

ORIGINAL ARTICLE

Blood pressure recording bias during a period when the Quality and Outcomes Framework was introduced

IM Carey, CM Nightingale, S DeWilde, T Harris, PH Whincup and DG Cook
Division of Community Health Sciences, St George's, University of London, London, UK

The 2004 UK Quality and Outcomes Framework (QOF) remunerates general practitioners for achieving a target blood pressure (BP) of $\leq 150/90$ mmHg for patients with ischaemic heart disease, stroke and hypertension. Using the DIN-LINK GP database, we investigated whether introducing the target altered BP recording. We extracted 3 164 189 BP measurements from 236 467 patients, with the above diagnoses from 2000 to 2005. Treatment was assessed by Read codes indicating prescriptions for antihypertensive drugs. Over this period, recorded systolic BP (SBP) fell: 36% had an SBP > 150 mmHg in 2000–2001, and only 19% in 2004–2005. However, there was a trend towards recording systolic values just below, rather than just above the 150 cut-off. In 2000–2001, 2.3% of patients had 148–149 recorded and 1.8% had 151–152. In 2004–2005, the figures were 4.2 and 1.3%, respectively. By smoothing

the distribution we estimate that the true percentage of patients with SBP > 150 mmHg in 2004–2005 was 23%, rather than the 19% recorded. Moreover, patients with a recorded SBP = 148–149 were more likely to have a recorded diastolic BP ≤ 90 (93%) than patients with SBP = 151–152 (78%). However, patients just below the 150 mmHg cut-off received more antihypertensive treatment than those just above it (odds ratio = 1.20, 95% confidence interval 1.01–1.41). We conclude that blood pressure levels in UK primary care have continued to fall through the introduction of QOF, offering significant public health benefits in the future. This fall has been exaggerated due to values being clustered just below the QOF target, but there is no evidence of adverse effects of this on clinical management.
Journal of Human Hypertension (2009) 23, 764–770; doi:10.1038/jhh.2009.18; published online 12 March 2009

Automated blood pressure measurement for diagnosing hypertension

Martin G. Myers^{a,b}

Guidelines for the management of hypertension have started to include home blood pressure (BP) and 24-h ambulatory BP monitoring as preferred methods for diagnosing hypertension. The next step will be to incorporate automated office BP measurement into the algorithm for diagnosing hypertension. Recent studies support this approach with automated office BP readings being closely correlated with the ambulatory BP. *Blood Press Monit* 12:405–406 © 2007 Wolters Kluwer Health | Lippincott Williams & Wilkins.

Blood Pressure Monitoring 2007, 12:405–406

Keywords: blood pressure measurement, hypertension diagnosis

^aSchulich Heart Centre, Sunnybrook Health Sciences Centre ^bDepartment of Medicine, University of Toronto, Toronto, Ontario, Canada

Correspondence to: Dr Martin G. Myers, MD, FRCPC, Sunnybrook Health Sciences Centre, A-202, 2075 Bayview Avenue, Toronto, Ontario M4N 3M5, Canada
Tel: +1 416 480 4749; fax: +1 416 480 5404;
e-mail: martin.myers@sunnybrook.ca

Received 13 March 2007 Accepted 3 May 2007

Use of automated office blood pressure measurement to reduce the white coat response

Martin G. Myers^{a,c}, Miguel Valdivieso^a and Alexander Kiss^b

Objective To examine the possibility of reducing the white coat response using an automated sphygmomanometer designed for office use, the BpTRU. Consecutive patients referred from physicians in the community to an ambulatory blood pressure (ABP) monitoring unit in an academic hospital were included in the study.

Participants and methods A total of 309 patients referred for diagnosis or management of hypertension were studied. Differences between mean awake ABP and BP readings taken by the patient's own physician using a manual sphygmomanometer or the automated BpTRU device with the patient resting alone in the ABP monitoring unit were compared.

Results BP recorded in the examining room using an automated device ($132 \pm 18/75 \pm 12$) was similar to the mean awake ABP ($134 \pm 12/77 \pm 10$) with both values being lower ($P < 0.001$) than the BP recorded on a routine visit to the patient's own family physician ($152 \pm 18/87 \pm 11$). The coefficient of correlation between the systolic/diastolic ABP and the automated office BP ($r = 0.62/0.72$) was higher ($P < 0.001$) than with the family physician's manual BP ($r = 0.32/0.48$). The prevalence of white coat hypertension in untreated patients ($n = 146$) was

significantly ($P < 0.001$) lower with automated office BP (16%) compared with the routine family physician BP (55%).

Conclusion The white coat response associated with office BP measurements can be virtually eliminated by recording BP with the automated BpTRU device with patients resting alone in a quiet examining room.
J Hypertens 27:280–286 © 2009 Wolters Kluwer Health | Lippincott Williams & Wilkins.

Journal of Hypertension 2009, 27:280–286

Keywords: automated sphygmomanometers, blood pressure measurement, white coat hypertension

Abbreviations: ABP, Ambulatory blood pressure; ABPM, ABP monitoring; BP, Blood pressure

^aDivision of Cardiology, Schulich Heart Centre, ^bDepartment of Research Design and Biostatistics, Sunnybrook Health Sciences Centre and ^cDepartment of Medicine, University of Toronto, Ontario, Canada

Correspondence to: Dr Martin G. Myers, Division of Cardiology, Sunnybrook Health Sciences Centre, 2075 Bayview Avenue, Room A2 02, Toronto, ON, Canada M4N 3M5
Tel: +1 416 480 4749; fax: +1 416 480 5404;
e-mail: martin.myers@sunnybrook.ca

Received 7 April 2008 Revised 17 September 2008
Accepted 1 October 2008

Research article

Open Access

The BpTRU automatic blood pressure monitor compared to 24 hour ambulatory blood pressure monitoring in the assessment of blood pressure in patients with hypertension

Linda Beckett^{†1} and Marshall Godwin^{†2}

Address: ¹Linda Beckett is currently a 3rd year Family Medicine Resident at the Dept of Family Medicine, Queen's University, Kingston, Ontario, Canada and ²Marshall Godwin is a Professor, Queen's University and the Director, Centre for Studies in Primary Care, Department of Family Medicine, Queen's University, 220 Bagot Street, Kingston, Ontario, K7L 5J3, Canada

Email: Linda Beckett - beckettfamily@cgqco.ca; Marshall Godwin* - godwinm@post.queensu.ca

* Corresponding author †Equal contributors

Published: 28 June 2005

Received: 29 December 2004

BMC Cardiovascular Disorders 2005, 5:18 doi:10.1186/1471-2261-5-18

Accepted: 28 June 2005

This article is available from: <http://www.biomedcentral.com/1471-2261/5/18>

© 2005 Beckett and Godwin; licensee BioMed Central Ltd.

This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/2.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Abstract

Background: Increasing evidence suggests that ABPM more closely predicts target organ damage than does clinic measurement. Future guidelines may suggest ABPM as routine in the diagnosis and monitoring of hypertension. This would create difficulties as this test is expensive and often difficult to obtain. The purpose of this study is to determine the degree to which the BpTRU automatic blood pressure monitor predicts results on 24 hour ambulatory blood pressure monitoring (ABPM).

Methods: A quantitative analysis comparing blood pressure measured by the BpTRU device with the mean daytime blood pressure on 24 hour ABPM. The study was conducted by the Centre for Studies in Primary Care, Queen's University, Kingston, Ontario, Canada on adult primary care patients who are enrolled in two randomized controlled trials on hypertension. The main outcomes were the mean of the blood pressures measured at the three most recent office visits, the initial measurement on the BpTRU-100, the mean of the five measurements on the BpTRU monitor, and the daytime average on 24 hour ABPM.

Results: The group mean of the three charted clinic measured blood pressures (150.8 (SD 10.26) / 82.9 (SD 8.44)) was not statistically different from the group mean of the initial reading on BpTRU (150.0 (SD 21.33) / 83.3 (SD 12.00)). The group mean of the average of five BpTRU readings (140.0 (SD 17.71) / 79.8 (SD 10.46)) was not statistically different from the 24 hour daytime mean on ABPM (141.5 (SD 13.25) / 79.7 (SD 7.79)). Within patients, BpTRU average correlated significantly better with daytime ambulatory pressure than did clinic averages (BpTRU $r = 0.571$, clinic $r = 0.145$). Based on assessment of sensitivity and specificity at different cut-points, it is suggested that the initial treatment target using the BpTRU be set at $<135/85$ mmHG, but achievement of target should be confirmed using 24 hour ABPM.

Conclusion: The BpTRU average better predicts ABPM than does the average of the blood pressures recorded on the patient chart from the three most recent visits. The BpTRU automatic clinic blood pressure monitor should be used as an adjunct to ABPM to effectively diagnose and monitor hypertension.

Consistent relationship between automated office blood pressure recorded in different settings

Martin G. Myers^a, Miguel Valdivieso^a and Alexander Kiss^b

Objective Conventional office blood pressure (BP) readings are affected by various factors including the presence of an observer and the setting. This study was undertaken to assess the consistency of automated self-measurement of BP in the office during repeat visits and in different settings. Automated office BP readings were also compared with the mean awake ambulatory BP.

Methods BP readings were obtained using an automated BpTRU sphygmomanometer during routine visits to a hypertension specialist before and after 24-h ambulatory BP monitoring (ABPM) was performed. A third automated BP reading was obtained during the visit to the ABPM unit.

Results There were no significant differences among the three automated office BP readings, which were all similar to the mean awake ambulatory BP. A manual BP reading taken by the ABPM technician was significantly higher ($P < 0.001$) than the mean awake ambulatory BP. There was good agreement among the three automated office BP readings (intraclass correlation coefficient for systolic/diastolic BP $r = 0.896/0.873$).

Conclusion Mean automated office BP readings are consistent from visit-to-visit regardless of the setting in which they are taken and they are similar to the mean awake ambulatory BP. *Blood Press Monit* 14:108–111 © 2009 Wolters Kluwer Health | Lippincott Williams & Wilkins.

Blood Pressure Monitoring 2009, 14:108–111

Keywords: automated sphygmomanometers, blood pressure measurement, reproducibility

^aSchulich Heart Centre, Sunnybrook Health Sciences Centre, Department of Medicine, University of Toronto and ^bDepartment of Research and Biostatistics, Sunnybrook Health Sciences Centre, Toronto, Ontario, Canada

Correspondence to: Dr Martin G. Myers, MD, FRCPC, Sunnybrook Health Sciences Centre, A-202, 2075 Bayview Avenue, Toronto, Ontario M4N 3M5, Canada
Tel: +1 416 480 4749; fax: +1 416 480 5404;
e-mail: martin.myers@sunnybrook.ca

Received 20 November 2008 Revised 10 March 2009
Accepted 17 March 2009