

# Managing hypertension in frail oldest-old – the role of guideline use by general practitioners from 29 countries

**Céline Roulet**

Institute of primary health care (BIHAM)

**Zsafia Rozsnyai**

Institute of Primary Health Care (BIHAM)

**Katharina Tabea Jungo**

Institute of Primary Health Care (BIHAM)

**Milly Van der Ploeg**

Department of Public Health and Primary Care, Leiden University

**Carmen Floriani**

Institute of Primary Health Care (BIHAM)

**Donata Kurpas**

Family Medicine Department, Wroclaw Medical University

**Shlomo Vinker**

Tel Aviv University Sackler Faculty of Medicine

**Sanda Kreitmayer Pestic**

Family Medicine Department, University of Tuzla, Bosnia and Herzegovina

**Ferdinando Petrazzuoli**

Center for Primary Care Research, Lund University, Malmö

**Kathryn Hoffmann**

Department of General Practice and Family Medicine, Medical University Vienna

**Rita Viegas**

Department of family Medicine, NOVA Medical School

**Christian Mallen**

Primary Care and Health Sciences, Keele University

**Athina Tatsioni**

Research Unit for General Practice and Primary Health Care, University of Ioannina

**Hubert Maisonneuve**

Primary Care Unit, University of Geneva

**Claire Collins**

Irish College of General Practitioners

**Heidrun Lingner**

Center for Public Health and Healthcare, University of Hannover

**Rosy Tsopra**

INSERM U1138 Team 22 Information Science to Support Personalized Medicine, Paris and LTSI  
University of Rennes

**Yolanda Müller**

Department of Family Medicine, Center for Primary Care and Public Health (Unisanté)

**Rosalinde Poortvliet**

Department of Public Health and Primary Care, Leiden University

**Jacobijn Gusselkoo**

Department of Public Health and Primary Care, Leiden University

**Sven Streit** (✉ [sven.streit@biham.unibe.ch](mailto:sven.streit@biham.unibe.ch))

Institute of Primary Health Care (BIHAM) <https://orcid.org/0000-0002-3813-4616>

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# Abstract

**Background** The best management of hypertension in frail oldest-old ( $\geq 80$  years of age) remains unclear while lacking guidelines providing specific recommendations. **Aim, Objectives** To investigate guideline use in general practitioners (GPs) and if guideline use relates to different decisions when managing hypertension in frail oldest-old. **Design/Setting** Cross-sectional study.

**Methods** GPs participated in a survey with case-vignettes of frail oldest-old varying in systolic blood pressure (SBP) and cardiovascular disease (CVD). GPs in Europe, Brazil, Israel and New Zealand were invited. We compared the percentage of GPs using guidelines per country and further stratified on the most frequently mentioned guidelines. To adjust for patient characteristics (SBP, CVD and GP's gender, years of experience and prevalence of oldest-old in their practice), we used a mixed-effects regression model accounting for clustering within countries.

**Results** Overall, 2,543 GPs from 29 countries were included. About 60% reported to use guidelines. Higher guideline use was found in female ( $p=0.031$ ) and less-experienced GPs ( $p<0.001$ ). Across countries, we found a large variation in guidelines use, ranging from 25% to 90% of the GPs. However, there was no difference in decisions about treatment hypertension in frail oldest-old patients between GPs that used or not used guidelines nor which guideline they used.

**Conclusion** Many GPs reported using guidelines to manage hypertension in frail oldest-old patients, however guideline users did not decide differently from non-users. Instead of focusing on the fact if GPs use guidelines or not, we as a scientific community should put an emphasis on what guidelines suggest in frail and oldest-old patients.

## Background

Hypertension is highly prevalent worldwide especially in oldest-old. In primary care, general practitioners (GPs) are paramount to decide on optimal blood pressure goals. However how best to treat hypertension in oldest-old (80 years or older) patients, especially those who are frail, is still an open question [1]. This population group is rarely the subject of specific recommendations in currently available guidelines for treating hypertension.

Oldest-old patients are a rapidly increasing segment of the population, and GPs see more and more of them [2]. These patients are a heterogeneous group. Some are healthy, while others are frail and live with multiple complex medical conditions. Despite its increase, this population is widely excluded from clinical trials, particularly from hypertension trials [3]. Most studies apply in fact very strict criteria excluding patients with other diseases than the condition under study which reduces the generalizability of the results [4]. This statement is especially relevant in a primary care setting where over two thirds of patients over 50 of age have more than one chronic disease [5].

Treating hypertension effectively decreases cardiovascular risk factors in the general population [6], but there are no reliable data whether it is also the best treatment-strategy in the oldest-old. Whilst some trials suggested that lowering blood pressure benefits this group [7], most of these trials included only fit members of that age group. Meanwhile observational studies reported that low systolic blood pressure was associated with an increase in all-cause mortality in the oldest-old [8-10].

In this study we aim to assess if GPs used guidelines when deciding on how to treat hypertension in their oldest-old and frail patients, and if guideline-users decide differently from non-users.

## Methods

### *Design*

We conducted a re-analysis of data from the cross-sectional case-vignettes study called 'Antihypertensive Treatment in Very Elderly' (ATTENTIVE) [11].

### *Setting*

The design of the ATTENTIVE Study has been described previously [11,12]. In brief, we organized a network of 'national coordinators' (mostly one per country) through GP organizations like the European General Practice Research Network (EGPRN). The role of the national coordinator was to seek ethical approval (if applicable), supervise translation of the survey and send out the survey and reminders to their GP network(s). The surveys were distributed from spring to summer 2016.

### *Ethical considerations*

Our study accords with the ethical principles of the Declaration of Helsinki [13]. The GPs' responses to the survey served as their informed consent. Because the survey was anonymous, there was no need to seek ethical approval in most countries. The ethics committees of Brazil and Switzerland specifically waived the requirement. We sought and obtained approval from the ethics committee of Auckland University in New Zealand.

### *Participants*

The ATTENTIVE study only included currently active GPs. We excluded GPs who were not practicing anymore. GPs were recruited by email and answered the survey without any incentive.

### *Procedures*

The questionnaire was published online in English and 21 other languages corresponding to the participating countries on SurveyMonkey® ([www.surveymonkey.com](http://www.surveymonkey.com), Palo Alto, CA, USA). Content validity of the translations were checked by the national coordinators who were all fluent in English. In Ukraine, where web access was limited, a paper version was administered. The first set of survey questions determined GP specific characteristics (sex, years of experience as a GP, estimation of

prevalence of oldest-old patients in their practice). Then, GPs were asked if they used hypertension guidelines to decide how to treat the oldest-old, and which guidelines they used. We defined the first guideline they mentioned as the most important. We analyzed all the documented guidelines and we categorized them. When local guidelines referred to another guideline (e.g., from the European Society of Cardiology, ESC), we counted it as the second guideline. If GPs listed something other than a guideline, we classified it under “Others” (Appendix 1).

The complete survey described eight case vignettes where oldest-old male or female patients presented for a routine control (Additional file 1 in [11]). These patients had no symptoms suggesting hypertension and took no antihypertensive medication. The vignettes differentiated by the following variables: systolic blood pressure (SBP) 140 or 160mmHg, presence or absence of history of cardiovascular disease like myocardial infarction or stroke, and presence or absence of frailty. In each case, GPs were asked to decide whether they would start antihypertensive treatment. In our study, we analysed data from four of the eight case-vignettes that applied to frail oldest-old patients. We defined frailty when at least two of the following Fried’s criteria were present: unintentional weight loss, muscle weakness, exhaustion, slow gait speed and low level of activity [14].

### ***Statistical analysis***

We used descriptive statistics to compare baseline characteristics in the whole sample and stratified by guideline use (rather yes and yes = yes; neutral, rather no and no = no). We used the Chi2-test to assess categorical data and a complete case analysis to handle missing data. To assess how GPs varied in their use of guidelines when they treated hypertension in the oldest-old, we calculated the crude proportions and 95% confidence intervals (CI) per country. To assess the role that guidelines played in GPs decisions, we used a mixed-effects Poisson model to calculate percentages and 95% CI of GPs who decided to treat hypertension across the four case-vignettes. We adjusted the model for gender and years of experience and stratified by guideline use. We used the mixed-effects model to account for a clustering effect within each country and used the same model to further stratify the guidelines that GPs said they followed. To lower the risk of selection bias in countries with a low response rate, we performed a sensitivity analysis restricted to countries where >60% of GPs responded. Based on the distribution of guidelines GPs mentioned (Appendix 1), we made a 5-category group that included the three most frequently mentioned guidelines (ESC, NICE, NHG, and every other guideline), and GPs who said they did not use guidelines (reference group). We considered a two-sided p-value of 0.05 to be statistically significant. STATA 15.1 (StataCorp, College Station, TX, USA) was used for all analyses.

## **Results**

We received responses from 29 countries. After excluding 42 GPs who were no longer practicing, we included 2,543 GPs. The median response rate across countries was 26% (Inter Quartile Range 10–62%). A total of 52.7% of the GPs were women. About one third of GPs (37.6%) had more than 20 years

of experience. The self-reported prevalence of oldest-old in most GP practices ranged from 10% to 20%. Only 7.2% listed a prevalence higher than 30%.

About 60% of GPs mentioned using guidelines when they treat hypertension in the oldest-old. Female and GPs with under 20 years of experience were more likely to use guidelines while GPs with the most experience (more than 20 years) reported using them less frequently. We found that reported prevalence of oldest-old patients in GPs' practices was not significantly associated with guideline use (Table 1).

We did find large variation in guideline use across countries, ranging from less than 25% in New Zealand to almost 90% in Ukraine (Figure 1, Appendix 2). Over 80% of GPs in Brazil, Greece, Czech Republic, Macedonia, Slovenia, Romania and Ukraine reported using guidelines. Across all countries, 20 different guidelines were mentioned; 95% of guideline users mentioned at least one of these guidelines listed (Appendix 1). Inherent to the distribution of number of participants per country, the most commonly mentioned guidelines were influenced: NICE, ESC and NHG (the 'Dutch College of GPs'); resulted in 60% of mentions.

Table 2 stratifies the treatment recommendation to start antihypertensive medication on guideline users and non-users. We found that proportions advising to start treatment differed by the case characteristics. However, GPs made similar decisions about treating or not treating hypertension in frail oldest-old patients, whether they used guidelines or not. The exception in the case of a patient without history of CVD and SBP 140mmHg, in which there was an evidence for more treatment in guideline users (16% of guideline users decided to treat, 95%CI 11%-24%) compared to non-users (12% of non-users decided to treat, 95%CI 7-18%,  $p=0.015$ ). However, when restricting GPs to only those countries with a higher than 60% response rate ( $n=8$  countries; 676 participants), this difference was no longer statistically significant: guideline users and non-users (19%, 95%CI 9%-40%,  $p=0.28$ ).

In Figure 2, we further stratified GP treatment decisions by the three most mentioned guidelines, other guidelines, and no guidelines. GPs in all categories again made similar decisions for each case-vignette, no matter which guidelines was applied (or no guideline applied). However, there seems to be a trend that NHG-users were less likely to treat patients without history of CVD when SBP was 160mmHg but this finding was not statistically significant.

## Discussion

Our study of more than 2,500 GPs from 29 countries found about 60% of GPs reported use of guidelines when treating hypertension in frail oldest-old. These proportions varied largely between countries, from less than 25% in New Zealand to almost 90% in Ukraine. Less experienced GPs and female GPs were more likely to use guidelines. However, GPs from all countries overall made similar treatment decisions when confronted with cases of frail oldest-old patients, whether or not they used guidelines, and regardless which guidelines they used.

### *Clinical context and comparison with existing literature*

While guideline use seems to have little or no effect on treatment decisions in frail oldest-old, frailty, systolic blood pressure and history of cardiovascular disease have [11]. In addition, country-specific factors such as cardiovascular burden and life expectancy are associated with the decisions when managing hypertension in this age group [12].

An explanation why guideline use is not associated with treatment decisions could be the absence of specific and clear recommendations in most current guidelines for this population group, since in the majority of hypertension trials frail and oldest-old patients are excluded [15]. Therefore GPs are left to decide based on other factors such as patient characteristics rather than on guidelines [16]. We speculate GPs would use more guidelines if they were more applicable to the types of patients they treat. Moreover, the literature outlines patient safety to be more important than adherence to guidelines [17].

Some guidelines, however, provide specific recommendations for the oldest-old e.g. the NHG guideline about cardiovascular disease risk management implemented in the Netherlands [18]. This work was an initiative of Dutch GPs involving all healthcare professionals in cardiovascular disease prevention in a multidisciplinary workgroup. The 2012 version, which was applied at the time of the survey, was recently updated in spring 2019 and now also contains specific recommendations for frail patients. In our study, in the case of primary prevention and SBP of 160mmHg, we could see that NHG-users seemed to treat less, however, the confidence interval overlapped with the proportions of GPs that adhered to other or no guidelines. This observation may imply that guidelines could influence GPs' treatments decision in frail oldest-old if specific recommendations are provided.

In the present study we found that female doctors were more likely to use hypertension guidelines when treating frail oldest-old patients. This is in line with findings from other studies that described higher adherence to clinical guidelines by female physicians when treating other chronic conditions such as diabetes [19].

### ***Limitations and strengths***

This study has several limitations but also strengths: Asking GPs what they would do is not the same as measuring what they actually do. However, the use of a case-vignette study allows comparing decisions in different countries while still having a standardized situation which can be seen as a strength when comparing across countries. We believe anonymity also lowered social desirability bias risk. Studies including GPs often have a moderate response rate. Our median response rate of 26% is not uncommon, but we, like others, must take the risk of selection bias into account. We mitigated that risk by running a sensitivity analysis of countries where the response rate was higher (more than 60%). We further acknowledge that due to different numbers of participants per country the list of most used guidelines is skewed to overestimate responses from countries with many participants. However, we focused on the variety by including almost 30 countries, some being able to recruit more, some to recruit less GPs. This approach also let us include response from countries sometimes under-represented in research. Moreover it is the first study to our knowledge to investigate guideline use and treatment decisions in frail and oldest-old with hypertension through standardized case vignettes.

## ***Implications for research and/or practice***

Until future trials in primary care with oldest-old and frail patients will assess the benefit as well as risks of hypertension treatment in this population group, our study suggests that due to the remaining clinical dilemma, some GPs will choose not to follow any guidelines. One explanation may be the absence of specific recommendations for this heterogeneous group of oldest-old patients. The development of future guidelines should ideally help in achieving a higher agreement among guidelines. The absence of agreement between the various recommendations was found to be associated with a large variation in how GPs apply preventive measures [20]. Further, guideline committees would benefit from larger efforts in consulting patients as well as GPs to raise more awareness of their patients' specificity. This would decrease the potential of conflicting interests compared to guidelines written by professional societies and might lower the risk of overtreatment [21,22]. The actual format of guidelines with an often complex and ambiguous text can be a barrier to GPs adoption of recommendations [23].

## **Conclusions**

Most GPs stated using guidelines when treating hypertension in oldest-old patients, but with a large variety across countries and which guideline they mentioned. Nevertheless, guideline-users all made similar treatment decision compared to non-users. This suggests that the individual patient characteristics have a higher impact in GPs' decisions than guidelines which still fail to provide guidance concerning the optimal treatment in oldest-old and frail patients. Therefore future efforts should be made by including oldest-old patients into studies and GPs in guideline committees to develop more specific guidelines with recommendations for oldest-old and frail patients with hypertension.

## **Abbreviations**

ATTENTIVE: Antihypertensive Treatment in Very Elderly study

CVD: Cardiovascular disease

CI: Confidence intervals

ESC: European society of cardiology

GP: General practitioner

NICE: National Institute for Health and Care Excellence (UK)

NHG: Dutch society of general practitioners

SBP: Systolic blood pressure

## **Declarations**



### ***Ethics approval and consent to participate***

Our study accords with the ethical principles of the Declaration of Helsinki [13]. The GPs' responses to the survey served as their informed consent. Because the survey was anonymous, there was no need to seek ethical approval in most countries. The ethics committees of Brazil and Switzerland specifically waived the requirement. We sought and obtained approval from the ethics committee of Auckland University in New Zealand.

### ***Consent for publication***

Not applicable.

### ***Competing interests***

The authors declare that they have no competing interests.

### ***Availability of data and materials***

The dataset used and analysed during the current study is available from the corresponding author on reasonable request.

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### ***Authors' contributions***

CR extracted data from GPs' surveys including case-vignettes. Data were analyzed from CR, ZR and SS. CR wrote the manuscript under the supervision of ZR and SS who also wrote the statistical part. All authors helped to interpret results, provided input on the manuscript and approved to this manuscript.

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## Tables

**Table 1.** Baseline characteristics of general practitioners by 'guideline use' during decision-making on treatment of hypertension in oldest old patients (n=2,543)

Characteristics	Overall	Guideline use		P-value <sup>a</sup>
		Yes	No	
		2,543	1,510 (59.4%)	
Gender, n (%)				
Female	1,341 (52.7)	823 (54.5)	518 (50.2)	0.031
Clinical Experience, n (%)				
<5 years	471 (18.5)	314 (20.8)	157 (15.2)	<0.001
5-10 years	445 (17.5)	274 (18.1)	171 (16.5)	
11-15 years	341 (13.4)	203 (13.5)	138 (13.4)	
16-20 years	328 (12.9)	204 (13.5)	124 (12.0)	
>20 years	956 (37.6)	514 (34.1)	442 (42.8)	
Estimated prevalence of oldest-old, n (%)				
<10%	851 (38.7)	591 (39.2)	260 (37.7)	0.145
10-20%	865 (39.4)	576 (38.2)	289 (41.9)	
21-30%	323 (14.7)	222 (14.7)	101 (14.7)	
>30%	159 (7.2)	120 (8.0)	39 (5.7)	

<sup>a</sup> Chi-square test for categorical variables

**Table 2.** Proportions of general practitioners starting antihypertensive treatment in frail oldest-old stratified by history of cardiovascular disease, systolic blood pressure and use of guidelines

	Patients with no history of cardiovascular disease				Patients with history of cardiovascular disease			
	SBP 140 mmHg		SBP 160 mmHg		SBP 140 mmHg		SBP 160 mmHg	
	GPs starting treatment (95% CI)	P-value	GPs starting treatment (95% CI)	P-value	GPs starting treatment (95% CI)	P-value	GPs starting treatment (95% CI)	P-value
Guideline		0.015		0.13		0.09		0.12
Users	16% (11%-24%)		80% (69%-94%)		37% (28%-49%)		86% (77%-97%)	
Non-users	12% (7%-18%)		73% (61%-88%)		31% (23%-43%)		80% (69%-92%)	

Proportions and p-values comparing users and non-users from mixed Poisson regression models adjusted for GP gender, years of experience and country

Figures

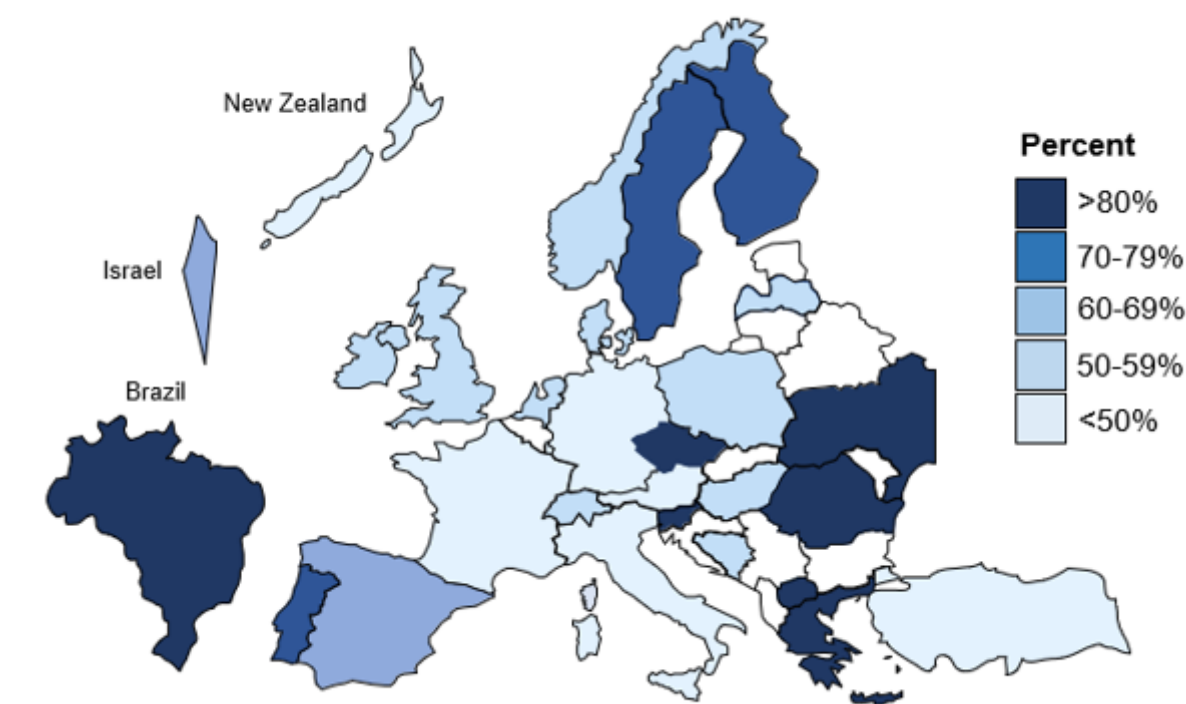
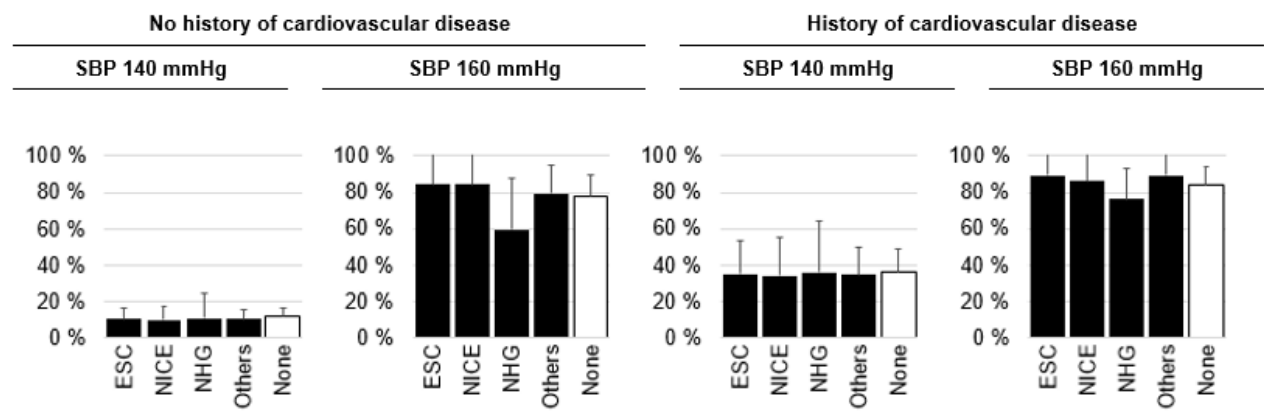


Figure 1

Crude percentages of general practitioners using guidelines by country when treating hypertension in frail oldest-old (n=2,543)



Proportions and p-values comparing users and non-users from mixed Poisson regression models adjusted for GP gender, years of experience and country

Figure 2

General practitioners deciding to start antihypertensives in frail oldest-old stratified by type of guidelines used and no guideline used

## Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [Appendix2Attentive3.pdf](#)
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