

## Preventive Care Screening in the Puerto Rican Geriatric Population: A Formative Evaluation of Patient Knowledge

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**Objective:** This study was meant to be the first step in bridging a gap in the literature concerning Puerto Rican geriatric patients' levels of knowledge concerning 4 preventive care screening tests: mammography, bone densitometry, colonoscopy, and lipid panels.

**Methods:** Patients 65 years old and older were interviewed at the University of Puerto Rico (UPR), Medical Sciences Campus, primary care clinics. Fisher's exact test was used to assess knowledge status for each screening test.

**Results:** Fifty-three participants, 53% being women, took part in the study. All the women (100%) reported having knowledge about mammography screening as well as about bone densitometry scans (71%); 91% of the participants reported having knowledge concerning colonoscopy. Only 34% understood what information results from a lipid panel. The majority of the participants were not aware of precisely when each of the screening tests under discussion should be undertaken. For all the screenings, level of education and provider recommendation were associated with increased levels of knowledge (though statistically significant only for bone densitometry and lipid panels).

**Conclusion:** Elderly Puerto Ricans appear to have knowledge about screening tests; however, there is an overall lack of knowledge about the timing of screening. Risk factors for this lack of knowledge are having a relatively lower level of education, the lack of healthcare-provider recommendation, and the lack of patient education. Understanding when to have tests is vital for interventions, in order to improve patient outcomes, which can include death from treatable conditions or diseases. Future research should include larger samples as well as studies of outcomes associated with these screening tests. These will help researchers and policymakers better understand this issue and aid in the development and implementation of interventions for both patients and physicians. [*PR Health Sci J* 2017;36:198-204]

*Key words:* Screening, Preventive, Geriatric, Knowledge

According to 2012 statistics from the Department of Health of Puerto Rico (PR), 15% of the Puerto Rican population was older than 65 years in 2011 (1). Individuals 65 years and older constitute the fastest growing segment in America. By 2030, they will account for 20% of the United States (US) population and 24% of the PR population (2,3). Therefore, it is important to assist the geriatric population in its efforts at health maintenance and understand the underlying causes of morbidity and mortality. In PR, the 4 primary causes of death are cancer, cardiovascular disease, diabetes, and Alzheimer's (3). Prostate, breast, colorectal, and lung are the most common types of cancer (4). Furthermore, cardiovascular disease and diabetes are more prevalent in PR than in the US (5).

The Centers for Disease Control and Prevention's Behavioral Risk Factor Surveillance System (BRFSS) evaluates the

prevalence of different diseases among the general and geriatric populations (5). It focuses on collecting data on diseases with high prevalence but that are preventable with the aid of proper screening.

For example, the 2012 BRFSS shows that compliance with mammography in Puerto Rican women displays a decreasing trend as they grow older: 83% in the 50 to 59 years' age group,

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79% in the 60 to 64 years age group, and 77% in 65 years and older age group. The prevalence of colonoscopy screening in Puerto Ricans of both sex, on the other hand, shows a tendency to increase with age, starting at 34% in the 50 to 59 years' age group, increasing to 52% in the 60 to 64 years' age group, and rising further still to 57% in the 65 years and older age group (6). Screening tests are defined as tests done among apparently well people to identify those at an increased risk of a disease or disorder. Screening can lead to benefits in the prevention and early detection of diseases such as cancer, osteoporosis, and coronary artery disease (7).

Despite the need for preventive care as we age, research shows that the Hispanic adult population is less likely to undergo recommended screening tests compared to non-Hispanics (8, 9). In one study, Hispanic women 40 years and older were less likely to undergo routine breast and cervical screening compared with non-Hispanic women in the same age group (10). There are multiple factors that influence a geriatric patient's decision regarding whether or not to undergo a screening test. Barriers to care perceived by patients include cultural beliefs, fear, fatalistic attitudes, and lack of knowledge about screening and early detection (8, 10). For example, Goldman and Risica found that barriers to breast and cervical cancer screening for Hispanic women included the fear of cancer and misconceptions about both its causes and the effectiveness of its treatments, the perception of being at low risk, screening costs, the lack of health insurance, and the lack of knowledge about screening-test guidelines (11). Other barriers found included the lack of a recent physical exam, absence of a condition or conditions requiring evaluation, and lack of a physician's referral for the test. Steele found that the decision to be screened for prostate cancer was strongly influenced by a given patient's physician recommendations (12). In addition, the lack of access to a provider or to test facilities, the fear of pain or diagnosis, shame, embarrassment, and the misperception of exam frequency were all cited by patients as barriers to screening (9, 12).

Access to a primary healthcare provider improves outcomes in disease prevention and early treatment and is correlated with having both a higher income and health insurance coverage (10, 13). Harris, Miller, and Davis found that having any source of healthcare services was associated with higher rates of breast self-exam knowledge, clinical breast exam, and mammography knowledge and compliance (14). Their findings suggest that education by the patient's physician plays an important role in a patient's level of knowledge about screening tests. In addition, trust and communication between healthcare providers and patients have been found to be influential in increasing compliance with cancer screening (9, 11). Bernstein, Mutschler, and Bernstein found that the number of older women who undergo mammography can be increased by using interventions in which the patient can express her feelings about the test and is able to participate in the decision-making process (15).

The underutilization of breast and colon cancer screening correlates with receiving sub-optimal therapy for one or the other

disease (9, 16). Breast cancer is the second highest cause of death among women, with about 50% of deaths each year occurring in women over 65 years (4). The early detection of breast cancer via mammography can reduce breast cancer mortality by up to 40% (17). Densitometry can reduce the risk of fractures by implementing the early diagnosis and treatment of osteoporosis; a colonoscopy can reduce mortality for colon cancer, and lipid screening is a positive factor in heart disease prevention.

Notwithstanding the BRFSS data, there is a lack of evidence about the knowledge of preventive screening tests in the Hispanic geriatric population. This study was meant to bridge this gap, identifying the levels of knowledge possessed by Puerto Rican geriatric patients concerning 4 screening tests: mammography, bone densitometry, colonoscopy, and lipid panels. It will aid in the development of educational strategies and awareness programs to address the problem of insufficient screening knowledge and thereby ensure the early detection of treatable diseases.

## Methods

### Study design and Population

This cross-sectional study was performed at the UPR Medical Sciences Campus primary care facility over a 6-month period (January to June, 2015). A convenience sample was recruited from subjects visiting the clinics. Inclusion criteria were that the potential participant be 65 years old or older, be mentally aware of time, place, and person, and have the ability to answer a feedback question. Patients meeting the inclusion criteria were invited to participate, and those who consented took part in a face-to-face interview that consisted of a questionnaire of 64 items developed specifically for the use of this study and that followed the United States Preventive Services Task Force (USPSTF) guidelines for each of the medical conditions, focusing on screening-test objectives, the age to start and frequency of testing, and education provided. The research physicians gained informed consent and interviewed the participants while those participants waited for their appointments. After being interviewed, each participant received an educational sheet about the screening tests.

### Study variables

Sociodemographic characteristics included date and place of birth (PR, US, or other), years of education (<12 vs. ≥12), self-reported annual family income (<\$20,000 vs. ≥\$20,000), healthcare coverage (private, public, none), and marital status (married/cohabitating, single/never married, divorced/separated/widowed). Health characteristics included self-reported history of cancer (breast and colon cancer), chronic diseases (hyperlipidemia and osteoporosis), and family medical history (breast cancer, colon cancer, hyperlipidemia, and osteoporosis).

The main outcome variables were the participants' knowledge about screening tests, specifically, about mammography, bone

densitometry, colonoscopy, and lipid panels. The variable of interest was retrieved using the following questions: “Do you know what a mammography is?” and “Do you know which disease can be detected with this test?” The Institutional Review Board of the Medical Sciences Campus, University of Puerto Rico, approved this study.

**Statistical analysis**

Descriptive statistics were performed to summarize the demographic characteristics of the study group. Fisher’s exact test was used to assess factors associated with knowledge status for each screening test. For the interpretation of results, p values below 0.05 were considered statistically significant, and p values from 0.05 to 0.10 were considered marginally significant. Statistical analyses were performed using Stata for Windows release 12.0 (Stata Corporation, College Station, Texas, USA).

**Results**

**Study sample**

Seventy-five participants were identified during the study period. One subject was excluded because he did not meet the inclusion criteria of mental awareness of time, place and person. Twenty-one participants refused to complete the interview. Those who refused did so because they had limited time or were not interested in participating. The sociodemographic characteristics of the study sample (n = 53) are shown in Table 1.

**Mammography**

The female participants were asked about the recommended frequency of mammography, and the majority (96%) responded “yearly,” while 4% answered that the test should be undertaken on a biennial basis. Knowledge about the suggested age of a first mammography was variable: 46% responded that it was 30 years; 39%, 40 years; 7%, 50 years; and 7%, didn’t know. All women (100%) had knowledge of mammography screening (Figure 1), and all had received a recommendation for a mammography at least once in their lives. In addition, all the female participants reported having had a mammography once in their lifetimes and for 71% of them, the time since their last mammography was under 2 years.

**Bone densitometry**

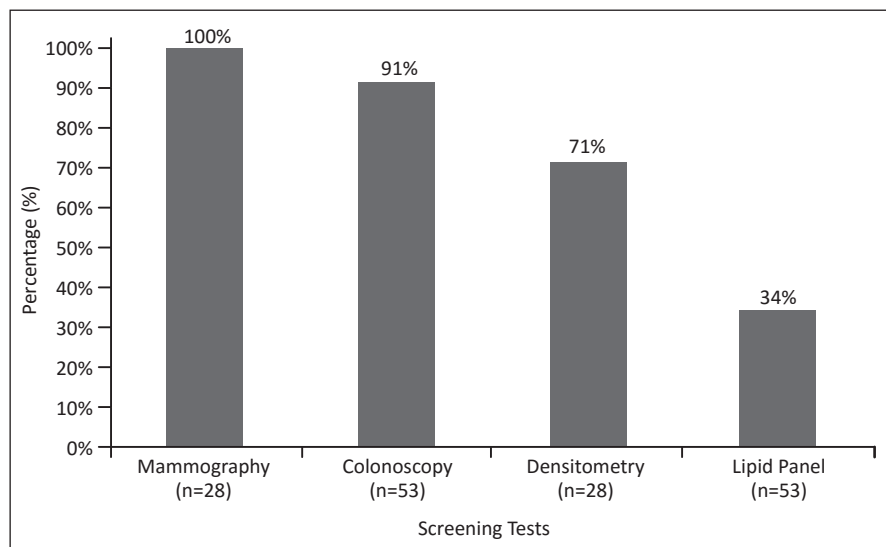
The female participants’ knowledge about the recommended

frequency of bone densitometry was variable; 7% said yearly, 18% said biennially, 7% said every 5 years, and 68% did not know. Responses about the recommended age of first bone densitometry were also variable, being 55 years (39%), 65 years (32%), and don’t know (29%). The only variable significantly associated with the knowledge of bone densitometry testing (reported by 71% of the women) (Figure 1) was educational level (p = 0.01). However, having once received a recommendation by a healthcare provider for a bone densitometry test (p = 0.06) and having received information about such a test were marginally associated with knowledge of the test (p = 0.06) (Table 2).

**Table 1.** Characteristics of study participants

Characteristic	% (n)
Sex	
Female	53 (28)
Male	47 (25)
Age	
≤ 70 years	43 (23)
>70	57 (30)
Mean (± SD)	73.0 ± 6.0
Education	
<12	34 (18)
≥ 12	66 (35)
Marital status	
Married/consensual cohabitating	83 (44)
Single, widowed, separated, divorced	17 (9)
Annual family income	
<\$20,000	51 (27)
≥ \$20,000	49 (26)
Health insurance	
Private	57 (30)
Combined*	30 (16)
Public	13 (17)

n = 53, \*Combined category includes: Medicare/public or Medicare/private.



**Figure 1.** Overall knowledge of participants by specific screening test; shows the percentage of participants who know what the test is and which disease it can detect.

**Table 2.** Factors associated with bone densitometry knowledge

Characteristic	Knowledge %		P-value
	No	Yes	
Age			0.99
≤ 70 years	50.0 (4)	45.0 (9)	
>70 years	50.0 (4)	55.0 (11)	
Education			0.01*
≥ 12	12.5 (1)	70.0 (14)	
<12	87.5 (7)	30.0 (6)	
Ever received a recommendation for a bone densitometry scan by a healthcare provider			0.06**
No	37.5 (3)	5.0 (1)	
Yes	62.5 (5)	95.0 (19)	
Ever had a bone densitometry scan			0.19
No	25.0 (2)	5.0 (1)	
Yes	75.0 (6)	95.0 (19)	
History of osteoporosis			0.67
No	75.0 (6)	60.0 (12)	
Yes	25.0 (2)	40.0 (8)	
Information received about bone densitometry			0.06**
No	37.5 (3)	5.0 (1)	
Yes	62.5 (5)	95.0 (19)	

n = 28, \*p ≤ 0.05, \*\*p ≤ 0.10

**Table 3.** Factors associated with colonoscopy knowledge

Characteristic	Knowledge %		P-value
	No	Yes	
Sex			0.66
Female	40.0 (2)	54.2 (26)	
Male	60.0 (3)	45.8 (22)	
Age			0.29
≤ 70 years	20.0 (1)	45.8 (22)	
> 70 years	80.0 (4)	54.2 (26)	
Education			0.32
≥ 12	40.0 (2)	68.8 (33)	
< 12	60.0 (3)	31.3 (15)	
Ever received a recommendation for a colonoscopy by a healthcare provider			0.63
No	40.0 (2)	29.2 (14)	
Yes	60.0 (3)	70.8 (34)	
Ever had a colonoscopy			0.99
No	40.0 (2)	33.3 (16)	
Yes	60.0 (3)	66.7 (32)	
History of colorectal cancer			0.99
No	100.0 (5)	93.8 (45)	
Yes	0.0 (0)	6.3 (3)	
Ever received information about colonoscopy			0.12
No	40.0 (2)	10.4 (5)	
Yes	60.0 (3)	89.6 (43)	

n = 53, \*p ≤ 0.05, \*\*p ≤ 0.10

**Colonoscopy**

All the study participants were asked about the recommended frequency of a colonoscopy; 34% responded yearly; 40%, every 5 years; 9%, every 10 years; and 17%, do not know. The knowledge

about the recommended age for a first colonoscopy was variable: 43% said 40 years, 36% said 50 years, 6% said 60 years, and 15% did not know. Ninety-one of the participants had knowledge about colonoscopy screening (Figure 1), and 67% had had at least one colonoscopy. Although no variable was significantly associated with having knowledge about colonoscopy screening, being a woman (54%), being more than 70 years old (54%), having an educational level of high school or higher (69%), having received a recommendation by a healthcare provider for a colonoscopy (71%), having had a colonoscopy once in their lives (67%), and having received information about colonoscopy screening (90%) were associated to knowledge about colonoscopy screening (Table 3).

**Table 4.** Factors associated with lipid panel-screening knowledge

Characteristic	Knowledge %		P-value
	No	Yes	
Sex			0.25
Female	45.7 (16)	66.7 (12)	
Male	54.3 (19)	33.3 (6)	
Age			0.25
≤ 70 years	37.1 (13)	55.6 (10)	
>70 years	62.9 (22)	44.4 (8)	
Education			0.07**
≥ 12	57.1 (20)	83.3 (15)	
<12	42.9 (15)	16.7 (3)	
Ever received a recommendation for a lipid panel test by a healthcare provider			0.15
No	14.3 (5)	0.0 (0)	
Yes	85.7 (30)	100.0 (18)	
Ever had a lipid panel test			0.29
No	11.4 (4)	0.00 (0)	
Yes	88.6 (31)	100.0 (18)	
History of high levels of cholesterol			0.99
No	50.0 (17)	50.0 (9)	
Yes	50.0 (17)	50.0 (9)	
Ever received information about lipid panel test			0.29
No	11.4 (4)	0.0 (0)	
Yes	88.6 (31)	100.0 (18)	

n = 53, \*p ≤ 0.05, \*\*p ≤ 0.10

**Lipid panel**

All participants were asked about recommended frequency of having a lipid panel done, and their responses were variable: 74% answered that it should be done yearly; 0%, every 5 years; and 26% said that they did not know. The frequency varies according to family history and comorbidities, but according to the USPSTF, a reasonable frequency is every 5 years. The recommended age for having a first lipid panel done was reported to be 25 years (40%), 35 years (23%), and 45 years (15%); 23% didn't know. Of all the participants, only 34% evidenced any knowledge about the lipid panel test (Figure 1), and the only variable that was (marginally) associated with this knowledge was educational level (p = 0.07). However, being a female (67%), being 70 years old or younger (56%), having

received a recommendation to get a lipid panel sometime in one's life by a healthcare provider (100%), ever having had a lipid panel done in one's lifetime (100%), and having received information about the test (100%) were associated to knowledge about lipid panel testing (Table 4).

## Discussion

The overall knowledge for each screening test (mammography, densitometry, colonoscopy, and the lipid panel) ranged from 34% (lipid panel) to 100% (mammography) (see Figure 1). The associations between the knowledge of each screening test and the recommended age for the first test, education level, history of the disease in question, recommendations and information received, and test history are shown in Tables 2 through 4.

### Mammography

All the female participants reported having had a mammography at least once in their lifetimes, knew the purpose of the screening, and reported having received at least 1 screening recommendation from a healthcare professional. Our study showed a significant increase in breast cancer screening rates and high rates of knowledge about the mammography test compared to the previously reported (respective) rates. However, only 39% knew the recommended age for the first screening. A study performed in Puerto Rican geriatric women in 1999 by Oliver-Vazquez et al. showed that only 42% had had at least 1 mammogram during the year previous to the study (18). A study done in PR by Miranda, Betancourt, Ruiz, and Hunter showed a higher (85%) mammography rate (in the 2 years previous to the study) for women older than 40 years (19). Coughlin and Uhler studied a group of Hispanic women and found that 68% of these women, 40 years and older, had had a mammography in the 2 years prior to the study (10). Despite the higher reported rate of mammography screening in this population, the mortality rate due to breast cancer in PR is extremely high (4). Few studies have examined the topic of breast cancer screening in geriatric women in general or in Puerto Rican women in particular. Further studies are needed in view of the expected growth of the elderly population. Education about when to initiate and the frequency of screening is essential for the survival of this population.

### Bone densitometry

Female participants who had received a recommendation by a healthcare provider for a bone densitometry test also reported having received information about the test. Those who had attained higher levels of education had overall better knowledge about bone densitometry, in general. Ninety-five percent of the participants in our study had received a recommendation for bone densitometry, and 89% reported having had a bone densitometry test performed. In comparison, De Jesus, Chaudhry, Angstman, and Cha et al. reported that, in their population, the mean screening rate for osteoporosis using bone

densitometry was 81% (20). However, the majority of the study population (68%) did not know the recommended frequency of the test. While 32% reported the correct recommended age for a first bone densitometry as a screening test for osteoporosis, the remainder of the participants stated an incorrect age or did not know. The USPSTF recommends performing screening for osteoporosis in women aged 65 years and older and in younger women whose fracture risk is equal to or greater than that of a 65-year-old who has no additional factors. Whether or not men should undergo osteoporosis screening remains the subject of debate: The USPSTF has concluded that the current evidence is insufficient to determine what benefits might accrue or harm be done as a result of such testing (21). This could be an area of interest for further study in Puerto Rico. Our results suggest that if information is given about or a healthcare provider recommends a test, patients will improve their knowledge about that test. Following the USPSTF recommendations can therefore result in a significant reduction of fracture risk in the geriatric population. Further studies with a larger sample are needed to assess the prevalence of osteoporosis screening using bone densitometry in the geriatric population in order to increase the frequency of such screening.

### Colonoscopy

To our knowledge, this study is the first to assess colonoscopy screening knowledge and prevalence specifically in the Puerto Rican geriatric population. Participants who have received information about colonoscopy have demonstrated having knowledge about the test. In our study, 71% of the participants had received a doctor's recommendation for a colonoscopy, and 67% had had one. In comparison, research by Dolan et al. of a population of Chicago veterans who were 50 year and older showed that 40% of participants had knowledge about the colonoscopy test because of a doctor's recommendation (22). Miranda, Betancourt, Ruiz, and Hunter reported that 54% of individuals older than 50 years had had a colonoscopy sometime in the 10 years prior to the study. While men reported inadequate knowledge as being a barrier to being screened, both men and women pointed to the lack of provider recommendation as the reason for not undergoing a colonoscopy (19). Again, a lack of knowledge about the timing and frequency of screening was observed. According to the USPSTF, the physician needs to take into consideration the risks versus the benefits, based on age and comorbidities (23). Our results conform with those of the studies detailed above: the knowledge and compliance of screening both increased when healthcare providers supplied information about it. Government agencies should be aware of these findings and take action by developing preventive programs that promote educational campaigns about this topic. Indeed, innovative awareness campaigns have been developed and have proven successful in PR (24, 25). Further studies are needed to assess the knowledge of colonoscopy screening in the general geriatric population, the prevalence of colonoscopy, and (when applicable) the reasons for not performing a colonoscopy.

### Lipid panel

A marginal difference in knowledge about lipid panels was found in participants with a higher level of education. In our study 93% of the participants had had a lipid panel done, but only 34% understood what information the results of a lipid panel provide. In comparison, the 2009 BRFSS found that the percentage of respondents screened for high blood cholesterol in the geriatric US population was 95% (26). The main factor responsible for the low levels of knowledge concerning this test could be the limited knowledge of the term “lipid panel,” which is known colloquially as a “cholesterol test.” The term “cholesterol test” was not used in our interview because 1 of the questions was intended to determine whether the respondent knew what is evaluated with this test. After the purpose of the test was explained, most of the patients reported having had this test in the past. Therefore, our results concerning knowledge about this screening test are limited because of this confusion, but the prevalence of this test in our sample was similar to that revealed in the United States 2009 BRFSS (26). Another interesting finding is that 50% of the patients had a history of high cholesterol, but 98% had had a lipid panel test done yearly. The USPSTF recommends that it be performed every 5 years (at shorter intervals for people who have lipid levels that warrant or are close to warranting therapy) (26). Further studies are needed to assess the cost-effectiveness of this test for this population.

This study shows that there is an overall lack of knowledge about preventive screening tests in the Puerto Rican geriatric population; some factors, such as having a low level of education, the lack of healthcare provider recommendation, and whether or not information about preventive tests was given to the participants, have been identified. Further, the data show that the participants in this study were more educated about some screening tests than others. However, that 100% of the participants claimed to have knowledge about mammography is in such contrast to the high rate of death secondary to breast cancer in Puerto Rico that further investigation of screening knowledge and compliance is paramount. Are Puerto Rican women avoiding screening despite their knowledge? Our study results suggest that there is a need for better education concerning preventive healthcare screening in the Puerto Rican geriatric population.

The importance of this study lies in the fact that it is the first attempt to conduct an investigation about the Puerto Rican geriatric population's knowledge of a group of preventive screening tests that are valuable to members of this same population. One limitation of the study is the small population size, which limits the ability to generalize to the elderly population living in PR. To overcome this issue, future studies should include populations across the whole island. Evaluating gender and age differences was beyond the scope of this study. Further studies with a larger sample should consider gender differences and comparisons between age groups. In addition, the survey we used provided limited information about the

healthcare provider. Screening tests are part of quality measures for providers. Therefore, evaluating the providers' characteristics would provide a more comprehensive view.

In conclusion, evaluating this elderly population sample in our primary clinics was the first step in the exploration of patient needs. Assessing the knowledge of a few people can help identify the huge gap in the literature regarding the knowledge possessed by the growing elderly population, driving future studies, with larger populations. Further research should explore the associations observed in our study, as well as the prevalence, awareness, and knowledge of preventive behaviors, patient barriers, and screening practices among the Puerto Rican geriatric population. This will aid in the development of educational strategies focused on improving the early detection of preventable diseases.

### Resumen

**Objetivo:** Atender el vacío en la literatura relacionado al nivel de conocimiento de los puertorriqueños geriátricos acerca de cuatro pruebas de cernimiento: mamografía, densitometría ósea, colonoscopia y panel de lípidos. **Métodos:** Pacientes de 65 años o más de las clínicas de atención primaria de UPR, Recinto de Ciencias Médicas fueron entrevistados. Utilizando la prueba exacta de Fisher se evaluó el conocimiento para cada prueba. **Resultados:** Cincuenta y tres participantes, 53% siendo mujeres, completaron el estudio. Todas las mujeres (100%) reportaron conocimiento sobre el cernimiento de mamografía, así como 71% sobre la densitometría ósea; 91% de los participantes reportó conocimiento acerca de la colonoscopia. Sólo 34% entendió cual información resulta del panel de lípidos. La mayoría de los participantes desconocía el tiempo de evaluación para cada prueba. El nivel educativo y la recomendación por un proveedor se asociaron a mayor conocimiento, estadísticamente significativo solo en la densitometría ósea y el panel de lípidos. **Conclusión:** Adultos mayores puertorriqueños parecen tener conocimiento acerca de las pruebas de cernimiento; sin embargo, existe una falta de conocimiento sobre el calendario de exámenes. Factores de riesgo identificados: menor nivel de educación, falta de recomendación por un proveedor de salud y la falta de educación al paciente. Cuando realizarse las pruebas, es importante en la intervención, para mejorar los resultados, incluyendo la muerte por condiciones o enfermedades tratables. Investigaciones futuras deben incluir mayor tamaño de muestra, así como los resultados asociados a estas pruebas de cernimiento. Esto ayudará a los investigadores y a la política pública a comprender este tema, asistiendo en el desarrollo e implementación de intervenciones para pacientes y médicos.

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