



Prevention of Type 2 Diabetes in Brazil: A Survey-Based Analysis of Healthcare Professionals

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Abstract

To develop an effective Brazilian diabetes prevention program, the first step is understood how prevention is currently carried out by health professionals. Identifying bottlenecks and potential improvements is crucial for establishing the program's relevance. This proposal aims to investigate how individuals with high risk for type 2 diabetes mellitus (T2DM) are identified in Brazilian health institutions and to understand how professionals are managing and preventing T2DM. This is a cross-sectional survey study with a non-probabilistic convenience sample. To be considered an eligible response, the questionnaire must have been completed by a health professional who provides healthcare for patients at high risk of developing T2DM either in private practice or in public primary health care units. The survey was disseminated electronically between August and October 2023, and 579 eligible health professionals accessed and responded it. Most of the respondents (86%) were women, with an average age of 41.6±11.5 years. This study showed that only 36.5% of health professionals use a standardized clinical protocol to identify individuals with risk of T2DM, and 59.6% of them employs specific protocols for the care and monitoring these patients. This data highlights a significant gap in the standardization of procedures for identifying and managing prevention of T2DM in Brazil.

Keywords: Surveys and Questionnaires; Diabetes Mellitus, Type 2; Prevention; Compliance; Practice Guidelines.

Introduction

Type 2 Diabetes Mellitus (T2DM) is a chronic disease affecting approximately 3% of the global population. Its prevalence has risen due to population aging, making it the ninth leading cause of lost healthy life years. The estimate in Brazil was 15.7 million individuals with diabetes in 2021, representing a prevalence of 10.5% (IC95% 9.4-11.6) [1]. Projections indicate that the diabetes mortality burden will increase by 144% by 2040, more than double the expected overall disease burden increase of 54% [2]. The high prevalence of diabetes mellitus and its complications highlights the urgent need for investments in disease prevention with time-effective actions required from professionals and managers within primary health care [3].

Consistent evidence in the literature indicates that T2DM can be prevented or delayed with lifestyle changes [4-6]. Oral antidiabetic drugs, while used in prevention studies, have potential side effects and only help to delay or prevent diabetes, without addressing other diseases related to obesity and sedentary lifestyle [7]. Hence, policies aimed at lifestyle modifications, specifically achieving adequate body weight and regular physical activity, should be implemented as they bring health benefits beyond diabetes prevention. Although the effectiveness of primary prevention programs is widely recognized, literature has shown that these programs are highly effective only in “experimental” conditions [8]. The complex infrastructure and resources required for these studies seem unfeasible for public health services in developing countries [9]. Brazil is a vast country with significant cultural, religious, and social diversity, and a striking social inequality. This scenario must be studied and considered when planning and implementing prevention programs.

In Brazil, there is a national policy for diabetes prevention and treatment [10]. However, a national program is nonexistent. Despite medical societies establishing guidelines [11] that include promoting lifestyle changing with physical activity and healthy eating, it remains unclear how health professionals are guiding patients, and more importantly, whether they can accurately identify individuals at risk for diabetes. Therefore, to develop an effective diabetes prevention program, the first step is to understand if and how prevention is currently carried out by Brazilian health professionals. Identifying bottlenecks and potential improvements is crucial for establishing the program’s relevance with the Brazilian Ministry of Health. This proposal aims to understand how professionals are managing and preventing this condition.

Materials and Methods

This is a cross-sectional survey study without sample size calculation, employing a non-probabilistic convenience sample. The survey was disseminated electronically with the support of the Brazilian Diabetes Society, the Brazilian Society of Endocrinology,

social media platforms (E-mail, Instagram and LinkedIn), and the Ministry of Health. The dissemination was conducted over the period from August to October 2023.

To be considered an eligible response, the questionnaire must have been filled by a health professional with experience with patients at high risk of diabetes, either in private or public health services.

The study was approved by the Research Ethics Committee (CAAE: 70760423.6.0000.5483) and conducted in accordance with national and international resolutions on good practices in clinical research. All participants consented to participate in the study electronically. Upon accessing the survey link, participants were presented with an invitation to participate and the Informed Consent Form (ICF). A contact phone number and email address of the research team were provided to address doubts before deciding to participate. Participants received a copy of the ICF by email. Data were collected only after participant consent.

The inclusion criteria consisted of being a healthcare professional actively involved in patient care. Participation in the survey was voluntary, with no questions deemed mandatory. Participants had the option to terminate their involvement at any point and could also pause their responses and return to the survey within the same initialized questionnaire.

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The primary outcome of the study is the proportion of professionals adhering to a standardized clinical protocol for identifying and caring for patients at high risk of T2DM. Other outcomes include an assessment of the criteria and characteristics these professionals use to define high risk for T2DM, whether these professionals provide guidance on lifestyle changes (such as diet and physical activity), and their practices regarding medication prescription.

The electronic data collection system used was REDCap, a web-based system with functionalities that include registering professionals and institutions, data cleaning, and exporting data for statistical analysis. The electronic clinical forms were accessed through a link generated by the REDCap system. Data entry through the study’s data collection system is subject to various checks, such as open fields, plausible value ranges, possible and disallowed values, as well as logical checks. The participant entering the data is notified of any issues at the time of data entry. The categorical variables are described using absolute and relative frequencies, while con-

tinuous variables are described using measures of central tendency (mean, median) and dispersion (standard deviation, interquartile ranges). The analyses were performed using the latest version of the R software 4.3.1 (2023).

Results

During the period of survey data collection, 588 health professionals accessed the survey. Although only 579 was involved in patient care. The characterization of these professionals is shown in table 1. We observed that 86% were women with an average age of 41.6 ± 11.5 years.

Characteristics	Total
Female - % (n/total)	86% (498/579)
Age (Years) - mean ± SD (n)	41.6 ± 11,5 (569)
Brazilian Region - % (n/total)	
South	15.5% (89/576)
Southeast	58.2% (335/576)
Midwest	5.6% (32/576)
Northeast	15.5% (89/576)
North	5.4% (31/576)
Race-ethnicity - % (n/total)	
White	63.6% (374/588)
Mixed Race (Parda)	25.7% (151/588)
Black	6.6% (39/588)
No information	2.6% (15/588)
Asian	1.5% (9/588)
Health Profession - % (n/total)	
Dietitian	38.3% (225/588)
Nurse	18.2% (107/588)
Physician*	12.1% (71/588)
Pharmacist	5.1% (30/588)
Nursing Technician	3.6% (21/588)
Physiotherapist	2.2% (13/588)
Physical Education Professional	1.4% (8/588)
Psychologist	1.2% (7/588)
Other	18.0% (106/588)
Education Level - % (n/total)	
No information	3.6% (21/588)
Technical	5.8% (34/588)
Undergraduate	19.9% (117/588)
Specialization	49.3% (290/588)
Master degree	12.1% (71/588)
PhD degree	6.8% (40/588)
Post doctoral degree	2.6% (15/588)

Table 1: Characterization of the professionals who responded to the survey.

*Medical Specialties of respondents: endocrinologist, family physician, general practitioner, gynecologist and cardiologist.

Brazil is divided into five main geographic regions: North, Northeast, Central-West, Southeast, and South. This regional division is based on geographic, economic, social, and cultural criteria to facilitate the organization and planning of public policies. Our survey reached professionals from all five regions, with the Southeast region, the most populous, being the most represented (58.2%).

Notably, the majority of respondents were dietitian (38.3%), followed by nurses (18.2%), and most of them had some form of postgraduate degree (49.3%).

The nature and characteristics of patient care provided by these professionals are summarized in table 2. Most respondents work in the public sector (61.6%), mainly in primary health care (37.9%).

We aimed to assess if the professionals who answered the sur-

Characteristics	Total
Type of Service - % (n/total)	
Public	61.6% (362/588)
Private	19.2% (113/588)
Mixed	4.6% (27/588)
Philanthropic	3.4% (20/588)
Other	11.2% (66/588)
Characterization of Services Where Appointments are Conducted - % (n/total)	
Primary Care (public)	37.9% (173/457)
Specialized Outpatient Care (public)	17.7% (81/457)
Hospital Care	19.7% (90/457)
Specialty Clinic (private)	6.6% (30/457)
Private Practice	32.2% (147/457)
Other	14% (64/457)
Characterization of Appointments - % (n/total)	
Number of patients at risk for T2DM seen per week - mean ± SD (n)	12.7 ± 14 (n = 340)
Duration of appointments (minutes) - mean ± SD (n)	40.8 ± 24.8 (n = 320)

Table 2: Characteristics of Patient Appointments.

vey regularly provided care to patients at high risk of developing T2DM in their daily work. Identifying the proportion of high-risk patients in their total patient load is crucial for assessing their relevance. Hence, we inquire for an estimate of the number of high-risk patients seen per week. On average, they provide care to 12.7 (± 14) high-risk patients weekly, with an average consultation time of 40 ± 24.8 minutes.

Of the 579 professionals, 370 (63.9%) reported that they identified patients at high risk for T2DM, of which 340 assessed this risk using standardized protocols. In table 3, we highlight how these professionals identify an individual at risk for T2DM. Only 124

Characteristics	Total
Use of a Standardized Clinical Protocol for Identifying People at Risk for T2DM (Primary Outcome) - % (n/total)	36,5% (124/340)
Protocols Used for Identifying Risk for T2DM	
Materials from the Brazilian Diabetes Society	71.0% (88/124)
Protocol Developed by the Health Service Where They Work	29.8% (37/124)
Self-authored Protocol	22.6% (28/124)
Materials from the American Diabetes Prevention Program (DPP)	12.9% (16/124)
Professional's agreement with the statement - % (n/total)	
"I feel capable of identifying individuals at risk for T2DM"	
Strongly Disagree	1.5% (5/337)
Partially Disagree	8.9% (30/337)
Neither Agree nor Disagree	10.1% (34/337)
Partially Agree	38.9% (131/337)
Strongly Agree	40.7% (137/337)
How the health professional identifies that an individual is at risk for T2DM - % (n/total)	
From a medical diagnosis	53.8% (199/370)
From the patient's self-reported prediabetes	49.7% (184/370)
From the patient's family history of T2DM	49.7% (184/370)
From the observation of specific clinical characteristics in the patient	73% (270/370)
Characteristics of patients that professionals report observing to define the risk for T2DM - % (n/total)	
Overweight/obesity	97% (262/270)
Family history of diabetes	91.5% (247/270)
Fasting blood glucose (mg/dL) between 100 and < 126	85.2% (230/270)
Glycated hemoglobin (%) between 5.7 and < 6.5	84.1% (227/270)
Physical inactivity	81.1% (219/270)
Poor diet quality	80.4% (217/270)
Waist circumference	78.9% (213/270)
Previous gestational diabetes	74.8% (202/270)
Dyslipidemia	65.2% (176/270)
Blood glucose two hours after OGTT (mg/dL) between 140 and < 200	61.9% (167/270)
Hypertension	56.3% (152/270)
Alcohol consumption	40.7% (110/270)
Poor sleep quality	39.6% (107/270)
Smoking	28.5% (77/270)
Male sex	7% (19/270)
All of the above characteristics	4.1% (11/270)
Recording in medical records that the patient is at risk for T2DM - % (n/total)	
Never	12.2% (41/336)
Rarely	15.8% (53/336)
Sometimes	17.6% (59/336)
Often	14.6% (49/336)
Always	39.9% (134/336)

Table 3: Identification of Risk for T2DM.

(36.5%) of the 340 health professionals use a standardized clinical protocol to identify the risk of T2DM, mainly based on materials from the Brazilian Diabetes Society. Most of professionals (73%) refer to assess the risk of T2DM based on the patient’s clinical and biochemical characteristics, mostly BMI classification (obesity and overweight) (97%), family history of diabetes (91.5%), fasting blood glucose (85.2%), glycosylated hemoglobin (84.1%), self-report of physical activity practice (81.1%), and unhealth diet habits (80.4%). Alcohol consumption (40%), sleep quality (39.6%), and smoking (28.5%) are observed by less than half of the respondents. When asked if they feel capable of identifying individuals at risk for diabetes, only 40% fully agreed that they feel capable, and

39.9% of them state that they always record in medical records that the patient is at risk for T2DM.

In table 4, we describe how the professionals manage patients at high risk for T2DM. More than half of the professionals (59.6%) utilize educational materials to guide patients in T2DM prevention, with the most commonly resource used to be the Dietary Guidelines for the Brazilian Population. Diet, physical activity, weight management, stress management, and smoking cessation were the most frequently addressed topics in prevention T2DM. Additionally, more than half of the professionals reported reference patients to specialists, such as endocrinologists (65.9%), dietitians (53.2%), or physical education professionals (52.7%).

Characteristics	Total
Professionals Using Protocols for T2DM Prevention Guidance - % (n/total)	59.6% (189/317)
The material used is from the Ministry of Health - Dietary Guidelines for the Brazilian Population	72.0% (136/189)
The material used is from the Brazilian Diabetes Society	54.5% (103/189)
Self-authored material	45.0% (85/189)
The material used is from the Ministry of Health about the Brazilian Cardioprotective Diet	32.8% (62/189)
The material used is from the Brazilian Obesity Association	28.6% (54/189)
Other materials from the Ministry of Health	14.3% (27/189)
Content Covered in the Protocols Used - % (n/total)	
Improvement of diet	91.6% (163/178)
Guidance to increase physical activity	74.2% (132/178)
Weight reduction treatment	72.5% (129/178)
Guidance to reduce stress	48.9% (87/178)
Guidance to reduce smoking	47.2% (84/178)
Medication treatment	31.5% (56/178)
Referral to Specialists - % (n/total)	
Endocrinologist	65.9% (244/370)
Nutritionist	53.2% (197/370)
Physical education professional	52.7% (195/370)
Psychologist	26.5% (98/370)
Physiotherapist	4.1% (15/370)

Table 4: Characterization of Clinical Conduct.

Discussion

Our aim was to understand how health professionals are identifying, managing and preventing T2DM. The study reveals that only 36.5% of health professionals use a standardized clinical protocol to identify the risk of T2DM, and an even smaller proportion employs specific protocols for care and monitoring patients. These findings highlight a significant gap in the standardization of procedures for identifying T2DM and managing its prevention in Brazil.

Health professionals from all Brazilian regions engaged on this survey, which was crucial for our results. It is also worth noting that most participants work in the public sector, particularly in

primary healthcare services. Hence, including perspectives from various regions and contexts is essential for developing a national prevention program. The average volume of patients with high risk of T2DM is considerable, with an average of 12.7 patients per week. However, many professionals still report not feeling fully equipped to correctly identify T2DM risk, suggesting that the number of patients being treated may be even higher and highlighting the urgent need for capacity-building programs and standardization of procedures to properly identify an individual at high risk.

Various risk assessment tools for diabetes have been developed, employing different risks and weighting schemes [12]. In Brazil,

the Brazilian Diabetes Society uses a risk score that considers variables such as age, body mass index, waist circumference, physical activity, diet quality, hypertension, and family history of diabetes [13]. In our study, we found that most professionals recognize these factors as important, except for hypertension. Although several risk scores have been validated in independent populations, with many showing good discriminatory ability, it is important to identify low-cost tools, which are validated for target Brazilian population, in order to favor better identification and standardization in the screening of patients at high risk for T2DM.

Although the risk score considered by Brazilian Diabetes Society does not include alcohol consumption and smoking status, these factors should also be monitored by health professionals. However, in our study most professionals report not paying much attention to these as risk factors for T2DM, despite providing guidance on smoking cessation to individuals at high risk. Subjects who smoke are 30 to 40 percent more likely to develop T2DM than those who don't smoke [14]. The more cigarettes you smoke, the higher your risk [15]. Regarding alcohol, it is important to highlight abusive consumption as being associated with the development of diabetes [15]. Compared with lifetime abstainers, the relative risk (RR) for T2DM among men was most protective when consuming 22 g/day of alcohol (RR 0.87 [95% CI 0.76-1.00]) and became deleterious at just over 60 g/day of alcohol (1.01 [0.71-1.44]) [16]. Among women, it became deleterious at about 50 g/day of alcohol (1.02 [0.83-1.26]) [16].

Diabetes mellitus has a profound impact on health systems, especially in low and lower-middle income regions [17]. Disease prevention and management involves engaging in regular physical activity and having a healthy diet. However, lifestyle change is a gradual process that requires continuous re-evaluation of one's life project and future expectations. Low adherence to treatment is one of the main challenges faced by health professionals due to several factors [18], which can be even more challenging when taken into account health disparities and social determinants of health. Adherence is a multifactorial phenomenon that depends on effective partnership between the caregiver and the patient, encompassing therapeutic, educational, and mutual recognition aspects. Guidance for lifestyle changes can be promoted by any health professional, hence, it is interesting to note that the majority of professionals refer patients to specialists [19]. Therefore, it is more feasible to promote a training initiative for disease prevention and health promotion in primary care, emphasizing the role of specialists as consultants for disease treatment when necessary. Moreover, the low utilization of protocols for caring for patients at risk for T2DM stands out as a result of the lack of proper health professional training for T2DM prevention. Similarly, health literacy should be also encouraged for a better engagement among patients [20].

An important limitation of this study is that most respondents are dietitians, which may have been influenced by the fact that the researchers are also dietitians, favoring the network of colleagues to whom the survey was disseminated. Additionally, the number of respondents was lower than expected, possibly due to the short-period data collection not being sufficient to reach a broader sample of health professionals.

However, this study represents the first step in structuring a national diabetes prevention program and was essential in providing data that underpin the need for such a program. In addition, empowering professionals to identify the risk of T2DM and promote healthy eating and physical activity is imperative for achieving success in disease prevention.

Conclusion

In summary, this study sheds light on critical gaps in the identification and management of individuals with high risk for T2DM among health professionals in Brazil. With only 36.5% utilizing standardized clinical protocols and a lack of attention to significant risk factors such as hypertension, smoking, and alcohol consumption, there is an urgent need for comprehensive training and standardization of practices in diabetes prevention. The findings highlight not only the considerable patient load in primary care but also the necessity for empowering healthcare providers to effectively identify and manage diabetes risk. Enhancing adherence to treatment and lifestyle change guidance should be prioritized, with primary care professionals playing a pivotal role in prevention efforts. This study serves as a foundational step toward establishing a robust framework for diabetes prevention, emphasizing the need for ongoing training and resource allocation to improve health outcomes for patients at risk of T2DM. Tackling these challenges will be crucial in transforming diabetes care in Brazil and advancing public health.

Conflict of Interest

All authors declare no financial interest, or any conflict of interest exists.

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