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The inspiration for this article stemmed from the Saskatchewan Transplant Program. At this site, pharmacists on multidisciplinary care teams play an active role in cancer screening and prevention. The authors believe there are many ways these types of activities could be easily adapted into community practice.

Cet article trouve son inspiration dans le programme de transplantation de la Saskatchewan. À cet endroit, les pharmaciens jouent un rôle actif au sein d'équipes de soins pluridisciplinaires pour le dépistage et la prévention du cancer. Les auteurs pensent que ce type d'activités pourrait être adapté facilement au milieu communautaire, et ce, de nombreuses manières.

The community pharmacist's role in cancer screening and prevention

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ABSTRACT

As the Canadian population continues to age, the incidence of cancer is on the rise. To help alleviate the burden malignancy imposes on our health care system, a shift toward early cancer detection is necessary. Pharmacists are well positioned and willing to assume a more active role in cancer surveillance. Patients are receptive to pharmacist involvement and seem to prefer a convenient community

pharmacy-based location for screening programs. The community pharmacist's current and potential role in cancer screening and prevention is summarized in this article. A review of screening recommendations and a discussion of opportunities will hopefully inspire pharmacists to consider incorporating malignancy screening initiatives into their practice. *Can Pharm J (Ott)* 2016;149:274-282.

Introduction

As the Canadian population continues to age, the incidence of cancer is expected to grow congruently. By 2032, the number of new cancer cases is estimated to increase by 79%.¹ This statistic is particularly alarming, since cancer is currently the leading cause of death in our country, and almost half of all Canadians will develop a malignancy at some point in their lifetime.¹

Fortunately, early screening and treatment have allowed for improved malignancy detection and improved patient outcomes. Screening for breast cancer, for instance, has decreased the mortality rate by up to 23%,² and between 21,000 and 40,000 deaths could be avoided with proper colorectal screening.¹ However, thousands of people still die unnecessarily every year because of a late cancer diagnosis,³ indicating that it is imperative that innovative ways of enhancing patient participation in these types of screening programs continue to be explored.¹ The purpose of this article is to examine the pharmacist's involvement in malignancy screening and prevention, to educate pharmacists on the current recommendations for cancer screening and to explore other potential opportunities

for implementing screening services into their practices.

Pharmacists could be more involved in malignancy screening and prevention

The scope of the pharmacist has dramatically changed in recent years.⁴ With a shift toward patient care and away from dispensing activities, pharmacists are in a prime position to incorporate cancer-screening initiatives into their practice. The regulation of pharmacy technicians could increase the feasibility for community pharmacists to become involved in this area of health promotion by freeing up time previously dedicated to dispensing.⁵ Pharmacists have embraced the opportunity to participate in the prevention and screening of a variety of other chronic conditions such as osteoporosis, osteoarthritis, diabetes, hypercholesterolemia, hypertension, asthma, chronic obstructive pulmonary disease, sleep disorders and depression, and they seem interested in becoming more involved in cancer screening.^{6,7} A recent study in Alberta showed that pharmacists were able to successfully identify patients with chronic kidney

disease using a targeted screening approach in the community setting.⁸ As the pharmacist is one of the most accessible health care professionals,⁹ simple cancer-screening measures conducted within the pharmacy could have an impact on improving patient involvement in provincial cancer-screening programs.

Patients frequently visit pharmacies for health information and have long sought advice from pharmacists regarding signs and symptoms of cancer.¹⁰ Pharmacists are already participating in malignancy prevention efforts by educating patients on strategies that decrease the incidence of specific cancers. By identifying risk factors such as photosensitizing medications and assisting with the selection of sunscreens, pharmacists are participating in preventive efforts to decrease the risk of skin cancer. By playing an active role in smoking cessation, pharmacists are assisting patients in reducing their risk of lung cancer. With recent changes to legislation allowing pharmacists to administer medications via injection, pharmacists now have the ability to prevent cervical cancer by administering the human papillomavirus (HPV) vaccine. Despite these efforts, there is room for improvement. Mayer and colleagues¹¹ demonstrated that pharmacists could play a larger role in delivering patient education related to skin cancer prevention. Likewise, a recent study in Ontario indicated that only one-third of pharmacies participated in remunerated pharmacy smoking cessation and that only 56% of patients who were enrolled in the program received a follow-up service, indicating missed opportunities for both pharmacists and patients.¹²

A recent systematic review analyzing the pharmacist's role in early cancer detection concluded that there is great potential for community pharmacy-based cancer education and screening.¹³ The review identified 12 relevant studies examining the community pharmacist's involvement in prostate, colon, breast and cervical cancer. Six of the studies were reported to have influenced patient behaviour using various approaches such as test kits, questionnaires and patient education as part of the screening activities. The review determined that screening in community pharmacies is possible, and by identifying those who are at higher risk of developing cancer, such activities are an effective means for improving participation in screening programs.¹³

KNOWLEDGE INTO PRACTICE

- Malignancy rates in Canada are on the rise, and prevention is key to improving patient outcomes.
- Pharmacists are well positioned to be involved in this area of health promotion but could be doing more.
- Armed with knowledge, community pharmacists have the opportunity to incorporate cancer screening initiatives into their practice.

Public support for pharmacy-based cancer-related programs has also been indicated in the literature. Patients are receptive to colorectal cancer-screening programs conducted by community pharmacists.¹⁴ A study examining patient perceptions on mammography indicated that 76.7% of respondents would prefer a community pharmacy setting because of the convenience and accessibility.¹⁵ Disease screening in rural community pharmacies could also greatly increase patient participation in underserved communities.¹⁶ Since pharmacists are viewed as one of the most trusted and accessible health care professionals, it has been suggested that they should take a more active role in patient education with regard to disease screening.¹⁷ A systematic review conducted by Ayorinde et al.¹⁸ examined the impact of community pharmacy-based screening for major diseases. This study showed that while such activities are indeed feasible, a full realization of these initiatives is yet to be seen.

Certain barriers may have hindered the widespread implementation of cancer-screening efforts at the community pharmacy level. First, successful screening programs have often incorporated the use of a systematic approach to identify individuals at highest risk.¹⁸ While the Canadian Task Force on Preventive Health Care (CTFPHC) has provided recommendations on which patients to screen for specific malignancies, no formal approach has been identified to suggest how to implement these into community practice. Second, inadequate foundational cancer knowledge has been speculated to be a barrier to pharmacists performing this service.^{10,19} Hence, for malignancy screening initiatives to become universally feasible, a means for strengthening the pharmacist's knowledge about such topics should be explored.

MISE EN PRATIQUE DES CONNAISSANCES

- Le taux d'affections malignes est à la hausse au Canada, et la prévention est essentielle pour améliorer l'issue de ces maladies.
- Les pharmaciens occupent une place de choix pour contribuer à la promotion de la santé, mais ils pourraient en faire plus.
- Dotés de connaissances, les pharmaciens communautaires ont la possibilité d'intégrer des initiatives de dépistage du cancer dans leur pratique.

Summary of current screening recommendations and suggested resources

Pharmacists interested in becoming more involved in cancer screening and prevention must be knowledgeable about the risk factors and symptoms associated with various malignancies and be comfortable discussing these with patients. They must keep up to date on current screening recommendations and be abreast of educational resources that can assist with patient education.

The CTFPHC offers systematically reviewed evidence-based guidelines on various disease prevention topics.²⁰ These guidelines broadly suggest who should be screened, how often and which diagnostic measures should be used. Recommendations have recently been developed regarding prostate, cervical and breast cancer, as well as lung and colorectal cancer. Since cancer-screening protocols are typically determined at the provincial level, pharmacists are also encouraged to refer to their provincial cancer agency. Health care professionals interested in a comprehensive overview of current risk reduction strategies may refer to the National Comprehensive Cancer Network Clinical Practice Guidelines in Oncology.²¹

Breast cancer

Although breast cancer mortality rates have declined by 44% in the past 29 years, 1 in 30 women continues to die from the disease.¹ Early detection is key to decreasing the mortality rates from this type of malignancy. Current CTFPHC guidelines recommend that women aged 50 to 74 years receive routine screening for breast cancer every 2 to 3 years via mammography. For women younger than 50, however, the risks associated with the possibility of false-positives outweigh any benefit obtained via early screening, and a strong correlation

with reduced mortality has not been shown. Women over the age of 74 years have not been included in the guidelines, because of a paucity of evidence.²²

Cervical cancer

HPV is the biggest risk factor for developing cervical cancer, and it is estimated that 1 in 478 women diagnosed with the condition will die in their lifetime.¹ The CTFPHC weakly recommends that women aged 25 to 29 years undergo routine cytology screening (Pap smear) every 3 years for early detection of cervical cancer. The evidence is stronger for women between the ages of 30 to 69 years, for whom the recommendation of routine cytology every 3 years remains the same. For women over the age of 70, however, routine screening is recommended only if screening has been inconsistent in the past (i.e., fewer than 3 consecutive negative Pap tests in the previous 10 years). In addition to routine cytology, evidence suggests that HPV-DNA testing may be beneficial in reducing both cervical cancer incidence and mortality, but further analysis is necessary.²³

Health Canada has currently authorized the use of HPV4 (Gardasil) and HPV2 (Cervarix) vaccines for the prevention of cervical cancer in specific female populations.²⁴ Since the initial time between becoming infected with the virus and developing cervical cancer averages 20 years, it will take many years before the full impact of these vaccinations is realized. Health Canada will continue to monitor and update recommendations accordingly.²⁵

Colorectal cancer

Approximately 423 new colorectal cancer diagnoses are made in Canada each week.²⁶ Unfortunately, most cases are diagnosed in later stages, and as a result, approximately 175 Canadians will die from the disease each week.²⁶ New CTFPHC guidelines have been recently published that suggest screening all low-risk asymptomatic individuals between the ages of 50 and 74 years with fecal occult blood test (either guaiac fecal occult blood test or fecal immunochemical test) every 2 years or flexible sigmoidoscopy every 10 years. This recommendation is strong for individuals aged 60 to 74 and weak for younger ages (50-59), since the absolute benefits of screening are larger for the former, because of the increased incidence of colorectal cancer in the

older age group. Screening is not recommended for asymptomatic patients 75 years of age or older, because of reduced life expectancy and the lack of research showing benefit or potential harms of the tests. While the CTFPHC currently does not recommend the use of colonoscopy in the screening for colorectal cancer patients, it is important to note that these guidelines do not apply to high-risk patients who have symptoms or a family history of the disease. Four trials are currently under way examining the mortality benefits associated with colonoscopy, which will be considered as results become available.²⁷

Prostate cancer

One in 8 men will be diagnosed with prostate cancer at some point in his lifetime, and approximately 4100 will die from the disease yearly.¹ The most common method of screening for prostate cancer includes conducting a prostate-specific antigen (PSA) test with or without digital rectal examination. Routine age-based screening is not recommended in asymptomatic men. This recommendation is based on the risk/benefit analysis, in which the risks of unnecessarily treating men based on a false-positive PSA outweigh any benefit that may be obtained. Despite the official recommendation, CTFPHC notes that a small benefit may exist for men aged 55 to 69 years, but at this time, routine screening is not recommended. Preventive efforts should emphasize patient education, including identification of early warning signs,²⁸ such as difficulty, urgency and/or increased frequency of urination; burning or pain or inability to urinate; difficulty starting or stopping urine flow; painful ejaculation; or blood in the urine or semen.

Lung cancer

Lung cancer is the leading cause of cancer for both sexes, accounting for approximately 27% of all yearly cancer deaths.¹ The CTFPHC recommends that adults between the ages of 55 and 74 years who have a 30 pack-year or more smoking history, who currently smoke or who quit within the past 15 years be screened with low-dose computed tomography on up to 3 occasions. (A pack-year is defined to be the average daily number of cigarettes multiplied by the number of years smoking.) Screening is not recommended for those who do not meet these criteria. The CTFPHC also strongly recommends against the use of chest x-ray with or without the

use of sputum cytology in the screening of lung cancer.²⁹

A focus on lifestyle modification continues to be the most effective means of preventing lung cancer. Smoking cessation can significantly improve patient quality of life and reduce the chance of developing lung cancer. It is estimated that the added risk of coronary heart disease decreases by 50% within 1 year of quitting smoking, and by 10 years, the risk of lung cancer is diminished by 50%.³⁰ A continued focus on smoking cessation programs within pharmacies is highly encouraged, since tobacco use is the single greatest avoidable risk factor for cancer.³¹

Skin cancer (melanoma)

In the past 30 years, the incidence of melanoma has more than tripled. Fortunately, if this condition is diagnosed early, survival rates are very high.¹ Besides personal self-examination, there is no CTFPHC-endorsed guideline for this type of malignancy. As such, the importance of patient education and awareness cannot be overstated. The pharmacy is often the first point of contact for skin conditions, and all pharmacists should be aware of early signs of melanoma. The BC Cancer Agency has suggested the use of the “ABCDE” acronym to help identify skin lesions of concern. Lesions with **A**symmetrical shape, **B**order irregularity, **C**olor variation, **D**iameter >6 mm and **E**volving morphologically or symptomatically are cause for concern and warrant referral. In addition to symptom recognition, pharmacists can play a key role in raising awareness of the importance of protecting against the harmful effects of sun exposure and the associated risks of developing skin cancer.³²

Risk factors and malignancy prevention

Many risk factors increase the likelihood of developing cancer, including general factors as well as specific ones. In addition, specific populations are inherently at greater risk of receiving a cancer diagnosis in their lifetime. Patients who undergo liver, kidney or other type of solid organ transplant, for instance, are up to 3 times more likely to die from cancer than those in the general population.³³ Likewise, patients with HIV/AIDS are at an increased risk of malignancy because of their immunocompromised state.³⁴

According to the World Health Organization, the most cost-effective, long-term strategy

TABLE 1 Known risk factors for various malignancies*

Cancer	Known risk factors
Prostate	Family history ³⁵
Cervical	Human papillomavirus, smoking, multiple births, sexual activity, weakened immune system, low socioeconomic status, diethylstilbestrol, oral contraceptives ³⁶
Breast	Personal history of breast cancer, family history of breast and other cancers, BRCA gene mutations, dense breasts, Ashkenazi Jewish ancestry, rare genetic conditions, reproductive history, exposure to ionizing radiation, hormone replacement therapy, oral contraceptives, atypical hyperplasia, alcohol, obesity, high socioeconomic status, tall adult height ³⁷
Colorectal	Family history of colorectal cancer; personal history of colorectal cancer; familial adenomatous polyposis; Lynch syndrome; polyps in the colon and rectum; rare genetic conditions; lack of physical activity; obesity; alcohol; smoking; diet high in red meat or processed meat; diet low in fibre; sedentary behaviour; inflammatory bowel disease; diabetes; Ashkenazi Jewish ancestry; personal history of breast, ovarian or uterine cancer; tall adult height; cooking meat at high temperatures; exposure to ionizing radiation ³⁸
Lung	Smoking tobacco, second-hand smoke, radon, asbestos, outdoor air pollution, occupational exposure to chemical carcinogens, personal or family history of lung cancer, arsenic, previous lung disease, exposure to radiation, indoor burning of coal, weakened immune system, lupus ³⁹
Melanoma	Ultraviolet radiation, number of moles, atypical moles, congenital melanocytic nevi, familial atypical multiple mole melanoma (FAMMM) syndrome, fair complexion, personal history of skin cancer, family history of skin cancer, CDKN2A gene mutation, weakened immune system, history of blistering sunburn, inherited conditions (such as xeroderma pigmentosum or Werner syndrome) ⁴⁰

*Risk factors are generally listed in order from most to least important. But in most cases, it is impossible to rank them with absolute certainty.

for controlling cancer and other noncommunicable diseases is prevention.³¹ A number of general strategies can be used to reduce the risk of cancer, including smoking cessation, maintaining a healthy diet high in fruits and vegetables, maintaining a healthy body weight and engaging in regular physical activity, limiting alcohol use, decreasing infection risk through vaccination and preventative strategies to control infection and reducing exposure to environmental pollution, occupational carcinogens and radiation.³¹ Pharmacists should be familiar with the risk factors that can increase the chances of developing malignancy, know which patients are most vulnerable and be equipped to counsel patients on preventive strategies. Table 1 summarizes the specific factors that can increase the risk of developing the cancers discussed in this article.³⁵⁻⁴⁰

Opportunities for pharmacists

Thousands of people die unnecessarily every year because of a late cancer diagnosis, and more people should be referred for cancer testing.³ We believe that pharmacists have the potential

to make a positive impact in this area of disease prevention in a variety of ways (Table 2).

For screening programs to be successful, patients must be aware of the benefits of early malignancy detection as well as how and where to access the appropriate screening programs. Simple strategies can be used to promote awareness, such as providing brochures or other educational materials in patient waiting areas. Alternatively, more comprehensive education could be provided to high-risk individuals eligible for screening. Targeting individuals with limited education, lower health literacy and of lower economic means may be particularly beneficial, since these individuals are often the ones who participate infrequently in disease-screening programs.⁴¹ Health information that is not conveyed in a manner that patients fully comprehend can lead to a decrease in screening rates,⁴² and pharmacists have the opportunity to assist by delivering education clearly and concisely. A combination of communication techniques may be effective in enhancing comprehension, including verbal, written materials and/or short

TABLE 2 Potential strategies to improve malignancy screening and prevention in the community pharmacy

Opportunity	Potential strategies for implementation	Potential areas of impact
Promoting general public awareness on prevention and screening	<ul style="list-style-type: none"> • Increasing the availability of promotional materials (e.g., brochures, posters, educational videos) 	<ul style="list-style-type: none"> • General risk reduction (all types of malignancies)
Education on cancer prevention for vulnerable populations	<ul style="list-style-type: none"> • Providing education when dispensing high-risk medications • Providing education during medication assessments • Development of formalized screening processes 	<ul style="list-style-type: none"> • Individuals with low health literacy, limited education or lower economic status (all types of malignancies, smoking cessation, skin protection)
Risk assessment and referral for further testing	<ul style="list-style-type: none"> • Performing risk assessment and recommendations during medication assessments • Partnerships with other stakeholders • Development of formalized screening processes 	<ul style="list-style-type: none"> • Rural communities/underserved populations (breast, cervical, colorectal, skin cancer)
Risk assessment and testing within the pharmacy setting	<ul style="list-style-type: none"> • Performing risk assessment and recommendations during medication assessments • Partnerships with other stakeholders • Development of formalized screening processes • Testing could be performed on location 	<ul style="list-style-type: none"> • Rural communities/underserved populations • Mammography, FOB or FIT test (ex., breast, colorectal cancer)

videos.^{18,43} In addition, the use of questionnaires and risk assessment forms may assist in identifying individuals at high risk within the pharmacy. Despite efforts in improving patient health literacy, documented effectiveness in improving screening participation has been scarce.⁴¹ Further research on the impacts of such materials would therefore be beneficial. In the meantime, improving health comprehension in patients is a worthwhile and achievable goal for pharmacists.

Nearly all provinces in Canada now have provincially funded medication assessment programs in place. While the process of assessing a patient's medication in a systematic way is not a new concept, having the service offered in a community pharmacy is rather novel, and it provides an excellent opportunity to incorporate cancer-screening initiatives into this setting. Since performing a medication assessment involves reviewing both medical history and medications, pharmacists are already gathering information useful for assessing cancer risk, and this provides another opportunity to perform clinical services within the pharmacy. For instance, as part of a

medication assessment, many pharmacists also identify infection risk, review immunization status and provide advice on (or administer) any appropriate vaccinations. We hypothesize that this approach could be successfully used for cancer screening as well. By stepping away from dispensing activities and taking a broader view of the patient, pharmacists could use this opportunity to ask questions to determine patient risk factors and suggest appropriate screening. Furthermore, the medication assessment process could provide a foundation for the development of a formal cancer-screening process within the community pharmacy setting.

While risk assessment and referral is one way for community pharmacists to participate in cancer screening, offering the testing within the pharmacy setting could be another opportunity to increase screening rates. Gupta and colleagues¹⁵ showed that more than three-quarters of women indicated they would prefer to receive a mammogram in the community pharmacy setting and believe that community venue-based screening mammographic services could be provided in a

subspecialty delivery model. The logistics of this may be challenging, but this is another area that could be explored. Collaborations between pharmacies and other stakeholders could also potentially increase the feasibility of incorporating cancer-screening activities within the pharmacy. The ColonCancerCheck program, launched by the Ministry of Health and Long-Term Care and Cancer Care Ontario, is an example of such a partnership. Community pharmacists in Ontario can participate in this multidisciplinary initiative to improve colon cancer-screening rates by providing information about the importance of screening for colorectal cancer, dispensing screening kits to eligible participants and referring individuals at increased risk. Establishing an open line of communication with other health care professionals (such as family physicians and public health nurses) will also be essential in enhancing current efforts and prevent duplication of services.

Pharmacists in rural communities have an additional opportunity to improve screening program participation in underserved populations. In some remote communities where there is limited access to primary care clinics, hospitals and

family physicians, community pharmacists are the most accessible health professional. Screening patients in these community pharmacies could be very beneficial in improving the uptake of various screening activities in rural areas.⁴⁴

While it may seem logical to incorporate cancer screening into the pharmacy, a paucity of data exists surrounding the topic. Further study in this area is warranted to investigate the effectiveness of pharmacist interventions in this area of health prevention and promotion.

Conclusion

Community pharmacists are in a prime position to conduct cancer-screening activities and further assist with malignancy prevention, but more study is warranted in this area. By being up to date on current-screening guidelines and being aware of educational resources, pharmacists can potentially have a major impact on increasing the early detection of cancer. We hope that this article generates further discussion and helps to inspire community pharmacists to consider incorporating malignancy screening efforts into their practice.■

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References

1. Canadian Cancer Society's Advisory Committee on Cancer Statistics. *Canadian Cancer Statistics 2015*. Toronto (ON): Canadian Cancer Society; 2015. Available: <https://www.cancer.ca/~media/cancer.ca/CW/publications/Canadian%20Cancer%20Statistics/Canadian-Cancer-Statistics-2015-EN.pdf> (accessed Feb. 8, 2016).
2. Berry D, Cronin K, Plevritis SK, et al. Effect of screening and adjuvant therapy on mortality from breast cancer. *N Engl J Med* 2005;353(17):1784-92.
3. Richards MA. The size of the prize for earlier diagnosis of cancer in England. *Br J Cancer* 2009;101(Suppl 2):S125-9.
4. Canadian Pharmacists Association. Scope of practice. 2016. Available: www.pharmacists.ca/index.cfm/pharmacy-in-canada/scope-of-practice-canada/ (accessed Jan. 28, 2016).
5. National Association of Pharmacy Regulatory Authorities. Pharmacy technicians. 2009. Available: <http://napra.ca/pages/PharmacyTechnicians/default.aspx> (accessed Jan. 18, 2016).
6. Ibrahim OHM, Ibrahim RM. Community pharmacists' involvement in breast cancer health promotion in United Arab Emirates (UAE). *Am J Pharmacol Toxicol* 2013;8(4):155-63.
7. Odedin FT, Warrick C, Vilme H, Young S. Pharmacists as health educators and risk communicators in the early detection of prostate cancer. *Res Soc Admin Pharm* 2008;4(1):59-66.

8. Hamarneh YN, Hemmelgarn B, Curtis C, Balint C, Jones CA, Tsuyuki RT. Community pharmacist targeted screening for chronic kidney disease. *Can Pharm J (Ott)* 2016;149(1):13-17.
9. Canadian Pharmacists Association. Expanding the scope of practice: pharmacist's role in the management of minor ailments. *The Translator* 2013;7(2). Available: www.pharmacists.ca/index.cfm/education-practice-resources/pharmacy-practice-research/the-translator/ (accessed Jan. 30, 2016).
10. Lum L, McWaters D, Mergener MA. Cancer detection and the community pharmacist. *Am Pharm* 1989;NS29(7):54-9.
11. Mayer JA, Eckhardt L, Stepanski BM, et al. Promoting skin cancer prevention counseling by pharmacists. *Am J Public Health* 1998;88(7):1096-9.
12. Wong L, Burden AM, Liu YY, et al. Initial uptake of the Ontario Pharmacy Smoking Cessation Program: descriptive analysis over 2 years. *Can Pharm J (Ott)* 2015;148:29-40.
13. Lindsey L, Husband A, Nazar H, Todd A. Promoting the early detection of cancer: a systematic review of community pharmacy-based education and screening interventions. *Cancer Epidemiol* 2015;39:673-81.
14. Potter B, Gildengorin G, Wang Y, Wu M, Kroon L. Comparative effectiveness of two pharmacy-based colorectal cancer screening interventions during an annual influenza vaccination campaign. *J Am Pharm Assoc* 2010;50:181-7.
15. Gupta S, Vij A, Cafiero E, et al. Retail based screening mammography: assessment of women's preferences. *Acad Radiol* 2012;19:1268-72.
16. McGuire TR, Leyboldt M, Narducci WA, Ward K. Accessing rural populations: role of the community pharmacist in a breast and cervical cancer screening programme. *J Eval Clin Pract* 2007;13(1):146-9.
17. Canadian Pharmacists Association. Pharmacists improve health care access in Ontario. 2012. Available: www.pharmacists.ca/index.cfm/news-events/news/pharmacists-improve-health-care-access-in-ontario/ (accessed Jan. 29, 2016).
18. Ayorinde AA, Porteous T, Sharma P. Screening for major diseases in community pharmacies: a systematic review. *Int J Pharm Pract* 2013;21:349-61.
19. Odedina FT, Warrick C, Vilme H, Young S. Pharmacists as health educators and risk communicators in the early detection of prostate cancer. *Res Social Adm Pharm* 2008;4:59-66.
20. Canadian Task Force on Preventive Health Care. About the CTFPHC. 2015. Available: <http://canadiantaskforce.ca/about-us/about-the-ctfphc/> (accessed Jan. 28, 2016).
21. National Comprehensive Cancer Network. NCCN guidelines. 2015. Available: www.nccn.org/professionals/physician_gls/f_guidelines.asp#detection (accessed Jan. 2, 2016).
22. Canadian Task Force on Preventive Health, Tonelli M, Connor Gorber S, et al. Recommendations on screening for breast cancer in average-risk women aged 40-74 years. *CMAJ* 2011;183:1991-2001.
23. Canadian Task Force on Preventive Health Care, Dickinson J, Tsakonas E, et al. Recommendations on screening for cervical cancer. *CMAJ* 2013;185:13-4.
24. National Advisory Committee on Immunization. Summary of the National Advisory Committee on Immunization's update on the recommended human papillomavirus (HPV) vaccine immunization schedule: an Advisory Committee Statement (ACS). 2015. Available: www.phac-aspc.gc.ca/publicat/ccdr-rmtc/15vol41/dr-rm41s-3/updates-mj01-eng.php (accessed Apr. 19, 2016).
25. Canadian Cancer Society. HPV vaccines. Available: www.cancer.ca/en/cancer-information/cancer-101/what-is-a-risk-factor/viruses-bacteria-and-other-infectious-agents/hpv-vaccines/?region=bc (accessed Apr. 19, 2016).
26. Colon Cancer Canada. Fast facts on colorectal cancer. 2013. Available: <http://coloncancer.ca/fast-facts-on-colorectal-cancer-crc/> (accessed Jan. 28, 2016).
27. Canadian Task Force on Preventive Health Care. Recommendations on screening for colorectal cancer in primary care. *CMAJ*. 2016;188(5):340-8.
28. Canadian Task Force on Preventive Health Care Bell N, Connor Gorber S, et al. Recommendations on screening for prostate cancer with the prostate-specific antigen test. *CMAJ* 2014;186:1225-34.
29. Canadian Task Force on Preventive Health Care. Recommendations on screening for lung cancer. *CMAJ* 2016;188:425-32.
30. U.S. Department of Health and Human Services. *The health benefits of smoking cessation: a report of the Surgeon General*. Atlanta (GA): U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; 1990:107-35.
31. World Health Organization. Cancer prevention. 2016. Available: www.who.int/cancer/prevention/en/ (accessed Feb. 9, 2016).
32. BC Cancer Agency. Melanoma. 2016. Available: www.bccancer.bc.ca/health-info/types-of-cancer/skin/melanoma (accessed Jan. 26, 2016).
33. Chapman JR, Webster AC, Wong G. Cancer in the transplant recipient. *Cold Spring Harb Perspect Med* 2013;3(7):pii:a015677.
34. Grulich AE, van Leeuwen MT, Falster MO, Vajdic CM. Incidence of cancers in people with HIV/AIDS compared with immunosuppressed transplant recipients: a meta-analysis. *Lancet*. 2007;370:59-67.
35. Canadian Cancer Society. Risk factors for prostate cancer. 2016. Available: www.cancer.ca/en/cancer-information/cancer-type/prostate/risks/?region=sk (accessed Jan. 28, 2016).
36. Canadian Cancer Society. Risk factors for cervical cancer. 2016. Available: www.cancer.ca/en/cancer-information/cancer-type/cervical/risks/?region=sk (accessed Jan. 28, 2016).
37. Canadian Cancer Society. Risk factors for breast cancer. 2016. Available: www.cancer.ca/en/cancer-information/cancer-type/breast/risks/?region=sk (accessed Jan. 28, 2016).
38. Canadian Cancer Society. Risk factors for colorectal cancer. 2016. Available: www.cancer.ca/en/cancer-information/cancer-type/colorectal/risks/?region=sk (accessed Jan. 28, 2016).

39. Canadian Cancer Society. Risk factors for lung cancer. 2016. Available: www.cancer.ca/en/cancer-information/cancer-type/lung/risks/?region=sk (accessed Jan. 28, 2016).
40. Canadian Cancer Society. Risk factors for melanoma. 2016. Available: www.cancer.ca/en/cancer-information/cancer-type/skin-melanoma/risks/?region=on (accessed Jan. 28, 2016).
41. Davis TC, Dolan NC, Ferreira MR, et al. The role of inadequate health literacy skills in colorectal cancer screening. *Cancer Invest* 2001;19(2):193-200.
42. Doak CC, Doak LG, Friedell GH, Meade CD. Improving comprehension for cancer patients with low literacy skills: strategies for clinicians. *CA Cancer J Clin* 1998;48:151-62.
43. Giles JT, Kennedy DT, Dunn EC, Wallace WL, Meadows SL, Cafiero AC. Results of a community pharmacy-based breast cancer risk-assessment and education program. *Pharmacotherapy* 2001;21:243-53.
44. McGuire TR, Leyboldt M, Narducci WA, Ward K. Accessing rural populations: role of the community pharmacist in a breast and cervical cancer screening programme. *J Eval Clin Pract* 2007;13(1):146-9.