

# Knowledge Levels Among Elderly People With Diabetes Mellitus Concerning COVID-19: an Educational Intervention via a Teleservice

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## Research Article

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# Abstract

**Aim** To investigate knowledge levels concerning COVID-19 in elderly patients with T2DM through an educational intervention at a call center.

**Methods** This cross-sectional, quantitative, observational, and descriptive study was undertaken among elderly individuals with T2DM involved in a body balance rehabilitation program that had been suspended due to social isolation. Study participants comprised elderly individuals with T2DM, contactable using fixed or mobile telephones. Data concerning participants' socioeconomic variables, depressive symptoms, and knowledge of COVID-19 were collated, using a Brazil Ministry of Health guidelines checklist. Mann-Whitney and Spearman's correlation tests were used to analyze their responses.

**Results** Of 30 elderly participants, 76.7% were women and 63.3% were married. The most cited information medium was television (96.6%). Of a possible 24 correct responses on the checklist, the median correct response score was 7.5. No significant relationship was observed between the total checklist score and the variables studied.

**Conclusion** Elderly participants did not have in-depth knowledge concerning COVID-19, which suggests that their knowledge sources may be deficient or that their capacity to retain information was inadequate.

## Introduction

The end of 2019 was marked with the first cases of the new coronavirus disease (COVID-19) in Wuhan city, the capital of Hubei province in China. Initially, infected individuals were admitted to hospital with symptoms of acute pneumonia without a definite cause [1]. Within three months, severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) had spread globally, and the World Health Organization announced a pandemic level on March 11, 2020. COVID-19 affects elderly people to a greater extent, and fatality rates have been shown to be higher among elderly populations with multiple comorbidities [2].

Among chronic diseases, type 2 diabetes mellitus (T2DM) is an important complication of COVID-19. According to survey results involving 7,337 SARS-CoV-2-infected patients in China, a diagnosis of T2DM significantly increased the risk of mortality in patients hospitalized with COVID-19 [3], as patients with T2DM are generally more susceptible to infections, including infections involving the respiratory tract [4].

A patient with T2DM may develop a more severe manifestation of COVID-19 due to excess body fat tissue, which increases the inflammatory and chronic pro-oxidative state in the body, resulting in negative effects on blood glucose [5]. Poor blood glucose control and hyperglycemia decrease immunity, which increases the risk of mortality due to COVID-19. In addition, an elderly patient with T2DM and SARS-CoV-2 infection may have severe kidney complications and cardiovascular and pulmonary diseases; therefore, particular attention is needed when treating and managing this high-risk patient group [6].

However, due to social isolation and social distancing measures, blood glucose control and quality of life issues for elderly patients with T2DM have become more challenging, especially for those with other chronic diseases. Stoian et al. (2020) proposed: (i) the elaboration of a digital medical record, which could directly send information, questions, and glycemic data from users to health professionals; (ii) telephone contact involving an automated answering service tailored to questions asked by the user, and; (iii) the use of telemedicine via videoconferencing [6].

Telehealth, telemedicine, telemarketing, and eHealth are frequently used terms to describe the use of information and communication technologies that provide health services at a distance in different areas. They allow screening and act as an aid to diagnostics, and promote interventions, protection, and health education. These technologies have been reported to be ideal during health emergencies in relation to communicable diseases, such as COVID-19 [7, 8]. A call center can coordinate the most diverse types of communication, ranging from lectures via videoconferencing for permanent education and inter-consultation, to phone calls, messages via cell phones, internet messaging platforms, videos, or satellite messages [7].

In patients with COVID-19 or among those at risk of SARS-CoV-2 infection, a call center can assist with remote assessments and care delivery. For non-infected individuals, especially those at higher risk of infection (for example, elderly people with preexisting medical conditions), a call center can provide convenient access to guidelines that should be followed during a pandemic, and provide routine care information without risking exposure to a hospital or any other congested health service with high exposure [9]. This study aimed to investigate knowledge levels among elderly individuals with T2DM in relation to COVID-19, through an educational intervention via a call center.

## Methodology

This was a cross-sectional, observational, quantitative, and descriptive study. The study design was approved by the Ethics Committee in Research with Humans of the Hospital Universitário Onofre Lopes (HUOL) linked to the Federal University of Rio Grande do Norte (UFRN) (No: 3.084.420).

### Population

In undertaking this study, we consulted a list of participants from the “Influence of a virtual reality protocol on the body balance of elderly people with type 2 diabetes mellitus: a randomized controlled clinical trial” project, who resided in the metropolitan area of Natal, Rio Grande do Norte, Brazil.

### Sample and eligibility criteria

The sample population was drawn from those enrolled in the project described above. Our study participants comprised elderly individuals (aged 65–75 years) with a clinical diagnosis of T2DM according to the American Diabetes Association [10] who had been participating in body balance rehabilitation at the Laboratory of Technological Innovation in Health of the HUOL/UFRN and who had a

telephone contact (fixed or mobile). Elderly individuals were excluded from the study if they did not respond to any of five attempts to make telephone contact, or who had hearing loss and did not have an accompanying caregiver who could receive guidance over the phone.

## Instruments

Sociodemographic data (sex, age, marital status, education, income, and social participation) were obtained through a structured questionnaire, in the form of an interview.

Regarding the level of knowledge about COVID-19, a checklist was prepared based on data provided by the Brazil Ministry of Health (MOH), as shown in Table 1. No data were collected concerning “diagnosis”, “information for travelers” and “if the individual becomes ill”, to reduce the number of responses and because most of these matters had previously been clarified.

Scores were assigned, with one point added for each correct participant response. Possible scores were as follows: symptoms (0-5 points); forms of transmission (0-6 points), and; preventive measures (0-13 points). The total score was the sum of the points acquired by the participant, ranging from 0 to 24. The higher the score, the greater the level of COVID-19 knowledge.

**Table 1** Checklist of COVID-19 guidelines provided by the call center

Symptoms	Ways of transmission	Prevention measures
<ul style="list-style-type: none"> <li>· Cough</li> <li>· Fever</li> <li>· Runny nose</li> <li>· Sore throat</li> <li>· Difficulty breathing</li> </ul>	<ul style="list-style-type: none"> <li>· Handshake touch</li> <li>· Droplets of saliva</li> <li>· Sneeze</li> <li>· Cough</li> <li>· Catarrh</li> <li>· Contaminated objects or surfaces, such as cell phones, tables, door handles, toys, or computer keyboards</li> </ul>	<ul style="list-style-type: none"> <li>· Wash hands with soap and water or with 70% gel alcohol</li> <li>· When coughing or sneezing, cover your nose and mouth with a handkerchief or your arm, not your hands</li> <li>· Avoid touching eyes, nose, and mouth with unwashed hands</li> <li>· Maintain a minimum 2 meter distance from anyone;</li> <li>· Avoid physical contact with people who do not live in your home</li> <li>· When ill, avoid physical contact with other people, including inside your own home, and stay at home until you your health improves</li> <li>· Frequently sanitize children's cell phones and toys</li> <li>· Do not share personal items, such as cutlery, towels, plates, and glasses</li> <li>· Keep your environment clean and well ventilated;</li> <li>· Avoid unnecessary circulation in the streets, churches, or in supermarkets, and banks</li> <li>· Take plenty of rest and eat healthily</li> <li>· Use fabric masks when leaving your home, changing them every 2 hours.</li> </ul>

Source: Brazil Ministry of Health, 2020 Available at: < <https://coronavirus.saude.gov.br/sobre-a-doenca#se-eu-ficar-doente> >.

The Geriatric Depression Scale (GDS-15) has previously been used to screen outpatients for depressive symptoms [11]. It is a validated instrument for tracking mood disorders, although it cannot be used to diagnose depression or any other disease [12]. A short version of the GDS-15 consists of 15 questions, with yes or no responses. In this version, the lowest possible score is zero and the highest possible score is 15, with a cutoff score of 5 indicating the presence of depressive symptoms [13]. Furthermore, this short version of the GDS-15 has previously been validated for use in tele-attendance [14].

### **Procedures for obtaining data**

The elderly participants were contacted by an appropriately trained and qualified physiotherapy undergraduate student who conducted the telephone interviews during business hours. After identification, participants were questioned concerning their socioeconomic status.

Participants were asked to indicate whether they had obtained information concerning COVID-19 or SARS-CoV-2 infection, and through what means of communication. Participants were asked to indicate what they knew about the symptoms, forms of transmission, and preventive measures concerning COVID-19. When the participants gave incorrect information, the interviewer provided accurate information, as well as adding any further relevant information not been previously mentioned by the participant. The GDS-15 was then applied.

### **Statistical analysis**

Data were analyzed using SPSS software (version 20.0, IBM, New York, USA), and the level of significance was set at 5% for statistical tests. Descriptive statistics (arithmetic mean, standard deviation, median, minimum, and maximum values, and 95% confidence intervals) were calculated.

Using a Shapiro-Wilk test, the dependent variable “total checklist score” was confirmed to be non-parametric. A Mann-Whitney test was used to compare the “total checklist score” and sociodemographic variables and the GDS-15. Spearman’s correlation test was used to correlate the “total checklist score” with age.

## **Results**

Of 38 patients contacted, 30 elderly individuals (women;  $n = 23$ , 76.7%) answered the telephone and agreed to participate in this study. The average age was  $69.96 \pm 4.46$  years (age range, 65 years–79 years), 63.3% were married, and the average number of years spent in education was  $8.16 (\pm 5.81)$  years. The average income was R\$ 3,522.20 ( $\pm 3,476.27$ ), and their income was predominantly derived from 1 to 2 minimum wages. In total, 50% of the respondents participated in community activities, and 21 (70%) did not show depressive symptoms, according to their GDS-15 responses. Participant characteristics are shown in Table 2.

**Table 2** Participants socioeconomic characteristics.

Variable	n (%)
<b>Sex</b>	
Male	7 (23.3%)
Female	23 (76.7%)
<b>Civil status</b>	
Married	19 (63.3%)
Not married	11 (36.7%)
<b>Education</b>	
Illiterate or did not complete primary school	13 (43.3%)
Completed primary or post-elementary	17 (56.7%)
<b>Income</b>	
1-2 minimum wages	17 (56.7%)
≥3 minimum wages	13 (43.3%)
<b>Social participation</b>	
Participates in community activities	15 (50%)
Does not participate in community activities	15 (50%)
<b>Depressive Symptoms</b>	
Evidence of depressive symptoms	9 (30%)
No evidence of depressive symptoms	21 (70%)

Source: Author, Natal, 2020.

Regarding the most used medium to obtain information concerning COVID-19, Figure 1 shows that 29 of 30 participants reported receiving information from the television.

Concerning items derived from the Brazil MOH checklist, each variable may or may not have been mentioned by a participant during the telephone interview. Among items relating to COVID-19 symptoms, fever was most frequently cited (n = 23, 76.7%), and coryza was the least frequently cited symptom (n = 26, 86.7%). In terms of contamination, "touch or handshake" was the most cited form of transmission (n = 23, 76.7%), whereas phlegm was not mentioned by any participant. In terms of prevention, hand hygiene was the most cited item (n = 27, 90.0%), whereas "having plenty of rest and maintaining a healthy diet" was not mentioned by any participant, as shown in Table 3.

**Table 3** Checklist items and participant responses

Feature	n (%)
<b>SYMPTOMS</b>	
<b>Cough</b>	
Mentioned	13 (43.3%)
Not mentioned	17 (56.7%)
<b>Fever</b>	
Mentioned	23 (76.7%)
Not mentioned	7 (23.3%)
<b>Coryza</b>	
Mentioned	4 (13.3%)
Not mentioned	26 (86.7%)
<b>Sore throat</b>	
Mentioned	8 (26.7%)
Not mentioned	22 (73.3%)
<b>Difficulty breathing</b>	
Mentioned	16 (53.3%)
Not mentioned	14 (46.7%)
<b>FORMS OF TRANSMISSION</b>	
<b>Handshake touch</b>	
Mentioned	23 (76.7%)
Not mentioned	7 (23.3%)
<b>Droplets of saliva</b>	
Mentioned	10 (33.3%)
Not mentioned	20 (66.7%)
<b>Splash</b>	
Mentioned	10 (33.3%)
Not mentioned	20 (66.7%)
<b>Cough</b>	
Mentioned	9 (30%)
Not mentioned	21 (70%)
<b>Phlegm</b>	
Mentioned	0
Not mentioned	30 (100%)
<b>Contaminated objects or surfaces</b>	
Mentioned	5 (16.7%)
Not mentioned	25 (83.3%)
<b>PREVENTION FORMS</b>	
<b>Wash hands and sanitize with alcohol</b>	
Mentioned	27 (90%)
Not mentioned	3 (10%)
<b>Cover nose and mouth when sneezing</b>	
Mentioned	1 (3.3%)
Not mentioned	29 (96.7%)
<b>Avoid touching your eyes, nose, and mouth</b>	
Mentioned	1 (3.3%)
Not mentioned	29 (96.7%)
<b>If you touch your face, wash your hands immediately</b>	
Mentioned	9 (30%)
Not mentioned	21 (70%)
<b>Avoid contact with people who do not live with you</b>	
Mentioned	13 (43.3%)
Not mentioned	17 (56.7%)
<b>Maintain a 2-meter distance from other people</b>	
Mentioned	8 (26.7%)
Not mentioned	22 (73.3%)
<b>If you are sick, isolate yourself at home</b>	
Mentioned	2 (6.7%)
Not mentioned	28 (93.3%)
<b>Sanitize children's cell phones and toys</b>	

Mentioned	4 (13.3%)
Not mentioned	26 (86.7%)
<b>Do not share personal items</b>	
Mentioned	1 (3.3%)
Not mentioned	29 (96.7%)
<b>Keep your environment clean and airy</b>	
Mentioned	4 (13.3%)
Not mentioned	26 (86.7%)
<b>Avoid unnecessary circulation</b>	
Mentioned	17 (56.7%)
Not mentioned	13 (43.3%)
<b>Take plenty of rest and maintain a healthy diet</b>	
Mentioned	0
Not mentioned	30 (100%)
<b>Use a fabric mask, changing it every 2 hours</b>	
Mentioned	24 (80%)
Not mentioned	6 (20%)

Source: Author, Natal/RN, 2020.

The total checklist score concerning all the variables showed an average of 7.73 ( $\pm 1.61$ ) points (range, 5–12). The Mann-Whitney U-test showed no significant difference between socioeconomic variables and total checklist scores in terms of sex ( $p = 0.56$ ), marital status ( $p = 0.49$ ), education ( $p = 0.15$ ), income ( $p = 0.16$ ), social participation ( $p = 0.39$ ), and depressive symptoms ( $p = 0.06$ ), nor did the Spearman's correlation test show a significant difference in relation to age ( $p = 0.34$ ).

## Discussion

Healthcare provision during periods of social isolation and social distancing has been delivered remotely during the COVID-19 pandemic in Brazil and elsewhere worldwide. Call centers have been introduced into the health arena as a positive strategy to maintain contact with patients living remotely and without physical contact. Interventions undertaken via telephone calls can be effective in promoting health and enhancing knowledge.

Women comprised 76.7% of our study population. More women have been reported to seek health services [15, 16], which may have led to this predominance, as our study population was derived from a specialized health unit database. In one United States study involving patients aged from 18 to 75 years diagnosed with T2DM, a population management program was designed to assist patients with T2DM in self-management through receiving telephone calls and text messages. In that study, there was also a predominance of females [17].

In our study, 63.3% of the participants were married. A study by Carvalho (2018) reported a similar prevalence of married participants with T2DM. Patients with T2DM living within a family structure have been found to have a more suitable environment in which to influence self-care behaviors [18].

The participants in our study had low levels of education, which may have impaired their access to information and hindered their self-care, in addition to making it difficult to adhere to the treatment required concerning their comorbidities. Becker (2017) suggested that telephone contact was an efficient means of health education for this vulnerable population [15], and it appears reasonable to continue with this type of care when aiming to clarify issues and challenges concerning COVID-19.

In total, 56.7% of the participants reported living on one to two minimum wages, which revealed further vulnerability among these patients as their limited resources may have affected their access to medication. These data can help guide health management in controlling COVID-19 better through implementing more appropriately targeted public policies to reduce the health needs of patients with chronic diseases [19].

Of the 30 elderly people evaluated, 21 (70%) did not present depressive symptoms, according to the GDS-15. The absence of depressive symptoms in most of the participants may be related to this elderly population not being very elderly (average age,  $69.96 \pm 4.46$  years). Further, this absence could also be explained through the presence of family or a spouse, which has been reported to help with reducing anxiety levels in this population [16].

Ozamiz-Etxebarria [20] highlighted the presence of long-term post-quarantine psychopathological symptoms, including depression, among elderly individuals. Moreover, social isolation for elderly people can result in decreased cognitive stimuli, resulting in depression and dementia [21]. In 2019, Valentiner reported that other methods to assist with self-care, including telephone guidance, were found to lead to a general improvement in depressive symptoms [22].

In terms of the 24 items derived from the Brazil MOH checklist, an average score of 7.73 ( $\pm 1.61$ ) points indicated that the elderly participants with T2DM in our study were not as well informed concerning COVID-19 as they should have been. The participant with the highest score correctly identified only 12 items, comprising 50% of the relevant information. This finding suggests that the means of communication used by elderly individuals to receive information concerning COVID-19 may not provide sufficient or accurate enough information to meet their needs during this period of social isolation. Television was found to be the most used information medium for the elderly participants in this study, which was similar to the findings of a study by Goodman-Casanova [23] that showed television was a major means of providing health information and social support.

Providing timely, sufficient, and accurate information can raise awareness among a population. In emergency situations involving disease outbreaks, epidemics, and pandemics, effective communication is essential, with the provision of accurate information more likely to help responsible agencies to take more effective measures [24].

During a health crisis, the public depends on the media to transmit accurate and updated information to make informed decisions regarding health protection behaviors. Thus, it is essential that reliable sources are available to provide assessments and recommendations [25, 26]. However, the ease of access to

multiple media, along with the consumption, dissemination, creation, and sharing of information, mainly through social media, can have serious negative implications. A total of 20% of the sample claimed that one way to obtain information about COVID-19 was through social networks. However, the large amount of information generated through social networks, some of which is inaccurate, can be confusing, making it difficult to differentiate accurate from inaccurate content and facilitating the proliferation of potentially erroneous conceptions [27, 28].

While no significant relationship was found between age and the total checklist score, we observed low scores ( $\leq 50\%$  of the total score) among the participants. This relationship may be explained as due to the limited and higher age range among the participants and that such elderly individuals tend to recall less health information [29]. The ability to recall instructions is critical in adhering to health professionals' recommendations and can be influenced by various factors, such as the amount of information conveyed to a patient and the manner in which it is acquired, the duration of exposure, and whether numerous interruptions occur [30, 31].

Age has been reported to influence the level of information retention [32]. It has also been shown that, if not used frequently, the learned content passes through the working memory and is then discarded whereas, if such content is used routinely, it reaches the long-term memory and is retained [33]. However, as the information volume increases, it becomes more difficult to recover relevant information [30].

The participants' socioeconomic level (education and income) was a further consideration as this factor is an important determinant of health and of health-related matters. A person's socioeconomic level plays a mediating role between staying in good health and acquiring effective health information in terms of facilitating health literacy, defined as the knowledge, motivation, and skills of a person to access, understand, evaluate, and apply information, and to make decisions in daily life in relation to care, prevention, and health promotion to maintain or improve that person's quality of life [34].

In this study, 56.7% of the elderly participants reported having completed primary or post-elementary education; however, no statistical difference was found in relation to the total checklist score ( $p = 0.15$ ). It is possible that information transmitted to this population group may have been so simple that all the participants assimilated the knowledge in a similar way. A low socioeconomic status is considered a potential risk factor for low health literacy [35], and education is one of the main determinants of health literacy. However, it has been suggested that education levels determined according to the number of completed school years is not accurate in measuring an individual's true educational level, as it does not take into account the different cognitive skills of each individual [36]. Individuals with the same educational level may have different levels of cognitive skills, leading to differences in knowledge acquisition [36].

This study had some limitations. It can be difficult for elderly participants to answer telephone calls. Of the 38 participants we initially sought to contact, 8 did not answer our calls. The participants were also noted to be shy in their responses and some had difficulties in expressing themselves over the telephone.

In conclusion, our study showed that the elderly participants did not have in-depth knowledge concerning COVID-19, as we obtained an average of only 7.73 ( $\pm$  1.61) correct answers from a total of 24 questions. This finding suggests that the knowledge sources of these elderly participants may have been deficient or that their capacity to retain information was inadequate. Television was the most cited source of information, and the total checklist scores did not show any significant difference in terms of depressive symptoms and social variables among the participants. Therefore, we suggest that tele-service interventions be encouraged and new approaches developed to disseminate accurate information concerning COVID-19.

## Declarations

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## COMPLIANCE WITH ETHICAL STANDARDS

**Conflict of interest:** The authors declare that they have no conflict of interest.

**Ethical Standard Statement:** The study followed the tenets of Helsinki Declaration and consent was obtained.

**Informed consent:** All patients were informed of the purpose of study and signed a consent form.

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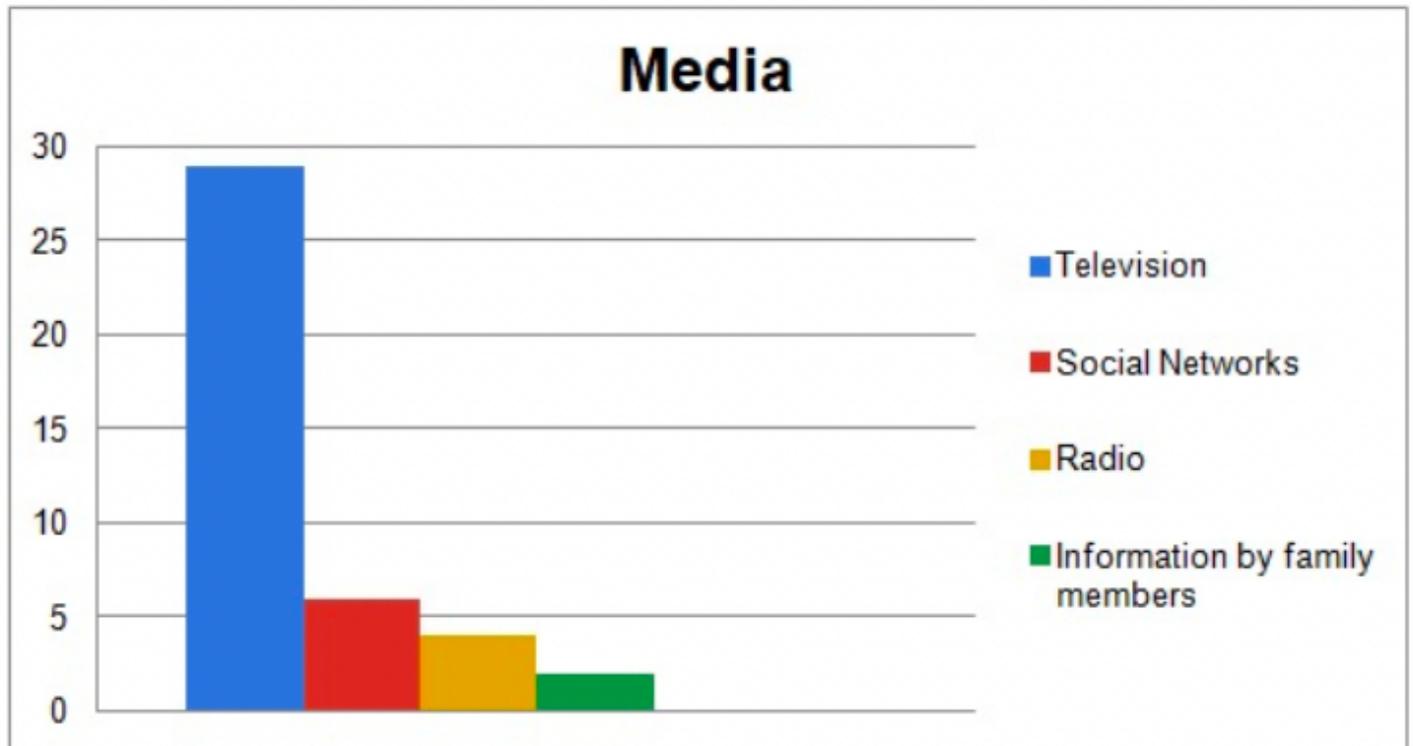
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## Figures



Source: Authors, 2020.

Figure 1

Sources of information concerning COVID-19 among elderly participants with T2DM

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