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Management and prevention of diabetes in primary health care in Amazonas

Ações de prevenção e controle de diabetes na atenção primária no Amazonas

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ABSTRACT

Actions for the prevention and management of type 2 diabetes (T2DM PM) are priorities within primary health care, from the dispensing of specific medications to non-pharmacological actions, such as physical activity and nutrition. The aim of the study was to describe prevention and management of type 2 diabetes actions and their components in primary health settings in the State of Amazonas, Brazil. An observational study based on RE-AIM framework. Preventions and managements actions approach were described by 5 dimensions: (R) reach, (E) effectiveness, (A) adoption, (I) implementation, and (M) maintenance. Data was collected in Primary Health Care Units from 6 cities from Amazonas, Brazil. The questionnaires were addressed to managers regarding current T2DM PM programs and their development. This study identified 17 different types of diabetes prevention and/or management actions currently implemented. Eleven actions included both prevention and management actions with 53.8% focusing on physical activity and nutrition orientation. However, zero actions reported any form of evaluation measuring changes in physical activity and nutrition behavior, and actions reported collecting feedback from participants, providers, and health professionals' workers. A total of 310 health professionals participated in diabetes actions, including 4 physical educational professionals and 3 nutritionists, with 100% of the efforts coordinated by nurses. Actions were based on traditional health education practices such as lectures and did not have practical activities that help to change and maintain healthy habits. Despite this, primary care plays a fundamental role in caring for users with chronic illnesses in cities in the interior of Amazonas.

Keywords: Physical activity, Primary prevention, Secondary prevention, Community health care, Health services administration.

RESUMO

Ações de prevenção e controle da diabetes do tipo 2 (T2DM) são prioridades dentro da atenção primária de saúde, desde a dispensação de medicações específicas, às ações não medicamentosas como atividade física e nutrição. O objetivo foi caracterizar ações de prevenção e manejo (PM) e seus componentes na atenção primária no Estado do Amazonas, Brasil. Estudo observacional baseado no modelo RE-AIM. Estratégias adotadas em ações de PM foram descritas pelas 5 dimensões: (R) Alcance, (E) Efetividade, (A) Adoção, (I) Implementação e (M) Manutenção. Dados foram coletados em Unidades Básicas de Saúde em 6 cidades do Amazonas, Brasil. Os questionários endereçados aos gestores visavam ações de PM e seu desenvolvimento. Este estudo identificou 17 diferentes tipos de ações. Onze ações contemplaram ambas as estratégias de PM com 53,8% focadas em atividade física e orientações nutricionais. No entanto, nenhuma ação relatou mensuração para avaliação de mudanças no nível de atividade física e no comportamento nutricional. As ações baseiam suas avaliações em coleta de feedback dos participantes, equipe executora e profissionais de saúde. Ao todo, 310 profissionais de saúde participaram de ações, incluindo 4 profissionais de educação física e 3 nutricionistas, sendo 100% dos esforços coordenados por enfermeiros. As ações de PM da T2DM são baseadas em práticas tradicionais de educação em saúde como palestras e não possuem atividades práticas que auxiliem na mudança e manutenção de comportamentos saudáveis. Apesar disso, a atenção primária exerce um papel fundamental no cuidado ao usuário portador de doença crônica em municípios do interior do Amazonas.

Palavras-chave: *Atividade física, Prevenção primária, Prevenção secundária, Serviços de Saúde Comunitária, Administração de Serviços de Saúde.*

Introduction

Diabetes Mellitus (DM) is a growing health problem affecting all countries, regardless of their level of development[1]. It is estimated that DM affects 9.3% of the world population (463 million people) with a forecast of moving to 10.2% (578 million) in 2030 and 10.9% (700 million) in 2045. Brazil is one of the nations with the highest prevalence (Ranked 5th), with more than 16.8 million people[2], and Type 2 DM (T2DM) represents 90-95% of all cases of this disease worldwide[3].

In the capital of Amazonas, Manaus, the prevalence of DM in 2019 was 6% among adult men and women[4].

T2DM is a non-communicable chronic disease whose main risk factors are age and lifestyle[1]. Characterized by dysregulation of blood glucose and insulin levels, it generates metabolic abnormalities and secondary acute and chronic complications[1,5]. It is an incurable disease, but prevention and management (PM) strategies are well described in the literature (Table 1).

Physical activity (PA) is a highlighted non-pharmacological strategy for T2DM prevention[6]. Its practice is associated with a 26% to 53% reduction in the risk of developing the disease[7]. Along with PA, the adoption of a healthy lifestyle is recommended, with adequate nutrition[6], maintenance of adequate body weight[7] and smoking cessation[6]. Some drugs can also be prescribed to inhibit the progression of pre-diabetes[1,7]. In addition to the strategies mentioned, screening for other risk factors[1,5] and gestational diabetes[1,5] should also be included.

In the management of T2DM, pharmacological treatment is widely used[1,8–10] associated with regular monitoring of capillary blood glucose, fasting blood glucose and hemoglobin A1c (HbA1c) monitoring[1,10,11]. Among the non-pharmacological actions, PA will act mainly on glycemic control and weight loss and should be associated with a healthy diet[1,5,12], smoking cessation[1] and weight loss[1,13]. The management of other morbidities[1,10,14] that affect the individual's general health should also be included, as well as the encouragement of self-management[5,15].

Developing T2DM prevention and management actions in primary health care (PH) is essential in the Unified Health System (SUS)[16], improving health status, and reducing costs[17]. Considering the existence of guidelines for the PM of T2DM, it is possible to identify gaps in the PH service.

The aim of the study is to describe T2DM prevention and management actions and their components in primary care setting in the State of Amazonas, Brazil.

Methods

Data were collected as part of the Study of Health in Primary Care of the Amazon Population (SAPPA). SAPPA is a cross-sectional study carried out in cities

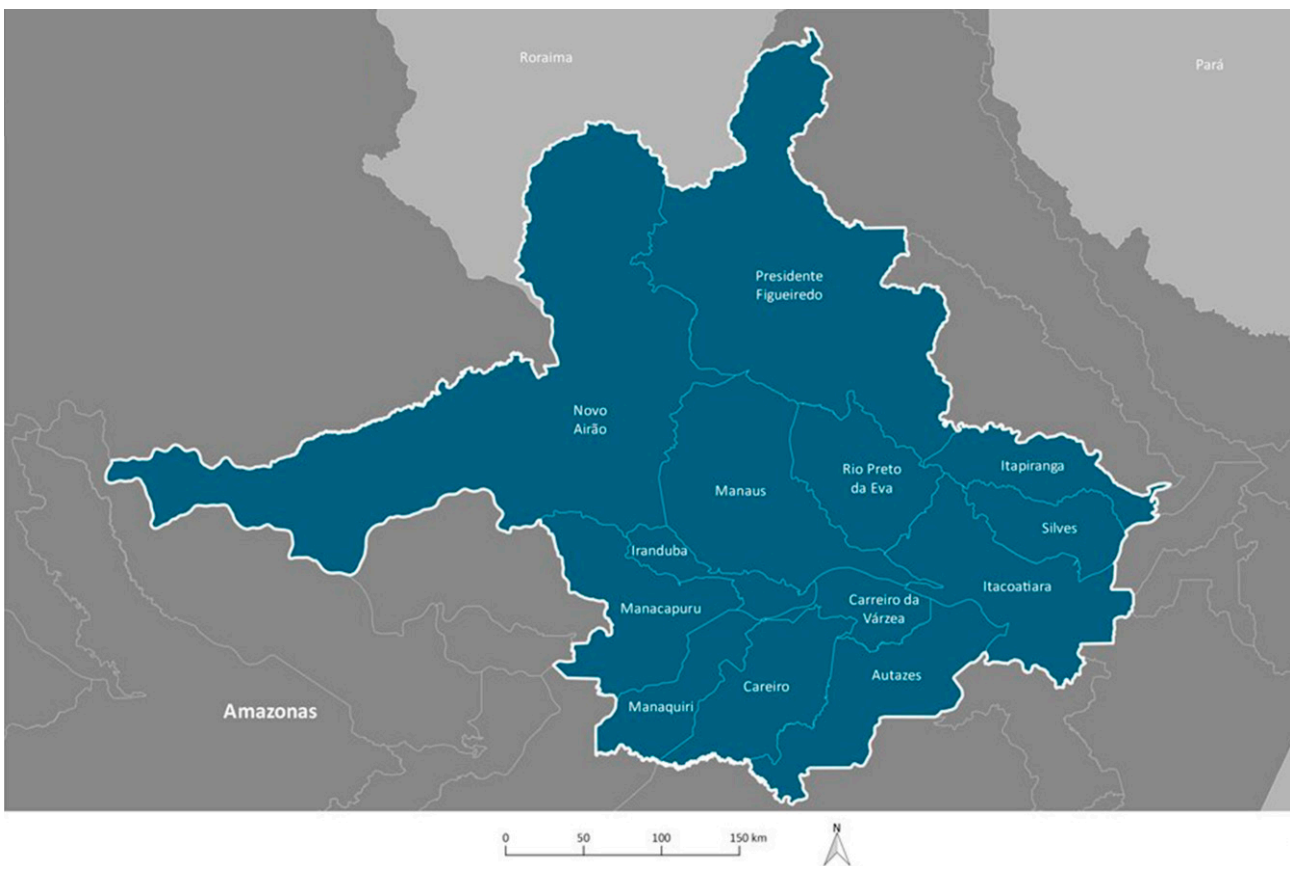

Figure 1 – Greater Amazonas Metropolitan Area map.
IBGE, 2016. Emplasa/CDT, 2018.

from Amazonas State, Brazil. The ethical approval (registration: 4.318.325) was granted by the Research Ethics Committee with humans of the Amazonas Federal University, and the study followed the bioethics principles according to the 510/16 resolution of the National Health Council. All participants signed consent forms.

SAPPA study was conceived in order to describe the reality of the DM care offered to individuals in the interior of Amazonas. Data collection was initiated in the cities with greater proximity to the capital Manaus. Therefore, data showed in this article were collected in six cities from the Greater Amazonas Metropolitan Area (Figure 1): Iranduba (38,1km by car from the capital), Itacoatiara (270km by car from the capital), Manacapuru (98.8km by car from the capital), Novo Ayrão (194.8km by car from the capital), Presidente Figueiredo (125.5km by car from the capital), Rio Preto da Eva (80.2 km by car from the capital).

SAPPA was conducted in Primary Health Care Units (Unidade Básica de Saúde - UBS) in each city according to the National Register of Health Establishments (CNES). Individual UBS units were chosen from each city using a random selection tool with every unit having an equal chance of being selected. After the random selection, managers from each unit were invited to participate.

The recruitment process for engaging involves cities administrators and managers. Briefly, we initially contacted the Amazonas State Secretary of Health (SUSAM) for initial approval. Following this approval, we reached out to each city health department (SEMSA) to engage administrators and managers. Once SEMSA agreed to participate in the study, we identified primary care coordination administrators for each city. These coordinators facilitated contact with individual managers from each UBS unit. An individual member from the SAPPA study team contacted the UBS unit managers by phone to schedule the site visit for data collection.

Managers were invited to complete a questionnaire containing demographic data (e.g. Manager and UBS characteristics), information regarding current T2DM PM programs, and RE-AIM framework dimensions thought to influence program delivery[16]. The questionnaire included a total of 42 items (Reach – 03, Effectiveness – 06, Adoption – 08, Implementation – 06, and Maintenance – 03) adapted from the instrument described by Brito et all (2018)[16] (see Supplementary material). The questionnaire was applied by trained interviewers during our single onsite visit. In order to attend the Covid restrictions, all interviews were scheduled privately, and all the participants were wearing masks.

The questionnaire was designed and developed using KoBoTollbox and KoBoCollect. These data collection instruments are Android app based with an Open Data Kit (ODK) that can be installed on any standard Android device. The study team used these devices embedded with KoBoToolbox to allow building and reviewing forms entirely offline as well as allowing data collection online or offline. The form can capture data and be securely transmitted to the central server via Wi-Fi with other alternative data transfer methods including mobile phone network or direct cable.

We chose to conduct the analysis using the RE-AIM framework. The RE-AIM framework has been valuable for helping community practitioners ask important questions during program planning, implementation, dissemination, and evaluation[17]. RE-AIM is an acronym that consists of five elements, or dimensions: **R**each, Efficacy/**E**ffectiveness, **A**doption, **I**mplementation, and **M**aintenance[18].

To evaluate RE-AIM dimensions in this study, managers were asked to identify strategies/actions currently being used in their specific UBS unit. The questions focused on planning and implementation phases from each action delivered to users for prevention or management of T2DM.

Reach: We assessed reach using data from the target population and the participation rate of T2DM individuals and general population collected from data given by managers. We analyzed separately the data on kids (<18 years), people aged 18 to 60, and people aged 60 or older. To calculate the participation rate, the denominator was the number of all users registered at the specific UBS, and the numerator was the number of participants. Additionally, for each action, the managers were asked about inclusion criteria and strategy used to publicize each action (recruitment).

Efficacy/Effectiveness: Addresses the impact of an intervention on important outcomes when tested under optimum conditions (efficacy) or in real-world settings by individuals who are not part of the research team (effectiveness)[17]. In this study, questions from effectiveness included the main aim from each action, the use of strategies to measure results (implementation team feedback/ user feedback/ UBS unit team/

capillary blood glucose/fasting blood glucose/HbA1c measurements/or others), the frequency of evaluation (no regular attendance/weekly/fortnightly/monthly/every/six months/annually/or others), attendance control of participants and fidelity checks, and if they tracked reasons for withdrawal.

Adoption: In this study, the questions involved a description of who delivered the program (implementation team) and who managed them.

Implementation: In this study we asked managers to describe the core actions content, provide information on the duration of each session, and frequency of sessions (no regular attendance/weekly/fortnightly/monthly/others), where the actions/program were delivered and the provenance of the resources. After data collection, actions target components were classified into 6 dimensions: orientations about PA, nutrition behaviors, weight loss, self-care, drug adherence (medication), and blood measures.

Maintenance: Refers to long-term sustainability and the insurance of long-term benefits and institutionalization of the intervention and continued community capacity for implementation[19]. In this study the maintenance was measured using the time of implementation of actions, and if the action was still being offered.

Descriptive statistics (mean and standard deviation or frequency and percentage) were used to describe the characteristics of participants. Categorical variables were summarized using counts and percentages; quantitative variables were summarized using means and standard deviations or medians and inter-quartile ranges, as appropriate.

Results

Between August 2020 and June 2021, 18 managers from primary care units took part in this research from 6 rural Amazonas cities. There were no refusals or exclusions during data collection. Managers were predominantly women (n = 14), mean age 39 ± 8.15 year old and nurses (n = 11; 57.9%). Other professionals were administrator (n = 3), physiotherapist (n = 1), social workers (n = 2), biological science (n = 1), literature degree (n = 1), and 73.7% had a post-graduate degree. The length of professional experience varied between 1 until 15 years (range more prevalent 3-6 years). And 58% were in office for less than a year.

Seventeen actions were identified during study collections. Only one UBS informed there was more than one action/program (2 action/program) currently occurring and two of them there were no diabetes PM actions. Managers described 6 prevention actions, while 11 were focused on PM of T2DM (Table 2).

To best reflect the aims of the study, the results are presented following the RE-AIM framework.

A total of 672 users were enrolled in some PMA,

Table 1 – Evidence-based components of diabetes prevention and/or management programing.

Prevention actions	Management actions
Physical activity practice[1,7,6,10]	Physical activity practice[1,5,10]
Nutritional education[1,7,6,10]	Nutritional education[15,12]
Weight loss management[7]	Weight loss management[1,13]
Intervention and management of metabolic syndrome and dyslipidemia[1]	Intervention and management of metabolic syndrome and dyslipidemia[1,14,10]
Screening for capillary blood glucose[5], fasting blood glucose, glucose tolerance test with overload in two hours and HbA1c[1,5, 10]	Monitoring of capillary blood glucose, fasting blood glucose and HbA1c[5,1,10]
Smoking cessation[6,10]	Smoking cessation[1]
Pharmacological prevention.[7,6,1]	Treatment and monitoring of pharmacological adherence[1,5,9,10]
	Hypertension management[1,10]
Screening for gestational diabetes[1,5]	Monitoring the albumin-creatinine ratio[10]
Screening for risk factors: Age ≥ 45 years who present one more risk factor (History, race / ethnicity at high risk for DM (Black, Hispanic or Pima Indians), women with a previous diagnosis of GDM syndrome of polycystic ovaries, history of cardiovascular disease, sedentary lifestyle[1,5]	Prevention and management of acute complications: hypoglycemia and nonketotic hyperosmolar hyperglycemic syndrome[5,1]; and chronic: retinopathy[5] , nephropathy[1,5,10] and diabetic neuropathy[1 5]
	Diagnosis and management of depression[5,28]
	Encouragement of self-management[29] and foot self-care[5,15]
	Constant updating of vaccines[1,30]
	Oral health assessment and care[5]
	Diagnosis and management of multimorbidities: sleep apnea, hepatic steatosis, decreased testosterone levels, cancer, fractures, cognitive alterations, tuberculosis[5]

representing 67.5% of the total diabetic population registered in the UBS. Children's participation represented 2.7% of the total sample. Considering the number of children registered in the UBS, on average, 25% were enrolled in 3 different actions. Adults were included in 15 actions, representing 52% of the total sample, and the participation rate was 32.7%. People aged 60 or older represented 45% of the participants and the participation rate was 27.5%. Related to recruitment, 9 managers reported the existence of some criteria as being diabetic, presence of hypertension, obesity, or being older. Recruitment strategies were predominantly health professional indication (76.5%) and person to person (88.2%).

Effectiveness

As described in Table 2, the principal verbs used by managers to describe the primary aim of actions were "guide" and "prevent". Effectiveness for diabetes PMA outcomes was measured in 76.5% by implementation team feedback, 35.3% user feedback, 53% UBS unit team feedback, 41.2% capillary blood glucose measurement, 29.4% HbA1c and/or fasting blood glucose measurements and occurred weekly (41.2%) and mon-

Table 2 – Primary aims and effectiveness measures.

N	PM	Primary aim	Evaluations (Y/N) and frequency	Type of evaluation
1	P	Guide for disease prevention and control	Y (monthly)	Implementation team feedback User feedback UBS unit team
2	PM	Well-being of patients with diabetes and their self-care	Y (monthly)	Implementation team feedback UBS unit team Capillary blood glucose and hba1c measurement
3	PM	Guide measures to control sequelae and medication	Y (fortnightly)	Implementation team feedback UBS unit team
4	PM	Monitor diabetic users	Y (monthly)	Implementation team feedback
5	PM	Guide the user's self-knowledge to improve the quality of life	Y (weekly)	Implementation team feedback User feedback UBS unit team Hba1c measurement
6	PM	Keep control and prevention of patients to lower glycemic index	Y (weekly)	Implementation team feedback Capillary blood glucose, fasting blood glucose and hba1c measurement
7	P	Educate, clarify, and guide users about diabetes	Y (weekly)	Implementation team feedback User feedback
8	P	Health prevention	Y (weekly)	Implementation team feedback UBS unit team
9	P	Diabetes prevention	N	User feedback UBS unit team
10	PM	Prevention and control of chronic diseases (hypertension, diabetes and obesity)	Y (monthly)	Implementation team feedback User feedback
11	PM	Prevent and control diabetes	Y (monthly)	Implementation team feedback UBS unit team Capillary blood glucose and glucose measurement
12	PM	Encourage coming to the consultation and controlling the glycemic index	Y (monthly)	Implementation team feedback User feedback Capillary blood glucose and fasting blood glucose measurement
13	PM	Encourage patient improvement	N	Capillary blood glucose
14	PM	Make this population aware of diabetes	N	Hba1c measurement
15	PM	Strengthen prevention and control for diabetes.	Y (weekly)	Implementation team feedback Capillary blood glucose and fasting blood glucose measurement
16	PM	Diagnose diabetes cases early	Y (weekly)	Implementation team feedback UBS unit team Capillary blood glucose, fasting blood glucose and hba1c measurement
17	P	Necessary guidance for nutrition, encouragement of physical activities, use of medication.	N (monthly)	UBS unit team

P = prevention actions; M = management actions; PM = prevention and management actions; Y = presence of frequently evaluation; N = absence of evaluation; UBS = Primary care unit (Unidade Básica de Saúde); HbA1c = hemoglobin A1c.

thly (41.2%), predominantly. Among prevention actions, the main mechanisms for evaluation were implementation team, user, and UBS unit team feedbacks. 76.5% of the actions had frequency controlling of participants during the development, but only 41.1% measured fidelity checks and of these, 57% investigated the reasons for withdrawing.

Adoption

A total of 310 health professionals participated in diabetes PMA in primary health care settings in the State of Amazonas from planning to implementation, including 31 nurses, 39 health technicians, 27 physicians, 174 community health agents, 4 physical education professionals, 3 physiotherapists, 3 nutritionists, and 29 (others) with 100% of the efforts coordinated by nurses.

Implementation

Methods and targets of the actions are presented in Table 3. All (100%) actions used lectures as a method of knowledge transference approach. Furthermore, 58.8% used individual user guidance, and 47% used partici-

Table 3 – Actions and componentes.

N	PM	Methods	PA	Nutrition	Weight loss	Self-care	Medication	Blood measures
1	P	Lectures Conversation wheel	X	X				
2	PM	Lectures Conversation wheel Groups				X		
3	PM	Lectures Groups Videos				X	X	
4	PM	Lectures Individual guidance						X
5	PM	Lectures Conversation wheel Groups				X		
6	PM	Lectures Individual guidance	X	X				
7	P	Lectures Groups	X	X		X		
8	P	Lectures Individual guidance Videos	X	X				
9	P	Lectures Individual guidance Videos	X	X				
10	PM	Lectures Conversation wheel Individual guidance	X	X	X			
11	PM	Lectures Conversation wheel Individual guidance	X	X				X
12	PM	Lectures Conversation wheel Individual guidance						X
13	PM	Lectures Conversation wheel Individual guidance Videos				X		
14	PM	Lectures	X	X				
15	PM	Lectures Individual guidance	X	X				
16	PM	Lectures Conversation wheel Individual guidance						X
17	P	Lectures	X	X			X	

P = prevention actions; M = management actions; PM = prevention and management actions.

pant group discussions. Related to targets from PM actions, 10 (58.8%) actions included PA and nutritional behaviors. Only one mentioned weight loss orientation and two actions targeted medication adherence. Blood measures were mentioned in 23.5% during the data collection. There were no practical activities including effective lifestyle changes, with healthy nutrition and physical exercise.

The actions occurred weekly (n = 6; 35.3%), monthly (n = 6; 35.3%) or fortnightly (n = 3; 17.7%), lasting from 30 (n = 5) to 60 min (n = 6), on average. Six actions did not have a fixed duration occurrence. The vast majority of meetings took place at the UBS (n = 12), and only 5 actions involved community spaces such as (gym, church, association, school). Ten (58.8%) actions were government-supported and 5 (29.4%) required that all material resources come from each participant. One action did not have any funding.

Maintenance

Eight (47%) actions occurred for a period longer than 4 years and 3 (17.6%) from 1 to 4 years. Five managers didn't answer or did not know this information. One action was no longer offered during the collection period.

Discussion

This study identified different types of T2DM prevention and/or management actions currently implemented in primary health care settings in the State of Amazonas, Brazil. The orientation about the importance of PA was one of the main focuses of PM actions, along with the importance of healthier nutrition behaviors. These actions were planned and conducted by health professionals' participation as community health agents, health technicians, nurses, and physicians. Furthermore, zero actions reported any form of evaluation measuring changes in PA and nutrition behavior. Most actions reported collecting feedback from participants, providers, and UBS health teams.

When looking at the whole panorama of PH action in the Amazonas region, there is the use of several components for the educational process of patient care, but little based on the available evidence. It is the role of the health professional involved in PH care and the managers to take a new look at T2DM and how to change the lives of users with the disease[20]. It seems that most of the strategies are still based on a traditional educational approach, and very little is known and propagated about the planning and monitoring of these users as recommended by the Brazilian Ministry of Health. In our study, the data from how they delivered the actions were very similar. They always used lectures and there were no practical activities included as a real strategy to induce lifestyle changes, which in PA is not enough for a good implementation, as such action needs planning and monitoring[6].

Geographical characteristics, distances linked to lifestyle and socio-economic conditions are challenging points for PH in the Amazonas region. There is a scenario of lack of resources, transport, equipment, mobility that makes teams take direct decisions to assist the entire population[21]. Perhaps the biggest challenge for managers is not only the lack of resources but how to reach remote areas that require strategic planning. For this, health professionals must seek policy guidelines and health practices to reorganize family health practices. However, what we observed in real-world are traditional conducts and based on own experience. We are still reproducing what have been done in the past.

Additionally, in this study, no action measured drug adherence. A study carried out in the interior of Brazil with a population with characteristics similar to those of the actors in this study showed that adherence outside the drug treatment was insufficient when they had a non-motivational educational approach[20]. In a literature review that investigated scientific publications on T2DM in PH settings, two major challenges were pointed out in decision-making for this audience: the first involves managers and the second, professionals who need more training and qualified assistance to people with T2DM. Changing nutritional behaviors, practice of physical exercise, healthier life and the prevention of other chronic problems need to be part of the approach taken by professionals and managers[22].

The challenge of teams in the management of T2DM is enormous, ranging from consultations to guidance on PA and identify the dietary pattern, for example, which contributes a lot in controlling blood glucose and preventing future complications[5]. Despite a total of 310 health professionals enrolled in PM actions in primary health care settings in the State of Amazonas there was only 3 nutritionists belonging to the team.

A study carried out at the HP in Belo Horizonte, Brazil, on the practice of counseling on PA and nutrition showed that joint and differentiated actions are necessary for users and professionals. For professionals, continuing education needs to focus on strategies that invest in behavior change, placing the patient as the

main active agent in the process[23]. In addition, the importance of multidisciplinary starting with educational strategies that have integrality and good counseling, understanding that no one works alone or in isolation. And for users, healthy practices and good monitoring by a multidisciplinary team[24].

The challenges for the deployment of professionals from any health area such as Physical Education professionals and nutritionists throughout the Amazonas region are enormous. Problems of locomotion, permanence and fixation of these professionals often make the links with local primary care inexistent.

There is strong evidence on the effects of PA on glycemic control, as long as, there is adherence in T2DM programs. The results showed that users participating in this group had better disease prognosis, reduced body mass, and improved glycemic control when compared with those who do not adhere to this program[25]. Furthermore, the practice of regular PA should be prioritized in the management of T2DM as well as actions to prevent the disease. The population studied lacks an understanding of these actions by managers and professionals, and there is often a lack of trained professionals who make up the local health teams. It is seen that PA counseling is often performed by the medical professional or nurse, exclusively for users with greater comorbidities, leaving the others aside. Because of this, there is enormous difficulty in adherence by users, claiming almost always lack of time, and resistance to change[24]. In this study, only 4 Physical Education professionals directly involved in PM actions were found, showing the gap between the evidence-based and real-world.

It is noteworthy the benefits of proper supervision of a professional, family support, management program adhesion, awareness, and sensitization of the multidisciplinary team. All these components together, including exercises protocols supervised by Physical Education professionals, will improve considerably health, quality of life, glycemic control, and prevention of T2DM complications in users[25].

It is necessary to emphasize that without the specific training for health professionals, they tend not to provide correct counseling or just general advice to users with T2DM. To carry out an approach based on blaming, these users will not achieve success in changing, decision-making, and self-awareness. An holist health approach, including an action planning, must be implemented to change this reality[24].

On the other hand, clinical research interventions, with high levels of experimental control and rigor are not practical or feasible for community-based organizations to evaluate their programs (e.g., using pre-post assessments). Rather, community programs may monitor members' general experiences through testimonials or simplified surveys that do not necessarily include validated measures[26]. Available resources for evaluation are often limited in "real world" non-academic community and clinical settings. However, the lack of valid and reliable measures would limit the ability to accurately report on the effectiveness of a program[27].

The study primary limitation was the lack of representativeness of the entire State of Amazonas, with most UBS located in the larger Manaus-AM metropolitan area. Nevertheless, the current study is one of the first to describe the different programs and activities for the prevention and treatment of T2DM being carried out in primary health care settings in the State of Amazonas. This information is important to help better understand what is being done to combat this growing epidemic in the State of Amazonas and the role of PA in this context. Future studies should seek to gather further data to see whether our descriptions are also found elsewhere in the State of Amazonas and primary care settings. These studies should also seek to evaluate the effectiveness of these programs and activities to determine whether new approaches may be needed to help address the growing number of individuals at risk of developing or with T2DM in the State of Amazonas.

This study identified PM programs and activities currently implemented in primary health care in the State of Amazonas. The primary methodology used to deliver content was classroom-based lectures, with a greater focus on PA and nutrition orientation. However, there were no practical activities or strategies included to help participants initiate and maintain lifestyle changes, nor measures of effectiveness used to evaluate the programs and activities by users, implementation team, or UBS team providing feedback. Further, it is important to note that while the current study gathered information on current strategies and actions being implemented for the prevention and management of T2DM, it did not evaluate whether these strategies and actions were delivered as originally planned and or to what extent community members participated in these strategies and activities. Future, studies should further investigate implementation fidelity and participant engagement to accurately assess

the potential impact of these activities on the health of community members.

The lack of specialized professional training and the high turnover of the team were identified as barriers to delivering T2DM PM programs and activities. The further absence of a multidisciplinary team (i.e., lack of PA and Nutrition specialists), in addition to the difficulty of incorporating specific care and behavior modification strategies for the PM of T2DM, negatively impacted the assistance received by users in primary care. While users received detailed information on "what to do", they lacked practical knowledge and skills of "how to do". This gap in knowledge and ability to carry-out the necessary behaviors may lead to sub-optimal care outcomes and a difference in perceptions between health providers and end-users. Despite that, primary health care has an important and central role in the PM of chronic disease care in the State of Amazonas and the approach of PA is fundamental in this whole process.

Conflict of interest

The authors declare no conflict of interest.

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Author's contributions

Leon EB, participated in the study's design, data collection, analysis, and manuscript writing. Fernandes LS, participated in manuscript writing. Campos HLM, participated in the study's design, data collection, and manuscript writing. Almeida FA, participated in the study's design, analysis, and critical review of the manuscript.

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Supplementar material

ESTUDO SAÚDE NA ATENÇÃO PRIMÁRIA DA POPULAÇÃO AMAZÔNICA (ESTUDO SAPPA) QUESTIONÁRIO AO GESTOR	
BLOCO 1 – IDENTIFICAÇÃO DO LOCAL E RESPONDENTE	
INFORMAÇÕES DO LOCAL DE SERVIÇO DE SAÚDE	
1	Número do CNES:
2	Nome do local:
3	Cidade:
4	O local de serviço de saúde possui aproximadamente quantos usuários cadastrados?
5	O local possui HIPERDIA **(**Sistema de Cadastramento e Acompanhamento de Hipertensos e Diabéticos)?
6	Telefone para contato do local de serviço ( )
INFORMAÇÕES DO RESPONDENTE: Neste bloco você deverá preencher as questões com seus dados pessoais.	
7	Nome completo:
8	e-mail (e-mail institucional): e-mail (e-mail pessoal):
9	Sexo:
10	Data de nascimento:
11	Data de hoje:
12	Formação profissional:
13	Grau de formação completa:
14	Qual seu tempo de atuação profissional:
15	Tempo de atuação profissional no local:
BLOCO 2 - IDENTIFICAÇÃO DAS AÇÕES DE PREVENÇÃO OU CONTROLE DA DIABETES	
Neste bloco, você irá responder sobre as atividades de educação em saúde, atividades em grupo, ou qualquer outra iniciativa que tenha como público alvo usuários do SUS visando prevenção ou controle da Diabetes Mellitus que são coordenadas por sua UBS. Atenção: as ações devem ser contínuas e com curta, média ou longa duração. Por favor, desconsidere eventos pontuais que são realizados em dias comemorativos (ex.: caminhada da paz, dia mundial da saúde, dia de controle da Diabetes , etc.).	
16	No seu local de atuação há o desenvolvimento de alguma ação de prevenção ou controle da Diabetes?
17	Quantas ações de prevenção ou controle da Diabetes são desenvolvidas no local?
Agora você irá responder às informações sobre as características das ações de prevenção e/ou controle coordenadas por sua UBS. Caso ocorra mais de uma ação, escolha uma das ações para iniciar a descrição. Ao fim do relato será possível inserir as demais ações.	
ADOÇÃO	
18	Inserir o tipo de ação desenvolvida: ( ) Atividades de educação em saúde ( ) Atividades de sala de espera ( ) Atividades direcionadas a grupos específicos, estudantes da rede de ensino, por exemplo ( ) Atividades para mudança no estilo de vida, com uma alimentação saudável e a prática de exercícios físicos ( ) Aconselhamento medicamentoso regular ( ) Outros
19	Essa é uma ação de prevenção ou controle da Diabetes?
20	Há quanto tempo essa ação é desenvolvida?
21	Você poderia descrever brevemente essa ação?
22	Quantos profissionais de saúde do seu local de trabalho estão envolvidos no desenvolvimento desta ação (desde o planejamento à prática)?
23	Quem são os profissionais envolvidos na ação?
24	Quem é o profissional que coordena a ação?
25	Qual o vínculo do profissional que coordena a ação?
ALCANCE	
26	A ação desenvolvida atende qual faixa etária? ( ) Crianças (0-9 anos) Quantos são cadastrados? Quantos participam da ação? ( ) Adolescentes (10-19 anos) Quantos são cadastrados? Quantos participam da ação? ( ) Adultos (20-59 anos) Quantos são cadastrados? Quantos participam da ação? ( ) Idosos (60 anos ou mais) Quantos são cadastrados? Quantos participam da ação?
27	Houve algum critério para a inclusão dos participantes na ação? (Ex.: ter diagnóstico de diabetes, ser cadastrado no Programa Hiperdia, estar cadastrado na UBS, ser maior de 18 anos, etc.)

28 Qual a principal estratégia que e/foi utilizada para a divulgação da ação? (assinale a mais utilizada).
( ) Não houve
( ) Panfletos e Cartazes
( ) Ligações telefônicas
( ) Indicação pelo profissional de saúde.
( ) Boca-a-boca
( ) Outros
( ) Não sabe ou não quer informar

IMPLEMENTAÇÃO

29 Qual a metodologia empregada no desenvolvimento da ação?
( ) Rodas de conversas
( ) Palestras
( ) Grupos
( ) Consultas individuais
( ) Vídeos
( ) Consultas em grupo
( ) Outro
( ) Não sabe ou não quer informar

30 Com qual frequência a ação é desenvolvida?
( ) Semanal
( ) Quinzenal
( ) Mensal
( ) Bimensal
( ) Outra frequencia. Qual?
( ) E variavel, nao tem uma frequencia definida
( ) Nao sabe ou nao quer informar

31 A cada encontro, qual a duração da ação?
( ) Nao tem duracao definida, varia de acordo com o encontro
( ) Ate 30 minutos
( ) de 30 a 60 minutos
( ) mais de 60 minutos
( ) Nao sabe ou nao quer informar

32 Na maioria das vezes, onde ocorrem os encontros da ação?
( ) Unidade Básica de Saúde
( ) Polo do Programa Academia da Saúde
( ) Áreas comunitárias (ginásio, salão, igreja, associação, escola, etc.)
( ) Área abertas comunitárias (parque, praça, quadra esportiva, escola pública, etc.)
( ) Área privada cedida (ginásio, quadra esportiva, escola privada, etc.)
( ) Outro
( ) Não sabe ou não quer informar

33 Na maioria das vezes, os recursos materiais utilizados para o desenvolvimento da ação foram fornecidos por quem?
( ) Não há uso de recursos materiais
( ) Governo municipal, estadual ou federal
( ) Emprestados/cedidos por parceiros da iniciativa privada (clube, associação esportiva, academia, etc.)
( ) Adquirido pelos próprios participantes e/ou profissionais
( ) Outros.
( ) Não sabe ou não quer informar

EFETIVIDADE

34 Qual o principal objetivo da ação?

35 Qual estratégia para avaliar se os objetivos da ação são alcançados?
( ) Não há avaliação
( ) Feedback (parecer) da equipe executora
( ) Feedback (parecer) dos participantes da ação
( ) Feedback da equipe assistencial
( ) Mensuração de glicose com fita
( ) Exame laboratorial de hemoglobina glicada
( ) Exame laboratorial de glicose em jejum
( ) Outros
( ) Não sabe ou não quer informar

36 Com que frequência são aplicadas essas avaliações de efetividade da ação?
( ) Semanalmente
( ) Quinzenamente
( ) Mensalmente
( ) Semestralmente
( ) Anualmente
( ) Outra. Qual?
( ) Nao tem frequencia regular
( ) Nao sabe ou nao quer informar

37	Houve controle da frequência dos participantes no decorrer da ação?
38	Houve controle do número de participantes que desistiram no decorrer da ação?
39	Houve levantamento das razões que levaram os participantes a desistirem da ação?
	MANUTENÇÃO
40	Atualmente, a ação ainda está sendo realizada?
41	Houve mudança na gestão municipal no decorrer do funcionamento da ação?
42	Houve mudança na coordenação da ação desde a sua implementação?