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Deprescribing in Older Adults: Attitudes, Awareness, Training, and Clinical Practice Among Portuguese Physicians

Desprescrição nos Idosos: Atitudes, Conhecimento, Formação e Prática Clínica dos Médicos Portugueses

Anabela PEREIRA✉[1,2], Manuel VERÍSSIMO[3], Oscar RIBEIRO[1]
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ABSTRACT

Introduction: The importance of deprescribing in clinical practice is growing, particularly in aging populations with polypharmacy scenarios, making it a crucial matter in Portugal, one of Europe's most aged nations. The aim of this study was to investigate deprescribing awareness, training, attitudes, and practices among Portuguese physicians to inform future healthcare strategies.

Methods: A cross-sectional study using an anonymous online questionnaire was disseminated through the Portuguese Medical Association. It gathered sociodemographic and professional data, and insights into deprescribing awareness, attitudes, training, and practices. Descriptive statistics were summarized as frequencies, percentages, medians, and interquartile ranges. For inferential analysis, the Chi-square test and Fisher's exact test were used to evaluate categorical variables, and the Mann-Whitney U test was used for continuous variables. The significance level was set at $p < 0.05$.

Results: A total of 425 valid questionnaires were included. The participants were mostly women (61.6%), with a median age of 45 (IQR 34 - 42). General practice/family medicine (34.1%) and internal medicine (16.2%) were the most common medical specialties. While 81.2% of the respondents were familiar with the term 'deprescribing', 55.4% reported no training. A vast majority (91.9%) reported practicing deprescribing, but a smaller fraction employed specific methodologies to deprescribe (39.8%) and criteria for identifying potentially inappropriate medications (38.7%). Training in deprescribing was significantly associated with higher deprescribing awareness ($p < 0.001$), the use of specific deprescribing methods ($p < 0.001$), the use of criteria to identify potentially inappropriate medications ($p < 0.001$) and having certification in geriatrics by the Portuguese Medical Association ($p = 0.006$). Family physicians showed higher familiarity with and training in deprescribing than hospital-based specialists ($p < 0.001$). Deprescribing methodologies were adopted more often by family physicians than by hospital-based specialists ($p = 0.004$).

Conclusion: This study highlights widespread deprescribing awareness among Portuguese physicians, while simultaneously uncovering considerable gaps in training and inconsistencies in its application. These findings highlight the pressing need for targeted educational initiatives that could contribute to medication optimization for older adults in the national healthcare system. Furthermore, these findings emphasize the importance of policy development and medical education in promoting safe deprescribing.

Keywords: Aged; Deprescribing; Practice Patterns, Physicians; Portugal; Surveys and Questionnaires

RESUMO

Introdução: A importância da desprescrição na prática clínica tem aumentado, especialmente em populações envelhecidas e com polimedicação, tornando-a uma questão crucial em Portugal, um dos países mais envelhecidos da Europa. Este estudo teve como objetivo investigar a consciencialização, formação, atitudes e práticas de desprescrição entre os médicos portugueses, a fim de informar futuras estratégias e políticas de saúde.

Métodos: Estudo transversal com recurso a um questionário *online* anónimo aos médicos portugueses, disseminado com a colaboração da Ordem dos Médicos. Foram recolhidos dados sociodemográficos, profissionais e relativos à desprescrição (consciencialização, atitudes, formação e prática clínica). A estatística descritiva inclui frequências, percentagens, medianas e intervalos interquartis. Foram aplicados o teste do qui-quadrado e o teste exato de Fisher (variáveis categóricas) e o teste de Mann-Whitney U (variáveis contínuas). A significância estatística foi estabelecida em $p < 0,05$.

Resultados: Foram incluídos 425 médicos, maioritariamente do sexo feminino (61,6%), com média de idade de 45 anos (IQR 34 - 42). As especialidades médicas mais frequentes foram medicina geral e familiar (34,1%) e medicina interna (16,2%). Apesar de 81,2% dos respondentes conhecerem o termo 'desprescrição', 55,4% não possuíam formação na área. A maioria (91,9%) efetuava desprescrição, contudo, uma menor percentagem utilizava metodologias específicas (39,8%) e critérios para identificar medicamentos potencialmente inapropriados (38,7%). Verificou-se uma associação da formação em desprescrição com uma maior consciencialização sobre a mesma ($p < 0,001$), utilização de métodos de desprescrição ($p < 0,001$), uso de critérios para identificar MPI ($p < 0,001$) e competência em Geriatria ($p = 0,006$). Os profissionais de medicina geral e familiar revelaram maior familiaridade e formação em desprescrição do que os especialistas hospitalares ($p < 0,001$), e referiram adotar mais frequentemente as metodologias de desprescrição ($p = 0,004$).

Conclusão: Este estudo destaca uma ampla consciencialização sobre a desprescrição entre os médicos portugueses, mas revela, simultaneamente, lacunas consideráveis na formação e inconsistências na sua aplicação. Estes resultados sublinham a urgente necessidade de iniciativas direcionadas à formação em desprescrição para a otimização da medicação nos idosos no sistema nacional de saúde. Os resultados enfatizam ainda a importância do desenvolvimento de políticas de saúde e da educação médica na promoção de uma desprescrição segura.

Palavras-chave: Desprescrição; Idoso; Inquéritos e Questionários; Padrões de Prática Médica; Portugal

1. Centre for Health Technology and Services Research at the Associate Laboratory – Health Research Network (CINTESIS@RISE). Department of Education and Psychology. Universidade de Aveiro. Aveiro. Portugal.
2. Institute of Biomedical Sciences Abel Salazar. Universidade do Porto. Porto. Portugal.
3. Coimbra Institute for Clinical and Biomedical Research (iCBR). Faculdade de Medicina. Universidade de Coimbra. Coimbra. Portugal.
✉ **Autor correspondente:** Anabela Pereira. anabela.i.pereira@ua.pt
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KEY MESSAGES

- Deprescribing Awareness and Implementation Gaps: Although most Portuguese physicians are aware of deprescribing and its benefits, there is a significant gap in the consistent application of structured methods and the use of PIM identification criteria.
- Training in deprescribing is associated with higher awareness and more frequent use of specific deprescribing methodologies and criteria to identify PIMs.
- Specialty-Based Variations in Deprescribing: Family physicians and internal medicine specialists are more actively engaged in deprescribing practices than other specialties, indicating a disparity that needs to be addressed.
- Policy, Educational, and Training Recommendations: These findings advocate for the development of national deprescribing policies and educational programs to address current gaps and promote safer medication practices for older adults.

INTRODUCTION

As populations age globally, healthcare systems face the challenge of effectively managing complex medication regimens. This requires the adoption of evidence-based practices and a shift towards personalized medication management.[1-3] Geriatric health care presents challenges owing to the high prevalence of polypharmacy and multimorbidity. Clinical trials often exclude older adults, resulting in guidelines that do not account for the unique pharmacokinetic and pharmacodynamic changes associated with aging and multimorbidity.[4,5] Consequently, managing inappropriate polypharmacy in older adults has become a complex issue for healthcare professionals.

Deprescribing is the process of withdrawing inappropriate medication, supervised by a healthcare professional, and is a key strategy for managing polypharmacy and improving health outcomes.[6] Recognizing its importance, the World Health Organization (WHO) released, in 2024, a comprehensive policy brief titled “Medication Without Harm”, which followed the WHO Global Patient Safety Challenge: Medication Without Harm released in 2017. This brief outlines a global strategy for ensuring medication safety and urges countries to develop national action plans to address medication errors and prevent medication-related harm.[7,8]

Deprescribing interventions can significantly reduce potentially inappropriate medications (PIMs), potential prescribing omission (PPOs), and the incidence of adverse drug events (ADEs); improve medication adherence; and enhance medication safety and health outcomes in older patients.[9] Furthermore, evidence supports that deprescribing interventions are cost-effective in various contexts and countries.[10]

Deprescribing includes a structured approach that entails creating a comprehensive medication history; identifying PIMs; assessing cessation feasibility; prioritizing medications; implementing withdrawal; and monitoring, supporting, and documenting the entire process. Shared decision making with patients or caregivers is vital during this process.[11]

An umbrella review published in 2023 aimed to identify guidelines to assess medication appropriateness and aid deprescribing. It revealed the existence of 95 tools and 9 guidelines to assist healthcare professionals.[12] In Portugal, some of the adapted tools include the Beers Criteria[13], EU(7)-PIM list[14], and STOPP/START criteria.[15]

Despite expanding evidence, various barriers at the level of healthcare professionals, patients, and systems make it difficult to implement deprescribing practices.[16-18] Deprescribing is a patient-centered approach involving multiple healthcare providers who face numerous challenges and barriers. Physicians have recognized several barriers to deprescribing, such as fear of withdrawal symptoms, disease relapse, insufficient knowledge, lack of evidence-based deprescribing, patient resistance, time constraints, fragmented healthcare with a lack of communication between different prescribing specialists, fear of disrupting relationships with other specialists, and fear of legal consequences.[16-18] Portugal, along with Italy, has the highest proportion (24%) of the population aged 65 years and over in Europe[19] and one of the highest rates of polypharmacy (36.7%) based on Wave 6 of the Survey of Health, Ageing, and Retirement in Europe (SHARE) database.[20] Nationwide studies have underscored the high prevalence of polypharmacy (77%)[21] and potentially inappropriate medications (PIMs) among older Portuguese adults. A retrospective nationwide population-based study revealed a frequency of 9.2% of PIMs in older adults,[22] while a cross-sectional study reported 68.9% of PIMs in this demographic.[23] These findings emphasize the need for implementing policies aimed at optimizing medication use. Furthermore, in Portugal, several studies have been conducted to evaluate the barriers and facilitators of deprescribing using diverse methodologies.[24-27] However, none have comprehensively and quantitatively addressed, at a national level, Portuguese physicians’ awareness, training, use of specific deprescribing methods, or criteria to identify PIMs. This gap in the literature underscores the need for more targeted research

to inform and optimize deprescribing practices across the country.

The objective of our study is to significantly contribute to the existing body of knowledge on deprescribing in Portuguese clinical practice. Specifically, the aim of our study was to evaluate the current state of deprescribing in Portuguese physicians' clinical practice, with a particular focus on awareness, training, attitudes, and practices related to this topic.

METHODS

Study design

A national cross-sectional study using a web survey targeted physicians registered with the Portuguese Medical Association (OM).

Participants and recruitment

Participants were selected based on the following inclusion criteria: being physicians registered with the OM, having an email address in the OM database, and actively practicing in the country. The web survey dissemination employed a strategic sequential approach, using two different channels of communication to reach the widest audience of Portuguese physicians and promote a higher response rate. The first phase of the study was launched in September 2021 through OM's newsletter, which introduced the study and invited participation through a hyperlink to the survey. In the second phase, the survey was sent via email by the Central Portugal Regional Section of the OM (first in April and a reminder in May 2023). Data were extracted in October 2023. The process was encrypted to comply with the General Data Protection Regulation (GDPR), ensuring anonymization of the collected data.

Data collection and questionnaire

The questionnaire is part of a research project entitled "Deprescribing in Older Adults: The Physician's Perspectives". This project consists of two studies: the current study that examines the knowledge, training, and practices of Portuguese physicians regarding deprescribing, and a second study, to be presented in a separate paper, that explores the barriers and facilitators of deprescribing from the physicians' perspective. The web survey was developed to answer the research questions on physicians' deprescribing awareness, training, and practices. Additionally, questions focusing on physicians' attitudes and perceptions were also included, using main themes and sub-themes from the literature on barriers and facilitators to deprescribing.[16,28,29-33]

Five independent physicians pilot-tested the questionnaire to assess its clarity, feasibility, and completion time, which took approximately 10 minutes. The comprehensive questionnaire consisted of nine questions on sociodemographic and professional data and 14 multiple-choice questions on polypharmacy and deprescribing (Appendix 1: https://www.actamedicaportuguesa.com/revista/index.php/amp/article/view/21677/15515). The survey was divided into four sections: sociodemographic and professional data, polypharmacy and deprescribing awareness, attitudes and practices, and facilitators/barriers to deprescribing. This study analyzed the results from the first three sections. The questionnaire was developed using Microsoft Forms® software and stored on the University of Aveiro's server.

Ethics

Informed consent and participant information document

The emails containing the hyperlink to access the questionnaire included an introductory text that invited physicians to participate in the study. This text provided an outline of the study's objectives and framework, and introduced the researchers who were responsible for it. The participants were then presented with an informed consent form that had to be agreed upon before accessing the questionnaire [see Appendix 1 (Appendix 1: https://www.actamedicaportuguesa.com/revista/index.php/amp/article/view/21677/15515)].

Ethics committee approval

This study was approved by the Ethics and Deontology Committee of the University of Aveiro (reference no. 28-CED/2021) and was conducted in accordance with the Declaration of Helsinki (World Medical Association, 2013).[34] All data were confidentially maintained and used exclusively in this study.

Statistical analysis

To assess data normality, we used the Kolmogorov-Smirnov test and visual inspection of histograms. Descriptive statistics were summarized as frequencies and percentages. For categorical variables, the Chi-Square test and Fisher's exact test were used, and Cramer's V test was used to measure the association strength. The Mann-Whitney U test was used for continuous and ordinal variables, and the effect size r was calculated using the formula $r = |Z|/\sqrt{n}$, with missing data excluded from the analysis.

In the statistical analysis, all participants were considered for the general characterization of the sample concerning professional and demographic variables. Nevertheless, pediatric specialists were excluded from the remaining statistical analyses because their specialty does not cater to older adults. The association between participants' socio-professional characteristics and their training in deprescribing, as well as their competency in geriatrics and the number of years of medical experience, was explored. The

categorization of medical specialties into four groups was designed to capture the complexities and nuances of medical practice. This methodology was adopted to differentiate between hospital- and non-hospital-based specialties, further subdividing hospital-based specialties into surgical and non-surgical categories. Internal medicine and family medicine, both of which provide comprehensive care to older patients, were categorized individually. These specialties are crucial for overseeing the health care of the aging population and emphasizing their comprehensive approach to patient care. We transformed several variables to streamline the analysis: "years of medical degree" were converted to "decades" and the question "Do you have training in deprescribing" was classified as either "No" (lacking training) or "Yes" (having received training through literature, conferences, or from employers). Lastly, the question "Do you agree that deprescribing is beneficial in older patients when indicated?" was simplified to a binary choice: "Disagree" (combining "disagree" and "no opinion") and "Agree" (including "agree" and "strongly agree").

Adjusted residuals were used to analyze the contingency table results among the categorized medical specialties and deprescribing-related variables, including awareness, perceived benefits, training, implementation in clinical practice, use of deprescribing methodologies, and application of established criteria to identify PIMs. The Critical Z value (1.96 for a 95% confidence interval) was applied to assess the statistical significance of the adjusted residuals. Values outside ± 1.96 were considered significant at $p < 0.05$. Statistical analysis of the data was conducted using the Statistical Package for the Social Sciences (SPSS) – IBM® Statistics Version 29 for MacOS.

RESULTS

Participants characteristics

The web survey had 577 entries; 116 were excluded due to the absence of responses, and from the remaining 461 entries, 36 were excluded for not meeting the inclusion criteria. This process yielded 425 entries that were considered appropriate for the study as they met the inclusion criteria. The survey distributed through the OM weekly newsletter resulted in 122 responses out of 60 178 Portuguese physicians, yielding a response rate of 0.20%. Later, the OM sent the survey via email to 10 234 physicians, receiving 303 responses, for a response rate of 2.96%.

The respondents had a median age of 45 years (IQR: 34 - 62 years) and were primarily women (61.6%). The median number of years since graduating from medical school was 21 (IQR: 10.5-39). The largest group of participants (32.2%) graduated between 2010 and 2019. Senior consultant (*assistente graduado*) was the most common professional category (36.5%). Among the 425 participating physicians, 57 (13.4%) has certification in geriatrics certification from the OM. Table 1 presents a detailed description of the participants.

Participants representing 35 medical specialties were included in the study, with the most common being family physicians (34.1%), followed by internal medicine (16.2%) and psychiatry (4.9%). Among the 57 physicians with certification in geriatrics, 70.2% were family physicians and internal medicine specialists (45.6% and 24.6%, respectively). Within their respective specialties, 34.1% of the family physicians and 16.2% of the internal medicine specialists had certification in geriatrics. The distribution of participants according to medical specialty and certification in geriatrics is shown in Appendix 2 (Appendix 2: https://www.actamedicaportuguesa.com/revista/index.php/amp/article/view/21677/15516).

Following the question "Are you familiar with the term 'deprescribing?'", 40 participants ceased to respond to the questionnaire. A significant association ($p = 0.001$) was observed between unfamiliarity with the term and cessation of responding to the questionnaire. Specifically, 20% of those who were not familiar with the term ceased responding, while only 7% of those who were familiar with the term did so.

Global characterization of patients managed by participating physicians: age distribution and polypharmacy patterns

Most physicians (53.5%) had more than half of their patients aged ≥ 65 years, whereas 95.5% reported that polypharmacy was more common in older adults. For patients aged ≥ 65 years, respondents considered polypharmacy either frequent (51.1%) or very frequent (45.2%). See Table 1.

Awareness, training, attitudes, and clinical practice of participating physicians regarding deprescribing

Most physicians (81.8%) were familiar with the term deprescribing, but more than half (54.7%) reported having no training in this field. The majority (98.9%) agreed on the benefits of deprescribing in older adults, and 92% deprescribed medications in their daily practice. However, most participating physicians (59.9%) did not use a specific method and 61.4% did not use specific criteria to identify PIMs. See Table 2.

Physicians' deprescribing training: associations with deprescribing awareness, attitudes, competency in geriatrics, and clinical practice

The findings of the study indicate a substantial discrepancy in participants' familiarity with the term deprescribing based on their training backgrounds. A statistically significant association was observed between awareness of the

Table 1 – Demographic and professional characteristics of the participating physicians (n = 425)

Age	
Median (IQR)	45 (34 - 62)
Sex	n (%)
Female	262 (61.6)
Male	163 (38.4)
Academic degree	
Medical degree	201 (47.3)
Master's degree	199 (46.8)
Doctorate	25 (5.9)
Professional category	
Senior Consultant	155 (36.5)
Consultant	107 (25.2)
Specialty medical resident	61 (14.4)
Senior consultant	54 (12.7)
Specialist physician with no affiliation to the Portuguese NHS	41 (9.6)
Physician without specialization	4 (0.9)
Intern (common year)	3 (0.7)
Certification in geriatrics	
Yes	57 (13.4)
No	368 (86.6)
Medical specialty[a] (n = 425)	
General practice/family medicine	145 (34.1)
Internal medicine	69 (16.2)
Psychiatry	21 (4.9)
Others	190 (44.7)
Considering your patients, is polypharmacy, defined as the use of 5 or more medications, more frequent in: (n = 425)	
Older adults (≥ 65 years)	406 (95.5)
Children and adolescents	3 (0.7)
In adults	16 (3.8)
Among all your patients, the approximate percentage of adults aged ≥ 65 years is: (n = 424)	
None	8 (1.9)
< 25% of older adults	42 (9.9)
25% - 49% of older adults	147 (34.7)
50% - 74% of older adults	170 (40.1)
≥ 75% of older adults	57 (13.4)
Among your older patients (age ≥ 65 years), polypharmacy is: (n = 425)	
Rarely present	8 (1.9)
Occasionally present	8 (1.9)
Frequently present	217 (51.1)
Very Frequently present	192 (45.2)

IQR: interquartile range; NHS: national health service.
a: Frequencies and percentages of the three most frequent specialties are presented individually, while all other specialties are grouped as 'others'. Detailed data on medical specialties can be found in Appendix 2 (Appendix 2: https://www.actamedicaportuguesa.com/revista/index.php/amp/article/view/21677/15516).

Table 2 – Physicians' deprescribing training: associations with deprescribing awareness, perception of benefit, certification in geriatrics, and deprescribing clinical practice

	Total	Training in deprescribing		*p*-value
		Yes	No	
Years of medical graduation (n = 417)				
Median (IQR)	20 (10 - 39)	16 (8.50 - 38.00)	26.5 (11.25 - 40.00)	**0.008**[a]
Years of medical graduation by decades (n = 417)				
1970 - 1979	64 (15.3)	26 (13.8)	38 (16.7)	
1980 - 1989	74 (17.7)	30 (15.9)	44 (19.3)	
1990 - 1999	53 (12.7)	15 (7.9)[d]	38 (16.7)[d]	**0.007**[b]
2000 - 2009	81 (19.4)	38 (20.1)	43(18.9)	(χ^2 (5) = 15.955, V = 0.196)
2010 - 2019	135 (32.4)	77 (40.7)[d]	58 (25.4)[d]	
2020	10 (2.4)	3 (1.6)	7 (3.1)	
Certification in geriatrics (n = 417)		n (%)	n (%)	
Yes	57 (13.7)	35 (18.5)	22 (9.6)	**0.007**[c]
No	360 (86.3)	154 (81.5)	213 (90.4)	(χ^2 (1) = 6.889, V = 0.129)
Workplace setting (n = 417)				
NHS hospital[e]	127 (30.5)	78 (41.3)[d]	135 (59.2)[d]	
NHS primary health care[f]	77 (18.5)	80 (42.3)[d]	47 (20.6)[d]	**< 0.001**[c]
Private sector[g]	127 (30.5)	31 (16.4)	46 (20.2)	(χ^2 (2) = 23.307, V = 0.236)
Are you familiar with the term 'deprescribing'? (n = 417)		n (%)	n (%)	
Yes	341 (81.8)	188 (99.5)	153 (67.1)	**< 0.001**[c]
No	76 (18.2)	1 (0.5)	75 (98.7)	(χ^2 (1) = 72.633, V = 0.417)
Do you have training in deprescribing? (n = 417)				
Yes	189 (45.3)	-	-	-
No	228 (54.7)	-	-	-
Do you agree that deprescribing is beneficial in older patients when indicated? (n = 369)		n (%)	n (%)	
Disagree	4 (1.1)	1 (0.6)	3 (1.6)	0.624[b] (χ^2 (1) = 0.875, V = 0.049)
Agree	365 (98.9)	177 (99.4)	188 (98.4)	
In your daily clinical practice, do you deprescribe medications in patients when indicated? (n = 367)		n (%)	n (%)	
Yes	338 (92.0)	173 (97.2)	165 (87.3)	**< 0.001**[c]
No	29 (7.9)	5 (2.8)	24 (12.7)	(χ^2 (1) = 12.319, V = 0.183)
Do you have a specific methodology for deprescribing medications? (n = 367)		n (%)	n (%)	
Yes	147 (40.1)	102 (57.3)	45 (23.8)	**< 0.001**[c]
No	220 (59.9)	76 (42.7)	144 (76.2)	(χ^2 (1) = 42.829, V = 0.342)
What criteria do you use to identify PIM? (n = 370)		n (%)	n (%)	
No specific criteria to identify PIMs	227 (61.4)	77 (33.9%)	150 (66.1%)	**< 0.001**[c] (χ^2 (1) = 47.356, V = 0.358)
STOPP-START criteria	103 (27.8)	80 (77.7%)	23 (22.3%)	**< 0.001**[c] (χ^2 (1) = 49.966, V = 0.367)
Beers Criteria (American Geriatric Society)	93 (24.8)	77 (82.8%)	16 (17.2%)	**< 0.001**[c] (χ^2 (1) = 59.874, V = 0.402)

IQR: interquartile range; PIM: potentially inappropriate medication; V: Cramer´s V.
a: Mann Whitney test; **b**: Fisher exact test, **c**: Chi-square test, and all cells have an expected count greater than 5; **d**: Cells with statistical significance after post-hoc analysis of contingency tables, considering adjusted residuals and using 1.96 as the critical Z-value; **e**: includes physicians working solely in NHS hospitals and those practicing in both NHS hospitals and the private sector; **f**: includes physicians in NHS primary healthcare and dual practitioners in NHS primary healthcare and the private sector; **g**: includes physicians working in the private sector.

term deprescribing and deprescribing training ($p < 0.001$). Nearly all participants (99.5 %) familiar with the term had received training, whereas the majority (98.7%) of those unfamiliar with the term had not undergone such training.

Additionally, this study revealed that deprescribing training was associated with fewer years of clinical practice. The Mann-Whitney test showed a significant difference ($p = 0.008$) between the group with training (n = 189, Md = 16) and the group without training (n = 228, Md = 26.5).

Moreover, deprescribing training was significantly associated with physician certification in geriatrics ($p = 0.009$). Among the participants with certification in geriatrics, a substantial majority (61.4%) had received deprescribing training, whereas only a minority (38.6%) of those without certification had undergone such training.

The study also underscored a significant association between training in deprescribing and practice of deprescribing among Portuguese physicians ($p < 0.001$). Among those with deprescribing training 97.2% reported deprescribing during their clinical practice, compared to 87.3% of those without training.

Furthermore, among those who received deprescribing training, 57.3% used a specific method to deprescribe, whereas only 23.8% of those without training used a specific method. Most participants (76.3%) without deprescribing training did not use any specific deprescribing methods. A significant association was found between receiving training and using a method for deprescribing ($p < 0.001$).

The results indicated significant associations between deprescribing training and the use of the PIM identification criteria. Participants who applied established criteria to identify PIMs had a higher prevalence of deprescribing training. Specifically, 77.7% of those who adopted the STOPP/START criteria ($p < 0.001$) and 82.8% of those who used the Beers criteria ($p < 0.001$) had undergone deprescribing training. Conversely, a significant proportion of the respondents who reported not using specific criteria to identify PIMs (66.1%) lacked deprescribing training ($p < 0.001$).

Interestingly, training in deprescribing was not associated with physicians' perspectives regarding the benefits of deprescribing in older adults, when deemed appropriate ($p = 0.624$).

Table 2 presents these results.

Associations between certification in geriatrics and deprescribing practices

A statistically significant association was identified between certification in geriatrics and physicians' years of clinical experience ($p = 0.048$), deprescribing awareness ($p = 0.043$), deprescribing training ($p = 0.009$), adoption of deprescribing methodology ($p = 0.022$), and the use of the STOPP/START criteria to identify PIMs ($p = 0.028$). Deprescribing in clinical practice and agreement on deprescribing benefits in older patients showed no significant association with having such certification. Further details of this analysis are presented in Table 3.

Associations between years of medical experience and deprescribing awareness, deprescribing attitudes, certification in geriatrics, and prescribed clinical practices

Physicians who graduated more recently were more familiar with the term 'deprescribing' ($p = 0.007$) and had more deprescribing training ($p = 0.008$). Physicians with certification in geriatrics had more years of graduation ($p = 0.048$). Fewer years of clinical experience were associated with using the STOPP/START and Beers Criteria to identify PIMs ($p < 0.001$ for both). Additionally, years of graduation were not associated with deprescribing in clinical practice, employment of a methodology for deprescribing, or physicians' agreement with the benefits of deprescribing in older adults (all $p > 0.05$). The results are presented in Table 4.

Deprescribing awareness, training, attitudes, and practices: associations with medical specialties

A difference in awareness of 'deprescribing' was found across medical specialties ($p < 0.001$), with higher levels of familiarity among family physicians (93.1%) and internal medicine specialists (95.7%) compared to hospital-based medical specialists (68.9%) and medical-surgical specialists (46.2%).

Substantial differences in deprescribing training were observed among medical specialties, with 63.9% of the family physicians and 62.3% of internal medicine specialists having received training, compared to 25.3% of hospital-based specialties and 11.5% of medical-surgical specialists ($p < 0.001$).

Significant differences were observed in the adoption of deprescribing methodology. Only 31.2% of hospital medical specialty physicians reported having a deprescribing methodology compared to 48.1% of the family physicians ($p = 0.004$).

Within hospital-based medical specialties, 78.6% of physicians did not use specific criteria to identify PIMs. In contrast, only 46.2% of family physicians did not use specific criteria to identify PIMs. This difference was statistically significant ($p < 0.001$).

Significant differences were observed in the use of the STOPP/START criteria between specialties ($p < 0.001$). Family physicians had the highest adoption rate within their specialty (43.8%), accounting for 60.6% of all users of these criteria. In contrast, only 4.5% of the medical-surgical specialists used these criteria, representing only 1.1% of the total users.

Differences in Beers criteria usage were observed

Table 3 – Analysis of associations between certification in geriatrics and years of clinical practice, workplace setting, awareness, training attitudes, and clinical practice regarding deprescribing

	Certification in geriatrics		
	Yes	No	*p*-value
Years of experience since medical graduation (n = 418)			
Median (IQR)	27 (13 - 43)	20 (10 - 38)	**0.048**[a]
Workplace setting (n = 418)			
NHS hospital[d]	25 (43.9)	188 (52.1)	0.235[b] (χ^2 (2) = 2.899, V = 0.083
NHS Primary health care[e]	17 (29.8)	111 (30.2)	
Private sector[f]	15 (26.3)	62 (17.2)	
Are you familiar with the term 'deprescribing'? (n = 418)	n (%)	n (%)	
Yes	52 (91.2)	289 (80.1)	**0.043**[b] (χ^2 (1) = 4.089, V = 0.099)
No	5 (8.8)	75 (19.9)	
Do you have training in deprescribing? (n = 417)	n (%)	n (%)	
Yes	35 (61.4)	154 (42.8)	**0.009**[b] (χ^2 (1) = 6.889, V = 0.129)
No	22 (38.6)	206 (57.2)	
Do you agree that deprescribing is beneficial in older patients when indicated? (n = 369)	n (%)	n (%)	
Disagree	2 (3.9)	2 (0.6)	0.094[c] (χ^2 (1) =4.444, V= 0.110)
Agree	49 (96,1)	316 (99.4)	
In your daily clinical practice, do you deprescribe medications in patients when indicated? (n = 367)	n (%)	n (%)	
Yes	45 (88.2%)	293 (92.7)	0.266[c] (χ^2 (1) = 1.214, V = 0.058)
No	6 (11.8%)	23 (7.3)	
Do you have a specific methodology for deprescribing medications? (n = 367)	n (%)	n (%)	
Yes	28 (54.9)	119 (37.7)	**0.022**[b] (χ^2 (1) = 5.438, V = 0.122)
No	23 (45.1)	197 (62.3)	
What criteria do you use to identify PIMs? (n = 370)	n (%)	n (%)	
No specific criteria to identify PIMs	26 (51)	201 (63)	0.121[b] (χ^2 (1) = 2.683, V = 0.085)
STOPP-START criteria	21 (41.2)	82 (25.7)	**0.028**[b] (χ^2 (1) = 5.239, V = 0.119)
Beers Criteria (American Geriatric Society)	15 (29.4)	78 (24.5)	0.487[b] (χ^2 (1) = 0.575, V = 0.039)

a: Mann-Whitney test; **b**: Chi-square test, and all cells have an expected count greater than 5; **c**: Fisher's exact test; **d**: Includes physicians working solely in NHS hospitals and those practicing in both NHS hospitals and the private sector; **e**: Includes physicians in NHS primary health care and dual practitioners in NHS primary health care and the private sector; **f**: Physicians working in the private sector.

among specialties ($p < 0.001$). Medical surgical and hospital-based medical specialties had the lowest proportions at 4.5% and 9.2%, respectively, whereas internal medicine and family physicians had the highest proportions at 37.3% and 35.4%, respectively. The latter specialty represented 54.8% of the total Beers Criteria users, and internal medicine accounted for 29.8%.

No significant differences were found between specialties associated with the benefits of deprescribing in older adults ($p = 0.878$) or with deprescribing in clinical practice ($p = 0.110$). The results are summarized in Table 5.

Associations of physicians' sex with their deprescribing awareness, training, attitudes, and practices

Physicians' sex was associated with years of experience ($p < 0.001$), deprescribing awareness ($p = 0.015$),

Table 4 – Association between years of medical experience and deprescribing awareness, training in deprescribing, certification in geriatrics, deprescribing benefit in older adults, use of a deprescribing method, and use of criteria to identify PIM

Variable	Category	Median (IQR) Years since graduation	Mann-Whitney U	Z	*p*-value	*r* (effect size)
Are you familiar with the term 'deprescribing'? (n = 418)	No	29 (16.5 - 39.5)	10 565.000	-2.678	**0.007**	0.130
	Yes	18 (10.0 - 39.0)				
In your daily clinical practice, do you deprescribe medications to patients when indicated? (n = 367)	No	26 (9.0 - 30.5)	4604.500	-0.541	0.588	0.028
	Yes	19 (10.0 - 38.0)				
Do you have certification in geriatrics? (n = 418)	No	20 (10.0 - 38.0)	8611.500	-1.979	**0.048**	0.096
	Yes	27 (13.0 - 47.0)				
Do you agree that deprescribing is beneficial in older patients when indicated? (n = 369)	No	22.5 (20.5 - 37.5)	559.000	-0.806	0.420	0.041
	Yes	19 (10.0 - 27.5)				
Do you have training in deprescribing? (n = 417)	No	26.50 (11.25 - 40.0)	18 284.500	-2.663	**0.008**	0.130
	Yes	16 (8.5 - 38.0)				
Do you have a specific methodology for deprescribing medications? (n = 367)	No	18.5 (10.0 - 30.4)	147 375.000	-1.803	0.071	0.094
	Yes	20 (11.0 - 42.0)				
What criteria do you use to identify PIMs? - No specific criteria to identify PIMs (n = 370)	No	15 (8.0 - 34.0)	13 390.000	-2.837	**0.005**	0.147
	Yes	23 (12.0 - 39.0)				
What criteria do you use to identify PIMs? - STOPP/START Criteria (n = 370)	No	23 (12.0 - 39.0)	9678.500	-4.419	**< 0.001**	0.230
	Yes	13 (8.0 - 24.0)				
What criteria do you use to identify PIMs? - Beers Criteria (n = 370)	No	23 (12.0 - 39.0)	8951.500	-4.404	**< 0.001**	0.229
	Yes	12 (8.0 - 23.0)				

V: Cramer's V; PIM: potentially inappropriate medication
The Mann-Whitney U test was used to assess associations between the variable years of medical experience and other variables. The effect size *r* was calculated using the formula $r = |Z|/\sqrt{n}$.

certification in geriatrics (p = 0.003), perception of deprescribing benefits (p = 0.022), and the use of criteria to identify PIMs (p = 0.003). Specifically, male physicians had more years of experience after graduation and were more frequently certified in geriatrics training. By contrast, female physicians were more familiar with the benefits of deprescribing, agreed more with the term deprescribing, and were more likely to use criteria to identify PIMs. The detailed results are presented in Appendix 2 - Table 2 (Appendix 2: https://www.actamedicaportuguesa.com/revista/index.php/amp/article/view/21677/15516).

DISCUSSION

This study provides novel insights into Portuguese physicians' awareness, attitudes, behaviors, and clinical practice concerning deprescribing, which contributes to a broader understanding of its implications in clinical practice. A striking paradox emerged: Although most physicians were familiar with deprescribing, recognized its benefits, and implemented it regularly, the majority lacked adherence to a specific deprescribing method or criteria for identifying PIMs. Notably, a significant proportion of the participants did not receive deprescribing training. In fact,

discrepancies were observed between participants' high awareness of deprescribing (81.2%), agreement on its benefits for older adults (98.9%), and deprescribing in clinical practice (91.9 %). In contrast, a smaller fraction of participants adopted a specific deprescribing methodology (39.4%) and did not employ specific criteria for PIMs (44.6%). This discrepancy may be attributable to the substantial proportion of physicians (55.4%) lacking training in deprescribing. Furthermore, there is cause for concern regarding the fact that less than half of those applying deprescribing in practice embraced a methodological approach specific to deprescribing, since deprescribing ought to be a structured, evidence-based process that leverages available tools for identifying PIMs and follows guidelines when they exist. It should be a patient-centered process that involves shared decision-making.[35] Merely discontinuing PIMs without a defined methodology can undermine safety and effectiveness.

Training appears instrumental in shaping deprescribing practice. We identified significant associations, with effect sizes greater than 0.3 between receiving deprescribing training and increased awareness of deprescribing, more frequent use of deprescribing methodologies, and more prevalent use of criteria for identifying PIMs. Furthermore, a significant modest association was found between deprescribing training and the active integration of deprescribing into clinical practice. These results suggest the need of increased training and education regarding deprescribing among Portuguese physicians.

The outcome that 98.8% of the participants agreed on the benefits of deprescribing, despite only 81.2% being initially familiar with the term, was likely due to the questionnaire including a definition of deprescribing after asking about familiarity with the term and before inquiring about its perceived benefits for older patients.

Our study revealed that younger physicians with less clinical experience received more deprescribing training than their older and more experienced counterparts. This difference in training may be the reason why physicians with less clinical experience reported a significantly higher awareness of

Table 5 – Physicians deprescribing awareness, training, perception of benefits, and deprescribing practices and their association with medical specialties[a]

		General Practice/ Family Medicine	Internal Medicine	Hospital Medical Specialties[b]	Medical-Surgical Specialties	*p*-value
Are you familiar with the term 'deprescribing'? (Yes) (n = 391)		135 (93.1%)	66 (95.7%)	104 (68.9%)	12 (46.2%)	**< 0.001**[c]
	Adjusted residual	4.7	3.4	-4.9	-4.7	(χ^2 (3) = 59.501, V = 0.387)
Do you have training in deprescribing? (Yes) (n = 390)		92 (63.9%)	43 (62.3%)	40 (25.3%)	3 (11.5%)	**< 0.001**[b]
	Adjusted residual	5.8	3.2	-6.4	-3.5	(χ^2 (3) = 61.572, V = 0.397)
Do you agree that deprescribing is beneficial in older patients when indicated? (Yes) (n = 344)		128 (99.2%)	66 (98.5%)	124 (98.4%)	22 (100%)	0.878[c]
	Adjusted residual	0.5	-0.3	-0.6	0.5	(χ^2 (3) = 0.688, V = 0.045)
In your daily clinical practice, do you deprescribe medications in patients when indicated? (Yes) (n = 342)		124 (96.1%)	63 (94%)	113 (90%)	18 (85.7%)	0.130[c]
	Adjusted residual	1.8	0.4	-1.4	-1.3	(χ^2 (3) = 5.042, V = 0.130)
Do you have a specific methodology for deprescribing medications? (Yes) (n = 345)		62 (48.1%)	34 (50.7%)	39 (31.2%)	5 (23.8%)	**0.005**[c]
	Adjusted residual	2.2	1.9	-2.9	-1.6	(χ^2 (3) = 13.499, V = 0.194)
Criteria used to Identify PIM: (n = 345)						
Does not use specific criteria to identify PIMs		60 (46.2%)	37 (55.2%)	103 (78.6 %)	17 (77.3%)	**< 0.001**[b]
	Adjusted residual	-4.7	-1.3	5.0	1.5	(χ^2 (3) = 32.709, V = 0.311)
STOPP-START criteria		57 (43.8%)	21 (31.3%)	15 (11.5%)	1 (4.5%)	**< 0.001**[b]
	Adjusted residual	5.4	0.8	-4.9	-2.5	(χ^2 (3) = 41.192, V = 0.338)
Beers criteria		46 (35.4%)	25 (37.3%)	12 (9.2%)	1 (4.5%)	**< 0.001**[b]
	Adjusted residual	3.7	2.8	-4.9	-2.2	(χ^2 (3) = 36.129 V = 0.316)

a: Responses from all medical specialists were considered in the analysis. Specialties, according to their frequency and the nature of their clinical activity, were grouped into four categories: family medicine, internal medicine, hospital-based medical specialties (excluding internal medicine), and medical-surgical specialties. All hospital medical specialties except internal medicine.; **b**: Chi-square test. All the cells had an expected count greater than 5; **c**: Fisher's exact test

deprescribing concepts and more frequently used specific criteria to identify PIMs. However, despite the clear statistical association between fewer years of clinical experience and greater engagement with deprescribing practices, the overall impact of this relationship appeared modest, with effect sizes for these associations being lower than 0.3. These discrepancies in deprescribing training based on age and clinical experience may be because the concept emerged in the literature only in 2003,[6] meaning that doctors with more years of experience likely did not have access to deprescribing training during their undergraduate or specialty training. However, the length of clinical experience did not significantly affect deprescribing practices or agreement on its benefits, possibly because physicians treating many older patients with polypharmacy experience the need to deprescribe PIMs despite having less training than their less experienced peers. In addition, certification in geriatrics training was associated with more years of clinical experience. As geriatrics is not a medical specialty in Portugal, many practitioners may have obtained this certification only after completing their specialty training, resulting in more years since graduation.

Further analysis demonstrated that possessing certification in geriatrics training was associated with a heightened awareness and training in deprescribing, a stronger conviction in its benefits for older adults, the use of a specific deprescribing method, and the use of the STOPP/START criteria to identify PIMs.

The STOPP/START criteria exhibit a tailored approach to addressing the specific needs of older adults, combined with a practical and evidence-based nature that likely contributes to their adoption by the participants with certification in geriatrics. Furthermore, the results suggested that education and training were crucial in shaping deprescribing attitudes and practices, as medication management for older patients is a fundamental aspect of geriatrics.

As for the differences observed across specialties, our study showed that family physicians, along with internal medicine specialists, exhibited higher deprescribing awareness, increased deprescribing training, more frequent use of criteria for identifying PIMs, and greater adoption of deprescribing methodologies. These differences may arise from the focus of these specialties in older adults, which inherently affects the existence of knowledge and skills in deprescribing. Other specialties catering to older patients with a holistic care approach require more expertise in medication safety and efficacy, and demand advanced deprescribing training and practice. Nonetheless, all specialties must develop deprescribing skills, improve communication between colleagues, and ensure a patient-centered approach and optimal medication management outcomes.

National policies on deprescribing with a structured approach are necessary to enhance physicians' knowledge and practice of deprescribing. This involves developing and implementing targeted educational interventions that integrate deprescribing principles, guidelines, and evidence-based practices into healthcare curricula across all levels of education and continuing professional development.[36,37] A multidisciplinary collaboration among educators, healthcare professionals, policymakers, and relevant stakeholders, including patients and caregivers, is crucial for ensuring a comprehensive and structured approach to deprescribing education and practice. Furthermore, policies aimed at promoting deprescribing should align with good prescribing practices and be multifaceted, considering the distinct barriers and facilitators present in various healthcare settings while also allocating the necessary resources accordingly.[38,39]

Comparison to existing literature

We found that most physicians (98.9%) agreed with deprescribing benefits for older patients, which is generally in line with other studies, but with varying rates: 92% among Indian hospital physicians in internal medicine and nephrology,[40] 71.8% in another large Indian study across all specialties,[41] and 66% in a Singaporean study of internal medicine physicians.[42] Physician awareness of deprescribing in our study matched that of a smaller study of 70 physicians (80% awareness)[43] but exceeded that of a qualitative study of 15 physicians, most of whom were unfamiliar with deprescribing.[44] Variability likely arises from differences in the sample size, specialty, organizational culture norms, socio-cultural aspects of the professionals involved, and healthcare systems.

The prevalence of deprescribing training among physicians has demonstrated considerable variability in the literature. For instance, a study conducted within a Nigerian hospital reported that only 21.4% of physicians had received such training.[43] In contrast, our more comprehensive and heterogeneous study, which spanned various specialties, revealed that 44.6% of physicians were trained in deprescribing. A cross-sectional study conducted in Portugal using an online survey of family physicians found that 11% of the family physicians reported a lack of training and knowledge as factors that might influence deprescribing when answering an open-ended question.[24] This differs from our study, which specifically inquired about training in deprescribing. Additionally, among our subgroup of geriatric-competent physicians, 61.4% received deprescribing training, which is close to the reported 72% in a 31-country European web-based survey on deprescribing practices, habits, and attitudes of geriatricians and geriatricians-in-training.[45]

Strengths and limitations

Our study has limitations, such as the relatively low response rate, which may be due to factors such as time constraints, survey fatigue, or a perceived lack of relevance of the study's subject matter to recipients. Additionally, there is a potential for non-response bias since physicians with a heightened interest in deprescribing may be more likely to participate. Indeed, our investigation uncovered a relationship between familiarity with the research subject, deprescribing, and the completion of the questionnaire. However, our study's strength is that our sample size was commendable and only exceeded by a European study spanning 31 countries that garnered 964 responses.[45] Furthermore, the sample of 425 physicians was representative of the overall population of 60 178 physicians affiliated with the OM, with a 95% confidence interval and a margin of error of 4.75%. The sample proportions for male and female physicians were also representative, with a margin of error of 4.64%. Among the top three medical specialties with the highest response rates, family physicians comprised 34.1% of the sample (compared to 23.96% nationally), internal medicine accounted for 16.2% (compared to 5.48% nationally), and psychiatry accounted for 4.9% (compared to 2.19% nationally). The 95% confidence intervals and margins of error indicate that the samples for these specialties are representative of their respective populations, with margins of error of 2.05% for family physicians, 4.67% for internal medicine, and 5.23% for psychiatry. Another strength is that our study included physicians across 35 medical specialties, achieving national coverage and having the largest number of nationwide participants in exploring Portuguese physicians' deprescribing knowledge, training, and clinical practice. In contrast, a recently published study evaluating primary healthcare physicians' perspectives on deprescribing included 63 participants from a regional health administration in northern Portugal.[26]

CONCLUSION

This study illuminates the paradox within Portuguese medical practice: despite physicians recognizing and agreeing with the benefits of deprescribing, there was a clear discrepancy in the consistent and effective application of methods to deprescribe or criteria to identify PIMs. Consequently, our findings underscore the pressing need for enhanced deprescribing education and training among Portuguese physicians. Such an intervention is crucial and holds paramount importance for medication optimization in Portuguese older adults. Future research should examine additional barriers to deprescribing beyond educational and training factors. This will allow the development of comprehensive deprescribing policies that ensure medication optimization for older adults in Portugal.

AUTHOR CONTRIBUTIONS

AP: Conceptualization, methodology, formal analysis, investigation, resources, data curation, writing original draft, writing, reviewing, editing, and project administration.

MV: Conceptualization, methodology, investigation, writing, reviewing, editing, and supervision.

OR: Conceptualization, methodology, investigation, resources, writing, reviewing, editing, and supervision.

All authors approved the final version to be published.

PROTECTION OF HUMANS AND ANIMALS

The authors declare that the procedures were followed according to the regulations established by the Clinical Research and Ethics Committee and to the Helsinki Declaration of the World Medical Association updated in 2013.

DATA CONFIDENTIALITY

The authors declare having followed the protocols in use at their working center regarding patients' data publication.

DATA AVAILABILITY

The data supporting the findings of this study are available upon request from the corresponding author.

COMPETING INTERESTS

The authors have declared that no competing interests exist.

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