

Blood pressure targets in the very old

Development of a tool in a geriatric day hospital

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Abstract

Problem addressed Canadian hypertension guidelines do not address blood pressure (BP) targets in the very old (older than 85 years of age), making BP management in this group difficult.

Objective of program To develop a BP target tool and implementation process in order to facilitate management of BP in the very old at the Bruyère Continuing Care Geriatric Day Hospital in Ottawa, Ont.

Program description A BP target tool and implementation process were developed to target, monitor, and communicate BP goals within the care team, to the patient and family, and to other prescribers. An audit was conducted of the first 10 weeks of the tool's implementation and illustrated good use with areas for improvement noted.

Conclusion The development and use of a BP target tool increased prescriber consistency and confidence in managing BP in the very old. The tool filled a gap in the absence of guidelines specific to BP management in the very old. The BP target tool has implications for practice, as well as for the training of health care professionals involved in treating and monitoring BP in very old patients.

EDITOR'S KEY POINTS

- As there were no guidelines specific to blood pressure (BP) management in the very old, this geriatric day hospital created an evidenced-based BP target tool to facilitate BP management, as well as implemented a process to ensure consistent use of these targets.
- With this systematic approach to managing BP in very old and frail patients, prescribers felt more confident reducing antihypertensive medications in these patients, which might reduce polypharmacy and decrease the risk associated with hypotension.

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Valeurs cibles pour la tension artérielle chez les personnes très âgées

Développement d'un outil dans un hôpital gériatrique de jour

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Résumé

Problème à l'étude Les directives canadiennes pour l'hypertension ne mentionnent pas les cibles de tension artérielle (TA) à atteindre pour les personnes très âgées (plus de 85 ans), ce qui complique le contrôle de la TA de ces personnes.

Objectif du programme Développer un outil pour établir les cibles de TA et établir une façon de les appliquer et ce, afin de faciliter le traitement des personnes très âgées à l'hôpital gériatrique de jour Soins continus Bruyère à Ottawa, en Ontario.

Description du programme On a développé un outil permettant d'établir des cibles de TA, de les appliquer, de les surveiller et d'en faire part aux membres de l'équipe soignante, au patient et à sa famille, ainsi qu'aux autres prescripteurs. Une vérification effectuée sur les 10 premières semaines de la mise en œuvre de l'outil a montré qu'il était bien utilisé et a permis de cerner des améliorations à apporter.

Conclusion La création et l'utilisation d'un outil établissant des cibles de TA a amélioré la cohérence et la confiance des prescripteurs qui surveillent la TA des patients très âgés. Cet outil a permis de compenser l'absence de directives spécifiques pour le traitement de la TA des patients très âgés. Il est important pour la pratique, mais il devrait également faire partie de la formation des professionnels de la santé qui devront traiter et surveiller la TA de patients très âgés.

POINTS DE REPÈRE DU RÉDACTEUR

- Devant l'absence de directives spécifiques pour la prise en charge de la tension artérielle (TA) des personnes très âgées, cet hôpital gériatrique de jour a créé un outil fondé sur des preuves établissant des cibles de TA pour faciliter le traitement de la TA, en plus de mettre en place un processus pour s'assurer du bon usage de ces cibles.
- Grâce à cette façon systématique de surveiller la TA des patients frêles et très âgés, les prescripteurs étaient plus à l'aise pour réduire la médication antihypertensive, ce qui pourrait diminuer la polypharmacie et le risque d'hypotension qui s'y rattache.

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Addressing uncontrolled hypertension and risks associated with hypotension in the very old is one of the main areas of intervention pursued jointly by the physicians and the pharmacist at the Bruyère Continuing Care Geriatric Day Hospital (GDH) in Ottawa, Ont. The GDH offers a multidisciplinary program for community-dwelling seniors who have experienced functional decline and loss of independence as a result of the effect of multiple chronic diseases, such as those associated with falls and cognitive decline. Patients might be referred to the GDH by their family physicians, other specialists, the geriatric assessment outreach team, emergency department staff, or family members. Patients visit twice weekly, most often for half-day sessions, for up to 12 weeks, during which a treatment plan is undertaken with a physician collaborating with other allied health care professionals, depending on identified needs. For example, medication review by a pharmacist might be requested if it is believed that the patient would benefit from assessment for polypharmacy, might be experiencing adverse drug effects, or requires medication education. The program aims to optimize patients' medical status and improve function in order to preserve their independence.

Observation of the use of multiple antihypertensive medications and generally low blood pressure (BP) readings among GDH patients led to discussions of what would be appropriate BP targets in these older, often frail patients. A literature review was conducted in early 2011 using MEDLINE and Scopus for randomized controlled trials and observational studies published in English and conducted in humans. Details about the literature review are available from the authors upon request. Citations from identified publications were also reviewed.

There is robust evidence that for "younger" elderly patients (aged 60 to 79 years), there is a clear mortality benefit to achieving a target BP less than 140/90 mm Hg (or <130/80 mm Hg for patients with diabetes), in addition to undeniable benefits with respect to reducing incidence of stroke and other vascular events; guidelines in this population are clear.¹ However, the literature is not so robust or straightforward with respect to those 80 years of age or older; and, at the time of this study, there were no Canadian guidelines that were specific to this age group or those with frailty. This made it difficult to estimate an appropriate BP target for these patients and, as a result, impeded the management of antihypertensive medications.

Evidence review

Evidence in patients with hypertension older than 80 years of age. Much of the randomized controlled trial evidence for those between the ages of 80 and 85 years comes from studies of "healthy" elderly only (having

excluded those suffering from orthostasis, chronic kidney disease, diabetes, dementia, etc).² The Hypertension in the Very Elderly Trial enrolled 3845 healthy patients who were aged 80 years or older (73% of patients were aged 80 to 84 years) with sustained systolic BP greater than 160 mm Hg and randomized these patients to either active treatment or placebo. The target BP was less than 150/80 mm Hg, which was reached by 48% of participants receiving active therapy.³ Active therapy was found to reduce total mortality and fatal and non-fatal heart failure.³ However, early discontinuation of the study and the lack of applicability to the sick or frail elderly limit the generalizability of these results.

Studies that have included patients older than 80 years of age have yielded conflicting results regarding the effects of lowering BP, some showing no effect (European Working Party on High Blood Pressure in the Elderly),⁴ others showing reduced risk of stroke (Systolic Hypertension in the Elderly Program [SHEP]),⁵ and some showing reduced mortality (Hypertension in the Very Elderly Trial).³ Some have neglected to report mortality separately for those 80 years of age or older (SHEP,⁵ Systolic Hypertension in Europe trial⁶). Two recent meta-analyses of trials involving patients 80 years of age or older found a reduction in total stroke but not in mortality.^{7,8}

Lack of evidence and risks associated with treating hypertensive patients older than 85 years of age. No studies exist on the effectiveness of treatment of hypertension for those 85 years of age or older. For example, the Swedish Trial in Older Patients with Hypertension, which randomized patients aged 70 to 84 years to active antihypertensive therapy or placebo, showed those using active treatment had a reduced risk of stroke and total deaths, but statistical modeling also demonstrated decreasing benefit of treatment with increasing age, with no projected benefit for patients 85 years of age or older.⁹

Caution likely needs to be exercised in lowering systolic BP too much in the very old. Epidemiologic evidence has shown high systolic BP to be associated with survival in patients older than 85 years of age after adjustment for health status and comorbidities,¹⁰⁻¹⁴ with a several-fold greater chance of 5-year survival in patients with high BP compared with those with "normal" BP.¹⁴ For example, patients with systolic BP greater than 160 to 180 mm Hg had a 3 times higher chance of 5-year survival than those with systolic BP greater than 120 to 140 mm Hg.¹⁴ A decrease in 5-year mortality by 10% for every increase of 10 mm Hg in systolic BP has been shown.¹¹ Recently, a population-based cohort study demonstrated that after adjustment for multiple health measures and diseases, the highest mortality in patients 85 years of age or older was seen in those with systolic BP less than 120 mm Hg.¹⁵ Another prospective population-based study found that for patients 85 years

of age or older, a systolic BP less than 140 mm Hg was associated with an increased risk of death after adjustment for age, sex, functional status, dementia, cancer, and cardiovascular disease.¹³ The evidence suggests there might be increased risk of morbidity (related to cardiovascular events, worsening drowsiness, and confusion) and mortality in select circumstances of overzealous treatment of systolic hypertension in the older elderly or frail population.^{15,16}

Risks of lowering diastolic BP. Similarly, the risk of cardiovascular events appears to increase when diastolic BP is lowered to less than the level needed to maintain perfusion. Retrospective analysis of SHEP found that low diastolic BP (less than 60 mm Hg) in patients receiving active treatment was associated with increased risk of stroke and cardiovascular disease.¹⁷ Secondary analysis of the International Verapamil SR-Trandolapril Study also demonstrated that older elderly with coronary artery disease have an increased risk of all-cause death and myocardial infarction with lower diastolic BP measurements (61 to 70 mm Hg).^{18,19} In the Rotterdam prospective population-based cohort study, diastolic BP less than 65 mm Hg in treated patients with hypertension was associated with a substantial increase in the risk of stroke.²⁰

Program objective

Balancing competing benefits and harms of elevated BP is therefore a challenge in the older elderly population, especially for those with mild elevations in BP or comorbidities, or for those who are frail. In view of this, we set out to gain consensus within our team on appropriate BP targets and target ranges in our very old, often frail GDH patients and to develop a tool that we could use to ensure that targets were individualized and used to guide interventions for hypertension management in this population. Ultimately, we hoped that using this tool would assist in reducing the use of medications known to increase BP and in increasing or decreasing doses of antihypertensive medications to maintain BP within an individualized optimal range.

Program description

Following the literature review and over the course of several meetings, the 3 GDH physicians and the pharmacist developed and achieved consensus on a draft set of BP targets and target ranges for those 80 years of age or older (eg, BP target <150/80 mm Hg for those without comorbidities) and those 85 years of age or older. Input was provided by the GDH team nurses, as well as by 2 local external specialists known to the GDH physicians (ie, a cardiologist and a geriatrician) who informally reviewed the tool, commented on the team's conclusions, and recommended adjustments be made for lower BP targets for patients with diabetes or

those with kidney disease. The resulting tool included a series of instructions to follow as a patient progressed in the GDH program. A current version of the tool can be found at **CFPlus**.*

Laminated copies of the tool were posted in high-traffic areas (ie, the charting room and the "chart cart" used during daily care-planning rounds) to ensure it was readily accessible for physicians and nursing staff who routinely monitored patients' BP measurements. The team decided the tool should be used for the following circumstances:

- identifying and documenting a patient's target BP during goal-setting rounds;
- documenting a patient's BP measurements (from twice weekly measurements) during midpoint-review rounds;
- adjusting nonpharmacologic and pharmacotherapeutic management strategies for hypertension (typically after 5 to 7 readings, unless systolic BP is <100 mm Hg, in which case 1 to 3 readings might suffice); and
- communicating the target BP, as well as the progress toward it, to patients (through medication charts given to patients seen by the team's pharmacist) and to primary care providers (through GDH discharge summaries including a rationale for the BP target range).

We conducted an audit of the first 10 weeks (July 1 to September 15, 2011) of the tool's use in the GDH. The objectives of the audit were to determine the following:

- if the tool was being used to consistently document target BP in patient care plans and medication charts;
- whether the BP target was being communicated to family physicians on discharge;
- whether the tool was being used to guide pharmacologic and nonpharmacologic changes to achieve BP targets; and
- whether users perceived the tool to be helpful.

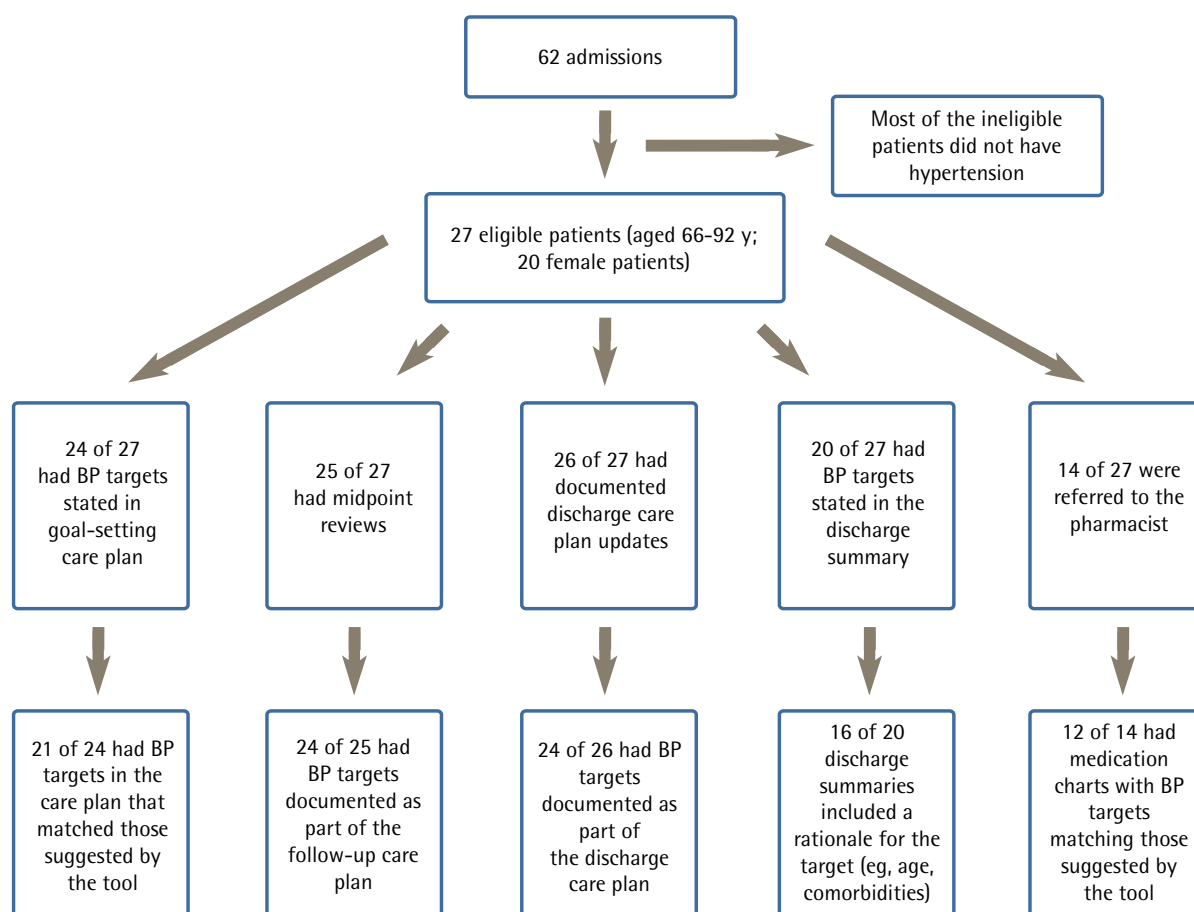
An audit form was developed and used by a co-op pharmacy student to screen patients for eligibility (eg, preexisting diagnosis of hypertension) and capture relevant data. A guided small group discussion was held with 3 GDH physicians, the pharmacist, a nurse, and a local family physician to informally gather thoughts about whether the tool was allowing BP targets to be identified and communicated clearly. The group also discussed general barriers and perceived benefits of the tool.

Program evaluation

The results of the chart audit are outlined in **Figure 1**. We were not able to ascertain whether establishing a BP target was responsible for individual pharmacologic and

*The blood pressure target tool is available at www.cfp.ca. Go to the full text of the article online and click on **CFPlus** in the menu at the top right-hand side of the page.

Figure 1. Results of the chart audit used to screen patients for eligibility



BP—blood pressure.

nonpharmacologic interventions that occurred, as prescribers rarely re-stated the BP target when documenting rationale for interventions in the progress notes.

Overall, the GDH physicians and staff found the BP target tool to be extremely useful in establishing consistent practices among the physicians and increasing prescriber confidence in reducing or stopping antihypertensive medications. All participants agreed that the 2011 Canadian Hypertension Education Program (CHEP)¹ guidelines were well known and adhered to; however, their applicability to patients older than 80 years of age, or those who were frail, was much less clear.

In order to reduce confusion, provide education, and improve primary care providers' future adherence to the BP targets, it was suggested during the group feedback discussion that a standardized letter describing common issues and relevant literature surrounding hypertension management in the very old, in addition

to stating the patient's BP target, be attached to the discharge summary. It was also suggested that a similar letter be sent to the primary care provider after the first care-planning round in order to minimize the potential for conflicting hypertension management strategies between the GDH and the primary care provider during the course of the patient's admission. While these suggestions were not subsequently incorporated into the process, the physicians have started including a paragraph in their discharge summaries outlining the rationale for the individualized BP targets. To improve continuity of care among health care providers and to foster patient self-management, it was suggested that the patients' BP targets be written on all antihypertensive prescriptions and prescription labels.

Finally, it was suggested that the tool be simplified for easier use (eg, revising the tool's BP target to a single target instead of 2 targets for patients with diabetes).

Discussion

We found good use of the BP target tool among the team and a successful BP-management process, with consistent documentation in goal-setting and care-planning reviews, discharge summaries, and patients' medication charts. This is to be expected, given that the tool users and process implementers were the same as the developers. However, on occasion, BP targets were neither documented nor did they match the targets suggested by the BP tool. There were several discharge letters without BP targets documented; however, most that did mention a target also included a brief rationale. The group was able to generate ideas to improve the ease of the tool's use and the consistency of its use, as well as to enhance the efficiency of the BP-management process for, and the communication with, those patients who were not routinely seen by the pharmacist.

The development of the BP target tool and a BP-management process, as well as the audit itself, has been an important step in the creation of strategies to reduce polypharmacy and the risk of hypotension in GDH frail elderly patients. We recognize that communication of the rationale for higher BP targets (and hence less antihypertensive medication use) is essential, as most primary care providers continue to apply CHEP guidelines in the very old or frail elderly. While we have identified strategies that might assist us locally, we propose the need for a national consensus on this matter and incorporation of appropriate BP guidelines for these populations into health care professional undergraduate curricula and continuing education programs. Further research to measure the effect of the tool's use on outcomes (eg, family physician acceptance, reduced use of antihypertensive medications and thus the effect on polypharmacy, related adverse reactions, and improved adherence with remaining medications), as well as to determine whether BP measurements subsequently fall within the identified range, is required.

Emerging research on treatment of hypertension in the very old or frail elderly should continue to guide decisions regarding optimal diastolic and systolic targets and the ranges within which cardiovascular outcomes are optimized and adverse effects are minimized.

Conclusion

Creation of an evidence-based BP target tool and BP-management process helped us establish a systematic approach to managing BP in very old and frail patients. Through the use of an audit process, we were able to identify gaps in documentation consistency and ways to improve communication about BP targets between the GDH and primary care providers.

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Contributors

All authors contributed to the concept and design of the program; data gathering, analysis, and interpretation; and preparing the manuscript for submission.

Competing interests

None declared

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References

1. Canadian Hypertension Education Program [website]. 2011 CHEP recommendations for the management of hypertension. Markham, ON: Hypertension Canada; 2011. Available from: www.hypertension.ca/images/stories/dls/2011gl/FulICHEPREcommendations_EN_2011.pdf. Accessed 2012 Oct 25.
2. Beckett NS, Peters R, Fletcher AE, Staessen JA, Liu L, Dumitrascu D, et al. Treatment of hypertension in patients 80 years of age or older. *N Engl J Med* 2008;358(18):1887-98.
3. Bulpitt CJ, Beckett NS, Cooke J, Dumitrascu DL, Gil-Extremiera B, Nachev C, et al. Results of the pilot study for the hypertension in the very elderly trial. *J Hypertens* 2003;21(12):2409-17.
4. Amery A, Birkenhäger W, Brixko R. Efficacy of antihypertensive drug treatment according to age, sex, blood pressure, and previous cardiovascular disease in patients over the age of 60. *Lancet* 1986;2(8507):589-92.
5. SHEP Cooperative Research Group. Prevention of stroke by antihypertensive drug treatment in older persons with isolated systolic hypertension. Final results of the Systolic Hypertension in the Elderly Program (SHEP). *JAMA* 1991;265(24):3255-64.
6. Staessen JA, Fagard R, Thijs L, Celis H, Birkenhäger WH, Bulpitt CJ, et al. Subgroup and per-protocol analysis of the randomized European trial on isolated systolic hypertension in the elderly. *Arch Intern Med* 1998;158(15):1681-91.
7. Bejan-Angoulvant T, Saadatian-Elahi M, Wright JM, Schron EB, Lindholm LH, Fagard R, et al. Treatment of hypertension in patients 80 years and older: the lower the better? A meta-analysis of randomized controlled trials. *J Hypertens* 2010;28(7):1366-72.
8. Musini VM, Tejjani AM, Bassett K, Wright JM. Pharmacotherapy for hypertension in the elderly. *Cochrane Database Syst Rev* 2009;(4):CD000028.
9. Dahlöf B, Lindholm LH, Hansson L, Scherstén B, Ekblom T, Wester PO. Morbidity and mortality in the Swedish trial in old patients with hypertension (STOP-Hypertension). *Lancet* 1991;338(8778):1281-5.
10. Satish S, Freeman DH Jr, Ray L, Goodwin JS. The relationship between blood pressure and mortality in the oldest old. *J Am Geriatr Soc* 2001;49(4):367-74.
11. Hakala SM, Tilvis RS, Strandberg TE. Blood pressure and mortality in an older population. A 5-year follow-up of the Helsinki Ageing Study. *Eur Heart J* 1997;18(6):1019-23.
12. Van Bommel T, Gussekloo J, Westendorp RG, Blauw GJ. In a population-based prospective study, no association between high blood pressure and mortality after age 85 years. *J Hypertens* 2006;24(2):287-92.
13. Rastas S, Pirttilä T, Viramo P, Verkkoniemi A, Halonen P, Juva K, et al. Association between blood pressure and survival over 9 years in a general population aged 85 and older. *J Am Geriatr Soc* 2006;54(6):912-8.
14. Mattila K, Haavisto M, Rajala S, Heikinheimo R. Blood pressure and five year survival in the very old. *Br Med J (Clin Res Ed)* 1988;296(6626):887-9.
15. Molander L, Lovheim H, Norman T, Nordstrom P, Gustafson Y. Lower systolic blood pressure is associated with greater mortality in people aged 85 and older. *J Am Geriatr Soc* 2008;56(10):1853-9.
16. Oates D, Berlowitz CR, Glickman ME, Silliman RA, Borzecki AM. Blood pressure and survival in the oldest old. *J Am Geriatr Soc* 2007;55(12):2102-3.
17. Somes GW, Pahor M, Shorr R, Cushman WC, Applegate WB. The role of diastolic blood pressure when treating isolated systolic hypertension. *Arch Intern Med* 1999;159(17):2004-9.
18. Denardo SJ, Gong Y, Nichols WW, Messerli FH, Bavry AA, Cooper-Dehoff RM, et al. Blood pressure and outcomes in very old hypertensive coronary artery disease patients: an INVEST substudy. *Am J Med* 2010;123(8):719-26.
19. Messerli FH, Mancia G, Conti CR, Hewkin AC, Kupfer S, Champion A, et al. Dogma disputed: can aggressively lowering blood pressure in hypertensive patients with coronary artery disease be dangerous? *Ann Intern Med* 2006;144(12):884-93.
20. Vokó Z, Bots ML, Hofman A, Koudstaal P, Witteman JC, Breteler MM. J-shaped relation between blood pressure and stroke in treated hypertensives. *Hypertension* 1999;34(6):1181-5.