Antihypertensive Treatment in Elderly Frail Patients
Evidence From a Large Italian Database

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Abstract —Aim of our study was to assess the relationship between adherence with antihypertensive drugs and the risk of death in frail versus nonfrail old individuals. Using the database of the Lombardy Region (Italy), we identified 1 283 602 residents aged ≥65 years (mean age 76) who had ≥3 prescriptions of antihypertensive drugs between 2011 and 2012. A nested case-control design was applied, with cases being the cohort members who died during the observation period (7 years). Logistic regression was used to model the association of interest, with adjustment for potential confounders. Adherence was measured by the proportion of the follow-up covered by prescriptions, and the analysis was separately performed in patients with a good, medium, poor, and very poor clinical status, as assessed by a score that has been shown to be a sensitive predictor of death in the Italian population. The 7-year death probability increased from 16% (good) to 64% (very poor) clinical status. Compared with patients with very low adherence with antihypertensive treatment (<25% of follow-up time covered by prescriptions), those with high adherence (>75% of time covered by prescriptions) exhibited a lower risk of all-cause mortality in each group, the difference decreasing progressively (−44%, −43%, −40%, and −33%) from the good to the very poor clinical status. Adherence with antihypertensive drug treatment was also associated with a lower risk of cardiovascular mortality. Adherence with antihypertensive appears to be protective in frail old patients, but the benefit is less marked than in patients with a good clinical status. **(*Hypertension*. 2020;76:442-449. DOI: 10.1161/HYPERTENSIONAHA.120.14683.)** ● **Data Supplement**

Key Words: aged ■ antihypertensive drug ■ Italy ■ medication adherence ■ mortality ■ population

Randomized outcome-based trials have shown that antihypertensive treatment is accompanied by a substantial reduction in the risk of hypertension-related cardiovascular morbid or fatal events and that this is the case also in old patients, that is, those aged ≥65 years.[1,2] However, trials usually exclude patients particularly vulnerable to early events or death,[3–5] such as institutionalized patients, patients in whom hypertension is associated with serious comorbidities, and patients with orthostatic hypotension in whom an impaired cardiovascular homeostasis favors a high incidence of injurious falls and outcomes.[6,7] As a result, evidence on the protective effect of antihypertensive treatment in frail elderly individuals is limited to observational studies in which antihypertensive treatment has shown in some instances no and in other instances a protective effect similar to the one seen in healthier elderly patients.[3,5,8–24] This is acknowledged by guidelines on hypertension which do not deny to these patients use of antihypertensive drugs, but emphasize that knowledge of their effects on outcome is insufficient and that thus cautionary treatment strategies and management are desirable.[5,25,26]

Using databases from several Italian regions, we have developed a multisource comorbidity score, which was validated for its ability to sensitively predict time to death in a very large, that is, 2 million, unselected population aged ≥50 years.[27] In the present study, we have used this score to determine the protective effect of antihypertensive treatment on elderly patients with different life expectancies, including those with serious comorbidities and a very high risk of early mortality. Protection by antihypertensive treatment was inferred from the relationship between adherence with the prescribed treatment regimen and the risk of all-cause and cardiovascular mortality, based on the evidence that an increased adherence with antihypertensive drugs is associated with these outcomes.[28–31] Average adherence was assessed by the time covered by antihypertensive drug prescriptions with respect to the entire follow-up time.

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Methods

The data that support the findings of the present study belong to the Lombardy Region. They are not available for public use and were used under license restricted to the needs of the study. However, data can be made available by the authors for specific purposes upon reasonable request and with permission of the Lombardy Region.

Setting

The data used for the current study were retrieved from the Healthcare Utilization databases of Lombardy, a region of Italy that accounts for about 16% (almost 10 million) of its population. In Italy, the whole population is covered by the National Health Service (NHS), and in Lombardy, the data are included in an automated system of databases that provides information on administrative data (including the date of death), drug prescriptions, hospitalizations, death certificates (including the cause of death), and other healthcare-related items. For each patient, we linked the above databases via a single identification code. To preserve privacy, each identification code was automatically converted into an anonymous code. The inverse process was prevented by deletion of the conversion table. Further details on healthcare utilization databases of the Lombardy region in the field of cardiovascular disease are available in previous papers.[28,32,33] The diagnostic and therapeutic codes used for the current study are given in Supplementary Table S1 in the Data Supplement.

Cohort Selection and Follow-Up

The target population included Lombardy residents aged ≥65 years who were beneficiaries of the NHS. Of these, those who received at least 3 consecutive prescriptions of antihypertensive drugs between 2011 and 2012 were identified, and the date of the third prescription was defined as the index date. Patients were excluded if they (1) were not beneficiaries of the NHS for at least 5 years before the index date and (2) did not reach at least 6 months of follow-up. Patients institutionalized in long-term residential settings were not included in our study because their prescriptions are not collected in the reimbursement-oriented database as individual record; thus, we cannot assess their adherence to drug therapy (see below). The patients recruited into the final cohort accumulated person-years of follow-up from the index date until the earliest date between death (outcome), emigration, or June 30, 2018.

Assessing Clinical Status of Cohort Members

A prognostic index based on the association of 34 weighted cardiovascular and noncardiovascular conditions and mortality was used in the current investigation. The index was generated by the footprints that every NHS beneficiary left when, in the years preceding the index date, he/she received a health care service (hospital admission, drug prescription), which allowed tracking down all healthcare-related conditions for which an NHS service was required. We assigned to each condition a weight proportional to its strength in explaining mortality, thereby obtaining a score that represented the weights accumulated by each cohort member. The score, which was termed Multisource Comorbidity Score (MCS), was then categorized to characterize cohort members as having a good, medium, poor, or very poor clinical status (scores: 0–4, 5–9, 10–14, and ≥15, respectively). A validation study, performed on a cohort of 2 million Italian NHS beneficiaries, showed that the MCS was better than conventional scores (ie, Charlson, Elixhauser, and Chronic Disease scores) for predicting mortality in the Italian population.[27]

Cases and Controls

A case-control study was nested into the cohort of antihypertensive drug users. The main end point of the study was all-cause mortality, and a secondary end point was cardiovascular mortality (death for ischemic heart disease, cerebrovascular disease, or heart failure). Consequently, 2 sets of cases were built: the first one including cohort members who died for any cause and the second one including those who died for a cardiovascular cause.

Each case was matched to one control randomly selected by risk-set sampling from all cohort members, provided that his/her follow-up did not end before the follow-up of the matched case. Matching was performed according to sex, age at cohort entry (±1 year), date of cohort entry (±30 days), and the clinical status as measured by the MCS category.

Adherence With Antihypertensive Medicaments

The antihypertensive drugs dispensed to each patient during the follow-up were identified. The period covered by each drug prescription was calculated by dividing the total amount of the dispensed medicament for the defined daily dose. For overlapping prescriptions, the individual was assumed to have completed the former prescription before starting the second one. Adherence with therapy was assessed as the cumulative number of days during which the medication was available divided by the number of days of follow-up, a quantity referred to as proportion of days covered (PDC) by prescriptions. Because information on drug therapies dispensed during a hospitalization was not available, the antihypertensive drugs dispensed before hospital admission were assumed to be continued during the hospital stay.[34] Patients were categorized as having very low (PDC<25%), low (PDC 25%–49%), intermediate (PDC 50%–74%), and high (PDC≥75%) adherence.

Additional Information

The collected data at the cohort entry also included (1) the antihypertensive treatment strategy, that is, monotherapy or combination therapy; (2) the class of antihypertensive medicament; (3) comedications (ie, use of lipid-lowering, antidiabetic, other cardiovascular and noncardiovascular drugs); and (4) comorbidities (hospitalization for cardiovascular, respiratory, renal and noncardiovascular diseases) over 5 years before the index prescription.

Data Analysis

χ^2 in its version for the trend and linear regression model were used when appropriate to test demographic and clinical differences in the different MCS categories as well as in cases and controls.

Conditional logistic regression models were fitted to estimate the odds ratio, and its 95% CI, for the predictor-outcome association. The predictor variables of interest were the factors constructed according to the categories of PDC, using the first category (ie, very low adherence) as reference. According to the aim of the study, the predictor-outcome association was separately analyzed for the different MCS categories. Adjustments were made for the variables reported in Table 1. The statistical significance of the regression coefficients obtained by scoring the corresponding ordinal categories was considered for testing trends in odds ratio.

Sensitivity Analysis

To verify the robustness of our findings, 3 sensitivity analyses were performed. One, we adopted different ways of categorizing exposure to antihypertensive drugs. Two, because adherence to antihypertensive drugs could reflect health-seeking behavior, and thus, high adherent patients might be more adherent to other cardioprotective drugs (eg, lipid-lowering agents, antithrombotic agents, and antidiabetic drugs), the analysis was repeated including in the model also the adherence to cotreatments. Three, although our estimates were adjusted for a number of factors, and because several relevant clinical features were not available in our databases, we addressed the potential bias generated by unmeasured confounders by the rule-out approach described by Schneeweiss.[35] This method aims at detecting the extension of the overall confounding required to fully account for the exposure-outcome association, thus moving the observed point estimate to the null. We set the possible unmeasured confounder: (1) to have a 10% prevalence in the study population, (2) to increase the outcome risk up to 10-fold in patients exposed compared to those unexposed to it, and (3) to be up to 10-fold less common in high than in very low adherent patients.

Table 1. Comparison of Demographic, Clinical, and Therapeutic Traits of the Cohort Members Along Categories of Clinical Status

	Clinical Status*				
Characteristics	Good (n=324 966)	Medium (n=482 937)	Poor (n=395 721)	Very Poor (n=79 978)	*P* Value†
Men	126 000 (38.8%)	195 050 (40.4%)	174 963 (44.2%)	40 698 (50.9%)	<0.001
Age, y, mean (SD)	74.5 (7.0)	75.3 (6.9)	77.8 (7.4)	77.9 (7.1)	<0.001
Antihypertensive drugs					
One drug (diuretics)	110 866 (34.1%)	145 000 (30.0%)	77 847 (19.7%)	14 319 (17.9%)	<0.001
One drug (other classes)	7190 (2.2%)	10 934 (2.3%)	18 823 (4.8%)	7731 (9.7%)	<0.001
Fixed-dosed combinations	70 439 (21.7%)	86 177 (17.8%)	35 298 (8.9%)	5169 (6.5%)	<0.001
Free combinations	136 471 (42.0%)	240 826 (49.9%)	263 753 (66.7%)	52 759 (66.0%)	<0.001
Other drugs					
Lipid-lowering agents	76 621 (23.6%)	180 197 (37.3%)	189 549 (47.9%)	36 691 (45.9%)	<0.001
Antiarrhythmic agents	18 (0.0%)	30 175 (6.3%)	52 932 (13.4%)	12 796 (16.0%)	<0.001
Antiplatelet drugs	78 380 (24.1%)	206 165 (42.7%)	245 841 (62.1%)	51 303 (64.2%)	<0.001
Oral anticoagulant drugs	0 (0.0%)	27 760 (5.8%)	75 734 (19.1%)	16 898 (21.1%)	<0.001
Antidiabetic drugs	0 (0.0%)	99 029 (20.5%)	109 552 (27.7%)	27 469 (34.4%)	<0.001
Antigout drugs	122 (0.0%)	41 329 (8.6%)	74 241 (18.8%)	24 218 (30.3%)	<0.001
Nitrates	0 (0.0%)	16 343 (3.4%)	107 691 (27.2%)	23 702 (29.6%)	<0.001
Digitalis	0 (0.0%)	2792 (0.6%)	40 855 (10.3%)	8745 (10.9%)	<0.001
Antidepressant drugs	37 351 (11.5%)	75 423 (15.6%)	88 361 (22.3%)	24 881 (31.1%)	<0.001
Drugs for respiratory disease	14 508 (4.5%)	130 545 (27.0%)	139 917 (35.4%)	33 594 (42.0%)	<0.001
Previous hospitalizations					
Cardiovascular disease	8089 (2.5%)	62 795 (13.0%)	163 429 (41.3%)	53 478 (66.9%)	<0.001
Diabetes mellitus	0 (0.0%)	7384 (1.5%)	33 759 (8.5%)	17 910 (22.4%)	<0.001
Kidney disease	138 (0.0%)	758 (0.2%)	11 716 (3.0%)	14 944 (18.7%)	<0.001
Respiratory disease	1832 (0.6%)	11 428 (2.4%)	40 699 (10.3%)	21 655 (27.1%)	<0.001
Mental disorders	600 (0.2%)	2585 (0.5%)	10 756 (2.7%)	9127 (11.4%)	<0.001
Cancer	5241 (1.6%)	11 894 (2.5%)	37 238 (9.4%)	38 915 (48.7%)	<0.001

MCS indicates multisource comorbidity score.

*Clinical status was assessed by the MCS, and 4 categories were considered: good (score=0), medium (score ≤1 to ≤4), poor (score≤5 to ≤14) and very poor (score≥15).

†χ^2 for the trend, or linear regression model (mean age), was used to test differences in demographic and clinical traits along categories of MCS.

The SAS statistical package was used for the analyses (SAS, Version 9.4). For all hypotheses, 2-tailed *P* values <0.05 were considered to be significant.

Results

Patients

Figure 1 shows the sequential distribution of the exclusion criteria. The 1 283 602 patients included into the study cohort accumulated 7 579 381 person-years of observation (median follow-up: 84 months) and generated 255 228 deaths, with a death incidence that increase progressively from the group of patients with good to the group of patients with a very poor clinical status (from 16% to 64% over the follow-up period, Figure 2). The baseline characteristics of the cohort members in the different MCS categories are shown in Table 1. As expected, mean age, men prevalence, use of medicaments other than antihypertensives, as well as previous hospitalization for cardiovascular and noncardiovascular disease increased as the clinical status worsened.

Among the 255 228 case patients (ie, those who died during follow-up), 254 778 were matched with a control patient. Their characteristics are shown in Table 2. Compared with controls, cases more often (1) used only one drug (more frequently diuretics) at the index date; (2) used much more frequently other medicaments; and (3) exhibited more comorbidities. Controls showed a higher adherence with antihypertensive treatment compared to cases.

Similar findings were observed for the case-control matching pairs obtained by considering cardiovascular death as secondary end point (see Table S2).

Antihypertensive Treatment and Mortality

Figure 3, upper parts, shows that increasing adherence with antihypertensive treatment was accompanied by a progressive

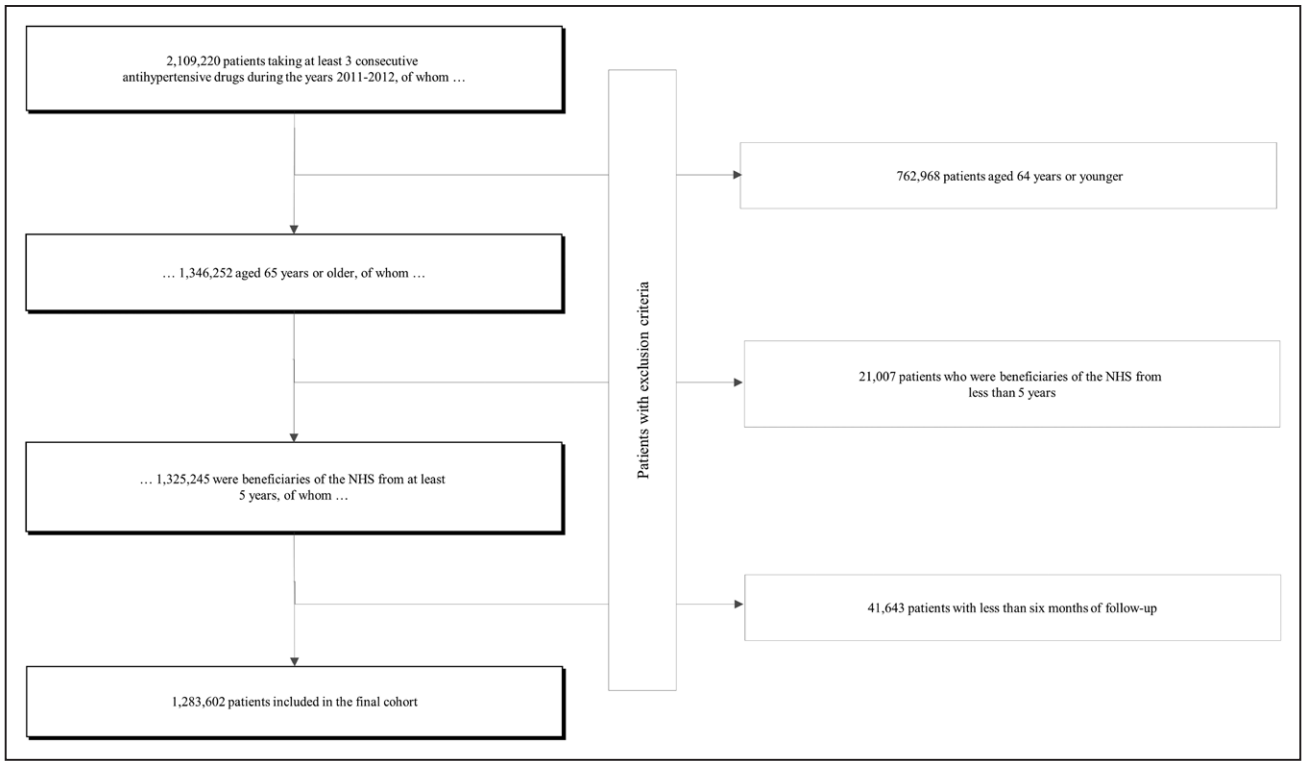

Figure 1. Flow-chart of inclusion and exclusion criteria for patients considered for data analysis. NHS indicates National Health Service.

reduction in the risk of all-cause mortality in all MCS categories, although in the very poor clinical status, a clearcut mortality reduction was seen only in the group with the best adherence with antihypertensive drugs. Compared with patients with a very low adherence, those with a very high adherence exhibited a total mortality reduction of 44%, 43%, 40%, and 33% according to whether their baseline clinical status was good, medium, poor, or very poor, respectively (p-trend=0.046).

Similar figures were observed for cardiovascular death, that is, compared with patients with very low adherence, those with a very high adherence exhibited a reduction of cardiovascular mortality of 41%, 34%, 23%, and 14% in the good, medium, poor, and very poor clinical status, respectively (Figure 3, bottom).

Sensitivity Analyses

The relationships described above did not substantially change by varying the criteria for categorization of adherence with antihypertensive drug therapy nor by adjusting the data for adherence to cotreatments (Table S3 and Table S4).

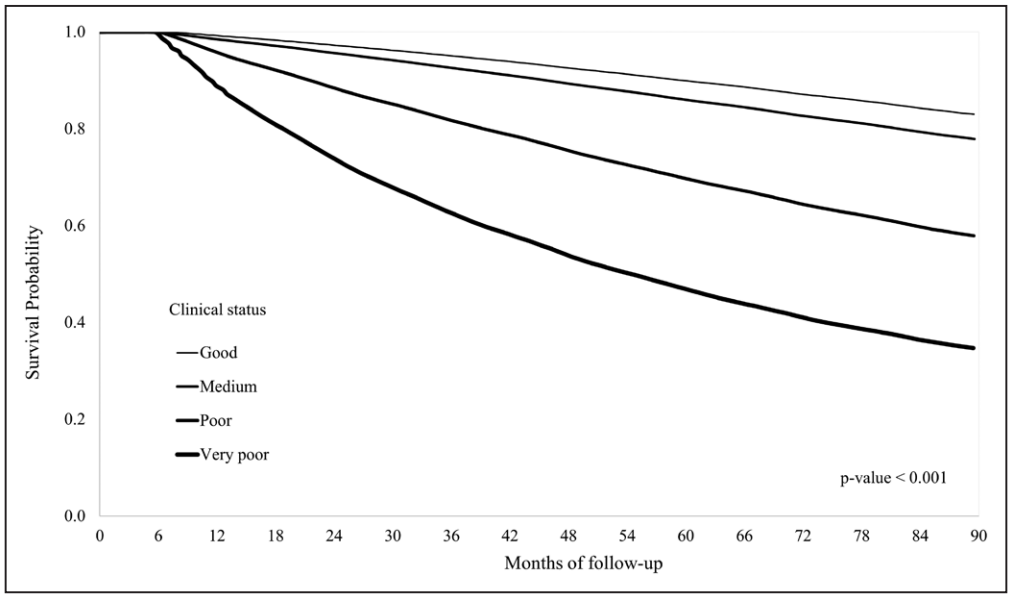

Figure 2. Incidence of all-cause mortality in elderly patients with good, intermediate, poor, and very poor clinical status according to the multisource comorbidity score.

Table 2. Comparison of Demographic, Clinical and Therapeutic Characteristics of the Cohort Members Who Died (Cases) or Survived (Controls)

Characteristics	Cases (n=254 778)	Controls (n=254 778)	*P* Value
Baseline			
Men	116 184 (45.6%)	116 184 (45.6%)	MV
Age, years, mean (SD)	80.8 (7.5)	80.8 (7.5)	MV
Clinical status*			
Good	40 232 (15.8%)	40 232 (15.8%)	MV
Medium	73 310 (28.8%)	73 310 (28.8%)	
Poor	105 618 (41.4%)	105 618 (41.4%)	
Very poor	35 618 (14.0%)	35 618 (14.0%)	
Antihypertensive drugs			
One drug (diuretics)	17 299 (6.8%)	11 181 (4.4%)	<0.001
One drug (other classes)	60 274 (23.7%)	61 523 (24.1%)	
Fixed-dosed combinations	30 809 (12.1%)	32 863 (12.9%)	
Free combinations	146 396 (57.5%)	149 211 (58.6%)	
Other drugs			
Lipid-lowering agents	84 678 (33.2%)	96 178 (37.8%)	<0.001
Antiarrhythmic agents	23 956 (9.4%)	24 361 (9.6%)	0.053
Antiplatelet drugs	137 253 (53.9%)	137 636 (54.0%)	0.282
Oral anticoagulant drugs	32 704 (12.8%)	31 430 (12.4%)	<0.001
Antidiabetic drugs	54 892 (21.6%)	50 440 (19.8%)	<0.001
Antigout drugs	39 257 (15.4%)	37 375 (14.7%)	<0.001
Digitalis	19 442 (7.6%)	16 456 (6.5%)	<0.001
Nitrates	43 205 (17.0%)	45 829 (18.0%)	<0.001
Antidepressant drugs	59 809 (23.5%)	49 513 (19.4%)	<0.001
Drugs for respiratory disease	72 384 (28.4%)	70 969 (27.9%)	<0.001
Previous hospitalizations			
Cardiovascular disease	79 372 (31.2%)	76 027 (29.8%)	<0.001
Diabetes mellitus	18 065 (7.1%)	15 579 (6.1%)	<0.001
Kidney disease	11 497 (4.5%)	9130 (3.6%)	<0.001
Respiratory disease	28 938 (11.4%)	20 444 (8.0%)	<0.001
Mental disorders	9140 (3.6%)	7015 (2.8%)	<0.001
Cancer	30 676 (12.0%)	28 682 (11.3%)	<0.001
During follow-up			
Adherence with antihypertensive therapy†			
Very low	16 904 (6.6%)	11 889 (4.7%)	<0.001
Low	31 056 (12.2%)	23 320 (9.2%)	
Intermediate	52 398 (20.6%)	43 334 (17.0%)	
High	154 420 (60.6%)	176 235 (69.2%)	

MV indicates matching variable; and PDC, proportion of days covered.

*Clinical status was assessed by the multisource comorbidity score, and 4 categories were considered: good (score=0), medium (score ≤ 1 to ≤ 4), poor (score ≤ 5 to ≤ 14), and very poor (score≥15).

†Adherence was measured according to PDC, that is, the proportion of days with antihypertensive drugs available with respect to the days of overall follow-up. Categories are the following: very low: ≤25%; low: 26% to 50%; intermediate: 51% to 75%; and high: >75%.

Figure S1 shows the results of the residual confounding analysis obtained by the rule-out approach. Assuming that patients with the best adherence to antihypertensive therapy had a 3-fold lower odds of exposure to the confounder than nonadherent ones, the unmeasured confounder should have increased the outcome risk by >5-fold to nullify the observed protective effect of drug adherence on all-cause mortality among patients with a very poor clinical status. As expected,

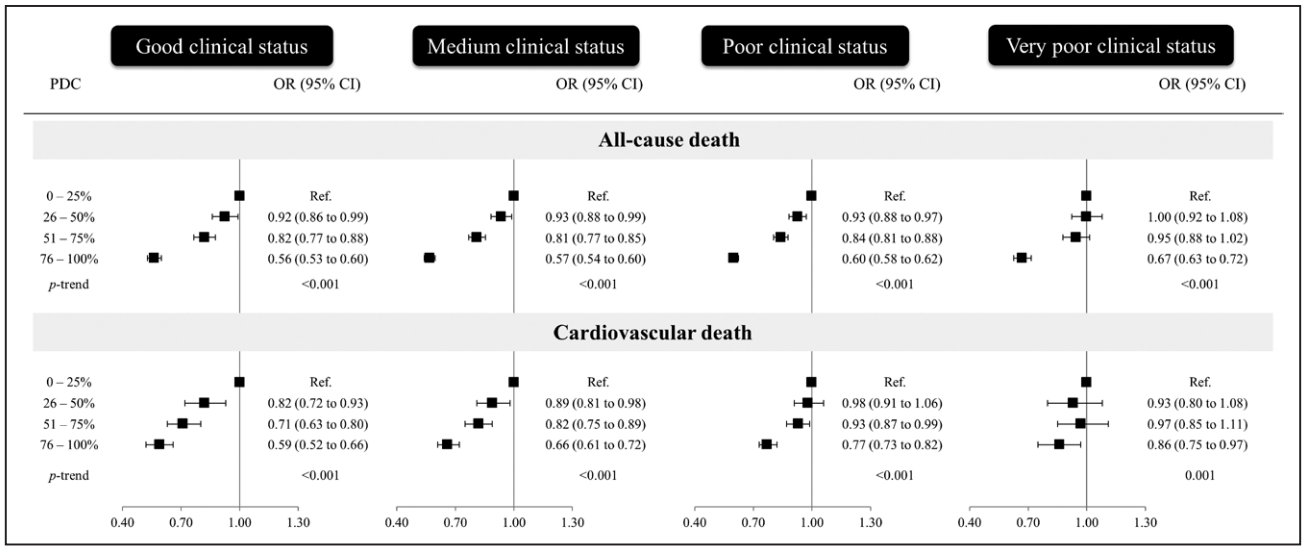

Figure 3. Effect of adherence with antihypertensive drug therapy on the odds ratio (OR) of all-cause and cardiovascular death according to the clinical status as determined by multisource comorbidity score. OR, and 95% CIs, was estimated with conditional logistic regression. Estimates were adjusted for the covariates listed in Table 1. PDC indicates proportion of days covered.

stronger confounder-outcome association is required for moving to the null the protective effect of adherence with antihypertensive drugs in the other clinical categories.

Discussion

Our study provides the following main findings. First, an increase in adherence with antihypertensive drug treatment was associated with a reduction in the risk of all-cause mortality. Second, this was the case not only in elderly patients in good clinical conditions but also in elderly patients with a very poor clinical status, as identified by their much higher rate of comorbidities and very high incidence of mortality during the follow-up. Third, the protective effect of antihypertensive treatment was not independent from the patients' clinical status because the reduction in mortality between the minimal and maximal adherence with treatment became progressively less as the patients' clinical status deteriorated. Fourth, similar results were obtained when the analysis was restricted to cardiovascular mortality. This supports the conclusion that antihypertensive treatment is beneficial in frail old patients but that the extent of the benefit may be less than that achieved by healthier old individuals.

Several other aspects of our study deserve mention. One, regardless the clinical status, in our patients' reduction of mortality was particularly marked when adherence increased to its maximal level, that is, when prescriptions covered more than three-fourth of the observation time. This suggests that, compared with intermediate adherence levels (>25% to <75% of the observation time covered by prescriptions), high levels of adherence with antihypertensive treatment offer an especially important protective effect. Two, in a previous investigation of our group, elderly patients of the Lombardy database exhibited a progressive reduction in all-cause mortality as adherence with antihypertensive treatment increased.[28] The present study importantly extends this finding because, in the previous investigation, we did not perform the analysis according to the clinical status, which was presumably more commonly good than very poor. Furthermore, in our previous investigation, patients were selected if they did not have any prescription of antihypertensive agents in the preceding years, a novel blood pressure–lowering treatment in the old age probably also indicating no advanced impairment of the health status in the group as a whole. Finally, although the observational nature of our study does not allow to entirely remove confounding, the possibility that the progressive reduction of outcomes seen with a progressive increase in adherence with treatment is due to other factors is made unlikely by the data provided by the sensitivity analysis. Namely that the effect of adherence persisted after taking into account a theoretical factor that was set to be much more prevalent and powerful than what can realistically occur.

Our study has several elements of strength. First, the investigation was based on a large unselected population, which was made possible because in Italy, a cost-free healthcare system extends to virtually all citizens who can thus be part of the database.[28,32,33,36] Second, the drug prescription database provides accurate data because pharmacists are required to report prescriptions in detail to obtain reimbursement, and incorrect reports have legal consequences.[37] Third, because antihypertensive drugs are free or almost free of charge but can only be dispensed under prescriptions, the amount prescribed outside the NHS database is negligible. Fourth, selection of all-cause mortality as the primary outcome avoided any uncertainty about diagnostic accuracy. There are also, however, some elements of weakness. One, our method of assessing adherence with treatment cannot take into account patients in whom prescriptions are renewed without being followed by drug assumption, an event perhaps more common in frail patients in whom the concomitance of serious comorbidities might divert patient's attention away from antihypertensive drugs. More in general, quantification of adherence by renewal of prescription may also be less accurate in frail patients in whom antihypertensive drugs may be assumed at lower doses, making the duration of a canister longer (and the level of adherence better) than that calculated for the average dose in the population as a whole. Two, although hospitalizations had almost always a duration that was only a minor fraction of the overall follow-up, our assumption about the use of antihypertensive drugs when patients were hospitalized may

have introduced some error, also because in-hospital changes in drug treatment may continue for some time after hospital discharge. In addition, our data did not allow us to know whether antihypertensive medications were temporarily interrupted or reduced after injurious or not injurious falls, electrolyte dysregulation, or other side effects. Three, because antihypertensive drugs are also prescribed for coronary heart disease and heart failure, our data do not exclusively reflect adherence with antihypertensive treatment, although in Italy antihypertensive treatment accounts for the largest use of these drugs.[38] Four, better adherence to antihypertensive treatment might reflect what can be termed a "health-seeking behavior," that is, healthier lifestyle habits and more frequent use of health care facilities that might explain the reduced mortality, alternatively to the more regular use of blood pressure–lowering drugs.[39] However, as suggested by studies that have found outcomes to be reduced by adherence to placebo,[40] the effect of this potential confounder is probably less than the benefit of an optimal adherence to antihypertensive treatment. Furthermore, and most importantly, the sensitivity analysis showed that only an extremely important, and thus unrealistic, involvement of an unmeasured confounder would have nullified the effect of adherence on mortality in patients with a very poor clinical status, which makes it most likely that adherence to antihypertensive treatment was independently responsible for the results. Finally, administrative databases do not include baseline and on-treatment blood pressure values nor do they provide information on the effects of treatment on other cardiovascular risk factors, raising the possibility that unequal baseline or on-treatment blood pressure levels, uneven baseline risk factor distribution or effects of treatment of comorbidities might be responsible for or contributed to differences between adherence strata in people with different health statuses. However, our data were adjusted for many potential confounders, including prevalence and treatment of several risk factors, comorbidities, cardiovascular diseases, and use of and adherence to a large number of cardiovascular drugs.

Perspectives

In conclusion, adherence with antihypertensive treatment markedly reduced the risk of death in elderly patients. This is the case also in elderly patients with a high rate of comorbidities and a short life expectancy, although in these patients, the benefit appears to be less than that in patients in good clinical conditions.

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Disclosures

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Novelty and Significance

What Is New?

- Randomized controlled trials have shown that antihypertensive drug treatment reduces the risk of hypertension-related cardiovascular outcomes in elderly patients. The exclusion of subjects particularly vulnerable to early events or death limits this finding to healthier elderly patients, however.

What Is Relevant?

- Increasing adherence with antihypertensive treatment was accompanied by a progressive reduction in the risk of all-cause and cardiovascular mortality.
- This was the case not only in elderly patients in good clinical conditions but also in elderly patients with a very poor clinical status.

Summary

The results of the present study provide strong support to the benefit of antihypertensive therapy also in elderly frail patients.