

Prevention of chronic complications of diabetes mellitus according to complexity

Prevenção das complicações crônicas do diabetes mellitus à luz da complexidade
Prevención de las complicaciones crónicas de la diabetes mellitus a la luz de la complejidad

Maria Aparecida Salci¹, Betina Hörner Schlindwein Meirelles¹, Denise Maria Vieira Guerreiro da Silva¹

¹ Federal University of Santa Catarina, Postgraduate Program in Nursing. Florianópolis, Santa Catarina, Brazil.

How to cite this article:

Salci MA, Meirelles BHS, Silva DMVG. Prevention of chronic complications of diabetes mellitus according to complexity. Rev Bras Enferm [Internet]. 2017;70(5):996-1003. [Thematic Edition "Good practices and fundamentals of Nursing work in the construction of a democratic society"] DOI: <http://dx.doi.org/10.1590/0034-7167-2016-0080>

Submission: 03-29-2016

Approval: 03-09-2017

ABSTRACT

Objective: To assess the prevention by primary health care providers of chronic complications of diabetes mellitus according to the complex thinking theoretical approach. **Method:** Evaluative research based on the complex thinking theoretical approach. The following techniques for data collection were used: interviews with 38 participants; observation in collective and individual appointments; and analysis of medical records of people with diabetes. The triangulation applied for data analysis was the ATLAS.ti software. **Results:** The prevention and management of chronic complications of diabetes did not meet the requirements set forth by ministerial public policies aimed at this population. Systematic monitoring to prevention of chronic complications showed significant gaps. **Final considerations:** Primary health care did not consider preventive actions for diabetes mellitus complications. This context was marked by disjunctive, fragmented, and dissociated practices types of care targeted to the totality of the assisted people.

Descriptors: Complications of Diabetes; Primary Health Care; Assessment of Health Services; Diabetes mellitus; Chronic Disease.

RESUMO

Objetivo: Avaliar a prevenção de complicações crônicas do diabetes *mellitus* a luz do referencial teórico do Pensamento Complexo por integrantes da atenção primária à saúde. **Método:** Pesquisa avaliativa, que teve como referencial teórico o Pensamento Complexo. Como técnicas de coleta de dados foram utilizadas: entrevista com 38 participantes; observação nos atendimentos coletivos e individuais; e análise em 25 prontuários de pessoas com diabetes. A triangulação subsidiou a análise de dados que teve auxílio do *software* ATLAS.ti. **Resultados:** A prevenção e o manejo das complicações crônicas do diabetes não atendiam ao estabelecido nas políticas públicas ministeriais destinadas a esse público. O acompanhamento sistematizado para controle da prevenção das complicações crônicas apresentou importantes lacunas. **Considerações finais:** A assistência na atenção primária não contemplava ações de prevenção de complicação do diabetes *mellitus*. Esse contexto era por marcado por práticas disjuntivas, fragmentadas e dissociadas de uma assistência que visa a totalidade das pessoas assistidas.

Descritores: Complicações do Diabetes; Atenção Primária à Saúde; Avaliação de Serviços de Saúde; Diabetes *mellitus*; Doença Crônica.

RESUMEN

Objetivo: Evaluar la prevención de complicaciones crónicas en diabetes mellitus a la luz del referencial teórico del Pensamiento Complejo en actantes de atención primaria de salud. **Método:** Investigación evaluativa con Pensamiento Complejo como referencial teórico. Datos recolectados mediante entrevista con 38 participantes; observación de atenciones colectivas e individuales; y análisis de 25 historias clínicas de personas con diabetes. La triangulación facilitó el análisis de datos, realizado con *software* ATLAS.ti. **Resultados:** La prevención y el manejo de las complicaciones crónicas de la diabetes no atendían lo establecido en las políticas públicas ministeriales dirigidas a tal público. El seguimiento sistematizado para control de prevención de complicaciones crónicas mostró importantes fallas. **Consideraciones finales:** La asistencia en atención primaria

no contemplaba acciones de prevención de complicaciones de la diabetes mellitus. El contexto estaba cargado de prácticas disyuntivas, fragmentadas y disociadas de una atención que apunta a la totalidad de las personas atendidas.

Descritores: Complicaciones de la Diabetes; Atención Primaria de Salud; Evaluación de Servicios de Salud; Diabetes Mellitus, Enfermedad Crónica.

CORRESPONDING AUTHOR Maria Aparecida Salci E-mail: masalci@uem.br

INTRODUCTION

All around the world, costs incurred in health systems for treating people with diabetes mellitus (DM) are high, resounding, and alarming. Estimates show a trend of increases in the number of people with this disease and its complications. This has led many countries to restructure their public policies to reduce these statistics and resolve the impacts of these costs on health systems in a near future⁽¹⁻²⁾.

Chronic complications of DM point to a series of complex events in its singularity, and also to a complex network of care when analyzed in its plurality. Keeping glucose levels controlled is seen as an effective preventive measure to lower the risk and progression of chronic complications⁽³⁻⁴⁾. Effective therapeutic plans require multiple interventions, both pharmacological and non-pharmacological: changes in lifestyle; regular physical activities; strict food intake control; correct use of pharmacotherapy; periodic follow-up with consultations and laboratory tests; smoking cessation; blood pressure control; immunizations; psychosocial attention; and detection and treatment of chronic complications⁽⁵⁾.

Since it includes the concepts of systems and integrity of network systems, complexity theory fosters understanding of this context in all its dimensions and contradictions. This theory allows recognition of multiple aspects of a reality, based on the scientific principle of multidimensionality, which asserts that a reality should be contemplated and respected based on its characteristics of being intrinsic, historical, sociological, and ethical, in addition to being complex⁽⁶⁾.

In this regard, the Ministry of Health (MS) protocols for DM care, geared towards primary health care (PHC) professionals, emphasize that some follow-up for DM patients should include prevention, identification, and management of these complications, carried out by trained staff with specific tasks. This care should include organization of therapeutic plans and references and counter-references coordinated by the primary care network within the health system⁽⁵⁻⁷⁾. These protocols are considered a reference for professionals in the Family Health Strategy (FHS) program, for integrating the current care model in Brazil.

Therefore, the objective of the present study was to assess the prevention of chronic complications of diabetes mellitus by primary health care providers according to complex thinking.

METHOD

Ethical aspects

The project was evaluated and approved by the Human Research Ethics Committee of Federal University of Santa Catarina, and authorized by the Health Office of the referenced city.

All participants signed two copies of the Free and Informed Consent Form. During the development of the study, all participants were kept confidential and anonymous; to assure identity protection, they were identified by occupation and/or position followed by the letter P and a number corresponding to the interview in the ATLAS.ti software.

Theoretical-methodological approach

The complex thinking theoretical approach was utilized, due to its ability to study complex phenomena of human life. This approach allows a broader view for understanding all dimensions of the context of interest and the multiple contradictions involved⁽⁶⁾.

The methodological approach was evaluative research. This type of evaluation covers the responsibilities and strictness of studies understood as academic, and also questions related to evaluation as a research strategy⁽⁸⁾.

Type of study

Qualitative study.

Methodological procedures

Study setting

The study was carried out in a medium-sized city located in the state of Paraná.

Data source

Thirty-eight health professionals participated in the study: 29 members of five family health teams (FHTs), consisting of 5 physicians, 5 nurses, 4 nursing assistants, and 15 community health agents (CHAs); 6 professionals from 3 family health support centers (FHSCs), consisting of 2 pharmacists, 1 physical therapist, 1 psychologist, 1 social assistant, and 1 nutritionist; and 3 managers, consisting of 2 directors of primary health care units (PHCUs), and 1 linked to city government.

For selection of the sample, the Primary Health Information System (PHIS) database was searched in order to find the FHTs that had the highest number of people with DM registered in their coverage areas. Initially, it was thought that these professionals were prepared to provide care to this population and, consequently, capable of providing information relevant to the theoretical concepts of the study.

The FHSC participants and managers were selected from among the first group studied as a reference, that is, from among FHT professionals. Thus, the current study intended to broaden the understanding of professionals regarding care for people with DM, allowing more extended evaluation of the care practices provided to them.

As an additional data source, monitoring of collective and individual care provided by the health professionals to people with DM was carried out, along with analysis of the patient records, which served to confirm what the health professionals pointed out during the interviews.

Data collection and organization

Data collection took place from December 2013 to May 2014, utilizing three techniques: interviews, observation, and analysis of patient records. Open interviews were conducted for which an interview guide was obtained; however, further questions were added according to the need to deepen exploration of the topic. All interviews took place on pre-scheduled days, hours, and places. They were conducted by the researcher and recorded with an electronic audio device. The average duration of the interviews was 1 hour and 15 minutes.

The observations took place during group appointments and some individual appointments in the FHTs for people with DM, and the data was recorded by the researcher in a field diary. For the analysis of the patient records, 5 from each team were selected, totaling 25 records for people diagnosed with DM as indicated by nurses. Data related to care and follow-up of these people were extracted, with special attention paid to chronic complications of the illness. The extracted data included: diagnosis time; presence of chronic complications, behaviors, and follow-up; and frequency of appointments, requested exams, physical exams, referrals, and guidelines. These data were recorded on a form designed by the researcher, specified for each analyzed medical record. The conclusion of data collection met the information saturation criteria.

Data analysis

Data analysis triangulation was carried out, because it allows combination of several data collection techniques. This allowed the researcher to use information in a manner that encompasses interaction, intersubjective criticism, and comparison.⁽⁸⁾ Therefore, in the data analysis process, the statements of the participants, the observation of care practices, and the patient record data were taken into consideration.

In its turn, data analysis of the observations was carried out after concluding the interview data, in which observations were highlighted that contributed to better understanding of what the participants said. The medical record data were entered into a spreadsheet and were considered as a data analysis supplement.

ATLAS.ti 7.1.7 with license number 58118222, with a technological tool to help in the organization and analysis of the interview data, was used. For analysis of these data, the grounded theory⁽⁹⁾ analytical technique was applied, which involved the following steps: open coding, which had as a reference the identification of how professionals performed prevention of chronic complications; and axial coding, which resulted from gathering of codes on the axis, which corresponds to the formation of the submitted category "Prevention of chronic complications of DM in the PHC."

As reference for data-driven analysis, the analysis used the protocols established by the Ministry of Health for assisting people with DM: Primary Care Notebooks – Diabetes

Mellitus⁽⁷⁾; Primary Care Notebooks – Strategies for assistance to people with chronic disease – Diabetes Mellitus⁽⁵⁾.

RESULTS

The prevention and management of chronic complications of DM in the assessed setting of PHC diverged in several ways from the protocols for DM established by public policies. The way the assistance was organized was unable to meet the standards proposed by the Ministry. Systematic monitoring for effective control, with a focus on the prevention of chronic complications of DM, showed gaps. This may be attributable to a multiplicity of intervening factors involving the organization of the PHC system and the management, teams, and professional attitudes towards individual care, in a dynamic that reveals the complexity of monitoring and managing people with DM.

Prevention of chronic complications of diabetes mellitus in the primary health care context

This category consists of prevention actions for chronic complications of DM—cardiovascular diseases, diabetic retinopathy, diabetic nephropathy, diabetic neuropathy, diabetic foot, and oral changes—with regard to what is proposed by the Ministry protocols for DM prevention and management. The data shown here represent the development and conduct of the interviews regarding these complications, and how the PHC network operates in terms of specialties with the aim of preventing chronic complications of DM.

The prevention actions for chronic complications of DM during care provided by the FHT staff to people with DM were less expressive, whereas the considerations made regarding chronic complications of DM were related more to personal than professional experience. When they talked about people they had assisted, it was always about those who had experienced poor outcomes, such as amputation, blindness, kidney failure, or cardiovascular complications, and in which they had experienced the patients' suffering and death. These experiences made them aware of the seriousness of the situation to the extent of expressing concern; however, this did not always lead to actions that could change the situation.

They were more concerned about and focused on visible complications, that is, those they could only identify through examination, or just by looking at them. The more expressive were complications related to diabetic foot, reported as wounds. However, diabetic neuropathy did not show expressive valorization and was not seen as a precursor to foot complications that deserved attention and follow-up. Therefore, the complications only began to receive attention after further progression.

However, even though diabetic foot was referred to as the most concerning chronic complication, follow-up physical examination of the feet, as a measure capable of preventing the disease from progressing, was not carried out as a systematic and periodic activity. In the medical records assessed, entries referring to physical examination of the feet of people with DM and recommendations aiming at preventing the risk of ulcers and amputation of lower limbs were not found.

We are with a patient with a horrible foot wound, and the saddest thing is that he came with the last group, and later he came to get a medication and nobody asked anything or even looked at his foot. And, do you know what? Now, he is almost losing his foot... (Nursing Assistant-P8)

The second-most-mentioned chronic complication was diabetic retinopathy, considered as vision changes in people with DM. This complication was more valued after complaints of loss of visual acuity. The account of these complaints could mean irreversible vision impairment, as a result of failure to carry out adequate monitoring as a preventive measure. However, data referred to by the professionals and also reported in medical records showed referrals to ophthalmologists only after situations of complaints expressed by the patients.

I had the experience of a patient losing his foot. My father has diabetes and had retinal involvement, he can barely see. And I was always concerned about his foot. Because those are things that we can see. The vision is what he reports to me that today is fine and tomorrow maybe not. How am I supposed to check if one of his kidneys is harming him or not? It would be through laboratory testing. (Nurse-P4)

Renal and cardiovascular complications were mentioned less than the others as problems resulting from DM. This shows the difficulty of paying attention to complications that depend on other resources besides those that can be visually observed or mentioned by people as symptoms, since these complications need laboratory exams in order to be monitored.

Regarding cardiovascular complications, a prevailing thought was that those were changes already to be expected, regardless of interventions, since they were said to be a consequence of the chronification process and aging.

As far as I know, diabetes is a disease that consumes the body over time, with cardiovascular and brain involvement, which is a thing that the person will have, treated or not. Now, the diabetic foot is not so, sometimes a tiny callus turns into that thing that you have no idea, it is quite shocking! A small sore brings life to an end. Now, other problems in the body will happen no matter what. (Nursing Assistant-P7)

Cardiovascular complications were also not seen as a problem by professional nurses and physicians, in which blood pressure was the reference value most used for monitoring it, with absences of effective and periodical control of the dyslipidemias and by the specialist.

As for the metabolic control of dyslipidemias, despite being carried out, the professionals did not rely on standardization of periodicity required for the exams. It was identified that, for following up the laboratory tests as an essential tool for the prevention and control of chronic complications of DM, there seemed to be a "hidden consensus" that it was the responsibility of physicians. The nurses did not systematically assisted patients with DM, acting solely in situations in which patients were in decompensated states and complaining about what could be characterized as acute complications.

The computerized system included exams that were part of the protocol for DM and, generally, professionals would request them for first appointments. Subsequent exams for case control and management depended on the initiative and actions of the professionals, whereas the parameter that came closest to those action, among all physicians, was patient complaints.

For all new patients, I ask for the hypertension and diabetes exams based on the protocol that include: uric acid, CBC, lipid profile, fasting glucose, urine, and so on... the right protocol is in the management system. In addition, I request glycated hemoglobin. Now, if the patient is not insulin-dependent, I don't ask for the glycated, just the fasting glucose, then I evaluate, and if it's very altered, above 200, then I request a new glucose along with glycated for him; I do that most of the time. When the patient is already mine, who I already know, I request it every three months, but the system does not release, and tells me this: "next appointment for exam only in six months." Then, you have the option to supplement the diagnosis, and I request it then. For my patients, I ask practically every three months. (Physician-P9)

For managing diabetic neuropathy, the creatinine blood test was identified as frequently requested by the professionals in the medical records. However, records of requests for microalbuminuria were practically nonexistent. The justifications for not requesting this exam were related to the ability of general practitioners in conducting cases that showed changes, claiming that they needed a specialized professional for intervening with the altered results, which is hardly possible in the PHC context.

Regarding oral complications, the participants did not even mention them. However, in the PHCUs, there were dental clinics associated or for reference. But in practice, it seemed like a service that was just occupying the same physical space, since there was no integration among professional, nor any planning for coordinated care in this specialty capable of promoting preventive care for people with DM.

Dentistry is a department apart, not integrated with nursing nor physicians, the service is carried by themselves, the appointments are done there. We joke sometimes that it is a department that does not belong to the PHCU. You don't have contact, cannot make an appointment, you have to go there to get one with them, I know that when we have an emergency they respond, now, I don't know if it takes a long time. Nor even if they have a specific treatment for those with diabetes (Nursing Assistant-P7)

There is no schedule, it doesn't exist; for instance, one day is just for diabetics. There is not a program for diabetics. The objective is to prioritize care, I know that pregnant women have priority, and there are also those who have no teeth and end up being a priority as well. (Nurse-P3)

Lack of PHC support for specialties was also a problem mentioned by the study participants. There is great difficulty in finding specialized appointments. General practitioners

pinpoint this fact as a major problem when dealing with more complex cases, for which the need for evaluation and orientation arises, especially regarding referrals made by endocrinologists and changes in behavior of people with DM who show significant glycemic decompensation.

Regarding waiting time for specialized appointments, it could vary from six months to a year for ophthalmologists and more than a year for endocrinologists; appointments with cardiologists were generally within a period of six months. Counter-reference was also a specialty issue based on patient reports and medical prescriptions they received from specialists, since there were no records of evaluations, actions, and orientations for the FHT professionals to maintain follow-up in the PHCU.

As a result of all the current difficulties related to specialties in PHC, FHT professionals felt they weren't encouraged to request preventive follow-ups. This situation led to referrals only when faced with complaints and possibly when chronic complications had already settled in, making preventive actions impossible. However, this behavior is a reflection of the health system organization in which professionals take part, as the city manager stated:

We have the entrance door, which is primary care with the team, and from then on referrals. And is there any specific procedure for referrals to specialists for diabetics? Is there a vacancy there for them? No! They are part of the routine; they stand in the same line as anyone else. They will have priority if everything is complicated, then they are sent to the high (complexity), on average it is very tight. In high complexity, we are able to get more things, because there are fewer people. (City Manager-P34)

DISCUSSION

The way that care was handled and provided to people with DM by managers and FHT staff was marked by gaps and inabilities in spotting potential complications and efforts to stop them, and absence of a sense of purpose to avoid harming people and burdening the health system. These situations show that care of people with DM in PHC is fragmented and very far from the kind of assistance that could consider the integrity and totality needed for this process.

Regarding the feet of people with DM, the Ministry of Health suggests annual evaluations and indicates how they should be carried out; furthermore, it specifies risk ratings for diabetic foot and management according to level of risk, and stipulates basic educational guidelines for foot care.^(5,7) Several studies have shown that most foot complications could be prevented with low-complexity measures, and demand that the health system take responsibility for this in order to provide preventive care with full assessment in a timely manner to people with DM⁽¹⁰⁻¹¹⁾.

This is because when people seek health services with foot involvement, lesions are generally in the advanced stage and require surgical intervention. This significantly contributes to a scenario of disability, suffering, and high costs to the health system⁽¹²⁻¹³⁾.

Just like any other complications, ophthalmic complications are also costly to the health system, and preventive measures are more financially accessible than intervention measures. Exams to assess physiopathological changes in retinal blood vessels in people with DM, besides being considered essential for follow-up of these people, are not invasive and are cost-effective⁽¹⁴⁾.

For diabetic retinopathy, the Ministry suggests control of glycemic levels and blood pressure in PHC. It is necessary to request retinal mapping exams carried out by specialists for people with type 1 DM five years after diagnosis. However, for people with type 2 DM, the screening must be carried out at the time of the diagnosis; in case of normal results, the exam should be repeated every two years^(5,7).

According to the protocols for handling and managing DM in PHC, laboratory exams to meet the goals of glycemic, metabolic, and cardiovascular control must be requested at the following intervals: fasting glucose and glycated hemoglobin every three months until reaching control, then every six months; and LDL, HDL cholesterol and triglycerides annually^(5,7). Thus, requests for exams outside this schedule, without a justifiable need, cause costly losses in health care, and the same is true of subsequent requests that make follow-up to prevent chronic complications difficult for those who use these services.

Regarding the identification of individuals at risk of developing renal failure, microalbuminuria is considered the best tracer⁽⁵⁻¹⁵⁾. It is seen as important for prevention of renal complications, which are counterproductive for people's health and health system finances, due to their high cost in managing DM⁽¹⁶⁾. Furthermore, studies have shown that this is one of the most frequent complications; DM represents the leading worldwide cause of chronic renal disease, with estimates that, after 15 years of the disease, 10% to 20% of the people will develop nephropathy⁽¹⁷⁻¹⁹⁾.

The priority established for dental appointments is marked by the most urgent needs, mainly curative/welfare measures, not preventive. A study carried out in PHC showed that the provision of dental services was insufficient to cover the restrained demand of the coverage areas, which contributed to a contradictory practice in the concept of FHT access and reception⁽²⁰⁾.

However, periodontal exams must be considered part of the evaluation of people with DM, and health professionals should provide guidance on the need for a good glycemic control and adequate oral hygiene to minimize those risks⁽²¹⁾. A study of the National Policy on Oral Health, from a bio-ethical perspective in the comprehensive health care context, showed that despite advances in this policy, there is still a need for those involved to make greater efforts to actually achieve comprehensive health care⁽²²⁾.

According to the Ministry of Health, the basic measures for preventing periodontal disease include: glycemic control maintenance; oral hygiene with brushing and dental floss at least twice a day; constant follow-up to avoid tooth loss and gingival hemorrhage; and annual evaluation with dental surgeons^(5,7).

This study also highlighted lack of communication and care planning carried out by FHT professionals and dental clinics of reference for people with DM, as a common situation in which oral complications were not put into the care practice

context, since professionals did not even mention or show concern regarding this complication. Such attitudes diverge from what is expected in the relationship between professionals and people with chronic diseases within the health system, which is regular and extensive checking during treatment, including comprehension and valorization by professionals and the multidimensionality demanded by chronic conditions⁽⁵⁾.

Given the shortcomings in terms of the access and support given to FHT professionals when sending referrals to specialists, it is the responsibility of management to respond to shortcomings and disarray in the primary care network when dealing with specialties. This is necessary in the care process for people with DM at this level of care.

Specialties should serve as support, so FHT professional can provide referrals and share the most complex cases, in an attempt to provide new directions for handling shortcomings in referral by general practitioners. In addition, taking into consideration delays and difficulties in getting specialized appointments, specialists must make greater commitments to counter-referencing for FHT professionals, in a manner that is better developed and more detailed than just prescribing medications to people with DM. These remarks reinforce the paradigm that secondary/specialized care is precarious in public service⁽²³⁾, with a retroactive response to meeting primary care needs.

Therefore, people with DM end up receiving mere curative care, in which complaints are used as the reference to establish referrals, and must endure delays in getting specialized appointments in PHC; consequently, a combination of these factors contributes to the development and worsening of chronic complications. The current contradiction of the PHC focusing on the most complex cases, without effective involvement in preventing chronic complications of DM, is a reflection of a system that is still centered on curative care, without committing to or tackling the iatrogenic issues resulting from this practice. Another study also identified communication glitches among active professionals at various levels of care in the Unified Health System. This was reflected in flaws in the reference and counter-reference system, showing that it was practically nonexistent⁽²⁴⁾.

Thus, it is necessary to invest efforts and financial resources in the health care area to partially reverse these shortcomings, such as hiring enough specialized professionals to meet demand. In line with the public policy for DM, it is necessary to guarantee specialized appointments focused on prevention, and not just referrals that do not materialize into appointments when chronic complications have already settled in.

Taking into account the singularity of the care and the need to respect and understand people's heterogeneity and contexts, including the uniqueness and multiplicity of people living with a chronic disease such as DM, all these factors must be addressed by health professionals engaged in systematic monitoring of this population. This is especially true when considering the importance of people with DM receiving quality monitoring in PHC⁽²⁵⁾.

In light of this context, it is crucial that the professionals and managers who make up the PHC network pay more attention to all chronic complications of DM, with a focus on the

totality of people and the multiplicity of interventions needed for the prevention of these complications. They must adopt practices aiming toward the formation of proactive teams that can contemplate multidisciplinary and interdisciplinary actions based on their work.

As a result, in order to tackle the complexity and dynamics embedded in the health process/people with DM, it is necessary to overcome the linear causality of cause-effect in order to reach an understanding of mutually interrelated causality, which demands recognition of circular, retroactive-recursive needs with responses that meet integrality and totality⁽⁶⁾.

According to complex thinking, all systems involved in this assessment, understood as PHC health professionals, managers at different levels of care, and public policies related to this topic, are marked by dysfunction and decoupling. This has resulted from: the failure of health professionals to provide care to people with DM with a focus on prevention of chronic complications; managers not involving and motivating professionals to perform tasks that contemplate the prevention of chronic complications; and public policies created and sent to PHC without any inspection or control of the actions carried out by professionals and managers.

These shortcomings reveal a fragmented scenario, in which each social player ends up engaging in actions in a particular and individualized manner. Furthermore, the actions are driven by specific clinical complaints presented by the patients, without a more comprehensive assessment. They reveal simplified services, limited to what patients refers to, without an investigative and anticipating anamnesis for preventing chronic complications of DM.

However, based on complex thinking, this simplified paradigm is the result of a long-disseminated process. It involves social and cultural issues in an education system that has always taught people to isolate and sort things out. This has contributed to the fragmentation and decontextualization of facts, separating knowledge from understanding, favoring and reinforcing the construction of simplified principles in the human mind⁽⁶⁾. In the present study, the prevention of chronic complications of DM, besides receiving a fragmented connotation by the participants, is also decontextualized and simplified in the settings where they perform care, since it is not investigative and was indicated by the study participants as actions developed by them.

Study limitations

It is worth noting that this study was applied to a limited number of FHTs in one city, so there is a need to include other teams and other contexts. However, it reveals a reality that raises awareness of current problems not limited to this city, as the cited studies have shown.

Contributions to the health area

Regarding the care provided to people with DM in PHC, the present study encourages reactions that could stimulate changes in the prevention and management of chronic complications of the disease and subsidize new assessment in the area.

FINAL CONSIDERATIONS

The complex thinking theoretical approach allowed assessment of the prevention of chronic complications by primary health care providers by considering the care as integrated in a systemic and complex context, due to the plurality of intervening situations existing in the assessed reality.

The results emphasized that there were difficulties in the care provided to people with DM in PHC, which did not take into account what was proposed in the health care model established by the Ministry Health. This revealed significant gaps when compared to what was set forth by public policies.

Other findings were that: none of the chronic complications of DM were investigated; some were poorly valued; and others were not even acknowledged by health professionals as complications of DM. In the light of this context, prevention and management of chronic complications of DM constitute

a set of factors that demand involvement from all interested parties – patients, their families and social networks, health professional, managers, health services, the health system at all levels of care, and favorable and applicable public policies – in order enable everyone able to promote positive results for the lives of those with DM.

However, in order to apply the already prevailing public policies for DM, the professionals involved must be competence to broaden their interrelationships in the process of providing care to these people in PHC, including playing a more effective role and coordinating with all the professionals that are part of the primary care network.

ACKNOWLEDGEMENTS

To the Brazilian National Council for Scientific and Technological Development (CNPq) – doctorate scholarship.

REFERENCES

1. Zimmet PZ, Magliano DJ, Shaw JE. Diabetes: a 21st century challenge. *Lancet* [Internet]. 2014[cited 2016 Jan 15];2(1):56-64. Available from: [http://www.thelancet.com/pdfs/journals/landia/PIIS2213-8587\(13\)70112-8.pdf](http://www.thelancet.com/pdfs/journals/landia/PIIS2213-8587(13)70112-8.pdf)
2. Kearns B, Rafia R, Leaviss J, Preston L, Brazier JE, Palmer S, et al. The cost-effectiveness of changes to the care pathway used to identify depression and provide treatment amongst people with diabetes in England: a model-based economic evaluation. *BMC Health Serv Res* [Internet]. 2017[cited 2017 Jan 25];17(1):78. Available from: <http://bmchealthservres.biomedcentral.com/articles/10.1186/s12913-017-2003-z>
3. Wing J, Jivan D. Targeting composite treatment of type 2 diabetes in middle-income countries – walking a tightrope between hyperglycaemia and the dangers of hypoglycaemia. *S Afr Med J* [Internet]. 2016[cited 2017 Jan 25];106(1):57-61. Available from: <http://www.samj.org.za/index.php/samj/article/viewFile/10284/7462>
4. American Diabetes Association. Standards of medical care in Diabetes-2017. *Diabetes Care* [Internet]. 2017[cited 2017 Jan 23];40(S1):1-2. Available from: http://professional.diabetes.org/sites/professional.diabetes.org/files/media/dc_40_s1_final.pdf
5. Brasil. Ministério da Saúde. Secretaria de Atenção à Saúde. Departamento de Atenção Básica. Estratégias para o cuidado da pessoa com doenças crônicas: diabetes mellitus. Brasília: Ministério da Saúde, 2013.
6. Morin E. Ciência com consciência. 14^a ed. Rio de Janeiro: Bertrand Brasil; 2010.
7. Brasil. Ministério da Saúde. Secretaria de Atenção à Saúde. Departamento de Atenção Básica. Diabetes Mellitus. Ministério da Saúde, Secretaria de Atenção à Saúde. Departamento de Atenção Básica. Brasília: Ministério da Saúde, 2006.
8. Minayo MCS (Org.). Avaliação por triangulação de métodos: abordagem de programas sociais. Rio de Janeiro: Editora Fiocruz; 2005.
9. Higginbottom G, Lauridsen EI. The roots and development of constructivist grounded theory. *Nurse Res*[Internet]. 2014[cited 2015 Nov 30];21(5):8-13. Available from: <http://journals.rcni.com/doi/pdfplus/10.7748/nr.21.5.8.e1208>
10. Neta DSR, Silva ARV, Silva GRF. Adherence to foot self-care in diabetes mellitus patients *Rev Bras Enferm* [Internet]. 2015 [cited 2015 Jun 30];68(1):111-6. Available from: <http://www.scielo.br/pdf/reben/v68n1/0034-7167-reben-68-01-0111.pdf>
11. Lucas LPP, Barichello E, Zuffi FB, Barbosa MH. The perception of the bearers of Diabetes Mellitus type 2 in relation to amputation. *Rev Eletr Enf* [Internet]. 2010 [cited 2015 Abr 10];12(3):535-8. Available from: <https://www.fen.ufg.br/revista/v12/n3/pdf/v12n3a17.pdf>
12. Salomé GM, Blanes L, Ferreira LM. Assessment of depressive symptoms in people with diabetes mellitus and foot ulcers. *Rev Col Bras Cir* [Internet]. 2011[cited 2015 Feb 10];38(5):327-33. Available from: http://www.scielo.br/pdf/rcbc/v38n5/en_a08v38n5.pdf
13. Maydick DR, Acee AM. Comorbid depression foot ulcers. *Home Healthc Now* [Internet]. 2016[cited 2016 Dec 05];34(2):62-7. Available from: <http://www.nursingcenter.com/cearticle?an=01845097-201602000-00003>
14. Ikram MK, Cheung CY, Lorenzi M, Klein R, Jones TLZ, Wong TY. Retinal vascular caliber as a biomarker for diabetes microvascular complications. *Diabetes Care* [Internet]. 2013[cited 2014 Nov 11];36(3):750-9. Available from: <http://care.diabetesjournals.org/content/36/3/750>
15. American Diabetes Association. Standards of care in Diabetes. *Diabetes Care* [Internet]. 2014 [cited 2016 Jan 14];37(S1):14-80.

Available from: http://care.diabetesjournals.org/content/37/Supplement_1/S14

16. Mcbrien KA, Manns BJ, Chui B, Klarenbach SW, Rabi D, Ravani P, et al. Health care costs in people with diabetes and their association with glycemic control and kidney function. *Diabetes Care* [Internet]. 2013 [cited 2016 Jan 14];36(5):1172-80. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3631826/>
17. Forsblom C, Harjutsalo V, Groop PH. Who will develop diabetic nephropathy? *Duodecim*. 2014;130(12):1253-9.
18. Zhuo L, Zou G, Li W, Lu J, Ren W. Prevalence of diabetic nephropathy complicating non-diabetic renal disease among Chinese patients with type 2 diabetes mellitus. *Eur L Med Res* [Internet]. 2013[cited 2016 Jan 10];18(1):4. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3598553/>
19. Min TZ, Stephens P, Kumas P, Chudleigh RA. Renal complications of diabetes. *Br Med Bull* [Internet]. 2012 [cited 2016 Jan 10];104(1):113-27. Available from: <https://academic.oup.com/bmb/article/104/1/113/327554/Renal-complications-of-diabetes>
20. Amorim ACCL. A. Practices of the family health team: advisors of the access to the health services? *Texto Contexto Enferm* [Internet]. 2014 [cited 2016 Jan 10];23(4):1077-86. Available from: http://www.scielo.br/pdf/tce/v23n4/pt_0104-0707-tce-23-04-01077.pdf
21. Araya OV, Pavez VC, Baksai NC, Cordero FA, Lechugo MC, López GS. Frequency of periodontitis in a sample of type 2 diabetics and non-diabetics. *Rev Chil Endocrinol Diabetes* [Internet]. 2011 [cited 2016 Jan 05];4(4):251-6. Available from: http://www.revistasoched.cl/4_2011/2-4-2011.pdf
22. Reis WG, Sgherer MDA, Carcereri DL. O trabalho do cirurgião-dentista na atenção primária à saúde. *Saúde Debate* [Internet]. 2015 [cited 2016 Jan 05];39(104):56-64. Available from: <http://www.scielo.br/pdf/sdeb/v39n104/0103-1104-sdeb-39-104-00056.pdf>
23. Tesser CD. Prevenção quaternária para a humanização da atenção primária à saúde. *Mundo Saúde* [Internet]. 2012 [cited 2016 Jan 05];36(3):416-26. Available from: http://www.saocamilo-sp.br/pdf/mundo_saude/95/3.pdf
24. Machado LM, Colomé JS, Beck CLC. Estratégia de saúde da família e o sistema de referência e de contra referência: um desafio a ser enfrentado. *Rev Enferm UFSM* [Internet]. 2011 [cited 2016 Jan 05];(1):31-40. Available from: <https://periodicos.ufsm.br/reufsm/article/view/2337/1509>
25. Gómez IPP, Castilho IYA, Alvis LRE. Uncertainty in Adults with Type 2 Diabetes According to Merle Mishel's Theory. *Aquichan* [Internet]. 2015 Dec [cited 2016 Jan 10];15(2):210-18. Available from: <http://aquichan.unisabana.edu.co/index.php/aquichan/article/view/3969/html>