Blood pressure kiosks for medication therapy management programs: Business opportunity for pharmacists

Sherilyn K.D. Houle, Anderson W. Chuck, and Ross T. Tsuyuki

Abstract

Objective: To develop an economic model based on the use of pharmacy-based blood pressure kiosks for case finding of remunerable medication therapy management (MTM) opportunities.

Design: Descriptive, exploratory, nonexperimental study.

Setting: Ontario, Canada, between January 2010 and September 2011.

Patients: More than 7.5 million blood pressure kiosk readings were taken from 341 pharmacies.

Intervention: A model was developed to estimate revenues achievable by using blood pressure kiosks for 1 month to identify a cohort of patients with blood pressure of 130/80 mm Hg or more and caring for those patients during 1 year.

Main outcome measure: Revenue generated from MTM programs.

Results: Pharmacies could generate an average of $12,270 (range $4,523–24,420) annually in revenue from billing for MTM services.

Conclusion: Blood pressure kiosks can be used to identify patients with elevated blood pressure who may benefit from reimbursable pharmacist cognitive services. Revenue can be reinvested to purchase automated dispensing technology or offset pharmacy technician costs to free pharmacists to provide pharmaceutical care. Improved patient outcomes, increased patient loyalty, and improved adherence are additional potential benefits.

Keywords: Pharmacy practice, compensation, hypertension, community pharmacy, automated blood pressure devices.

J Am Pharm Assoc. 2012;52:188–194.
doi: 10.1331/JAPhA.2012.11217

Received October 31, 2011, and in revised form February 3, 2012. Accepted for publication February 3, 2012.

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Disclosure: Dr. Tsuyuki has been a consultant for PharmaSmart Inc. No funding was received from PharmaSmart Inc. for the conduct of this study, and the study authors were the sole developers of the economic model and manuscript. The authors declare no conflicts of interest or financial interests in any product or service mentioned in this article, including grants, employment, gifts, stock holdings, or honoraria.

Acknowledgments: To Josh Sarkis and Lisa Goodwin, PharmaSmart Inc., for providing data on the frequency of use and distribution of blood pressure results obtained from their blood pressure kiosks and to Dr. Lisa Dolovich for guidance on pharmacist remuneration programs available to pharmacists practicing in Ontario, Canada.

Funding: Ms. Houle receives support from the Interdisciplinary Chronic Disease Collaboration (funded through Alberta Innovates–Health Solutions) for her PhD studies.

Previous presentation: Canadian Hypertension Congress, Alliston, Canada, October 2–5, 2011.

Hypertension affects 20% to 30% of North American adults and approximately one-half remain uncontrolled.[1–3] Uncontrolled hypertension causes major cardiovascular events, including myocardial infarction, stroke, heart failure, and kidney disease. It is the leading global risk for mortality[4] and is a core chronic disease within Medicare Part D Medication Therapy Management (MTM) programs.[5] The evidence for the benefit of pharmacist care regarding hypertension outcomes is strong.[6–8]

MTM allows for the remuneration of pharmaceutical care services worldwide.[9] Pharmacists are ideally suited to provide these interventions, particularly pharmacists practicing in community pharmacies, which are generally visited by patients more frequently than a physician's office. However, pharmacists historically do not take full advantage of remuneration opportunities, partly because they often lack a system for finding patients.[10] Blood pressure kiosks may help in this regard because they are used frequently by patients and because newer-generation kiosks can provide printed messages to patients or on-screen messages to pharmacists that could drive patients to pharmacists for appropriate hypertension care.

Objective

The purpose of this study was to analyze the economic potential of using newer-generation blood pressure kiosks to identify patients who were eligible for remunerable pharmacist care in Ontario, Canada.

At a Glance

Synopsis: This study from the perspective of pharmacy owners in Ontario, Canada, used a model to estimate possible revenue from using blood pressure kiosks to identify patients with elevated blood pressure who may benefit from reimbursable pharmacist cognitive services. MedsCheck and Pharmaceutical Opinion are two medication therapy management programs for which pharmacists in Ontario can bill the provincial government for providing care. Assuming pharmacists successfully completed the medication review(s) and Pharmaceutical Opinions for all eligible patients identified from among those using blood pressure kiosks, a mean (±SD) of $12,270 ± 3,854 in revenue could be generated by the pharmacy annually. Blood pressure kiosks could prove valuable in identifying patients who are eligible for remunerable cognitive services.

Analysis: *The results reported here assume that case-finding efforts and patient identification occur for 1 month of the year only; therefore, continued case finding each month would further increase possible annual revenue. Improving patient health and reducing the risk of adverse events is the primary goal of pharmacist medication review; however, additional benefits can include increased customer loyalty, potentially higher prescription volumes, and improved adherence to prescription drugs.*

Methods

Pharmacists in Ontario, Canada, can bill the provincial government for the provision of two types of pharmaceutical care: MedsCheck[11] and Pharmaceutical Opinion.[12] Ontario residents can receive an annual MedsCheck medication review by a pharmacist at no charge if they possess a valid Ontario Health Care card and take at least three prescription medications for chronic disease or have a type 1 or type 2 diabetes diagnosis regardless of the number of prescription medications they are taking.

A MedsCheck follow-up review can be conducted if considerable changes occur to an existing patient medication profile, nonadherence is documented, a change in residence occurs and prescriptions are transferred to another pharmacy, patients are referred for a MedsCheck follow-up from a physician or nurse practitioner, or a planned hospital admission occurs.

The Pharmaceutical Opinion program enables pharmacists to bill the provincial government for identifying and resolving a drug-related problem during the course of dispensing a medication or when conducting a MedsCheck review. Pharmaceutical Opinion program services can be provided to all Ontario residents (Figure 1).

Patients eligible for MedsCheck and Pharmaceutical Opinion program

Number of blood pressure kiosk readings per month per pharmacy. More than 7.5 million PS-2000 blood pressure kiosk (PharmaSmart Inc., Surrey, Canada) readings were taken from 341 pharmacies between January 2010 and September 2011 (J. Sarkis and L. Goodwin, PharmaSmart Inc., written communication, September 2011). A mean (±SD) of 964 ± 26.8 kiosk readings were taken per pharmacy per month.

Proportion of blood pressure kiosk readings from "unique" users. Some patients may check their blood pressure multiple times per month at a single kiosk or once at multiple kiosks. In the absence of verified patient-specific data, we assumed that up to one-half of blood pressure kiosk readings are multiple readings from the same users.

Eligibility for remunerable pharmacist care. Estimates for the model are based on an adult population (consisting of those ≥25 years) because adults are most likely to use the blood pressure kiosks. All patients qualify for the Pharmaceutical Opinion program; however, MedsCheck reviews are limited to those with diabetes or those taking three or more chronic medications. In Ontario, a total of 519,495 (6.2%) adults qual-

Table 1. Ontario population 25 years or older with a diagnosis of diabetes

Age group (years)	No. population[13]	Diabetes prevalence (%)[14]	No. population with diabetes
25–34	1,535,645	0.90	13,759
35–54	3,777,770	3.21	120,415
55–64	1,356,510	9.95	133,376
65–74	898,190	16.66	145,487
≥75	780,990	18.03	106,458
Total	8,349,105		519,495

ify based on diabetes status alone (Table 1). For the remainder of the population without diabetes, data suggest that 62% of all Canadians older than 65 years take medications from at least five different drug classes,[15] and U.S. data suggest that approximately one-half of patients younger than 65 years take at least three unique prescriptions.[16] Therefore, we assumed that 50% to 62% of the adult population qualifies for MedsCheck reviews, including the 6.2% of adults with diabetes. Canadian diabetes guidelines advocate for at least one oral hypoglycemic medication or insulin therapy (acknowledging that combination therapy with two or more agents often is required). Moreover, most patients with diabetes have concomitant hypertension[17] and may require drug therapy to achieve target blood pressure. Therefore, adult patients with diabetes are likely to be on three or more chronic medications to control their diabetes and cardiovascular risk factors. The proportion of patients with diabetes is subtracted from the total eligible for MedsCheck review, as they are automatically eligible. We estimated that 43.8% to 55.8% of the general population qualifies for MedsCheck based on the number of prescriptions criteria. The midpoint was used for the model (49.8%).

Elevated blood pressure kiosk readings. From PS-2000 usage data, we determined that 27% of readings were 130–139/80–89 mm Hg, 29% were 140–159/90–109 mm Hg, and 7% were 160/110 mm Hg or greater. Canadian hypertension guidelines recommend a treatment target of less than 130/80 mm Hg for those with diabetes or chronic kidney disease and less than 140/90 mm Hg otherwise.[18] Therefore, because diabetes and kidney disease status cannot be assessed by the kiosk, we assumed that patients with a blood pressure kiosk

1. Size of population with elevated blood pressure and eligible for MedsCheck and Pharmaceutical Opinion program:

Number of blood pressure kiosk readings taken per month per pharmacy
×
Proportion of blood pressure kiosk readings from "unique" users (to account for multiple measurements per month by the same patients)
×
Proportion of all adults eligible for MedsCheck and Pharmaceutical Opinion
×
Proportion of blood pressure kiosk results that are elevated (>130/80 mm Hg)
×
Eligible billable amount for MedsCheck (CAD $60) and Pharmaceutical Opinion (CAD $15)

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2. Subset of above population that would be expected to receive more than one MedsCheck and Pharmaceutical Opinion program intervention per year:

Population defined in step 1
×
Proportion of patients with hypertension who are hospitalized each year
×
Eligible billable amount for MedsCheck (CAD $60) and Pharmaceutical Opinion (CAD $15)

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3. Proportion of blood pressure kiosk users who do not meet MedsCheck criteria but are on at least one antihypertensive drug and may receive a Pharmaceutical Opinion program intervention tied to a dispensing activity each year:

Same calculation as step 1 above, except incorporating the proportion of all adults *not* eligible for MedsCheck
×
Proportion of patients who are taking antihypertensive medication therapy
×
Eligible billable amount for Pharmaceutical Opinion (CAD $15)

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4. Net revenue = sum of steps 1, 2, and 3

Figure 1. Equations used for economic model

Table 2. Sensitivity analysis parameters

Parameter	Point estimate	Variability	Distribution
Blood pressure kiosk readings taken per month per pharmacy	964	SE 26.8	Gamma[a]
Proportion of blood pressure kiosk readings that correspond to unique patients (to account for multiple readings per patient per month)		Range 50–75%	Uniform[b]
Proportion of the population qualifying for MedsCheck[13–16]	49.8%	Range 43.8–55.8%	Uniform[b]
Proportion of blood pressure kiosk readings ≥130/80 mm Hg	63%	±10%	Uniform[b]
Proportion of patients receiving a MedsCheck follow-up review and additional Pharmaceutical Opinion intervention annually[19]	14.5%	±10%	Uniform[b]
Proportion of patients not eligible for MedsCheck with elevated blood pressure kiosk readings and on drug therapy who could receive a Pharmaceutical Opinion program intervention tied to a dispensing activity[3]	50%	±10%	Uniform[b]

[a]Gamma distribution samples values following a normal distribution with the point estimate as the mean and with a lower limit of zero so that negative values cannot be sampled.
[b]Uniform distribution assumes an equal probability for sampling among the entire range specified.

reading of 130/80 mm Hg or more (63%) were appropriate for pharmacist intervention, realizing that a portion will not meet the hypertension guideline criteria. Pharmacists completing an annual MedsCheck medication review are eligible for CAD $60 in payment for the 20- to 30-minute in-person consultations, including preparation and documentation time.[11] Pharmacists also can bill the provincial government CAD $15 for Pharmaceutical Opinions if a drug-related problem is identified.[12] Pharmacists who conduct a MedsCheck review for their patients with elevated blood pressure are likely to submit a recommendation to the patient's physician if appropriate. Therefore, we assumed that each annual MedsCheck also included a Pharmaceutical Opinion for the primary physician who qualified for payment.

Patients eligible for more than one annual MedsCheck and Pharmaceutical Opinion

To estimate the number of follow-ups provided between annual MedsCheck reviews, we consulted the 2007 Canadian Community Health Survey. It is a cross-sectional national survey of approximately 65,000 Canadians aged 12 years or older.[19] Based on the survey results, we determined that 14.5% of respondents reporting a diagnosis of hypertension also reported being an overnight patient in a hospital or related health setting and therefore would be eligible for a MedsCheck follow-up. However, all of these patients receiving a follow-up would be unlikely. In addition, patients could receive a follow-up for another reason. Therefore, we assumed that 14.5% represented the total proportion of patients with high blood pressure who were eligible for a follow-up review from all sources. These follow-up reviews also were assumed to include a Pharmaceutical Opinion. Pharmacists completing a follow-up MedsCheck review are eligible for a CAD $25 payment and CAD $15 for their Pharmaceutical Opinion, as required.[11]

Pharmaceutical Opinions tied to medication dispensing

All Ontario residents qualify for the Pharmaceutical Opinion program. Even residents who do not qualify for MedsCheck are eligible for a reimbursable Pharmaceutical Opinion that is tied to the dispensing of a new or repeat prescription if a drug-related problem is identified. The proportion of kiosk users who take blood pressure medications is unknown. Therefore, we estimated eligible patients using the following rationale. Of Canadians with hypertension, 80% are treated.[3] A fraction of these patients are likely controlled and use the kiosks to monitor their blood pressure. We assumed that 50% of those using the kiosk who have blood pressure greater than 130/80 mm Hg are on at least one antihypertensive drug and eligible for a Pharmaceutical Opinion upon dispensing of their medication(s), if required. Pharmacists can request payment of CAD $15 per Pharmaceutical Opinion regardless of a patient's eligibility for MedsCheck.[12]

Program costs

Costs for pharmacist time and overhead for the service were not factored into the model. The Government of Ontario conducted an analysis of personnel and overhead costs to ensure that the payment rate was sufficient to offset the service cost. The cost of leasing the blood pressure kiosk also was not factored into the model because it varies based on the pharmacy location (distance for company representatives to travel for regular calibration and maintenance) and service options selected, among other factors (J. Sarkis, written communication, PharmaSmart Inc., October 2011). Finally, most pharmacies currently lease a blood pressure kiosk. Therefore, it is an overhead cost already borne by most pharmacies regardless of whether it is used to identify patients for cognitive services.

Sensitivity analysis

Sensitivity analysis incorporates variability for parameters having a range of potential values. A Monte Carlo simulation repeated the model 10,000 times using different values for each variable; each sample was taken from a predetermined distribution around the known average (Table 2). Monte Carlo simulation is preferred because only one variable is sampled for each model using one-way sensitivity analysis. The Monte Carlo method simultaneously incorporates variability around each estimate for each of the 10,000 calculations, producing more robust results.[20,21]

Two distributions were used to incorporate variability around the point estimates in the model depending on the pres-

ence or absence of observed variance parameters. Uniform distributions were used when observed variance parameters were unavailable. We assumed that the sampled values for each of the 10,000 iterations would fall within the prespecified range but with an equal probability of being sampled, unlike a normal distribution in which the probability of sampling is higher for values closer to the mean. When observed variance parameters were available, a gamma distribution was used. Gamma distributions model the normal distribution with the point estimate as the mean of the distribution, with a lower bound of zero.

Results

On average, 189 patients with elevated blood pressure who would qualify for a MedsCheck annual drug review and Pharmaceutical Opinion were identified per month using blood pressure kiosk readings. Of these, 28 patients likely would require a follow-up MedsCheck assessment and Pharmaceutical Opinion within 1 year. On average, 95 patients would be identified as qualifying for Pharmaceutical Opinion but not for MedsCheck. Assuming pharmacists successfully completed the medication review(s) and Pharmaceutical Opinions for all eligible patients, a mean (±SD) of $12,270 ± 3,854 in revenue could be generated by the pharmacy annually. Of important note, these results assume that case-finding efforts and patient identification occur for 1 month of the year only. Continued case finding each month would further increase possible annual revenue.

After the Monte Carlo simulations, the results remained robust, with a range of $4,523 to $24,420 in revenue estimated if this care was provided to all eligible patients. Assuming that not all patients will agree to and receive a complete medication review, even completing these reviews for one-half of the potentially eligible patients could generate an average of $6,135.

Discussion

Community pharmacists face many barriers to widespread incorporation of pharmaceutical care into practice, including remuneration,[22] dispensary support to allow time to provide cognitive services,[22] and proactive identification of eligible patients.[23] The MedsCheck and Pharmaceutical Opinion programs allow pharmacists in Ontario, Canada, to bill the government for time spent providing pharmaceutical care to qualified patients. Public use blood pressure kiosks can serve as an effective case-finding tool to identify patients who would benefit from pharmacist intervention or triage. These kiosks are used frequently—more than 900 times per month in an average community pharmacy—providing daily opportunities for pharmacists to become involved in assisting patients. Pharmacies must legally have a pharmacist on duty at all times to provide patient care and oversee the dispensing process. Consequently, the cost to use the pharmacist(s) may be partially offset by revenues generated from billing for cognitive services, rather than having the pharmacist(s) tied to the dispensary. Such revenues could be reinvested into automated dispensing technology or to obtain additional technician support to address dispensing demands.

Although improvement in patients' health status and reduced risk of adverse events is the primary goal of pharmacist medication reviews and other cognitive services, additional benefits from a business perspective also may result from the provision of these services. Such benefits may include increased customer loyalty, potentially higher prescription volumes, and improved adherence to prescription drugs, which should be examined in future research. Patients may remain loyal to pharmacies that they feel provide a value-added care service compared with other pharmacies. Pharmacists spending one-on-one time to review a patient's individual medication regimen and achieve clinical targets can be anticipated to provide such a value-added service. Further, with documentation of consultations and medication reviews by the pharmacist and the patient's current medication regimen on file at a particular pharmacy, patients can be educated on the importance of maintaining a consistent pharmacy to ensure the highest quality care and best ability for the pharmacist to recognize any actual or potential drug-related problems with their existing medications. Recognition of potential untreated or undertreated medical conditions through the MedsCheck and Pharmaceutical Opinion program reviews also may result in adding new therapies by the patient's physician to better control these conditions. Adherence also can be expected to improve as a result of such services by educating patients on the importance of their medications and addressing any barriers to adherence,[8] which would be expected to result in additional revenue for the pharmacy.[24]

Pharmacist care for hypertension has been shown to have a positive effect on patient outcomes in randomized controlled trials. SCRIP-HTN (Study of Cardiovascular Risk Intervention by Pharmacists–Hypertension) found that patients who saw a pharmacist/nurse team every 6 weeks for blood pressure assessment, education, and communication of treatment recommendations to the patients' physician experienced a 5.6–mm Hg greater decrease in systolic blood pressure after 6 months compared with patients receiving usual care. If sustained, this would be expected to reduce stroke risk by 30%.[6] A recently published systematic review on pharmacist interventions for cardiovascular risk factor reduction also demonstrated positive clinical outcomes for patients receiving pharmacist care for hypertension.[7] Although one certainly cannot expect community pharmacies conducting annual MedsCheck assessments to provide the same comprehensiveness of care, these studies provide evidence that pharmacist involvement in patient care is associated with improved patient outcomes.

Limitations

A number of assumptions were incorporated into the model when published information was lacking and must be considered when interpreting the results. Because patients may use a blood pressure kiosk more than once per month, a broad range was applied in estimating the proportion of all readings from individual users, estimating that up to one-half of the readings were multiple readings from the same users. In doing so, it was assumed that these multiple readings followed the same dis-

tribution of results as all readings, as available data were unable to distinguish whether people with higher blood pressure results were more likely to take multiple monthly readings than those with lower blood pressure results. In addition, the best estimate of the proportion of patients requiring more than one MedsCheck review and Pharmaceutical Opinion annually was applied based on hospitalization rates for patients with hypertension. Without actual data on the proportion of patients receiving more than one annual review/intervention, one cannot be sure whether this is an under- or overestimate.

The accuracy of certain models of public use blood pressure kiosks has been questioned[25,26]; however the PS-2000 model has been well validated against the standards of the Association for the Advancement of Medical Instrumentation and a modified British Hypertension Society protocol.[27] However, because blood pressure kiosks are not used in a supervised setting, patients may not use the proper technique (e.g., incorrect arm position, not resting before test, talking during testing), therefore resulting in falsely high results. Therefore, measurement on the kiosk should be repeated under observation to ensure proper technique. During this assessment, patients should take three consecutive tests, 1 minute apart, with the first reading discarded and the latter two averaged to minimize the effect of blood pressure variability, as recommended for clinic and home blood pressure monitoring.[18] Even in situations in which results were found to be falsely elevated as a result of suboptimal technique, valuable education can be provided to the patient on the proper measurement of blood pressure and their individual target blood pressure and a medication review for appropriateness and efficacy can be offered.

The results of this model are likely conservative, as Ontario is in the process of developing a chronic disease management remuneration strategy through which all patients with hypertension will be eligible for pharmacist MTM. This would ensure that all hypertensive patients are eligible for MedsCheck services, even those who currently are ineligible because they do not take three or more medications or have concurrent diabetes. This program will expand the size of the eligible population considerably, contributing to even higher revenue potential. In addition, other remunerable programs in Ontario such as the Pharmacy Smoking Cessation Program offer pharmacists additional opportunity to claim remuneration for activities related to smoking cessation, which is another intervention that can be identified at the time of providing MedsCheck or Pharmaceutical Opinion program services.[28] Billable at CAD $40 for the first smoking cessation consultation, $15 for the first three follow-up consultations per calendar year, and $10 for each follow-up consultation thereafter, this program offers pharmacists the ability to combine billable smoking cessation initiatives with existing pharmaceutical care programs. These additional opportunities were not factored into this economic model, but they do portend additional opportunities for sustainable sources of revenue for pharmacy services, including MTM.

Actual revenues achievable as a result of billing for cognitive services may vary depending on each community pharmacy's patient demographics, ability to offer cognitive services because of personnel or infrastructure limitations, or other factors. The intention of this model was to make a business argument for better integration of the blood pressure kiosk into pharmaceutical care services. Increasingly, these services can be billed in certain situations to governments or third-party payers. Although Ontario, Canada, was used as the setting for this analysis, such an approach also could be used for patients qualifying for MTM through Medicare Part D and other existing remuneration frameworks. Each jurisdiction will have its own remuneration models in place with unique inclusion criteria and billing amounts, potentially affecting the generalizability of our results. However, the overall conclusion is the same. By *actively* identifying patients who may qualify for and benefit from these services, pharmacy blood pressure kiosks could be used as a tool to generate revenue through available MTM remuneration strategies.

Conclusion

Blood pressure kiosks could be a valuable strategy for identifying patients eligible for remunerable cognitive services by pharmacists, providing an evidence-based service for patients, and affording a unique business opportunity for community pharmacies.

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