

Behavior and knowledge: basis for prevention of diabetic foot**Comportamento e conhecimento: fundamentos para prevenção do pé diabético**Comportamiento y conocimiento: fundamentos para la prevención del pie diabético***Roseanne Montargil Rocha¹, Maria Lúcia Zanetti², Manoel Antônio dos Santos³****ABSTRACT**

Objective: To describe the knowledge and behaviors of patients with diabetes towards foot care. **Methods:** A cross-sectional descriptive study was conducted at a university research and intervention center in the interior of the state of São Paulo. Data were collected through interviews, two specific questionnaires, and physical examination of the foot in 55 patients in 2005. **Results:** The participants did not recognize the dimension of the true risks regarding lack of foot care. The participant knowledge of diabetes did not translate into actions to prevent foot problems. These results suggest the need to take into consideration specific individual characteristics and the individual's interactions with the environment in designing educational interventions. **Conclusions:** Health care professionals need to understand that discrepancy between knowledge and behaviors of patients with diabetes is not an obstacle impossible to cross, but a challenging issue that needs to be addressed.

Keywords: Diabetes mellitus; Primary prevention; Diabetic foot/prevention & control; Health behavior; Health knowledge, attitudes, practice

RESUMO

Objetivo: Identificar o conhecimento e comportamento de pessoas diabéticas em relação aos cuidados com os pés. **Métodos:** Estudo descritivo e transversal realizado em um centro de pesquisa e extensão universitária do interior paulista, em 2005. Foram entrevistados 55 pacientes diabéticos. Para a obtenção dos dados utilizamos um formulário, dois questionários e exame físico dos pés. **Resultados:** As pessoas diabéticas não reconhecem a dimensão do risco real com relação aos pés. O conhecimento referido nem sempre se traduz na adoção de ações de autocuidado para a prevenção de problemas relacionados aos pés. Esta realidade aponta para a necessidade de considerarmos as particularidades de cada sujeito e sua interação com o ambiente, para delineamento das intervenções educativas. **Conclusões:** É preciso que os profissionais de saúde compreendam que o descompasso entre conhecimento e comportamento dos diabéticos não deve ser interpretado como um obstáculo intransponível, mas como um dos desafios fundamentais que precisam ser enfrentados.

Descritores: Diabetes mellitus; Prevenção primária; Pé diabético/prevenção & controle; Conduta de saúde; Conhecimentos, atitudes e prática em saúde

RESUMEN

Objetivo: Identificar el conocimiento y comportamiento de personas diabéticas en relación a los cuidados de los pies. **Métodos:** Estudio descriptivo y transversal realizado en un centro de investigación y extensión universitaria del interior paulista, en el 2005. Fueron entrevistados 55 pacientes diabéticos. Para la obtención de los datos utilizamos un formulario, dos cuestionarios y examen físico de los pies. **Resultados:** Las personas diabéticas no reconocen la dimensión del riesgo real en relación a los pies. El conocimiento referido no siempre se traduce en la adopción de acciones de autocuidado para la prevención de problemas relacionados a los pies. Esta realidad apunta hacia la necesidad de considerar las particularidades de cada sujeto y su interacción con el ambiente, para el delineamiento de las intervenciones educativas. **Conclusiones:** Es preciso que los profesionales de salud comprendan que el descompás entre conocimiento y comportamiento de los diabéticos no debe ser interpretado como un obstáculo intransferible, sino como uno de los desafíos fundamentales que precisan ser enfrentados.

Descriptores: Diabetes mellitus; Prevención primaria; Pie diabético/prevenición & control; Conducta de salud; Conocimientos, actitudes y práctica en salud

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INTRODUCTION

Diabetic foot is one of the most incapacitating chronic complications resulting from poor disease management. It has a social and economic impact on families, health system, and society as a whole in both developing and developed countries⁽¹⁾.

Diabetic foot is the main cause for hospital admissions in diabetic patients and accounts for 6% of all admissions in the United States. In Brazil, the prevalence of foot ulcers is 5% to 10% in type 2 diabetic patients⁽²⁾.

Lower limb conditions such as diabetic neuropathy, peripheral vascular disease, ulcers, and limb amputations are seen twice as much in diabetic compared to non-diabetic patients affecting 30% of those aged 40 or more⁽³⁾.

It is estimated that at least 15% of diabetic patients will develop a foot lesion in their lifetime⁽⁴⁾. A study has showed that 28% of patients followed up in a health care clinic developed foot lesions over a 30-month period⁽⁵⁾.

Diabetic neuropathy is a major factor for the development of lower limb ulcers affecting 50% of all diabetic patients over 60. This condition may be present before their loss of protective sensitivity and it makes them more susceptible to trauma and poses a 7-fold increased risk of ulcers⁽⁶⁻⁸⁾.

A serious challenge for early diagnosis of diabetic patients at high risk of lower limb ulcers is inadequate foot care and foot self-examination. Studies have reported that, in patients diagnosed with diabetes who were admitted to hospitals, 10% to 19% of them had their feet examined after footwear and socks were taken off⁽⁹⁻¹⁰⁾.

However, it is well-established that 85% of diabetic foot problems are preventable with specialized care⁽¹⁾.

Current recommendations for adequate prevention and intervention include identification of risk factors such as diabetic neuropathy, peripheral vascular disease, and structural foot deformities using soft and soft-to-intermediate technology⁽¹⁾.

For successful prevention efforts there is a need to further explore foot care knowledge and behaviors in diabetic patients. To achieve the goals of diabetes education, patients should be encouraged to take a proactive attitude toward self-care, they need to change old life habits which would require converting information into action⁽¹¹⁾.

Health providers should involve diabetic patients in all stages of the education process. For shared therapeutic responsibility patients have to broaden their specific knowledge and develop skills for self-care. Hence, they must clearly know what they need, what they praise and what they want in life.

Health education is intended to provide successful

learning experiences to facilitate voluntary behavior changes for improving health and quality of life. Health education for diabetic foot prevention should include personal development that would enable people to change their foot care behavior. There is a need to create facilitating conditions for strengthening and maintaining desired behaviors where diabetic patients are committed partners involved in the education process.

While caring for chronic patients, health providers should assess patients' willingness to learn using effective learning approaches. The assessment of patient knowledge and skills, especially their ability to deal with daily problems, is a key component of foot self-care.

There is no consensus on the best education approach but it has been evidenced that, in the short run, knowledge improvement is accompanied of, though slight, risk reduction of ulcers and amputations. Special attention should be paid to those patients at high risk for the development of ulcers and they should be followed up every three months. Raising awareness is crucial since removing calluses is known to reduce plantar pressure by 26%⁽¹²⁾.

Recognizing that both foot care knowledge and behaviors are critical for the prevention of lower limb complications in diabetic patients, and that there are scarce Brazilian studies on this subject, the objective of the present study was to assess foot care knowledge and behaviors in diabetic subjects.

METHODS

Descriptive cross-sectional study conducted at a university facility in an inner city of the state of São Paulo, southeastern Brazil, in 2005. A convenience sample was drawn including 55 diabetic patients registered at the study facility who met the following inclusion criteria: having type 1 or type 2 diabetes; being enrolled in the Diabetes Education Program offered at the facility; and agreeing to participate in the study by signing a free informed consent form. Exclusion criteria were cognitive and sensory deficits or mental disorder that would make subjects unable to answer the questionnaire.

Sociodemographic (gender, age, schooling, family income) and clinical (type of diabetes, time since diagnosis, type of treatment, comorbidities, body mass index [BMI]) variables were collected using a questionnaire. In addition to clinical history, information on skin, and cardiovascular changes, and autonomic, motor, and sensory neuropathy were collected through foot examination using 10-g Semmes-Weinstein monofilaments and a 128-Hz pitchfork for measuring vibratory and tactile sensitivity.

For the assessment of knowledge and behaviors, two questionnaires were specifically developed for this study

based on the International Consensus on the Diabetic Foot guidelines⁽¹⁾. Both questionnaires were first evaluated by three diabetes specialists for instrument adequacy and then pre-tested in three diabetic patients registered at the facility. The instruments showed to have clear language and to be suitable to achieve the proposed objectives.

Each questionnaire consisted of 24 multiple choice questions in a checklist format. For each question there was only one correct answer. Both instruments had the same contents but with different phrasing. The order of item presentation, sequence of choices and verbs used in the questions were periodically changed to prevent patients to memorize them.

Data was collected during individual face-to-face interviews in an especially reserved comfortable room at the facility. First the questionnaire assessing behaviors was administered and subjects were asked to answer the questions that reflected their current foot care at home regardless of whether their answers were correct or wrong. Then subjects underwent foot examination⁽¹⁾. A questionnaire about knowledge was applied after everything else to avoid any influence on subjects' self-assessment of their behaviors.

Knowledge and behaviors were measured by summing up the scores obtained from each correct answer. Each correct answer scored one point. The total score was 24 points.

Data were coded and entered into an Excel spreadsheet and analyzed in SPSS program v. 11.5. Descriptive statistics were used to present all results.

RESULTS

Sociodemographic and clinical characteristics

Of 55 (100%) diabetic subjects included in the sample, 72.7% were females aged 29 to 79 years. Mean age was 59.7 years old, and 56.4% were older than 60. Also, 33.3% of males and 40.0% of females aged between 60 and 69 years, accounting for 38.2% of the entire sample. Of all subjects studied, 96.4% had type 2 diabetes.

In the sample, 41% had up to eight years of schooling. As for family income, 52.7% reported three to five monthly minimal wages (MMWs) and 20.0% one to two MMWs; 72.7% of the subjects were low-income. In regard to time since diabetes diagnosis, 40.0% had six to 10 years of disease and 32.7% one to five, mean 9.7 years.

As for diabetes management, all subjects reported following a special diet; 65.0% engaged in any physical activity; 74.5% used oral antidiabetic agents and 36.4% insulin.

With respect to clinical risk for diabetes complications, 70.9% had arterial hypertension, 50.9% cataracts, 30.9% peripheral vascular disease, 23.6% retinopathy, and 16.4% acute myocardial infarction. It should be noted that 63.6%

had BMI higher than 30 kg/m², i.e., obesity.

Conditions predisposing for the development of diabetic foot disease

Table 1 shows data related to skin and cardiovascular changes, and autonomic, motor, and sensory neuropathy predisposing diabetic foot complications.

Sensory neuropathy was evaluated using vibratory and tactile sensitivity tests and the Achilles reflex test. Of 55 subjects studied, 98.2% showed vibratory sensitivity. One subject did not have local sensitivity in the metatarsal head. As for tactile sensitivity, 40% did not show any sensitivity in the 10-g monofilament in at least one of 10 spots tested as recommended⁽¹³⁻¹⁴⁾. All subjects showed intact sensitivity in Achilles reflex test.

Foot care behaviors

In the assessment of foot care behavior, low scores were found for correct answers on adequate foot care. Mean score was 12.9, ranging between 7.5 and 18. It should be mentioned that 36.4% of subjects provided less than 50% correct answers. Figure 1 presents adequate and inadequate foot care behaviors found.

As for adequate behaviors, 78.2% did not use heating pads on their feet, 78.2% checked inside their footwear before wearing them, 70.9% dried between their toes when their feet were wet, 65.4% wore leather footwear, 60.0% wore comfortable soft footwear, and 60.0% avoided going barefoot.

On the other hand, as for inadequate behaviors, 98.2% wore open home and street footwear, 89.1% wore seam or seamless footwear, 85.4% removed their calluses with inappropriate nail files and chemical products, 83.6% cut their toe nails inappropriately, very short and round, 83.6% bought footwear in the morning or early afternoon; 80.0% wore seam dark socks, 78.2% did not lubricate their feet on a daily basis, 69.1% trimmed their cuticles, 67.3% did not examine their feet on a daily basis, and 63.6% used emollients between their toes.

Foot care knowledge

Subjects' foot care knowledge was satisfactory. Mean score of correct answers was 16.6, ranging between 10 and 22; 65.4% provided between 54.2% and 75.0% correct answers.

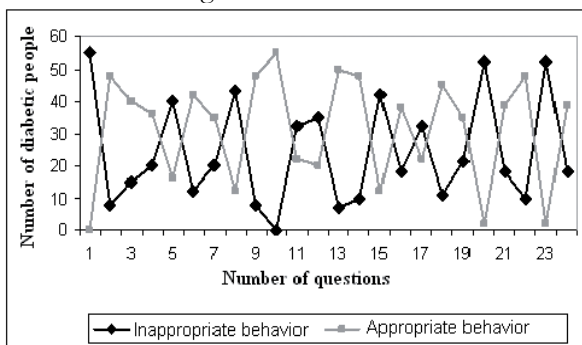
Figure 2 presents the subjects' correct and wrong knowledge on foot self-care.

In regard to correct foot care knowledge, all subjects reported they checked their footwear before wearing it, 94.5% were aware of the importance of daily foot washing, 87.3% said it was important to dry between the toes, 83.6% knew they should avoid going barefoot, 81.8% reported they should examine their feet everyday, and 54.5% said they know their nails should be cut properly.

Table 1 – Distribution of identified risk factors for the development of diabetic foot in diabetic patients registered at a university facility

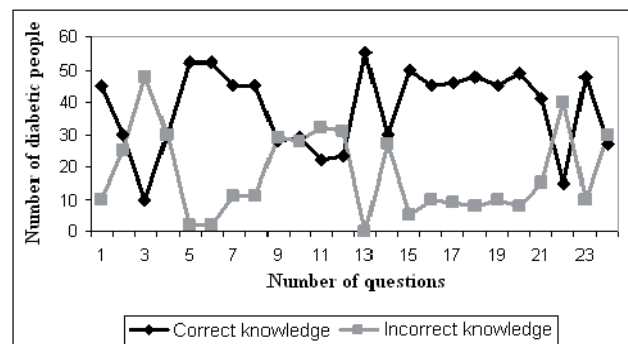
Risk factors	Signs and symptoms	n	%
Local skin changes	Inadequate nail cutting	51	92.7
	Ingrown toenails	41	74.5
	Hypertrophic frail nails	30	54.5
	Increased moisture and white mass between toes	14	25.4
Cardiovascular changes	Feet redness in down position	52	94.5
	Varicose veins	40	72.7
	Edema	34	61.8
	Abnormal tibial pulse	12	21.8
	Hairless skin	7	12.7
	Intermittent claudication	6	10.9
	Abnormal pedious pulse	1	1.8
Autonomic neuropathy	Dryness	51	92.7
	Fissures	21	38.2
	Charcot's arthropathy	1	1.8
Motor neuropathy	Calluses	55	100
	Claw toes	36	65.5
	Plantar instep alterations	34	61.8
	Plantar arch alterations	28	50.9
	Prominence of metatarsal heads	20	36.4
	Hallux hammer toe	16	29.1
Sensory neuropathy	Cramps	24	43.6
	Numbness	22	40.0
	Tingling	21	38.2
	Burning pain	14	25.5
	Paresthesia	11	20.0
	Hyperesthesia	1	1.8

As for wrong knowledge about foot self-care, 72.7% did not mention daily foot lubrication, 58.2% were not aware of the best time of the day to buy footwear, and 56.4% did not know the type of soap that should be used in foot washing.

**Figure 1** – Number of diabetic people, according to the answers to questions regarding essential foot care that correspond to appropriate or inappropriate behavior.

DISCUSSION

Most subjects studied were females (72.7%) aged between 60 and 69 years (38.2%). The subjects studied had similar gender and age as described in nonrandomized studies⁽¹⁵⁻¹⁷⁾ which showed a predominance of women. It should be stressed that prevalence studies carried out in Brazil and in the city of Ribeirão Preto did not find any significant

**Figure 2** – Number of diabetic people, according to the answers to questions regarding essential feet care that correspond to correct or incorrect knowledge

differences between men and women⁽¹⁸⁻¹⁹⁾.

The sample studied was characterized by low schooling; 41% had up to eight years of education. Patients with low education have more difficult access to information and find it harder to understand the complex disease mechanisms and treatments provided, thus limiting their opportunities for gaining knowledge about health care⁽²⁰⁻²¹⁾. As for family income, the majority (72.7%) had up to five MMWs from retirement plans or diabetic elderly allowance.

Most subjects studied (96.4%) had type 2 diabetes. The predominance of type 2 diabetic elderly patients in this study shows a need for reviewing education and care

strategies. The aging process is characterized by major physical, psychic, and social changes that affect individuals living longer⁽²²⁾ and elderly patients generally have cognitive deficits with reduced intellectual ability, and altered memory, logical reasoning, and judgment.

In regard to time since diabetes diagnosis, 40% of subjects had diabetes for 6 to 10 years, mean 9.7 years. The longer the time since diagnosis, the more likely they are of developing diabetic foot neuropathy and ulcers. A study demonstrated that 20 years of diabetes pose high risk for peripheral vascular disease. It is thus vital to identify risk factors for this condition⁽²³⁾.

The association between time since diabetes diagnosis and chronic complications shows that diabetic neuropathy is present in 8% to 12% of type 2 diabetic patients at the time of diabetes diagnosis and in about 50% to 60% of them 20 to 25 years later⁽²⁴⁾.

With respect to the prescribed diet, all subjects reported following their nutritionist's or their doctor's advice; 65% engaged in any physical activity such as walking or weight lifting; 74.5% used oral antidiabetic drugs and 36.4% insulin. These findings are corroborated in the literature that shows 68.5% of patients use oral drugs and 31.5% insulin⁽²⁵⁾. A Brazilian study reported that about 22% of diabetic patients did not follow any treatment⁽¹⁸⁾. Another study conducted in Salvador, northeastern Brazil, reported that 30.5% of diabetic patients did not follow treatment regularly⁽²⁶⁾.

With respect to risk factors for diabetic foot complications, 70.9% of the patients studied had arterial hypertension, 49% dyslipidemia, 24% retinopathy, and 31% peripheral vascular disease. It is also remarkable that 63.6% of diabetic subjects were obese (BMI higher than 30 kg/m²). The Brazilian Consensus on Diabetes points that even small weight reductions (around 5% to 10%) can lead to significant improvement of blood pressure levels and cardiovascular mortality.

The study found the following risk conditions for the development of foot ulcers: fungal infections of the nails, ingrown toenails, incorrect nail cutting, edema, varicose veins, abnormal tibial pulse, foot dryness, fissures, claw toes, plantar arch and instep alterations, prominence of metatarsal heads, calluses, tingling, numbness, and cramps.

Local skin changes are also a reflex of social and economic obstacles as diabetic patients may have difficult access to proper footwear, inner sole of shoes, creams, among others to prevent foot conditions. A study investigating foot conditions found that 71.7% of people had adequate foot hygiene; however 49% had anhydrosis while 48% had thick, hypertrophic toenails⁽²⁷⁾.

Another study identified foot deformities in elderly patients and 81.4% of them also had calluses⁽²⁸⁾. Preexisting toe deformities such as hallux hammer toe, metatarsal compression, and bone protrusions make skin more

susceptible to breakdown and infection in diabetic patients. Lesions in motor nerves result in toe deformities such as claw toes, crossover toes, among others⁽²⁹⁾. Claw toes were found in 31.7% of patients, crossover toes in 23.3%, and prominence of metatarsal heads in 18.3%⁽³⁰⁾. In addition, 75% wore inadequate footwear and 65% inadequate nail cutting.

Diabetic patients with risk factors for foot complications need to wear appropriate custom-made footwear following the recommendations of the International Consensus on the Diabetic Foot⁽¹⁾. Inadequate footwear predisposes to external foot injuries and is a contributing factor of foot ulcers in as much as 85%⁽²⁾.

In regard tactile sensitivity, 29% of the subjects studied had three to ten non-sensitive spots, indicating compromised plantar protective sensitivity.

As for adequate foot care behaviors, more than 50% of subjects used to dry between their toes, did not use heating pads, wore comfortable soft footwear, and checked their footwear before wearing them. These findings are consistent with other studies⁽³⁰⁾ that found diabetic patients were generally aware of the need of adequate foot care but their self-care was inadequate, even though more than 60% wore close footwear and 85% reported foot washing with water and soap and drying them properly.

As for inadequate foot care behaviors, more than 50% of subjects did not lubricate their feet and used to apply emollients between their toes, which favors spread of fungal infections; they did not examine their feet on a daily basis, they cut their toenails very short and round; wore seam dark socks; trimmed their cuticles; used open home and street footwear; removed calluses against medical advice using inappropriate procedures and products.

Another study⁽³⁰⁾ reported that most diabetic patients deemed foot care important for diabetic foot prevention but only half of them examined them on a daily basis. The reasons found for their difficulty in foot care were short time since diagnosis (less than one year); patient unawareness of foot conditions; foot examinations performed only in follow-up visits; diabetic subjects were not aware of the need to examine their feet; advanced age making foot examination difficult; and no family support. Unawareness of the importance of adequate footwear was also reported⁽³⁰⁾. These authors found that, despite all information available, 19.1% still did not avoid going barefoot.

The findings of the present study are concerning. Diabetic patients are unaware of their actual risk for diabetic foot complications. It is also noteworthy that they do not perceive changes, especially local skin and motor foot alterations, as risks for foot ulcers. They tend to follow specific pieces of advice unaware that the risks are associated to the inadequate behaviors they have.

The study findings are consistent with those reported in recent studies, which have underscored the need for health providers to focus their attention on providing regular careful foot care to diabetic patients⁽³¹⁾. Also, it was evidenced the need for strengthening education activities as a strategy for maximizing self-care and reinforcing the importance of good glucose management as key to diabetic foot prevention.

CONCLUSION

The present study shows foot care behaviors in diabetic patients as well as the knowledge they gain over the course of their disease. It evidenced that this knowledge is not always translated into self-care actions for diabetic foot prevention. It points to the need for taking into consideration individual peculiarities and patient interaction with their environment while planning education inter-

ventions. Health providers should bear in mind that this unexpected gap between knowledge and behaviors should not be an insurmountable obstacle but rather a real challenge posed to them in their work.

The health team needs to develop strategies to encourage diabetic patients to follow adequate foot care behaviors and to find ways to overcome the obstacles to their adoption.

The knowledge patients gain on diabetes and basic foot care over the course of their disease do not assure the adoption and maintenance of adequate behaviors. However, it may help raise patients' awareness of their health, which can contribute to their education.

The findings of the present study underline a need for a change from traditional to critical education where patients are involved in thought process and the focus of education is shifted from an abstract sphere of information to a concrete level of actions and behaviors.

REFERENCES

- Grupo de Trabalho Internacional sobre Pé Diabético. Consenso internacional sobre pé diabético. Brasília: Secretaria de Estado de Saúde do Distrito Federal; 2001.
- Pedrosa HC, Nery ES, Sena FV, Novaes C, Feldkircher TC, Dias MSQ, et al. O desafio do projeto Salvando o Pé Diabético: terapêutica em diabetes. *Bol Méd Centro B-D de Educ Diabetes*. 1998;4(19):1-10.
- Gregg EW, Sorlie P, Paulose-Ram R, Gu Q, Eberhardt MS, Wolz M, Burt V, Curtin L, Engelgau M, Geiss L; 1999-2000 national health and nutrition examination survey. Prevalence of lower-extremity disease in the US adult population 40 years of age with and without diabetes: 1999-2000 national health and nutrition examination survey. *Diabetes Care*. 2004;27(7):1591-7.
- Reiber GE. The epidemiology of diabetic foot problems. *Diabet Med*. 1996;13 Suppl 1:S6-11. Review.
- Veves A, Murray HJ, Young MJ, Boulton AJ. The risk of foot ulceration in diabetic patients with high foot pressure: a prospective study. *Diabetologia*. 1992;35(7):660-3.
- Young MJ, Boulton AJ, Macleod AF, Williams DR, Sonksen PH. A multicentre study of the prevalence of diabetic peripheral neuropathy in the United Kingdom hospital clinic population. *Diabetologia*. 1993;36(2):150-4.
- Reiber GE, Vileikyte L, Boyko EJ, del Aguila M, Smith DG, Lavery LA, Boulton AJ. Causal pathways for incident lower-extremity ulcers in patients with diabetes from two settings. *Diabetes Care*. 1999;22(1):157-62.
- Young MJ, Breddy JL, Veves A, Boulton AJ. The prediction of diabetic neuropathic foot ulceration using vibration perception thresholds. A prospective study. *Diabetes Care*. 1994;17(6):557-60.
- Siitonen OI, Niskanen LK, Laakso M, Siitonen JT, Pyörälä K. Lower-extremity amputations in diabetic and nondiabetic patients. A population-based study in eastern Finland. *Diabetes Care*. 1993;16(1):16-20.
- Trautner C, Haastert B, Giani G, Berger M. Incidence of lower limb amputations and diabetes. *Diabetes Care*. 1996;19(9):1006-9.
- Péres DS, Santos MA, Zanetti ML, Ferronato AA. Difficulties of diabetic patients in the illness control: feelings and behaviors. *Rev Latinoam Enferm*. 2007;15(6):1105-12.
- Young MJ, Cavanagh PR, Thomas G, Johnson MM, Murray H, Boulton AJ. The effect of callus removal on dynamic plantar foot pressures in diabetic patients. *Diabet Med*. 1992;9(1):55-7.
- Wunderlich RP, Armstrong DG, Husain K, Lavery LA. Defining loss of protective sensation in the diabetic foot. *Adv Wound Care*. 1998;11(3):123-8.
- Ahroni JH. Preventing diabetic foot complications. *Adv Skin Wound Care*. 2000;13(1):38-9.
- Teixeira CRS, Zanetti ML. Custos de consultas médicas em pessoas com diabetes mellitus durante um programa educativo. *Rev Baiana Saúde Pública*. 2006;30(2):261-71.
- Otero LM, Zanetti ML, Teixeira CRS. Sociodemographic and clinical characteristics of a diabetic population at a primary level health care center. *Rev Latinoam Enferm*. 2007;15(N Esp):768-73.
- Salgado Filho N, Salgado BJJ, Brito LGO, Ferro GAC, Sampaio ALO. Perfil do paciente diabético internado no Hospital Universitário Presidente Dutra, São Luís, Maranhão. *Diabetes Clin*. 2001;5(5):333-8.
- Malerbi DA, Franco LJ. Multicenter study of prevalence of diabetes mellitus and impaired glucose tolerance in the urban Brazilian population aged 30-69 yr. The Brazilian Cooperative Group on the Study of Diabetes Prevalence. *Diabetes Care*. 1992;15(11):1509-16.
- Torquato MTCCG, Montenegro RM, Viana LAL, Souza RAHG, Lanna JCB, Durin CB, et al. Prevalência do diabetes mellitus, diminuição da tolerância à glicose e fatores de risco cardiovascular em uma população urbana adulta de Ribeirão Preto. *Diabetes Clín*. 2001;5(3):183-9.
- Gamba MA, Gotlieb SLD, Bergamaschi DP, Vianna LAC. Amputações de extremidades inferiores por diabetes mellitus: estudo caso-controle. *Rev Saúde Pública = J Public Health*. 2004;38(3):399-404.
- Pace AE, Foss MC, Ochoa-Vigo K, Hayashida M. Fatores de risco para complicações em extremidades inferiores de pessoas com diabetes mellitus. *Rev Bras Enferm*. 2002;55(5):514-21.
- Kalache A, Veras RP, Ramos LR. O envelhecimento da população mundial: um desafio novo. *Rev Saúde Pública*. 1987;21(3):200-10.

23. Gamba MA. A importância da assistência de enfermagem na prevenção, controle e avaliação à pacientes portadores de diabetes com neuropatia e vasculopatia. *Acta Paul Enferm.* 1991;4(2/4):7-19.
24. Armstrong DG, Hussain SK, Middleton J, Peters EJ, Wunderlich RP, Lavery LA. Vibration perception threshold: are multiple sites of testing superior to single site testing on diabetic foot examination? *Ostomy Wound Manage.* 1998;44(5):70-4,76.
25. Bernardes CHA, Penteadó JG, Martins MFS, Rosa VA, Tinós MS. Pé diabético: análise de 105 casos. *Arq Bras Endocrinol Metab.* 1993;37(3):139-42.
26. Lessa I. Epidemiologia do tratamento e da adesão ao tratamento da hipertensão arterial e do diabetes mellitus. In: Lessa I, organizadora. *O adulto brasileiro e as doenças da modernidade: epidemiologia das doenças crônicas não-transmissíveis.* São Paulo: Hucitec/ ABRASCO; 1998. p.223-39.
27. Scapim EP. Perfil dos pacientes com diabetes mellitus que possuem úlcera no pé, atendidos em unidade ambulatorial da cidade de Marília-SP [dissertação]. Ribeirão Preto: Escola de Enfermagem de Ribeirão Preto da Universidade de São Paulo; 2004.
28. Mendes MRSSB, Novakoski LER. O cuidado com os pés do senescente: um processo em construção. *Texto & Contexto Enferm.* 2000;9(2 Pt 2):752-63.
29. Levin ME. Preventing amputation in the patient with diabetes. *Diabetes Care.* 1995;18(10):1383-94.
30. Barbui EC, Cocco MIM. Conhecimento do cliente diabético em relação aos cuidados com os pés. *Rev Esc Enferm USP.* 2002;36(1):97-103.
31. Ochoa-Vigo K, Pace AE. Pé diabético: estratégias para prevenção. *Acta Paul Enferm.* 2005;18(1):100-9.