ENHANCED LOWER EXTREMITY AND FOOT ASSESSMENT WITH RECOMMENDATIONS FOR TEACHING

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Enhanced Lower Extremity and Foot Assessment with Recommendations for Teaching

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Abstract

Lower extremity and foot assessment leads to early intervention for potentially disabling disorders. At-risk diabetic populations experienced 54,000 non-traumatic amputations (Centers for Disease Control (CDC), 1995); an estimated 50-75% could be avoided with early recognition and treatment. A key component in maintaining mobility is the promotion of regular foot care, prevention of lower extremity injuries and prompt intervention for complications. The advanced practice nurse (APN) is in a unique position to identify, document and manage assessment findings critical in determining optimal patient outcomes. The purpose of this project is to create an educative product (assessment tool and Web site) utilizing the APN's knowledge base and professional expertise; individually mapping areas for concentrated future learning. Additionally, the development and use of the Enhanced Foot Assessment Tool ensures continuity with each assessment. A teaching-learning model is the framework for this project, encouraging APNs to enrich their professional knowledge base specific to lower extremity and foot care; developing the link between theory and practice. Future implications include increasing awareness among APNs of the importance of lower extremity and foot care, standardized documentation for measurable patient outcomes, and potential for research.

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From Margie: To Dan, M.O.E.P., thank you for your unconditional love and support. I couldn't have done this without you! To Nello and Assunta Procaccini, parents who were great teachers. Lastly, my nursing mentors, Dorothea Milbrandt, Dorothy Linau-Mirkil, and Pat Hays.

From Wendy: To Bob, Ben and Tanner, thank you for the years of understanding and love. You always come first.

From Margie and Wendy: The duality of this project is pure and simple: the left and right hand meet in symmetry.

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Introduction

A key component in maintaining physical independence is the promotion of regular foot care and the prevention of potentially debilitating foot injury or loss of function. Early detection and management of foot injury can effect a difference between limb-threatening complications and a return to full potential. Healthy feet are a prerequisite for balance and stable ambulation. Immobility can be considered a strong risk factor in predicting systematic diminution of physical and psychological health.

Concomitant illness may attack the integrity of foot tissues and underlying structures. Accelerated atherosclerosis of the diabetic cardiovascular system, diabetic retinopathy and sensory polyneuropathy all contribute to a higher risk of poor tissue perfusion, trauma, ulceration, gangrene and lower extremity amputation for the diabetic patient. The National Institutes of Health estimated the prevalence of diabetes in the United States in 1995 at 16 million individuals. Diabetes mellitus, complications notwithstanding, ranks as the 7th most common principal diagnosis requiring patients to be seen by their primary care provider (Ostergaard & Schmittling, 1997).

Alarming statistics for lower extremity amputations reveal that 50-70% of all non-traumatic lower extremity amputations involve diabetic patients (Ahroni, 1993); the

Centers for Disease Control (CDC) reports 54,000 such procedures are performed yearly (1995). Through early detection and treatment, the CDC estimated that half of these lower extremity amputations are preventable. Recommendations by both The American Diabetes Association (ADA, 1996) and the CDC include an examination of the feet of diabetic patients by the primary care provider at every visit.

Prevalent Foot Problems .

Onychomycosis represents 50% of all nail disease and the most difficult to treat of all skin mycoses (Elewski, 1996). Fungal infections of the toenails are almost always caused by a dermatophyte fungi, with distal and lateral subungual onychomycosis being the most common (Roberts, 1993). These molds, and occasionally yeast, infect an already diseased or traumatized nail. Arterial circulatory disorders, peripheral nerve disease, disturbances of the venous and lymphatic drainage systems, as well as chronic paronychia are common predisposing factors (Haneke, 1991). Onychomycosis may cause disturbances in nail growth with loosening or separation of all or part of the nail plate from the nail bed at the free edge (Helfand, 1989). Anti-fungal drug treatments remain difficult to accomplish because predisposing factors are usually not amenable to therapy. Patience, combined with optimal patient

compliance, are mediators. A high recurrence rate is estimated at 80-90% (Haneke, 1991).

A survey of 813 bunionectomies revealed that 94% involved females (Conkling, 1994). Medical costs and associated time off work are estimated at $3.5 billion per year (American Academy of Orthopaedic Surgeons & the National Shoe Retailers Association, 1995).

Changes Associated with Aging

The process of normal aging inherently involves adaptation to change. Physical challenges are observed in every organ during the lifespan continuum. The epidermis of the skin thins, and the dermis decreases in elasticity and vascularity. Nails become brittle, with a 30-50% slower growth rate. Slowed cell reproduction and repair, coupled with a diminished immune response sets the stage for delayed healing of trauma or ulceration. The pumping ability of the heart slows and venous return is delayed. Increased systolic blood pressure interfaces with added vascular resistance at the cellular level, precipitating foot edema, impaired sensation, and a diminished response to pedal insult.

Bony landmarks become more prominent as subcutaneous fat decreases in the periphery. Joints develop increased potential for stiffness, deformity, inflammation and pain. Muscular changes create slowed movement and reflexes diminish. Neurologically, decreased proprioception and

impaired balance may result in gait disturbances or imbalance. Potential implications exist for impaired mobility, loss of function, injury from falls and concurrent decreased independence.

Advanced Practice Nurse Implications

Many nurses possess limited assessment skills and minimal clinical expertise in dealing with lower extremity care. Many are unaware that foot care is within the scope of nursing practice. However, foot care is an integral part of optimal health maintenance and, historically, a missed nursing opportunity. Clearly, the value of a standardized tool for lower extremity assessment and care by nurses should not be minimized. Indeed, the ability to differentiate normal changes from pathological threat and detection of problems followed by initiation of appropriate care and ongoing patient education is integral to nursing and the promotion of health.

The value of the advanced practice nurse (APN) in providing expert knowledge, coupled with empirically informed decision making skills, enables the APN to function in a number of roles. As a facilitator, the APN may coordinate teaching-learning opportunities that enhance reciprocal learning. The role of the APN in primary care is multidimensional. The American Nurses' Association's (ANA)

former Council of Nurses in Advanced Practice defines the APN (as cited in Hickey, Ouimette, & Venegoni, 1990):

> Nurses in advanced clinical practice have a graduate degree in nursing. They conduct comprehensive health assessments, demonstrate a high level of autonomy and expert skill in the diagnosis and treatment of complex responses of individuals, families, and communities to actual or potential health problems. They formulate clinical decision to manage acute and chronic illness and promote wellness. Nurses in advanced practice integrate education, research, management, leadership, and consultation into their clinical role and function in collegial relationships with nursing peers, physicians and others who influence the health environment (p. 22).

This definition clearly illustrates the multidimensional roles of the APN with concrete applications for lower extremity assessment.

Scope of Project

The purpose of this scholarly project is to establish an enhanced lower extremity and foot assessment tool that may be utilized in a variety of nurse-managed settings such as ambulatory primary care, subacute or extended care, parish nursing clinics, or applied in advanced nursing education and research. Traditional orientation materials

will be augmented by the creation of a World Wide Web (WWW) site utilizing an interactive format and use of digitized photographs of common foot disorders and abnormalities. Traditional roles of the APN will be expanded to explore the possibilities of an approach that is intrapreneurial in foot care. The conceptual framework that guides this project is the teaching-learning model, which adapts well to the adult learner.

Conceptual Framework

The framework upon which this project is based is grounded by the principles of teaching-learning theory. All teaching-learning events consist of five elements (Clark, 1987). These elements, as depicted in Figure 1, consist of characteristics of adult learners, the characteristics of the facilitator, contextual factors, teaching-learning theories, and teaching techniques and methods.

Historically, instruction has been defined as the methods, approaches, and techniques used by teachers to influence intellectual, physical and emotional behaviors in a desired direction (Gronlund, 1971). It has also been postulated that members of a professional discipline are prone to develop learning styles that reflect the predominant learning patterns and demands of their discipline (Kolb, 1984).

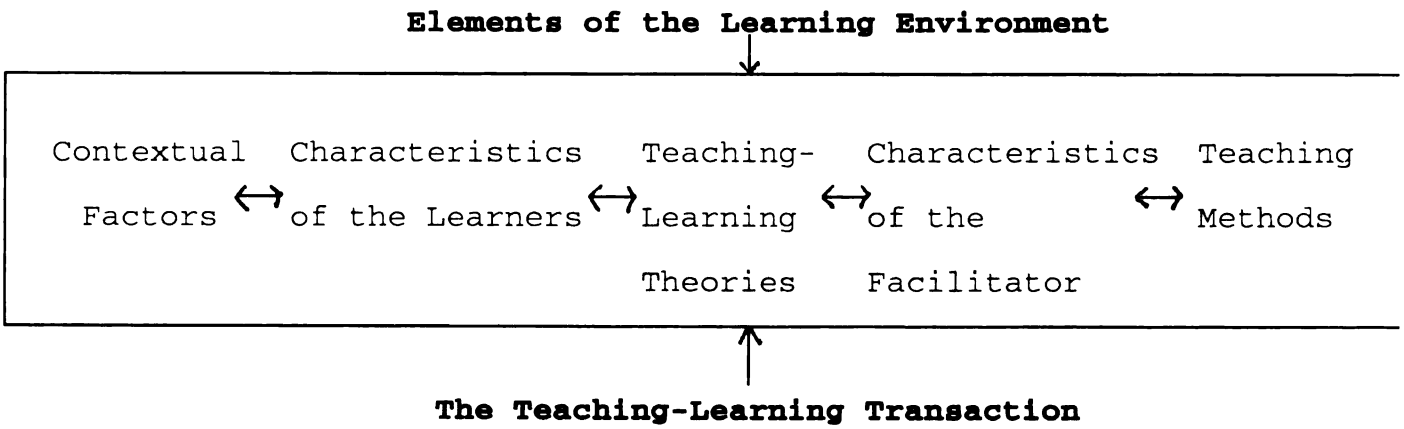

Figure 1. The Teaching-Learning Event (Clark, 1987)

Successful functioning in nursing was thought to be based on positive negotiation of required competencies, aligned with a predominantly concrete learning style (Christiansen, 1979; Merritt, 1983). Concrete approaches to learning rely on experience and active experimentation, producing a task-oriented individual who learns primarily by trial and error (Goldrick, 1993).

Highfield's study in 1988 stated that, of 54 nursing students, the predominant learning styles (46%) were abstract, with use of assimilation and convergence. Participants were non-traditional nursing students, with a mean age of 28. Reflective observation and inductive organization of the material was observed. Laschinger and Boss (1983) identified increased use of abstract learning in baccalaureate nursing students versus diploma students.

In a study of 303 critical care nurses, operating room nurses and infection control practitioners, 64% had an abstract learning style and preferred a self-directed, discovery approach to learning. Identified preferred strategies included live demonstrations, clinical practice, case studies, simulations, computer-assisted instruction and student-led seminars. The use of reason and logic, the testing of theories and ideas, analyzing of quantitative data and the design of experiments were all suggested components of a maximized teaching-learning strategy (Goldrick, Gruendemann & Larson, 1993).

Developing links between theory and practice promotes conceptual understanding, development of reasoning skills and self-directed learning strategies (Barrows, 1985). A constructivist philosophy focuses on the learner's existing knowledge base as a basis for conceptual change (Creedy, Hand, & Horsfall, 1992). The adoption of a teaching-learning model specific to nursing education reflects both constructivist philosophy and Mezirow's (1991) theory of adult education. Unlike the "invariant age-related steps and stages" of growth and development in children, the missing dimension of meaning is recognized as integral with the learning process of adults.

Piaget (1973) refers to what is 'known' as being constructed by the knower in the process of adapting one's

experiences to the reality of the environment. Piaget postulates that either the minor negotiation of assimilation (filtering experiences in accordance with what is already known) or accommodation occurs. Accommodation reflects an imbalance between experiences and one's current level of understanding. This state of imbalance precipitates new cognitive construction. A major difference between experts and novices, identified by Creedy et al. (1992), reflects that experts are able to organize their knowledge; thus it can be used efficiently and effectively.

Teaching-learning strategies utilized in nursing education may vary in form, but these authors believe that basic delineators are universally present. Just as Leininger (1988) defines culture as the "learned, shared, and transmitted values, beliefs, norms and lifeway practices of a particular group that guides thinking, decisions and actions in patterned ways" (p. 158); so do nurses define theoretical springboards for their growth and conceptual changes within the scientific discipline of professional nursing.

This suggestion of perspective also complements Mezirow's (1991) theory of perspective transformation, wherein, unexpected events that cannot be understood using prevailing meaning schemata lead to a critique of existing assumptions. Restructuring of "old meaning schemes and

perspectives are brought into consciousness and negated, or they are modified and synthesized with a more insightful new viewpoint" (Mezirow, 1985, p. 24). This transformation, which occurs during the learning process, may be closely intertwined with tension or threat to self-esteem.

Homogeneity among group members, promotion of a mutual sense of trust, a fund of shared information and experiences, and a safe climate for exploration and evaluation of actions and beliefs spur adult risk-taking and learner empowerment (Callin, 1996). "When the focus is placed on process, the learner takes an active role in acquiring and using knowledge" (Marcinek, 1993, p. 14). "Content is essential but varies with the individual learner's need, whereas process remains stable and common to all learners" (p. 15).

Teaching-learning strategies incorporate the learner's acquisition of an integrated body of knowledge with an in-depth assessment of problem-solving and critical thinking skills. Utilization of this reflective approach enhances growth, and allows the student to develop personal and professional skills that transcend the immediacy of the prescribed tutorial. The stimulation of interpretation, correlation, and arrangement of knowledge within one's schemata empowers the individual to transfer learning from a specific setting to a lifelong process.

Philosophic assumptions integral to the teaching learning conceptual model are based on three beliefs: (1) teaching-learning is a process, not a product, (2) the process is implemented in a relationship between experts, (3) communication is the essential element of the process (Leddy, 1998).

Viewed as a process, a special teaching-learning opportunity is represented by the diagram in Figure 2. A teaching-learning module has been created for Enhanced Lower Extremity and Foot Assessment wherein the specific content is not necessarily predetermined in it's entirety, but evolves to become more meaningful to the learner.

This dynamic process is focused within a collaborative relationship between the teacher and the learner. As participation ensues, "learning leads to new action and new problem solving, which enable individuals and systems to continue to learn". (Argyris, 1982, p. 160)

The varied roles of the APN become evident as the teaching learning process is implemented in a relationship between experts. Expert knowledge and organization of subject matter, skill in instructive techniques, and the ability to act as a resource for colleagues augment the association of complex relationships that promote transfer of learning from the classroom to clinical practice. Individualized instruction can provide avenues of positive

feedback. A mutually validating relationship occurs which "links power to the ability to bring about change" (Jacano & Jacano, 1995, p. 21).

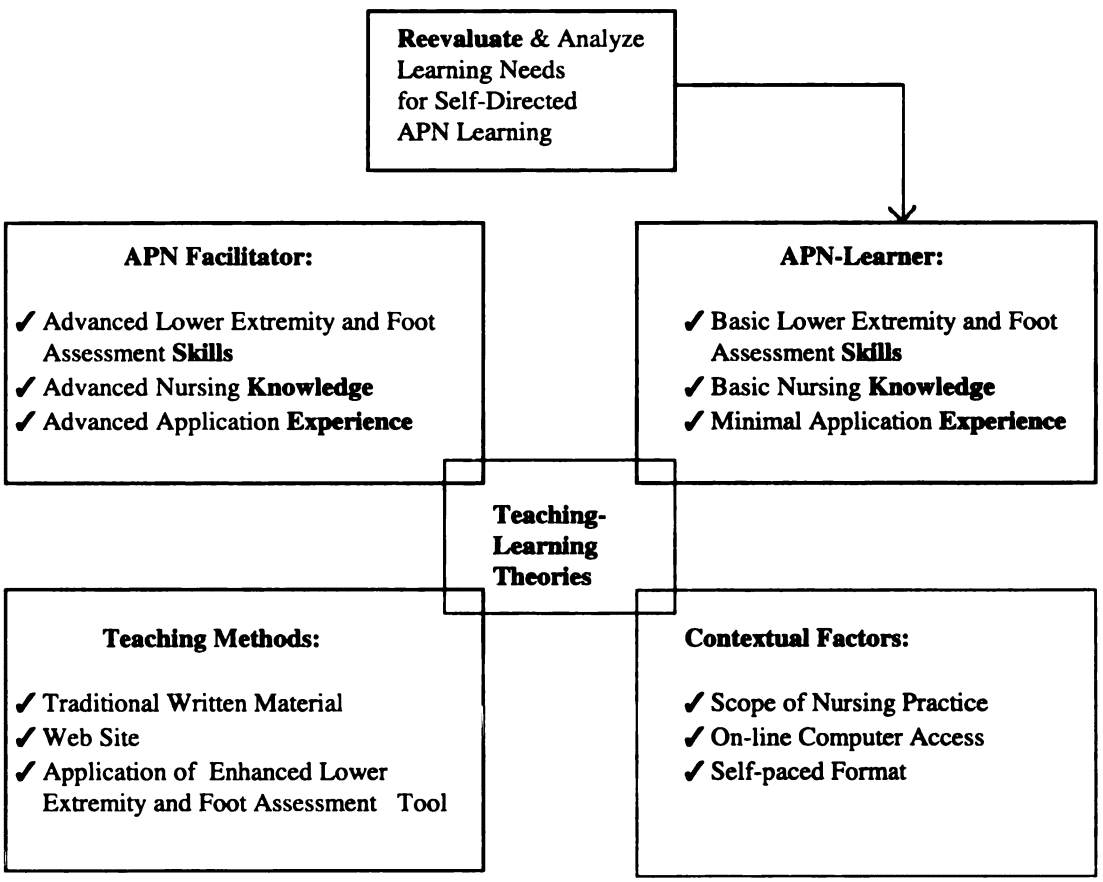

Figure 2. Utilization of Teaching-Learning Model in Enhanced Lower Extremity and Foot Assessment (Clark-Ehnis, 1998)

Communication is considered the essential element for effective teaching-learning. Three characteristics necessary for effective communication are empathy, respect and

genuineness. Only then, is full advantage taken of both parties' expertise, in communication designed to elicit mutual responsibility (Leddy, 1998). The empowerment engendered by this communion provides a framework for creative thinking.

Teaching-learning begins with assessing a point of reference for learning. Identification of the learner's needs is followed by a mutual prioritization. An inclusive plan with measurable objectives delineates the information to be disseminated. Implementation of the plan utilizes creative interpretation and may include all techniques available to enhance learning. The format may be enhanced by such tools as observation and assessment scales, self-directed learning exercises, on-site demonstration, visual images, modeling, 'hands-on' practical experience, on-line (World Wide Web) and CD-ROM references, interpretative discussion, and case scenarios. The documented evaluative tool completes the model allowing for an analysis of the degree of integration of knowledge.

Supportive mutuality permeates the successful teaching-learning experience. As Watson (1988) states, nursing "must shift from oppressive interactions to liberating interactions" (p. 4). This paradigm shift allows learning to be "characterized by anticipatory-participatory behaviors,

shared power, and the absence of separation of doing from knowing and being" (Watson, 1988, p. 2).

In summary, three elements of critical thinking skills, knowledge and experience, are common to both the teacher and the learner. The provider-learner is accountable for evaluating and analyzing the learner's specific learning needs. This self-directed endeavor may be accomplished independently or collaboratively. Internalization of this process allows for unlimited utilization of the teaching protocol, reassessment of learning needs, autonomous functional application and ongoing evaluation.

Review of Literature

This literature review will explore the prevalence, pathophysiology, characteristics and treatment of common foot disorders in the elderly population. Additionally, in acknowledgment of clearly alarming statistics indicating a relationship between diabetes and lower extremity morbidity, lack of requisite adherence by primary care providers to a prescribed regimen of foot assessment and care is discussed.

Skin

The outermost layer of skin, the epidermis, is comprised of five sub-layers and is estimated to be 75 microns to 0.6mm thick, thinning as one ages. This organ's surface layer, or 'horny' stratum corneum, is subjected to daily use and exposure to the environment. An acid mantle,

which retards certain bacterial and fungal proliferation, provides a protective water-repellent covering (Alterescu & Alterescu, 1988).

The innermost layer, the dermis, contains blood and lymphatic vessels, nerves and cellular components such as mast cells, leukocytes, macrophages, and fibroblasts (Alterescu & Alterescu, 1988). The dermis decreases in vascularity, elasticity and defensive ability as an individual ages, leading to a loss of water content and slowing of re-epithelialization.

Decreased circulation to the skin of the appendages results in diminished oxygen and nutrients at the cellular level. Reduced production of sebaceous and sweat glands couples with decreased water storage to produce a rough, scaly texture with decreased skin turgor. Diminished tactile sensation is caused by neurosensory changes; pain or friction to surface tissues may go unrecognized. The aforementioned physiological functional changes categorize the elderly foot as identifiable at high risk for impaired skin integrity (Jaffe, 1991).

Research

No long term skin care studies have examined the effects of patient education on foot care. A hands-on teaching-learning approach was evaluated in a study (n=50) by Kruger and Guthrie (1992) in a diabetic population over a

6 month period. Although the results were inconclusive, positive minimal changes were reported in self-care practices; daily inspection and washing of feet, and trimming toenails related to skin and foot care.

A medically oriented classification tier has been reported by Strauss, Hart, and Wiant (1998) which assigns a grading system, I-IV level, for the evaluation for foot, nail and skin problems. Specified interventions for both physician and patient exist at each grading level. Grade I indicates a moist and well-lubricated skin condition. No interventions are necessary and patients are encouraged to continue good skin care. Grade II shows mild to moderate scaling and dryness. Daily and consistent skin care is stressed. Grade III reveals marked scaling and dryness and office care is begun. A three-step skin care program is initiated with incorporated self-care teaching. Grade IV is characterized by crusts, plaques, and debris. In-office whirlpool, debridement, inception of skin care program, and patient teaching are begun. This documentation has proven to be both reimbursable and practical in preventing further lower extremity and foot complications.

Hyperkeratoses

Structural changes occur simultaneously; the loss of subcutaneous plantar fat pads allows for less tissue insulation and vessel support (Jaffe, 1991). Calluses, or

diffuse areas of thickened skin, may form on bony prominences or any area where soft tissue is exposed to prolonged unrelieved pressure, friction or shear (Kelechi & Lukacs, 1997). Tensile stress may also be a factor in callus formation. Digital deformity, such as toe alignment can cause the head of one phalanx to be compressed against the base of an adjacent metatarsal-phalangeal articulation. The continued pressure may create a hyperkeratotic lesion (Helfand, 1989). The formation of additional layers of skin reflects the body's attempt at a protective mechanism. Calluses may also form under weight bearing areas such as the heel or metatarsal heads. Wearing slippers or ill-fitting shoes that do not have a snug heel counter predisposes an individual to thickened, dry, heel skin (Kelechi & Lukacs, 1997).

Pressure may intensify as the keratin layers build and the cause of the callus is not identified and eradicated. A central nucleus develops and a corn (heloma) is generated. The pressure acts as a foreign body; inflammation is common, and ulceration may occur (Helfand, 1989). Appropriate documentation should be made upon assessment of callus, corn or ulcerous conditions, noting the location, width and estimated depth in centimeters, as well as surrounding redness, dryness or bruising (Dorgan, Birke, Moretto, Patout, & Rehm, 1995).

Advanced practice nurses, implementing standard skin care protocols, debride hyperkeratotic foot lesions with a pumice stone, foot file or rotary tool, followed by application of an emollient. There is little data available comparing the method of intervention, but general parameters include thickness of callus, degree of expertise, and level of associated patient discomfort (Kelechi & Lukacs, 1997). Most calluses cannot be completely removed, but thinning may bring about relief (Kelechi & Lukacs, 1997). A large foot file may be applied in one direction until the skin is smooth and even with the foot surface (Ruscin, Cunningham, & Blaylock, 1993). It is not recommended that patients apply commercial products to aid in corn removal, as the concentrations of acid may produce a second-degree chemical burn (Helfand, 1989).

Insertion of a small foam pad or ring interdigitally may serve to separate the web space occupied by a soft corn and cushion surrounding tissues (Lian, 1992). Used circumferentially, the corn pad will cushion areas of friction and allow relief from direct pressure.

Dryness of the skin, decreased elasticity and keratotic thickening may produce heel fissures, which can extend into the dermis. Assessment of depth, size, drainage and condition of surrounding tissues is imperative (Kelechi & Lukacs, 1997). Recent documentation of acceptable

interventions includes the application of a solid sheet of high-glycerin content hydrogel, which acts both as a cushion, and possesses bacteriostatic and anti-fungal qualities (Kelechi & Lukacs, 1997). Keratolytic compounds, in an emollient cream or lotion base utilize concentrations of urea, alpha-hydroxy acid, lactic acid and salicylic acid to exfoliate (Kelechi & Lukacs, 1997). Application of any petroleum-based barrier moisturizer to soften the skin should be preceded by a moisture-containing product, and be applied 2-4 times per day and after bathing (Kelechi & Lukacs, 1997).

Maceration of the interdigital web spaces may develop from the use of emollients between the toes, the inability to dry feet completely, or friction from lateral pressure of shoes or digital contractures (Kosinski & Ramcharitar, 1994). Lamb's wool or cotton gauze is used to separate and dry the interspace, but should not encircle the digit (Kosinski & Ramcharitar, 1994; Kelechi, 1996; Kelechi & Lukacs, 1996). Patients are to dry between the toes completely, switch to shoes with a roomier toe box and are encouraged not to soak feet (Lian, 1992).

Research

Through an extensive review of the literature, these authors discovered a paucity of research based studies related to hyperkeratoses. In 1995, the Department of

Veteran Affairs conducted a study involving 100 homeless participants (Robbins, Roth, & Villanueva, 1996). The national incidence and prevalence data were consistent; the three most common conditions were nail pathology, corns and calluses, and foot infections (fungal, skin, and warts).

Bony Deformities

Generalized musculoskeletal changes associated with aging include loss of muscle fiber, strength and limitations in mobility. Ligaments become stretched, resulting in joint stiffness and reduced motion. Postural changes include a shift from the hips as the center of gravity, to the chest (Jaffe, 1991). In order to increase stability, the elderly begin to walk with their feet directed outward, which does not follow the design or last of most shoes (Helfand, 1989). This alteration in gait elicits a foot-shoe incompatibility that accentuates pressure points on the feet (Helfand, 1989).

Bunions are the result of a subluxation of the metatarsal-phalangeal (MP) joint of the great toe, creating a lateral angulation that produces pressure from two distinct directions. The MP joint becomes enlarged, and may be reddened and inflamed from friction with a toe-box or instep. Bunions are caused by an inherited joint weakness and/or poorly fitting shoes.

A hammer toe may be caused by lateral derangement of the second toe due to a bunion. This deformity is a combination of extension at the MP joint and flexion at the proximal inter-phalangeal (PIP) joint. Pain results as the plantar muscles tear and soft tissue lesions form from friction at the dorsal PIP joint, with corn development at the tips of the toe and PIP joint (Lian, 1992). Conservative treatment with hammer toe pads, designed to fit over the toe and hold down the PIP joint may be used in conjunction with a roomier, high toe-box shoe (Lian, 1992). The treatment provides symptomatic relief and is not curative.

Research

The American Academy of Orthopaedic Surgeons & the National Shoe Retailers Association (1995) found that women are 9 times more likely than men to develop pain and deformity in their feet; causative factors include poorly fitting shoes, shoes that are too small for the foot, and heels higher than 2 1/4 inches.

Additionally, a survey of 813 bunionectomies revealed that 94% involved females (Conkling, 1994). Medical costs and associated time off work are estimated at $3.5 billion per year (American Academy of Orthopaedic Surgeons & the National Shoe Retailers Association, 1995).

These authors did not find evidence of research based Level 3 intervention studies. This finding supports the need for future exploration.

Footwear and Self-Care Practices

Advance practice nurses should assess footwear for signs of uneven wear, friction, pressure and poor fit. These simple measures are basic to preventive foot care. All footwear should be replaced when worn, and inspected periodically for torn linings or rough edges. Padding may restore neutral functions, and prevent repeated microtrauma of the foot in-patients with degenerative changes (Helfand, 1989). Leather or canvas shoes allow moisture to evaporate, and should be purchased in the afternoon, when the feet are largest. Cotton or wool socks should be worn to absorb moisture and wick it away from the foot. White socks are preferable if lesions exist; entry of dyes into the wound is eliminated (Ruscin et al. 1993). Patients should never go barefoot, thus reducing the risk of penetrative or abrading injury from foreign body (Helfand, 1989).

Feet should be inspected with a mirror every day and twice daily, for patients at high risk for complications. Nurses should assess blisters, sores or cracks in the skin, changes in toenails, skin temperature and color (Ruscin et al. 1993).

Research

Pelican, Barbieri, and Blair (1991) found that most people, including nurses, had strong negative reaction to contact with feet. This negative reaction was especially noted with respect to cutting toenails.

Pock, Frankel, and Shiu (1995) identified that on routine physical examination, the foot is the most neglected part of the body. In fact, the Foundation for Accountability of the Agency of Health Care Policy and Research had a predominantly negative response when diabetic patients were asked whether they recalled taking their shoes and socks off during a recent office visit (FACCT, 1996).

At Risk Diabetic Populations

The diabetic mellitus population is a group at heightened risk for impaired skin integrity and foot and lower extremity trauma. "Diabetes predisposes individuals to amputation primarily because of the presence of peripheral neuropathy and peripheral vascular disease" (Ahroni, 1993). An estimated 1 in every 4 diabetic patients admitted to a hospital has an infected foot lesion, with "the age adjusted rate of lower extremity amputation in the diabetic population 15 times that on the non-diabetic population" (Ahroni, 1993 p. 320). Although foot lesions can arise anywhere that pressure or repeated friction occurs, common hot spots are under plantar calluses, in the toe-nail bed or

in tandem with neuropathic ulcers (Garrison & Campbell, 1993). The sequela of minor trauma, ulceration and eventual failure of a wound to heal occurred in 72% of lower extremity amputations studied (Pecoraro, Reiber, & Burgess, 1990).

Neuropathic ulcers may present as red, warm, painless, circular lesions, surrounded by callus, and located over bony prominences. Deformity, muscle weakness, dry skin and tight shoes have all been implicated as causative (Dorgan et al. 1995).

Autonomic, sensory and motor neuropathies act together to create foot ulceration (Ahroni, 1993). Diabetic impairment of the autonomic nerves causes a reduction in blood flow and glandular activity, resulting in drier skin that is prone to fissures and infection (Garrison & Campbell, 1993). Motor neuropathy leads to muscle weakness and changes in the shape of the foot. "Weaker intrinsic muscles allow flexors to predominate, lesser toes become hammered or clawed. Toe tips may ulcerate" (Ahroni, 1993).

Patients with sensory neuropathy experience progressive insensitivity to pain, pressure and temperature. To test for sensory loss, "the APN applies a 5.07 (10-g) monofilament perpendicular to the skin until it bends, to the count of 1-second touch, 1-second bend, and 1 second lift. Four areas are screened, including the distal fat pad areas of the

great and fifth toes, and the metatarsal head areas below these two toes" (Kelechi & Lukacs, 1996). Eyesight may be impaired by diabetic retinopathy or macular degeneration to the extent that it is not the protective sense of sight, but the foul smell of an infected wound that prompts the patient to seek attention (Garrison & Campbell, 1993).

Disruption of arterial flow from micro and macro angiopathies and atherosclerosis occurs at a heightened rate in the diabetic patient (Jaffe, 1991). Thickening of the capillary walls, restricted blood flow to the site of invading bacteria (typically polymicrobial) and impaired oxygen perfusion at the cellular level combine to evidence as pale, cool extremities with shiny skin and a weak or absent pulse (Garrison & Campbell, 1993). Almost 20% of diabetic patients with palpable pedal pulses have significant small vessel disease (Kosinski & Ramcharitar, 1994). Thus, the APN should check each foot for the presence of dorsalis pedis and posterior tibial pulses, with referral to specialists for absence of pulses. Skin temperature should be checked by feeling both feet simultaneously to compare any 'hot-spots' that may indicate problems. The dorsal surfaces of the hands may be used, with detection of any difference greater than 2 degrees Centigrade both determinable and potentially significant (Dorgan et al. 1995).

Research

Studies indicate a defined need for focused assessment of foot care in diabetics. Plummer and Albert (1996) conducted a study of 308 elders to investigate the prevalence and characteristics of foot problems in diabetic versus non-diabetic populations. They identified 90% of the sample as having inappropriate foot care practices, 47% of non-diabetic participants wearing inappropriate shoes and peripheral vascular diseases increasing with age, irrespective of diabetes. Conclusions that all elderly are at risk for foot-related disease and should be evaluated, educated, and receive specific follow-up were echoed by Evans (1991).

In 1995 Wylie-Rosett, Walker, Shamoon, Engel, Basch and Zybert determined adherence to documented guidelines (CDC, 1995; ADA, 1996) for foot examinations of primary care patients with diabetes in an inner city setting. There was no documentation of foot examination or referral for 58% of the elderly participants over a two-year period. Payne (1989), based on a one-year review, identified that only half of diabetic patients in a Denver clinic had a foot exam by a primary care provider.

In a study of 6 nurse practitioners, Fain & Melkus (1994) found documentation of foot exams in 23% of charts reviewed. Despite lack of written adherence, in a 1989 NIH

survey, over 80% of primary care providers indicated performance of foot, neurological and circulatory exam in diabetic patients one or more times per year. Results of a 1990 study by Hempel suggest that use of a flow sheet in a nurse-managed patient education clinic significantly enhances compliance and documentation to standards in a diabetic population.

Fungal Infections

It has been estimated that fungal (onychomycosis) infections explain 50% of all nail diseases. "There are four major types of fungal nail infections: distal subungual onychomycosis, white superficial onychomycosis, proximal subungual onychomycosis, and *Candida* onychomycosis" (Elewski, 1996, p. S6; Scher, 1983). Causative pathogen and the method of fungal invasion into the nail plate differentiate these types of fungal infections. The literature supports that distal subungual onychomycosis is the most common form of fungus (typically *Tricholphyton rubrum*) invading the distal nail plate and hyponychium (Scher, 1983; Berg, Cantwell, Heudebert, & Sebastian, 1993; Hobday, 1995; Elewski, 1996; Tierney, McPhee & Papadakis, 1997). Dermatophytes, yeasts, and non-dermatophytes molds are the three major groups of fungi that can cause onychomycosis (Hobday, 1995; Elewski, 1996; Lukacs &

Kelechi, 1997). Of these three fungi, the dermatophytes account for the most common pathogens.

Onychomycosis can be visible by changes in the texture, structure, and presentation of one, several, or all nails of the upper and lower extremities. Typically, the nail plate becomes thick and discolored (onychauxis) and the damaged nail becomes brittle, crumbly, and a subungual hyperkeratosis is present with an uplifting of the nail plate (onycholysis). A 'musty' odor may also accompany these findings. Occasionally, the surrounding skin, proximal nail fold, near the fungal nail may be involved (Omura, 1985; Stone, 1989; Hobday, 1995). The proximal nail fold and the two lateral fold makeup the three borders the nail plate. The raised portion of the proximal nail fold is the cuticle. Paronychia is acute pain and swelling associated with a past trauma to the nail, poor nail care, fungal infection (onychomycosis) or an 'in-grown nail' (onychocryptosis) around the lateral nail fold (Berg et al. 1993).

Generally, subungual hyperkeratosis (onycholysis) may be regarded as the most reliable sign of onychomycosis (Scher, 1983). Trauma to nails plays an important role as a precursor to onychomycosis.

Subungual hematoma can be defined as trauma resulting in the collection of reddish-blue blood in the nail bed.

Increased pressure, under the nail plate, causes extreme tenderness on palpation (Berg et al. 1993).

Grossly elongated nails (onychogryphosis) may be a result of poor hygiene or neglect in foot care. Onychogryphosis may result in extreme curvature with a 'hooked' configuration (*gryphos*, meaning 'claw') to the nail (Omura & Rye, 1994).

Research

Summerbell, Kane, and Krajden (1989) reported that of 3000 nails studied, 91% of the fungal infections were caused by dermatophytes. Elewski's (1996) study found nearly the same results and reported 90% of the nail infections were from dermatophytes.

Again, the literature is lacking in documented intervention based studies. Anecdotally, topical Vick's® application has been thought to inhibit growth of fungus in toenails (Michigan State University Nurse Managed Foot Care Clinic, East Lansing Michigan)

Summary of Literature Review

There is a dearth of medically based research applicable to lower extremity and foot care. A thorough literature review was conducted with specific findings enumerated above. There is however, a new approach to foot care, which finds its origins in the scope of nursing practice.

Pelican, Barbieri and Blair (1991) report the inception of a nurse managed well foot care clinic with the development of an assessment tool, instructional videotape and informational brochure. Kelechi and Lukacs (1996), both Master's prepared nurses, recognize foot care as an "integral part of the promotion and maintenance of health" (p. 722). They have implemented a comprehensive lower extremity assessment protocol with nursing interventions, which focus on problems associated with toenails and skin. Patient and caregiver education is complemented by identification of complications that need to be referred to a primary care provider or specialist.

Many nurses possess limited assessment skills and minimal clinical expertise in dealing with lower extremity and foot care. Many are unaware that foot care is within the scope of nursing practice. Some expressed that this type of care was aesthetically unpleasing. "Nurses typically adopt the attitude that this procedure is not considered part of nursing practice" (p. 6-7).

These authors believe nursing care is delivered with the premise of providing holistic care; foot care which includes lower extremity assessment, skin care, and toenail care is an essential component of nursing care. Indeed, the identification of real or potential risk for lower extremity complications, detection of problems followed by initiation

of appropriate care and ongoing client education is integral with nursing and the promotion of health.

The use of standardized documentation provides an avenue for consistent assessment, identifies and tracks patient complications and self-care practices, and allows for follow-up of patient education. "Medical records suggest that even health-care workers do not typically consider the feet as a priority. Edema is often the only consistent documentation." (Pelican, Barbieri, & Blair, 1991, p. 6).

Improved patient outcomes were reported in an intervention study (Hempel, 1990) as a result of utilizing standardized flow sheets for provider documentation of foot care, education, and appropriate referrals.

It is the purpose of this project to develop an Enhanced Lower Extremity and Foot Assessment Tool for APNs in order to improve patient outcomes using the methodology of a standardized tool specific to nursing. Coupled with this intervention, a self-directed teaching-learning module was created; accessed via web site or traditional written material.

Teaching-Learning Project Development

Overview

Acceptance of student autonomy and the creation of educational opportunities, in which metaconceptual inquiry and drive induces learner-generated import of knowledge,

represents significant contextual pedagogic reform. Although APNs share considerable cognitive commonalities, their contextual differences may include level of scientific expertise, differing communities of learners or scope of personal practice, and a divergent research focus.

Implementation of the principles of constructivist teaching allows for anchors of grounded instruction, followed by a focus on the nature of reasoning to enable the learner to construct a new conceptual perspective. Consistency and generalizability of the information presented acknowledges the individual learner's level of adaptation, and the incorporation of viability and independent judgment; producing a fruitful conceptual balance.

Learning is framed in this project as an active, continuous process, which invites application and review. Respect for competency in the Advanced Practice role, coupled with an expectation of vital experience and sense of direction affords a valid and relevant participation in the teaching-learning module.

The teaching format should yield a multivariate impact, interfacing with the learner's experience. Text, embedded with imagery, solicits participant involvement. Content scanning ability constructively focuses on direct implications for practice. A generative model, richly

complex, yet explicit in communicative outline is made possible by transforming educative input into an interactive, computerized translation through use of the World Wide Web (WWW).

Computer Assisted Instruction

Teaching on a web site entails the design of the site, writing of the code (content) in the source language, and loading and executing of the program. The vertical framework in this project maps each topic in a subsystem that first specifies overview, and then examines relevant conditions, with assessment technique or intervention in table format encompassing graphic and discussive review. This process of cueing and probing is mirrored by the horizontal shared borders of the web site, through which one may interface with any number of related foot care aspects. The ultimate goal of this generative module is to energize the learner through the initial capture of overview, one component of the overall process, and facilitate movement through the additional units until each has been internalized.

The use of computer assisted instruction (CAI) as a curricular adjunct has been documented in epidemiological and community health nursing in a baccalaureate population (Russell & Miller, 1994). Conceptual content, calculations and simulations were programmed, allowing students to work at their own pace, repeating full or partial modules as

necessary. Development of CAI in planning and decision making affecting nursing administration found secondary gain in enhanced participant motivation in the search for knowledge via computerized sources (Carmagnani & Cunha, 1995). Computerized modules for uniform nursing documentation of patient education in a diabetic population allowed for measurement of specific educational outcomes (Farris, Stoupa, Mendendall, & Mazzuca, 1994). Proposal of a computerized database through the University of Nebraska Medical Center goes beyond the standardized educational series to include tools for assessing knowledge and self-care behaviors for multiple chronic diseases.

Creation of the Web Site

Enhanced Foot Assessment was developed as a web site to educate nurses in the standardized assessment and delivery of foot care. The site includes text and graphics, is complemented by an assessment tool, Enhanced Lower Extremity and Foot Assessment, and illustrates a simulation of standardized charting.

An International Business Machine (IBM) compatible personal computer with Pentium processor and a factory installed Windows 95 operating system was used to create the site. Text was processed in Microsoft® Word for Windows® (7.0). Images were captured by a Sony 10x digital still camera (Mavica MVC-FD7), with permission to photograph

obtained from all participants. Images were saved as a graphics interchange format (gif) file, and imported into the FrontPage® 98 document, along with the text. All images retain participant anonymity.

The web site was developed using FrontPage® 98 software, which features FrontPage Editor, a tool for creating and editing web pages. In addition, FrontPage Explorer was used for viewing, modifying and administering the site. One benefit of using FrontPage® 98 is that automatic conversion into HTML is accomplished. The assessment tool was scanned for inclusion on a Hewlett Packard 7.0 scanner. Interactive hyperlinks were created, allowing the user to link to additional pages in the web site, as well as access related sites on the Internet.

Ipswitch WS_FTP allows for transference of digital files through the use of a modem, from the personal computer to a local Michnet server for access to Internet services at Michigan State University (MSU). Exploration of the web site may be accomplished by any server, such as Microsoft Internet Explorer.

Michigan State University's computer lab publishes MSU PILOT Electronic Mail (Appendix A) to establish access to a student, employee or customer account, as well as configuring information in Using Terminal Emulation to Dial in to the Internet (Appendix B). These author's student

PILOT account used a - Advanced features to access a - Fix AFS public space (Andrew File System). This function will create a directory called 'public' and set the permissions so anyone can read files there. All files, text and graphics, were transferred to the newly created web site: **http://pilot.msu.edu/~clarkm10/** opening with a home page titled Enhanced Foot Assessment. This location is reached on the WWW via a browser of your choice. Vertical links are provided to the following pages: Role of APN; Normal Foot Structure with links to Supportive Footwear, Normal Nail and Age Related Changes; Skin Integrity; Bony Deformities; Dystrophic Nails; Effects of Diabetes; Foot Assessment with links to Assessment Tool and Step-by-Step; and Related Links.

Standardized Assessment for Lower Extremity and Foot Care

The value of standardized protocol for lower extremity assessment and care by nurses should not be minimized. Foot care is an integral part of optimal health maintenance; and historically a missed opportunity. The use of flow sheets significantly improves the assessment and documentation of foot care (Hempel, 1990). Through the use of standardized assessment tools and consistent documentation, retrospective research studies can provide nursing knowledge in the client

outcomes related to routine foot care and the reduction of complications in high risk populations. Comprehensive assessment should include:

I. Documentation flow sheets

A. Demographic information and current health history

1. Review of recent history, medications and changes
2. Assessment of ADLs, gait, balance, falls and footwear
3. Assessment of feet and lower extremities
   a. Color
   b. Temperature
   c. Varicosities
   d. Edema
   e. Circulation
   f. Capillary refill
   g. Pain
   h. Skin integrity
   i. Bony deformities
4. Nail assessment
   a. Shape
   b. Color variations
   c. Texture
   d. Fungal changes

e. Macerated web space

f. Sensation

g. Skin changes

5. Interventions to include:

a. Soak feet

b. Inspect and dry between toes

c. Nails debrided with orange stick, hyponychial border located, nails trimmed and filed

d. File calluses and corns

e. Lotion massage to feet

f. Apply treatment ointments, if applicable

g. Recommendations, education and referral

6. Completion of documentation form per protocol

7. Narrative note, if applicable

II. Teaching-Learning Module to include

A. World Wide Web site access of interactive teaching material

1. Digital photographs of common foot and nail conditions and bony deformities

2. E-mail feedback from on-line participants

C. On site orientation (area future development)

1. Use of equipment

2. Routine care per visit

3. General guideline for referral

4. Client education at each visit

5. Documentation protocol

The review of the literature supports the components identified in the Enhanced Lower Extremity and Foot Assessment Tool. Foot examination should include review of medications and past medical history, assessing circulation, skin integrity and presence of hyperkeratotic lesions, temperature, nail condition, pain, bony deformities, skin color, edema, varicosities, neurological status, evaluation of footwear, education, and the need for referral.

The importance of client history is imperative to identify at risk populations. Lia van Rijswijk (1998) described at risk populations as client's with a history of diabetes mellitus, smoking, atherosclerosis, deep vein thrombosis, increased age, signs of neuropathy (numbness of pain), limited mobility, coronary artery disease, spinal problems, impaired vision, decreased hand dexterity, decreased hip flexion, obesity, and peripheral vascular disease. These populations exhibit greater need for lower extremity and foot care assessment. Also, through identifying a change in activities of daily living (ADLs) from one visit to another providers may predict actual or potential risk factors (Kelechi, 1996). An Enhanced Lower Extremity and Foot Assessment should include circulation (color, temperature, and palpation of pedal pulses). Observe

for evidence of bony deformities (bunions, hammer toes, or overlapping toes) as well as skin changes (edema, corns, calluses, fissures, lesions, wounds, and maceration). Included in this Enhanced Lower Extremity and Foot Care Assessment Tool (Figure 3) are the examination of toenails for thickness, length, condition, and hygiene. Protective sensation is assessed using a special instrument such as a monofilament (Kelechi, 1996; Kelechi & Lukas, 1997). Lastly, footwear is assessed for appropriateness of fit, wear, and style (North Carolina Medical Society, 1995).

Use of Enhanced Foot Assessment Tool

The following text has a detailed description of 'how to' use the Enhanced Lower Extremity and Foot Assessment Tool. This tool is designed for ease of use; thus, the format of circling or use of a check box format is consistent. Rarely, when 'other' is used, a written description is required. This tool has been developed after a thorough review of the literature relevant to content and design. An example of current practice, which parallels our tool, is reflected in the 1996 Iowa Intervention Project Nursing Intervention Classification (NIC) with the taxonomy 1660 entitled Foot Care (Appendix C). It is these authors intent that the Enhanced Lower Extremity and Foot Assessment Tool will provide succinct documentation for research

analysis and comparative evaluation from visit-to-visit by providing two assessments on one form.

Use of Front Page of Assessment Tool

The front page of the assessment tool (Appendix D) begins with basic demographic information such as client name, date of birth, primary care provider, podiatrist, and a brief past medical history. In addition, a series of questions are asked that focus on activities, which may or may not change from one visit to the next. The questions, simple yes or no, invoke possible changes in ADLs, medications, mobility, purchase of new shoes, visits to primary care provider or a podiatrist that would solicit further investigation. Additionally, with each assessment, current medications are reviewed.

Providers of foot care are generally positioned in front of, and below the client. Typically, the provider sits upon a stool, while the client is seated in a chair; thereby, allowing the client's feet to rest upon the providers lap. With this positioning as a point of reference, this tool has been designed to enhance documentation by clearly labeling right or left, dorsal or ventral, anterior or posterior lower extremity parameters. This format will attempt to decrease the number of documentation errors.

The lower extremities are assessed for color (pale, pink, ruddy, brown, cyanotic, or other), temperature (warm, cool, or other), presence or absence of varicosities (superficial, palpable, tortuous, or other), edema (1+, 2+, 3+, 4+, or other), circulation including the dorsalis pedis and the posterior tibial pulses (0, 1+, 2+, 3+) and capillary refill after blanching, documented in seconds. Presence or absence of pain, coupled with location, is recorded utilizing the Numeric Pain Intensity Scale (0-10). The inclusion of footwear (proper or improper) gives insight as to wear patterns, foot support (orthotic or prosthetic), and sole, fabric, and toe box dimensions. Skin integrity is delineated on a diagram using the first initial of the following descriptive words: moist(M), dry(D), flaky(F), bruised(B), opened(O), scabbed(S), or other. Space has been allocated for selected further documentation and provider signature.

Use of Back Page of Assessment Tool

The back page of the assessment tool (Appendix E) focuses on the foot assessment. The presence or absence (yes or none) of bony deformities are differentiated as bunions, hammer toes, overlapping digits, prominent metatarsal heads, or amputations. If present, the provider will circle the abbreviation for the appropriate digit. Nail shape (incurvated, c-shaped, ingrown, flat, other), nail color

(white, yellow, brown, black, other), nail texture (thick, thin, crumbly, brittle, split, separated nailbed, other), nail fungus (yes or none), and macerated web space is delineated in the same fashion. Sensation may be assessed using a 5.09 monofilament according to the Lower Extremity Amputation Prevention (LEAP) program protocol (Appendix E). Location to be assessed is identified on the diagram by a circle; presence of sensation is denoted by placement of the + symbol in the circle or a - symbol, if applicable. The test consists of one-second landmark touch with a 5.09 monofilament, one second mónofilament bend, and one second release. Next, skin changes of the foot are added to the plantar and dorsal diagrams using the first initial(s) of the descriptors: corn(K), callus(C), pain(P), redness(R), fissure(F), wound(W), scar(S), or wart(Wa). Interventions (soak, trim, file, lotion, massage, other) are documented as yes or no. Recommendations for education or referral include daily hygiene and inspection, drying between the toes, and the opportunity for other education. Space has been allocated for additional comments, if needed. The provider recommends the projected interval for return to clinic visit. Lastly, the provider of care signs the form.

Evaluation of Project

Practice

The format of this scholarly project allows for the establishment of an enhanced foot assessment protocol to be utilized by nursing colleagues who have opportunities to provide foot care. These authors recognize the importance of establishing protocols and guidelines, which provide APNs with standards of care for preventive lower extremity and foot health. Hempel (1990) noted a significant increase in lower extremity examinations (25%) when practitioners utilized an assessment tool.

Education

The Enhanced Lower Extremity and Foot Assessment Protocol includes: access to a self-paced teaching-learning module via the WWW and a documentation tool for practitioners. Through the use of the WWW many convenient opportunities exist; feedback from site authors, ability to hyperlink to related content, and exposure to a visual representation of the variables assessed. Unique to the WWW is the ability to track the numeric counts of visitors to the site.

Research

The Lower Extremity and Enhanced Foot Assessment Tool allows the user to establish a client baseline and monitor any deviations in a consistent manner. Omission of any

variable during documentation on the assessment tool is not likely. The assessment tool requires a response in all categories; including 'not assessed' or 'none'. Each categorical variable has a discreet value. Research tools designed in this fashion have fewer data entry errors and require less data cleaning.

In any observational encounter a degree of discrepancy may exist; as two raters or observers, operating independently, assign relative value to the attribute being evaluated. Measures employed by this project to enhance interrater reliability include: comparative visits aligned on one form, encouraged use of lower extremity and foot photographs, and an opportunity to access visually interpreted variables via the world wide web.

Future Implications

A logical outcome of this teaching-learning protocol is application to applied research; the study of finding a solution to immediate and practical problems. A quantitative, longitudinal, prospective research design would be appropriate. Many Level II questions involving the relationship between or among variables would be possible. A correlational design will explore the relationship between nail thickness and presence of fungus. A comparative design supports or rejects a hypothesis, for example, does the combined use of the teaching-learning module and

documentation tool lead to increased referrals and (or) decreased complications.

These authors challenge advanced practice nurses to reevaluate and analyze their learning needs related to lower extremity and foot assessment. Refinement of assessment skills, nursing knowledge, and past clinical experience strongly suggests a greater probability of selecting interventions, which improve client outcomes.

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MSU Computing Information Center Publication

Quickstart guide to PILOT Electronic Mail

PILOT users can exchange email with other email users on the worldwide Internet. Every MSU student and employee has an account on the PILOT email system. This document describes how to activate and use a PILOT account. Some terms you'll need to know:

CIC: Computing Information Center, 305 Computer Center. Phone 432-6200. The CIC has copies of all the documents and software mentioned here.

MSU identification number: Students use PID. MSU employees use employee ID (ssn). For newly admitted students, your PID was included in your admissions letter. For others, this number is assigned when your application for a PILOT account is processed.

PIN: Students use PAN. (Admissions gives PANs to newly admitted students, usually on a form included with this document). Employees use PIN. Others are assigned a PIN when their PILOT application is processed. If you lost your PIN or PAN, contact the CIC.

MSUnet ID and password: Your network ID and password. These are created when you activate your PILOT account. They are your authorization keys to many network functions, including PILOT email. You can also use PILOT to change your MSUnet password.

What You Need

You need communications software and a computer connected to the Internet. The software must be able to do vt100 terminal emulation. Your Internet connection can be either by modem and phone line or by direct connection. To begin using your account, you also need to activate it. See Activating your account on the page below.

Connecting

In short, connect your computer to the Internet and then telnet to the address *pilot.msu.edu*

There are two ways to connect to the Internet. Either a dial-in connection or a direct connection.

Dial-in Connection

Within Michigan, the Internet and PILOT can be accessed by a local call to a MichNet phone line. See the document *Using a Terminal Program to Dial in to MichNet / MSU.*

If you access the Internet through a commercial service provider such as America Online, contact that provider for help on telnetting to the Internet address *pilot.msu.edu*

Direct Connection

From an off-campus site connected to the Internet

- Telnet to the Internet address: *pilot.msu.edu* (MSU students and employees)
  or
  Telnet to the Internet address: *msualum.msu.edu* (Alumni)

From PC on MSU's Campus Ethernet

- Using DOS and PC/TCP software:
  1. At the C:/> prompt, enter: tn *pilot.msu.edu* (MSU students and employees)
     or
     At the C:/> prompt, enter: tn *msualum.msu.edu* (Alumni)

Using Windows 95:

1. Run the telnet application.
2. Pull down the *Connect* menu and select *Remote System*.
3. Enter one of these host names:
   pilot.msu.edu (MSU students and employees)
   or
   msualum.msu.edu (Alumni)

From Micro Lab PC

1. Use the HD menu to select PILOT (MSU Email System). If necessary, reset the PC to display the HD Menu.
2. Enter one of these host names:
   pilot.msu.edu (MSU students and employees)
   or
   msualum.msu.edu (Alumni)

From Micro Lab Mac or Mac on the Campus Ethernet

1. Open (double click) the NCSA Telnet application. In the microlabs, NCSA Telnet is on the server in the Communications folder.
2. Pull down the File menu. Select *Open Connection*.
3. Enter one of these host names:
   pilot.msu.edu (MSU students and employees)
   or
   msualum.msu.edu (Alumni)

Activating your Account

Before using PILOT you must activate your MSUnet ID and choose a password. To do this you need to identify yourself to PILOT by your MSU identification number and your secret PIN (see definitions

above).

1. Connect to PILOT. When the *login:* prompt displays, enter *pilot*. When asked for a password, press Return (Enter).
2. Read the screens carefully. Enter your MSU identification number and PIN when asked.
3. Enter a secure password when asked. An MSUnet ID will be created. On future logins use this ID and password to enter PILOT.
4. The last activation screen will show your MSUnet ID. Remember your ID and the password you entered in step 3. Your Internet email address using PILOT is one of the following:
   yourMSUnetID@pilot.msu.edu (student or employee account)
   yourMSUnetID@msualum.msu.edu (alumni account)

Using PILOT

Getting On-screen Help

The bottom of most PILOT screens describes how to get on-line help.

Create and Send Mail

1. From the MAIN MENU press *m*
2. From the MAILBOX screen press *m*
3. Enter the email address of the person you are emailing. To send to another PILOT user simply enter their MSUnet ID. (Do ID searches from the MAIN MENU).
4. Enter the subject of your message.
5. Type the body of your message.
6. When done, press the *esc* key, then *1*, then *s*.

Read Mail

1. From the MAIN MENU press *m*.
2. Use the arrow keys to select a message you want to read then press Enter.

Disconnect

Quit PILOT

Always exit via the MAIN MENU. From the MAIN MENU press *q* .

Revised: 17 Feb, 1997 Feedback welcome!

CIC Home Page | | MSU Computer Store | | MSU Microlabs

MSU Computing Information Center Publication

Using Terminal Software to Dial in to MichNet / MSU

This document provides general information on how to use terminal emulation software and a modem to connect to MichNet (within Michigan). For information about access from outside of Michigan, see the section *Out of State.* Popular emulation software is HyperTerm (Windows 95), Z-term (Mac), and Kermit (all platforms).

What you need

You need a computer, modem, phone line, and communications software capable of vt100 terminal emulation. A number of capable commercial and shareware programs are available. Kermit communications software works well and is available free from the Computing Information Center (CIC). See *More Help.*

Configuring your modem and communications software

You may need to consult your modem and software documentation for instructions on how to make the following settings. Kermit, as provided by the CIC, is preconfigured and does not require additional set up.

Modem or software setting	Value you should use
Modem (DCE) speed	14.4 Kbps or highest speed supported
Computer (DTE) speed	57.6 Kbps or highest speed supported
Error correction	On
Type of error correction	V.42; if V.42 isn't supported, use MNP4
Data compression	On
Type of data compression	V.42 bis; if V.42 bis isn't supported, use MNP5
Flow control	CTS/RTS (also called flow control or handshaking. If not supported, use XON/XOFF,but be aware that enabling XON/XOFF may interfere with binary file transfers).
DTR clearing	DOS: Disconnect when DTR is dropped Mac: Ignore DTR
Parity	Off or none
Data bits	8
Stop bits	1
Terminal emulation	vt100
Other settings	Default settings

East Lansing MichNet dial-in numbers

The East Lansing MichNet dial-in numbers are:

- 517/318-2500 (ISDN, 56K) (Note: not listed with Michnet)
- 517/353-3500 (33.6k speed)

A comprehensive list of dial-in numbers is available from any of the following:

- The printed document *MichNet Dial-in Access Numbers*
- Connect to any MichNet number and search the on-line phone list by entering ***help*** at the *host:* prompt.
- Using the World Wide Web:
  http://www.merit.edu/michnet/how.to.get.connected/michnet.nos

Connecting

1. Use your modem and communications software to dial the selected phone number.
2. At the *host:* prompt, enter the domain name address of the computer you want to connect to. Examples:

host: *pilot.msu.edu*	PILOT email
host: *stuinfo.msu.edu*	Student information system)
host: *ibmgate.msu.edu*	Gateway to MSU IBM hosts. Use this address to go to magic, enroll, ibm.cl.msu.edu, and ais3270

3. When prompted for your network ID and password, enter your MSUnet ID (same as your PILOT ID) followed by *@msu.edu* Then enter your PILOT password. Login example

```
login: smithjan@msu.edu
password: (your PILOT password, it won't display)
```

If you haven't yet activated your PILOT account, enter *guest@msu.edu* and press Return (Enter). Then follow the instructions on *Activating Your Account* in the *MSU PILOT Electronic Mail* handout. Login example:

```
login: guest@msu.edu (for people without an active PILOT ID
password: (no password required)
```

Out of State

Outside of Michigan, a dial-in connection to the Internet can be made using the Merit/MSU Wide Area Dial-in (for fee) Services or through many different Internet service providers (ISPs). An extensive list of ISPs is available at the web site:
http://www.yahoo.com/Business_and_Economy/Companies/Internet_Services/Internet_Access_Pr

More help

Consulting is available by email at consult@msu.edu or from the Computing Information Center (CIC), 305 Computer Center, 432-6200. The CIC also distributes preconfigured versions of Mac and MS Kermit free of charge.

Revised: 7 May, 1998 Feedback welcome!

Appendix C

Foot Care (1660)

DEFINITION: Cleansing and inspecting the feet for the purposes of relaxation, cleanliness, and healthy skin

ACTIVITIES:

- Inspect skin for irritation, cracking, lesions, corns, calluses, deformities, or edema
- Inspect patient's shoes for proper fit
- Administer foot soaks, as needed
- Dry carefully between toes
- Apply lotion
- Clean nails
- Apply moisture-absorbing powder, as indicated
- Discuss with patient usual foot care routine
- Instruct patient/family on the importance of foot care
- Offer positive feedback about self-care foot activities
- Monitor patient's gait and weight disturbance on feet
- Monitor cleanliness and general condition of shoes and stockings
- Instruct patient to inspect inside of shoes for rough areas
- Monitor hydration level of feet
- Monitor for arterial insufficiency in lower legs

- Monitor legs and feet for edema
- Instruct patient to monitor temperature of feet using the back of the hand
- Instruct patient in the importance of inspection, especially when sensation is diminished
- Cut normal thickness toenails when soft, using a toenail clipper and using the curve of the toe as a guide
- Refer to podiatrist for trimming of thickened nails, as appropriate

Iowa Intervention Project (1996).

Enhanced Lower Extremity and Foot Assessment Form

Since your last visit have you (your)....	Date_____	Date_____
medications changed?	Yes ☐ No ☐	Yes ☐ No ☐
changed your ADLs?	Yes ☐ No ☐	Yes ☐ No ☐
fallen?	Yes ☐ No ☐	Yes ☐ No ☐
purchased new shoes?	Yes ☐ No ☐	Yes ☐ No ☐
seen a PCP/podiatrist?	Yes ☐ No ☐	Yes ☐ No ☐

Medications	Medications

Client Name _____

_____

Date of Birth_____

Primary Care Provider

_____

Podiatrist_____

PMH _____

_____

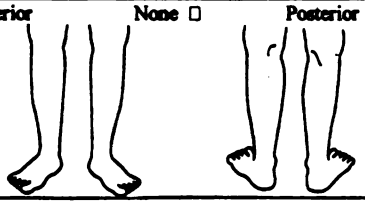
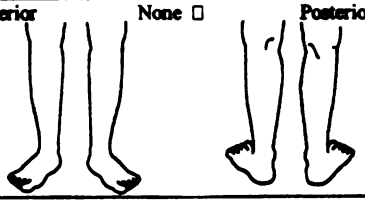
_____

_____

_____

Circle all that apply, if other, describe
*** Indicates need for further documentation**

Lower Extremity

Assessment	Date	Date
Color	Right- Pale, Pink, Ruddy, Brown, Cyanotic, other Left - Pale, Pink, Ruddy, Brown, Cyanotic, other	Right- Pale, Pink, Ruddy, Brown, Cyanotic, other Left - Pale, Pink, Ruddy, Brown, Cyanotic, other
Temperature	Right - Warm, Cool, other Left - Warm, Cool, other	Right - Warm, Cool, other Left - Warm, Cool, other
Varicosities	Right - Superficial, Palpable, Tortuous, other None ☐ Left - Superficial, Palpable, Tortuous, other None ☐	Right - Superficial, Palpable, Tortuous, other None. ☐ Left - Superficial, Palpable, Tortuous, other None ☐
Edema	Right 1+, 2+, 3+, 4+ other None ☐ Left 1+,2+,3+,4+ other None ☐	Right 1+, 2+, 3+, 4+ other None ☐ Left 1+,2+,3+,4+ other None ☐
Circulation	Right DP 0, 1+, 2+, 3+ Left DP 0, 1+, 2+, 3+ Right PT 0, 1+, 2+, 3+ Left PT 0, 1+, 2+, 3+	Right DP 0, 1+, 2+, 3+ Left DP 0, 1+, 2+, 3+ Right PT 0, 1+, 2+, 3+ Left PT 0, 1+, 2+, 3+
Capillary refill	Right Seconds Left Seconds	Right Seconds Left Seconds
Pain, Location Scale 0-10 (0=None;10=high)	No ☐ Yes ☐ if yes, describe Scale	No ☐ Yes ☐ if yes, describe Scale
Footwear	Shoes Proper ☐ Improper ☐ Socks Proper ☐ Improper ☐ Orthotics No ☐ Yes ☐ Right ☐ Left ☐ Prosthesis No ☐ Yes ☐ Right ☐ Left ☐	Shoes Proper ☐ Improper ☐ Socks Proper ☐ Improper ☐ Orthotics No ☐ Yes ☐ Right ☐ Left ☐ Prosthesis No ☐ Yes ☐ Right ☐ Left ☐
Skin integrity M= Moist D= Dry F= Flaky B= Bruised O= Open S= Scabbed other, describe	Anterior None ☐ Posterior 	Anterior None ☐ Posterior 
Additional Comments:	_____	_____
Nurse Provider		

Developed by Margherita P. Clark & Wendy A. Ehnis, last revised 10-3-98

Assessment Form © 2

Foot Assessment	Date	Date
Bony Deformities	Yes ☐ None ☐	Yes ☐ None ☐
Bunions	R5☐ R1☐ L1☐ L5☐ None ☐	R5☐ R1☐ L1☐ L5☐ None ☐
Hammer toes	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5 None ☐	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5 None ☐
Overlapping digits	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5 None ☐	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5 None ☐
Prominent met head	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5 None ☐	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5 None ☐
Amputations	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5 None ☐	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5 None ☐
Nail Shape		
Incurvated	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5 None ☐	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5 None ☐
C-shaped	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5 None ☐	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5 None ☐
Ingrown	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5 None ☐	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5 None ☐
Flat	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5 None ☐	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5 None ☐
Other	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5 None ☐
Nail Color		
White	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5 None ☐	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5 None ☐
Yellow	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5 None ☐	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5 None ☐
Brown	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5 None ☐	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5 None ☐
Black	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5 None ☐	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5 None ☐
Other	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5
Nail Texture		
Thick	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5 None ☐	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5 None ☐
Thin	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5 None ☐	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5 None ☐
Crumbly	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5 None ☐	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5 None ☐
Brittle	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5 None ☐	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5 None ☐
Split	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5 None ☐	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5 None ☐
Separated nail bed	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5 None ☐	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5 None ☐
Other	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5
Nail Fungus	Yes ☐ None ☐ R5 R4 R3 R2 R1 L1 L2 L3 L4 L5	Yes ☐ None ☐ R5 R4 R3 R2 R1 L1 L2 L3 L4 L5
Macerated web space	R5 ☐ R4 ☐ R3 ☐ R2 ☐ L2 ☐ L3 ☐ L4 ☐ L5 ☐ None ☐	R5 ☐ R4 ☐ R3 ☐ R2 ☐ L2 ☐ L3 ☐ L4 ☐ L5 ☐ None ☐
Sensation use a 5.09 monofilament; mark the O with + or – for sensation	Right Left not assessed ☐	Right Left not assessed ☐
K = corn(s) **C = callus(es)** **P = pain** **R = redness** **F = fissure(s)** **W = wound(s)** **S = scar(s)** **Wa= wart(s)** *use the diagram to indicate skin changes	Right None ☐ Left	Right None ☐ Left
Interventions Soak, trim, file, lotion, massage, other	Yes ☐ No ☐ other, describe	Yes ☐ No ☐ other, describe
Recommendations, Education & Referral	Daily hygiene, dry between toes, foot inspection, other	Daily hygiene, dry between toes, foot inspection, other
Additional Comments		
Return to Clinic		
Nurse Provider		

Developed by Margherita P. Clark & Wendy A. Ehnis, last revised 10-3-98

Figure 3. Enhanced Lower Extremity and Foot Assessment Tool (Clark-Ehnis, 1998)

Appendix F

Welcome to our Web Site!

This site was developed by Margherita P. Clark RN and Wendy A. Ehnis RN. We welcome inquiries or suggestions. Please feel free to contact us at either clarkm10@pilot.msu.edu or ehniswen@pilot.msu.edu .

Introduction

A key component in maintaining physical independence is the promotion of regular foot care and the prevention of potentially debilitating foot injury or loss of function. Early detection and management effect a difference between limb-threatening complications and a return to full potential. Healthy feet are a prerequisite for balance and stable ambulation. Immobility can be considered a strong risk factor in predicting systemic diminution of physical and psychological health.

HEALTHY FEET ARE HAPPY FEET!

This page has been accessed [illegible] times as of 2/26/99

Discussion

Foot care is an integral part of optimal health maintenance; and historically a missed opportunity. Many nurses possess limited assessment skills and minimal clinical expertise in dealing with lower extremity care. Many are unaware that foot care is within the scope of nursing practice. Indeed, the ability to differentiate normal changes from pathological threat and detection of problems followed by initiation of appropriate care and ongoing patient education is integral with nursing and the promotion of health.

The value of the advanced practice nurse (APN) in providing expert knowledge, coupled with strong decision making skills, enables the APN to function in a number of roles. As a facilitator, the APN may coordinate teaching-learning opportunities that enhance reciprocal learning. The role of the advanced practice nurse in primary care is multidimensional. The American Nurses' Association's (ANA) former Council of Nurses in Advanced Practice defines the APN as (cited in Hickey, Ouimette, & Venegoni):

> Nurses in advanced clinical practice have a graduate degree in nursing. They conduct comprehensive health assessments, demonstrate a high level of autonomy and expert skill in the diagnosis and treatment of complex responses of individuals, families, and communities to actual or potential health problems. They formulate clinical decision to manage acute and chronic illness and promote wellness. Nurses in advanced practice integrate education, research, management, leadership, and consultation into their clinical role and function in collegial relationships with nursing peers, physicians and others who influence the health environment (p.22). This definition clearly illustrates the multidimensional nature of the APN.

Clearly, the value of a standardized protocol for lower extremity assessment and care by nurses should not be minimized. In a study of 6 nurse practitioners, Fain & Melkus (1994) found documentation of foot exams in 23% of charts reviewed. Despite lack of written adherence, in a 1989 NIH survey, over 80% of primary care providers indicated performance of foot, neurological and circulatory exam in diabetic patients one or more times per year. Results of a 1990 study by Hempel suggest that use of a flow sheet and nurse-managed patient education clinic significantly enhances compliance and documentation to standards in a diabetic population.

Pelican et al. (1991) reports in the Journal of Gerontological Nursing, the inception of a nurse run well foot care clinic, with the development of an assessment tool, instructional videotape and informational brochure. Kelechi and Lukacs (1996), both Master's prepared nurses, recognizing foot care as an "integral part of the promotion and maintenance of health" (p. 722) have devised "comprehensive lower extremity assessment, hygiene and nursing interventions that address problems associated with toenails and skin. It also includes patient and/or caregiver education and the identification of complications that need to be referred to a physician or specialist." It is the purpose of this project to develop for practitioners an assessment and documentation protocol, along with a self-directed teaching-learning module to deliver foot care in a geriatric non-traditional setting.

Supportive Footwear
Normal Nail
Age Related Changes

Discussion

Each foot is made up of 28 bones, 33 joints, and a complex web of greater than 100 tendons, muscles, and ligaments (Conkling, 1994). Acting as a shock absorber for the leg and spine, the plantar arch of the foot contacts the ground at only the heel and ball. Skeletal muscles further shape the foot, holding the bones in position and serving as attachments for tendons. Cord-like tendons are held in place by broad ligaments to allow foot and ankle flexion and extension.

The average American walks 4-5 miles per day, 70,000 miles lifetime, with the feet supporting accumulative pressure of several 100 tons. It is estimated that 1 in 6 Americans (43.1 million) suffer from foot discomfort or disease. Women are 9 times more likely than men to develop pain and deformity; causative factors include poorly fitting shoes, shoes that are too small for the foot, and heels higher than 2¼ inches (North Carolina Medical Society, 1995). A survey of 813 bunionectomies revealed that 94% involved females (Conkling, 1994). Medical costs and associated time off of work are estimated at $3.5 billion per year (North Carolina Medical Society, 1995).

The femoral artery supplies the majority of blood to the legs. One of its branches descends down the top of the foot forming the dorsalis pedis artery. Its pulse can be palpated on the medial dorsal foot (great toe side). The posterior branch is the posterior tibial artery, palpated behind the medial malleolus of the ankle. These vessels supply the foot with blood.

Venous circulation is a low pressure system. The blood from the leg and foot must flow upward to the heart with the help of one-way valves, muscular contraction, and a pressure gradient. Venous return is impeded and stasis results with impairment of the aforementioned sturctures (tortuous and dialated veins, lack of muscular activity, and prolonged sitting, standing, or lying).

Discussion

The average American walks 4-5 miles per day, 70,000 miles lifetime, with the feet supporting a cumulative pressure of several hundred tons. Each road warrior is made up of 28 bones, 33 joints and a complex web of greater than 100 tendons, muscles and ligaments (Conkling, 1994).

Careful assessment of footwear by the APN for signs of uneven wear, friction, pressure and poor fit is basic to preventive foot care. All footwear should be replaced when worn, and inspected periodically for torn linings or rough edges. Padding may restore neutral functions, and prevent repeated microtrauma of the foot in patients with degenerative changes (Helfand, 1989).

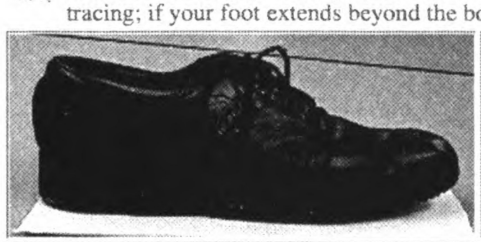
Leather or canvas shoes allow moisture to evaporate, and should be purchased in the afternoon, when the feet are largest. Cotton or wool socks should be worn, instead of nylon, to absorb moisture and wick it away from the foot. White socks are preferable if lesions exist, entry of dyes into the wound is eliminated (Ruscin et al, 1993). Patients should never go barefoot, thus reducing the risk of penetrative or abrading injury from foreign body (Helfand, 1989).

Desirable shoe features include padded tongue and ankle collar, a flexible curved sole, arch support, comfortable well-fitted insole, a well cushioned heel with a firm heel counter and a padded Achilles' tendon collar.

The client's shoe should fit their lifestyle. Standing for several hours a day or walking on hard surfaces requires a shoe with a thick sole and soft upper.

When buying shoes consider these points:

- have both feet measured; full weight bearing on measured foot.
- stand on one foot at a time; wiggle toes; stand on tip toes; make sure foot and shoe bend at the same place.
- don't buy with the idea of breaking a shoe in; your foot may alter in an uncomfortable shoe, but the shoe will not
- allow 1/2 inch of space between end of big toe and shoe.
- widest part of the foot should fit comfortably in the widest part of the shoe.
- shoe shop in the middle of a normal day, not early in the morning, since feet swell as the day progresses; wear the type of socks or stockings you intend to wear with the shoes.
- when considering a shoe style, trace your foot on paper and place the particular shoe over the tracing; if your foot extends beyond the borders of the shoe...it's not for you!



This is an example of supportive footwear.

Home | Up | Supportive Footwear | Normal Nail

Age Related Changes

Discussion

The primary function of the toenail is to provide protection for the soft tissue of the toe. The nail, normally measures 1/16 of an inch in thickness and is comprised of three layers; a dorsal thin covering, a thicker middle layer, and a deep inner layer derived from the nail bed. The nail bed is made up of epithelium, a rough surface of longitudinal waves which interface with grooves on the underside of the nail plate, facilitating adherence of the plate to the bed. The hyponychium smoothly seals the boarder between the distal end of the nail and the bed. Normal nail color is translucent with a pink tinge reflecting the highly vascular matrix. As the nail grows, extending beyond the matrix, the translucent color is lost and becomes white.

Discussion

The process of normal aging inherently involves adaptation to change. Physical challenges are observed in every organ during the lifespan continuum. The epidermis of the skin thins, and the dermis decreases in elasticity and vascularity. Nails become brittle, with a 30-50% slower growth rate. Slowed cell reproduction and repair, coupled with a diminished immune response sets the stage for delayed healing of trauma or ulceration. The pumping ability of the heart slows and venous return is delayed. Increased systolic blood pressure interfaces with added vascular resistance at the cellular level, precipitating foot edema, impaired sensation, and a diminished response to pedal insult.

Bony landmarks become more prominent as subcutaneous fat decreases in the periphery. Joints rest in greater degree of flexion, develop increased potential for stiffness, deformity, inflammation and pain. Muscular changes create slowed movement, tendon shrink and harden, and reflexes diminish.

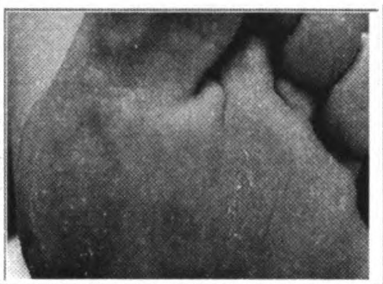
Neurologically, decreased proprioception and impaired balance may result in gait disturbances or imbalance. Healthy, older individuals exhibits a reduction in stride length and velocity. Women develop a narrow-based, waddling gait, while men increase the flexion of their posture and widen the base of support. Sensory changes may include an altered perception of pain due to neuropathey, as well as decreased visual acuity and peripheral vision. Minor, unattended trauma may result in progressive ulceration as the result of lack of protective senory input. Potential implications exist for impaired mobility, loss of function, injury from falls and concurrent decreased independence.

Discussion

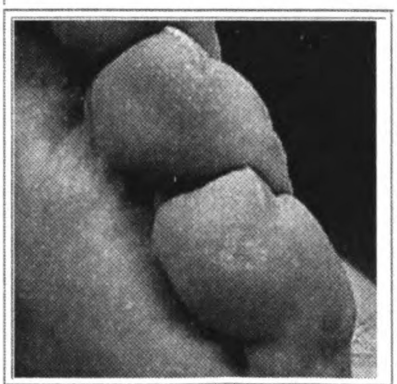
The outermost layer of skin, the epidermis, is comprised of 5 sub-layers and is estimated to be 75 microns to 0.6mm thick, thinning as one ages. This organ's surface layer, or "horny" stratum corneum, is subjected to daily use and exposure to the environment. It is protected by an acid mantle, which retards certain bacterial and fungal proliferations, a protective water-repellent covering (Alterescu & Alterescu, 1988).

The innermost layer, the dermis, contains blood and lymphatic vessels, nerves and cellular components such as mast cells, leukocytes, macrophages, and fibroblasts (Alterescu & Alterescu, 1988). The dermis decreases in vascularity, elasticity and defensive ability as an individual ages, leading to a loss of water content and slowing of re-epithelialization.

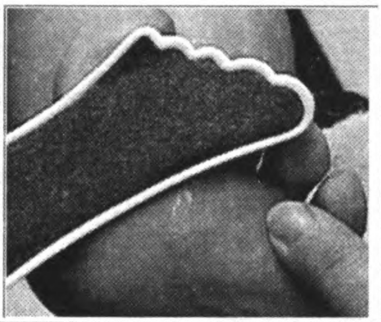
Decreased circulation to the skin of the appendages results in diminished oxygen and nutrients at the cellular level. Reduced production of sebaceous and sweat glands couples with decreased water storage to produce a rough, scaly texture with decreased skin turgor. Diminished tactile sensation is caused by neurosensory changes; pain or friction to surface tissues may go unrecognized. Structural changes occur simultaneously; the loss of subcutaneous plantar fat pads allows for less tissue insulation and vessel support (Jaffe, 1991). The aforementioned physiological functional changes categorize the elderly foot as identifiable at high risk for impaired skin integrity (Jaffe, 1991).



Calluses, or diffuse areas of thickened skin, may form on bony prominences, or any area where soft tissue is exposed to prolonged unrelieved pressure, friction or shear (Lukacs, 1997). Tensile stress may also be a factor in callus formation. Digital deformity, such as toe alignment can cause the head of one phalanx to be compressed against the base of an adjacent metatarsal-phalangeal articulation. The continued pressure may create a hyperkeratotic lesion (Helfand, 1989) The formation of additional layers of skin reflects the body's attempt at a protective mechanism. Calluses may also form under weight bearing areas such as the heel or metatarsal heads. Wearing slippers or ill-fitting shoes that do not have a snug heel counter predisposes an individual to thickened, dry heel skin (Lukacs, 1997).



If the cause of the callus is not identified and eradicated, pressure may intensify as the keratin layers build. A central nucleus develops and a **corn** (heloma) is generated. The pressure acts as a foreign body, inflammation is common, and ulceration may occur (Helfand, 1989). Appropriate documentation should be made upon assessment of callus, corn or ulcerous conditions, noting the location, width and estimated depth in centimeters, as well as surrounding redness, dryness or bruising (Dorgan et al, 1995).



Skin care may be accomplished by the advanced practice nurse to debride the hyperkeratotic lesion with a pumice stone, foot file or rotary tool, followed by application of an emollient. There is little data available comparing the method of intervention, but general parameters include thickness of callus, degree of expertise, and level of associated patient discomfort (Lukacs, 1997). Most calluses cannot be completely removed, but **thinning** may bring about relief (Lukacs, 1997). A large foot file may be applied in one direction until the skin is smooth and even with the foot surface (Ruscin et al, 1993).It is not recommended that patients apply commercial products to aid in corn removal, as the concentrations of acid may produce a second degree chemical burn (Helfand, 1989).

Picture not available

Insertion of a small foam pad or ring interdigitally may serve to separate the web space occupied by a soft corn and **cushion** surrounding tissues (Lian, 1992). Used circumferentially, the corn pad will cushion areas of friction and allow relief from direct pressure.

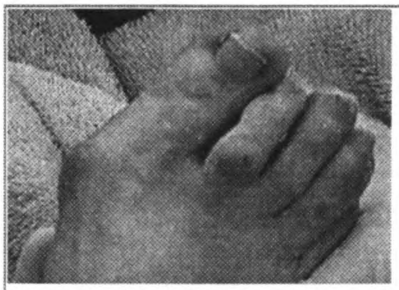
Dryness of the skin, decreased elasticity and keratotic thickening may produce **fissures** which can extend into the dermis. Assessment of depth, size, drainage and condition of surrounding tissues is imperative (Lukacs, 1997) Recent documentation of acceptable interventions includes the application of a solid sheet of high-glycerin content hydrogel, which acts both as a cushion, and possesses bacteriostatic and anti-fungal qualities (Lukacs, 1997). Keratolytic compounds, in an emollient cream or lotion base utilize concentrations of urea, alpha-hydroxy acid, lactic acid and salicylic acid to exfoliate (Lukacs, 1997). Application of any petroleum-based barrier moisturizer to soften the skin should be preceded by a moisture-containing product, and be applied 2-4 times per day and after bathing (Lukacs, 1997).

Maceration of the interdigital web spaces may develop from the use of emollients between the toes, the inability of the elderly to dry their feet completely, or arise due to friction from lateral pressure of shoes or digital contractures (Kosinski & Ramcharitar, 1994). Lamb's wool or cotton gauze is used to separate and dry the interspace, but does not encircle the digit. (Kosinski & Ramcharitar, 1994). The patient is encouraged not to soak their feet, to dry between the toes completely, and switch to shoes with a roomier toe box (Lian, 1992).

Discussion

The average American walks 4-5 miles per day, 70,000 miles lifetime, with the feet supporting a cumulative pressure of several hundred tons. Each road warrior is made up of 28 bones, 33 joints and a complex web of greater than 100 tendons, muscles and ligaments (Conkling, 1994). It is estimated that 1 in 6 Americans (43.1 million) suffer from foot discomfort or disease. Women are 9 times more likely than men to develop pain and deformity; causative factors include poorly fitting shoes, shoes that are too small for the foot, and heels higher than 2 1/4 inches (North Carolina Medical Society, 1995). A survey of 813 bunionectomies revealed that 94% involved females (Conkling, 1994). Medical costs and associated time off work are estimated at $3.5 billion per year (North Carolina Medical Society, 1995).

Generalized musculoskeletal changes associated with aging include loss of muscle fiber, strength and limitations in mobility. Ligaments become stretched, resulting in joint stiffness and reduced motion. Postural changes include a shift from the hips as the center of gravity, to the chest (Jaffe, 1991). In order to increase stability, the elderly begin to walk with their feet directed outward, which does not follow the design or last of most shoes (Helfand, 1989). This alteration in gait elicits a foot-shoe incompatibility that accentuates pressure points on the feet (Helfand, 1989).



Bunions are the result of a subluxation of the metatarsal-phalangeal (MP) joint of the great toe, creating a lateral angulation that produces pressure from two distinct directions. The MP joint becomes enlarged, and may be reddened and inflamed from friction with a toe-box or instep. Either an inherited joint weakness or poorly fitting shoes may be culpable.

The **top** photo demostrates a bunion on the 1st digit and a hammer toe on the 2nd digit. There is evidence of a corn on the 2nd digit.

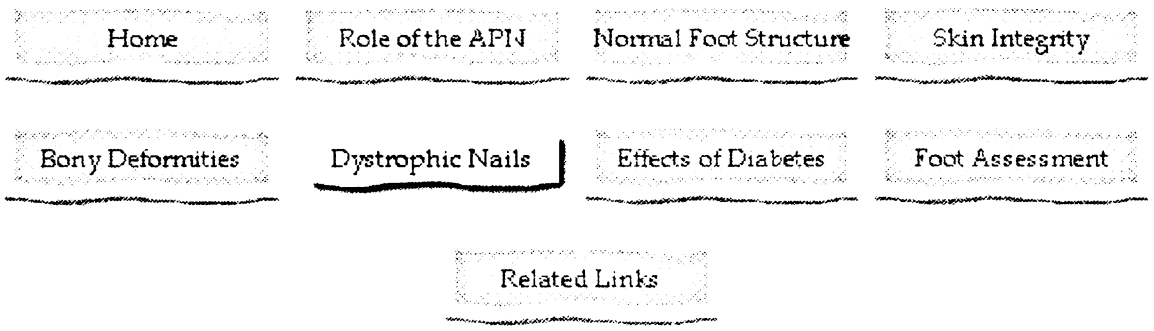
Hammer toe

A **hammertoe** may be caused by lateral derangement of the second toe due to a bunion. This deformity is a combination of extension at the MP joint and flexion at the proximal inter-phalangeal (PIP) joint. Pain results as the plantar muscles tear and soft tissue lesions form from friction at the dorsal PIP joint, with corn development at the tips of the toe (Lian, 1992). Conservative treatment with hammertoe pads, designed to fit over the toe and hold down the PIP joint may be used in conjunction with a roomier, high toe-box shoe (Lian, 1992). The treatment provides symptomatic relief and is not curative.

Client Education

Careful assessment of footwear for signs of uneven wear, friction, pressure and poor fit is basic to preventive foot care. All footwear should be replaced when worn, and inspected periodically for torn linings or rough edges. Padding may restore neutral functions, and prevent repeated microtrauma of the foot in patients with degenerative changes (Helfand, 1989). Leather or canvas shoes allow moisture to evaporate, and should be purchased in the afternoon, when the feet are largest. Cotton or wool socks should be worn, instead of nylon, to absorb moisture and wick it away from the foot. White socks are preferable if lesions exist, entry of dyes into the wound is eliminated (Ruscin et al, 1993). Patients should never go barefoot, thus reducing the risk of penetrative or abrading injury from foreign body (Helfand, 1989).

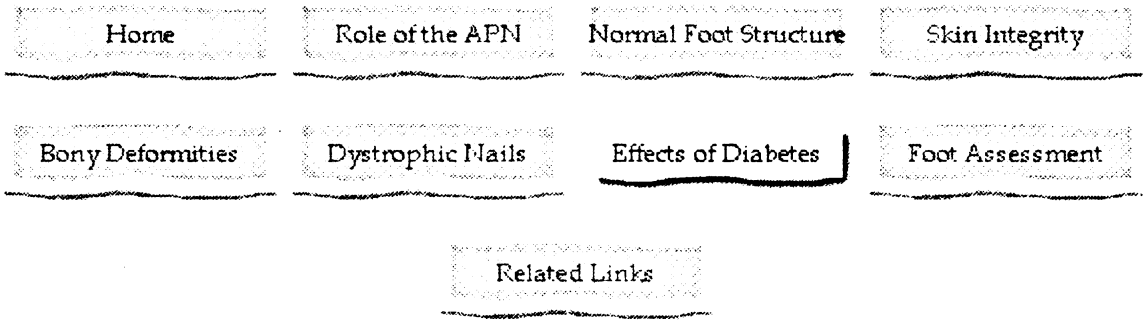
Daily inspection of the feet should be encouraged, twice daily for patients at high risk for complications, using a mirror to enhance visualization, if needed. Assessment should include blisters, sores or cracks in the skin, changes in toenails, skin temperature and color (Ruscin et al, 1993).



Discussion

Onychomycosis represents 50% of all nail disease (Elewski, 1996) and the most difficult to treat of all skin mycoses. Fungal infections of the toenails are almost always caused by a dermatophyte fungi, with distal and lateral subungual onychomycosis being the most common (Roberts, 1993). These molds, and occasionally yeast, infect an already diseased or traumatized nail. Arterial circulatory disorders, peripheral nerve disease, disturbances of the venous and lymphatic drainage systems, as well as chronic paronychia are common predisposing factors (Haneke, 1991). Onychomycosis may cause disturbances in nail growth with loosening or separation of all or part of the nail plate from the nail bed at the free edge (Helfand, 1989). Anti-fungal drug treatments remain difficult to enact because predisposing factors are usually not amenable to therapy. Patience combined with optimal patient compliance are mediators. A high recurrence rate is estimated at 80 - 90% (Haneke, 1991).

	It has been estimated, that fungal (**onychomycosis**) infections explain 50% of all nail diseases. Types of fungal infections are differentiated by causative pathogen and the method of fungal invasion into the nail plate. The literature supports that distal subungual onychomycosis is the most common form of fungus (typically *Tricholphyton rubrum*) invading the distal nail plate and hyponychium (Elewski, 1996;Scher, 1983; Hobday, 1995; Tierney, McPhee & Papadakis, 1997; Berg, Cantwell, Heudebert, & Sebastian, 1993). Trauma to nails plays an important role as a precursor to onychomycosis. Dermatophytes, yeasts, and non-dermatophytes molds are the three major groups of fungi that can cause onychomycosis (Hobday, 1995; Elewski, 1996).
	**Onychomycosis** can be visible by changes in the texture, structure, and presentation of one, several, or all nails of the upper and lower extremities. Typically, the nail plate becomes thick and discolored (**onychauxis**) and the damaged nail becomes brittle, crumbly, and a subungual hyperkeratosis is present with an uplifting of the nail plate (**onycholysis**). Generally, subungual hyperkeratosis (onycholysis) may be regarded as the most reliable sign of onychomycosis (Scher, 1983). A 'musty' odor may also accompany these findings.
 	Occasionally, the surrounding skin, proximal nail fold, near the fungal nail may be involved (Hobday, 1995). The proximal nail fold and the two lateral fold makeup the three borders the nail plate. The raised portion of the proximal nail fold is the cuticle. **Paronychia** is acute pain and swelling associated with a past trauma to the nail, poor nail care, fungal infection (onychomycosis) or an 'in-grown nail' (**onychocryptosis**) around the lateral nail fold (Berg, Cantwell, Heudebert, & Sebastian, 1993).
no picture at this time	Grossly elongated nails (**onychogryphosis**) may be a result of poor hygiene or neglect in foot care. Onychogryphosis may result in extreme curvature with a 'hooked' configuration (*gryphos*, meaning "claw") to the nail (Omura & Rye, 1994).
no picture at this time	**Subungual hematoma** can be defined as trauma resulting in the collection of reddish-blue blood in the nail bed. Increased pressure, under the nail plate, causes extreme tenderness on palpation (Berg, Cantwell, Heudebert, & Sebastian, 1993).



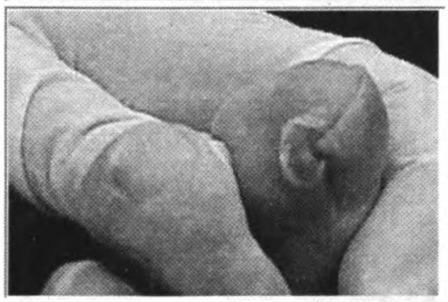
Discussion

One group at heightened risk for foot and lower extremity trauma and inpaired skin integrity is the diabetic population. Accelerated atherosclerosis of the diabetic cardio-vascular system, diabetic retinopathy and sensory polyneuropathy all contribute to a higher risk of poor tissue perfusion, trauma, ulceration, gangrene and lower extremity amputation for the diabetic patient. The prevalence of diabetes in the United States was estimated by the National Institutes of Health in 1995 at 16 million individuals. Diabetes mellitus, complications notwithstanding, ranks as the 7th most common principal diagnosis requiring a patient to be seen by their primary care provider (Ostergaard & Schmittling, 1997).

Alarming statistics for lower extremity amputations reveal that 50 - 70% of all non-traumatic lower extremity amputations involve diabetic patients (Ahroni, 1993); the Centers for Disease Control (CDC) reports 54,000 such procedures are performed yearly (1995). Through early detection and treatment, it has been estimated by the CDC that half of these lower extremity amputations are preventable. Recommendations by both The American Diabetes Association (ADA) and the CDC include an examination of the feet of diabetic patients by the primary care provider at every visit (1991).

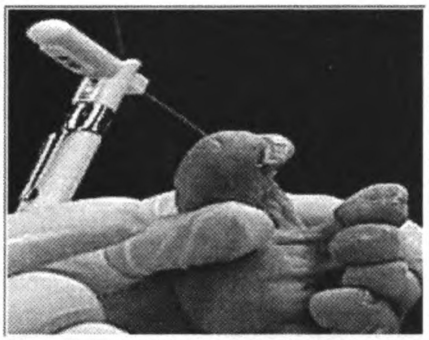
Disruption of arterial flow from micro and macro angiopathies and atherosclerosis occurs at a heightened rate in the diabetic patient (Jaffe, 1991). Thickening of the capillary walls, restricted blood flow to the site of invading bacteria (typically polymicrobial) and impaired oxygen perfusion at the cellular level combine to evidence as pale, cool extremities with shiny skin and a weak or absent pulse (Garrison & Campbell, 1993). Almost 20% of diabetic patients with palpable pedal pulses do have significant small vessel disease (Kosinski & Ramcharitar, 1994).

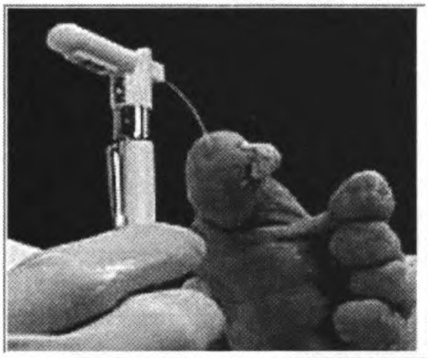
Although **foot lesions** can arise anywhere pressure or repeated friction occurs, common hot-spots are under plantar calluses, in the toe-nail bed or in tandem with neuropathic ulcers (Garrison & Campbell, 1993). The sequela of minor trauma, ulceration and eventual failure of a wound to heal occurred in 72% of lower extremity amputations studied (Pecoraro).

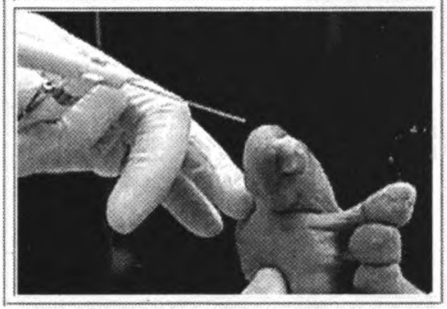


Neuropathic ulcers may present as red, warm, painless, circular lesions, surrounded by callus, and located over bony prominences. Deformity, muscle weakness, dry skin and tight shoes have all been implicated as causative (Dorgan et al, 1995).

Autonomic, sensory and motor neuropathies act together to create foot ulceration (Ahroni, 1993). Diabetic impairment of the autonomic nerves causes a reduction in blood flow and glandular activity, resulting in drier skin that is prone to fissures and infection (Garrison & Campbell, 1993). Motor neuropathy leads to muscle weakness and changes in the shape of the foot. "Weaker intrinsic muscles allow flexors to predominate, lesser toes become hammered or clawed. Toe tips may ulcerate" (Ahroni, 1993).



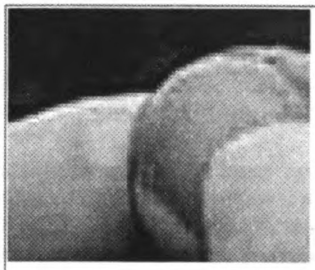




Sensory neuropathy allows patients to experience a progressive insensitivity to pain, pressure and temperature. To test for sensory loss, "the APN applies a 5.07 (10-g) **monofilament** perpendicular to the skin until it bends, to the count of 1-second touch, 1-second bend, and 1 second lift. Four areas are screened, including the distal fat pad areas of the great and fifth toes, and the metatarsal head areas below these two toes" (Kelechi & Lukacs, 1996). Eyesight may be impaired by diabetic retinopathy or macular degeneration to the extent that it is not the protective sense of sight, but the foul smell of an infected wound that prompts the patient to seek attention (Garrison & Campbell, 1993).

Posterior tibial pulse

Thus, the APN should check each foot for the presence of dorsalis pedis and posterior tibial **pulses**, with referral to specialists for absence of pulses. Skin temperature should be checked by feeling both feet simultaneously to compare any "hot-spots" that may indicate problems. The dorsal surfaces of the hands may be used, with detection of any difference greater than 2 degrees Centigrade both determinable and potentially significant (Dorgan et al, 1995). Capillary refill is measured in seconds after blanched pressure to the nail bed. Less than 3 seconds is consistent with a normal finding.



Capillary nail bed pressure

Assessment Tool **Lower Extremity and Foot Care**

Step-by-Step The value of standardized protocol for lower extremity assessment and care by nurses should not be minimized. Foot care is an integral part of optimal health maintenance; and historically a missed opportunity. The use of flow sheets significantly improves the assessment and documentation of foot care (Hempel, 1990). Through the use of standardized assessment tools and consistent documentation, retrospective research studies can provide nursing knowledge in the client outcomes related to routine foot care and the reduction of complications in high risk populations. Comprehensive assessment should include:

I. Documentation flow sheets

A. Demographic information and current health history

1.Review of recent history, medications and changes

2.Assessment of ADLs, gait, balance,falls and footwear

3.Assessment of feet and lower extremities

a.Color

b.Temperature

c.Varicosities

d.Edema

e.Circulation

f.Capillary refill

g.Pain

h.Skin integrity

i.Bony deformities

4.Nail assessment

a.Shape

b.Color variations

c.Texture

d.Fungal changes

e.Macerated web space

f.Sensation

g.Skin changes

5.Interventions to include:

a.Soak feet

b.Inspect and dry between toes

c.Nails debrided with orange stick, hyponychial border located, nails trimmed and filed

d.File calluses and corns

e.Lotion massage to feet

f.Apply treatment ointments, if applicable

g.Recommendations, education and referral

6.Completion of documentation form per protocol

7.Narrative note, if applicable

II. Teaching-Learning Module to include

A.World Wide Web site access of interactive teaching material

1.Digital photographs of common foot and nail conditions and bony deformities

2.E-mail feedback from on-line participants

B.On site orientation (area future development)

1.Use of equipment

2.Routine care per visit

3.General guideline for referral

4.Client education at each visit

5.Documentation protocol

The review of the literature supports the components identified in the Enhanced Foot Assessment Tool. **Lower extremity and foot examination should include** review of medications and past medical history, assessing circulation, skin integrity and presence of hyperkeratotic lesions, temperature, nail condition, pain, bony deformities, skin color, edema, varicosities, neurological status, evaluation of footwear, education, and the need for referral.

The importance of client **history** is imperative to identify at risk populations. Rijswijk (1998) described at risk populations as client's with a history of diabetes mellitus, smoking, atherosclerosis, deep vein thrombosis, increased age, signs of neuropathy (numbness of pain), limited mobility, coronary artery disease, spinal problems, impaired vision, decreased hand dexterity, decreased hip flexion, obesity, and peripheral vascular disease are in greater need for foot care and lower extremity assessment. Also, the need for identifying a change in activities of daily living (ADLs) from one visit to another(Kelechi, 1996). **An Enhanced Lower Extremity and Foot Assessment should include** circulation (color, temperature, and palpation of pedal pulses). Also, observe for evidence of bony deformities (bunions, hammer toes, or overlapping toes) as well as skin changes (edema, corns, calluses, fissures, lesions, wounds, and maceration). Included in this enhanced foot care assessment are toenails for thickness, length, condition, and hygiene. Protective sensation is assessed using a special instrument such as a monofilament (Kelechi, 1996; Kelechi & Lukas, 1997). Lastly, footwear is assessed for appropriateness of fit, wear, and style (North Carolina Medical Society, 1995).

Use of Enhanced Lower Extremity and Foot Assessment Tool

In the following text is a detailed description of 'how to' use the Enhanced Lower Extremity and Foot Assessment Tool. This tool is designed for ease of use; thus, the format of circling or use of a check box format is consistent. Rarely, when 'other' is used, a written description is required. This tool has been developed after a thorough review of the literature relevant to content and design. It is these authors intent that this tool will provide succinct documentation for research analysis and comparative evaluation from visit-to-visit by providing two assessments on one form.

Use of the Front Page of the Assessment Tool

The front page of the assessment tool begins with basic demographic information such as, client name, date of birth, primary care provider, podiatrist, and a brief past medical history. In addition, a series of questions are asked, which focus on activities which may or may not change from one visit to the next. The questions, simple yes or no, invoke possible changes in ADLs, medications, mobility, purchase of new shoes, visits to primary care provider or a podiatrist that would solicit further investigation. Additionally, with each assessment, current medications are reviewed.

Provider Positioning

Providers of foot care are generally positioned in front of, and below the client. Typically, the provider sits upon a stool, while the client is seated in a chair; thereby, allowing the client's feet to rest upon the providers lap. With this positioning as a point of reference, this tool has been designed to enhance documentation by clearly labeling right or left, dorsal or ventral, anterior or posterior lower extremity parameters. This format will attempt to decrease the number of transcription errors.

Lower Extremity Assessment

The lower extremities are assessed for color (pale, pink, ruddy, brown, cyanotic, or other), temperature (warm, cool, or other), presence or absence of varicosities (superficial, palpable, tortuous, or other) and edema (1+, 2+, 3+, 4+, or other), circulation including the dorsalis pedis and the posterior tibial pulses (0, 1+, 2+, 3+) and capillary refill after blanching, documented in seconds. Presence or absence of pain, coupled with location, is recorded utilizing the Numeric Pain Intensity Scale (0-10). The inclusion of footwear (proper or improper) gives insight

as to wear patterns, foot support (orthotic or prosthetic), and sole, fabric, and toe box dimensions. Skin integrity is delineated on a diagram using the first initial of the following descriptive words: moist, dry, flaky, bruised, opened, scabbed, or other. Space has been allocated for selected further documentation and provider signature.

Use of the Back Page of the Assessment Tool
Foot Assessment

The back page of the assessment tool focuses on the foot assessment. The presence or absence (yes or none) of bony deformities are differentiated as bunions, hammer toes, overlapping digits, prominent metatarsal heads, or amputations. If present, the provider will circle the abbreviation for the appropriate digit. Nail shape (incurvated, c-shaped, ingrown, flat, other), nail color (white, yellow, brown, black, other), nail texture (thick, thin, crumbly, brittle, split, separated nailbed, other), nail fungus (yes or none), and macerated web space is delineated in the same fashion. Sensation is assessed using a 5.09 monofilament according to the Lower Extremity Amputation Prevention (LEAP) program protocol. Location to be assessed is identified on the diagram by a circle; presence of sensation is denoted by placement of the + symbol in the circle or a - symbol, if applicable. The test consists of one second landmark touch with a 5.09 monofilament, one second monofilament bend, and one second release. Next, skin changes of the foot are added to the plantar and dorsal diagrams using the first initial(s) of the descriptors: corn (K), callus, pain, redness, fissure, wound, scar, or wart (Wa). Interventions (soak, trim, file, lotion, massage, other) are documented as yes or no. Recommendation for education or referral include daily hygiene and inspection, drying between the toes, and the opportunity for other education. Space has been again allocated for additional comments, if needed. The provider recommends the projected interval for return to clinic visit. Lastly, the provider of care signs the form.

Using the Tool

Enhanced Foot Assessment Form

Since your last visit have you (your)….	Date_____	Date_____
medications changed?	Yes ☐ No ☐	Yes ☐ No ☐
changed your ADLs?	Yes ☐ No ☐	Yes ☐ No ☐
fallen?	Yes ☐ No ☐	Yes ☐ No ☐
purchased new shoes?	Yes ☐ No ☐	Yes ☐ No ☐
seen a PCP/podiatrist?	Yes ☐ No ☐	Yes ☐ No ☐

Medications | **Medications**

Client Name _____

Date of Birth _____

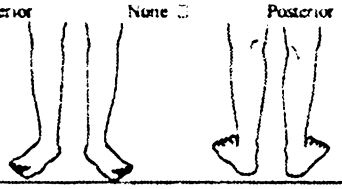
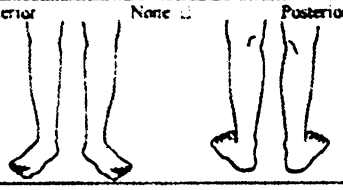
Primary Care Provider _____

Podiatrist _____

PMH _____

Circle all that apply, if other, describe
*** Indicates need for further documentation**

Lower Extremity

Assessment	Date	Date
Color	Right- Pale, Pink, Ruddy, Brown, Cyanotic, other Left - Pale, Pink, Ruddy, Brown, Cyanotic, other	Right- Pale, Pink, Ruddy, Brown, Cyanotic, other Left - Pale, Pink, Ruddy, Brown, Cyanotic, other
Temperature	Right - Warm, Cool, other Left - Warm, Cool, other	Right - Warm, Cool, other Left - Warm, Cool, other
Varicosities	Right - Superficial, Palpable, Tortuous, other None ☐ Left - Superficial, Palpable, Tortuous, other None ☐	Right - Superficial, Palpable, Tortuous, other None ☐ Left - Superficial, Palpable, Tortuous, other None ☐
Edema	Right 1+, 2+, 3+, 4+ other None ☐ Left 1+,2+,3+,4+ other None ☐	Right 1+, 2+, 3+, 4+ other None ☐ Left 1+,2+,3+,4+ other None ☐
Circulation	Right DP 0, 1+, 2+, 3+ Left DP 0, 1+, 2+, 3+ Right PT 0, 1+, 2+, 3+ Left PT 0, 1+, 2+, 3+	Right DP 0, 1+, 2+, 3+ Left DP 0, 1+, 2+, 3+ Right PT 0, 1+, 2+, 3+ Left PT 0, 1+, 2+, 3+
Capillary refill	Right Seconds Left Seconds	Right Seconds Left Seconds
Pain, Location Scale 0-10 (0=None;10=high)	No ☐ Yes ☐ if yes, describe Scale	No ☐ Yes ☐ if yes, describe Scale
Footwear	Shoes Proper ☐ Improper ☐ Socks Proper ☐ Improper ☐ Orthotics No ☐ Yes ☐ Right ☐ Left ☐ Prosthesis No ☐ Yes ☐ Right ☐ Left ☐	Shoes Proper ☐ Improper ☐ Socks Proper ☐ Improper ☐ Orthotics No ☐ Yes ☐ Right ☐ Left ☐ Prosthesis No ☐ Yes ☐ Right ☐ Left ☐
Skin integrity **M= Moist** **D= Dry** **F= Flaky** **B= Bruised** **O= Open** **S= Scabbed** **other, describe**	Anterior None ☐ Posterior 	Anterior None ☐ Posterior 
Additional Comments:	_____	_____
Nurse Provider		

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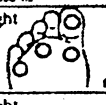
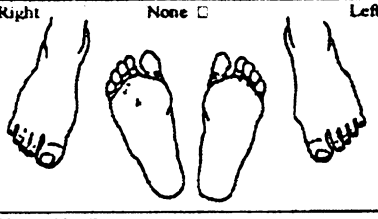
Foot Assessment	Date	Date
Bony Deformities	Yes ☐ None ☐	Yes ☐ None ☐
Bunions	R5 ☐ R1 ☐ L1 ☐ L5 ☐ None ☐	R5 ☐ R1 ☐ L1 ☐ L5 ☐ None ☐
Hammer toes	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5 None ☐	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5 None ☐
Overlapping digits	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5 None ☐	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5 None ☐
Prominent met head	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5 None ☐	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5 None ☐
Amputations	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5 None ☐	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5 None ☐
Nail Shape		
Incurvated	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5 None ☐	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5 None ☐
C-shaped	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5 None ☐	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5 None ☐
Ingrown	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5 None ☐	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5 None ☐
Flat	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5 None ☐	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5 None ☐
Other	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5 None ☐
Nail Color		
White	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5 None ☐	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5 None ☐
Yellow	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5 None ☐	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5 None ☐
Brown	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5 None ☐	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5 None ☐
Black	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5 None ☐	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5 None ☐
Other	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5
Nail Texture		
Thick	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5 None ☐	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5 None ☐
Thin	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5 None ☐	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5 None ☐
Crumbly	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5 None ☐	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5 None ☐
Brittle	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5 None ☐	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5 None ☐
Split	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5 None ☐	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5 None ☐
Separated nail bed	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5 None ☐	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5 None ☐
Other	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5	R5 R4 R3 R2 R1 L1 L2 L3 L4 L5
Nail Fungus	Yes ☐ None ☐ R5 R4 R3 R2 R1 L1 L2 L3 L4 L5	Yes ☐ None ☐ R5 R4 R3 R2 R1 L1 L2 L3 L4 L5
Macerated web space	R5 ☐ R4 ☐ R3 ☐ R2 ☐ L2 ☐ L3 ☐ L4 ☐ L5 ☐ None ☐	R5 ☐ R4 ☐ R3 ☐ R2 ☐ L2 ☐ L3 ☐ L4 ☐ L5 ☐ None ☐
Sensation use a 5.09 monofilament; mark the O with + or – for sensation	Right Left  not assessed ☐	Right Left  not assessed ☐
K = corn(s) **C = callus(es)** **P = pain** **R = redness** **F = fissure(s)** **W = wound(s)** **S = scar(s)** **Wa= wart(s)** *use the diagram to indicate skin changes	Right None ☐ Left 	Right None ☐ Left 
Interventions Soak, trim, file, lotion, massage, other	Yes ☐ No ☐ other, describe	Yes ☐ No ☐ other, describe
Recommendations, Education & Referral	Daily hygiene, dry between toes, foot inspection, other	Daily hygiene, dry between toes, foot inspection, other
Additional Comments	_____	_____
Return to Clinic		
Nurse Provider		

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- Provider wears protective gear; gloves and eye shield
- Client seated in a comfortable chair with supporting arm rests
- Provider seated on a stool in front of client
- Remove stockings and shoes, if applicable
- Assess lower extremities and feet prior to soaking
- Begin assessment with lower extremities and progress to the feet *see Using the Tool for assessment inclusion criteria
- Soak feet in tepid water (95 degrees F) for 5 minutes using mild foot soap. *place soap powder in basin first, then add water
- Remove one foot at a time for foot care
- First, dry foot with special attention to dry between the toes (may use 2 x 2 gauze to remove excess debris)
- Inspect between toes and top and bottom of foot
- File, in one direction, corns and/ or calluses using a large foot file
- Remove debris under the nail using a beveled wooden stick (orange wood stick)
- The above step identifies the hyponychium borders under the nail
- Compress and secure base of nail to be trimmed
- Hold nail nippers with the flat edge of nipper against nail
- Trim nails to the contour of the toe, taking small nips in the nail as you progress across the nail
- File nails in a downward direction
- Apply lotion; avoid toe web spaces
- Massage feet and lower legs, if not contraindicated
- Begin the above procedure on the second foot
- Client teaching threaded throughout encounter
- Referrals to specialists, if applicable
- Contract with client for follow-up appointment and return to clinic (RTC)
- Assist client with putting on socks (clean) and shoes

The following links access sites of relevance to podiatric medicine.

Leap Program site with use of monofilament

http://fohweb.macarthur.uws.edu.au/podiatry/medlinks.htm