

Pharmacy students screening for pre-diabetes/diabetes with a validated questionnaire in community pharmacies during their experiential rotation in Alberta, Canada

SAGE Open Medicine
3: 2050312115585040
© The Author(s) 2015
Reprints and permissions:
sagepub.co.uk/journalsPermissions.nav
DOI: 10.1177/2050312115585040
smo.sagepub.com

Hoan Linh Banh¹, Sheldon Chow², Shuai Li³, Nancy Letassy⁴, Cheryl Cox⁵ and Andrew Cave¹

Abstract

Purpose: Type 2 diabetes is a major condition impacting morbidity, mortality, and health care costs in Canada. Pharmacists are very accessible and are in an ideal position to promote public health education. The primary goal of this study was to incorporate public health promotion and education into a community pharmacy experiential education rotation for fourth year pharmacy students to screen for the risk of pre-diabetes/diabetes in adults. A secondary goal was to determine the frequency of common risk factors for pre-diabetes/diabetes in adults in the community setting.

Method: Fourth year pharmacy students were invited to recruit all adults 25 years or older attending community pharmacies to complete a pre-diabetes/diabetes risk assessment questionnaire. If the participants were at risk, the participants were provided education about risk reduction for developing pre-diabetes/diabetes.

Results: A total of 340 participants completed a risk assessment questionnaire. Over 90% of people approached agreed to complete a risk assessment questionnaire. The common risk factors were overweight (154/45%), hypertension (102/30%), taking medications for hypertension (102/30%), and having symptoms of diabetes (111/33%). The ethnic minorities have 2.56 (confidence interval = 1.48–44.1) times greater odds of having a family history of diabetes compared to non-minority subjects.

Conclusion: Pharmacy students are able to screen community-based patients for pre-diabetes/diabetes risks. The most common risk factors presented were overweight, hypertension, and taking medications for hypertension.

Keywords

Diabetes risk assessment, community pharmacy, pharmacy students, health promotion

Date received: 23 December 2014; accepted: 9 April 2015

Introduction

With more than 60,000 new cases of Type 2 diabetes mellitus (T2DM) annually, it is the fastest growing disease among Canadians, impacting health care costs (CAD 9 billion/year) and mortality (seventh leading cause of death).¹ Nearly two million Canadians have been diagnosed and an estimated six million people are at risk for development of T2DM due to pre-diabetes.^{2,3} Left untreated, approximately 25% of people with pre-diabetes will progress to T2DM within 3–5 years.⁴ Identification of pre-diabetes leading to implementation of lifestyle changes or use of metformin can decrease the progression to diabetes by 31%–58% in high-risk individuals.^{5,6} There is also evidence to indicate that preventing or delaying

¹Department of Family Medicine, Faculty of Medicine and Dentistry, University of Alberta, Edmonton, AB, Canada

²London Health Sciences Centre, London, ON, Canada

³School of Public Health, University of Alberta, Edmonton, AB, Canada

⁴Department of Pharmacy Practice, College of Pharmacy, University of Oklahoma, Oklahoma City, Oklahoma

⁵Faculty of Pharmacy and Pharmaceutical Sciences, University of Alberta, Edmonton, AB, Canada

Corresponding author:

Hoan Linh Banh, Department of Family Medicine, Faculty of Medicine and Dentistry, University of Alberta, 6-10 University Terrace, Edmonton, AB T6G 2T4, Canada.

Email: hoan@ualberta.ca



the onset of T2DM results in lower rates of cardiovascular disease and renal failure.⁷ Early detection of pre-diabetes and the possibility to delay or prevent diabetes and its complications could have a major impact on the health and financial wellbeing of the nation. Because of the impact of diabetes on the individual and the nation and to enhance health, the Institute of Nutrition, Metabolism and Diabetes encourages research to address the prevention and screening of a wide range of conditions including diabetes.⁸

In Alberta, 5.8% of the population has been diagnosed with T2DM, and it is estimated that 22.2% of people in the province will develop pre-diabetes.⁷ Given the lack of public awareness about pre-diabetes/diabetes risk factors, efforts to educate the public about these risks and how to reduce them are warranted. Raising awareness through education could empower people to discuss with their health care providers formal screening for abnormal glucose tolerance, and to initiate lifestyle changes to lose weight, to increase exercise, and to improve dietary choices to reduce risk.⁹

Pharmacists in community pharmacies have reported screening programs for a variety of conditions including osteoporosis, cardiovascular disease, sleep disorders, breast and cervical cancer, and T2DM.^{10–17} Pharmacists are educated about diabetes risk factors and are trained to educate patients about their risk. With the accessibility of pharmacists and pharmacies in urban and rural areas, there exists a great opportunity for promoting a public awareness program for the risk of T2DM. In addition, the accreditation standards from the Canadian Council for Accreditation of Pharmacy Programs (CCAPP) require Canadian Pharmacy curricula to include a clinical component that provides the understanding and acquisition of knowledge and development of skills to deliver care such as health promotion and disease prevention to patients.¹⁸ Also, the CCAPP requires the Pharmacy program to create a health science network or establish a close relationship with health care facilities that have an academic mission toward research and scholarly activities.¹⁸ The primary goal of this study was to incorporate public health promotion and education into a community pharmacy experiential education rotation for fourth year pharmacy students by using a validated questionnaire to screen for the risk of pre-diabetes/diabetes in adults. A secondary goal of this study was to determine the frequency of common risk factors for pre-diabetes/diabetes in adults visiting a community pharmacy

Materials and methods

Fourth year pharmacy students on experiential rotations or working in community pharmacies throughout Alberta between September 2013 and April 2014 were invited to recruit participants for the study. All adults 25 years or older who attended the pharmacy for prescriptions or over the counter products were invited to participate in the

study. The study included male and female adults and all ethnic groups. Adults who were already known to have diabetes or who were cognitively impaired and could not complete the questionnaire were excluded. Pediatric patients were not included because the risk assessment tool used has not been validated for use with children at risk of diabetes.

The study received University of Alberta Research and Ethics Boards Health Panel 2 approval.

Research plan

All pharmacy students were trained by the principle investigator and co-investigators on the study protocol, and how to (1) approach the potential subjects, (2) handle refusal to participate, (3) collect data, (4) submit data, and (5) handle questions. The pharmacy students were also given an in-service on patient education topics, including (1) risk factors for pre-diabetes/diabetes, (2) lifestyle interventions to reduce risk, and (3) Canadian Diabetes Association (CDA) pre-diabetes fact sheet. All pharmacy students were always under the supervision of a pharmacist, and they were given a contact phone number of the principle investigator to use to discuss problems if they occurred.

The pharmacy students invited all eligible patients who came to the pharmacy to participate in the study. Once the participants were identified, they were given a letter of information explaining the study and explaining that by completing the questionnaire, consent to participate was implied. The pharmacy students asked the participants to complete a questionnaire adapted for context from the CDA risk assessment questionnaire and Canadian Diabetes Risk (CANRISK) questionnaire, which are validated tools (Appendix 1). After the questionnaire was completed, the pharmacy student reviewed diabetes risks with the participants. If the participants were found to be at risk of developing pre-diabetes/diabetes, the pharmacy students educated the participants on the steps they could take to reduce their risks. The participants were given a copy of their completed questionnaire and were encouraged to share the information with their primary care provider. They were also provided a copy of the lifestyle modification education brochure from CDA.

All anonymous paper questionnaire data were entered to Google Survey[®] by the students at the point of collection; the data were transferred to a Microsoft Excel[®] spreadsheet for analysis.

Statistical analysis

Data from Microsoft Excel[®] spreadsheet was imported and analyzed in Stata/IC 13.1 by Statacorp LP (<http://www.stata.com/company/>). The number of risk factors was expressed in sum and mean per each age category.

Table 1. Demographics and characteristics.

Age category (n) (years)	25–34 (70)	35–44 (53)	45–54 (68)	55–64 (68)	≥65 (81)
Mean age (SD) (years)	29.5 (1.0)	40.0 (2.7)	50.1 (2.8)	58.8 (2.6)	74.4 (6.7)
Gender, male (%)	39 (56)	33 (62)	48 (59)	40 (59)	43 (53)
Mean number of risk factors (SD)	1.81 (1.66)	2.28 (1.81)	2.57 (1.48)	2.78 (1.76)	3.40 (1.80)
Risk factors (total)					
Family history (100)	18 (26%)	17 (32%)	27 (40%)	21 (31%)	17 (21%)
Symptoms of diabetes (111)	23 (33%)	22 (41%)	22 (32%)	15 (22%)	30 (37%)
Taking hypertensive medications (102)	4 (6%)	6 (11%)	12 (18%)	30 (44%)	50 (62%)
History of hypertension (102)	5 (7%)	7 (13%)	9 (13%)	29 (43%)	52 (64%)
Overweight (154)	22 (31%)	24 (45%)	35 (51%)	33 (49%)	40 (49%)
High-risk group (minority) (99)					
Aboriginal (41)	15 (21%)	8 (15%)	9 (13%)	8 (12%)	1 (1%)
East Asian (34)	12 (17%)	7 (13%)	10 (15%)	3 (4%)	2 (2%)
South Asians (12)	5 (7%)	3 (6%)	1 (1%)	2 (3%)	1 (1%)
Hispanic (7)	4 (6%)	1 (2%)	1 (1%)	0 (0%)	1 (1%)
African (5)	0 (0%)	1 (2%)	4 (6%)	0 (0%)	0 (0%)
Dyslipidemia (89)	3 (4%)	8 (15%)	15 (22%)	26 (38%)	37 (46%)
History of heart disease (30)	2 (3%)	2 (4%)	4 (6%)	7 (10%)	15 (19%)
Gestational diabetes (26)	1 (1%)	6 (11%)	10 (15%)	5 (7%)	4 (5%)
Erectile dysfunction (22)	2 (3%)	2 (4%)	4 (6%)	3 (4%)	11 (14%)
Urban (318/93%)	66 (21%)	51 (16%)	67 (21%)	67 (21%)	77 (24%)
Rural (22/7%)	4 (18%)	2 (9%)	1 (5%)	1 (5%)	4 (18%)

SD: standard deviation.

Result

Feasibility by pharmacy students to implement pre-diabetes/diabetes screening in community pharmacies

Pre-diabetes/diabetes assessment and education were provided to a total of 340 participants by 30 out of 124 pharmacy students. The main reasons for students not to participate were lack of time and being overwhelmed with the workload requirements for other components of the rotation. The workload requirements include completing 12 patient care plans during their 8–10 weeks of community rotation; the students also had to complete an inter-professional reflective assignment, a medication safety assignment, an assignment on clinical judgment, as well as an enhancement of practice project.

Despite the low participation from the pharmacy students, subjects were recruited from all eight zones in Alberta. Over 90% of people approached by pharmacy students completed a risk assessment questionnaire. The major reasons for people to decline to participate were lack of time to fill out the risk assessment questionnaire or they felt well. The students reported that on average, the assessment and education took 10 minutes to complete. The pharmacists were very supportive and receptive of the project and students during recruitment of the study.

Risk factors

The demographics and characteristics of the participants are summarized in Table 1. The average age was 52 years with

203 (60%) males. There were 241 subjects of ethnic majority and 99 subjects from ethnic minorities. Of these, 99 subjects (41/41%) were of Aboriginal and (34/34%) were of East Asian origins. The most common risk factors presented were overweight (154/45%), hypertension (102/30%), taking medications for hypertension (102/30%), and having symptoms of diabetes such as unusual thirst, frequent urination, and blurred vision (111/33%). The ethnic minorities have 2.56 (confidence interval (CI) = 1.48–44.1) times greater odds of having a family history of diabetes compared to non-minority subjects.

Discussion

The participants in the study are representative of the general population in Alberta that attend community pharmacies. The study demonstrates the potential to incorporate public health promotion and education into a community experiential education for pharmacy students to screen for the risk of pre-diabetes/diabetes in community pharmacies in Alberta. This is consistent with a similar study conducted in the United States.¹⁹ Our study also attempted to tailor health education to the minority in specific regions in Alberta. For example, a majority of Chinese reside in urban Alberta, while most Aboriginals reside in rural Alberta. The goal is to provide diabetes prevention education in Chinese in urban pharmacies and Cree in rural pharmacies. In our study, only 30 students felt they had enough time in their demanding community rotation to participate in this study. This suggests there is a need to educate the pharmacy

students on the importance of public health promotion and education in a community pharmacy setting. Since the pharmacists are one of the most accessible health care providers, it is important that the pharmacy students recognize their potential role in disease prevention and education. Also, perhaps the Faculty of Pharmacy could consider the importance of incorporating health promotion, disease prevention, and research as required components for their community rotation since they are part of the accreditation standards from the CCAPP. Most importantly, these types of activities would open up a dialogue between pharmacists and patients about chronic disease prevention and health promotion. Pharmacists are already engaged to perform pre-diabetes/diabetes screening, as under Alberta Health Compensations for Pharmacy Services, the screening is eligible to be reimbursed for a minimum of CAD 60 for each completed patient care plan in patients with diabetes or risks of diabetes.

By having pharmacy students to perform the screening, it would reduce the burden of demand for pharmacists. By the same token, since the students are trained centrally, the screening and education process would be carried out more consistently throughout different communities than trying to coordinate education of pharmacists employed by different community pharmacies across the province. If the pharmacy students are trained appropriately and could execute the tasks without disrupting the flow of service in the pharmacy, then it would be more acceptable and beneficial to the pharmacists.

Limitation

The study has small sample size, but from our literature search, it is the only one to date examining these questions in Canada. Since this was a one-point observational study and the pharmacy students only spent 8–10 weeks in the community pharmacy rotation, they were unable to follow up with patients to assess how many participants went to their family physicians to discuss their risks or to assess whether the lifestyle modification education provided by the pharmacy students made an impact on delaying or preventing the development of diabetes.

We elected to screen patients 25 years and older because based on the Alberta Diabetes Surveillance system in 2011, the incidence of T2DM began to rise at the age of 30–34 years and subjects may have had pre-diabetes for 3–5 years prior to the disease onset.²⁰ In 2011, the population of Alberta was over 3.6 million people with 83% living in urban and 17% in rural areas.²⁰ Although our minority groups consist mostly of Aboriginals (41/12%) and East Asians (34/10%), they are representative of the proportion of minorities in Alberta.²⁰ The results show that belonging to the ethnic minority group results in greater odds of having a positive family history of diabetes; this is consistent with the current literature.^{21–24}

Conclusion

It is feasible for a pharmacy student to screen patients for diabetes risks. To incorporate this activity into their rotation, the Faculty of Pharmacy could consider allocating time for the students to participate. The most common risk factors for pre-diabetes/diabetes for Albertans are overweight, hypertension, taking medications for hypertension, and having symptoms of diabetes. In addition, the results indicate that perhaps patients in the minority groups such as Aboriginals and East Asians with a family history of diabetes should be closely monitored at an early age. Currently, we are conducting a feasibility study (which includes follow up) for staff pharmacists to screen adults for pre-diabetes and implement lifestyle interventions to prevent the development of T2DM in Alberta.

Acknowledgements

We thank pharmacy students of class of 2014, Marlene Gurket and Ken Cor, University of Alberta, Faculty of Pharmacy and Pharmaceutical Sciences.

Declaration of conflicting interests

All authors have no conflict of interest to declare.

Funding

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

References

1. Type 2 diabetes, <http://www.healthycanadians.gc.ca/health-sante/disease-maladie/diabete-eng.php>
2. Statistics Canada, <http://www.statcan.gc.ca/tables-tableaux/sum-som/101/cst01/health53a-eng.htm> (accessed 12 May 2014).
3. Canadian Diabetes Association, <http://www.diabetes.ca/about-diabetes/prediabetes> (accessed 12 May 2014).
4. Harris MI, Klein R, wellborn TA, et al. Onset of NIDDM occurs at least 4–7 year before clinical diagnosis. *Diabetes Care* 1992; 15: 815–819.
5. Knowler WC, Barrett-Connor E, Fowler SE, et al. Reduction in the incidence of type 2 diabetes with lifestyle intervention or metformin. *New Engl J Med* 2002; 36: 393–403.
6. Schellenberg ES, Dryden DM, Vandermeer B, et al. Lifestyle interventions for patients with and at risk for type 2 diabetes: a systematic review and meta-analysis. *Ann Intern Med* 2013; 159: 543–551.
7. Canadian Diabetes Association 2008 Clinical Practice Guidelines for the Prevention and Management of Diabetes in Canada, <http://www.diabetes.ca/files/cpg2008/cpg-2008.pdf> (accessed 12 May 2014).
8. Canada Institute of Health Research. Institute of Nutrition, Metabolism, and Diabetes, <http://www.cihr-irsc.gc.ca/e/13521.html> (accessed 28 May 2014).
9. Blueprint for Pharmacy, <http://blueprintforpharmacy.ca/docs/pdfs/2011/05/11/BlueprintVision.pdf?Status=Master> (accessed 1 September 2014).

10. Denttloff RW and Morse JA. Demonstration of community pharmacy and managed care organization collaboration on cardiovascular disease risk factor identification using health risk appraisal. *J Am Pharm Assoc* 2009; 49: 220–222.
11. Summers KM and Brock TP. Impact of pharmacist-led community bone mineral density screenings. *Ann Pharmacother* 2005; 39: 243–248.
12. Law AV and Shapiro K. Impact of a community pharmacist-directed clinic in improving screening and awareness of osteoporosis. *J Eval Clin Pract* 2005; 11: 247–255.
13. Hersberger KE, Renggli VP, Nirko AC, et al. Screening for sleep disorders in community pharmacies: evaluation of a campaign in Switzerland. *J Clin Pharm Ther* 2006; 31: 35–41.
14. Simmons S, Foulon E, Dethier M, et al. Promoting targeted screening for type 2 diabetes mellitus: the contribution of community pharmacists. *Diabet Med* 2005; 22: 812–815.
15. McGuire TR, Leyboldt M, Narducci WA, et al. Accessing rural populations: role of the community pharmacist in a breast and cervical cancer screening programme. *J Eval Clin Pract* 2007; 13: 146–149.
16. Alberta Diabetes Surveillance System, <http://www.albertadiabetes.ca/AlbertaDiabetesAtlas2011.php> (assessed 15 May 2014).
17. Tsuyuki RT, Johnson JA, Teo KK, et al. Study of Cardiovascular Risk Intervention by Pharmacists (SCRIP): a randomized trial design of the effect of a community pharmacist intervention program on serum cholesterol risk. *Ann Pharmacother* 1999; 33: 910–919.
18. The Canadian Council for Accreditation of Pharmacy Programs: Accreditation Standards for the First professional Degree in Pharmacy Programs, http://www.ccapp-accredit.ca/site/pdfs/university/CCAPP_accred_standards_degree_2014.pdf (accessed 13 February 2015).
19. Letassy N, Dennis V, Lyons TJ, et al. Know your diabetes risk project: student pharmacists educating adults about diabetes risk in a community pharmacy setting. *J Am Pharm Assoc* 2010; 50: 188–194.
20. Statistics Canada, <http://www.statcan.gc.ca/tables-tableaux/sum-som/101/cst01/demo62j-eng.htm> (accessed 15 May 2014).
21. Unoki H, Takahashi A, Kawaguchi T, et al. SNPs in KCNQ1 are associated with susceptibility to type 2 diabetes in East Asian and European populations. *Nat Genet* 2008; 40: 1098–1102.
22. Yasuda K, Miyake K, Horikawa Y, et al. Variants in KCNQ1 are associated with susceptibility to type 2 diabetes mellitus. *Nat Genet* 2008; 40: 1092–1097.
23. Bell RA, Mayer-Davis EJ, Beyer JW, et al. Diabetes in non-Hispanic white youth: prevalence, incidence, and clinical characteristics: the RESEARCH for diabetes in youth study. *Diabetes Care* 2009; 32(Suppl. 2): S102–S111.
24. Dean HJ, Mundy RL and Moffatt M. Non-insulin-dependent diabetes mellitus in Indian children in Manitoba. *CMAJ* 192(147): 52–57.

Appendix I

Are you at risk?

If you checked any of the following from boxes 6–15, you should be tested for diabetes earlier and/or more often:

1. You are ≥ 40 years old? Age: _____
2. ☐ Female ☐ Male
3. Your height: ____ ft, ____ in
4. Your weight: _____ (pounds)
5. ☐ I have a parent, brother or sister with diabetes.
6. ☐ I am overweight (especially if you carry most of your weight around your middle).
7. ☐ I am a member of a high-risk group:
 - ☐ Aboriginal peoples
 - ☐ Hispanic
 - ☐ East Asian (Chinese, Vietnamese, Filipino, Korean, etc ...)
 - ☐ South Asian (East Indian, Pakistani, Sri Lankan, etc ...)
 - ☐ African descent
8. ☐ I have high cholesterol or other fats in my blood.
 - a. Cholesterol medication: _____
9. ☐ I gave birth to a baby that weighed over 4 kg (9lbs) at birth, or I have gestational diabetes (Diabetes during pregnancy)
10. ☐ I have high blood pressure.
11. ☐ I have taken high blood pressure pills.
 - a. High blood pressure medication: _____
12. ☐ I have heart disease.
13. ☐ I have numbness in my hands and/or feet.
14. ☐ I have trouble getting and maintaining an erection.
15. I have symptoms of diabetes.
 - ☐ Unusual thirst.
 - ☐ Frequent urination.
 - ☐ Unusual weight loss.
 - ☐ Extreme fatigue or lack of energy.
 - ☐ Blurred vision.
 - ☐ Frequent or recurring infections
 - ☐ Cuts and bruises that are slow to heal.
 - ☐ Tingling or numbness in hands or feet.

Adapted from the Canadian Diabetes Association “Are you at Risk?” 316530 08-396 06/09 Q-100M, and the CANRISK questionnaire from public Health Agency of Canada (<http://www.healthycanadians.gc.ca/diseases-conditions-maladies-affections/disease-maladie/diabetes-diabete/canrisk/index-eng.php>).