

Risk factors of the beneficiaries of clinical management through telemonitoring of supplementary health: a cross-sectional study

Fatores de risco dos beneficiários do gerenciamento clínico por telemonitoramento da saúde suplementar: estudo transversal

Factores de riesgo de los beneficiarios del seguimiento clínico por telemonitorización de la salud complementaria: estudio transversal

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ABSTRACT

Objective: To identify the prevalence of the modifiable risk factors for chronic non-communicable disease in hypertensive and diabetic beneficiaries. **Method:** A cross-sectional study, from 2019, with data from the electronic medical records of 109 adults, independent for the daily activities, of clinical management through telemonitoring of a health plan operator, Paraná-PR. Descriptive statistics, chi-square test and unadjusted binary logistic regression were performed. **Results:** Men had lower inadequate consumption of soft drinks (OR=0.37) and overweight as a risk factor (OR=3.57). Protective factors for adults were arterial hypertension (OR=0.14) and good readiness for behavioral change (OR=0.21) and, for older adults, arterial hypertension concomitant with diabetes mellitus (OR=0.16). There was an association between age, arterial hypertension (p=0.001; OR=0.14; CI=0.04-0.51) and good readiness for behavioral change (p=0.023; OR=0.21; CI=0.06-0.76). **Conclusion:** Aged women with a healthy lifestyle predominated, for whom secondary prevention interventions are recommended.

DESCRIPTORS: Behavior; Healthy Lifestyle; Health System; Prevalence; Older Adult; Carbonated Beverages.

RESUMO

Objetivo: Identificar a prevalência dos fatores de risco modificáveis para doença crônica não transmissível de beneficiários hipertensos e diabéticos. **Método:** Estudo transversal, de 2019, com dados do prontuário eletrônico de 109 adultos, independentes para as atividades cotidianas, do gerenciamento clínico por telemonitoramento de operadora de plano de saúde, Paraná-PR. Realizou-se estatística descritiva, teste qui-quadrado e regressão logística binária bruta. **Resultados:** Homens tiveram menor consumo inadequado de refrigerante (OR =0,37) e peso elevado como fator de risco (OR =3,57). Fatores de proteção dos adultos foram hipertensão arterial (OR =0,14) e boa prontidão para mudança comportamental (OR =0,21) e, dos idosos, hipertensão arterial concomitante ao diabetes mellitus (OR =0,16). Houve associação entre idade, hipertensão arterial (p =0,001; OR =0,14; IC =0,04-0,51) e boa prontidão para a mudança comportamental (p =0,023; OR =0,21; IC =0,06-0,76). **Conclusão:** Predominaram idosos com estilo de vida saudável, para as quais são recomendadas intervenções de prevenção secundária.

DESCRIPTORIOS: Comportamento; Estilo de Vida Saudável; Sistema de Saúde; Prevalência; Idoso; Bebidas Gaseificadas.

RESUMEN

Objetivo: Identificar la prevalencia de factores de riesgo modificables de enfermedades crónicas no transmisibles en beneficiarios hipertensos y diabéticos. **Método:** Estudio transversal, de 2019, con datos de historias clínicas electrónicas de 109 adultos, con independencia para las actividades diarias, de seguimiento clínico por telemonitorización de un operador de plan de salud, Paraná-PR. Se realizó estadística descriptiva, prueba de chi-cuadrado y regresión logística binaria bruta. **Resultados:** Los hombres presentaron menor consumo inadecuado de gaseosas (OR =0,37) y alto peso como factor de riesgo (OR =3,57). Los factores de protección para los adultos fueron hipertensión arterial (OR =0,14) y buena disposición para el cambio de comportamiento (OR =0,21), y para los adultos mayores, hipertensión arterial concomitante con diabetes mellitus (OR =0,16). Hubo una asociación entre edad, hipertensión (p =0,001; OR =0,14; IC =0,04-0,51) y buena disposición para el cambio de comportamiento (p =0,023; OR =0,21; IC =0,06-0,76). **Conclusión:** Predominaron los adultos mayores del sexo femenino con estilo de vida saludable, para quienes se recomiendan intervenciones de prevención secundaria.

DESCRIPTORIOS: Comportamiento; Estilo de Vida Saludable; Sistema de Salud; Prevalencia; Adulto Mayor; Bebidas Carbonatadas.

INTRODUCTION

Like the health systems, people with chronic non-communicable CNCDs also suffer, and knowing early on the uniqueness of their unmet needs, modifiable risk factors, vulnerabilities and potentialities is crucial for the conduction of the different health interventions, public policies, resource allocation and research studies⁽¹⁻³⁾.

Abuse of alcoholic beverages, tobacco use, physical inactivity and consumption of unhealthy food products are the main modifiable risk factors of most CNCDs, which can have early onset and be consolidated during adulthood, with negative impacts on people's health in any stage of the life cycle⁽⁴⁾.

Several theoretical approaches point to the relationship between sociodemographic factors, diseases, disabilities and deaths, which influence the choices, desires, needs, lifestyle and health behavior of people with CNCDs, mainly those with low schooling and access to information and to goods and services^(1,2,5,6).

Therefore, the care models for such individuals must identify the social determinants of health, modifiable risk factors for CNCDs, the complexity of the clinical risk and the self-care ability, which is vital for the development of preventive and effective interventions, in particular clinical management through telemonitoring^(1,2).

It is known that exposure of the population to the behavioral risk factors is precocious, that they consolidate in adulthood, that their consequences compromise health, at any stage of the life cycle, and that their incidence guides the public policies for disease prevention and health promotion; however, the occurrence of

the main risk factors for CNCDs among adults and older adults and their access to supplementary health is little explored in research studies on this topic⁽⁴⁾.

Given the above and considering that the incipient implementation of health education interventions and support for self-management in supplementary health⁽⁷⁾ impairs the reduction of the modifiable risk factors for CNCDs among their beneficiaries⁽⁴⁾, the objective of this study was to identify the prevalence and association of the modifiable risk factors for CNCDs among beneficiaries with arterial hypertension and diabetes mellitus of clinical management through telemonitoring.

METHOD

An observational, cross-sectional, retrospective and analytical study with a quantitative approach⁽⁸⁾, carried out in 2019, with data from the chronically-ill patients from a medium-sized medical cooperative health plan provider (*Operadora de Plano de Saúde, OPS*), located in the Midsouth region of Paraná-PR, which corresponded to 5.6% of the approximately thirty thousand beneficiaries⁽⁹⁾. During this period, the OPS offered 200 vacancies in the Clinical Management through Telemonitoring (*Gerenciamento Clínico por Telemonitoramento, CMPT*) program for beneficiaries with CNCDs, which was a complementary service to the usual medical follow-up, developed by a multidisciplinary team led by a nurse, with an individual approach and educational actions and support for the self-management of health conditions^(10,11).

The intentional sampling technique was used, so that, during data collection, 185 beneficiaries were eligible for clinical management through telemonitoring and only 109 met the inclusion criteria, namely: having arterial hypertension (AH) and/or DM, being older than 18 years old, independence for the basic daily activities, and having information on the modifiable risk factors for CNCDS recorded in the electronic medical chart.

The questionnaire of the Surveillance Research of Risk and Protective Factors for CNCDS through Telephone Survey⁽¹²⁾, for beneficiaries of the supplementary health system, supported the extraction of socioeconomic data on the health status and modifiable risk factors for CNCDS of the participants of this study, which were double-typed into a Microsoft Office Excel® spreadsheet.

The independent variables were the sociodemographic data (male/female; age group 18-29, 30-39, 40-49, 50-59, 60-79, 80 or more years old; schooling 0-8, 9-11, 12 or more years of study), later categorized into adults (18-59 years old), older adults (60 years old or more), and up to high school/higher education or more. The dependent variables were as follows: self-reported health status, time of participation in clinical management through telemonitoring, and modifiable risk factors for CNCDS.

The data on the self-reported health status⁽¹¹⁾ were categorized as follows: morbidity: AH (yes/no), DM (yes/no), concomitant AH and DM (yes/no); multiple CNCDS (two or more chronic conditions): yes/no; readiness for behavioral change; motivational stage of behavioral change).

Readiness for behavioral change (good: the person understands the disease and recognizes the need to take care of themselves; average: the person understands the disease, but does not recognize the need to take care of themselves; poor: the person does not understand the disease and does not recognize the need to take care of themselves) concerns people's willingness to change inadequate habits⁽¹⁾.

In turn, the motivational stages of behavioral change (pre-contemplation: the person does not intend to change behavior; contemplation: the person intends to but does not know how to change behavior; preparation: the person prepares for the change; action: the person adopts changes; maintenance: the person seeks to maintain the changes; relapse: the person abandons the change) describe the behavioral change moment in which the person is and indicate the best approach to self-care support to be adopted by the health professional who assists them⁽¹⁾.

Such stages were categorized into active (action and maintenance stages) and non-active (pre-contemplation, contemplation, preparation and relapse stages).

The self-reported modifiable risk factors for CNCDS⁽¹²⁾ were categorized as follows: smoking habit (yes/no); enough physical activity (yes/no); alcohol consumption (yes/no); consumption of fruits and vegetables five or more days a week (adequate/inadequate); consumption of white meat up to six or fewer days a week or red meat up to two days a week (adequate/inadequate); consumption of soft drinks less than five days a week (adequate/inadequate); weight

classification, according to the Body Mass Index (BMI): normal (BMI < 25 kg/m²), overweight (BMI between 25 and 29 kg/m²) and obesity (BMI 30 kg/m²), later reclassified as excess weight (yes/no).

The Statistical Package for Social Science® (SPSS) software, version 24.0, was used for data analysis. The categorical variables were described in frequencies and associated by the Chi-square test (X²), with the respective proportions (%) and odds ratios (OR), as well as 95% confidence intervals (CI)⁽⁸⁾.

The variables with a significant association (p≤0.05) were also analyzed using unadjusted binary logistic regression to estimate OR and CI. The model adopted followed the mathematical criterion of the likelihood ratio, with the advance of each covariate, in blocks.

The current ethics recommendations in research studies with human beings were followed and the project was approved by the Research Ethics Committee of the State University of Londrina-PR, opinion No. 3,107,455 of 01/07/2019.

RESULTS

Among the 109 participants studied, the mean age was 68 years old (±10; CI=0.66-0.70), with predominance of females (67.0%), older

adults (86.2%) and people who studied up to High School (67%).

Good readiness to change behavior prevailed among the hypertensive and diabetic patients studied (87.2%). As for the motivational stage, none of them was in pre-contemplation and the only one who was in relapse was incorporated into the contemplation stage, which accounted for 24.8% of the participants. Only 18.3% were in the preparation stage.

A higher proportion of participants with healthy habits was verified, mainly adequate consumption of meat (99.1%) and of fruit, legumes and vegetables (96.3%). Among the physically active (81.7%), 46.1% practiced some physical activity three to four times a week. As for the duration of physical activity, 74.2% of the physically active exercised for less than one hour a day.

Regarding the modifiable risk factors, 55.1% of the participants consumed soft drinks more than five days a week and, among those who drank alcoholic beverages (35.8%), 64.1% did so occasionally and 3.7% did so in abusive amounts. A minority of the participants smoked tobacco (1.83%) and were not with excess weight (33.0%).

Tables 1 and 2 show the proportions (%), CI and p-value of the X² test for the health status and modifiable risk factors for CNCDS, respectively, according to gender and age.

Table 1 – Health status and modifiable risk factors for CNCDS of hypertensive and diabetic patients participating in clinical management through telemonitoring in a health plan operator, according to gender. Midsouth Paraná-PR, 2020

Health status and modifiable risk factors for CNCDS	Gender				X ²
	n (%)	Male 95% CI	n (%)	Female 95% CI	

Self-reported morbidity

Arterial hypertension	17 (26.6%)	(0.37-1.07)	47 (73.4%)	(0.95-1.70)	0.087
Diabetes mellitus	01 (25.0%)	(0.13-4.18)	03 (75.0%)	(0.63-2.01)	0.728
Hypertension and diabetes	17 (45.0%)	(1.02-2.91)	22 (55.0%)	(0.54-1.02)	0.043
Multimorbidity	21 (35.6%)	(0.69-2.05)	38 (64.4%)	(0.71-1.20)	0.536
Good readiness for change	32 (33.7%)	(0.49-2.83)	63 (66.3%)	(0.65-1.33)	0.704
Active motivational stage	21 (33.9%)	(0.55-1.63)	41 (66.1%)	(0.79-1.34)	0.830
Participation in telemonitoring between 6 and 12 months	20 (37.7%)	(0.44-1.30)	33 (62.3%)	(0.88-1.50)	0.309
Protective factor for chronic disease					
Sufficient physical activity	22 (29.3%)	(0.82-2.39)	53 (70.7%)	(0.61-1.14)	0.223
Smoking habit not present	35 (32.7%)	(0.37-6.28)	72 (67.3%)	(0.19-3.00)	0.606
Adequate consumption of meat	36 (33.3%)	*	72 (66.7%)	*	0.481
Adequate consumption of fruits and vegetables	34 (32.4%)	(0.23-1.79)	71 (67.6%)	(0.50-3.64)	0.462
Modifiable risk factors for chronic disease					
Alcohol consumption	32 (33.7%)	(0.41-2.83)	63 (66.3%)	(0.65-1.33)	0.704
Inadequate consumption of soft drinks	14 (23.3%)	(0.30-0.90)	46 (76.7%)	(1.04-1.86)	0.017
Overweight and obese	30 (41.7%)	(0.18-0.87)	42 (58.3%)	(1.12-1.82)	0.009

* They were not calculated because 2 cells contained less than 5 cases to be counted

Source: Prepared by the authors, 2020.

There was 0.52 times less inadequate consumption of soft drinks among the men (OR=0.37) than among the women and, for them, excess weight would be a risk factor (OR=3.57).

Table 2 – Health status and modifiable risk factors for CNCs of hypertensive and diabetic patients participating in clinical management through telemonitoring in a health plan operator, according to age. Midsouth Paraná-PR, 2020

Health status and modifiable risk factors for CNCs	Age		X ²
	Adult (18-59 years old) n (%)	Older adult (≥60 years old) n (%)	
Self-reported morbidity			
Arterial hypertension	03 (04.7%)	61 (95.3%)	0.001
Diabetes mellitus	01 (25.0%)	03 (75.0%)	0.506

Hypertension and diabetes	11 (27.5%)	(1.62-13.91)	29 (72.5%)	(0.63-0.94)	0.002
Multimorbidity	11 (18.6%)	(0.79-6.87)	48 (81.4%)	(0.76-1.02)	0.108
Good readiness for change	10 (10.5%)	(0.12-0.74)	85 (89.5%)	(0.94-2.07)	0.011
Active motivational stage	06 (09.7%)	(0.76-5.17)	56 (90.3%)	(0.75-10.5)	0.155
Participation in telemonitoring between 6 and 12 months	06 (11.3%)	(0.54-3.72)	47 (88.7%)	(0.82-1.10)	0.472
Protective factors for chronic disease					
Sufficient physical activity	13 (17.3%)	(0.08-1.42)	62 (82.7%)	(1.0-1.30)	0.108
Smoking habit not present	15 (14.0%)	*	92 (86.0%)	*	0.569
Adequate consumption of meat	15 (13.9%)	*	93 (86.1%)	*	0.688
Adequate consumption of fruits and vegetables	14 (13.3%)	(0.91-3.12)	91 (86.7%)	(0.65-2.05)	0.506
Modifiable risk factors for chronic disease					
Alcohol consumption	12 (12.6%)	(0.19-1.83)	83 (87.4%)	(0.84-1.48)	0.372
Inadequate consumption of soft drinks	05 (08.3%)	(0.15-1.12)	55 (91.7%)	(0.98-1.35)	0.069
Overweight and obesity	12 (16.7%)	(0.15-1.66)	60 (83.3%)	(0.95-1.27)	0.238

* They were not calculated because 2 cells contained less than 5 cases to be counted

Source: Prepared by the authors, 2020.

Presence of AH (OR=0.14) and good readiness to change behavior (OR=0.21) were protective factors for the adults, as was presence of concomitant AH and DM for the older adults (OR=0.16).

There was no significant association between schooling, health status and modifiable risk factors for CNCDS.

According to the binary model, there was no significant association between gender, inadequate consumption of soft drinks (p=0.019; CI=1.18-6.09) and excess weight (p=0.012; CI=1.32-9.65), but the older adults had 0.14 fewer chances of presenting AH (p=0.001; CI=0.04-0.51) and were 0.21 times less likely to have good readiness

for behavioral change (p=0.023; CI=0.06-0.76) than the adults.

DISCUSSION

The study population consisted mostly of women, aged 60 years old or over, with protective factors for CNCDS. Older adults represented 86.2% of this population and, as such frequency in supplementary health is 14.2%, it can be inferred that the analyzed sample preserved the main characteristic of the eligible beneficiaries for clinical management through telemonitoring⁽¹²⁾.

Research studies on the relationship of gender, social indicators and modifiable risk factors for CNCDS are essential for the management of

health systems. Gender must be considered as a behavioral determinant of health, as it interferes with morbidity and mortality, use, access and response of the health services, as well as with resilience and vulnerability of individuals, groups and communities worldwide.⁽¹³⁻¹⁵⁾.

In turn, aging, increasing in the current demographic transition, increases the risk of CNCDS, multimorbidities, low readiness for change, insufficient nutrition, low health literacy, especially among older adults with low schooling and inadequate support networks, for which the public assistance policies are still weak⁽¹⁶⁾.

The feminization of the aged population, herein observed, is similar to the findings of other national studies⁽¹⁷⁾. In fact, in another municipality from Paraná, the presence of aged women, between 60 and 79 years old and healthy, among the chronically-ill patients in primary health care, was also the majority⁽¹⁸⁾. Data from the National Health Survey⁽¹⁹⁾, carried out with older adults, presented high prevalence of women, with a mean age of 70 years old, low schooling, AH and impairment of daily activities.

In studies carried out with chronically-ill patients in a developing Asian country, where the digital health care system has been intensified to promote universal access to health, aged women with AH, DM and cataract prevailed, who remained physically active and participated intensely of preventive care, volunteering and politics⁽¹³⁾. These characteristics are similar to the results of this study, suggesting that clinical management

through telemonitoring can expand and qualify health care.

Globally, women's health is affected by the way in which they are treated, social status, lower schooling and wage levels, greater lack of protection in the work environments and use and expenditure regarding health services when compared to men, with the aggravating factor of not understanding their health needs and the lack of care that goes beyond reproductive issues⁽¹⁴⁾.

A number of research studies on gender inequality among older adults suggest actions to promote active aging and management of the end of life to mitigate such differences. Therefore, the actions of clinical management through telemonitoring must enhance the maintenance of healthy habits and the functional capacity of aged women, as well as offer additional care to reproductive health⁽¹³⁻¹⁶⁾.

In addition, the concomitant presence of AH and DM observed in this study doubles the cardiovascular risk and increases the risk of overweight and obesity, especially among older adults^(20,21).

If the older adults' frailty is determined by the presence of CNCDS⁽¹⁹⁾, the predominance of healthy aged women with protective factors for CNCDS can be considered a singular finding of this study, which also reveals the vulnerability of the adult population, particularly men with multimorbidity, which must be considered when planning unique health care measures.

As in this study, in the United States, where almost 80% of the deaths due to CNCDS would be prevented by changing the modifiable risk factors, adults aged from 20 to 39 years old

stand out and are not properly assisted by the health services⁽²²⁾.

Taking into account the high prevalence of workers among the beneficiaries of the operator under study⁽⁹⁾ and the high cardiovascular risk of hypertensive and diabetic individuals, it is urgent to offer them prevention and health promotion actions, particularly to those with lower schooling levels, who use health services the most and have lower quality of life, more disabilities and inequality in access to the diagnosis and treatment of CNCDS^(23,24). It is possible that the high proportion of healthy aged women in the studied population is due to their availability to the telephone approaches of the investigated clinical management, which are carried out during business hours.

Thus, as the information self-reported by the participants of this study consumes considerable telecontact time and can be of interest for new research studies, it would be advisable to use the electronic medical record, also by the health professionals from the OPS care network who assist them in person, in order to qualify production and access to reliable data.

The availability of 200 vacancies in clinical management through telemonitoring for chronic patients of the OPS limited the size of the target population of this study and, consequently, the generalization of these findings deserves caution, specifically in strategic decision-making by the senior management.

Another limitation to be considered is the impossibility of making causal inferences, and

that no research studies were identified which explained the lower chance of occurrence of arterial hypertension and good readiness for behavioral change among older adults with chronic diseases.

CONCLUSION

The results of this study showed predominance of aged women, with low schooling and a healthy lifestyle, and suggested less access for hypertensive and diabetic patients aged between 18 and 59 years old, with clinical management through telemonitoring being recommended for all. Lower consumption of soft drinks by men and higher occurrence of excess weight among women were also observed. The older adults had fewer chances of presenting hypertension and good readiness for behavioral change, and the causes of these findings require further investigation.

The identification of beneficiaries with arterial hypertension and diabetes mellitus with protective factors for CNCDS suggests the efficiency of clinical management through telemonitoring in reaching the target audience at the time studied. To improve this process, the telemonitoring clinical management health team could also explore their ability to face problems and make decisions, health literacy, their family, social and community support network, as well as their bond with other health professionals from the OPS accredited network.

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