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## ***Short report – Revision 2***

# **Population impact of the 2017 American guidelines compared with 2013 European guidelines for hypertension management**

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### **Disclosures**

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## **Abstract**

### **Background**

The 2017 American guidelines on hypertension management recommend introduction of antihypertensive treatment for patients with new stage 1 hypertension thresholds (130-139/80-89 mm Hg) and with a cardiovascular disease or related condition. We compared the Swiss population and economic impact of antihypertensive treatment of the 2017 American guidelines with the 2013 European guidelines.

### **Methods**

Analyses were based on 4,438 participants (aged 45-85 years; 2,448 women) of the CoLaus|PsyCoLaus study. Participants eligible to antihypertensive treatment according to the guidelines were sex- and age-standardized using the Swiss population for year 2016. In addition, we estimated the population-wide annual costs of antihypertensive treatment.

### **Results**

Individuals eligible to an antihypertensive treatment were 40.3% (95% CI, 38.5 to 42.1) and 31.3% (29.7 to 32.9) according to the American and European guidelines, respectively. That difference would translate into ~250,000 additional individuals eligible to an antihypertensive treatment, corresponding to an additional annual cost of 72.5 million CHF (63.0 million Euros).

### **Conclusion**

The 2017 American guidelines on management of hypertension substantially increase the number of individuals eligible to an antihypertensive treatment compared to the European guidelines.

While implementation of the 2017 American guidelines is expected to lead to costs reduction by

preventing cardiovascular diseases, that reduction might be mitigated by the costs incurred by antihypertensive treatments in a larger proportion of the population.

## Introduction

The American College of Cardiology (ACC) and the American Heart Association (AHA) released in 2017 guidelines for hypertension management, defining stage 1 hypertension based on lower thresholds (130-139/80-89 mm Hg).<sup>1</sup> Antihypertensive treatment is recommended for patients above those thresholds with previous cardiovascular disease (CVD) or related risk. Conversely, the 2013 European Society of Hypertension and European Society of Cardiology (ESH/ESC) guidelines for hypertension management define stage 1 hypertension, and the threshold to introduce an antihypertensive medication, based on a SBP of 140-159 mm Hg or a DBP of 90-99 mm Hg.<sup>2</sup> From a public health perspective, there exists an interest in managing a larger number of individuals to prevent the deleterious effects of hypertension.<sup>3</sup> However, aggressive BP treatment is also associated with adverse events and higher costs.<sup>4</sup> Hence, using data from the population-based CoLaus|PsyCoLaus study, we contrasted the population impact of the 2017 ACC/AHA and 2013 ESH/ESC guidelines.

## Methods

Data were collected between 2014 and 2017 in 4,438 participants (2,448 women) aged 45-85 years.<sup>5</sup> Participants eligible to antihypertensive treatments were selected according to guidelines. Participants on BP-lowering treatment had their SBP and DBP levels increased by 10 and 5 mm Hg, respectively.<sup>6</sup> For the 2017 ACC/AHA approach, we stratified individuals according to their ten-year CVD risk, using original SBP and DBP values.<sup>7</sup> For the 2013 ESH/ESC approach, we considered that an antihypertensive drug would be introduced for all participants with stage 1 hypertension, assuming several months of lifestyle changes. Assuming full compliance with the guidelines, results from the CoLaus|PsyCoLaus study were extrapolated to the Swiss population of 2016, aged 45-85 years (same age group), as reported by the Swiss Federal Statistical Office

(www.ofs.ch). Furthermore, we performed sex- and age-standardization. Population-wide annual cost of antihypertensive treatment was estimated based on an annual cost of CHF 281.- per hypertensive patient (EUR 242.-, exchange rate valid as of March 5 2018) as computed by the Swiss Health Observatory (Obsan Rapport 50, www.obsan.admin.ch).

## Results

Individuals eligible to an antihypertensive treatment were 40.3% (95% CI, 38.5 to 42.1) and 31.3% (29.7 to 32.9) according to 2017 ACC/AHA and 2013 ESH/ESC guidelines, respectively (**Table 1**). For those already taking antihypertensive drugs, 53.8% and 38.2% should intensify their treatment to meet the 2017 ACC/AHA and 2013 ESH/ESC guidelines, respectively. After extrapolation to the Swiss population, implementation of the 2017 ACC/AHA guidelines would translate into ~250,000 additional individuals eligible to an antihypertensive treatment, leading to an additional cost of 72.5 million CHF (62.2 million Euros).

## Discussion

The 2017 ACC/AHA guidelines on hypertension management substantially increase the number of individuals eligible to an antihypertensive treatment compared to the prevailing European guidelines, especially for individuals >65 years, in both sexes, and despite the selection of high-risk individuals. Other consequences related to implementation of the 2017 ACC/AHA guidelines (e.g. expected reduction of CVD; potential increased risk of CVD in treated individuals with DBP  $\leq$ 70 mm Hg and/or pulse pressure  $\geq$ 60 mm Hg<sup>8,9</sup>) were not considered and may influence global costs. We thus recommend a careful evaluation of the cost-effectiveness of the 2017 ACC/AHA guidelines before any implementation.

## **Authorship**

JV and PMV contributed to the conception or design of the work. JV, PMV and PV contributed to the acquisition, analysis, or interpretation of data for the work. JV drafted the manuscript. All authors critically revised the manuscript. All gave final approval and agree to be accountable for all aspects of work ensuring integrity and accuracy."

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**Table 1** Population impact and annual costs of blood pressure-lowering treatments according to 2013 ESH/ESC and 2017 ACC/AHA guidelines

	2016 Swiss population			Population eligible to BP-lowering treatment (%)			Annual cost of treatment (in mio Euros)
	Total	Men	Women	Total	Men	Women	
<b>2013 ESH/ESC guidelines</b>							
<b>Overall</b>	3,681,718	1,797,002	1,884,716	1,151,993 (31.3 %)	657,131 (36.6 %)	509,814 (27.0 %)	277.8
<b>Age groups</b>							
<b>45-55</b>	1,313,720	663,466	650,254	221,864 (16.9 %)	144,548 (21.8 %)	78,112 (12.0 %)	53.5
<b>55-65</b>	1,056,520	528,645	527,875	309,133 (29.3 %)	193,646 (36.6 %)	120,617 (22.8 %)	74.5
<b>65-75</b>	814,608	390,285	424,323	347,927 (42.7 %)	196,818 (50.4 %)	159,646 (37.6 %)	83.9
<b>75-85</b>	496,870	214,606	282,264	273,070 (55.0 %)	122,119 (56.9 %)	151,439 (53.7 %)	65.8
<b>2017 ACC/AHA guidelines</b>							
<b>Overall</b>	3,681,718	1,797,002	1,884,716	1,409,912 (38.3 %)	834,440 (46.4 %)	604,082 (32.1 %)	340.0
<b>Age groups</b>							
<b>45-55</b>	1,313,720	663,466	650,254	232,135 (17.7 %)	150,788 (22.7 %)	82,169 (12.6 %)	56.0
<b>55-65</b>	1,056,520	528,645	527,875	335,717 (31.8 %)	219,792 (41.6 %)	122,745 (23.3 %)	80.9
<b>65-75</b>	814,608	390,285	424,323	460,431 (56.5 %)	291,457 (74.7 %)	189,055 (44.6 %)	111.0
<b>75-85</b>	496,870	214,606	282,264	381,630 (76.8 %)	172,403 (80.3 %)	210,112 (74.4 %)	92.0

Estimates of the Swiss population eligible to a BP-lowering treatment are derived from CoLaus|PsyCoLaus data (i.e. percentage). Overall percentages were derived after sex- and age-standardization. Annual costs were first computed in Swiss francs and then converted into Euros.

ACC, American College of Cardiology; AHA, American Heart Association; ESH, European Society of Hypertension; ESC, European Society of Cardiology.

