Implementing standardized performance indicators to improve hypertension control at both the population and healthcare organization levels

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Abstract

The ability to reliably evaluate the impact of interventions and changes in hypertension prevalence and control is critical if the burden of hypertension-related disease is to be reduced. Previously, a World Hypertension League Expert Committee made recommendations to standardize the reporting of population blood pressure surveys. We have added to those recommendations and also provide modified recommendations from a Pan American Health Organization expert meeting for "performance indicators" to be used to evaluate clinical practices. Core indicators for population surveys are recommended to include: (1) mean systolic blood pressure and (2) mean diastolic blood pressure, and the prevalences of: (3) hypertension, (4) awareness of hypertension, (5) drug-treated hypertension, and (6) drug-treated and controlled hypertension. Core indicators for clinical registries are recommended to include: (1) the prevalence of diagnosed hypertension and (2) the ratio of diagnosed hypertension to that expected by population surveys, and the prevalences of: (3) controlled hypertension, (4) lack of blood pressure measurement within a year in people diagnosed with hypertension, and (5) missed visits by people with hypertension. Definitions and additional

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indicators are provided. Widespread adoption of standardized population and clinical hypertension performance indicators could represent a major step forward in the effort to control hypertension.

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1 Background

Increased blood pressure (BP) is the leading risk factor for death and disability globally.[1,2] Hence, in the context of the noncommunicable disease global monitoring framework,[3] a specific target was established by the World Health Organization (WHO) to reduce by 25% the prevalence of raised BP (defined as a BP of 140/90 mm Hg) by 2025.[2] That critical target, reducing raised BP or "uncontrolled hypertension," provides a priority call to action to national governments and hypertension-related health and scientific organizations. However, to measure progress towards the achievement of the targets, a key issue is the identification of further performance indicators that are needed to help guide hypertension control efforts at a population and a healthcare organization level.[4,5]

This paper discusses a set of standardized performance indicators that could be used for continuous quality improvement, to help prioritize the most cost-effective of interventions, and for good governance in the effort to reduce the burden of hypertension-related disease. Performance indicators are provided for both clinical hypertension control interventions and for population BP control programs. The World Hypertension League's (WHL's) mission is devoted to hypertension prevention and control in the population.[6] The paper is based on WHL guidance for analyzing hypertension surveys as well as a Pan American Health Organization (PAHO) meeting on hypertension metrics, and experiences in optimizing BP control from communities and clinic-based programs.[7–9] We hope this manuscript will stimulate others to implement standardized performance indicators into hypertension programs as a critical component of the effort to successfully control hypertension.

2 Indicators For Hypertension Control at a Population Level

The WHL expert Committee recommended a set of "core" (Table 1) as well as "expanded" and "optional" indicators to be used in population BP surveys.[9] The indicators were made in part to standardize approaches to developing and analyzing hypertension surveys, thus facilitating comparison between surveys. The standardization is essential for population hypertension control programs to evaluate their progress towards the global target, to reduce uncontrolled hypertension, to identify best practices that can be shared between hypertension control programs, and to provide a global basis for comparison. A primary data source for population BP is the STEPwise approach to Surveillance (STEPS) from the WHO, which is designed to assess chronic disease risk factors including BP.[10]

2.1 Core indicators

The prevalence of hypertension and the distribution of BP across the population are the major indicators necessary to assess the effectiveness of policies and interventions to prevent and treat hypertension. Health system and community-level interventions that reduce population BP will also have a significant impact on hypertension treatment and control rates by reducing the BP of patents with hypertension, even in individuals who may not be

aware or treated.[11] For example, in Canada, it was estimated that reducing dietary salt towards recommended targets would reduce the prevalence of hypertension by 30% and also double the rate of hypertension control with no change in drug treatment.[11] The WHL expert committee recommended that prevalence be assessed by two methods (Table 1). The usual definition used in national surveys is to define hypertension as people with blood pressure 140 mm Hg systolic or 90 mm Hg diastolic or taking medications to treat hypertension. A second more inclusive definition, prevalence of awareness of hypertension, uses the same criteria as the first method but also includes patents diagnosed with hypertension by a healthcare professional.

Hypertension "awareness," treatment, and control rates were recommended to assess the impact of efforts to reduce uncontrolled BP in populations (see Table 1). Hypertension awareness assesses the effectiveness of healthcare organizations and community programs to diagnose hypertension. Hypertension treatment and control rates assess primarily, the effectiveness of the healthcare system to provide antihypertensive drugs to people with hypertension and to control hypertension respectively, and the effectiveness of population health interventions (eg, dietary salt reduction policies).

2.2 Expanded and optional indicators

Expanded indicators are optional and may not be feasible in all settings. The WHL expert committee recommended the "core" hypertension indicators to be evaluated in patients with isolated systolic hypertension and patients with both hypertension and diabetes. Other recommended expanded indicators were antihypertensive drug treatment among persons aware of having hypertension, control among antihypertensive drug-treated patients, adherence to lifestyle recommendations, and the proportion of the population with prehypertension. It was recommended to assess relevant ethnic and sociodemographic characteristics in analyses of the core and expanded indicators. The specific definitions of these indicators are provided in the original publication, which also provides recommendations for a variety of optional indicators as well as recommendations for research on hypertension indicators.[9]

In addition to the suggested analyses in the WHL report, we propose performance indicators to specifically address "clinical care gaps." These care gaps include the proportions of patients defined as having hypertension using the usual definition that are: (1) undiagnosed, (2) not treated with antihypertensive drugs ("untreated"), and (3) treated with antihypertensive drugs but not controlled ("uncontrolled"). Although these "care gap" indicators are the inverse of the previously suggested core indictors, the care gap indicators can be examined by major sociodemographic characteristics (eg, age, sex, ethnicity, and socioeconomic status) to facilitate developing interventions to reduce the care gap. An example of the utility of examining care gaps occurred in the Canadian Hypertension Education Program where analysis revealed that most persons with undiagnosed hypertension were young men who were unlikely to be accessing the healthcare system.[12] This fact suggested that efforts to reduce undiagnosed hypertension through increased assessment of BP within the traditional healthcare system would not be likely to be effective at targeting this specific population, but that programs such as assessing BP outside the

traditional healthcare delivery model (eg, in the workplace) would be more likely to be effective.

3 Performance Indicators For Hypertension Control at Healthcare Organizations

PAHO hosted a workshop in December 2015 to start discussions to identify specific performance indicators that could be used for monitoring hypertension management at the healthcare facility level. The discussions were informed by the experience in developing performance indicators to facilitate controlling BP among individuals in the Kaiser Permanente Northern California healthcare delivery system.[8] Several other groups have also advocated for performance indicators to assess hypertension control efforts at the healthcare organization level.[13-17] Table 2 provides modified recommendations from the PAHO workshop, and Table 3 indicates the data that are required to be collected for the core performance indicators. Assessing performance indicators requires the clinic as well as the healthcare organization to have a registry of persons diagnosed with hypertension that documents the patent data pertinent to the performance indicators. Clinical performance indicators are selected to assess progress towards specific goals to enhance the quality of care in the specific clinical population that is being served and hence may be different than population indicators.

Core analysis performed in healthcare organizations is suggested to include the prevalence of hypertension in the clinic registry. The registry prevalence should be compared as a ratio to the expected prevalence in the population as an indirect assessment of the number of people with undiagnosed hypertension in the clinical population (ie, if the registry prevalence of hypertension is lower than the expected prevalence based on population surveys, the difference may reflect undiagnosed hypertension). The prevalence of controlled hypertension assesses the key performance indicator for reducing the burden of hypertension clinically and we have recommended a simplified performance indicator (BP <140 mm Hg systolic and 90 mm Hg diastolic for those registered as having hypertension). A wide variety of expanded performance indicators may assist clinics in assessing hypertension control in vulnerable or high-risk populations and in guiding treatment for those most likely to experience the greatest benefit (Table 2).

4 Discussion

This commentary from the WHL, PAHO, the US Centers for Disease Control and Prevention (CDC), and other partners is intended to promote discussion around a standardized approach to hypertension indicators to augment the single WHO indicator of a 25% relative reduction in the prevalence of raised BP and to facilitate planning of interventions to improve prevention and control of hypertension. We have advocated expansion of the previous WHL expert committee recommendations[9] to include performance indicators assessing clinical care gaps at a population as well as a healthcare organization level. The performance indicators are intended to facilitate prioritization of interventions to populations and communities where significant opportunities for care improvement exist and may provide useful information to enable policy change or system

implementation designed to reduce the burden of hypertension-related disease. We note that the definition of "uncontrolled hypertension" or "raised blood pressure" is largely based on the efficacy of drug therapy to reduce cardiovascular events and is subject to change based on emerging research. For example, hypertension was previously defined as a systolic BP >160 mm Hg before research demonstrated the efficacy of antihypertensive drug treatment to reduce cardiovascular disease at lower BP levels.[18]

In addition, the commentary is intended to promote discussion on clinical hypertension performance indicators. The development and implementation of performance indicators for clinical practice are envisioned to be integrated into efforts to systematically improve the quality and consistency of hypertension care, and, eventually, to improve the quality of care of other prevalent chronic conditions. The performance indicators can also be used to track clinical interventions that are most cost-effective, for example by developing metrics to track the use of specific medications that have been identified as being effective, affordable, and well tolerated. Assessing performance indicators in clinical practice is only feasible with a hypertension registry that is preferably linked to an electronic medical record. However, the use of an electronic health record in a population is not an indispensable requirement for the creation of a useful hypertension registry. For example, the Kaiser Permanente Northern California hypertension program began by using a paper registry for 6 years before transitioning to electronic registry data capture.[6] In other words, electronic medical records are not a prerequisite even though they are desirable and the availability of an electronic medical record is not a "rate limiting step" to starting a program.

The participants in the PAHO workshop recommended that both systolic and diastolic BP be used in the registry; however, if greater simplicity was necessary, then only systolic BP could be used and would likely identify the majority of people with hypertension. It was recognized that the fewer and more important "core" performance indicators that were selected, the more likely clinicians were to enter data into the registry. Nevertheless, it was understood that the performance indicators could be tailored to each unique clinical environment; hence, a menu of "optional" performance indicators is provided to help guide the selection of performance indicators of greatest practice importance. Optional indicators included the frequency of use of "recommended" drugs. Within the PAHO-CDC hypertension initative,[19] recommended drugs are included under PAHO's Strategic Fund, which provides high-quality medication at very competitive prices.[20] Within the Kaiser Permanente program, "recommended" drugs are included in a standardized care algorithm designed to improve hypertension control. Another optional analysis is based on examining hypertension control in people with a calculated cardiovascular risk at 10 years of over 20%. Clinics may wish to select this performance indicator to include patents with a calculated risk at a lower level (eg, >10% risk at 10 years) to identify those with hypertension where therapy is cost-effective in their resource setting. Although using cardiovascular risk as an indicator was indicated to require more research to be integrated into population surveys, the PAHO expert meeting recommended its consideration as a clinical performance indicator. Most people with hypertension in clinics are at much higher risk than the general population and the cost-effectiveness of drug treatment is highly dependent on baseline cardiovascular risk.

Performance indicators should be regularly evaluated at the healthcare organization level to assess progress in improving BP control rates and to identify care gaps where changes to ongoing interventions may be required. When common performance indicators are used they can also be used to compare different practice settings and share best practices. The experience of the authors suggests initiating hypertension registries with very few performance indicators (eg, prevalence, diagnosis, treatment and control, missed appointments, and lack of BP readings in the preceding year) to simplify program implementation and analysis of the performance indicators. Once the clinical team becomes comfortable with reviewing and assessing these indictors, an expanded set may be incorporated.

In general, each selected hypertension performance indicator at the population or healthcare organization level should have an associated target and a timeline for the target to be achieved. As part of continuous quality improvement processes, serial evaluation can assess progress towards the target and be used to identify interventions that need to be adjusted and modified. For many metrics, a target of 100% is both unachievable and clinically inappropriate, and perhaps even counterproductive, as interventions need to be tailored to the unique characteristics of each patent. For example, in individuals with white-coat hypertension, controlling clinic BP is not recommended. Performance metrics based on BP control for specific subgroups based on hypertension stage and global cardiovascular risk would facilitate prioritization of treatment strategies especially in low-resource environments.[1,9]

5 Conclusions

As the global population ages, hypertension management will remain a major health issue globally and clinical performance measurements a critical component to understand the global burden and to assess the impact of interventions. These metrics need to be further enhanced with input from all regions of the world.

Acknowledgments

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Table 1

Summary of definitions for recommended core performance indicators at a population level in population-based surveys[a]

Performance indicator	Numerator	Denominator
Core performance indicators		
Mean systolic blood pressure	Sum of valid average systolic blood pressure in the blood pressure survey[a]	Total number of respondents aged 18-69 y who had a valid blood pressure reading
Mean diastolic blood pressure	Sum of valid average diastolic blood pressure in the blood pressure survey[a]	Total number of respondents aged 18-69 y who had a valid blood pressure reading
Prevalence of hypertension	Respondents who have systolic blood pressure 140 mm Hg or diastolic blood pressure 90 mm Hg or who report currently taking medication for the treatment of high blood pressure (definition A) Respondents who have systolic blood pressure 140 mm Hg or diastolic blood pressure 90 mm Hg or who report currently taking medication for the treatment of high blood pressure or who report having been diagnosed with hypertension by a health professional (definition B)	Respondents aged 18-69 y
Prevalence of awareness of hypertension	Respondents who report either having been diagnosed with high blood pressure or who report being currently treated with medication for high blood pressure	Respondents with hypertension according to definition A
Prevalence of treatment of hypertension	Respondents who report being currently treated with medication for high blood pressure	Respondents with hypertension according to definition A
Prevalence of drug-treated and controlled hypertension	Respondents who report being currently treated with medication for high blood pressure and have systolic blood pressure <140 mm Hg and diastolic blood pressure <90 mm Hg	Respondents with hypertension according to definition A
Prevalence of controlled hypertension	Respondents who report being currently treated with medication for high blood pressure or have been diagnosed with hypertension and have systolic blood pressure <140 mm Hg and diastolic blood pressure <90 mm Hg	Respondents with hypertension according to definition B

Reproduced from reference.[9] Standard deviations of mean systolic and diastolic blood pressure and 95% confidence intervals for the proportions should be calculated. Each of these core performance indicators can be reported overall and by age group (18-29, 30-49, and 50-69 years) and sex, with crude and age-standardized (to the World Health Organization World standard) changes tracked over time.

Reporting core indicators among people with diabetes, those with isolated systolic hypertension, and among sociodemographic groups is recommended as expanded analyses.

[a]In the STEPwise approach to Surveillance system, average systolic and diastolic blood pressure are calculated from two of three blood pressure readings, taken 3 minutes apart, with preference given to the last two measurements.[10]

Table 2

Performance indicators for use in clinics and at the healthcare organizations

Performance indicator	Numerator	Denominator
Core performance indicators		
Prevalence of diagnosed hypertension	Patents who have systolic blood pressure 140 mm Hg or diastolic blood pressure 90 mm Hg or who report currently taking medication for the treatment of high blood pressure	Adult patents in the adult clinic population
Ratio of prevalence of diagnosed hypertension to the expected prevalence of hypertension	Prevalence of diagnosed hypertension	Expected age-adjusted prevalence of hypertension in the population[a]
Cardiovascular risk assessment	Registrants with a recorded cardiovascular risk assessment within 5 y	Registrants with hypertension
High calculated cardiovascular risk[b]	Registrants with calculated cardiovascular disease risk 20% in 10 y, systolic blood pressure 140 mm Hg or diastolic blood pressure 90 mm Hg, and taking antihypertensive medication	Registrants with hypertension
High calculated cardiovascular risk[b]	Registrants with calculated cardiovascular disease risk 20% in 10 y, systolic blood pressure 140 mm Hg or diastolic blood pressure 90 mm Hg, and not taking antihypertensive medication	Registrants with hypertension
Prevalence of controlled hypertension	Respondents who report being currently treated with medication for high blood pressure and have systolic blood pressure <140 mm Hg and diastolic blood pressure <90 mm Hg	Registrants with hypertension aged 18-69 y
Lack of opportunity	No recorded blood pressure in the past year	Registrants with hypertension
Missed visits	Registrants who have missed a hypertension-related appointment	Registrants with hypertension
Optional performance indicators		
Uncontrolled hypertension 1	Registrants with systolic blood pressure 140 mm Hg or diastolic blood pressure 90 mm Hg and cardiovascular disease, renal disease, or diabetes mellitus	Registrants with hypertension
Uncontrolled hypertension 2	Registrants with systolic blood pressure 160 mm Hg or diastolic blood pressure 100 mm Hg and not taking antihypertensive medication	Registrants with hypertension
Uncontrolled hypertension 3	Registrants with systolic blood pressure 160 mm Hg or diastolic blood pressure 100 mm Hg taking antihypertensive medication	Registrants with hypertension
Use of recommended antihypertensive drugs[c]	Registrants prescribed "core-recommended" antihypertensive drugs	Registrants with hypertension
"Resistant" hypertension[d]	Registrants with blood pressure 160/100 mm Hg treated with three or more antihypertensive drugs	Adult patents with hypertension
Appropriate treatment of black patents	Registrants who are black and being treated with medications that do not include either a diuretic or calcium channel-blocking antihypertensive medication	Registrants with hypertension who are black

[a] The observed prevalence of hypertension will need to be restricted to the same age range as the population survey for this indicator as hypertension prevalence rises with age.

[b] The performance indicator is the use of a validated cardiovascular risk assessment tool with the registrant's risk recorded.

[c] This performance indicator requires that the clinic has established a core set of medications. The core medications are selected to facilitate a standard approach to hypertension treatment with cost-effective and appropriate antihypertensive drugs.

[d] This definition of resistant hypertension is modified for a primary care low-resource setting.

Table 3

Recommended data to be obtained for the core performance indicators for use at the healthcare organizations

Age (date of birth)
Sex
Systolic blood pressure (mm Hg)
Diastolic blood pressure (mm Hg)
Antihypertensive medication use (yes, no)
Blood pressure recorded in the past year (yes, no)
Missed last follow-up appointment (yes, no)