

# May Measurement Month 2019: an analysis of blood pressure screening results from Australia

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## KEYWORDS

Hypertension;  
Blood pressure;  
Screening;  
Treatment

May Measurement Month (MMM) is an annual global blood pressure (BP) screening campaign aimed at obtaining standardized BP measurements and other relevant health information from members of the community to increase awareness of elevated BP and the associated risks. Adults ( $\geq 18$  years) were recruited through opportunistic sampling across the various Australian states during May 2019. Three BP readings were recorded in a standardized manner for each participant, and data on lifestyle factors and comorbidities were collected. Hypertension was defined as a systolic BP  $\geq 140$  mmHg, or a diastolic BP  $\geq 90$  mmHg (according to the MMM protocol) or taking antihypertensive medication. Multiple imputation was used to estimate participants' mean BP where three readings were not available. Of the 2877 participants, 901 (31.3%) had hypertension of whom 455 (50.5%) were aware of their condition, and 366 (40.6%) were on antihypertensive medication. Of those taking antihypertensive medication, 54.3% were controlled to  $< 140/90$  mmHg with the remaining 45.7% of participants inadequately treated. Approximately 74% of treated patients were on a single antihypertensive medication. The MMM campaign provides an important platform for standardized compilation of BP data and creation of BP awareness in Australia and other nations worldwide. Data from the 2019 MMM campaign highlight that BP control rates in Australia remain unacceptably low.

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## Introduction

High blood pressure (BP) is one of the most important risk factors for stroke, coronary heart disease, and chronic kidney disease.<sup>1</sup> An estimated 5.6% of Australian adults are affected by one or more of these conditions.<sup>2</sup> Based on data for 2017–18 from the Australian Bureau of Statistics, about one in three adults (34%) in Australia have confirmed hypertension.<sup>1,2</sup> It therefore remains important to further increase BP awareness through the May Measurement Month (MMM) campaign, initiated in 2017 as a concerted effort of the International Society of Hypertension (ISH), the World Hypertension League (WHL), and the High Blood Pressure Research Council of Australia (HBPRCA), to improve BP control in Australia and globally.

## Methods

The 2019 MMM cross-sectional survey was carried out throughout the month of May in over 25 sites set up in a wide range of locations across Australia. The Dobney Hypertension Centre (DHC) at the University of Western Australia/Royal Perth Hospital served as the national coordinating centre. Leaders in the hypertension field were identified in each state and were invited to co-ordinate the screening efforts locally. All training and promotional materials were made available via the MMM website. The campaign was promoted around Australia via various media channels and social media. BP machines kindly provided by Omron, Welch Allyn, and A&D, were made available by the DHC to those sites where machines were required. Informed consent was obtained from all MMM participants in line with the MMM protocol.<sup>3</sup>

Hypertension was defined as a systolic BP of  $\geq 140$  mmHg or a diastolic BP of  $\geq 90$  mmHg based on the mean of the second and third BP readings, or in those on antihypertensive medication. The number of patients on treatment who had BP levels in line with recently recommended BP targets<sup>4,5</sup> was also calculated. Individuals taking three or more antihypertensive medications with uncontrolled BP or on four or more medications were identified as treatment resistant. All participants with untreated or uncontrolled hypertension were provided with evidence-based diet and lifestyle modification advice and asked to follow-up with their general practitioner. All data collected were analysed centrally by the MMM project team and multiple imputation based on global data<sup>3</sup> was performed to impute the mean of readings two and three where this was missing.

## Results

During MMM 2019, a total of 2877 Australian participants were screened. The mean age was 43.5 (19.3) years, comprising multiple ethnicities including 1785 White participants (62.0%), 292 from South-East Asia (10.1%), 271 from South Asia (9.4%), 157 from East Asia (5.5%), 50 Black participants (1.7%), 44 Arabic (1.5%), 109 mixed (3.8%), 160 other (5.6%), and 9 of unknown origin (0.3%) with 1654 female (57.5%) and 1217 male (42.3%) participants. Of all

participants screened, 177 (6.2%) had previously participated in MMM17 or MMM18, 2588 (90.0%) were new to MMM, and the status of 112 (3.9%) was unknown. The majority of screening took place in public places both indoors (45.4%) and outdoors (14.9%). The remainder of screening occurred in hospitals or clinics (21.1%), workplace environments (15.7%), and other sites (2.9%).

A total of 145 participants (5.0%) reported having diabetes, 50 (1.7%) reported a history of myocardial infarction, 44 (1.5%) reported a history of stroke, 83 (2.9%) reported aspirin usage, and 137 (4.8%) reported statin use. Smoking was reported by 211 (7.3%) respondents and 902 (31.4%) reported alcohol consumption once or more per week. The mean body mass index of respondents was 25.5 kg/m<sup>2</sup> and 21 (1.3%) of female respondents reported being pregnant (Supplementary material online, Table S1).

Following imputation, of all the 2877 participants, 901 (31.3%) had hypertension (Table 1). Of those 901 participants with hypertension, 50.5% were aware of their diagnosis, and 40.6% were on antihypertensive medication. Of the 366 participants on antihypertensive medication, 54.3% had their BP controlled to  $<140/90$  mmHg. Of those for whom the number of medications was known, 74.1% were taking a single medication, 17.9% two medications, and 8.0% three or more medications. Of all hypertensive participants, 22.0% were controlled to  $<140/90$  mmHg and 0.8% had resistant hypertension. After imputation, of the 2865 individuals for whom age and sex were recorded, the mean BP, standardized for age and sex according to the WHO world standard population was 124.1/79.5 mmHg in those not on any antihypertensive medications, and 135.1/85.9 mmHg in those on antihypertensive medications. Of the 901 participants with hypertension, 535 (59.4%) were untreated.

## Discussion

As part of the MMM19 campaign in Australia, 2877 participants of multi-ethnic background were screened mostly from the community rather than from hospitals and pharmacies. The prevalence of hypertension across the Australian sites was 31.3% (901 participants), which was similar to the Australian MMM17 and 2018 campaigns (31.2% and 30.6%, respectively) and global MMM2017, 2018, and 2019 campaigns (34.9%, 33.4%, and 34% respectively).<sup>5–7</sup> Almost half of affected participants (49.5%) were unaware of their increased BP, which was similar to the MMM 2018 findings from Australia (49.0%).<sup>7</sup> Of the 901 participants with hypertension, only 366 (40.6%) were on BP lowering medication. Of those on treatment only 54.3% had controlled BP, leaving 45.7% treated participants uncontrolled, a rate that is substantially higher than the global rate of 38.3%.<sup>5</sup> The MMM findings demonstrate that elevated BP remains highly prevalent in Australia and that hypertension control rates remain unacceptably low compared to global rates. This warrants continued efforts to increase BP awareness and emphasis on appropriate BP management strategies by tackling some of the major contributors to BP elevation including alcohol consumption and obesity.<sup>5–7</sup>

**Table 1** Total participants and proportions of participants with hypertension, awareness, on medication, and with controlled BP

Total participants	Number (%) with hypertension	Number (%) of hypertensive participants aware	Number (%) of hypertensive participants on medication	Number (%) of participants on medication with controlled BP	Number (%) of all hypertensive participants with controlled BP
2877	901 (31.3%)	455 (50.5%)	366 (40.6%)	199 (54.3%)	199 (22.0%)

MMM limitations include the selection bias arising from convenience sampling. Screening predominantly took place in major cities and may therefore not reflect a representative sample of the Australian population. Furthermore, the assessment of BP was based on a single set of three readings in a less than ideal environment thereby potentially increasing the possibility of false positive results in terms of hypertension diagnosis. The impact of the dietary and lifestyle advice given to the participants with elevated BP and the post-survey awareness could not be assessed in MMM owing to the cross-sectional design of the study. Nevertheless, despite the above-mentioned limitations the estimates at the national and global level have been remarkably consistent across the MMM campaigns and the Australian estimates are in line with the results from the Australian Bureau of statistics.<sup>1</sup> MMM continues to be one of the most cost-effective means of raising BP awareness worldwide and in Australia.

## Supplementary material

Supplementary material is available at *European Heart Journal Supplements* online.

## Acknowledgments

We thank the countless volunteers and participants and Michelle Buchannan, Shariful Islam, Melinda Carrington, Tallan Ames, and the Dobney Hypertension Centre Team for their contributions.

## Funding

R.C. is supported by a National Heart Foundation Postdoctoral Fellowship. F.M. is supported by a National Heart Foundation Future Leader Fellowship. J.Y. is supported by the Sylvia and Charles Viertel Charitable Foundation Clinical Investigator Grant (2020). M.P.S. is supported by an NHMRC Senior Research Fellowship.

## Data availability

The data underlying this article cannot be shared publicly due to the privacy of individuals that participated in the study.

**Conflict of interest:** N.R.P. has received financial support from several pharmaceutical companies which manufacture BP-lowering agents, for consultancy fees (Servier),

research projects and staff (Servier, Pfizer) and for arranging and speaking at educational meetings (AstraZeneca, Lri Therapharma, Napi, Servier, Sanofi and Pfizer). He holds no stocks and shares in any such companies. M.P.S. reports non-financial support from OMRON, non-financial support from A&D, during the conduct of the study; personal fees from Medtronic, personal fees from Abbott, personal fees from Novartis, grants from Boehringer Ingelheim, outside the submitted work. Others have nothing to declare.

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