



Predictors of non-adherence to colorectal cancer screening among immigrants to Ontario, Canada: a population-based study



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ABSTRACT

Though colorectal cancer (CRC) screening rates have increased over time in Ontario, Canada, immigrants continue to have lower rates of screening. This study examines the association between non-adherence to CRC screening and immigration, socio-demographic, healthcare utilization, and primary care physician characteristics among immigrants to Ontario. This is a population-based retrospective cross-sectional study that uses healthcare administrative databases housed at the Institute for Clinical Evaluative Sciences. Our cohort comprised immigrants aged 60 to 74 years who lived in Ontario on March 31, 2015 and who had been eligible for the Ontario Health Insurance Plan for at least 10 years. The outcome was lack of adherence to CRC screening with any modality (fecal occult blood test, flexible sigmoidoscopy, colonoscopy) on March 31, 2015. Our cohort contained 182,949 immigrants. Overall 70,134 (38%) individuals were not adherent to screening. Risk of non-adherence to CRC screening was higher among immigrants who were from low (adjusted relative risk [ARR] 1.35, 95%CI 1.28–1.42) or low-middle (ARR 1.27, 95%CI 1.24–1.30, population-attributable risk [PAR] 9.8%) income countries and refugees (ARR 1.09, 95%CI 1.06–1.11). Compared to those from the United States, Australia, and New Zealand, immigrants from most other world regions, particularly Eastern Europe and Central Asia (ARR 1.28, 95%CI 1.21–1.37), had higher risks of non-adherence. Non-immigration factors such as low healthcare use and lack of primary care enrolment also increased the risk of non-adherence to screening. These findings can be used to inform future efforts to improve uptake of CRC screening among immigrant groups.

1. Introduction

Colorectal cancer (CRC) is the second most common type of cancer and cause of cancer-related mortality in Canada (Canadian Cancer Statistics Advisory Committee Editor, 2017). In 2017, it was expected that close to 40% of the individuals who would be diagnosed with CRC in Canada would be from the province of Ontario. Screening is effective at reducing CRC-related mortality and healthcare cost (Shaukat et al.,

2013; Coldman et al., 2015; Telford et al., 2010). The ColonCancerCheck program, launched in 2008 in Ontario, is an organized, population-based screening program (International Agency for Research on Cancer, 2005). It recommends screening average-risk individuals, defined as those aged 50 to 74 years who are asymptomatic and do not have a family history of CRC, with fecal occult blood test (FOBT) every two years (Cancer Care Ontario, 2016; Cancer Care Ontario, 2012). Other screening modalities endorsed by several

Abbreviations: CRC, colorectal cancer; FOBT, fecal occult blood test; PCP, primary care physician; ICES, Institute for Clinical Evaluative Sciences; IRCC, Refugee and Citizenship Canada; OHIP, Ontario Health Insurance Plan; RUB, Resource Utilization Band; ARR, adjusted relative risk; PAR, population-attributable risk

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organizations for average-risk screening, which include flexible sigmoidoscopy every five years and colonoscopy every ten years (Leddin et al., 2010; U.S. Preventive Services Task Force, 2008; Levin et al., 2008), are available in Ontario on an ad hoc basis.

Since 2013, the ColonCancerCheck program in Ontario mails invitation, recall, and reminder letters to all eligible individuals aged 50 to 74 years who are due for biennial FOBT screening (Cancer Care Ontario, 2016). The letters invite them to visit their family physicians in order to obtain an FOBT kit. Though most participants obtain the FOBT kits from their primary care physicians, they may also obtain them from nurse practitioners and less frequently from pharmacies or by contacting Telehealth Ontario. The specific FOBT currently used by the program is the guaiac FOBT (hema-screen™ by Immunostic Inc.).

CRC screening participation has increased over time in Ontario (Singh et al., 2015). The proportion of Ontarians overdue for CRC screening decreased from 50% in 2008 to 39% in 2015 (Cancer Quality Council of Ontario, 2017). However, immigrants continue to be less likely to undergo CRC screening in Ontario (Honein-AbouHaidar et al., 2013; Borkhoff et al., 2013; Buchman et al., 2016). Over half of all Canadian immigrants, who comprise 20% of the total national population, live in Ontario (Statistics Canada, 2011). Similar screening disparities among immigrants exist in Canada overall (Canadian Partnership Against Cancer, 2015; Wilkins and Shields, 2009) and in other countries (Goel et al., 2003; Klabunde et al., 2011; Ward et al., 2011; Koo et al., 2010; Turrin et al., 2015).

To our knowledge, most prior studies that focused on predictors of CRC screening among immigrants examined only a few, specific ethnic groups (Maxwell et al., 2000; Maxwell et al., 2008; Jandorf et al., 2010; Ellison et al., 2011; Lopez-Class et al., 2012; Todd et al., 2011; Thomson and Hoffman-Goetz, 2011). These studies showed positive associations between colorectal cancer screening and longer residency (Maxwell et al., 2000; Maxwell et al., 2008; Todd et al., 2011), English preference (Jandorf et al., 2010), physician recommendation (Jandorf et al., 2010; Ellison et al., 2011; Lopez-Class et al., 2012; Todd et al., 2011), having a regular physician (Ellison et al., 2011), having ever had a check-up (Maxwell et al., 2000), higher income (Maxwell et al., 2008), and greater health literacy (Todd et al., 2011). These studies were also limited by their small sample sizes and self-reported outcomes that were prone to recall bias. This study aims to assess characteristics of immigrants (encompassing all major world regions of origin) that may be associated with non-adherence to CRC screening in Ontario, specifically focusing on immigration, socio-demographic, healthcare use, and primary care physician (PCP) characteristics.

2. Methods

2.1. Study design, setting, and population

This is a population-based retrospective cross-sectional study. We used multiple healthcare administrative databases linked using unique, encoded identifiers and analyzed at the Institute for Clinical Evaluative Sciences (ICES), including the Immigration, Refugee and Citizenship Canada (IRCC)'s Permanent Resident Database (Appendix A). The IRCC database contains landing records of all individuals who obtained legal, landed immigrant status since 1985 and who could be linked to existing databases. All databases used in the study had been in operation for at least 10 years on March 31, 2015. Specific diagnostic and procedure codes were applied to define the exclusion criteria and outcome (Appendix B). Research Ethics Board approval was obtained from Sunnybrook Health Sciences Centre and St. Michael's Hospital in Toronto, Ontario, Canada.

Our cohort consisted of individuals in the IRCC database who were 60 to 74 years of age, had been eligible for the universal Ontario Health Insurance Plan (OHIP) for at least 10 years, and lived in Ontario on March 31, 2015. Though CRC screening is recommended for individuals aged 50 to 74 years, we excluded those younger than 60 and those who

immigrated within the past 10 years in order to ensure a standard observation window for all cohort members. Individuals who had a diagnosis of CRC or inflammatory bowel disease and those who received a total colectomy before March 31, 2015 were excluded. We also excluded individuals seen at community health centres because their PCPs could not be identified. Secondary analyses were performed on an expanded cohort of immigrants aged 52 to 74 years who had immigrated at least two years before March 31, 2015 to examine non-adherence among more recent and younger immigrants.

2.2. Data definitions

Our outcome was non-adherence to CRC screening with any modality on March 31, 2015. This was defined as not having had a FOBT in the previous two years (April 1, 2013 to March 31, 2015), sigmoidoscopy in the previous five years (April 1, 2010 to March 31, 2015), or colonoscopy in the previous 10 years (April 1, 2005 to March 31, 2015).

Our main predictors of interest were related to immigration. These were world region of birth and gross national income of country of birth, both of which were based on the World Bank classification system (The World Bank, 2017), immigration class (economic, family, refugee), and English language ability, level of education, and marital status at landing. Age of initial OHIP eligibility and time since initial OHIP eligibility were used as proxy variables for age and time since landing. Whether the last country of permanent residence before immigration to Canada was in the world region of birth was examined in order to assess the potential impact of secondary migration.

Socio-demographic factors studied were age, sex, location of residence (urban, suburban, or rural), and neighbourhood income quintile, which was defined by linking postal codes to income data from the 2006 Census. Ranging from 0 to 5, the Resource Utilization Band (RUB) reflects morbidity level of each individual by estimating the expected use of healthcare resources, taking into consideration one's age, sex, and existing diagnoses (The Johns Hopkins University, 2017).

The primary care roster status of each individual was also assessed. In Ontario, patients are rostered to PCPs in Primary Care Enrolment Models; these physicians receive financial incentives for screening their rostered patients for cancer. For those not formally rostered, patients can be “virtually rostered” to a PCP based on patterns of care; these patients include those whose physicians are paid in a traditional fee-for-service manner, who are not eligible for financial incentives for cancer screening. Individuals who are neither formally nor virtually rostered to a PCP are considered as “not rostered”, meaning that they do not see a PCP regularly or have a usual provider of care.

For immigrants who were either formally or virtually rostered, the following characteristics of their PCPs were examined: age, sex, whether the patient was of the same sex, duration of independent practice in Ontario, time since graduation, graduation from a Canadian or foreign medical school, whether world region of training was the same as a patient's region of birth, and type of Primary Care Enrolment Model (team-based, primarily fee-for service, or primarily capitation).

2.3. Statistical analysis

Baseline characteristics and outcomes were described in numbers and percentages, stratified by world region of birth. Poisson multivariate regression analyses were performed to estimate the unadjusted relative risks and adjusted relative risks (ARR) of non-adherence to CRC screening. Population-attributable risk (PAR) was calculated based on each ARR using the formula $PAR = P(ARR - 1) / [1 + P(ARR - 1)]$, where P is the estimated prevalence of a predictor. The PAR is interpreted as the proportion of screening non-adherence that would be eliminated if a factor was removed. Analyses were performed using SAS®9.4.

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