were asked to submit a proposal if they were interested in pilot testing the recommendations of the guideline. The proposals underwent an external review process and the successful applicant (practice setting) selected. This guideline was implemented by a hospital and a community care organization in northern Ontario between April 2002 and July 2003. Four participating medical/oncology hospital units located at two sites in one community participated, as did the diabetic education and care centre, located at a third site. Nurses participating from the community care organization were located in three geographically separate communities. An evaluation of the implementation process was conducted during this period by an evaluation team that was external to the pilot site.

The development panel reconvened following completion of the pilot to review the experiences of the pilot sites, consider the evaluation results and review any new literature published since the initial development phase. All these sources of information were used to update and revise the document prior to publication.



## Definition of Terms

For clinical terms not identified here, please refer to the Glossary of Terms, Appendix B.

**Clinical Practice Guidelines or Best Practice Guidelines:** Systematically developed statements (based on best available evidence) to assist practitioner and patient decisions about appropriate health care for specific clinical (practice) circumstances (Field & Lohr, 1990).

**Consensus:** A process for making policy decisions, not a scientific method for creating new knowledge. At its best, consensus development merely makes the best use of available information, be that scientific data or the collective wisdom of the participants (Black et al., 1999).

**Diabetes Mellitus:** Diabetes mellitus is a metabolic disorder characterized by the presence of hyperglycemia due to defective insulin secretion, insulin action or both. The chronic hyperglycemia of diabetes is associated with significant long-term sequelae, particularly damage, dysfunction and failure of various organs – especially the kidneys, eyes, nerves, heart and blood vessels (Canadian Diabetes Association, 2003).

**Type 1 Diabetes** encompasses diabetes that is primarily a result of pancreatic beta cell destruction and that is prone to ketoacidosis. This form includes cases due to an autoimmune process and those for which the etiology of beta cell destruction is unknown (CDA, 2003).

**Type 2 Diabetes** may range from predominant insulin resistance with relative insulin deficiency to a predominant secretory defect with insulin resistance (CDA, 2003).

**Education Recommendations:** Statements of educational requirements and educational approaches/strategies for the introduction, implementation and sustainability of the best practice guideline.

**Meta-analysis:** The use of statistical methods to summarize the results of independent studies, which provide more precise estimates of the effects of health care than those derived from the individual studies included in a review (Clarke & Oxman, 1999).

**Organization and Policy Recommendations:** Statements of conditions required for a practice setting that enables the successful implementation of the best practice guideline. The conditions for success are largely the responsibility of the organization, although they may have implications for policy at a broader government or societal level.

**Practice Recommendations:** Statements of best practice directed at the practice of health care professionals that are ideally evidence-based.

## *Background Context*

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Diabetes is a serious, life-long condition affecting more than 2 million Canadians. It is the leading cause of death by age, and worldwide the prevalence of diabetes is increasing annually. Diabetes is a disorder manifested by high blood glucose levels that result from defective insulin secretion or insulin action or a combination of both of these problems.

There are two major classifications of diabetes. Type 1 diabetes, which affects 10 – 15% of all people with diabetes, is primarily a result of the inability to produce insulin due to beta cell destruction in the pancreas. While Type 1 diabetes accounts for fewer individuals with diabetes, it results in a disproportionately high frequency of diabetes related complications. Type 2 diabetes, affecting over 80% of those diagnosed with diabetes, results from a combination of insufficient insulin production and/or resistance of the cells of the body to the actions of insulin (CDA, 1998; 2003).

Regardless of the diabetes type, over time, failure to achieve optimal glycemic control can cause damage to the body's small and large blood vessels and nerves. This damage can affect the functioning of many body organs and interfere with wound healing. Diabetes is a major cause of coronary artery disease, and is the leading cause of new cases of blindness and kidney disease (CDA, 1998; 2003). In Ontario, the adjusted rates of lower extremity amputation are approximately 20 times higher for people with diabetes than in persons without diabetes (Institute for Clinical Evaluative Sciences, 2003).

The Institute for Clinical Evaluative Sciences (2003) describes a decreasing rate for minor amputations in Ontario (amputation at the level of the foot or below) in people with diabetes

(a 29% decline from 1995 to 1999). However, rates for minor amputations were much higher in the diabetic population compared to the non-diabetic population – in 1999 the odds of having a minor amputation were 24 times greater in people with diabetes. Major amputation rates (amputation from the ankle to the thigh) remained relatively stable in Ontario over the same five-year interval; however rates increased with age and were significantly higher in those with diabetes. As with minor amputation rates, major amputation rates were significantly higher for people with diabetes. In 1999, the risk of major amputation was 14 times higher for those with diabetes, even after adjusting for differences in age and sex.

Abbott et al. (2002) found that the incidence of foot ulcers in people with diabetes was 2.2% annually, and that past history of foot ulcers or history of amputation was strongly related to future ulcer risk. The sequence of events leading to lower extremity ulceration and amputation in diabetes is a complex process with many factors combining to increase the likelihood that a foot injury or infection will occur and healing will be delayed. In the presence of reduced circulation (peripheral vascular disease) and loss of protective sensation (neuropathy), even minor foot trauma or unusual pressures on the foot may be sufficient to cause ulceration and eventual amputation. For example, in the insensate foot a callus is an ulcer waiting to happen. Fully 85% of lower extremity amputations are preceded by non-healing ulceration (Pecoraro, Reiber & Burgess, 1990).

The prevention of such traumatic “pivotal” events, together with the early identification and prompt treatment of foot problems can reduce the incidence of foot ulceration and amputation. This can be achieved through a program of risk assessment, self-care education and regular reinforcement of self-care (Mayfield et al., 1998). Valk, Kriegsman and Assendelft (2002) in a systematic review of the effectiveness of patient education to prevent diabetic foot ulcers, found that the evidence suggests patient education may have positive short-term effects on foot care knowledge and behaviour of patients, and may reduce foot ulceration and amputation, particularly in high-risk patients.

Not only does diabetes seriously affect the lives of individuals and their families, it poses a significant societal burden as well. The Canadian Diabetes Association (2003) indicates that although economic analyses of the cost of diabetes to the Canadian health care system vary widely, a recent study calculated that the economic costs of diabetes in Canada in 1998 was between \$4.76 billion and 5.23 billion (US).



In light of the serious and costly impact of diabetes, lower extremity ulceration and amputation, and the potential of nursing intervention to positively influence this problem, reducing foot complications for people with diabetes was selected as the focus for this nursing best practice guideline. Nurses are in a unique position to promote the maintenance of healthy feet, identify problems in early stages, positively influence self-care practices, and refer high-risk individuals for specialized care. They are in contact with individuals who have diabetes across their life span, in a multitude of practice settings from emergency departments, tertiary care hospitals and long-term care facilities to physicians' offices, community clinics, clients' homes, workplaces and public venues. Health promotion and the facilitation of effective self-care through education are essential elements of nursing practice.

The development panel acknowledges the stressful conditions in which nurses work and in particular, the demands on the time of nurses in various practice settings. With this in mind, the recommendations are targeted to allow nurses who do not specialize in diabetes education and care to conduct a quick assessment to identify key risk factors for foot ulcers in clients with known diabetes. This guideline recommends that all nurses encourage and support clients who are identified as being at increased risk for foot complications in their efforts to access appropriate, specialized diabetes services for more in-depth assessment and intervention.

Diabetes care and education is best provided by a specialized, interdisciplinary team working closely with the clients and their families to address the complex lifestyle, self-care, and multiple treatment demands of diabetes (CDA, 1998; 2003). It is acknowledged that this level of care is not yet accessible to, or accessed by, all people with diabetes. Fewer than 40% of the people in Ontario who have diabetes receive formal education about their condition and its management. Risk-reducing foot care is one aspect of diabetes self-management that all nurses can facilitate and positively influence in the quest to reduce foot complications and associated traumatic sequelae in people with diabetes.



## Practice Recommendations

### Recommendation • 1.0

**Physical examination of the feet to assess risk factors for foot ulceration/amputation should be performed by a health care professional. (Level Ib)**

### Recommendation • 1.1

**This examination should be performed at least annually in all people with diabetes over the age of 15 and at more frequent intervals for those at higher risk. (Level IV)**

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### Discussion of Evidence:

Several clinical practice guidelines (ADA, 1999; CDA, 1998, 2003; Hutchinson et al., 2000; NZGG, 2000) recommend annual foot examinations for all people with diabetes to detect feet at higher risk of ulceration. However, there is no direct evidence to identify the optimal content or frequency of visual inspections and examinations. Rather, the evidence supports regular inspection.

Boulton, Meneses and Ennis (1999) explain the need for regular surveillance. People with diabetes require contact with health professionals on a regular basis for monitoring, reinforcement of diabetes and foot care education, and for support and encouragement to enact preventative self-care practices.

### Recommendation • 2.0

**Nurses should conduct a foot risk assessment for clients with known diabetes.**

**This risk assessment includes the following:**

- **History of previous foot ulcers;**
- **Sensation;**
- **Structural and biomechanical abnormalities;**
- **Circulation; and**
- **Self-care behaviour and knowledge.**

*(Level IV)*

## **Risk Factors:**

### **History of previous foot ulcers**

Identify the presence of foot ulceration or history of previous foot ulcers. A history of previous foot ulceration is highly associated with recurrent ulceration or amputation. In the presence of a foot ulcer or a history of previous foot ulceration, further assessment is not indicated – higher risk status is confirmed. Referral to a diabetes foot care specialist is indicated (*Level IV*).

### **Sensation**

Assess sensation in the foot using a Semmes-Weinstein monofilament (10 grams, 5.07) (*Level Ia*).

Conduct four-site testing including the great toe, first, third and fifth metatarsal heads to assess the presence of protective sensation (*Level IV*). Refer to Appendix E for instructions on the use of the Semmes-Weinstein monofilament and location of the four recommended sites for the assessment.

### **Structural and biomechanical abnormalities**

Observe the client's gait and inspect the feet for callus and other physical/structural abnormalities (*Level III*). Refer to Appendix F for details of this assessment.

### **Circulation**

Inquire regarding recent history of lower limb intermittent claudication and palpate dorsalis pedis and posterior tibialis pulses bilaterally (*Level III*). Refer to Appendix G for details regarding the location and palpation of pedal pulses.

### **Self-care behaviour and knowledge**

Assess for previous education on foot care, footwear, knowledge of personal risk factors, self-care behaviour and knowledge of avoidance of foot trauma, and when to access medical care (*Level IV*). Refer to Appendix H for care tips for the feet.

## **Discussion of Evidence:**

The development panel through its literature search as well as critical review of several clinical practice guidelines, systematic reviews, and technical reviews arrived at consensus that nurses can quickly and realistically assess five critical factors to screen for foot ulcer risk. The five factors are history of foot ulcers, sensation, structural and biomechanical abnormalities, circulation, and client understanding of self-care. There is consistent evidence to support these five critical risk factors in people with diabetes (ADA, 2001; CDA, 1998, 2003; Hunt, 2001; Hutchinson, et al., 2000; ICSI, 2000; NZGG, 2000).

There are other factors that are linked with the risk of foot ulcers such as smoking habits, an exercise injury of the insensate foot, visual difficulties and socioeconomic factors, etc. – these, however, are not consistently supported by research.

### **History and presence of foot ulcers**

Significant evidence supports a causal link between the presence of peripheral neuropathy, foot deformity, minor trauma and a previous history of foot ulceration and the development of future foot ulcers (Boyko et al., 1997; Reiber et al., 1999; Mayfield et al., 1998). Recurrence rates for foot ulcers may be as high as 50-70% over 3-5 years (ADA, 1999; Apelqvist, Larsson & Agardh, 1993; Bloomgarden, 2001). Foot ulceration is associated with a 2 to 10.5 fold increased risk of lower extremity amputation (Mayfield et al., 1998) and a foot ulceration history is described as preceding approximately 85% of lower extremity amputations (Pecoraro, Reiber & Burgess, 1990).

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Nurses are frequently in contact with people with diabetes and have a prime opportunity to conduct a risk assessment for the development of foot ulcers and amputation, as well as to plan and direct interventions aimed at minimizing identified risk factors. In the presence of a positive history for foot ulcers, it is the consensus recommendation of this panel that the individual be assigned a “higher risk” status for foot ulceration and referral made to a diabetes foot specialist.

### **Sensation**

There is strong evidence to support assessing foot sensation using a 10-gram, 5.07 Semmes-Weinstein monofilament. The point at which a 10-gram filament buckles when pressure is applied is highly correlated to the loss of protective sensation in the presence of diabetes (ADA, 2001; Campbell et al., 2000; Frykberg et al., 2000; Hunt, 2001; Hutchinson et al., 2000; ICSI, 2000; Lavery & Gazewood, 2000; McCabe, Stevenson & Dolan, 1998; NZGG, 2000; Smieja et al., 1999; Zangaro & Hull, 1999).

There are discrepant recommendations regarding the number of sites on the foot to test with the Semmes-Weinstein monofilament. One technical review (Mayfield & Sugarman, 2000) and one multi-center cross-sectorial study (Smieja et al., 1999) recommend testing more than one site on the foot to assess sensation. Some suggest that testing less sensitive areas such as the heel and the dorsum provide little additional information (Mayfield & Sugarman, 2000). Smieja et al. (1999) conducted a clinical trial comparing eight-site versus four-site evaluation. They found that testing four rather than eight sites identified 90% of insensate feet. Based on these

findings and expert consensus, four-site testing including the great toe, first, third and fifth metatarsal heads, using a 10-gram monofilament is recommended as an appropriate screening process to determine the presence of protective sensation in individuals with diabetes.

### **Structural and biomechanical abnormalities**

Structural and biomechanical abnormalities (soft and bony tissue deformities, impaired joint mobility) have been consistently identified as risk factors for lower extremity ulceration and amputation (Boyko et al., 1999; Lavery & Gazewood, 2000; Mayfield & Sugarman, 2000; Pham et al., 2000; Reiber et al., 1999) particularly when peripheral neuropathy is present (Mayfield & Sugarman, 2000). Hutchinson et al. (2000) identified foot callus and foot deformities as risk factors for foot ulcers. Although some foot deformities are congenital, the majority result from motor neuropathy (e.g., claw/hammer toes), increased glycosylation of collagen (e.g., leg-joint immobility), or improper footwear (e.g., callus, hallux valgus). Observable structural and biomechanical abnormalities result in weight redistribution, increased plantar pressure, poor shock absorption, and shearing stress to soft tissue.

### **Circulation**

Circulation is not consistently identified as a risk factor for lower extremity ulceration, but it is strongly associated with delayed wound healing and therefore has been established as a risk factor for amputation in people with diabetes who have an existing lower extremity ulcer (Adler, Boyko, Ahroni & Smith, 1999; Boyko et al., 1999; Lavery & Gazewood, 2000; Mayfield & Sugarman, 2000). It is often included as an important risk factor for foot ulcer and amputation in published diabetes clinical practice guidelines based on expert consensus.

Reported sensitivity (the ability to identify cases when they exist) and specificity (the ability to exclude cases when the condition is not present) of peripheral vascular assessment techniques suitable for clinical use are variable. Intermittent claudication, or calf pain associated with exercise and relieved with rest, may present atypically in diabetes and may be complicated by the presence of neuropathic symptoms. Sensitivity of a positive history of claudication as an indicator of peripheral vascular disease (PVD) in diabetes is low (22-50%) but specificity is quite high (93-97%) (Lavery & Gazewood, 2000; Mayfield & Sugarman, 2000).

Using palpation of pedal pulses to assess PVD in diabetes is problematic. Outcomes of this assessment are very dependent upon the skill of the clinician and the unique anatomy of each individual. Factors such as variability in the presence and location of lower extremity

arteries, calcification of vessels, and altered sensation may influence assessment findings. It has, however, been shown that absence of both pedal pulses (dorsalis pedis and posterior tibialis) may be associated with the presence of PVD. A positive history of lower limb intermittent claudication combined with non-palpable pedal pulses bilaterally increases the likelihood of identifying PVD in diabetes (Boyko et al., 1997).

The ankle-brachial index (ABI), or ratio of blood pressure in the lower extremity to blood pressure in the arm, may be the best clinical measure of reduced circulation and is strongly associated with impaired lower extremity wound healing and amputation. An ABI of  $< 0.8$  has been reported to be up to 95% sensitive and 100% specific in detecting PVD (Boyko et al., 1999). Findings can be confounded by the presence of arterial calcification.

Since measurement of ABI is not a part of usual clinical practice for most nurses, and the outcome of this assessment by individuals with varying experience will differ significantly, it has not been included as a routine assessment technique in this guideline. Appropriately trained and experienced nurses may, however, wish to include it as part of their assessment of foot ulcer risk.

### **Self-care behaviour and knowledge**

There is evidence to support the value of assessing the self-care behaviour and knowledge of people with diabetes. Evidence points to greater problems, such as “3.2 increased risk of amputation” (Mason et al., 1999b, p. 802) where there is lack of foot care and foot care knowledge. On the other hand, foot care education is linked with increased foot care knowledge, foot care behaviours (CDA, 1998; Hutchinson et al., 2000; NZGG, 2000; Valk et al., 2002) and reduced amputation risk (Reiber, Pecoraro & Koepsell, 1992).

Refer to Appendix C for an example of a Risk Assessment Algorithm.



### **Recommendation • 3.0**

**Based on assessment of risk factors, clients should be classified as “lower” or “higher” risk for foot ulceration/ amputation. (Level IV)**

#### **Discussion of Evidence:**

The presence of one or more risk factors, including:

- A history of previous foot ulceration;
- Loss of protective sensation;
- Structural or biomechanical abnormalities;
- Evidence of impaired circulation; and
- Deficit in self-care behaviour

are consistently associated with increase in foot ulceration and lower extremity amputation in individuals with diabetes (Hutchinson et al., 2000; NHS Centre For Reviews and Dissemination, 1999).

The literature suggests that individuals who are aware of and practice risk-reducing self-care may be less likely to experience negative outcomes, even in the presence of other risk factors. Likewise, individuals who have other risk factors and have not received the education required to initiate preventative foot care may be at increased risk for incurring a traumatic pivotal event leading to foot ulceration (ADA, 1999; CDA, 1998; Mason et al., 1999a; NHS Centre For Reviews and Dissemination, 1999; NZGG, 2000).

A sample of a diabetes foot assessment/risk screening guide developed for use by nurses to assess for the five risk factors of previous foot ulceration, loss of protective sensation, structural or biomechanical abnormalities, impaired circulation and deficit in self-care behaviours is provided in Appendix D. Other, more complex risk assessment tools, such as the University of Texas Diabetic Foot Classification system, have been developed and may be appropriate for use in some practice settings (Armstrong, Lavery & Harkless, 1998).

#### Recommendation • 4.0

All people with diabetes should receive basic foot care education. *(Level Ib)*

#### Recommendation • 4.1

Foot care education should be provided to all clients with diabetes and reinforced at least annually. *(Level IV)*

(ADA, 2001; Apelqvist et al., 2000; Diabetes Education Study Group of the European Association for the Study of Diabetes, 1995; Hutchinson et al., 2000; ICSI, 2000; Zangaro & Hull, 1999)

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#### Discussion of Evidence:

Evidence supports educational intervention for improvement in foot care knowledge and behaviour in the short term for people with diabetes (Hutchinson, et al., 2000; Valk, 2002). There is additional evidence to support that people with diabetes who are at higher risk for foot ulceration significantly benefit from education and regular reinforcement of that education (ADA, 2001; CDA, 1998, 2003; Mason et al., 1999a; NHS Centre for Reviews and Dissemination, 1999; NZGG, 2000;).

The value of education is unclear for long-term prevention of foot ulceration in people with diabetes. Reiber et al. (1992) demonstrated a three-fold increased amputation risk for those people with diabetes who had NOT received formal diabetes education, suggesting significant prevention is possible with appropriate teaching strategies. Nurses are well positioned to monitor risk status and provide and/or reinforce basic foot care education, as they are the single largest group of health professionals, working in a range of settings. They may act as the primary diabetes foot care educator, or as a link between clients and their primary care providers or specialized diabetes care teams.

#### Recommendation • 5.0

Nurses in all practice settings should provide or reinforce basic foot care education, as appropriate. *(Level IV)*



### Recommendation • 5.1

The basic foot care education for people with diabetes should include the following six elements:

- Awareness of personal risk factors;
- Importance of at least annual inspection of feet by a health care professional;
- Daily self inspection of feet;
- Proper nail and skin care;
- Injury prevention; and
- When to seek help or specialized referral.

*(Level IV)*

### Recommendation • 5.2

Education should be tailored to client's current knowledge, individual needs, and risk factors. Principles of adult learning must be used. *(Level IV)*

### Discussion of Evidence:

As visible care providers across the continuum, nurses are in a unique position to promote the maintenance of healthy feet, identify problems in the early stages, positively influence self-care practices, and refer higher risk individuals for care. Health promotion, client empowerment and facilitation of effective self-care through education are essential elements of nursing.

There is evidence that diabetes self-care behaviours influence blood glucose control. Improved glycemic control will delay or prevent diabetes-related complications that contribute to peripheral neuropathies and reduced lower extremity circulation (Diabetes Control and Complications Trial Research Group, 1993; Gerstein, Hanna, Rowe, Leiter & Macgregor, 2001). Nursing interventions include educational strategies to support positive diabetes self-care behaviours and promote optimal glycemic control.

Educational strategies that focus on minimizing risk factors, and that focus on comprehensive diabetes education and specialized foot care have been shown to result in improvements in the condition of the feet (Mason et al., 1999a; Mayfield & Sugarman, 2000; McCabe, Stevenson, & Dolan, 1998; McGill, Molyneaux, Spencer, Heung, & Yue, 1999; Mensing et al., 2001; NHS Centre for Reviews and Dissemination, 1999). Although education seems to have short term positive impact on foot care knowledge and patient behaviour, it is uncertain whether it can prevent foot ulceration and

amputation, and further research is needed to clarify the impact of patient education on ulcer incidence and whether education has different effects for individuals with different levels of risk (Valk et al., 2002).

Several clinical practice guidelines and various studies and technical reviews identify common content for inclusion in the basic foot care education program. These common components include:

- Awareness of personal risk factors;
- Value of annual inspection of feet by a health care professional;
- Daily self inspection of feet;
- Proper nail and skin care;
- Injury prevention; and
- When to seek help or specialized referral.

(ADA, 2001; Apelqvist et al., 2000; CDA, 1998; Diabetes Education Study Group of the European Association for the Study of Diabetes, 2001; ICSI, 2000; NZGG, 2000; Pinzur, Slovenkai & Trepman, 1999)

The education of clients should be in keeping with the principles of adult learning from a client-centred approach (Glasgow, 1999). The sensitivity of the nurse to socioeconomic, cultural, psycho-social, and other individual domains should be carefully considered in planning all interventions. Personal attitudes and beliefs, level of literacy, age and physical condition will all influence the individual's ability to carry out the recommended regimen (American Association of Diabetes Educators, 1999; Canadian Diabetes Association – Diabetes Educator Section, 2000). Diabetes education should be interactive, solution focused and based on the experiences of the learner, as well as staged and tailored to meet individual needs and abilities. Group education and sustained, long-term follow-up have both been shown to enhance knowledge and produce positive outcomes (CDA, 2003). Refer to Appendix I for details regarding evidence supporting content for diabetes foot care education.

### **Recommendation • 6.0**

**Individuals assessed as being at “higher risk” for foot ulcer/amputation should be advised of their risk status and referred to their primary care provider for additional assessment or to specialized diabetes or foot care treatment and education teams as appropriate.**

*(Level IV)*

Possible sources of information on specialized diabetes or foot care treatment include the following:

- Diabetes Educator;
- Multidisciplinary team specializing in diabetes;
- Podiatrist, Chiropodist, or other foot care specialists trained in the care of the diabetic foot;
- Canadian Diabetes Association; and
- Diabetes Education Centres.

## **Discussion of Evidence**

As a complex, chronic disorder with major short- and long-term health implications, diabetes demands daily commitment from the client in order to achieve optimal health. An interdisciplinary diabetes team should be familiar with care, and supportive in facilitating the skill, knowledge and attitudinal development necessary for the client to attain effective self-care management (CDA, 1998, 2003).

Clients with “higher risk” feet will need assessment procedures (e.g., arterial perfusion), treatment (e.g., medication therapy) or education (e.g., for special orthotics or footwear) that may be beyond the scope of nursing practice. A person with diabetes who develops a foot ulcer requires treatment by experienced health care professionals with expertise in diabetes foot care. Nurses may communicate specific findings to their clients, but should take care not to exceed the scope of nursing practice by communicating a diagnosis.

## *Education Recommendations*

### **Recommendation • 7.0**

**Nurses need knowledge and skills in the following areas in order to competently assess a client’s risk for foot ulcers and provide the required education and referral:**

- **Skills in conducting an assessment of the five risk factors;**
- **Knowledge and skill in educating clients; and**
- **Knowledge of sources of local referral.**

*(Level IV)*

## Recommendation • 8.0

**Educational institutions should incorporate the RNAO Nursing Best Practice Guideline *Reducing Foot Complications for People with Diabetes* into basic nursing education curriculum as well as provide continuing education programs in this topic area. (Level IV)**

### Discussion of Evidence:

Nurses are in a key position for assessment and early intervention in reducing foot complications for people with diabetes. If nurses are to prevent foot ulcers, they need to be knowledgeable about the risk factors for foot ulceration, have skills in the use of tools that support early assessment to enable implementation of preventive strategies (Neil, Knuckey & Tanenberg, 2003) and be knowledgeable of the resources within their community for referral. In addition, nurses need to be skilled in educating clients, and responding to their unique needs.

Please note where resources have been provided in the appendices of this document to support nurses in this role:

### Skills in conducting an assessment of the five risk factors

- Risk Assessment Algorithm – Appendix C
- Diabetes Foot Assessment/Risk Screening Guide – Appendix D
- History or presence of previous foot ulcers
- Sensation – Appendix E
- Structural and biomechanical abnormalities – Appendix F
- Circulation – Appendix G
- Self-care behaviour and knowledge – Appendix H

### Knowledge and skill in educating clients

- Knowledge of adult learning principles – Appendix J
- Knowledge and skill in diabetic education and client empowerment

### Knowledge of sources of local referral

- Knowledge and scope of diabetes education/care resources – Appendix K
- Awareness of the Diabetes Education Centres programs and services of the Canadian Diabetes Association

## Organization & Policy Recommendations

### Recommendation • 9.0

Organizations should develop a policy that acknowledges and designates human and fiscal resources to support nursing's role in assessment, education, and referral of clients for appropriate foot care. It is the organization's responsibility to advocate with policy makers and develop policy that facilitates implementation. *(Level IV)*

### Recommendation • 10.0

Organizations should ensure that resources for implementation are available to clients and staff. Examples of such resources include policies and procedures, documentation forms, educational materials, referral processes, workload hours, and monofilaments. *(Level IV)*

### Recommendation • 11.0

Organizations should work with community partners to develop a process to facilitate client referral and access to local diabetes resources and health professionals with specialized knowledge in diabetes foot care. *(Level IV)*

### Recommendation • 12.0

Organizations are encouraged to establish or identify a multidisciplinary, inter-agency team comprised of interested and knowledgeable persons to address and monitor quality improvement in diabetes foot complication prevention. *(Level IV)*

### Recommendation • 13.0

Organizations should consult an infection control team to define appropriate care, maintenance, and replacement of the Semmes-Weinstein monofilament. Such a process may include setting up a protocol for the appropriate maintenance and replacement of the monofilaments. *(Level IV)*

#### Recommendation • 14.0

Organizations should advocate for strategies and funding to assist clients to obtain appropriate footwear and specialized diabetes education. For example, the inclusion of funding support through the Assistive Devices Program (ADP) for appropriate footwear and orthotics. *(Level IV)*

#### Recommendation • 15.0

Organizations should advocate for an increase in the availability and accessibility of diabetes care and education services for all residents of Ontario. *(Level IV)*

#### Recommendation • 16.0

Nursing best practice guidelines can be successfully implemented only where there are adequate planning, resources, organizational and administrative support, as well as appropriate facilitation. Organizations may wish to develop a plan for implementation that includes:

- An assessment of organizational readiness and barriers to education.
- Involvement of all members (whether in a direct or indirect supportive function) who will contribute to the implementation process.
- Dedication of a qualified individual to provide the support needed for the education and implementation process.
- Ongoing opportunities for discussion and education to reinforce the importance of best practices.
- Opportunities for reflection on personal and organizational experience in implementing guidelines.

*(Level IV)*

In this regard, RNAO (through a panel of nurses, researchers and administrators) has developed the *Toolkit: Implementation of Clinical Practice Guidelines* based on available evidence, theoretical perspectives, and consensus. The *Toolkit* is recommended for guiding the implementation of the RNAO guideline *Reducing Foot Complications for People with Diabetes*.

### Discussion of Evidence

In order to achieve optimal outcomes for individuals with diabetes, diabetes care should be organized around a multi- and interdisciplinary diabetes health care team that can establish and sustain a communication network between the person with diabetes and the necessary

health care and community systems. Both the organization and delivery of diabetes care should be comprehensive, according to evidence-based clinical practice guidelines, equitable in access and continuous throughout a person's lifetime. Where possible, diabetes programs and services should be culturally appropriate, community based and respectful of age, gender and socioeconomic conditions (CDA, 2003). Organizations have a role to play in advocating for and facilitating access to diabetes care and educational services (ICES, 2003).

Graham et al. (2002) indicate that in order for guidelines to be implemented successfully, a critical initial step must be the formal adoption of the guidelines by the organization. One way this may be accomplished is by incorporating guideline recommendations into the policy and procedure structure. This key step provides direction regarding the expectations of the organization, and facilitates integration of the guideline into such systems as the quality management process. The Canadian Diabetes Association (2003) indicates that a key organizational intervention for successful diabetes control is the availability of reminders and recall systems for diabetes metabolic control and complications risk assessment. This should include specific clinical tools such as clinical flow charts and documentation tools.

New initiatives such as the implementation of a best practice guideline require strong leadership from nurses who are able to transform the evidence-based recommendations into useful tools that will assist in directing practice. It is suggested that the RNAO *Toolkit* (2002) be considered to assist organizations develop the leadership required for successful implementation. Refer to Appendix M for a description of the RNAO *Toolkit: Implementation of Clinical Practice Guidelines*.

## *Evaluation and Monitoring of Guideline*

Organizations are encouraged to establish or identify a multidisciplinary, inter-agency team comprised of interested and knowledgeable persons to address and monitor quality improvement in diabetes foot complication prevention. As organizations implement the recommendations in this nursing best practice guideline, they are advised to consider how the implementation and its impact will be monitored and evaluated. The following table, based on the framework outlined in the RNAO *Toolkit: Implementation of Clinical Practice Guidelines* (2002), summarizes some suggested indicators for monitoring and evaluation.

## Reducing Foot Complications for People with Diabetes

Level of Indicator	Structure	Process	Outcome
Objectives	To evaluate the supports available in the organization that allow for nurses to implement strategies to reduce foot complications for people with diabetes.	To evaluate changes in practice that lead towards integration of strategies to reduce foot complications for people with diabetes.	To evaluate the impact of implementing the recommendations.
Organization	<p>Availability of patient education resources that are consistent with guideline recommendations.</p> <p>Monofilaments for assessment of feet are available and accessible for use by nurses.</p> <p>Review of guideline recommendations by organizational committee(s) responsible for policies or procedures.</p> <p>Availability of:</p> <ul style="list-style-type: none"> <li>• a steering committee to lead guideline implementation;</li> <li>• unit based champions to support implementation; and</li> <li>• staff educational resources that are consistent with the recommendations.</li> </ul>	<p>Modification to policies and/or procedures consistent with guideline recommendations.</p> <p>Documentation systems available for recording risk assessment results and referral.</p>	<p>Organizational policies exist reflecting a commitment to reducing foot complications for people with diabetes.</p> <p>Organization has a structured process in place to support the implementation of guideline recommendations.</p>
Nurse	Percentage of nurses attending best practice guideline education sessions.	<p>Nurses self-assessed knowledge of:</p> <ul style="list-style-type: none"> <li>• use of monofilament;</li> <li>• five risk factors for foot ulcers; and</li> <li>• good foot care practices.</li> </ul> <p>Percentage of nurses self-reporting:</p> <ul style="list-style-type: none"> <li>• routine use of monofilaments;</li> <li>• adequate knowledge of community referral sources for people with diabetes.</li> </ul>	<p>Percentage of patients reporting regular assessment of their feet.</p> <p>Percentage of patients reporting that a nurse taught them about foot care.</p> <p>Nurse satisfaction with implementation process and management support.</p>
Patient		<p>Percentage of patients with diabetes who had their feet assessed by a nurse.</p> <p>Percentage of patients with diabetes who have an assessment of the five risk factors recorded on their chart.</p>	<p>Percentage of patients accessing referral sources in community.</p> <p>Percentage of diabetic patients who regularly examine their feet.</p> <p>Patients self-assessed degree of confidence about their ability to prevent foot complications</p>
Financial	Provision of adequate financial resources for the level of staffing necessary to implement guideline recommendations.	Cost for education, other interventions, necessary supplies (monofilaments) and supports.	



## *Implementation Tips*

This best practice guideline was implemented and evaluated by a hospital and community care organization in northern Ontario. Four participating medical/oncology hospital units located at two sites in one community participated, as did the diabetic education and care centre, located at a third site. Nurses participating from the community care organization were located in three geographically separate communities. The lessons learned/results of the pilot may be unique to these organizations and may not be generalizable to other practice settings. However, there were many strategies that the pilot sites found helpful during the implementation, and those who are interested in implementing this guideline may consider these strategies or implementation tips. A summary of these strategies follows:

- Have a dedicated person such as a clinical resource nurse who will provide support, clinical expertise and leadership. The individual should have good interpersonal, facilitation and project management skills.
- As part of the implementation of a best practice guideline, organizations should identify champions across the organization, including managers and staff who will provide ongoing support and visibility for implementation and sustainability. Staff turnover is a reality in most organizations and building a sense of shared ownership is one way to minimize the impact of unexpected change.
- Establishment of a steering committee comprised of key stakeholders and members committed to leading the initiative. Organizations implementing the guideline should involve all stakeholders (e.g., nurses, chiropractors, podiatrists, dietitians) who may be affected by the implementation of the recommendations, and maintain communication with them during the implementation.
- Utilize a systematic approach to planning, implementation and evaluation of the guideline initiative. A work plan is helpful to keep track of activities, responsibilities and timelines.
- Organizational support, such as having the structures in place to facilitate the implementation. For example, providing paid time during regular work hours for nurses to attend education sessions and ensuring easy access to the documentation forms and materials needed to implement the guideline recommendations.

- Education sessions that provide a variety of opportunities for learning, such as self-learning packages (for reading prior to the training session), case studies, and posters. In particular, the pilot site found that opportunities for simulated foot assessments among participants were very helpful in applying theory into practice.

In addition to the tips mentioned above, the RNAO has published implementation resources that are available on the website. A *Toolkit* for implementing practice guidelines can be helpful, if used appropriately. A brief description of this *Toolkit* can be found in Appendix M. It is available for free download at [www.rnao.org/bestpractices](http://www.rnao.org/bestpractices). Implementation resources developed by the pilot sites in Sudbury, Ontario are also available on the website to assist individuals and organizations implement this best practice guideline. These resources are specific to these organizations, and have been made available as examples of local adaptation for implementation of the recommendations.



## *Process for Update/Review of Guidelines*

The Registered Nurses Association of Ontario proposes to update the Best Practice Guidelines as follows:

1. Following dissemination, each Best Practice Guideline will be reviewed by a team of specialists (Review Team) in the topic area every three years following the last set of revisions.
2. During the three-year period between development and revision, RNAO Nursing Best Practice Guideline project staff will regularly monitor for new systematic reviews, meta-analysis papers and randomized control trials (RCT) in the field.
3. Based on the results of the monitor, project staff may recommend an earlier revision period. Appropriate consultation with a team, comprised of original panel members and other specialists in the field, will help inform the decision to review and revise the best practice guideline earlier than the three-year milestone.
4. Three months prior to the three year-review milestone, the project staff will commence the planning of the review process as follows:
  - a) Invite specialists in the field to participate in the Review Team. The Review Team will be comprised of members from the original panel as well as other recommended specialists.
  - b) Compilation of feedback received, questions encountered during the dissemination phase, as well as other comments and experiences of implementation sites.
  - c) Compilation of new clinical practice guidelines in the field, systematic reviews, meta-analysis papers, technical reviews and randomized controlled trial research.
  - d) Detailed work plan with target dates for deliverables will be established.
5. The revised guideline will undergo dissemination based on established structures and processes.

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## Appendix A: Search Strategy for Existing Evidence

### STEP 1 – Database Search

An initial database search for existing diabetes guidelines was conducted in early 2001 by an external company that specializes in searches of the literature for health related organizations, researchers, and consultants. A subsequent search of the MEDLINE, Embase, CINAHL databases for articles published from January 1, 1998 to February 28, 2001 was conducted using the following search terms and key words: “diabetes”, “diabetes education”, “self-care”, “self-management”, “practice guideline(s)”, “clinical practice guideline(s)”, “standards”, “consensus statement(s)”, “consensus”, “evidence-based guidelines”, “best practice guidelines”. In addition, a search of the Cochrane Library database for systematic reviews was conducted concurrently using the above search terms.

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### STEP 2 – Internet Search

A metacrawler search engine (metacrawler.com) plus other available information provided by the project team was used to create a list of websites known for publishing or storing clinical practice guidelines. The following sites were searched in early 2001:

- Agency for Healthcare Research and Quality: [www.ahrq.gov](http://www.ahrq.gov)
- Alberta Clinical Practice Guidelines Program:  
[www.amda.ab.ca/general/clinical-practice-guidelines/index.html](http://www.amda.ab.ca/general/clinical-practice-guidelines/index.html)
- American Medical Association: <http://www.ama-assn.org/>
- Best Practice Network [www.best4health.org](http://www.best4health.org)
- British Columbia Council on Clinical Practice Guidelines:  
[www.hlth.gov.bc.ca/msp/protoguide/index.html](http://www.hlth.gov.bc.ca/msp/protoguide/index.html)
- Canadian Centre for Health Evidence: [www.cche.net](http://www.cche.net)
- Canadian Institute for Health Information (CIHI): [www.cihi.ca/index.html](http://www.cihi.ca/index.html)
- Canadian Medical Association Guideline Infobase: [www.cma.ca/eng-index.htm](http://www.cma.ca/eng-index.htm)
- Canadian Task Force on Preventative Health Care: [www.ctfphc.org/](http://www.ctfphc.org/)
- Cancer Care Ontario: [www.cancercare.on.ca](http://www.cancercare.on.ca)
- Centre for Evidence-Based Child Health: <http://www.ich.bpmf.ac.uk/ebm/ebm.htm>
- Centre for Disease Control: [www.cdc.gov](http://www.cdc.gov)

- Centre for Evidence-based Medicine: <http://cebm.jr2.ox.ac.uk/>
- Centre for Evidence-based Mental Health: <http://www.psychiatry.ox.ac.uk/cebmh/>
- Centre for Evidence-based Nursing:  
[www.york.ac.uk/depts/hstd/centres/evidence/ev-intro.htm](http://www.york.ac.uk/depts/hstd/centres/evidence/ev-intro.htm)
- Centre for Health Services Research: [www.nci.ac.uk/chsr/publicn/tools/](http://www.nci.ac.uk/chsr/publicn/tools/)
- Core Library for Evidence-Based Practice: <http://www.shef.ac.uk/~scharr/ir/core.html>
- Clinical Resource Efficiency Support Team (CREST): <http://www.n-i.nhs.uk/crest/index.htm>
- Evidence-based Nursing: <http://www.bmj.com/data/ebn.htm>
- Health Canada: [www.hc-sc.gc.ca](http://www.hc-sc.gc.ca)
- Health Care Evaluation Unit: Health Evidence Application and Linkage Network (HEALNet): <http://healnet.mcmaster.ca/nce>
- Institute for Clinical Evaluative Sciences (ICES): [www.ices.on.ca/](http://www.ices.on.ca/)
- Institute for Clinical Systems Improvement (ICSI): [www.icsi.org](http://www.icsi.org)
- Journal of Evidence-based Medicine: <http://www.bmj.com/data/ebm.htm>
- Monash University, Australia (Centre for Clinical Effectiveness)  
<http://www.med.monash.edu.au/publichealth/cce/evidence/>
- McMaster University EBM site: <http://hiru.hirunet.mcmaster.ca/ebm>
- McMaster Evidence-Based Practice Centre: <http://hiru.mcmaster.ca/epc/>
- Medical Journal of Australia: <http://mja.com.au/public/guides/guides.html>
- Medscape Multispecialty: Practice Guidelines: [www.medscape.com/Home/Topics/multispecialty/directories/dir-MULT.PracticeGuide.html](http://www.medscape.com/Home/Topics/multispecialty/directories/dir-MULT.PracticeGuide.html)
- Medscape Women's Health: [www.medscape.com/Home/Topics/WomensHealth/directories/dir-WH.PracticeGuide.html](http://www.medscape.com/Home/Topics/WomensHealth/directories/dir-WH.PracticeGuide.html)
- National Guideline Clearinghouse: [www.guideline.gov/index.asp](http://www.guideline.gov/index.asp)
- National Library of Medicine: <http://text.nlm.nih.gov/frs/gateway>
- Netting the Evidence: A SchARR Introduction to Evidence-Based Practice on the Internet: [www.shef.ac.uk/uni/academic/](http://www.shef.ac.uk/uni/academic/)
- New Zealand Guideline Group: <http://www.nzgg.org.nz/library.cfm>
- Primary Care Clinical Practice Guideline:  
<http://medicine.ucsf.edu/resources/guidelines/>
- Royal College of Nursing: [www.rcn.org.uk](http://www.rcn.org.uk)
- Royal College of General Practitioners: <http://www.rcgp.org.uk/Sitelis3.asp>
- Scottish Intercollegiate Guidelines Network: [www.show.scot.nhs.uk/sign/home.htm](http://www.show.scot.nhs.uk/sign/home.htm)
- TRIP Database: [www.tripdatabase.com/publications.cfm](http://www.tripdatabase.com/publications.cfm)
- Turning Research into Practice: <http://www.gwent.nhs.gov.uk/trip/>
- University of California: [www.library.ucla.edu/libraries/biomed/cdd/clinprac.htm](http://www.library.ucla.edu/libraries/biomed/cdd/clinprac.htm)
- [www.ish.ox.au/guidelines/index.html](http://www.ish.ox.au/guidelines/index.html)

One individual searched each of these sites. The presence or absence of guidelines was noted for each site searched – at times it was indicated that the website did not house a guideline but re-directed to another website or source for guideline retrieval. A full version of the document was retrieved for all guidelines.

### STEP 3 – Hand Search/Panel Contributions

Panel members were asked to review personal archives to identify guidelines not previously identified. In a rare instance, a guideline was identified by panel members and not found through the database or Internet search. These guidelines were developed by local groups and had not been published to date. Results of this strategy revealed no additional clinical practice guidelines.

### STEP 4 – Core Screening Criteria

This search method revealed 16 guidelines, several systematic reviews and numerous articles related to diabetes education. The final step in determining whether the clinical practice guideline would be critically appraised was to apply the following criteria,

- Guideline was in English;
- Guideline was dated 1998 or later;
- Guideline was strictly about the topic area;
- Guideline was evidence-based, e.g., contained references, description of evidence, sources of evidence; and
- Guideline was available and accessible for retrieval.



## Results of the Search Strategy

The results of the search strategy and the decision to critically appraise are itemized below.

### TITLE OF THE PRACTICE GUIDELINE RETRIEVED AND TO BE CRITICALLY APPRAISED

American Association of Clinical Endocrinologists (2000). The American Association of Clinical Endocrinologists medical guidelines for the management of diabetes mellitus: The AACE system of intensive diabetes self-management – 2000 update. *Endocrine Practice*, 6(1), 42-83.

American Diabetes Association (2001). Clinical practice recommendations 2001. *Diabetes Care*, 24(Suppl.1), S1-133.

Canadian Diabetes Association (1998). 1998 clinical practice guidelines for the management of diabetes in Canada. *Canadian Medical Association Journal*, 159(Suppl. 8), S1-S29.

Canadian Diabetes Association (2001). Guidelines for the nutritional management of diabetes mellitus in the new millennium. *Canadian Journal of Diabetes Care*, 23(3), 56-59.

Hutchinson, A. et al. (2000). *Clinical guidelines and evidence review for type 2 diabetes: Prevention and management of foot problems*. [Online]. Available: [www.rcgp.org.uk/rcgp/clinspec/guidelines/diabetes/index.asp](http://www.rcgp.org.uk/rcgp/clinspec/guidelines/diabetes/index.asp)

Institute For Clinical Systems Improvement (2000). *Health care guideline: Management of type 2 diabetes mellitus*. [Online]. Available: [www.icsi.org](http://www.icsi.org)

New Zealand Guidelines Group (2000). *Primary care guidelines for the management of core aspects of diabetes care*. [Online]. Available: <http://www.nzgg.org.nz/library.cfm>

Pinzur, S. M., Slovenkai, P. M., & Trepman, E. (1999). Guidelines for diabetic foot care. *American Orthopaedic Foot and Ankle Society*, 20(11), 695-701.

## *Appendix B: Glossary of Terms*

### **Ankle Brachial Index (ABI) or Ankle Brachial Pressure Index (ABPI):**

A ratio between the ankle systolic blood pressure and the brachial systolic blood pressure. This ratio gives an indication of arterial perfusion to the lower extremities. The normal value is a ratio of greater or equal to 1 (Sumner, 1998).  $ABI = \text{ankle systolic blood pressure} / \text{brachial systolic blood pressure}$ .

**Callus:** A thickened area of the epidermis due to increased keratin production caused by chronic direct pressure or continuous shearing stress, resulting from foot deformity or poorly-fitting shoes. A callus may form a central core or plug of tissue where pressure is greatest.

**Charcot's Foot or Joint:** There are two phases in the development of Charcot's foot. The acute Charcot foot is hot, swollen and red. Chronic Charcot foot refers to the constellation of foot deformities that may include cocked up toes, herniated metatarsal fat pads, fractures and rocker bottom sole. The chronic Charcot foot may result from previous acute changes or from longstanding motor neuropathy.

**Chiropodist:** A chiropodist provides assessment of the foot and the treatment and prevention of diseases or disorders of the foot by therapeutic, orthotic and palliative means (Ontario Society of Chiropodists, 2001).

**Claw/Hammer Toe:** Deformed toes that remain flexed during weight bearing. Interphalangeal joints are flexed, drawing the toes into a claw-like position.

**Corn:** Corns, like calluses, develop from an accumulation of dead skin cells on the foot, forming thick, hardened areas, usually on the tops, sides or tips of the toes. They contain a cone-shaped core whose point can press on the nerves below, causing pain.

**Diabetes Educator:** A health care professional who has mastered the core of knowledge and skills in biological and social sciences, communication, counselling, and education and is actively engaged in the education of clients with diabetes. The role of the diabetes educator can be assumed by various health care professionals, including, but not limited to, nurses, registered dietitians, pharmacists, physicians, social workers, mental health professionals, podiatrists, and exercise physiologists. A goal for all diabetes educators should be certification. Certification is the recognized standard for mastery.

**Diabetes Education Centre:** A centre where individuals with diabetes can go to obtain education related to diabetes self-care. Diabetes education centres are often associated with a hospital or community health centre, and are staffed by an interdisciplinary team of health professionals who collaborate with each other and with clients to provide self-management education, in a group and/or individual format.

**Foot Care Nurse:** A nurse who has received formal, specialized theoretical and practical training in non-invasive care of the feet. This training should include assessing the feet, care of the high and low risk individual, nail care, skin care and appropriate health teaching.

**Foot Ulcer:** A non-surgical partial or full thickness break in the skin of the foot that may extend to the subarticular tissue, tendon, muscle, bone or joint.

**Hallux Valgus (Bunion):** A bony abnormality at the first metatarsophalangeal joint which causes the great toe to angle towards the lateral aspect of the foot.

**Insensate Foot:** see Protective Sensation, Loss of

**Intermittent Claudication:** Pain in the calf that develops with walking or on exertion and is relieved by rest within 10 minutes.

**Monofilament:** A nylon fibre several centimetres long embedded in a handle and utilized to assess the presence of protective sensation. The monofilament 10g/5.07 is calibrated to bend when 10 grams of force is exerted on the surface of the skin.



**Peripheral Neuropathy:** Nerve damage through vascular, autoimmune, or biochemical mechanisms. All nerve types may be affected, including sensory, motor, and autonomic nerve function, but the loss of the sensory signals poses the greatest threat to the limb. The most common form of peripheral neuropathy in diabetes is distal symmetric polyneuropathy (DSPN), often described as a stocking-glove neuropathy, which affects the longest nerves first and progresses proximally.

**Pivotal Traumatic Event:** Trauma that precipitates ulcer formation. This may only be a minor tissue injury.

**Podiatrist:** A Doctor of Podiatric Medicine (D.P.M.) is a specialist in care of the feet. Podiatrists are concerned with the examination, diagnosis and prevention of foot disorders by mechanical, surgical and other means of treatment (Ontario Podiatric Medical Association, 2001).

**Protective Sensation, Loss of:** Loss of protective sensation may include any or all of the following: loss of sensation of pain, heat or cold (thermal) or pressure (sharp or dull). This absence of sensation on the plantar surface of the foot may be detected at one or more identified sites using the Semmes-Weinstein monofilament.

**Recurrent Foot Wound:** Any tissue breakdown at the same site of a previous ulcer that occurs more than 30 days from the time of original healing.



# Appendix C: Risk Assessment Algorithm

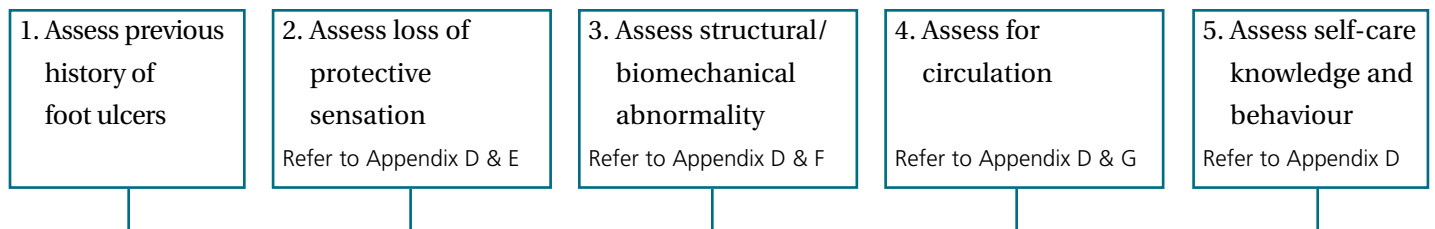
## Foot Care Risk Reduction Guideline

For all persons with diabetes over age 15 years (excluding women with gestational diabetes). Consider when best initiated for the individual, given priority within current issues and appropriateness of education on this issue at this time.

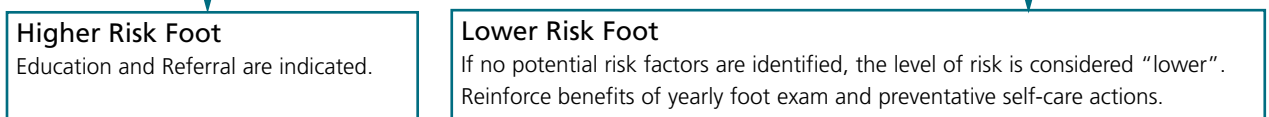
**Assessment of the five factors most strongly correlated with risk of foot ulcer/amputation should be performed at least annually.**

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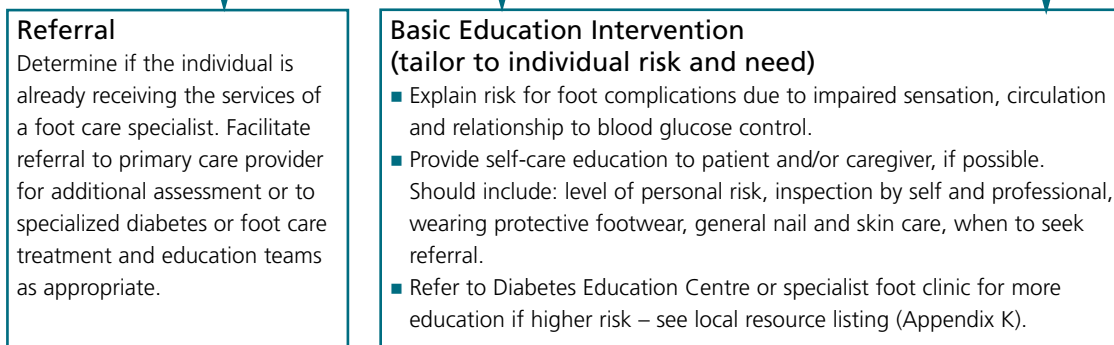
### 1. ASSESSMENT



### 2. IDENTIFY LEVEL OF RISK Refer to Appendix D



### 3. INTERVENTION



## Appendix D: Diabetes Foot Assessment/Risk Screening Guide

Use this guide to assess presence of potential risk factors for future foot ulceration and amputation. Examine both feet and inquire about client self-care practices.

Risk Factors	Yes	No
1. Foot ulcer (a wound that took > 2 weeks to heal) now or in the past.		
2. Loss of sensation at <u>any</u> one site (determined after testing the 4 sites: great toe, first, third, and fifth metatarsal heads using the 10 gram/5.07 monofilament).		
3. Callus present on soles of feet or toes or abnormal foot shape (e.g., claw or hammer toes, bunion, obvious bony prominence, Charcot's foot or joint).		
4. Pedal pulses (dorsalis pedis or posterior tibial) <u>not</u> palpable by nurse <u>and</u> positive history of lower limb pain on exertion that is relieved with rest.		
5. Client <u>unable</u> to see the bottom of feet and/or <u>unable</u> to reach the bottom of feet and does <u>not</u> have someone who has been taught to perform appropriate foot care/inspection.		
6. Poor fitting footwear (shoes too narrow or short, no toe protection, rough or worn interior, uneven wear on sole or heel).		
7. Client <b>has not</b> received foot care education before.		
8. Client <b>does not</b> check condition of feet most days, e.g., ask "How do you know if you have a reddened area or other problem with your feet?" or "How often do you check your feet?".		
9. Client <b>does not</b> report foot problems to health care provider, e.g., ask, "What would you do if you found a blister on your foot?".		
10. Client <b>does not</b> take steps to reduce risk of injury, e.g., ask if client walks bare foot in/outdoors, checks for foreign objects in shoes before wearing them, checks water temperature before entering a bath, etc.		
<b>"Lower Risk"</b> If client answers <b>NO</b> to any items 1-4, they are at "lower risk".	<b>"Higher Risk"</b> If the client answers <b>YES</b> to any items 1-4, they are at "higher risk".	
If the client answers YES to any items 5-10, this indicates a self-care knowledge deficit and opportunity to enhance self-care knowledge and behaviour.		

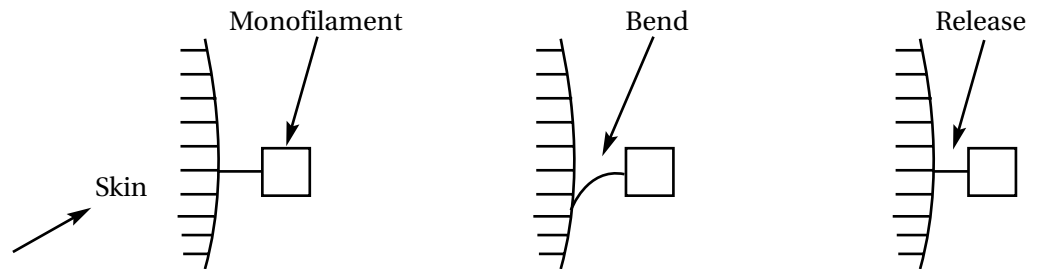
Adapted with permission of: Sharon Brez, RN, BScN, MA(Ed), CDE, Advanced Practice Nurse Endocrinology and Metabolism, The Ottawa Hospital, Ottawa, Ontario.

## Appendix E: Use of the Semmes-Weinstein Monofilament

### Directions for use of Semmes –Weinstein Monofilament

1. Assess integrity of monofilament (no bends/breaks).
2. Show the monofilament to the client. Place the end of the monofilament on his/her hand or arm to show that the testing procedure will not hurt.
3. Ask the client to turn his/her head and close his/her eyes or look at the ceiling.
4. Hold the monofilament perpendicular to the skin.

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5. Place the end of the monofilament on the sole of the foot. Ask the patient to say 'yes' when he/she feels you touching his/her foot with the monofilament. **DO NOT ASK THE PATIENT, "did you feel that?"** If the patient does not say 'yes' when you touch a given testing site, continue on to another site. When you have completed the sequence **RETEST** the area(s) where the patient did not feel monofilament.
6. Push the monofilament until it bends, then hold for 1-3 seconds.
7. Lift the monofilament from the skin. Do not brush or slide along the skin.
8. Repeat the sequence randomly at each testing site on the foot (see pictures below).

### Sites on the sole of the foot for monofilament testing

Loss of protective sensation = absent sensation at one or more sites.



## Notes

- Apply only to intact skin. Avoid calluses, ulcerated or scarred areas. DO NOT use a rapid or tapping movement.
- If the monofilament accidentally slides along the skin, retest that area later in the testing sequence.
- Store the monofilament according to the manufacturer’s instructions.
- Clean the monofilament according to agency infection control protocols.

# Appendix F: Structural and Biomechanical Abnormalities

Risk Factor	Assessment
<p>Bony and soft tissue deformities including:</p> <ul style="list-style-type: none"> <li>■ Toe deformities (claw or hammer toes)</li> <li>■ Prominent metatarsal heads with inadequate soft tissue padding</li> <li>■ Hallux valgus (bunions)</li> <li>■ Charcot’s joint (foot warm, swollen, red and painless during active phase)</li> <li>■ Blister</li> <li>■ Callus/Corn</li> <li>■ Fungal infection.</li> </ul>	<ol style="list-style-type: none"> <li>1. Examine feet standing and sitting/lying down with shoes and socks off.</li> <li>2. Examine footwear and teach client regarding appropriate footwear.</li> </ol> <p><b>The key criteria for appropriate footwear include:</b></p> <ul style="list-style-type: none"> <li>■ A wide toe box (1/2" between the tip of the toe and the end of the shoe)</li> <li>■ Sufficient depth</li> <li>■ Good arch support</li> <li>■ Shoe fits without rubbing along any area of the foot.</li> </ul>

## Appendix G: Location and Palpation of Pedal Pulses



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**Dorsalis Pedis:** To palpate pulse, place fingers just lateral to the extensor tendon of the great toe. If you cannot feel a pulse, move fingers more laterally.



**Posterior Tibial:** To palpate pulse, place fingers behind and slightly below the medial malleolus of the ankle. In an obese or edematous ankle, the pulse may be more difficult to feel.

**Note:** To enhance technique: Assume a comfortable position for you and the client. Place hand in position and linger on the site. Varying pressure may assist in picking up a weak pulsation. Do not confuse client's pulse with your own pulsating fingertips. Use your carotid pulse for comparison, if needed.

## Appendix H: Care Tips for the Feet

***Did you know that having diabetes puts you at risk of developing complications such as foot ulcers?***

### **Yearly exam needed!**

Have a health professional examine your feet at least once a year.  
Find out if you have lower or higher risk feet.

### **Risk Factors for Foot Ulcers:**

- A previous foot ulcer
- Loss of normal feeling in your feet
- Abnormal shaped foot, including calluses, and bunions
- Poor circulation to your feet

***Managing your blood sugar is important for healthy feet – See your healthcare provider! Get complete diabetes education.***

### **Protect your feet – Follow these simple guidelines:**

#### **1. Check your feet daily**

- Look for red areas, blisters or any open area. If you cannot do this yourself, have someone else check for you.
- See your doctor or foot specialist right away if you find a problem!



#### **2. Protect your feet - always wear shoes!**

- Wear shoes that fit well, support your foot and are not too tight. Do not wear shoes that cause reddened or sore areas.
- See a specialist for footwear advice if you have a higher risk foot.



#### **3. Keep your skin clean and soft**

- Wash your feet regularly, but do not soak them. Dry well between your toes. Check that the water is not too hot before putting your feet in it.
- Use unscented creams. Do not put cream between the toes.



#### **4. Don't hurt yourself with nail clippers or razors**

- Cut your nails straight across. Get help to cut your nails, if needed.
- Don't cut calluses. See a local foot care clinic. Many are covered by the Ontario Health Insurance Plan (OHIP).



## Appendix I: Evidence Supporting Content for Diabetes Foot Care Education

Content	CDA, 1998	ADA, 2002	ICSI, 2000	American Family Physicians, 1999
<b>Raise awareness of risk</b>				
All patients should be educated about the risk and prevention of foot problems		X	X	
<b>Monitor to detect problems early</b>				
Inspect feet daily – if at higher risk (HR)	X – and after exercise	X (HR)	X	X
– get help if necessary		X (HR)		
– inspect for redness, dryness, breaks in skin, calluses			X – also bruises, bleeding, and nail problems	X – report swelling, infection (other symptoms) to doctor
– use appropriate first aid: wash cuts, scrapes, blisters gently with soap and water. – Do not break blister.				X – use antibiotic cream several times a day
Seek experienced professional help early:	X – for ulcers – treat any infection aggressively		X – seek care immediately for new foot problems	X – call doctor if cuts, scrapes, blisters do not heal in a few days

(HR) = Higher Risk (LR) = Lower Risk



	DES Group of European Associations, 1995	Apelqvist et al., 2000	New Zealand Guidelines Group, 2000	Pinzur, et al., 1999	Zangaro, 1999
	- that foot care problems are preventable	X - to recognize potential foot problems and take action	X - Type 1 after 5 yrs.; Type 2 at diagnosis		X
	X	X (HR) - including area between toes	X	X (HR)	
	X - if difficult, use a mirror or ask a friend	X	X - with mirror or with help		X - use mirror to see soles of feet
	- corns, infections, colour changes		- if fungus between toes, dry, apply anti-fungal cream		
	X - report skin changes to doctor - if in doubt consult doctor	X - notify health care provider at once if blister, cut, scratch or sore develops	X - report signs of infection or other problems as soon as possible		

## Reducing Foot Complications for People with Diabetes

Content	CDA, 1998	ADA, 2002	ICSI, 2000	American Family Physicians, 1999
Ask doctor (health care provider) to inspect feet at every office visit, at least annually				X
<b>Care for feet properly, including skin and nails</b>				
- keep feet clean		X	X	X
- use warm, not hot, water			X	X - no heating pad or massager
- do not soak (for more than 10 minutes) unless specified by health care practitioner			X	X
- dry thoroughly, including between toes			X	X - use soft towel, blot gently, don't rub
- use moisturizing cream or lotion for dry skin but not between toes				- keep feet smooth, heels especially - use cream, lanolin lotion
<b>Avoid trauma!</b>				
- select proper footwear: well fitting, comfortable shoes and socks	X - for exercise - use protective devices when exercising	X		X - not tight

(HR) = Higher Risk (LR) = Lower Risk

	DES Group of European Associations, 1995	Apelqvist et al., 2000	New Zealand Guidelines Group, 2000	Pinzur, et al., 1999	Zangaro, 1999
	X – mention to the podiatrist that you have diabetes	X	X – part of provider/client contract	X	X
		– ‘regularly’	– if skin dry or cracked	X	X
	X – avoid extremes of temperature	X – always below 37°C	X - test - no heating pads, hot water bottles		X - avoid extremes - check bath water
	– keep clean and dry	X		X	X
	– if skin is very dry – use neutral creams, daily	X – lubricating oils or creams	X	X – avoid dryness – oil, lotion, lanolin cream	X – do not use alcohol
	X – soft	X	– if bunions or calluses present		X – stand, wear socks, measure both feet when buying shoes

## Reducing Foot Complications for People with Diabetes

Content	CDA, 1998	ADA, 2002	ICSI, 2000	American Family Physicians, 1999
<p>Risk category = 0:</p> <ul style="list-style-type: none"> <li>– normal footwear. Avoid narrow forefoot, tight toe box, or tight instep</li> <li>– laced shoes advised</li> </ul>		<p>X</p> <ul style="list-style-type: none"> <li>– advice may benefit LR</li> </ul>		
<ul style="list-style-type: none"> <li>– consider special shoes if foot abnormality or decreased sensation present</li> </ul>				<p>X</p> <ul style="list-style-type: none"> <li>– no sandals, open-toes, high heels, pointed toes</li> </ul>
<ul style="list-style-type: none"> <li>– break in new shoes gradually (to minimize formation of blisters and ulcers)</li> </ul>		<ul style="list-style-type: none"> <li>– advice for person with neuropathy</li> </ul>		<p>X</p> <ul style="list-style-type: none"> <li>– no more than 1 hour daily for several days</li> </ul>
<ul style="list-style-type: none"> <li>– check shoes daily (before putting them on) for objects that may have fallen inside, excessive wear or areas that may cause irritation</li> </ul>			<p>X</p>	<ul style="list-style-type: none"> <li>– look for things like gravel, torn linings that could rub or cause sores</li> </ul>
<ul style="list-style-type: none"> <li>– do not walk barefoot (especially if you have been told you have reduced sensation in your feet)</li> </ul>			<p>X</p> <ul style="list-style-type: none"> <li>– all patients</li> </ul>	<p>X</p> <ul style="list-style-type: none"> <li>– all patients</li> </ul>
<ul style="list-style-type: none"> <li>– cut nails straight across</li> <li>– file until no sharp edges present</li> <li>– if nails are not soft and easy to cut, see a nail care specialist trained in diabetes care</li> </ul>			<ul style="list-style-type: none"> <li>– avoid injuries from cutting toenails</li> </ul>	<p>X</p> <ul style="list-style-type: none"> <li>– to prevent ingrown toenails</li> </ul>
<ul style="list-style-type: none"> <li>– do not cut corns or calluses</li> <li>– consult health care practitioner trained in diabetes care</li> <li>– people with “at risk” feet should receive routine (preventive) podiatry</li> </ul>			<p>X</p>	<p>X</p> <ul style="list-style-type: none"> <li>– no instrument except nail clippers without doctor’s advice</li> </ul>
Do not smoke!	X			X

(HR) = Higher Risk (LR) = Lower Risk

	DES Group of European Associations, 1995	Apelqvist et al., 2000	New Zealand Guidelines Group, 2000	Pinzur, et al., 1999	Zangaro, 1999
				X	– laces advised
					X – no slip-ons or thongs
					X – do not wear any shoes for more than 6hrs
		– inspect and palpate			– stones or bunched up socks
	X – appropriate advice for all	X – in/outdoors	X – or in socks, in/outdoors	X	X – in/outdoors – avoid hot fire, sunburn
	– file don't cut	X – do not treat feet (nails) if visually impaired	– trim to shape of toes – file to remove sharp edges		– use clippers not scissors or razor blade – not too short
	– no sharp instruments on feet – no strong astringent lotions and corn cures	X – leave to health care provider – never use chemical agents or plasters	– file hard calluses with pumice stone – apply moisturizing cream or lotion	– do not use medicine to remove corns or calluses	– smooth with pumice stone – no over the counter remedies on feet
	X		X		

## Appendix J: Resources for Adult Diabetes Education

The following resources for nurses are intended to assist in supporting adult learning approaches, with a particular focus on diabetes education. These are sample resources only, and are not intended to be a comprehensive listing.

### Books and Journal Articles:

Belton, A. & Simpson, N. (2003). *The how to of patient education: A guide and workbook*. Toronto: Belton & Associates.

Knowles, M., Holton, E. & Swanson, R. (1998). *The adult learner: The definitive classic in adult education and human resource development*. 5<sup>th</sup> ed. Houston: Elsevier Science & Technology.

Norris, S., Engelgau, M. & Narayan, K. (2001). Effectiveness of self-management training in type 2 diabetes: A systematic review of randomized controlled trials. *Diabetes Care*, 24(3), 561-587.

Walker, A. E. (1999). Characteristics of the adult learner. *The Diabetes Educator*, 25(6), 16-24.

### Websites:

American Association of Diabetes Educators

<http://www.aadenet.org>

The American Association of Diabetes Educators is a multi-disciplinary professional membership organization. They are dedicated to advancing the practice of diabetes self-management training and care as integral components of health care for persons with diabetes, and lifestyle management for the prevention of diabetes.

Canadian Diabetes Association – Diabetes Educator Section

[http://www.diabetes.ca/Section\\_Professionals/desindex.asp](http://www.diabetes.ca/Section_Professionals/desindex.asp)

The Diabetes Educator Section (DES), a multidisciplinary professional section of the Canadian Diabetes Association, is committed to excellence in diabetes education, through education, service, advocacy and research as they relate to diabetes educators and diabetes education.

## Appendix K: Diabetes Education/Care Resources

Diabetes education may be available in a variety of settings, depending upon your local resources. The best source to readily identify what is available in your community would be to contact the National Office of the Canadian Diabetes Association at:

1-800-BANTING (226-8464) or [www.diabetes.ca](http://www.diabetes.ca)

They maintain a national directory and will be able to provide contact information specific to your community. Then contact your local chapter of the Canadian Diabetes Association for direction to available diabetes education and care resources and support groups. It may be a hospital, Community Health Centre or community visiting agency. Contacting any one of these agencies will then provide you with a list of potential referral points for Specialized Diabetes Foot Care and Education.

National Office, Canadian Diabetes Association 1-800-BANTING (226-8464) or [www.diabetes.ca](http://www.diabetes.ca)

**Local Chapter of the Canadian Diabetes Association** (enter your local numbers below)

1. \_\_\_\_\_
2. \_\_\_\_\_

**Local Diabetes Education Resources.**

**For those in Northern Ontario, go directly to: [www.ndhn.com](http://www.ndhn.com)** (enter your local numbers below)

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_

**Local Diabetes Foot Care Specialists** (enter your local numbers below)

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_

## **Internet Resources – Education:**

[www.diabetesontario.org](http://www.diabetesontario.org)

The provincial Diabetes Ontario Website (provided by the Northern Diabetes Health Network, a not-for-profit publicly funded organization) is a resource for people with diabetes across the province. The Registry of Programs offers valuable information about the diabetes education and management programs that are funded by or through the Ministry of Health and Long-Term Care by providing details about the services of each program and how they can be accessed. It is hoped that this Registry of Programs will make it easier for people affected by diabetes to access diabetes education and management services as close to home as possible.

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Diabetes Ontario is also a professional resource for diabetes educators and other team members across the province by facilitating access to information such as newsletters, a resource clearinghouse, an educator directory and employment opportunities. These unique professional development opportunities will support diabetes educators to provide the best care possible for their clients across the province of Ontario.



[www.canadian-health-network.ca](http://www.canadian-health-network.ca)

The Canadian Health Network is a national, non-profit, bilingual, web-based health information service. The Canadian Health Network's goal is to help Canadians find the information they're looking for on how to stay healthy and prevent disease. This is done through a unique collaboration – one of the most dynamic and comprehensive networks anywhere in the world. This network of health information providers includes Health Canada and national and provincial/territorial non-profit organizations, as well as universities, hospitals, libraries, and community organizations.

[www.ndep.nih.gov](http://www.ndep.nih.gov)

The National Diabetes Education Program (NDEP) is a partnership of the National Institutes of Health, the Centers for Disease Control and Prevention, and more than 200 public and private organizations. This site links you to: Diabetes Information; Awareness Campaigns and Programs (including “Feet Can Last a Lifetime”); and Improving Diabetes Care.



## *Appendix L: Documentation of Nursing Interventions*

Documentation should be designed to facilitate the recording of nursing assessment, client education, and referral.

### **Foot Risk Assessment**

Consider documentation forms that prompt assessment of the 5 key risk factors identified in this best practice guideline:

- Previous history of foot ulceration;
- Loss of protective sensation;
- Structural and biomechanical abnormalities;
- Impaired lower extremity circulation; and
- Lack of previous foot care education, knowledge or self-care gaps.

The Diabetes Foot Assessment/ Risk Screening Guide (Appendix D) included in this document may be used for this purpose or these elements could be included in nursing history or assessment forms currently used by an organization.

### **Client Education**

Basic foot care education should include the key elements identified below. Topics discussed, client response to teaching, and, if appropriate, the follow-up education plan should be documented in the clients' health care record.

#### **Steps in daily foot inspection and notable findings**

- Daily skin care including bathing, avoidance of soaking, drying, selection and use of lotion for dry skin
- Nail care, including nail cutting
- Selecting well fitting footwear
- Injury prevention including potential risks of walking bare foot, checking bath water temperatures before stepping in, checking shoes for foreign objects and rough spots.

### **Referral**

Documentation should facilitate recording of recommendations made to client/family regarding follow-up assessment, treatment, or self-care education.

## *Appendix M: Description of the Toolkit*

Best practice guidelines can only be successfully implemented if there are: adequate planning, resources, organizational and administrative support as well as appropriate facilitation. In this light, RNAO, through a panel of nurses, researchers and administrators has developed a *Toolkit: Implementation of Clinical Practice Guidelines* based on available evidence, theoretical perspectives, and consensus. The *Toolkit* is recommended for guiding the implementation of any clinical practice guideline in a health care organization.

The *Toolkit* provides step by step directions to individuals and groups involved in planning, coordinating, and facilitating the guideline implementation. Specifically, the *Toolkit* addresses the following key steps in implementing a guideline:

1. Identifying a well-developed, evidence-based clinical practice guideline
2. Identifying, assessing, and engaging stakeholders
3. Assessing environmental readiness for guideline implementation
4. Identifying and planning evidence-based implementation strategies
5. Planning and implementing evaluation
6. Identifying and securing required resources for implementation.

Implementing guidelines in practice that result in successful practice changes and positive clinical impact is a complex undertaking. The *Toolkit* is one key resource for such an undertaking.

The *Toolkit* is available through the Registered Nurses Association of Ontario. The document is available in a bound format for a nominal fee, and is also available free of charge from the RNAO website. For more information, an order form or to download the *Toolkit*, please visit the RNAO website at [www.rnao.org/bestpractices](http://www.rnao.org/bestpractices).



## Review 2007

### Nursing Best Practice Guideline Shaping the future of Nursing

### Reducing Foot Complications for People with Diabetes Guideline supplement

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### Supplement Integration

This supplement to the nursing best practice guideline *Reducing Foot Complications for People with Diabetes* is the result of a scheduled review of the guideline. As part of its commitment to ensure consistency with the best available evidence, the Registered Nurses' Association of Ontario (RNAO) has established a monitoring and review process which involves a full review of each guideline every 3 years.

Foot complications continue to be a major cause of morbidity and disability among people with diabetes (ADA, 2007). Therefore, all nurses, across the continuum of care, have an important role in helping clients understand and reduce their risk for such problems. Importantly, though this guideline addresses nursing care specifically related to the reduction of foot complications, these recommendations should be considered as part of the holistic approach that is required to promote the health and well-being of the individual with diabetes. Such an approach may involve further interventions including, for example,

health teaching regarding glycemic control, promoting physical activity and smoking cessation, and providing other self-management support interventions.

### Review Process

A panel of specialists was assembled for this review, comprised of members from the original development panel as well as other recommended individuals with particular expertise in this practice area. A structured evidence review based on the scope of the original guideline was conducted to capture relevant literature and other guidelines published since the original literature search. Initial findings regarding the impact of the current evidence base on the guideline were developed and circulated to the review panel. The review panel members were given a mandate to review the original guideline in light of the new evidence, specifically to ensure the validity, appropriateness and safety of the guideline recommendations as published in 2004. In August 2007, the panel was convened for a teleconference to achieve consensus on the impact of this new evidence on the existing recommendations.



## Review of Existing Guidelines

One individual searched an established list of websites for guidelines and other relevant content. This list was compiled based on existing knowledge of evidence-based practice websites and recommendations from the literature. Twelve international guidelines were critically appraised using the *Appraisal of Guidelines for Research and Evaluation (AGREE) Instrument*. From this review, two guidelines were identified to inform the review process and were circulated to all review panel members:

National Collaborating Centre for Primary Care. (2004). Clinical Guideline 10: Type 2 diabetes: Prevention and management of foot problems. London: National Institute for Clinical Excellence.

New Zealand Guidelines Group (NZGG). (2003). Management of type 2 diabetes. Wellington: New Zealand Guidelines Group.

## Literature Review

Concurrent with the review of existing guidelines, a search for recent literature relevant to the scope of the guideline was conducted with guidance from the Review Chair. The search of electronic databases, including CINAHL, Medline and EMBASE, was conducted by a health sciences librarian. A Master's prepared nurse conducted the inclusion/exclusion review, quality appraisal and data extraction of the retrieved studies, and summarized the literature findings. The comprehensive data tables and reference lists were provided to all panel members.

A summary of the evidence review is provided in the flow chart below.

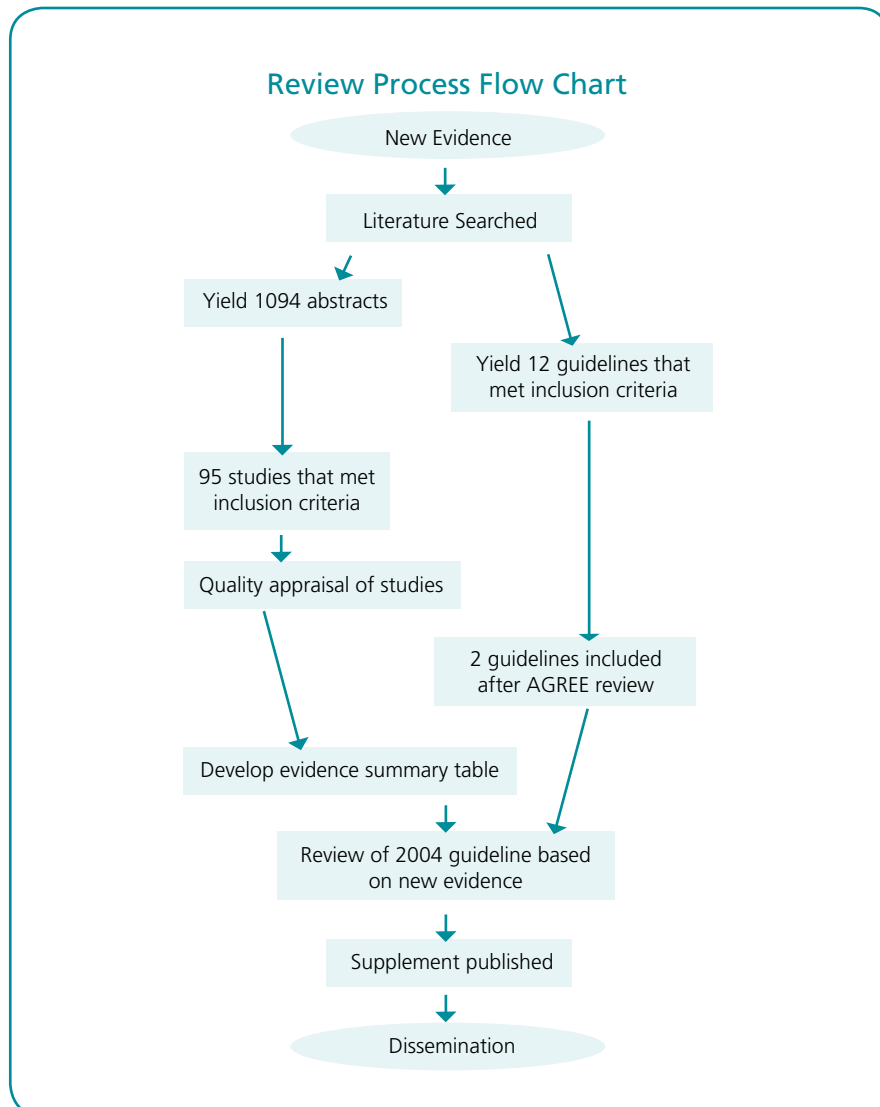
## Panel Review

After a review of the current evidence, it was the consensus of the panel that no substantive

changes to the recommendations were required. However, one revision was made to Appendix D: Diabetes Foot Assessment/ Risk Screening Guide based on an error noted in the original publication. The updated version of this appendix can be found on page three of this supplement. New implementation tools that were identified by the panel during this review process are available on the RNAO website at [www.rnao.org/bestpractices](http://www.rnao.org/bestpractices).

## Summary

A review of the most recent studies and relevant guidelines published since the development of the guideline *Reducing Foot Complications for People with Diabetes* does not support the need for change to the recommendations, but rather suggests stronger evidence for our approach to caring for those with diabetes.



# Appendix D: Diabetes Foot Ulcer Risk Assessment



Use this guide to assess presence of potential risk factors for future foot amputation and ulceration. Examine both feet and inquire about patient self-care practices.

RISK FACTORS		YES	NO
1. Foot Ulcer (a wound that took > 2 weeks to heal) now or in the past			
2. Loss of sensation at any one site (determined after testing the 4 sites: great toe, first, third and fifth metatarsal heads using the 10 gram/5.07 monofilament)			
3. Callus present on soles of feet or toes or abnormal foot shape (e.g. claw or hammer toes, bunion, obvious bony prominence, Charcots's foot or joint)			
4. Pedal pulses (dorsalis pedis or posterior tibial) not palpable by nurse and positive history of lower limb pain on exertion that is relieved with rest. (claudication)			
<b>RISK STATUS (mark status with an X)</b>			
<b>Lower Risk</b> If NO to all items 1-4	<b>If Higher Risk</b> If YES to any items 1-4		
SELF-CARE PRACTICES		YES	NO
5. Patient able to see and reach bottom of feet or has helper who has been taught to perform appropriate foot care/inspection.			
6. Patient has well fitting footwear (adequate length with no rough interior.)			
7. Patient has received foot care education before.			
8. Patient checks condition of feet most days e.g. ask "How do you know if you have a reddened area or other problem with your feet? or "How often do you check your feet?"			
9. Patient reports foot problems to health care provider e.g. ask "What would you do if you found a blister or sore on your foot?"			
10. Patient takes steps to reduce risk of injury e.g. ask if client walks bare foot out or indoors, checks for foreign objects in shoes before wearing them, checks water temperature before entering a bath etc.			

If the patient answers NO to any items 5 - 10, this indicates a self-care knowledge deficit and opportunity to enhance self-care knowledge and behaviour.

Referrals \_\_\_\_\_

Assessor _____	Date: (yyyy/mm/dd): _____
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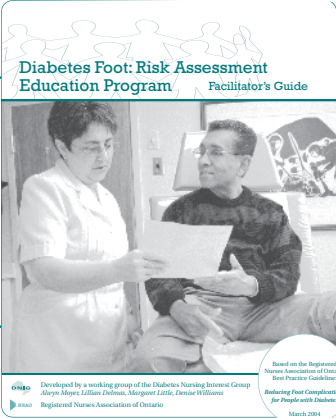
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**Diabetes Foot: Risk Assessment Education Program**  
Facilitator's Guide

For implementation resources developed to support the uptake of this guideline, please visit the RNAO website at [www.RNAO.org/bestpractices](http://www.RNAO.org/bestpractices)

Based on the Registered Nurses Association of Ontario Best Practice Guidelines: Reducing Foot Complications for People with Diabetes  
March 2004



















## Review 2007

### Nursing Best Practice Guideline Shaping the future of Nursing

### Reducing Foot Complications for People with Diabetes Guideline supplement

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### Supplement Integration

This supplement to the nursing best practice guideline *Reducing Foot Complications for People with Diabetes* is the result of a scheduled review of the guideline. As part of its commitment to ensure consistency with the best available evidence, the Registered Nurses' Association of Ontario (RNAO) has established a monitoring and review process which involves a full review of each guideline every 3 years.

Foot complications continue to be a major cause of morbidity and disability among people with diabetes (ADA, 2007). Therefore, all nurses, across the continuum of care, have an important role in helping clients understand and reduce their risk for such problems. Importantly, though this guideline addresses nursing care specifically related to the reduction of foot complications, these recommendations should be considered as part of the holistic approach that is required to promote the health and well-being of the individual with diabetes. Such an approach may involve further interventions including, for example,

health teaching regarding glycemic control, promoting physical activity and smoking cessation, and providing other self-management support interventions.

### Review Process

A panel of specialists was assembled for this review, comprised of members from the original development panel as well as other recommended individuals with particular expertise in this practice area. A structured evidence review based on the scope of the original guideline was conducted to capture relevant literature and other guidelines published since the original literature search. Initial findings regarding the impact of the current evidence base on the guideline were developed and circulated to the review panel. The review panel members were given a mandate to review the original guideline in light of the new evidence, specifically to ensure the validity, appropriateness and safety of the guideline recommendations as published in 2004. In August 2007, the panel was convened for a teleconference to achieve consensus on the impact of this new evidence on the existing recommendations.



## Review of Existing Guidelines

One individual searched an established list of websites for guidelines and other relevant content. This list was compiled based on existing knowledge of evidence-based practice websites and recommendations from the literature. Twelve international guidelines were critically appraised using the *Appraisal of Guidelines for Research and Evaluation (AGREE) Instrument*. From this review, two guidelines were identified to inform the review process and were circulated to all review panel members:

National Collaborating Centre for Primary Care. (2004). Clinical Guideline 10: Type 2 diabetes: Prevention and management of foot problems. London: National Institute for Clinical Excellence.

New Zealand Guidelines Group (NZGG). (2003). Management of type 2 diabetes. Wellington: New Zealand Guidelines Group.

## Literature Review

Concurrent with the review of existing guidelines, a search for recent literature relevant to the scope of the guideline was conducted with guidance from the Review Chair. The search of electronic databases, including CINAHL, Medline and EMBASE, was conducted by a health sciences librarian. A Master's prepared nurse conducted the inclusion/exclusion review, quality appraisal and data extraction of the retrieved studies, and summarized the literature findings. The comprehensive data tables and reference lists were provided to all panel members.

A summary of the evidence review is provided in the flow chart below.

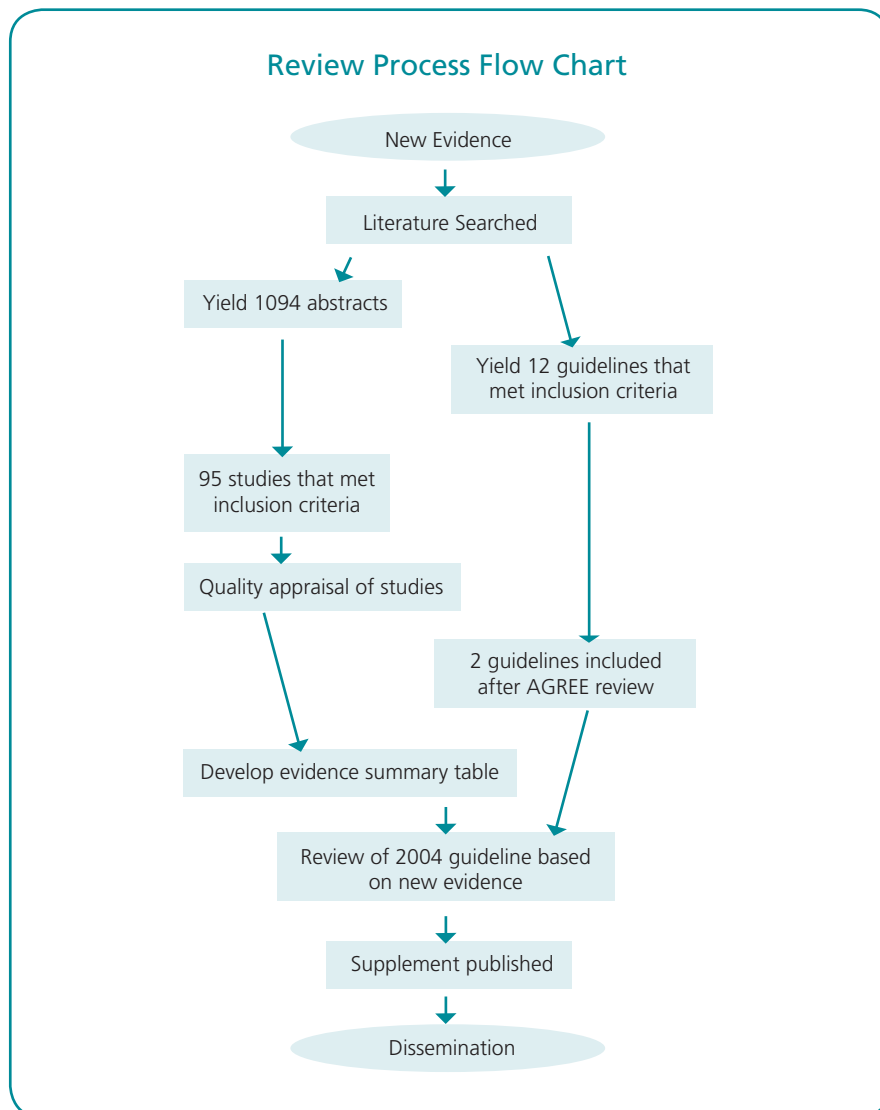
## Panel Review

After a review of the current evidence, it was the consensus of the panel that no

substantive changes to the recommendations were required. However, one revision was made to Appendix D: Diabetes Foot Assessment/Risk Screening Guide based on an error noted in the original publication. The updated version of this appendix and new implementation tools that were identified by the panel during the review process are available on the RNAO website at [www.rnao.org/bestpractices](http://www.rnao.org/bestpractices).

## Summary

A review of the most recent studies and relevant guidelines published since the development of the guideline *Reducing Foot Complications for People with Diabetes* does not support the need for change to the recommendations, but rather suggests stronger evidence for our approach to caring for those with diabetes.



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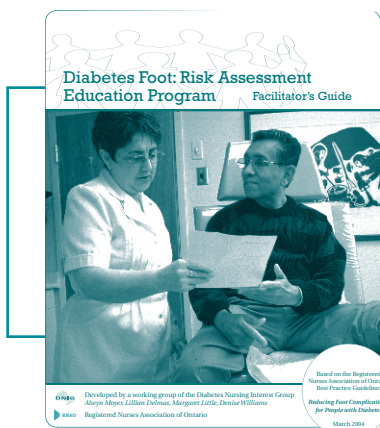
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For implementation resources developed to support the uptake of this guideline, please visit the RNAO website at [www.rnao.org/bestpractices](http://www.rnao.org/bestpractices)

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