



the **Translator**

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Pharmacists' role in hypertension management

The role of pharmacists in hypertension and its management was first addressed by *The Translator* in the Fall 2009 edition.¹ Since then, robust evidence has been published to describe the health benefits of pharmacist intervention. The pharmacy profession has experienced a transformation through both expanded scope and a higher level of patient trust in pharmacists' ability to manage their chronic diseases. At the same time, the magnitude of the health risk related to hypertension has garnered significant media attention, and it is now realized that close to 22% of Canadians adults (aged 20 to 79 years) have elevated blood pressure.² Furthermore, only 64% of this population has controlled hypertension (on hypertensive medication and blood pressure under 140/90 mmHg).¹ By improving blood pressure control, patients may achieve visible results such as an increased overall health and a decreased risk of other associated health concerns including heart disease, stroke and ultimately, death.

Pharmacists can have a significant role in monitoring blood pressure and managing the medication of patients with hypertension. As one of the most easily accessible health care professionals, pharmacists have the necessary tools and knowledge to implement timely screening and effective prevention initiatives. Those with prescriptive authority can modify antihypertensive regimens to better personalize a patient's treatment. Actively involved in hypertension research, pharmacists also play an important role in updating and publishing annual evidence-based guidelines. Recognizing pharmacists as key members of hypertension management opens the door to increasing their involvement in several additional chronic health conditions. In this issue of *The Translator*, four studies support the role of pharmacists' active intervention in the area of hypertension.

1. <http://www.pharmacists.ca/cpha-ca/assets/File/education-practice-resources/Translator2009V3-4EN.pdf>

2. <http://www.statcan.gc.ca/pub/82-625-x/2012001/article/11714-eng.htm>

Pharmacists' active prescribing leads to improved blood pressure and lipid values in stroke/TIA patients

McAlister FA, Majumdar SR, Padwal RS, Fradette M, Thompson A, Buck B, Dean N, Bakal JA, Tsuyuki R, Grover S, Shuaib A. Case management for blood pressure and lipid level control after minor stroke: PREVENTION randomized controlled trial. *CMAJ* 2014 Apr 14. [Epub ahead of print]

Issue: Optimal management of hypertension and dyslipidemia is the cornerstone in the secondary prevention of ischemic stroke. A 10 mm Hg drop in systolic blood pressure (SBP) results in a 41% decrease in stroke events.¹ Furthermore, the decrease of low-density lipoprotein (LDL) cholesterol by statins adds additional benefit in stroke survivors.² Despite hospitalization and stroke prevention clinics, modifiable vascular risk factors are not well controlled in

This study provides high quality evidence for the added value of prescriptive services offered by pharmacists

stroke survivors.³ The traditional screening and educational approach employed by case managers requires reassessment, and active pharma-

cist intervention is another avenue to evaluate.

A solution: According to a recent Cochrane review, stroke survivors may benefit from close monitoring and case management from nurses or pharmacists.⁴ This study compares two management methods over six months: pharmacist active prescribing versus nurse screening and feedback to physicians. Nurse case management (active intervention control



Pharmacists' active prescribing leads to improved blood pressure and lipid values in stroke/TIA patients (cont.)

group): at monthly visits, nurses provided lifestyle education (e.g., diet, exercise, smoking and adherence), blood pressure (BP) and LDL measurement and feedback to the primary care physician. Pharmacist case management: pharmacists with prescriptive authority engaged in all of the aforementioned nursing activities, as well as initiated or titrated medication (e.g., antihypertensive, antidiabetic agents) according to Canadian guidelines.

The proportion of subjects meeting both SBP (≤ 140 mm Hg; ≤ 130 mm Hg for diabetes) and LDL (≤ 2.0 mmol/L) targets in the pharmacist- and nurse-led group were 43.4% and 30.9%, respectively. Thus, a clinically important and significantly greater improvement (12.5% absolute difference; NNT = 8, $P = 0.03$) was observed in patients managed by pharmacists. Since both groups had similar proportion of

subjects meeting SBP targets at the end (pharmacist group: 80.4%; nurse group: 89.7%; $P = 0.2$), it is important to note that the benefit of pharmacist intervention was predominantly attributable to significantly more subjects achieving LDL targets (pharmacist group: 51.1%; nurse group: 33.8%; $P = 0.003$). The similarity in SBP between the two groups at six months may be due to a ceiling effect in hypertensive therapy, or an increased awareness of the importance of BP control in stroke survivors.

Subjects in the pharmacist-managed group had more changes in medication; both groups had similar median number of antihypertensive medications. For example, a greater proportion of subjects in the pharmacist-led group were treated with an angiotensin-converting enzyme inhibitor or angiotensin receptor blocker at six months ($P = 0.1$ for usage, $P = 0.02$ for dos-

ing). In contrast to other studies, this study's pharmacist intervention method resulted in a larger decrease in SBP and LDL. Furthermore, minimal benefit was achieved in studies where pharmacists did not have prescriptive authority and only provided counselling services.

Implications: Pharmacists and nurses play an important case management role in the secondary prevention of stroke. In addition to traditional screening and educational services offered by nurses, pharmacists' initiation or titration of antihypertensive and/or antidiabetic medication results in significantly greater improvement of vascular risk factors in stroke survivors. This study provides high quality evidence for the added value of prescriptive services offered by pharmacists over and above that of usual chronic disease management strategies.

Background or research methods: For this 6-month prospective, randomized control trial, 279 subjects from three stroke prevention clinics in Edmonton were randomly assigned to the pharmacist-led group (intervention) or nurse-led group (active control). After an initial visit with each study subject, the attending neurologist delegated management to the subject's family physician. For six

months, the subjects returned monthly to the clinic to be seen by a nurse or pharmacist.

No additional training was offered to the nurses or pharmacists. Patient educational materials and treatment algorithms based on recent Canadian guidelines were provided to the pharmacists. At each clinic visit, out of six SBP measurements taken one minute apart, the average of the last five readings

was calculated. The primary study outcome was predefined as the percentage of subjects achieving optimal control of SBP (≤ 140 mm Hg; ≤ 130 mm Hg for diabetes) and LDL (≤ 2.0 mmol/L). Secondary outcomes included adherence, smoking status, body mass index and mortality.

1. Law MR, Morris JK, Wald NJ. Use of blood pressure lowering drugs in the prevention of cardiovascular disease: meta-analysis of 147 randomised trials in the context of expectations from prospective epidemiological studies. *BMJ* 2009; 338: b1665.
2. Amarenco P, Goldstein LB, Szarek M. Effects of intense low-density lipoprotein cholesterol reduction in patients with stroke or transient ischemic attack: the Stroke Prevention by Aggressive Reduction in Cholesterol Levels (SPARCL) trial. *Stroke* 2007; 38: 3198-204.
3. Roumie CL, Ofner S, Ross JS, et al. Prevalence of inadequate blood pressure control among veterans after acute ischemic stroke hospitalization: a retrospective cohort. *Circ Cardiovasc Qual Outcomes* 2011; 4: 399-407.
4. Glynn LG, Murphy AW, Smith SM, et al. Interventions used to improve control of blood pressure in patients with hypertension. *Cochrane Database Syst Rev* 2010; (3): CD005182.

A home blood pressure monitoring system uses pharmacists and a web-enabled program to control hypertension

Magid DJ, Olson KL, Billups SJ, Wagner NM, Lyons EE, Kroner BA. A pharmacist-led, American Heart Association Heart360 Web-enabled home blood pressure monitoring program. *Circ Cardiovasc Qual Outcomes*. 2013 Mar 1; 6 (2): 157-63. *Epub* 2013 Mar 5.

Issue: Despite the 76 million US adults who suffer from hypertension, over half have uncontrolled blood pressure (BP),¹ demonstrating the necessity of adjusting current treatment strategies. Uncontrolled hypertension can contribute to other serious health concerns including acute myocardial infarction, stroke, kidney failure and congestive heart failure.¹ A key issue within hypertension treatment strategies is difficulty in separating patients only slightly outside their target ranges from those who are radically uncontrolled. With the increasing prevalence of hypertension, reforms in hypertension management are necessary to prolong lives and ultimately decrease hypertension's burden on the health care system, resources and associated costs.

A solution: Patient home blood pressure monitoring (HBPM), in conjunction with provider

High accessibility and medication knowledge grants pharmacists the ability to have significant impact on current antihypertensive medication therapies

interventions, may improve hypertension control rates. The American Heart Association developed a program to complement current health care methods called Heart360 (www.heart360.org).² Heart360.org is a free web application to help patients understand and track their cardiovascular risk. It monitors BP levels, physical activity, cholesterol, glucose, weight and medications. Patients can upload home BP readings from their BP device into Heart360.org, track their progress and receive additional educational information for decreasing their cardiovascular risk. Heart360 incorporates patient

involvement and provides feedback on their progress, encouraging continuous improvement. Heart360 graphics allow patients to view their progress and seek medical attention only if their readings begin to exceed their target BP range. Pharmacists, as medication experts, have in-depth knowledge and experience pertaining to medication therapy management. Heart360's report summaries can allow pharmacists to collaborate with physicians to provide innovative antihypertensive medication regimens.

Implications: Kaiser Permanente Colorado conducted a study to compare the effects of a pharmacist-led HBPM system to that of usual care (UC) on BP control at six months, among 348 patients with uncontrolled hypertension. The results demonstrated the important impact of pharmacists' involvement on BP control. There was significantly greater BP lowering,

BP control and increased patient satisfaction in the pharmacist-led HBPM group compared to UC. There was a -12.4 mm Hg (95% CI, -16.3 to -8.6) and -5.7 mm Hg (95% CI, -7.8 to -3.6) greater reduction in systolic BP and diastolic BP respectively for the HBPM group compared to UC. Blood pressure lowering and control was even greater among patients with

diabetes mellitus and chronic kidney disease. Patient satisfaction with hypertension care was greater among the HBPM group (58%) than the UC group (42%; $P < 0.001$). The HBPM group also proclaimed the BP cuff and Heart360 program to be very or extremely easy to use (68%), in addition to the pharmacy specialist being very or extremely helpful (52%). When

pharmacists are able to assess report summaries and flag higher risk patients, monitor adherence to medications and make adjustments accordingly, they become the ideal first-line resource for hypertension management. Their high accessibility and medication knowledge grants them the ability to have a significant impact on current antihypertensive medication therapies.

Background or research methods: This pragmatic, randomized, controlled trial evaluated 348 hypertensive patients at 10 Kaiser Permanente Colorado clinics. Each clinic was equipped with a minimum of one clinical pharmacy specialist. Statistical

analysis used intention-to-treat. Patients, in both HBPM and UC groups, returned after six months for an in-person clinic visit and BP check using a gold standard cuff. The primary outcome was the percentage of patients who achieved their BP goal. The change in both

systolic BP and diastolic BP between baseline values, follow-up patient satisfaction, change in medication intensity and adherence to antihypertensive medication were secondary outcomes.

¹ Roger VL, Go AS, Lloyd-Jones DM, et al. American Heart Association Statistics Committee and Stroke Statistics Subcommittee. Heart disease and stroke statistics-2012 update: a report from the American Heart Association. *Circulation* 2012; 125: e2-e220.

² Bosworth HB, Powers BJ, Olsen MK, McCant F, Grubber J, Smith V, Gentry PW, Rose C, Van Houtven C, Wang V, Goldstein MK, Oddone EZ. Home blood pressure management and improved blood pressure control: results from a randomized controlled trial. *Arch Intern Med* 2011; 171: 1173-80.

Evaluating the effects of physician-pharmacist co-management on 24-hour blood pressure control

Chen Z, Ernst ME, Ardery G, Xu Y, Carter BL. Physician-pharmacist co-management and 24-hour blood pressure control. *J Clin Hypertens (Greenwich)*. 2013 May; 15 (5): 337-43. *Epub* 2013 Feb 12.

Issue: Uncontrolled, high blood pressure is the most frequent treatable risk factor for heart disease, stroke and death; 17.8% of deaths in the US are connected to hypertension.¹ Hypertension remains uncontrolled despite adequate proof of the benefits of proper care. In the US, the National Health and Nutrition Examination Survey of 2005-2008 reported that a mere 43.6% of patients suffering with hypertension are controlled.² Procedures to improve hypertension control are a focus for all areas of health care. One design proven to be effective incorporates interprofessional collaboration.³ It allows the physician and pharmacist to formulate a comprehensive care plan that optimizes drug therapy. Upon publication, team-based management was the best method of lowering blood pressure (BP) levels, seen more so with pharmacist involvement [-8.44 mm Hg systolic blood pressure (SBP)] than nurse involvement (-4.80 mm Hg SBP).⁴

A solution: Physician-pharmacist co-management has been proven to be advantageous in lowering BP levels; however, this study was conducted to analyze the pharmacists' impact

on antihypertensive medications and BP control within the ambulatory period. For a period of six months, two groups (one co-managed by a pharmacist and one control) were assessed based on their ambulatory BP levels. At the end of the trial, the co-managed group saw 467 drug therapy changes, with the most prominent occurring during the first month. The co-managed group also saw more drug changes than the control, 2.7 and 1.1 respectively ($P > 0.001$). Upon the six-month visit, the co-managed groups' mean ambulatory SBP was considerably lower than the control group at all three time intervals: daytime (122.8 mm Hg vs. 134.4 mm Hg; $P > 0.001$), night time (114.8 mm Hg vs. 123.7 mm Hg; $P > 0.001$) and the overall 24-hour period (120.4 mm Hg vs. 131.8 mm Hg; $P > 0.001$). Such evidence promotes the physician-pharmacist collaboration to effectively decrease BP and improve management over 24 hours. Comparing SBP values over the 24-hour period, the co-managed group saw a 15.2 reduction whereas the control saw a mere 5.2. Despite the difference in BP control between both groups at the end of the study, the relative amount of antihypertensive medi-

cations between groups was quite similar. This suggests that pharmacists play an important role in proper antihypertensive medication selection and preparation of a drug therapy regimen. This is apparent considering the physician-pharmacist co-managed group received a much more intensified antihypertensive drug therapy.

Implications: Pharmacists are actively affecting antihypertensive therapy as demonstrated by 368 recommendations made by pharmacists to alter the drug therapy regimen, where 95% were accepted by physicians. Their extensive drug knowledge constitutes their ability to effectively lower BP levels and increase patients' overall wellbeing. Pharmacists' participation in the 24-hour ambulatory care period can significantly alter the antihypertensive medications, regimens and doses, ultimately leading to improved hypertension control in the foreseeable future. Co-management allows the pharmacist to recognize drug therapy problems and necessary lifestyle modifications, then develop appropriate care plans accordingly.

Background or research methods: This prospective, cluster-randomized controlled clinical trial operated in six (three co-managed, three control) Iowa community-based family medicine offices. Each office was staffed with a clinical pharmacist who had a minimum three-year work experience at

that office. Upon examination, daytime (6 a.m. to 10 p.m.) and night time (10 p.m. to 6 a.m.) readings were taken every 20 and 30 minutes respectively. A total of 374 patients participated in the study (198 at the control clinics and 176 co-managed). Patients within the control group were more likely to be mar-

ried, have diabetes or history of myocardial infarction ($P > 0.001$). They also had more coexisting conditions ($P > 0.001$). Regardless of such differences, mean baseline ambulatory BP measurement did not significantly vary among the two groups.

¹ Roger VL, Go AS, Lloyd-Jones DM, et al. Heart disease and stroke statistics-2011 update: a report from the American Heart Association. *Circulation* 2011; 123: e18-e209.

² Yoon PW, Gillespie CD, George MG, Wall HK. Control of hypertension among adults-national health and nutrition examination survey, United States, 2005-2008. *Morb Mortal Wkly Rep* 2012; 61 (suppl): 19-25.

³ Carter BL, Bergus GR, Dawson JD, et al. A cluster randomized trial to evaluate physician/pharmacist collaboration to improve blood pressure control. *J Clin Hypertens (Greenwich)*. 2008; 10: 260-71.

⁴ Carter BL, Rogers M, Daly J, et al. The potency of team-based care interventions for hypertension: a meta-analysis. *Arch Intern Med* 2009; 169: 1748-55.

Intensive pharmacist management of veterans with hypertension improves adherence and significantly decreases blood pressure

Parker CP, Cunningham CL, Carter BL, Vander Weg MW, Richardson KK, Rosenthal GE. A mixed-method approach to evaluate a pharmacist intervention for veterans with hypertension. *J Clin Hypertens (Greenwich)*. 2014 Feb; 16 (2): 133-40.

Issue: As a modifiable risk factor, hypertension may lead to a wide range of cardiovascular events including stroke, peripheral vascular disease, heart disease and death. Every 3 mmHg drop in systolic blood pressure (SBP) may decrease cardiovascular and stroke mortality risk by 5% and 8%, respectively.¹ A study has shown better optimal blood pressure (BP) control in veterans as compared to the general public.² This is attributed to the team-based approach that involves hypertension management by pharmacists. As per guidelines from the US Department of Defense, pharmacists can assist in medication adjustments to further improve and maintain BP control.

A solution: In community pharmacies, formalized guidelines have not been established for pharmacists in providing active intervention or referral back to primary care providers for hypertension. At the Iowa City Veteran Affairs Health Care System (VAHCS), primary care physicians authorized pharmacists to prescribe BP medication and order lab tests. For the first part of this study, three pharmacists provided intensive intervention for 127 subjects for six months. During the second part of this study after six months, subjects were randomized to continued intervention or back to usual care. However, data for this part is not yet available.

Pharmacists educated patients on lifestyle modifications including smoking cessation,

Physician-pharmacist co-management of hypertension increases medication adherence

low sodium diet and regular exercise. Patient adherence was closely monitored. Solutions for unintentional poor adherence include regimen simplification, adherence aids and family assistance. For intentional poor adherence, pharmacists identified possible causes such as cost or side effects and reemphasized the importance of meeting BP goals. Upon suboptimal regimen identification, pharmacists had the prescriptive authority to increase the dose of existing medication, and/or add thiazide diuretics or other antihypertensive medications. Finally, an angiotensin-converting enzyme inhibitor was added for diabetic patients if not currently on one.

For the 54 diabetic patients, the mean decrease in SBP and diastolic blood pressure (DBP) was 8.0 mmHg ($P < 0.001$) and 4.0 mmHg ($P = 0.001$), respectively. A greater decrease in SBP and DBP was recorded in non-diabetic patients (14.0 and 5.0 mm Hg drop, $P < 0.001$). At six months, 69 subjects had controlled BP ($< 140/90$ mm Hg; $< 140/80$ mm Hg for diabetics) and 58 subjects had uncontrolled BP. The number of drugs increased significantly more frequently in subjects with controlled BP ($P =$

0.04). Furthermore, thiazide diuretics were used more often in the controlled BP subjects ($P = 0.04$): 64.9% and 46.7% in the controlled and uncontrolled group, respectively. Medication adherence also improved substantially between baseline and 6 months ($P = 0.017$).

In a qualitative evaluation conducted 24 months after patients were enrolled, five common themes were gathered and documented from 37 subjects: (1) subjects preferred physician-pharmacist co-management, (2) subjects experienced improved access to pharmacists, (3) subjects preferred the intensive intervention, (4) subjects claimed pharmacists helped decrease BP better than usual care and (5) subjects' recall of lifestyle modifications offered by pharmacists was good. Furthermore, subjects are interested in physician-pharmacist co-management for other chronic conditions including diabetes.

Implications: Physician-pharmacist co-management of hypertension increases medication adherence, promotes recall of lifestyle change suggestions and significantly decreases SBP and DBP. Pharmacists with prescriptive authority can promptly adjust medication regimens to better minimize modifiable risk factors for cardiovascular conditions. Based on feedback from study subjects, there is a need and interest in utilizing this collaborative practice model for the long-term maintenance of hypertension and other chronic conditions.

Background or research methods: For this six-month prospective randomized control trial, 127 subjects from the Iowa City VAHCS and two community-based outreach clinics consented to participate. At baseline and six months, BP was measured three times by a

trained study coordinator or research assistant. An average of the second and third reading was calculated. In between structured appointments at baseline, one, two, four and six months, pharmacists provided counseling over the phone. At 18 months after the

six-month pharmacist intervention, the study coordinator conducted semi-structured interviews with 37 subjects. The randomization process occurred after the initial six-month pharmacist intervention period, but final results are not yet published.

¹ Stamler J, Rose G, Stamler R, et al. INTERSALT study findings. Public health and medical care implications. *Hypertension* 1989; 14: 570-7.

² Fletcher RD, Amdur RL, Kolodner R, et al. Blood pressure control among US veterans: a large multiyear analysis of blood pressure data from the Veterans Administration health data repository. *Circulation* 2012; 125: 2462-8.

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