THE DEVELOPMENT AND EVALUATION OF THE CARDIOVASCULAR ASSESSMENT SCREENING PROGRAM

By © Jill E. E. Bruneau A dissertation submitted to the School of Graduate Studies in partial fulfillment of the requirements for the degree of

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Abstract

BACKGROUND: An exploratory mixed methods study, with the philosophical basis of pragmatism and interpretive description, was used to develop, implement, and evaluate an intervention called the Cardiovascular Assessment Screening Program (CASP) to address the underutilization of clinical practice guidelines for cardiovascular screening. The Knowledge-to-Action (KTA) Framework with guideline adaptation was used to guide the study.

METHODS: In phase 1, the qualitative study, ten interviews and five focus groups were conducted with healthcare providers (HCPs), managers, and the public to gain different perspectives to inform the development of CASP. In phase 2, the quantitative study, CASP was tested in a randomized controlled trial (RCT) with eight nurse practitioners (NPs) and 167 patients aged 40-74 years without previously diagnosed cardiovascular disease (CVD). The intervention group implemented CASP while the control group provided usual care. Phase 3 integration examined the results from phases 1 and 2.

RESULTS: From the focus groups and interviews conducted in the qualitative phase, themes emerged related to the barriers to, facilitators of, and strategies for CVD screening in the local context. The Theoretical Domains Framework (TDF) was applied to the themes to identify relevant behaviour change techniques and modes of delivery, from which specific intervention components for CASP were developed. Findings from Phase 2, the RCT, showed a statistically and clinically significant difference between the NP intervention group compared to the control group in terms of comprehensiveness of screening, RR = 43.9, 95% CI [13.4, 144.2], $p < .0001$. The NPs in the intervention group were able to identify multiple risk factors; determine their patients' level of CVD risk; identify NPs' and patients' priorities for action; and encourage individualized goal-setting with patients for heart health. In Phase 3, the integration of results from phases 1 and 2 confirmed and refined strategies for knowledge translation. The mixed methods study results are reported in Manuscript 1, while Manuscript 2 focuses primarily on Phase 2, the results from the RCT. Manuscript 3 discusses strategies to address recruitment issues of HCPs such as nurses and NPs, as participants in research studies.

CONCLUSION: CASP was effective and can be used by HCPs and patients for CVD screening and management utilizing current guidelines to identify risk factors and promote relevant actions to reduce CVD risk and promote healthy aging.

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List of Abbreviations

A1C	Glycated Hemoglobin
BCT	Behaviour Change Techniques
BP	Blood Pressure
CAD	Coronary Artery Disease
CASP	Cardiovascular Assessment Screening Program
CBA	Controlled Before After Study
C-CHANGE	Canadian Cardiovascular Harmonized National Guidelines Endeavour
CDC	Centers for Disease Control
CDSS	Clinical Decision Support System
CHAP	Cardiovascular Health Awareness Program
CHD	Coronary Heart Disease
CHHSAP	Canadian Heart Health Strategy Action Plan
CI	Confidence Interval
CIHI	Canadian Institute for Health Information
CME	Continuous Medical Education
CPG	Clinical Practice Guideline
CRP	C - reactive protein
CT	Computed Tomography
CV	Cardiovascular
CVD	Cardiovascular Disease
FRS	Framingham Risk Score
HCP	Healthcare Provider
IQI	Interquartile Interval
ITS	Interrupted Time Series
JBI	Joanna Briggs Institute

KTA	Knowledge-to-Action
MHI	Million Hearts Initiative
MI	Myocardial Infarction
NLCHI	Newfoundland and Labrador Centre for Health Information
NHS	National Health Service
NP	Nurse Practitioner
OR	Odds Ratio
PI	Principle Investigator
PHAC	Public Health Agency of Canada
RCT	Randomized Controlled Trial
RHA	Regional Health Authority
RPAC	Research Proposal Approvals Committee
RR	Relative Risk
TDF	Theoretical Domains Framework
TIA	Transient Ischemic Attack
UTI	Urinary Tract Infection
WHO	World Health Organization

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CHAPTER 1 Introduction

Chapter 1 summarizes the comprehensive literature review conducted on the topic of cardiovascular disease screening of risk factors, the issues of inconsistent use of clinical practice guidelines for screening by healthcare providers, and the barriers of and facilitators to cardiovascular disease screening. Chapter 1 also provides evidence of various interventions that can increase healthcare provider adherence to clinical practice guidelines and the role of nurse practitioners in cardiovascular screening and management. An overview of the mixed methods research study is provided along with a description of the manuscripts that follow in this dissertation.

Cardiovascular disease (CVD) causes significant mortality and morbidity and contributes to substantial economic, social, and personal burden in our society today (World Health Organization [WHO], 2017). CVD is the number one cause of death globally (WHO, 2018). In both Canada and Newfoundland and Labrador (NL), CVD accounts for approximately 30% of the total deaths (Statistics Canada, 2016). The provision of care for people with CVD and other chronic diseases must continue, however, there needs to be a shift in focus away from treatment-oriented strategies to prevention and health promotion strategies through earlier screening and management to curtail the development of CVD risk factors and conditions. Screening for CVD is suboptimal and it is not clear what interventions are most effective to promote CVD screening based on current recommendations (Unverzagt, Oemler, Braun, & Klement, 2014). A mixed methods study, with the philosophical basis of pragmatism and interpretive description, was conducted to develop a contextually relevant intervention and to test its effectiveness in comparison to usual practice. The purpose of this research was to answer the overall research question about finding effective strategies to increase the uptake of clinical practice guidelines, specifically through the development, implementation, and evaluation of this novel screening program for nurse practitioners (NPs) and patients, the Cardiovascular Assessment Screening Program (CASP). The specific populations of interest were NPs, and their patients, aged 40-74 years, without a previous diagnosis of CVD residing in communities across NL.

This dissertation reports on the exploratory sequential mixed methods study that explores the perspectives of key stakeholders to inform the development of a contextually

relevant CASP intervention and then tests this intervention with NPs and patients. Chapter 1 provides the context for the study by summarizing important literature and an overview of the mixed methods study. Chapters 2-4 consists of manuscripts related to this research and chapter 5 summarizes this dissertation and provides recommendations for future practice and research. Further details of the manuscripts and chapters are summarized at the end of chapter 1.

This chapter summarizes key background information and introduces the mixed methods study. First, the chapter will define CVD and then describe what is known about CVD screening and the gaps that were found in the literature. Then, CVD screening is defined for this research study followed by a discussion of the appropriateness of screening and how CVD meets accepted criteria for initiating a new screening program. Differences in CPGs for CVD screening and management from developed countries are briefly discussed as is the importance of adopting the current Canadian guideline, the Canadian Cardiovascular Harmonized National Guidelines Endeavour (C-CHANGE) for our research study (Tobe et al., 2018). Issues related to the use of current CPGs for CVD screening will be discussed including the barriers and facilitators at the individual, healthcare provider, organizational and systems levels. The evidence linked with the intervention strategies for healthcare provider adherence to CPGs in daily practice will be reviewed. NPs are highlighted as members of the interprofessional team to play a key role in CVD screening and management (Farrell & Keeping-Burke, 2014). The implications for our research will be summarized as relevant. The philosophical and methodological approach of interpretive description will be described as the foundation

for this research study (Thorne, 2016). The research questions that have arisen from the gaps identified in the literature along with the mixed methods study design will be outlined. This chapter therefore shows evidence to support the development, implementation, and evaluation of a unique screening intervention based on current CPGs for the NL context to be used to promote cardiovascular health in the population.

1.1 Background

Chronic diseases such as CVD represent considerable burden in our population and important challenges for the healthcare system. Treatment for people with chronic diseases must continue, but a focus on prevention and health promotion strategies can potentially reduce this burden in the future. Screening for CVD is critical to identify risk factors early so that treatment and secondary prevention can begin (Tobe et al., 2018; Piepoli et al., 2016; Goff et al., 2014). Evidence-based CPGs are available with specific recommendations for screening, diagnosis, and management of CVD and related contributing factors and conditions. The problem that has been identified from the literature is that there is inconsistent utilization of cardiovascular screening CPGs by healthcare professionals (Unverzagt, Oemler, Braun, & Klement, 2014). Many strategies to increase utilization of CPGs have been identified in the literature, but the Knowledge to Action (KTA) Framework (Graham et al, 2006), with guideline adaption (Harrison et al., 2013) states that interventions must be context driven. Theoretical frameworks and a conceptual model, based on the literature, were used to guide this dissertation research.

1.11 Use of frameworks to guide the research. The KTA Framework was used as a theoretical framework to guide this mixed methods study. The focus of this framework is on knowledge translation specifically, getting expert evidence into daily clinical practice. The KTA framework has several phases: a) identifying the expert knowledge, b) developing a contextually relevant intervention, and c) evaluating the implementation of the intervention and sustainability of knowledge use. The KTA Framework, with guideline adaption, can be found in Appendix A.

The KTA Framework was utilized to guide this dissertation research to determine effective strategies for knowledge translation of the C-CHANGE guideline into daily clinical practice in NL. The first phase of the KTA Framework involved identifying the C-CHANGE guideline as the expert knowledge, the second phase required identifying the barriers and facilitators to knowledge use and tailoring an intervention to be relevant to the NL context. Identification of the barriers and facilitators for CVD screening as well as intervention strategies to address screening and appropriate management based on current CPGs are relevant to NL; this province has the highest rates of hypertension, obesity, diabetes, and cardiovascular disease in Canada and the fastest aging population projected for 2024 (Government of NL, 2014). The third phase of the KTA Framework completed during this research study was evaluating the implementation process of the CASP intervention with NPs across NL. The final phase of the KTA Framework concerns the sustainability of knowledge use through the evaluation of patient outcomes, practice, and system, but due to limitations of dissertation research this will be the focus of a future research study.

The Theoretical Domains Framework (TDF) was used in this research to specifically guide the development of the CASP intervention by focusing on the behaviour change of individuals as well as assessing implementation problems (Michie et al, 2013). There is evidence from other research studies of successful use of the TDF for intervention development aimed at improving implementation of CPGs by HCPs (French et al., 2012). In this research study, the TDF provided a comprehensive approach to determine the main factors influencing clinician behaviour according to selected domains; the techniques to be used encouraged change at the individual and organizational level; and, the methods to facilitate change along with relevant components of the CASP intervention (Atkins et al., 2017, Michie, 2015).

For this literature review, the databases searched were CINAHL, PubMed, and Embase from inception until 2019. This timeframe was chosen to capture relevant literature on CVD, CPGs, and the population-based screening initiatives that have arisen over the past decades. Database searches used both controlled vocabulary such as CINAHL Headings and Medical Subject Headings, as well as keyword terms. Major concept groups were used in a variety of combinations. The following keywords were used in the search: cardiovascular disease, screening, risk assessment, clinical practice guidelines, healthcare providers, community settings, interventions, and nurse practitioners. Studies published in English and French were considered for inclusion in this review. The reference lists of articles were searched for additional articles. Grey literature sources were also searched using the following websites: ProQuest Dissertations and Thesis; Google and Google Scholar; websites for various

cardiovascular screening programs, and heart associations. Quantitative studies included in the background were critically appraised using the Public Health Agency of Canada (PHAC) Critical Appraisal Toolkit (PHAC, 2014). Qualitative studies included in this review were critically appraised using the Joanna Briggs Institute (JBI) Critical Appraisal Tools (JBI, 2017).

1.2 Cardiovascular Disease

CVD includes diseases of the heart, vascular diseases of the brain, and diseases of blood vessels. Because of atherogenesis and other mediating factors, individuals can suffer from various conditions such as coronary heart disease, ischemic heart disease, myocardial infarctions, heart failure, transient ischemic attacks, cerebrovascular accidents, and peripheral vascular disease (PHAC, 2016). CVD is associated with multiple risk factors and comorbidities. The development of CVD is the result of multiple interacting genetic, social, and environmental factors occurring from conception onward throughout the lifespan and increasingly prevalent with an aging population (WHO, 2016).

1.3 CVD Screening

For the purposes of this research study, CVD screening is defined as looking for the presence of risk factors, comorbidities, and socioenvironmental conditions that can lead to the development of CVD. Screening for CVD is far more complex than simply screening for a single disease because of the multitude of factors, comorbidities, socioenvironmental conditions that contribute to its development. Traditional CVD risk

factors such as family history of premature coronary heart disease, dyslipidemia, smoking, inactivity, unhealthy diet, excess alcohol, obesity, and psychological stress are considered important to screen (PHAC, 2018; Leiter et al., 2011). Comorbidities such as diabetes and hypertension further contribute to the development of CVD. However, other risk factors and socioenvironmental conditions for CVD may be screened for depending on the context. Social circumstances, social support, income level, education, literacy level, and living and working conditions can have an impact on the ability or motivation of individuals to make healthy choices, achieve food security, and access health and social services that can influence health outcomes (Garg, Boynton-Jarrett, & Dworkin, 2016). In this dissertation, comprehensive CVD screening involved consideration of these many factors that can influence the development of CVD. Specifically, comprehensive screening was defined as systematic screening of adults aged 40-74 years for the following risk components: age, family history of premature coronary artery disease, Framingham Risk Score, smoking status, body mass index, waist circumference, blood pressure, lipid profile, A1C, and stress.

1.4 Appropriateness of CVD Screening

According to WHO, screening for CVD risk factors is important since CVD is well defined, is of public health importance, and has a known prevalence in the population worldwide with effective, affordable, and acceptable treatment available to all those who require it (Mendis, Puska, & Norrving, 2013). Criteria to determine the appropriateness of any screening initiative were outlined originally and published in a WHO report (Wilson & Jungner, 1968). The National Screening Committee from the

United Kingdom (UK) has since outlined criteria based on the original WHO report that should be met before screening for a disease or condition (UK National Screening Committee, 2015). According to the UK model, criteria for appraising the viability, effectiveness, and appropriateness of a screening program are the following: a) the condition ~~as~~ must be an important public health problem, b) the nature of the screening test(s) must be simple and valid, c) the treatment for the condition must be effective, and d) there must be evidence that screening for the condition can reduce morbidity and mortality. Each specific set of criteria is discussed in more detail in this section.

1.4.1 CVD is an important public health problem. CVD causes significant mortality, morbidity, and accelerating healthcare costs. As previously stated, CVD is the number one cause of death globally (WHO, 2018). In both Canada and NL, CVD accounts for approximately 30% of the total deaths (Statistics Canada, 2016). Morbidity resulting from myocardial infarctions and strokes has potential devastating impact on individuals, families, and communities. In Canada, costs have escalated beyond $20.9 billion annually in terms of healthcare expenditures and lost productivity (Heart Research Institute, 2019). Morbidity costs for CVD are related to high rates of hospitalization, disability, drug utilization, and the use of specialized cardiovascular (CV) diagnostic and therapeutic invasive procedures as well as decreased quality of life for many individuals and families (PHAC, 2017).

CVD prevalence increases with advancing age, so although the age-standardized incidence of ischemic heart disease, heart failure, and all-cause mortality have declined over the past decade, the burden of CVD is expected to remain elevated in the future

because of our aging population, population growth, and improved survival of those affected by CVD in Canada (PHAC, 2018). Older adults are predicted to comprise 25% of the Canadian population by 2036 (Statistics Canada, 2016). The province of NL has one of the highest rates of CVD in Canada as well as the fastest aging population (Government of Canada, 2018).

In Canada and the province of NL, the potential burden of CVD in the future will be significant based on the risk factor prevalence. In 2018, approximately nine in ten Canadians (24 million people) had at least one risk factor for heart disease and stroke and indigenous people are 1.5 to 2 times more likely to develop heart disease (Heart Research Institute, 2019; Heart & Stroke Foundation, 2019). In NL specifically, about 25% of people have hypertension, 9% have diabetes, about 23% of individuals are current smokers, 26% report heavy drinking, and 70% of individuals are overweight or obese (Statistics Canada, 2017). Sustained efforts to prevent development of cardiac risk factors through early detection and treatment are needed since the high prevalence of risk factors and comorbidities put the aging population at a higher risk of developing CVD in the future (PHAC, 2018; Kohli et al., 2014).

1.4.2 Screening tests and tools are applicable. The second set of criteria that should be met before a CVD screening program is initiated is related to the screening tests as well as the screening tools used by healthcare providers (HCPs). The screening tests used should be simple, safe, precise, validated, and acceptable to the population (UK National Screening Committee, 2014). Screening for hypertension is one example that can be used to illustrate that an appropriate, validated test is available. The most accurate

diagnosis of elevated blood pressure (BP) or hypertension requires use of an electronic, calibrated, blood pressure monitor over several consecutive visits by a primary care provider (Gelfer, Dawes, Kaczorowski, Padwal, & Cloutier, 2015). According to Hypertension Canada Guidelines, the BP measurement can be easily interpreted as low, normal, or elevated (2019). Like BP monitoring for hypertension, valid and reliable tests are also available for other risk factors such as diabetes, dyslipidemia, and obesity, and meet the requirements of a simple, safe, and precise measurement.

Because screening for CVD is so complex, measuring risk factors singly is not enough; it is more important to consider total or global CV risk to communicate with the patient. There are several valid and reliable global risk assessment tools that have been developed in countries around the world that are available to use (Willis, Davies, Yates, & Khunti, 2012; Grover et al., 2011, Collins & Altman, 2010). Risk assessment tools have been validated in specific populations so may or may not be accurate for individuals in other populations. The estimates of absolute risk may show variations between different populations because of geographical, cultural, social, behavioural, or genetic differences found in the population. Common risk assessment tools found in the literature are the following: Framingham Risk Score, Systematic Cerebrovascular and cOronary Risk Evaluation (SCORE), SCORE-Canada, Reynold's Risk Score for Women and Reynold's Risk Score for Men, and the Healthy Heart Score, QRISK®2 (Chiuve et al., 2014; Fornasini et al., 2006; Horgan, Blenkinsopp, & McManus 2010; Collins & Altman, 2010; Stamatelopoulos et al., 2008; Ulmer, Kollerits, Kelleher, Diem, & Concin, 2005). Choosing a relevant screening tool is important to be able to accurately predict an

individual's 10-year risk of having a CV event. Predicting whether an individual is at low (<10%), moderate (<10-19%), or high (>20%) risk of having a CV event (angina, myocardial infarction and CV death) is important to assist in clinical decision making about treatment and to avoid under or over-treatment. Choosing a relevant tool is dependent upon the population being researched or treated.

The Framingham Risk Score, originating from the Framingham Heart prospective cohort study, is the most commonly used online risk assessment tool in Canada to estimate absolute global cardiovascular risk. The following information can be inserted into the FRS calculator to determine an individual risk score: age, gender, total cholesterol, smoking status, diabetes, and blood pressure. Based on the risk calculator the individual's overall 10-year risk of development of CV event can be determined. The Framingham model works well if it is calibrated to mortality data and other data for specific populations, however, the FRS may not accurately predict risk in populations that were not involved in the original study, for example, Chinese, Hispanic, South Asian, or Indigenous populations (Health Canada, 2017; D'Agostino et al., 2008).

There are limitations to consider related to using the FRS in the Canadian population. Interpretation of risk is determined by the individual clinician's knowledge and experience with using the FRS tool, so results may vary. Further training in the use of risk estimation and interpretation may be helpful to ensure interrater reliability. Also, the assessment of anxiety and depression is generally not included in risk evaluation tools (Health Canada, 2017; Manzoni, Castelnuovo, & Proietti, 2011). Stress is a known risk factor for CVD and is not taken into consideration when evaluating risk using the FRS

tool, therefore the FRS may not accurately predict risk if an individual has stress. Finally, the social determinants of health are generally not considered in evaluating risk for individuals or for making recommendations. The social determinants such as income, education, social support and employment can all independently and in combination increase or decrease level of risk for CVD (Kreatsoulas & Anand, 2010)**.** Despite these limitations, the FRS tool is currently recommended to be used in the Canadian population (Anderson et al., 2013).

1.4.3 Effectiveness of treatment of CVD. The third set of criteria that should be met before a CVD screening program is initiated relates to the value of early detection and thereby the effectiveness of early treatment. There must be evidence that treating the condition earlier leads to better outcomes than later treatment so that earlier detection through screening is warranted (UK National Screening Program, 2014). There are effective treatments available for each modifiable risk factor for CVD. For example, there is evidence that glycemic control and appropriate therapeutic management is critical to reduce the risk of vascular events for an individual with Type 2 diabetes (Zinman et al., 2015; Hirakawa et al., 2014).

1.4.4 Effectiveness of the CVD screening. The fourth set of criteria is that there must be evidence from high quality studies that a screening program for CVD reduces morbidity and mortality (UK National Screening Committee, 2015). A systematic review of systematic reviews has provided evidence of a reduction in morbidity and mortality associated with screening for individual risk factors for CVD (Alvarez-Bueno et al., 2015). As one example to illustrate effectiveness, a cohort study in which 400 000

participants were screened and followed for five years showed significantly lower rates of CVD, higher detection of CVD-related health conditions, and lower healthcare utilization and costs (Lee et al., 2015).

1.5 CPGs for CVD Screening

There are many guidelines available worldwide with regards to screening for CVD or identifying individual CV risk factors and comorbidities. Most countries and jurisdictions develop and implement CPGs based on consensus of the best available research evidence. The CPGs are frequently updated as new research is reported and are based on different levels of evidence. The best available research is evaluated according to the type of evidence available using the GRADE criteria to grade quality (or certainty) of evidence and strength of recommendations. Randomized Controlled Trials (RCTs) and meta-analyses are considered to be the highest level of evidence on which to base recommendations. Less valuable evidence is based on consensus of expert opinion or retrospective studies that are interpreted and graded differently by professionals as a basis for recommendations. Also, regions develop guidelines in accordance with their healthcare systems, organizational structures, healthcare costs, and feasibility.

Guidelines from three different regions of Canada, Europe and the USA can be compared to illustrate some of the differences. In Canada, the (C-CHANGE) guideline is recommended for HCPs to use as previously mentioned (Tobe et al., 2018). The European Guidelines on Cardiovascular Disease Prevention in Clinical Practice is available (Piepoli et al., 2016). In the USA, the most updated version of ACC/AHA

Guideline on the Primary Prevention of Cardiovascular Disease is used (Goff et al., 2014).

The aforementioned guidelines differ in the timing to screen asymptomatic people, the use of global risk assessment tools, and the focus on dominant risk factors or comorbid conditions. The target age to begin screening asymptomatic adults varies in the three regions: 40 years of age in Canada, adult males over 40 years and females over 50 years according to European guidelines and adults 20-79 years in the USA (Tobe et al., 2018; Piepoli et al., 2016; Goff et al., 2014). In Canada, CVD screening may begin earlier if there are one or more risk factors already present such as smoking, hypertension, diabetes, a family history of premature CVD, or if there are symptoms suggestive of CVD (Tobe et al., 2018).

The use of global risk assessment tools to estimate the 10-year risk of an individual having a CV event varies by region. As previously discussed, the Framingham Risk Score has been used most frequently in Canada and is recommended to be done every 3-5 years (Tobe et al., 2018). The SCORE risk assessment tool is used in countries throughout Europe to estimate risk (Piepoli et al., 2016). The Pooled Cohort Equations have been used in the USA to determine risk estimates for having a CV event in the next 10 years (Goff et al., 2014).

The three regions differ regarding specific risk factors that should be assessed such as dyslipidemia, C-reactive protein (CRP), and screening for type 2 diabetes mellitus. For example, when screening for dyslipidemia, Canadian and European

guidelines have similar targets for different components, however, the USA has discarded the use of lipid targets to guide clinical decisions. For CRP, an inflammatory marker detected by a blood test, recommendations differ for all three regions. The Canadian guidelines do not include CRP screening and the European guideline indicates that including CRP may be premature; the USA, however, states that the CRP test can be useful for men 50 years and women 60 years and younger for CV risk assessment. Screening for type 2 diabetes mellitus in Canada is recommended every three years starting with individuals > 40 years or earlier with either a fasting blood glucose, an A1C, or a 2-hour postprandial glucose. The USA recommends measuring A1C in asymptomatic adults without diagnosis of diabetes but does not specify age.

The current C-CHANGE guideline is a consensus document developed for HCPs in Canada to potentially integrate the best available evidence into practice, to reduce inconsistencies, and to facilitate interprofessional collaboration among team members to improve the quality of patient care (Tobe et al., 2018). This guideline was developed by experts from the following organizations in Canada: Canadian Action Network for the Advancement, Dissemination and Adoption of Practice-informed Tobacco Treatment; Canadian Association of Cardiac Rehabilitation; Canadian Cardiovascular Society; Diabetes Canada; Hypertension Canada; Canadian Society for Exercise Physiology; Heart and Stroke Foundation, Canadian Stroke Best Practice Recommendations; and Obesity Canada. The C-CHANGE Guideline Panel updates its harmonized guideline when the various guideline groups release new critically important recommendations, or

a sufficient number of guideline groups have updated their recommendations (Tobe et al., 2018).

1.6 Is CVD Screening Utilizing CPGs Currently Being Done?

Although the C-CHANGE guideline is available and there is evidence that CVD screening is effective (Alvarez-Bueno et al., 2015), we have no national database to determine screening rates for CV risk factors in Canada for primary or secondary prevention. In Canada, there is no surveillance for screening rates of CVD risk factors like there is for chronic disease rates, hospitalization rates, or mortality data (PHAC, 2018). National and provincial survey data is often based on self-reports, hospitalization rates, or government documents not on actual screening at the provider level. Statistics Canada, Canadian Institute for Health Information (CIHI), and the NL Centre for Health Information (NLCHI) may collect data on individual risk factors in the population but there is no context for the data. For example, HCPs will document CVD screening results but if it is not recorded in a standardized way into a provincial or national databases, the screening rate is not accessible.

Progress is being made with the implementation of electronic health records, but a standardized documentation system for screening rates of CVD risk factors is lacking. Screening for CVD risk factors in Canada is not required through legislation, so records are not generally available or accessible for routine screening practices. Screening that occurs in the hospital setting may be recorded in provincial databases that are not accessible to individual HCPs in community practices. In Canada, electronic health

records have improved over the past decade, but ~~is~~ they are not always readily accessible in all provinces and territories and may vary depending on the region of the country (CHHS, 2009). In contrast, electronic databases in the UK contain specific information on rates of smoking, diabetes, hypertension, and other risk factors by region through accessible databases to the government, organizations, HCPs, and the public (National Health Service [NHS] Health Check, 2018).

This review of the literature found that documentation of screening rates for CVD risk factors in Canada and NL is suboptimal due to lack of specific information about the surveillance of risk factors or prevalence studies as just described. The surveillance of specific risk factors that can lead to the development of chronic diseases are not consistently recorded in accessible databases nationally, provincially, or regionally. Although there are no prevalence studies assessing screening rates, baseline rates reported in of intervention studies suggest screening is low. For example, in the UK, a recent quasi-experimental trial had an outcome measure of participation in the NHS Health Check Program. Researchers reported that attendance in the Health Check Program was low, but with a slight increase in participation from 12% to 30% between the years 2011-2015 (Kennedy, Su, Pears, Walmsley & Roderick, 2019). Similarly, a meta-analysis of studies from a recent systematic review by Unverzagt, Oemler, Braun, & Klement (2014), indicates that uptake of different CVD guidelines in primary care was lower prior to interventions, but these studies evaluated treatment for CVD care rather than CVD screening. Uptake of the C-CHANGE guideline by HCPs is similarly a concern and interventions at the provider level are needed (S. Tobe, personal

communication, October 12, 2017). We also have evidence from a retrospective cohort analysis of 5688 patients admitted to hospitals with their first MI in Canada on suboptimal screening for diabetes and dyslipidemia (Lugomirski et al., 2013). Researchers found that opportunities for the prevention of coronary artery disease were being missed, and more emphasis needed to be on identifying CVD risk factors before the development of acute coronary artery disease (Lugomirski et al., 2013).

1.7 Major CVD Screening Initiatives

Since screening for CVD risk factors or risk assessment is important for reducing CVD through appropriate management, it is important to review successful initiatives that are currently ongoing. In the UK, there is a NHS Health Check program that targets adults aged 40-74 years without previously diagnosed CVD. This Health Check program mandates HCPs to identify risk factors and to use appropriate management aimed to reduce CVD risk for patients (NHS Health Check Program, 2015). The USA has a population level program that promotes assertively screening for CVD and other chronic conditions called the Million Hearts Initiative (MHI). This federally funded initiative that focused on primary and secondary CVD prevention has recently ended and claims to have prevented half a million MIs and CVAs over five years from 2011-2017 (Centers for Disease Control [CDC], 2012). Based on these positive results, the MHI was extended to 2022 (CDC, 2019). There is support for the role of nurses, and specifically NPs, with a workforce of 2.8 million to take the lead in promoting CV health through the MHI (Melnyk et al., 2016). In Canada, there is no national CVD screening initiative despite the recommendations from the *Canadian Heart Health Strategy and Action Plan* (CHHSAP)

that was developed with extensive input by national experts in cardiovascular health. Unfortunately, this national initiative in Canada was never implemented (Smith, 2009).

Although there is no national program in Canada, a provincial initiative in Ontario for adults 65 years and over, the Cardiovascular Health Awareness Program (CHAP), is a community-based initiative that is mainly focused on blood pressure assessment by trained volunteers. It also gathers information about other key risk factors such as smoking and dietary habits through a screening questionnaire. CHAP volunteers then communicate abnormal findings to primary care providers. The CHAP initiative was successfully evaluated using a cluster RCT comparing the year before and the year after implementation of CHAP. The researchers Kaczorowski et al. (2011) found that CHAP was associated with a 9% relative reduction in the composite end point (rate ratio 0.91, 95% CI [0.86 to 0.97], (p = .002) and there were 3.02 fewer annual hospital admissions for cardiovascular disease per 1000 people aged 65 years and over. CHAP has been implemented in other Canadian provinces such as Quebec, and continues to expand in other areas. However, CHAP is limited in its scope and does not take a comprehensive approach to CVD screening and management. The target population for CHAP is individuals over 65 years and is limited to individuals obtaining prescriptions from local pharmacies rather than targeting younger people to identify and manage risk factors. The organizational infrastructure necessary for a CVD program similar to CHAP is not likely realistic in NL. In our province, there have been successful heart health initiatives with community-based programming and strategic partnerships implemented in the past such as the NL Heart Health Program that evolved into the current Wellness Program and

Wellness Coalitions in the province. However, interventions that can be implemented at the level of individual HCPs such as NPs and family physicians do not exist. There are no provincial screening programs that use an upstream approach to identify risk factors earlier for primary or secondary prevention of CVD and other chronic diseases.

1.8 Summary of Background and Implications for Current Research

Screening for CVD meets the criteria as an appropriate condition for screening since CVD is an important health problem with applicable tests and effective treatments. The C-CHANGE guideline recommends screening for asymptomatic adults beginning at the age 40 or earlier if warranted by the presence of risk factors. The FRS is the most acceptable tool to assess global risk and on which to base recommendations for management of risk factors for specified populations.

There is good evidence from systematic reviews that adherence to guidelines can reduce morbidity and mortality so systematic CVD screening is justified. Recommendations on the use of current CPGs for appropriate testing and treatments is key. Even though little is known about screening rates, limited evidence indicates it can be increased. The UK has implemented the NHS Health Check Program, but no such national initiative exists in Canada, even though one was recommended (Smith, 2009). The implementation of a comprehensive CVD screening program is warranted.

Reviewing the literature as well as existing initiatives and programs was important to determine the successful components to be incorporated into a CVD screening program for the NL context. In this dissertation, a CVD screening program

implementation by HCPs on a provincial level should target asymptomatic high risk individuals aged 40-74 years with at least one risk factor for CVD. The literature supports implementation of an intervention to promote screening by HCPs with specific guidelines for screening and management available in the C-CHANGE guideline. The utilization of global risk assessment tools, physiological measurements, and online programs with consistent documentation of risk factors into an electronic database would be integrated into the screening program for NL. The CVD screening program planned for NL would integrate the social, behavioural, and environmental determinants of health. Before decisions can be made about an intervention that can be implemented, it is important to consider the factors that can impact screening and to discuss the barriers and facilitators associated with screening that have been published in the literature.

1.9 Factors That Can Impact Screening

Screening for the multitude of comorbid conditions and CVD risk factors is complex. Each risk factor or comorbid condition for CVD has different clinical guidelines on "best practice", and this can be overwhelming and make it difficult for clinicians to stay abreast of the most current research available. Screening and treatment of individual risk factors, such as diabetes, hypertension, or dyslipidemia, for example, are more likely to occur than assessment of multiple risk factors simultaneously (Hopper, Billah, Skiba, & Krum, 2011; Kumar et al., 2009; Wright, Romboli, DiTulio, Wogen, & Belletti, 2011). HCPs find it challenging to follow the most evidenced-informed practice guidelines and make appropriate clinical decisions to provide the best individualized care for patients with multi-morbidities (Unverzagt, Oemler, Braun, & Klement, 2014).

Screening for risk factors for the prevention of CVD generally occurs opportunistically rather than systematically for several reasons such as the complexity of CVD screening, limited time available, and alternative priorities of organizations. Opportunistic screening by HCPs often occurs when individuals present with another health issue or following an acute CV event. Busy health professionals with limited time for patient encounters may screen for single risk conditions rather than comprehensive screening for all relevant risk factors for CVD during a single visit (Dyakova et al., 2016). Organizational priorities focus on the treatment of established disease rather than comprehensive screening for CVD or systematic documentation of CVD risk factors.

1.9.1 Barriers and facilitators to CVD screening. There are barriers and facilitators to the uptake of CVD screening practices by individual patients, HCPs, and the organizational or health systems level described in the literature (Khatib, et al., 2014). Improved awareness of global risk scoring (Hobbs, Jukema, Da Silva, McCormack, & Catapano, 2010) and other components of comprehensive screening such as obtaining physiological measurements, ordering specific laboratory tests, and following up with patients individually, may be achieved through increased awareness by the public, HCPs, and organizations. Emphasizing the significance of identification of individuals at high risk for developing CVD in the future is critical. The barriers and facilitators relevant to screening for CVD at each level are discussed in this section.

1.9.1.1 Individual patient level. At the individual level, healthy people may feel reluctant to be screened since they are asymptomatic and may not feel that it is relevant. Those who are at risk because of known lifestyle issues of smoking, sedentary living,

excessive stress, or unhealthy eating may not be motivated to be screened related to fear of identification of problems requiring behavior change (Ford, Zhao, Tsai, & Li, 2011). Individuals may not be interested in taking or adhering to new medication regimes (Benito et al., 2018) Also, those individuals living in low socioeconomic conditions, and poor housing may have no or poor accessibility to health services, screening, and recommended treatments (Wools, Dapper, & de Leeuw, 2016). Another issue could be related to the amount of time and effort required for some procedures and then associated wait times (Leinonen et al., 2017). Finally, some people may lack knowledge of the importance of screening for certain health conditions and, therefore, would not seek screening opportunities (Fritzell, Stake Nilsson, Jervaeus, Hultcrantz, & Wengstrom, 2017).

Facilitators at the individual level may increase participation in the screening process. Individuals who are motivated to stay healthy and strive to engage in screening can communicate with providers through online programs, social media, or apps that link directly to clinics (Hobbs et al., 2010). Capitalizing on opportunities to encourage self-motivation and assess the level of self-efficacy in individuals can facilitate screening. Other people may be fearful of being unhealthy so this may encourage them to continue to be screened so that they know that they are in good health. Some individuals who have had the experience of a close relative diagnosed with a terminal disease may be prompted to undergo investigations and screening (Benito et al., 2018). Awareness campaigns, including social media, can increase knowledge about the importance of getting screened and can engage the general public in screening (Jessup et al., 2018). Increasing access by

making the screening process more convenient for people may encourage them to participate in a screening program (Ragas et al., 2014).

1.9.1.2 Healthcare provider level barriers. At the healthcare provider level, accessibility, capability, and intention barriers can exist. Screening initiatives for younger adults are problematic to implement because it is often difficult to access this population unless they present to the primary care provider for another reason. Other individuals in the target population may be employed during the daytime and may not be able to attend clinic visits due to designated office hours that are not convenient. The process of screening individuals does not consider the determinants of health such as income, employment, education, social support, and housing. Often, the segments of the population that would truly benefit from screening interventions and appropriate treatment recommendations are difficult to access, diagnose, and treat. HCPs must consider the inability of patients to afford medications, their lack of understanding of the benefits of treatments, and inadequate support for behaviour change that may limit the effectiveness of some health promotion strategies. It is therefore important to tailor risk assessment programs to the specific needs of the population being treated (Harkins et al., 2010), and to individualize care for unique circumstances.

HCPs may also experience capability barriers such as lack of knowledge and skills to complete and communicate risk assessments. There can be a lack of understanding about nutrition, physical exercise, giving practical advice, and individualizing care. Other capability barriers to using risk assessments such as

unfamiliarity with using risk tools, poor computer software support, and difficulty in communicating risk to patients (Wan, Harris, Zwar, Vagholkar, & Campbell, 2010).

There may also be intention barriers for HCPs which can be considered to be lack of motivation, priority setting, social influences or personal stress, anxiety, or depression (Khatib et al., 2014; Hobbs, Jukema, Da Silva, McCormack, & Catapano, 2010). Some providers may have lack of trust in the evidence that supports guideline development and implementation due to inconsistencies in the methods used to grade evidence and make recommendations (Andrews et al., 2013). Another reason for non-adherence to CPGs could be that providers use the patient's wishes and other acceptable norms in the healthcare system to influence treatment decisions (Hobbs et al., 2010). Psychological stress and other psychiatric illnesses experienced by HCPs can inhibit their motivation to engage patients in prevention activities (Goldberg, Cho, & Lin, 2019).

In addition to barriers, there are also facilitators to CVD screening at the provider level that are related to accessibility and capability. Accessibility to target populations can be improved by increasing the convenience to patients by changing office hours to evenings and weekends if practitioners were available. Also, offering interventions at the workplace during the daytime may increases accessibility for younger adults ~~that~~ may not otherwise be able to leave their place of employment for outside appointments (Boorman, 2019; Schliemann & Woodside, 2019). Offering clinics in community centres or areas with low-income housing reduces barriers associated with transportation and aging and may improve opportunities for health screening (Michael & Yen, 2014).

Facilitators for screening at the provider level can occur by enhancing the capability of clinicians during patient encounters through the convenience of interactive tools, enhanced communication with patients, and accessibility of current guidelines for clinical decision-making (Karlsson et al., 2018; Ranta et al., 2017; Sheibani, Sheibani, Heidari-Bakavoli, Abu-Hanna, & Eslami 2017). Screening for risk factors can be enhanced through the use of global risk screening tools, the ability to do clinical measurements with the reliable devices at point-of-care, and the opportunity to document CV risk factors in electronic databases (Willis, Davies, Yates, & Khunti, 2012). Often healthcare practitioners such as family physicians and NPs have access to global CV risk screening tools to determine 10-year risk of having a CV event, but improved education would help implementation. Community pharmacies have opportunities to access the population to be able to perform screening risk assessment when combined with retail services (Horgan, Blenkinsopp, & McManus, 2010). Providers and patients who are confident utilizing telehealth, texting, email, or other social media can further enhance communication and follow-up opportunities related to risk factor management using this technology. Making current CPGs accessible can enhance provider adherence to current research and empower clinicians to make effective decisions for patient care (Njie et al., 2015).

1.9.1.3 Organizational and health systems level barriers. Barriers at the organizational or health systems level that influence screening and adherence to guidelines also exist. Government or organizational policies are predominantly focused on curative measures for individuals who have established CVD requiring invasive

procedures and interventions. Organizations may not be supportive of providing ample time for screening and risk assessment during patient-practitioner encounters despite the complex nature of patients with multiple comorbidities (Unverzagt, Oemler, Braun, & Klement, 2014; Hobbs, Jukema, Da Silva, McCormack, & Catapano, 2010). There may be a lack of computer software support or other useful tools to effectively implement screening initiatives and ongoing management and follow-up. Lack of support in terms of financial incentives for providers may negatively influence adherence to guidelines for screening and other prevention strategies (Scott et al., 2011).

At the organizational and governmental level, population-wide strategies that address behaviour risk factors through integrated risk assessment and management approaches can facilitate screening and prove to be cost-effective (Mendis, Puska, & Norrving, 2011). The NHS Health Check Program in the UK is a program that is focused on risk factor identification and management in asymptomatic patients and has demonstrated cost-effectiveness. The NHS program has mandated that the population-based prevention screening program be implemented and economic modelling suggests it is cost effective with estimated savings to the NHS budget of about £57 million per year after four years and rising to £176 million per year after a fifteen-year period (Waterall, Smith, Keogh, & Daykin, 2013). The use of statin therapy for primary prevention according to the ACC/AHA cholesterol treatment guidelines showed an acceptable cost-effectiveness profile in a microsimulation model of US adults aged 45 to 75 years with the 10-year CVD risk threshold (Pandya, Sy, Cho, Weinstein, & Gaziano, 2015).

1.9.2 Summary and implications for current research. For this dissertation research, exploration of the specific barriers and facilitators to CVD screening that are relevant to individual patients, providers, and administrators in the NL context provided insight into the development of an intervention that was based on current evidence such as the C-CHANGE guideline. Focusing on strategies at the individual patient and the healthcare provider level is important since much of health care occurs during the interaction between the provider and the individual patient which ultimately influences the quality of care provided (French et al., 2012). Finding innovative ways to address the complexity of CVD screening in an intervention that could be used by HCPs in a timely manner in clinical practice was critical. It was identified that having organizational support and buy-in into implementation of the intervention at the provider level would improve acceptability. Determining the strategies that would be relevant and cost-effective for the NL context to enhance the uptake and delivery of current evidence in daily clinical practice was important and are reviewed in the next section.

1.10 Intervention Strategies to Enhance HCP Guideline Adherence for Screening

Intervention strategies that enhance the utilization of current CVD screening and management guidelines by HCPs have been found in the literature. There is evidence of effectiveness of different interventions that improve HCP guideline adherence in clinical practice such as educational interventions, clinical decision support systems (CDSSs), audit and feedback, provider reminders, and multifaceted strategies. Intervention strategies related to HCP guideline adherence are described in this section.

1.10.1 Educational intervention strategies. Educational interventions such as educational meetings, educational materials, interactive educational media, and educational outreach are strategies for implementation of CPGs that have been shown to be effective for guideline adherence by HCPs. Educational intervention strategies in CVD-specific systematic reviews, systematic reviews of non-CVD related studies, and other levels of evidence are described below.

1.10.1.1 Systematic reviews on effectiveness of educational interventions. There were three well conducted systematic reviews that examined ~~looked at~~ educational interventions related to healthcare provider adherence to CVD guidelines (Shanbhag et al., 2018; Jeffrey et al., 2015; Unverzagt, Oemler, Braun, & Klement, 2014). Most of the studies in these systematic reviews compared the educational intervention with usual practice. There were a variety of educational strategies utilized that targeted different providers, resulting in considerable heterogeneity. Two systematic reviews Unverzagt et al. (2014) and Jeffrey et al. (2015) reported on guideline adherence based on self-reports, appropriate prescriptions, and chart reviews. Unverzagt et al. (2014) that analyzed 17 RCTs with 32 756 patients and 5935 HCPs found that guideline adherence was higher in the provider education group compared to the usual practice group OR=1.69, 95% CI [1.23, 2.32]. Examples of educational interventions reported in some of the RCTs and cRCTs were the following: training in information management, academic detailing, training programs on prescribing beta-blocker treatments, specific education programs on heart failure and type 2 diabetes, and lengthy (two-year) internet delivered interventions.

Jeffrey et al. (2015) built on the work of Unverzagt et al. (2014) and conducted a meta-analysis of 17 studies, (2306 patient participants). Researchers did not report the number of HCPs involved in the selected studies. Results showed that educational interventions were favoured over usual practice or another strategy in the short-term at 3-6 months OR = 2.11, 95% CI [-90, 4.97] and in the long-term at 7 months or longer OR = 1.05, 95% CI [0.82, 1.34] to improve clinical practice guideline adherence by HCPs. Interventions that focused on provider education demonstrated statistically significant improvements. The educational interventions used in the studies were the following: academic detailing individually or group to increase diuretic use in HTN patients; continuous medical education sessions (CMEs); small group face-to-face sessions; dissemination of guidelines; nurse-led guideline based software; office visits and educational materials; educational module for physicians for the management of CHF; adult-based education to reduce BP; recommendations of specific textbooks; and clinical decision algorithms.

A third systematic review Shanbhag et al. (2018) reported specifically on the treatment of heart failure with prescribing ACE inhibitors and beta blockers with an educational intervention in a hospitalized inpatient setting. Researchers reported on only two studies that had conflicting results. One study was a cluster RCT (Thilly, Briançon, Juillière, Dufay, & Zannad, 2003) with 370 patients and the other study was a controlled before-after with 489 patients (Asch et al., 2005). Both studies found that the prescriptions of ACE inhibitors increased significantly post intervention, $p < .003$. The controlled before-after study Asch et al. (2005), reported on the prescription of beta

blockers at target doses but found no difference. Examples of the educational interventions reported in these studies were the following: distribution of educational materials, focused educational sessions, and education outreach visits.

One other systematic review Pedersen et al. (2018) focused on guideline adherence for the treatment of depression using diverse educational interventions, such as distributing guidelines, education and training, or combining education with other components. This systematic review reported on 10 RCTs (3158 patient participants) that focused on the effectiveness of educational interventions compared to usual practice. Only one of the 10 RCTs, a cluster RCT with 444 patients, reported findings with a statistically significant difference. In this RCT, the intervention group received tailored provider implementation strategies to improve guideline adherence IRR = 0.85, 95% CI [0.43, 1.69] compared to provider training alone. In the other nine RCT studies conducted in the USA, Canada, and Iran there was heterogeneity in the type of educational intervention in combination with other interventions with variations in the timing of follow-up and the primary outcomes. For the other nine studies, the differences were not statistically significant for overall adherence, however, the majority of the RCTs reported results in favour of educational intervention effectiveness on prescribing pharmacotherapy for depression referral to mental health services or referral to psychiatrists.

1.10.1.2 Other evidence for the effectiveness of educational interventions. There were other studies not included in the systematic reviews related to the effects of educational interventions on HCP adherence to CPGs, however, not all studies reported

positive effects on provider guideline adherence. For example, Suman et al. (2018) compared the effects of a multifaceted educational intervention on HCP adherence to low back pain guidelines. The results suggested that, with one exception, there were no improvements. They did find statistically significant improvements, $p < .01$ in the frequency of inappropriate referrals to neurologists in the intervention group compared to the usual practice group. However, the authors concluded that the implementation strategy did not result in improved guideline adherence, stating that inappropriate referrals or requests for diagnostic tests were already low at baseline, leaving little room for improvement.

1.10.2 Summary of educational interventions and implications for research.

Despite some contradictory findings, there is evidence from aforementioned systematic reviews that educational interventions can improve provider adherence to CPGs, despite considerable heterogeneity associated with the many RCTs that examined different outcomes, targeted different providers, and took place in various settings. There are implications for further research that is focused on utilizing educational interventions strategies for HCPs to use in daily practice. It would be helpful for interventions to focus not only on measuring adherence to guidelines, but also on targeted outcomes and performance indicators such as assessing referral rates, appropriate prescribing of CV medications, identifying those at high risk for developing premature CVD, as well as providing supportive counselling to patients on risk factor management according to the C-CHANGE guideline (Tobe et al., 2018). Our research is focused on the effect of a complex intervention that included education on implementation and improvement of

process outcomes such as adherence to CPGs and tracking improvements in performance indicators. However, due to time constraints of dissertation research, the focus was on CVD screening behaviours and management rather than patient outcomes.

1.10.3 Clinical decision support systems. Clinical Decision Support Systems (CDSSs) can be algorithms or prompts from computer-based electronic information systems designed to assist HCPs in critical thinking and decision-making to enhance optimal clinical judgement during patient encounters (Holsteige, Mathes, & Pieper, 2015). The next sections will discuss the evidence related to CVD-related and non-CVD related guidelines separately. CDSSs for adherence to CPGs have been shown to be effective for guideline adherence by HCPs in CVD-specific systematic reviews, systematic reviews of non-CVD reviews, and individual RCTs and other well-conducted analytical studies.

1.10.3.1 CVD systematic reviews for effectiveness of CDSSs. One systematic review by Njie et al. (2015) with 45 studies reported on the effect of CDSSs on both primary and secondary outcomes. Primary outcomes were quality of care outcomes measuring provider adherence to guidelines for CV risk factor screening, preventative care, and treatments. Secondary outcomes were the effect of CDSSs on the clinicians' focus on patient health behaviours such as smoking cessation, dietary changes, and increased physical activity (Njie et al., 2015). Seventeen of the 45 studies evaluated CDSSs on quality of care outcomes for screening and other preventative care services related to CPGs with an overall median effect estimate increase of 3.8% Interquartile Interval (IQI) [-0.8, +10.6], and with a statistically significant difference ($p < .05$)

compared to usual practice. Seven out of 45 studies reported an increase (median 4% points) IQI [0.7, 7.0] in the proportion of guideline-based clinical tests completed or ordered by clinicians when prompted by CDSSs, compared with usual practice. Most recorded outcome measures (such as screening for hypertension, diabetes, dyslipidemia and prescribing medications and counselling on healthy diet and physical activity) showed a statistically significant improvement with provider use of CDSSs compared to usual care, $p < .05$.

1.10.3.2 Other CVD-specific evidence for using CDSSs. Since the systematic review by Njie et al. (2015), three more recent CVD-related studies two RCTs Karlsson et al. (2018) and Ranta et al. (2017) and one well-conducted interrupted time series study Sheibani, Sheibani, Heidari-Bakavoli, Abu-Hanna, & Eslami, (2017) reported on the effectiveness of CDSSs on adherence to current CPGs. One cluster RCT, Karlsson et al. (2018) with 13 379 patients reported on physician prescribing of anticoagulant medications for atrial fibrillation for patients at risk for stroke, with and without the assistance of CDSSs. This cluster RCT found a significant increase of 73%, 95% CI [64.6%, 81.4%] in guideline adherence after 12 months in the intervention group that used CDSSs versus an improvement of 71%, 95% CI [60.8%, 81.6%] in the control group that did not use CDSSs ($p = 0.013$). Researchers reported a treatment effect estimate of 0.016, 95% CI [0.003, 0.028] (Karlsson et al., 2018).

In comparison, two studies did find significant differences but were related to different guidelines and measured different outcomes. Ranta et al. (2017) conducted an RCT on the appropriateness of the physician ordering of diagnostic tests for patients who

had experienced transient ischemic attacks (TIAs) with the use of electronic decision support or CDSSs compared to usual practice. There was a higher degree of appropriate ultrasounds orders with a cluster adjusted OR = 1.41, 95% CI [0.44, 4.49], p = .56 and CT scans OR = 13.8, 95% CI [1.7, 110.7], p < .001 in the intervention group compared to the control group. The researchers reported that this study was a *post-hoc* analysis of a secondary outcome variable and therefore was vulnerable to Type I error rate inflation, so statistically significant results should be interpreted with caution. The second study by Sheibani et al. (2017) was a well-conducted interrupted time series study. Researchers found that mean adherence to anticoagulant guidelines for the treatment of atrial fibrillation by cardiologists significantly increased from 48% to 65.5% (p < .0001) and that the trend of adherence to the guidelines was stable in the post-intervention phase.

1.10.3.3 Systematic reviews of non-CVD studies on effectiveness of CDSSs.

CDSSs have also been examined in non-CVD guideline adherence. Two systematic reviews evaluated the effect of CDSSs for appropriate prescribing and other health care processes (Holstiege Mathes, & Pieper, 2015; Bright et al., 2012). In the systematic review by Holstiege et al. (2015) five trials were reviewed and all showed significant effects in improvement of antibiotic prescribing behaviour with computer-aided CDSSs compared to usual practice. For example, one study by Christakis et al. (2001) showed that, relative to baseline, physicians and NPs in the intervention group were significantly more likely than those in the control group to prescribe antibiotics appropriately to treat acute otitis media. In another trial, Forrest et al. (2013) found increases from the baseline adherence in the CDSSs arm for comprehensive care for treatment of otitis media with

effusion and acute otitis media compared to the usual care arm. Also, amoxicillin, as a first line treatment, was more likely to be prescribed in the intervention group compared to the control group with no CDSSs. The risk of bias of the included studies was unclear.

The second systematic review Bright et al. (2012) examined 128 RCTs that evaluated the effectiveness of CDSSs on the improvement of health care processes such as performance of recommended preventative care services, ordering clinical studies, and prescribing appropriate therapies for treatment of a variety of health conditions. In a meta-analysis of 43 studies, the researchers reported favorable outcomes OR = 1.42, 95% CI [1.27, 1.58] on provider performance of preventative care services using CDSSs compared to usual practice with no CDSSs. In this review, another meta-analysis was completed on 20 studies related to ordering clinical studies for diagnosis, pharmacotherapy, chronic disease management, laboratory testing and initiating conversations with patients with the assistance of CDSSs and found a positive result OR = 1.72, 95% CI [1.47, 2.00] compared to usual practice. Finally, one other meta-analysis of 67 studies evaluated the effect of CDSSs on the prescribing of appropriate treatment compared to usual care and found favorable results OR = 1.57, 95% CI [1.35, 1.82]. The level of evidence was rated high by the researchers with good quality studies even though it had a high level of bias since most settings had well-established information technology infrastructure already in place (Bright et al., 2012).

1.10.4 Audit and feedback interventions. There is evidence that interventions to increase adherence to guidelines as a result of audit and feedback in clinical practice can assist clinicians to provide evidence-based care in clinical practice. Studies have reported

on audit interventions that were carried out to review current practice using various methods and with feedback given through written reports, individual face-to-face meetings, or group feedback sessions.

1.10.4.1 Effectiveness of audit and feedback interventions. There have been numerous studies and recent systematic reviews on the effectiveness of audit and feedback interventions to increase guideline adherence. Unverzagt et al. (2014) included two relevant studies in their systematic review of interventions to promote guideline adherence. In one study, Korgan, Reynolds, and Shea (2003) provided feedback to HCPs using a report card and found no difference in physician guideline adherence; that study had an unknown risk of bias. In contrast, in the other trial Fiscella et al. (2010) there was a low risk of bias, and a statistically significant improvement in adherence OR = 3.72, 95% CI [1.86, 7.41] when peer review visits were used as a method to provide feedback to clinicians compared to usual care. Jeffrey et al. (2015) conducted a meta-analysis to determine the most effective intervention to improve implementation of CVD- related CPGs by HCPs in RCTs. They included six studies (2983 participants) that examined the effect of audit and feedback with an education component, with different comparison groups, but most frequently usual care. The researchers did not specify the nature of the feedback, but excluded academic detailing. They found no significant differences between groups OR = 1.39, 95% CI [0.88, 2.21] and reported that risk of bias was high or unclear in the majority of studies.

Since the meta-analysis by Jeffrey et al. (2015), five other studies showed evidence that audit and feedback was an effective intervention for provider adherence to

CPGs. Two studies evaluated audit with group feedback, and both found a positive effect. One of the studies Rawlins et al. (2017) used a cohort design that provided group feedback during rounds and reported that referrals for advice from prospective audit and feedback rounds were significantly more likely ($p < .0001$) to come from physicians on the rehabilitation service (61.9%) compared with the acute hospital (16.3%). Non-adherence with antimicrobial advice was more frequent in the acute hospital setting (13.8%) compared with the rehabilitation service (7.6%), $p < .0001$ (Rawlins et al., 2017). Another study, a well-conducted interrupted time series, showed an improvement in the appropriate prescribing of antibiotics at six months following an audit and feedback intervention (Hogli, Garcia, Skjold, Skogen, & Smabrekke, 2016).

Two studies examined individualized feedback rather than group feedback and found improved adherence to CPGs. Raval, Kwan, Travers, and Heiss, (2018) used a cohort study to provide individual feedback using email and personalized verbal communication with providers post intervention, which resulted in increased CPG compliance from pre-intervention (7%) to post-intervention (23%). Early postoperative ambulation improved significantly ($p < .001$) for patients post appendicitis from pre-intervention (47%) to post-intervention (84%) (Raval et al., 2018). The other study was a cluster RCT with a stepped-wedge design. Physicians were randomly assigned to one of six clusters that began in the control group and crossed over to the intervention group until all physicians received the intervention. The intervention consisted of monthly audit and feedback with blinded peer comparison on guideline adherence for treatment of pneumonia and severe sepsis. The blinded peer comparison that had feedback improved

adherence significantly from 52% without feedback to 65% after feedback. In subgroup analysis of patient diagnosis, CPG adherence remained statistically significant for the feedback group who had ~~for~~ patients with pneumonia, but not for physicians of patients with sepsis. After adjusting for several variables such as time, physician clustering, and patient and physician variables, individualized feedback compared to group feedback remained significantly associated with guideline adherence for pneumonia and sepsis management in the emergency department adjusted OR = 1.8, 95% CI [1.01, 3.2] (Trent, Havranek, Ginde, & Haukoos, 2018).

Finally, in a cluster RCT, peer review with audit and feedback was used to evaluate guideline adherence for ordering tests and prescribing behaviour of clinicians. Feedback was provided to each physician in an individualized report of prescribing and test ordering behaviour from the pharmacist and laboratory specialist. Results showed that this feedback strategy did not show any differences between the intervention and control groups for the volume of tests ordered or the medications prescribed (Trietsch et al., 2017).

1.10.5 Provider reminders. Clinical reminders in practice settings can cue HCPs to recall specific information through verbal, paper-based, or electronic format (Chan et al., 2017). There is evidence from the literature that clinical reminders are effective for improving provider adherence to guidelines. Evidence on effectiveness has been found in CVD-specific systematic reviews as well as RCTs and other analytical studies.

1.10.5.1 Effectiveness of reminders in CVD-specific systematic reviews. There were two CVD-specific systematic reviews of studies that showed effectiveness of clinical reminders as interventions for promoting provider adherence to guidelines compared to usual care. In one systematic review Unverzagt, Oemler, Braun, & Klement, 2014, with 15 RCTs, 184 132 patients and more than 1625 HCPs, a meta-analysis conducted showed that providers who received clinical reminders were 1.3 times (95% CI [1.17, 1.45]) more likely to adhere to guidelines than those who did not receive such reminders. Results across studies were consistent with moderate heterogeneity (I^2 = 34%) and only one trial found no benefit of provider reminder systems compared with usual care. There was no evidence of publication bias.

In the other more recent systematic review, five studies [one RCT and four controlled before-after studies (CBA)] not included in the previous review reported process outcomes in the use of provider reminders to improve adherence to heart failure guidelines (Shanbhag et al., 2018). The RCT and two CBAs evaluated prescription of medications. In two CBAs by Qian et al. (2011) and Braun et al. (2011) that looked specifically at antihypertensive drugs, there was a statistically significant improvement in provider prescribing of both ACE inhibitors 9.2%, p = .04, and target beta-blockers 12.3%, p = .03. In contrast, the RCT Ansari et al. (2003), did not show statistically significant results compared to usual care in prescribing when the providers were given a list of heart failure patients who would benefit from the addition of beta-blockers to their medication regimes. One of the five studies, Gravelin et al. (2011) evaluated the use of reminder prompts to cardiologists to refer patients with low left ventricular ejection

fractions for implantable defibrillators. One site using clinical reminders reported improved referral rates for ICDs by 40%, $p = .02$ compared to usual care with no intervention. The other site reported a statistically significant difference, $p < .001$ with an improved referral rate of 47% compared to usual care. Lastly, one study Butler et al. (2006) showed statistically significant results in provider use of disease-specific prompts in a computer order entry program compared to usual care +53%, $p < .001$.

1.10.5.2 Effectiveness of reminders from other non-CVD studies. Two cluster RCTs and one controlled before-after study that were non-CVD studies have shown effectiveness of provider reminders for HCP guideline adherence from different health conditions in a variety of settings. One stepped-wedge cluster RCT evaluated the effect of reminders on concordance with recommendations to decrease unnecessary ordering of tests according to Choosing Wisely Campaign in the USA. The researchers reported statistically significant decreases in the percentages of visits in compliance with the Choosing Wisely Campaign (indicating a decrease in the ordering of unnecessary tests). An overall decrease of 1.8%, 95% CI [−2.9%, −0.7%], $p = .001$); for headaches −0.7%, 95% CI [−1.3%, −0.2%], $p = .006$); and for acute sinusitis −3.2%, 95% CI [−5.1%, −1.3%], $p = .001$ (Kullgren et al., 2018). In contrast, the authors of the other cluster RCT did not report statistically significant differences with the use of electronic clinical reminders to nurses in decreasing complications associated with peripheral venous catheters. However, the researchers concluded that the clinical reminder strategy may have benefitted from a tailored intervention with additional strategies such as recording

reasons for removal of catheters, inspection of IV sites, and providing more regular feedback to RNs (Forberg et al., 2016).

The controlled before-after study did not evaluate the same type of reminder as the two cluster RCTs, but instead tested the effect of requesting a reason for non-adherence to a CPG that focused on prophylaxis of post-operative nausea and vomiting with specific medications. The researchers reported a statistically significant difference, $p < .0001$, in prescribing according to guidelines between two different intervention groups (89% and 90%) and a historical control group (82%) (Kooij, Klok, Preckel, Hollmann, & Kal, 2017).

1.10.6 Multifaceted interventions. Interventions that are multifaceted are considered by many to have greater evidence of effectiveness than single interventions strategies for guideline adherence (Chan et al., 2017). However, other researchers claim that there is inconclusive evidence for single or multimodal interventions to promote guideline adherence or behaviour change of clinicians (Squires, Sullivan, Eccles, Worswick, & Grimshaw, 2014). Evidence about effectiveness of multifaceted interventions to improve provider adherence were identified from CVD-specific systematic reviews, RCTs, cohort, as well as other well-conducted interrupted time series studies.

1.10.6.1 CVD-specific systematic reviews of multifaceted interventions. One recent systematic review of six studies, reported statistically significant differences between the intervention groups receiving multimodal strategies and the control groups

receiving usual practice in the prescribing of medications for heart failure patients (Shanbhag et al., 2018). All six studies that employed multimodal interventions used some form of audit and/or feedback strategy for the clinicians to promote adherence to guidelines. Four of the six studies used a combination of both audit and/or feedback and educational strategies to promote adherence. In the intervention groups of these studies, providers received a combination of other strategies to enhance guideline adherence such as: CDSSs with a toolkit, provider reminders, electronic prompts on medication prescribing, financial bonuses for quality compliance, and discharge referral summaries. Statistically significant differences between the intervention groups and control groups were reported for prescribing of ACE inhibitors (+6.7 to 15.7%, range $p < .001$ to .04) and beta-blockers (+7.4% to 15.2%, range $p < .0001$ to .01), and for referring patients for ICDs (+30.3%, $p < .001$).

In 2012, a Joanna Briggs Institute (JBI) systematic review was published on the effectiveness of interventions on health providers' compliance with CPGs on venous thromboembolism risk assessment and prophylaxis. The authors critically appraised 20 studies (experimental, observational, and qualitative studies) using JBI tools. The studies included in the systematic reviews used single or a combination of interventions such as: face-to-face education sessions, computer reminders, risk assessment tools, pre-printed order forms, regular feedback on facility audits, and newsletters. The interventions that increased awareness of guidelines and clinical reminder prompts for HCPs led to short-term improvements in compliance from approximately 5% to 50% (Gaston, White, & Misan, 2012). Due to heterogeneity in the practice guidelines used, the specific

interventions, the outcomes measured, and the quality of the studies, there was insufficient evidence to support using single versus multifaceted interventions.

1.10.6.2 Non-CVD studies of effectiveness of multifaceted interventions. Two RCTs reported contrasting evidence of guideline adherence for multifaceted interventions. The first multicentre cluster RCT (4183 patients) investigated whether the patient survival was improved by a reduction in the time that antibiotics were administered by HCPs according to sepsis guidelines (Bloos et al., 2017). The intervention group received input from quality improvement teams, educational outreach, provider reminders, as well as audit and feedback compared to a control group that received conventional continuous medical education (CME) opportunities. The multifaceted intervention was not effective to change the time to antimicrobial therapy in this setting and did not affect survival.

In contrast, the second RCT (902 patients) by Vellinga et al. (2016) used multimodal interventions that were shown to be effective. This RCT investigated the improvement in antimicrobial prescribing for urinary tract infections (UTIs) in general practice utilizing two intervention arms (A and B) that received multifaceted interventions compared to one control arm. All arms had baseline training on coding a consultation as a UTI or not. In both intervention arms, whenever a consultation was coded as a UTI, the physicians got a reminder outlining the guidelines. Physicians in arm B also got a reminder to encourage them to consider delaying prescription for UTI. The primary outcome measure was the proportion of prescriptions that was consistent with recommendations for first-line antimicrobials for suspected UTIs. The differences in

prescribing from baseline to the intervention period showed improved prescribing for both the intervention arm A (45.4% baseline to 68.2% post-intervention) and the intervention arm B (49.8% baseline to 66.5% post-intervention), but not for the control arm. The effect of the intervention was calculated as an OR in a logistic generalized estimating equation model. Physicians in the intervention arms were 2.3 times more likely with 95% CI [1.7 to 3.2], to prescribe antibiotics appropriately for UTIs compared to the control arm.

Three well-conducted interrupted time series studies have shown evidence of effectiveness of adherence to guidelines as a result of multifaceted interventions. One ITS showed improved guideline adherence following interventions from a newly constructed best practice guideline. The results showed that guideline adherence improved from 47% to 69% (Riney et al., 2018). The second well-conducted ITS assessed the ordering of CT scans according to the Canadian CT Head Rule and found a minimal difference of 2% monthly OR = 0.98, 95% CI [0.96, 0.99] for the seven post-intervention months. There was also an increase of 2.3%, 95% CI [1.5%, 3.1%] in appropriate head injury diagnoses (Sharp et al., 2018). The third ITS investigated changes in the identification of risk of falls, which is a key recommendation for guidelines for physical therapists. Following a multifaceted intervention, the researchers found an improvement in identification of falls from 6.3% pre-intervention to 94.8% post-intervention, $p < .001$ (Thomas & Mackintosh, 2016).

1.10.7 Overall summary of interventions. From the review of the literature, there was considerable conflicting evidence, but there were also effective interventions

identified that can be used at the provider level to enhance the adherence to current CPGs. There is evidence to support the use of educational, CDSSs, audit and feedback, provider reminders as well as multifaceted interventions. Appropriate strategies for an intervention to improve screening would include the following: using educational interventions such as webinars with facilitators; online educational modules to provide background information on the implementation of the screening intervention; and an interactive website with an algorithm to assist in HCP decision-making. The educational strategies chosen for our research were supported in the literature as effective evidence to improving utilization of CPGs by HCPs. Strategies for educational interventions that were used in our research study were relevant to the NL context and selected with consideration for feasibility given the geographic barriers that exist in the province. Educational interventions or strategies used in our research study were incorporated into the CASP intervention to improve the uptake of the C-CHANGE guideline by NPs in our province. A clinical database that was easily accessible at point of care was used by NPs across NL for the diagnosis, and management of patients, and documentation of CVD risk factors for individuals at high risk for CVD in NL.

1.11 NPs and Screening for CVD

Health professionals, primarily family physicians and more recently pharmacists and nurses working within the interprofessional team, are able to promote CVD screening and management in the community. However, NP numbers are growing, and these providers are positioned to play a key role in CVD screening and management and to continue to work collaboratively with members of the healthcare team. NPs demonstrate

the required core competencies and it is within their mandate to order the necessary investigations, diagnose health conditions, and prescribe therapeutic management according to the most current CPGs and recommendations (ARNNL, 2016). NPs also involve individuals in goal-setting, use a patient-centred approach, embrace a population health perspective, and advocate for healthy public policy and programs that are informed by the determinants of health (College of Registered Nurses of Newfoundland and Labrador [CRNNL], 2019; WHO 2005). NPs have access to the population in urban, rural, and remote community settings in NL for routine care and follow-up thereby improving the accessibility to individuals and communities to support positive health outcomes (Government of NL, 2015).

1.12 The Research Problem

Even though CPGs are available in Canada and throughout the world to guide CVD screening and follow-up actions, one of the main issues that has arisen in recent years is the inconsistent implementation of CPGs by HCPs (Unverzagt, Oemler, Braun, & Klement, 2014). One of the key reasons for inconsistent use of guidelines for CVD is that each risk factor or condition has different clinical guidelines based on "best practice"; this can be overwhelming and difficult for clinicians to apply in daily practice. This means that screening for individual risk conditions is more likely to occur than screening for multiple risk factors or conditions comprehensively (Hopper Billah, Skiba & Krum, 2011; Wright Romboli, DiTulio, Wogen, & Belletti, 2011; Kumar et al., 2009). To address the complexity issue related to CVD screening and management, the C-CHANGE guideline was developed and has been updated every four years to ensure

currency. Even though the C-CHANGE guideline is available, there is a gap in the implementation of this comprehensive guideline (Hua et al., 2011).

The methodological philosophy and qualitative approach of interpretive description (Thorne, 2016) was embraced as the foundation for this research study to derive new nursing knowledge and to better understand this real-life issue from the clinical context (Thorne, 2016). The research problem identified is how best to get HCPs to utilize current CPGs in clinical practice, otherwise referred to as knowledge translation of evidence into practice. According to Thorne, the methodological approach of interpretive description enables researchers of various disciplines the opportunity to utilize applied qualitative research in a pragmatic way to address real-life issues or problems identified in the field and to find solutions that could be useful in the practice setting (2016).

There were effective interventions for guideline adherence found in the literature, but it was not clear what interventions would work best or if these intervention should be implemented alone or in combination. The intervention components chosen would need to be realistic and feasible for the local NL context to improve adherence to guidelines. Furthermore, the interventions or strategies to be used had to be relevant to the NL context according to the Knowledge to Action (KTA) Framework with guideline adaption (Harrison et al., 2013; Graham et al., 2006).

The KTA Framework was selected for this mixed methods research study because this framework is about knowledge translation of evidence into daily clinical practice.

The first phase of the KTA Framework is the choice of guidelines or evidence, and the evidence chosen for translation is the C-CHANGE guideline. The second phase is about contextualizing the program or intervention, so in this research study a strategy to obtain input from key stakeholders to was planned to ensure that the intervention was relevant to the local context. The third phase of the framework is the evaluation of the intervention implementation process and the sustainability of knowledge use over time. For this research study, the focus was on the evaluation of the implementation process of the intervention. An intervention could have just been developed and evaluated to promote screening and application of the C-CHANGE guideline based on the literature, but to ensure that the intervention was relevant to and sustainable in the province of NL, a multiphase mixed methods study was conducted.

1.13 Overview of the Exploratory Sequential Mixed Methods Study

A multiphase exploratory sequential mixed methods design was used in this research study with an underlying philosophical basis of pragmatism and interpretive description. Utilizing a variety of methods and frameworks is consistent with pragmatism as we focused on finding a solution to the research problem that was a clinical practice issue. The overall purpose of the mixed methods study was to determine successful strategies for implementation of CPGs through the development, implementation, and evaluation of a cardiovascular screening intervention called CASP. There were three distinct phases in this mixed methods study, a qualitative phase, a quantitative phase, and an integration phase, which are discussed in this section.

The target groups for the qualitative study (phase 1) were HCPs, managers, and public to gather a variety of perspectives from key stakeholders to inform the development of the CASP intervention. Phase 2 had two target participant groups, the NPs working in community settings in NL and their patients. Inclusion criteria for the NPs were to have access to and be able to follow-up with patients in the community setting. The patients involved in the study had to be asymptomatic adults aged 40-74 years in NL without established CVD.

1.13.1 Research questions. The overall research question that was addressed in this mixed methods study was the following: "What strategies are effective to enhance HCPs' use of evidenced-based CPGs for CVD screening and management in NL?" The research questions that were answered through the research process were the following:

Phase 1 questions (qualitative phase):

1. What are the facilitators and barriers associated with screening at-risk individuals aged 40-74 years in NL?
2. What tools and strategies do healthcare providers, health administrators, and members of the public recommend to increase comprehensive CVD screening in NL?

Phase 2 questions (quantitative phase)

3. What is the effect of implementing CASP on comprehensiveness of screening by NPs in NL?

4. What is the effect of implementing CASP on the identification of multiple risk factors for individuals and determining the level of CVD risk for patients in the NP practice?
5. What is the effect of implementing CASP on the identification of NPs' and patients' priorities for heart health in NL?
6. What are the patients' and NPs' experiences with the CASP intervention in NL?

Phase 3 question (integration phase):

1. What strategies are effective to enhance healthcare providers' use of evidenced-based CPGs for CVD screening and management in NL?

1.13.2 Research study design. An exploratory sequential mixed methods study design was appropriate to answer the stated research questions. Figure 1.1 shows the sequence of the phases for this mixed methods study. Phase 1, a qualitative study, led to the development of CASP. The original logic model for the CASP intervention was based on a review of the literature and was comprised of the components that were thought to be important for implementation success. The original logic model can be found in Appendix B. Phase 2 was a larger quantitative study that tested the implementation of the CASP intervention with NPs and their patients. Phase 3, the integration phase, provided an opportunity to analyze the results of both phase 1 and 2 to generate new knowledge about strategies that can enhance provider adherence to current guidelines relevant to the local context that could potentially improve patient care. Phase 3 also informed the final

logic model for the CASP intervention that was created following the completion of the mixed methods study. The final logic model for the CASP intervention can be found in Appendix B. The focus of an exploratory design is to obtain input from key sources to ensure that the intervention developed is contextually relevant. An overview of each phase is presented in this section. Details of each phase and of CASP can be found in subsequent chapters. Research ethics approval was obtained for phase 1 and then phases 2 and 3 of this mixed methods study. The Health Research Ethics Board Approvals for this mixed methods study can be found in Appendix C. Approval was also obtained from the regional program approvals committees across NL.

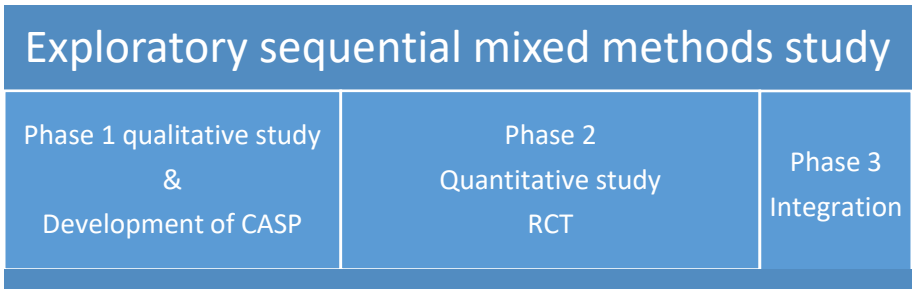

Figure 1.1 Exploratory Sequential Mixed Methods Study

1.13.2.1 Phase 1. The aim of the first phase of the mixed methods study was to explore the perspectives of various health professionals and members of the public to inform the development and implementation strategies of the screening program, CASP. We conducted five focus groups and 10 individual interviews with HCPs, health managers, and members of the public, between October 2016 and May 2017 in both urban and rural settings in NL. The focus was to explore the barriers and facilitators to

cardiovascular screening by HCPs with patients in NL. Appendix D contains the research documents for phase 1.

Interpretive description encourages the use of diverse methods to analyze data rather than using rigid techniques that are specific to one philosophical stance, for example, phenomenology or grounded theory (Thorne, 2016). Data analysis of the focus groups used specific methods on focus group analysis from Kruger and Casey (2015). The TDF was used to inform the researchers and provide insights into the development of CASP. Themes derived from the interview and focus group analysis were categorized into specific domains of the TDF and then behaviour change techniques were matched to those domains. The modes of delivery for the CASP intervention components that were selected were relevant to the NL context.

To ensure credibility of the results from the data analysis, the researcher has declared epistemological integrity of pragmatism and encouraged representativeness of the data from a variety of perspectives in the development of the intervention consistent with interpretive description. As well, an audit trail was created and independent researchers verified the analysis of numerous transcripts. Having disciplinary knowledge also gives credibility to interpretation of the data while being cognizant of the knowledge gained. Taking the time to participate in reflective journaling following the interviews and focus group sessions, also lends credibility to the findings (Thorne, 2016).

The CASP intervention content consisted of four main components: a) an educational module, b) an interactive website, c) a health providers' toolkit, and d) a

CVD database. The CASP intervention components with examples can be found in Appendix E. Both the knowledge user and patient partners on our research team were able to review CASP and provide important suggestions for improvement prior to finalizing these components. Details of the four components of the CASP intervention are described in below:

1) Educational resources-The educational module consisted of an online module to enhance CVD knowledge and CVD screening with CVD assessment tools and devices. Providing educational resources to all NPs was important to ensure a consistent standardized approach during the implementation phase.

2) CASP interactive website-The second component was a CDSS, an interactive website that housed a new algorithm and the C-CHANGE guideline to assist practitioners in clinical decision-making. The website also contained a separate section for patient use to access various provincial resources and contacts.

3) Health providers' toolkit-The third component of the CASP intervention was the HCPs' toolkit that contained devices and tools for risk assessment such as the following: an automated BP monitor (if the current office did not have one available); a digital weigh scale; a standard measuring tape; and handouts and brochures for patient counselling.

4) CVD database-The fourth component was a CVD database that was created by researchers with technical assistance from NLCHI. This database was used to document the following: the NPs' focused history and physical assessments; identified CVD risk

factors; prescribed medications; calculated FRS and heart age score; and diagnostic and laboratory findings. The NPs' priorities for patient management, the patients' priorities for heart health, and the patients' individualized goals documented on the My Heart Healthy Plan forms were summarized in the CVD database.

1.13.2.2 Phase 2. The purpose of the quantitative phase 2, an RCT, was to evaluate the effectiveness of CASP in clinical practice compared to usual practice to determine whether the intervention would increase comprehensiveness of screening, identification of patients' level of CVD risk, and individualized goal-setting. The primary outcome of phase 2 was the comprehensiveness of CVD screening. The null hypothesis for phase 2 was stated as follows: There will be no difference in comprehensiveness of screening between the intervention group and the control group.

The NPs in the intervention group implemented CASP and participated in educational webinars from their workplaces and received information on using specific tools to identify, screen, and follow-up with patients. The NPs received instructions on recruiting patients, obtaining consent, and on data collection methods using the CVD database that was developed by researchers with technical assistance from NLCHI specifically for this research study. The CVD database was an online database that had specific items that had to be filled in by the NPs during the assessment and management of patients in the intervention group during the study implementation. Tools to assist the NPs and additional resources for the patients were available on the CASP website that was developed with technical expertise from Memorial University of Newfoundland as part of the intervention for the study. The intervention differs from usual practice because

the components included the following: a website, an educational module, interactive tools, clinical reminders, and CDSSs. These CASP components were used to promote adherence to guidelines and to facilitate comprehensive screening and follow-up actions with patients in the community. Following completion of data collection, the NPs transferred the CVD database containing the patients' data by secure transfer to NLCHI. Descriptive statistics were used to compare differences between the intervention and the control group outcomes. The relative risk was calculated for the primary outcome using generalized linear modelling to control for the effect of the NP.

The NPs in the control group participated in webinar education sessions different from the webinars held with the intervention group NP participants, and were instructed to follow usual practice to screen patients for CVD. They were given instructions on recruiting patients and obtaining consent. The researchers conducted retrospective chart reviews in the NPs' practice settings who had consented to participate in this study. Data were collected about NP screening practices and follow-up care that occurred when the patients were recruited to the study, and any subsequent screening related visits. The specific CVD screening tools provided to the NPs in the intervention group were made available to NPs in the control group following the completion of data collection for phase 2 of the study. All NPs and patients were given feedback questionnaires to complete at the end of the data collection period in order for researchers to obtain valuable feedback on the participants' experiences in the RCT. The research documents for phase 2 can be found in Appendix F.

***1.13.2.3* Phase 3.** Phase 3 involved the integration of the results of phases 1 and 2 so that effective strategies to increase uptake of evidence-informed CVD screening and management in NL were identified to enhance knowledge translation in clinical practice. During the integration phase, researchers evaluated whether the CASP intervention components addressed the barriers and facilitators identified in phase 1 by evaluating the completed NP and patient feedback questionnaires. Researchers confirmed the CASP intervention components that were effective strategies to change provider behaviour and to increase uptake of CVD screening (according to C-CHANGE). The feedback questionnaires from NPs and patients at the end of phase 2 were used to evaluate whether the BCTs, methods of delivery, and intervention content were effective in changing the behaviour of the clinician and increasing comprehensive CVD screening. We evaluated the results to determine whether there was confirmation, congruence, or discordance of the findings to further refine the components of the CASP intervention.

1.14 Organization of Dissertation

This three-manuscript dissertation contains a total of five chapters. Chapter 1 provides the comprehensive literature review that identified a gap in the research that needed to be addressed and that stimulated the intervention design. The underlying philosophy of pragmatism and interpretive description is described as the foundation for this research (Thorne, 2016).

Chapter 2 contains the mixed methods manuscript. The results of the qualitative study that informed the development of the intervention used the TDF as a framework for

intervention development using a five-step process (French et al., 2014; Backman et al., 2015). The behaviour change techniques (BCTs) taxonomy was used to select relevant BCTs with specific modes of delivery (Michie et al., 2013). The results of phase 2 are briefly presented in a table to illustrate how specific barrier, facilitator and strategy themes from phase 1 were addressed during the implementation of the intervention in phase 2. The integration phase 3 describes how the quantitative results further explain how the theory-informed intervention developed in phase 1 is culturally and contextually relevant. Phase 3 also presents effective strategies that can be used in clinical practice to enhance the utilization of CPGs by HCPs at the present time, and in the future.

The manuscript in Chapter 3 reports on the results of testing the theory (TDF) informed intervention CASP, in an RCT, and provides evidence for the effectiveness of utilizing a comprehensive CVD screening intervention in clinical practice.

The manuscript in Chapter 4 contains the literature review on the methodology of the recruitment of healthcare professionals to research studies. This review was conducted because of the difficulty experienced by the research team in the recruitment of busy HCPs for this research study. Details on the methodology of recruitment was chosen to inform novice, and even experienced researchers, about effective strategies to streamline efforts for recruitment of HCPs and address any issues early in the research process.

Finally, Chapter 5 summarizes the dissertation journey and describes future educational and research opportunities that explain how the theory-informed intervention

can be adapted to be used with different patient populations. Details of how the intervention could be specifically tailored to meet the unique needs of vulnerable populations and used in practice to address health inequities that can exist during patient-provider interactions.

1.15 Conclusion

To address the economic, social, and personal burden associated with developing cardiovascular disease, there needs to be a shift in focus away from treatment-oriented strategies to prevention and health promotion through earlier screening and management of CVD risk factors and conditions. CVD is an important public health problem with acceptable screening tests, and treatments, and CPGs to guide health professionals using the latest research evidence to prevent or delay the development of CVD and complications. Even though there are relevant guidelines available for CVD screening and management, there remains a gap in their implementation. The mixed methods study was warranted and the results of this study will add to the nursing and knowledge translation literature to enhance uptake of current evidence leading to more positive patient outcomes.

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CHAPTER 2 Development and Refinement of the Cardiovascular Assessment Screening Program (CASP): A Mixed Methods Approach

The manuscript in Chapter 2 focuses on the development of the CASP intervention based on the results of phase 1 and the integration phase 3 of the mixed methods study.

The target audience is health professionals, administrators, government officials, and the university research community.

JB conceptualized the study, collected the data, performed data analysis, interpreted the results, and wrote the manuscript. DM contributed to the conceptualization of the study, research design, and interpretation of data. KP contributed to the data analysis, data interpretation, and conceptualizing results. DM, KP, and CD contributed to the discussion, suggested revisions, and approved the manuscript.

2.1 Abstract

BACKGROUND: There is inconsistent utilization of clinical practice guidelines (CPGs) for cardiovascular disease (CVD) screening and management by healthcare professionals to identify CVD risk factors early and to intervene using current recommendations. This manuscript reports on the development of the Cardiovascular Assessment Screening Program (CASP) and focuses on the qualitative phase of the exploratory mixed methods study. **METHODS:** Focus groups were held with nurse practitioners (three groups) and the public (two groups) in both rural and urban settings. Ten individual interviews were conducted with target health professional groups, the public, and health managers in community settings in phase 1 of the study. The Theoretical Domains Framework (TDF) was applied to the themes that emerged from the focus groups and interviews. Behaviour change techniques (BCTs), modes of delivery, and intervention components were selected for the development of the CASP. The CASP intervention was tested in phase 2 and refined in phase 3 of the mixed methods study. **RESULTS:** Themes identified included lack of knowledge about comprehensive screening, ambiguity around responsibility for screening, lack of time and commitment to screening. These themes lead to the development of a website, education module, decision tools, and a toolkit as part of CASP. Feedback obtained from participants at the end of phase 2 confirmed the relevance of the CASP components. **CONCLUSION:** Following focus groups and interviews with health professionals, managers, and the public; the barrier, facilitator, and strategy themes emerged about CVD screening in NL. Utilizing the TDF and BCTs the

CASP intervention was developed. *Keywords: clinical practice guidelines, Theoretical Domains Framework, cardiovascular, screening, intervention development*

2.2 Background and Overview

Cardiovascular disease (CVD) is the leading cause of death globally and accounts for approximately 31% of all deaths (World Health Organization [WHO], 2017). In Canada and Newfoundland and Labrador (NL), CVD accounts for 30% of all deaths (Public Health Agency of Canada [PHAC], 2018) while also resulting in lost years of life, reduced productivity, and decreased quality of life for individuals (Heart and Stroke Foundation, 2019). CVDs include diseases of the heart, vascular diseases of the brain, and diseases of the blood vessels that can progress to myocardial infarctions and cerebrovascular accidents leading to increased morbidity and mortality (PHAC, 2016). CVD develops as a result of a combination of genetic, social, and environmental influences over a number of years with CVD incidence increasing with advancing age (WHO, 2017). With consideration of many unique genetic and socioenvironmental influences on an individual's behaviour, traditional risk factors such as smoking, physical inactivity, and poor dietary intake can lead to chronic conditions such as hypertension, obesity, and diabetes; all of which contributes to the development of CVD. Control of risk factors is therefore critical to the prevention of CVD.

There is evidence that screening to identify cardiovascular risk factors and conditions early, with attention to the socioenvironmental influences that impact daily life and a focus on individualized approaches for behaviour change instituted by HCPs, can

reduce morbidity and premature mortality related to CVD (Alvarez-Bueno et al., 2015; Lee et al., 2015). CVD screening for the multitude of comorbid conditions and risk factors is complex. The fact that each risk factor or condition has different clinical practice guidelines (CPGs) can be overwhelming, making it difficult for clinicians to stay abreast of the most current research.

Current recommendations supporting CVD screening and management in Canada can be found in a set of coordinated CPGs by the Canadian Cardiovascular Harmonized National Guidelines Endeavour known as C-CHANGE (Tobe et al., 2018). The C-CHANGE guideline is comprehensive in the depth of information for CVD screening and management. As well, this guideline is multifaceted addressing many different risk factors and conditions. Many HCPs are not aware of the existence of these harmonized guidelines. Even though the C-CHANGE guideline is published in an online journal, the daily application of the guideline is difficult for clinicians because the screening and the management recommendations for many chronic conditions are presented together, making the guideline burdensome with respect to deciding appropriate actions during patient encounters. As a result of these and other barriers, there are inconsistencies in the utilization of cardiovascular CPGs by healthcare providers (HCPs) such as family physicians and nurse practitioners (NPs) (Graham, Xiao, Taylor, & Boehm, 2017; Unverzagt, Oemler, Braun, & Klement, 2014).

To address this clinical practice issue and increase utilization of the C-CHANGE guideline, a multiphase sequential mixed methods exploratory study was conducted to determine successful strategies for increasing the implementation of clinical practice

guidelines. Through the development, implementation, and evaluation of a cardiovascular screening intervention. The use of a qualitative study as the first phase was important for ensuring that the intervention would be contextually and culturally relevant, which is a key aspect of the Knowledge to Action (KTA) Framework, with guideline adaption (Harrison et al., 2013; Graham et al., 2006).

Our aim in phase 1 of the mixed methods study was to develop a theory-informed intervention named the Cardiovascular Assessment Screening Program (CASP). This intervention made the C-CHANGE guideline more user-friendly for HCPs to screen comprehensively in daily practice. We followed a process similar to others who developed interventions to promote adherence to guidelines utilizing the Theoretical Domains Framework (TDF) (Backman et al., 2015; French et al., 2014).

There were five steps in the process of developing the theory-informed intervention (summarized in Table 2.1). In brief, from the literature, the identified target behaviour was consistent use of the C-CHANGE guideline to promote comprehensive CVD screening and management of patients. Findings from a review of the literature also showed that in order for guideline adherence (behaviour change) to occur, the HCP required awareness and access to the guidelines congruent with the organizational environment (Michie et al., 2013). The next step involved conducting interviews and focus groups to explore the barriers of, and facilitators to, achieving the target behaviour change and finding strategies within the local context to increase uptake of the C-CHANGE guideline. The CASP intervention was then developed using the TDF, and

feedback was obtained on the provisional CASP with knowledge users and patient partners prior to its implementation and evaluation.

The TDF was originally developed by a number of behavioural scientists and implementation researchers to provide a comprehensive approach to determining the main factors influencing clinician behaviour, to assess the implementation research, and to support intervention design along with other uses (Atkins et al., 2017; Michie et al., 2013; French et al., 2012). The TDF was developed by identifying theories relevant to implementation research and grouping the constructs from these theories into domains (Atkins et al, 2017). The specific definitions and constructs underlying the domains of the TDF have been validated for assessing professional or other health related behaviours as well as implementation problems as a basis for the development of interventions (Atkins et al., 2017; Cane, O'Connor, & Michie, 2012).

This paper presents the results of the mixed methods study. The results of phase 1, the qualitative study leading to the development of the intervention, are summarized in Table 2.1 (Steps 1-5) and are described in more detail in this manuscript. There is a brief discussion on the results of phase 2, a randomized controlled trial (RCT) that was conducted to test the intervention. Phase 3, the integration phase, reports on how the results of phase 2 further informed the intervention that was developed in phase 1.

Table 2. 1 Overview of the Process for the Development of a Theory-informed Intervention, CASP.

Steps	Sources and Methods
1. Identify the target behaviour: HCP consistent use of CPGs in daily clinical practice for comprehensive CVD screening and management.	1. Performed a literature review to identify the target behaviour and to find effective interventions to promote HCP adherence to the C-CHANGE guideline.
2. Explore the barriers and facilitators related to CVD screening and identify possible strategies within the local context to improve uptake of the C-CHANGE guideline.	2. Conducted focus groups and individual interviews using evidence-informed interview guides with HCPs, managers, and the public during qualitative phase 1 of the mixed methods study; research team consensus.
3. Match barriers and facilitators with potential solutions for clinician behaviour change.	3. Identified barriers and facilitators from research findings to: a) match with the theoretical domains of the TDF, and b) choose relevant behaviour change techniques; research team discussion.
4. Integrate the behaviour change techniques with the modes of delivery and strategies for the intervention.	4. Selected the modes of delivery congruent with the local context; researchers and technical support available at the local university and agencies to support the intervention components.
5. Finalize the CASP intervention components	5. Obtained feedback on CASP from knowledge users and patient partners; reviewed components of intervention with research team.

The philosophy and qualitative methodological approach of interpretive description (Thorne, 2016) was embraced as the foundation for this research study to derive new nursing knowledge and to better understand the real-life issue from the clinical context (Thorne, 2016). The problem or issue identified is how best to get HCPs to utilize current CPGs in clinical practice, otherwise referred to as knowledge translation of evidence into practice. According to Thorne, the methodological approach of

interpretive description enables researchers of various disciplines the opportunity to utilize applied qualitative research in a pragmatic way to address real-life issues or problems identified in the field and to find solutions that could be useful in the practice setting (2016). Using the interpretive description approach, new nursing knowledge subjectively constructed that is relevant and contextually meaningful could be applied in the clinical practice setting (Thorne, 2016).

2.3 Exploration of Barriers and Facilitators: Methods

To explore barriers, facilitators and strategies, we sought to answer two research questions:

1. What are the facilitators and barriers associated with screening at-risk individuals aged 40-74 years in NL?

2. What are the tools and strategies that various healthcare providers, health administrators, and members of the general public recommend to increase comprehensive CVD screening in NL?

2.3.1 Participants and sampling. The target groups for this study were NPs, nurses, family physicians, dietitians and pharmacists, healthcare managers, and the general public. A convenience sample representing various members of the interprofessional team, healthcare managers, and the general public was recruited from both urban and rural areas in the province of NL. It was important to conduct interviews with a variety of participants for several reasons. Individuals representing different professional groups (nurse practitioner, public health nurse, family practice physician,

dietician, and pharmacist) would have varied experiences with CVD screening and management and their different perspectives could provide unique contributions to inform the development of the intervention. The NPs were of particular interest to the researchers since this professional group comprised the knowledge users who would be participating in the second phase of the mixed methods study. Having buy-in from management was important to determine the feasibility of implementation of such an intervention int~~o~~ the local context. Finally, engaging knowledge users and patient partners who would be collaborators in a patient-centred care approach for the intervention during the design phase of interventions ensured that the end program or intervention was relevant to the context and potentially sustainable (Brett et al., 2014). This is consistent with the interpretive description philosophy of encouraging input from a variety of perspectives to address the healthcare issue or problem (Thorne, 2016).

There were 30 participants involved in phase 1 of this study. This number was thought to be a sufficient sample by the research team and was consistent with interpretive description methodology (Thorne, 2016). Obtaining a variety of perspectives to answer the semi-structured questions contained in the interview guides used during the focus groups and interviews was important to inform the development of an intervention that was contextually and culturally relevant. The participant sample was recruited from both rural and urban settings utilizing different strategies such as putting up wall posters in community health clinics, setting up an information table, in workplaces, attending conferences, sending emails, and meeting with managers face to face.

2.3.2 Data collection. Focus groups and individual interviews were conducted for this research study. There were five focus groups held with 3-6 participants each. Three focus groups were held with NPs, and two focus groups with members of the general public in both rural and urban settings. The focus groups with the NPs took place at Memorial University and in Grand Falls-Winsor, NL. The focus groups with the public took place in a government building in St. John's and in the small town of Harbour Grace, NL. Ten individual interviews were conducted in various locations in the province by phone and in St. John's and the surrounding area with a number of different HCPs: a family physician, a pharmacist, a public health nurse, a nurse practitioner, two dieticians working in community health settings, and a member of the public. Three managers from different locations within the eastern Regional Health Authority were also interviewed.

We developed three different semi-structured interview guides, informed by the literature, that were used with the different participant groups (HCPs, healthcare managers and the general public). These interview guides were used for the focus groups and the individual interviews. Appendix D contains the interview guide documents entitled the Focus Group/Individual Interview Questions for Health Professionals, and the Focus Group/Individual Interview Questions for the Public.

Each focus group lasted 60-90 minutes and the individual interviews were approximately 60 minutes in length. We initially pre-tested the interview guide for the HCP group with four NP colleagues of the primary researcher since this HCP group represented the knowledge users in the RCT of this mixed methods study. The interview

guide for the general public was also tested prior to use in the focus groups with members of the public in both rural and urban settings.

At the beginning of each focus group and individual interview, participants were given an information letter that explained their role and were invited to ask questions. Verbal consent was obtained from all participants. The primary researcher conducted all of the focus groups and recorded the sessions using a digital audio recorder. Field notes were taken during and following the focus groups and were recorded as personal responses to what had been learned or observed during the focus groups sessions. All focus groups were transcribed verbatim and field notes further guided the content and interpretation of the data. The individual interviews were conducted, recorded, and transcribed in a similar manner.

Focus groups were used to derive benefit from group dynamics that enriched the responses given by participants during the sessions (Thorne, 2016). Responding to questions that are relevant to members of the same professional group created the circumstances or dynamics that allowed further reflection and expression of ideas by the individual members that may not otherwise be revealed in an individual interview. The questions in the semi-structured guide that were posed to the focus group members contained a subject matter that was non-threatening in nature which further encouraged the expression of ideas (Kruger & Casey, 2015). Using the interview guide questions, face-to-face or telephone individual interviews, were conducted by researchers for individuals who were unable to participate in a focus group in order to gain the perspectives of the participants of the various disciplines. As each focus group or

interview was conducted, modifications to the original guides occurred to ensure that the data obtained were addressing the stated research questions.

2.3.3 Data analysis. The focus group and interview data were analyzed using constant comparative strategy as described by Kruger and Casey (2015). All transcribed focus group sessions and individual interviews were uploaded into NVIVO software for data management and coding (Pro, 2016). All transcripts were coded line by line and were further organized into nodes in NVIVO according to the semi-structured interview guide questions. Transcripts were coded and verified by two researchers. Then, categories were analyzed, and patterns were arranged in relationship to one another. The patterns were then compared between and across the three NP groups to construct the main ideas that evolved (Kruger & Casey, 2015). Relationships and patterns evolved from the public participant groups in both rural and urban settings. From the analyses of the individual interviews, some common findings as well as unique ideas emerged across the different professional groups.

Interpretive description encourages the use of diverse methodologies to analyze data rather than using rigid techniques that are specific to one philosophical stance, for example, phenomenology or grounded theory (Thorne, 2016). In keeping with interpretive description, patterns were transformed during the analysis of the focus groups, according to Kruger & Casey (2015), and during the analysis of the individual interviews with health professionals, healthcare managers, and the general public. These patterns were further interpreted through integration, synthesis, and application of the

findings to inform the development of relevant themes, and implementation strategies for CASP.

To ensure credibility of the results from the data analysis, the researcher has declared epistemological integrity of pragmatism and encouraged representativeness of the data from a variety of perspectives in the development of the intervention consistent with interpretive description. As well, an audit trail was created and independent researchers verified the analysis of numerous transcripts. Having disciplinary knowledge also gives credibility to interpretation of the data while being cognizant of the knowledge gained. Taking the time to participate in reflective journaling following the interviews and focus group sessions, also lends credibility to the findings (Thorne, 2016).

2.4 Exploration of Barriers and Facilitators: Results

The analysis of the focus group and interview data revealed various perspectives about the barriers and facilitators for CVD screening and management in the province of NL.

2.4.1 Barriers to CVD screening. Several themes associated with the barriers to CVD screening emerged from the data analysis of the focus groups and the individual interviews with health providers, managers, and the public. The main barrier themes that emerged were the following: *ambiguity and uncertainty around responsibility for CVD screening; lack of knowledge and skills for comprehensive CVD screening using the C-CHANGE guideline; questioning the necessity of screening in light of the Choosing Wisely Campaign; lack of time and commitment for CVD screening; lack of dedicated*

resources and organizational supports for CVD screening; changing behaviour is difficult for patients; and *lack of access to services*. Each theme will be discussed with supportive evidence from the data.

Ambiguity and uncertainty around the responsibility for CVD screening emerged from the NP focus groups. NPs recognized that comprehensive screening for CVD was important but were uncertain about whether they were fully responsible. Some NPs thought that family physicians were responsible; however, NPs recognized that they too had a role along with other providers such as dieticians, public health nurses, community health nurses, and diabetes educators. One NP commented: "Yeah. Totally I think it should always be in the back of our minds – health screening, screening everything….they do have family doctors and visit them regularly not that I'm putting it back on the family doctor but I mean we do, do screening tests." Another NP stated: "The family physician is probably an obvious answer. But you know some people are connected with diabetic teams of dieticians and diabetic RNs….people are sometimes identified through that avenue. I know they come across my desk sometimes from teams like that." One NP commented: "I think it depends on what type of screening you're talking about too because if it's labs then only the NPs and the physicians can do that but if you're talking about sort of risk factors of obesity and smoking…then someone else can initiate screening."

The interviews with the public health nurse and two dietitians suggested that they have a role in assessing for CVD risk factors or encouraging patients to change

behaviour, but these health professionals agreed that screening was not part of their mandate and the major responsibility should fall to physicians primarily, and NPs.

A second theme that emerged from data analysis was the *lack of knowledge and skills for comprehensive CVD screening using the C-CHANGE guideline*. NPs often screen for individual CVD risk factors but were unfamiliar with the C-CHANGE guideline. As was stated earlier, many HCPs including NPs may not be familiar with or understand the purpose of the guidelines as they may not be widely disseminated in clinical practice. When NPs were questioned about their knowledge of the C-CHANGE guideline, they had not heard of them. One NP commented: "No I have never heard of them (C-CHANGE guideline)." Another NP responded: "….so they really just put it all together from all the guidelines that are out there?" Other health professionals and managers were also not familiar with the existence of the C-CHANGE guideline when questioned during individual interviews.

Another theme was *questioning the necessity of CVD screening in light of the Choosing Wisely Campaign* that discourages family physicians and other practitioners from ordering unnecessary tests and procedures. Because of this campaign NPs have begun to question whether certain screening tests, including CVD screening, should be done at all. One NP said, "…and provincially you're getting into the whole financial discussion now of the *Choose Wisely Campaign* about unnecessary diagnostic testing and everything so it's a delicate balance. It's a very individual decision as a practitioner I find you know." Another NP commented: "…are we going to do anything with it (screening test results)? Like are we just screening for the sake of screening?"

Another theme emerged around the *lack of time and commitment for CVD screening* in the current provincial health care climate of fiscal restraints. NPs in the community setting are very busy managing patients in clinical practice. NPs recognized that implementing a new CVD screening initiative would take extra time in their daily routine. Getting extra resources such as staff to assist in this screening process was very unlikely because of the present climate of decreased resources. One frustrated NP commented: "…from an organization's perspective, if you're doing all the work well fine and dandy, go and do it. I think that's what we find with that. As for putting in extra resources like giving everybody an LPN or something to do all the screening, that's not happening. If we're going to do the work ourselves and get the patient back and everything, yeah (it will happen)."

Similarly, one pharmacist and one physician who were interviewed were aware of the time and commitment required for implementing a comprehensive CVD screening program in the current fee-for-service system in this province. Reluctance about participating in a CVD screening program was based on a lack of financial compensation and lack of dedicated time for implementation of such a program.

Likewise, *lack of dedicated resources and organizational supports for CVD screening* was a similar theme that emerged through the interviews with the healthcare managers. There was no organizational priority for prevention nor resources allocated for implementation of a CVD intervention focused on prevention. The health managers were concerned about costs such as time and money associated with the implementation of a

comprehensive CVD screening program. Also, there was a question about the sustainability of such a program in light of the associated costs and necessary resources.

Another theme was *changing behaviour is difficult for patients.* The NPs were frustrated due to lack of interest by many patients to change unhealthy behaviours. NPs questioned the value and the purpose of screening when the patients are reluctant to participate in the screening process and change their behaviour. One NP commented: "What if the patient doesn't want to take meds, doesn't want to make changes you know before we actually do the screening. We should, well we do, we ask them you know we're going to do this test. It's going to tell us your cholesterol level and if it's elevated you may need to do a, b, c, or d but if they already don't want to do anything….why do it, put them through it? So, the risk associated with pricking them and then the cost of it and if they're not going to change things?" Another NP stated: "People are resistant to change, just generally speaking, not just about cardiac but I mean diabetes, everything…(it's) the same thing."

Dietitians also spoke about the fact that behaviour change is difficult. The dietitians explained that eating patterns are formed at a young age and are often resistant to change in later years. Changing behaviours associated with eating is difficult based on their experience with counselling patients with diabetes mellitus. One dietitian stated: "And part of the issue is…that patients don't engage for the follow-up piece. They believe that it is a quick fix. They believe that you're going to tell them what to do." One dietitian reported that patients often say, "Tell me what to eat…they find it hard to get here." Another dietitian commented: "You don't always get buy-in." During one of the

focus groups with the public the following comment was made about the reality of not being able to successfully change behaviour: “I think sometimes doctors…asking someone to change their diet, change their cholesterol level is not really effective. I think that’s the bottom line.”

In their encounters with patients, NPs identified a *lack of access to services.* In the province of NL, there are many people who live in rural and remote areas who often lack access to services. NPs stated the following: “I just think access (for some people) you know. How are you going to get it out there? If you don’t have the patients coming forward or someone saying it to them, I think access is huge…” Another NP suggested that if people do not actually come to the clinic, then how would any program make a difference. One NP stated “..Yeah, but it (the CVD screening program) only catches the ones who come to the clinic." Therefore, the people who would truly benefit from the program are not accessing preventative services.

For participants from both the rural and urban general public focus groups, lack of access to care was an important theme in terms of the number of primary care providers available, mainly physicians, in the rural setting. For the urban group, wait times and lack of time given by family practice physicians to individualized care was brought forward. “And it's not only that, people say oh go to my family doctor and that's a two-hour wait. I can't get in to see him for a month. How does that work?" Another commented: "Yeah, and then of course, you forget about it because I can't see my family doctor for two months or I can't get an appointment and then it's a five-hour wait." In focus groups with

the public in both urban and rural areas, there were complaints about the lack of opportunity for a focus on CVD risk factors.

2.4.2 Facilitators for CVD screening. There were two themes related to facilitators for CVD screening; the first theme was *knowing who to screen for CVD was obvious, but the timing of screening was not clear,* and the second theme was *components and tools identified from other successful provincial screening initiatives* were important to consider to determine successful strategies for the CASP implementation. Both themes will be discussed with supportive evidence from the analysis of the data.

One theme was *knowing who to screen for CVD was obvious, but the timing of screening was less clear.* There was a realization by NPs that there is a major problem with CVD risk factors in the province of NL. They recognized that NL has the highest prevalence of many CVD risk factors in Canada such as family history, obesity, hypertension, and dyslipidemia. Global risk assessment is used to determine risk categories and to identify those at highest risk, but this was not always consistently carried out in routine daily practice. NPs in the focus groups presented a variety of responses such as the following: “age and co-morbidities”; “family history”; “their lifestyles – if they’re smokers or inactive”; and “Aboriginal descent- they are considered high risk… so we begin screening (earlier).” One NP commented: “…there are a lot of the young people who came in with heart failure related to IV drug use (so they) are at an increased risk of cardiovascular disease...” Another NP stated: “…I guess like race. You know, black people are supposed to be may be more at risk. That’s what I’ve read.”

Another NP proclaimed: “I think just being a Newfoundlander is a risk factor!” The other health professional groups and managers recognized that there is a high prevalence of many CVD risk factors and conditions, so they believed CVD screening was obviously very important for all the people in NL.

NPs recognized that the ideal time for CVD screening for patients needed to be individualized since there are many different factors that have to be taken into consideration. NPs agreed that early screening is best especially for people in NL with a significant family history and given the fact that the province has the highest rates of CVD in Canada. One of the NPs commented: “I know there was a lot of obesity in a kindergarten class of one of my kids.” Another NP stated: "… I think one standard age would be appropriate.” An NP explained the following: "…It depends – sometimes you get people on medication like in their 30s." Still another NP stated: "I think everybody at some point should be screened. I think age is a big precursor I guess but again, you can’t put everyone out there (to be screened).” The reality about the costs associated with screening was stated by another NP: “I mean you’re not going to start screening everyone at 18…It’s expensive too, right.”

The second theme was *components and tools identified from other successful provincial screening initiatives* could provide successful strategies for implementing CASP. In NL, the provincial cervical screening program and the Diabetes Strategy Initiative provide good examples of successful screening in the NL context. NPs concurred that considering the tools used for successful NL screening initiatives would be beneficial to determine strategies for CASP implementation. “Yeah, I mean if you take

the cervical screening initiative that was a huge thing in the province, and I think it's worked quite well. You know something like that…" Another NP commented about tools being used during implementation of the Diabetes Strategy Initiative: "…. (using) the quick sheets like you got for diabetes… like I know with my diabetic patients I kind of just flip to the sheet…about what you do every 3 months, what you do every year. Like something like that – a quick sort of guideline thing."

2.4.3 Strategies for CVD screening. There were two themes identified for potential strategies that could be utilized for CVD screening. One theme was *the importance of training of healthcare providers* such as NPs for the implementation of the CASP intervention to reduce the stress of fitting this program into daily clinical practice, and allaying fears of not knowing or understanding correct screening process according to the C-CHANGE guideline. Managers and the other health professionals agreed that training in comprehensive CVD screening was integral to success of the program. One HCP stated: "The important part here is they are quite familiar with the current guidelines and …they have to have a very good working knowledge of the tools like the Framingham, the heart score and whatever tools are available." Having standardized training could ensure the consistent implementation of the intervention by HCPs.

The other strategy that emerged as a theme from the focus groups and interviews with patients, HCPs, and managers was the importance of *making the public aware of the importance of CVD screening* so to address the challenge of patient engagement and participation in the CASP intervention. The need for a public awareness campaign and a champion to promote CVD screening with the public were seen as vital to ensure success

and sustainability of CASP. One NP stated: "…you could have the faces of different people on the side of the Metrobus to bring awareness of the importance of screening". Another healthcare provider said: "you need to get this out into the public to let the people know-you need a champion." One member of the public stated, and others in the group agreed, with the following: "…why not have a screening clinic just like we have flu clinics…that will get our attention."

2.5 Development of CASP

The CASP intervention was developed by selecting the TDF domains (described in the next section) to match the barrier~~s~~ and facilitator~~s~~ themes from the interviews, and focus groups, then choosing behaviour change techniques (BCTs) from a valid taxonomy, and confirming the modes of delivery and content. A summary of the barrier~~s~~, facilitator~~s~~, and strategy themes from our qualitative study, the theoretical domains selected from the TDF and the intervention components including the modes of delivery used can be found in Table 2.2 *Application of the Theoretical Domains Framework for the Development of the Cardiovascular Assessment Screening Program (CASP)*. One example from Table 2.2 is used in this section to illustrate how the TDF and the BCT taxonomy were applied and the modes of delivery and content were selected in the process CASP development.

2.6 Using the Theoretical Domains Framework

The TDF was used as a framework to inform the development and implementation of the CASP intervention. Utilizing the TDF, a validated theoretical

framework, was important to ensure that the CASP intervention was informed by proven domains to enhance clinician behaviour change and our implementation research study (Cane, O'Conner, & Michie, 2012). The TDF was applied to the themes that were already derived from the qualitative data analysis of the focus groups and interviews based on the stated research questions for our study. The TDF did not inform the interview guides as such or data analysis in keeping with the interpretive description. The interpretive description methodological approach encourages the researcher to immerse themselves in the data to construct themes based on the stated research question(s), rather than following prescriptive interview guides according to rigid frameworks.

The TDF contains a set of 14 domains covering the main factors influencing practitioner clinical behaviour: professional role and identity; knowledge; skills; motivation and goals; emotions; memory, attention and decision processes; beliefs about capability; beliefs about consequences; optimism; reinforcement; intentions; behavioural regulation; social influences; environmental context and resources (Cane et al., 2012; French et al., 2012; Michie et al., 2005). In our research, eight of the 14 theoretical domains of the TDF were relevant to the themes from the qualitative study and were deemed important by researchers to the development of the CASP screening intervention. The eight domains selected to enhance clinician behaviour change were the following: professional role and identity; knowledge; skills; motivation and goals; emotions; beliefs about capability; beliefs about consequences; social influences; and environmental context. Table 2.2 summarizes the application of the TDF for the development of CASP in columns one and two. For example, one identified barrier from our qualitative study

shown in the first column of Table 2.2 was *lack of knowledge and skills for comprehensive screening using C-CHANGE guideline.* This barrier operates within the two theoretical domains of Knowledge and Skills as shown in the second column of Table 2.2.

2.7 Behaviour Change Techniques

BCTs were developed and organized into an extensive taxonomy of techniques for use in behavioural change interventions following an international consensus of 93 distinct BCTs organized into 16 clusters (Michie et al., 2013). BCTs are reproducible, observable actions used alone or in combination to explain the process used to change professional behaviour (or changes within organizations) during implementation of the intervention. Following the identification of the TDF domains associated with the identified barriers and facilitators, the next step was to select the BCTs for our research. The structural taxonomy of BCTs by Michie et al. (2013) was used during this study as similarly described for other behaviour change interventions found in the literature (Backman et al, 2015; French et al, 2012). The BCTs were not prioritized in any specific order, but are listed in Table 2.2 according to the themes and the identified domains. In the example from Table 2.2, column three shows the change technique that was selected from the BCT taxonomy that was "shaping knowledge, instructions on how to perform a behaviour" (within the Knowledge and Skills domains) to overcome the barrier of lack of NP knowledge and to provide a pathway to changing behaviour. For example, shaping NP cognitive knowledge occurred through access to information on performing physiological measurements during CVD screening and teaching the NPs how to measure

waist circumference accurately using a colourful illustration provided the instructions on performing this specific behaviour in the online education module.

2.8 Modes of Delivery and Content

The modes of delivery for the intervention were determined by the researchers based on the literature review of effective interventions, focus groups and interviews with key stakeholders, and available resources in terms of the feasibility and practicality, within the NL context. The methods or modes of delivery as described by Michie et al. (2013) are procedures for the delivery of the content of the intervention. Modes of delivery such as webinars, websites, and online resources can provide information that could potentially encourage change in the behaviour of the clinician. Following the above example, column 3 in Table 2.2 shows the modes of delivery for the intervention content to enhance NP knowledge and skills. They were the following: a webinar, an online education module, the CASP website, and other online resources.

Column 3 of Table 2.2 also provides examples of the content of the CASP intervention to be delivered. Following the example from above, the content covered to enhance the knowledge and skills of the NPs included background information on CVD screening and access to an interactive decision algorithm based on the C-CHANGE guideline. Other content contained in CASP was a HCP Toolkit and other resources for NPs to use during the screening process. This intervention content addressed the identified barrier of NP lack of knowledge and skills for comprehensive screening.

Table 2. 2 Application of the Theoretical Domains Framework for the Development of the Cardiovascular Assessment Screening Program (CASP).

Barriers, Facilitators, and Strategies	Theoretical Domains from TDF	CASP Intervention Components*	Phase 2 Results
Lack of knowledge and skills for comprehensive CVD screening using the C-CHANGE guideline.	**Knowledge** **Skills**	**BCT:** Shaping knowledge; instruction on how to perform a behaviour **Mode:** Webinar, Online education module, CASP Website with tools, resources, and the interactive C-CHANGE guideline algorithm. CVD database was used as the documentation system. **Content:** Background information on CVD screening, and access to clinical practice guidelines (C-CHANGE). NP Toolkit (Provided resources and materials for NP behaviour change related to the screening process during intervention implementation)	▪ NPs believed that it was easy to identify patients to screen and to access C-CHANGE in CASP. ▪ Communication of screening test results with patients and individualized goal-setting was considered important for the NPs. ▪ 90% of the patients in the intervention group had 9-10 risk factors documented vs only 2% of patients' charts had documented risk factors in the control group. ▪ CASP was effective in promoting comprehensiveness of screening by NPs compared to usual care RR = 43.9, 95% CI [13.4, 144.2], $p < .0001$
Ambiguity and uncertainty around responsibility for CVD screening.	**Professional role and identity**	**BCT:** Goals and planning-discrepancy between current behaviour and standard of practice **Mode:** Webinar; One-on-one facilitator support; Online education module **Content:** NP role in CVD screening, health promotion, adherence to clinical practice guidelines, and access to relevant nursing research. *ARNNL NP Standards of Practice*	▪ All NPs agreed that CVD screening of adults was important, however, at baseline, most NPs (75%) believed that doing CVD screening in clinical practice was difficult. ▪ Following implementation of CASP, NPs in the intervention group believed that CVD screening was easy to

Barriers, Facilitators, and Strategies	Theoretical Domains from TDF	CASP Intervention Components*	Phase 2 Results
		state the role of NPs to integrate health promotion at the individual and community level in clinical practice and research.	do in daily clinical practice and all NPs (100%) believed that it was easy to access CPGs for following up on results of screening for CVD.
Questioning the necessity of CVD screening in light of the Choosing Wisely Campaign	**Motivation and goals**	**BCT**: Goals and planning-Action planning (including implementation intentions). **MODE**: Feedback questionnaires given to NPs. **Content**: CASP contained information that was ~~in~~ congruent with the Choosing Wisely recommendations.	▪ Post intervention NP questionnaires indicated that screening according to the Choosing Wisely Campaign was more important in the NP intervention group (100%) compared to the NP control group (66%).
Lack of time and commitment for CVD screening. **Lack of dedicated resources and organizational supports for CVD screening**	**Beliefs about consequences** **Environmental context and resources**	**BCT:** Commitment; Social support. **MODE:** Email and phone calls; Webinar; Online access to facilitator and technical support during research study. **Content** Streamlined the process of CVD screening, management, and documentation through online resources for easy access and to reduce time and costs associated with NP participation in screening process. Ongoing support from designated CASP facilitator and technical support during intervention implementation.	▪ NPs in the intervention group initially felt that the organization did not consider CVD screening a priority. Post intervention NPs indicated that they felt support from the health organization for participating in CASP. ▪ At baseline, all NPs (100%) thought it was difficult to find time to screen patients. Post intervention, only half of the NPs (50%) believed it was difficult to find time to do CVD screening.

Barriers, Facilitators, and Strategies	Theoretical Domains from TDF	CASP Intervention Components*	Phase 2 Results
Lack of access to services	**Environmental context and resources**	**BCT**: Antecedents; restructuring the physical environment **MODE:** Online CASP website accessible to HCPs and separate access for members of the public. **Content:** The CASP intervention and other resources for NPs and patients in urban and rural remote areas of NL. Resources to promote heart health for screening and management and self-management.	▪ All NPs (100%) in the intervention group were able to access the CASP website, HCPs' toolkit, and other CASP resources. Most patients (69%) who responded to the post questionnaires utilized the CASP website. ▪ All NPs (100%) in the intervention group utilized the online CASP resources and HCP Toolkit provided to screen and follow-up with patients in various locations across NL to provide better access to screening and management for CVD.
Changing behaviour is difficult for patients	**Beliefs about capability**	**BCT**: Repetition and substitution-Behaviour rehearsal/practice **MODE**: Online educational module containing PowerPoint presentation. **Content**: Focused on behaviour change of NPs and behaviour change of patients. Focused on the application of the Trans Theoretical Model and motivational interviewing techniques for NP behaviour change. Assessing the patient's self-efficacy would be important to determine motivation to change behaviour. Access to My Heart Healthy Plan that is focused on a patient-	▪ All NPs (100%) in the intervention group versus a few in the control group documented priorities for CVD prevention. ▪ Patients were able to identify priorities for action using My Heart Healthy Plan. ▪ There was 94% congruence between NP and patient priorities for action to improve heart health.

Barriers, Facilitators, and Strategies	Theoretical Domains from TDF	CASP Intervention Components*	Phase 2 Results
		centred approach where the onus is on patient self-management and patient control of decision-making and goals for behaviour change to assist the NP.	
Knowing who to screen for CVD was obvious and the timing of screening had to be individualized	**Knowledge**	**BCT**: Action planning (including implementation intentions); Shaping knowledge (instruction on how to perform a behaviour). **MODE**: Access to CASP resources for implementation of the intervention, CASP website, NP Toolkit, Cardiovascular Access Database. **Content**: Access to the C-CHANGE guideline using interactive algorithm to assist in determining who and when to screen for CVD. Access to the CVD database that outlines what data needed to be collected for comprehensive screening and when that data needed to be collected by NPs. The Access Database also provided a place to document findings of CVD screening and management.	▪ In the NP practices, the Heart Health Assessment Pamphlet was used for the initial CVD screening and 96% of patients thought it was easy to complete. ▪ All NPs (100%) could determine eligibility of who and when to screen individual patients by utilizing the Eligibility to Screen Forms A and B provided in CASP. ▪ The CVD database was used by NPs (100%) to document findings related to CVD screening, NP and patient priorities, patient goal setting, and management plans.
Components and tools identified from other successful provincial screening programs	**Environmental context and resources** **Social influences**	**BCT**: Goals and planning-problem-solving **MODE**: Access to resources for providers and patients through the NP Toolkit and CASP Website,	▪ Results in the post-questionnaires indicate that NPs utilized resources available in the CASP intervention. NPs used the CASP website, links and

Barriers, Facilitators, and Strategies	Theoretical Domains from TDF	CASP Intervention Components*	Phase 2 Results
		online links to other resources. **Content**: Use of the CASP resources such as Heart Health Pamphlet, patient education materials and screening tools for NPs to use in daily practice.	health providers' toolkit for patient counselling.
Training of healthcare providers for implementation of a comprehensive screening intervention to reduce stress of fitting this program into daily clinical practice	**Knowledge** **Skills** **Emotions** **Environmental context and resources**	**BCT**: Shaping knowledge-instruction on how to perform a behaviour; Repetition and substitution behavioural rehearsal/practice; Social support emotional **MODE**: Webinars, Educational module, Support from researchers through various means. Online support from CASP Website, online support through Educational Resource, online CVD database. **Content**: Introduction of the educational module and other resources to be used during CASP implementation. Educational module contained videos on correct technique on how to do skills correctly according to CPGs. Support available to NPs participating in by CASP facilitator through email, phone, or in-person during CASP study implementation and availability of online resources.	▪ All NPs (100%) participated in training, webinars, utilized the educational resource to gain the necessary knowledge and skills for successful implementation of the CASP intervention.

Barriers, Facilitators, and Strategies	Theoretical Domains from TDF	CASP Intervention Components*	Phase 2 Results
Making the public aware of the importance of CVD screening	**Beliefs about consequences** **Environmental context and resources**	**BCT**: Antecedents-restructuring the physical environment, changing exposure to the cues for the behaviour **MODE:** NP Toolkit**,** Send materials to various RHAs, posters, pamphlets, media campaigns. **Content**: Distribution of Heart Healthy Posters in a regional health authorities, grocery stores, community centres, etc. across the province of NL. NPs advertising specific days for CVD screening clinics.	▪ Providing access to the CASP study across NL, patients were informed about the importance of heart health screening and encouraged to identify priorities and decide on goals for action to improve heart health.

*The CASP intervention components contain the following: the *BCT: behaviour change technique, MODE: how the technique was delivered, and Content: what specific information was delivered* (Michie et al., 2013). The BCT, MODE, and Content selected address the modifiable barriers and facilitators to promote behaviour change of the healthcare provider.

2.9 The CASP Intervention

The researchers developed an original logic model for the CVD screening program based on the literature and this original model was further refined following the completion of the mixed methods research study. The original model provided a way for our researchers to represent or conceptualize the components of a successful CVD screening program. At the centre of this model was depicted the screening program and strategies were needed for identifying patients, screening patients, and actions for following up with patients. The program had to be in the context of organizational

support; provider education and training; and continuous patient collaboration, in order for the program to lead to increased comprehensive screening in our province. Appendix B contains the original logic model.

Figure 2.1 shows the refined logic model for CASP, which was developed based on the original model; evidence and analysis from phase 1 then further refined following implementation of the intervention in phase 2 and the integration of the results in phase 3. The revised screening program has several interrelated elements with processes and resources for identifying, screening, and following up with patients by HCPs taking appropriate actions. Overall, in the environmental context of organizational support, implementation of the screening process by the NPs who will receive appropriate education and training, in collaboration with patients throughout the screening process, should lead to increased comprehensive CVD screening by NPs and enhanced individualized patient goal setting.

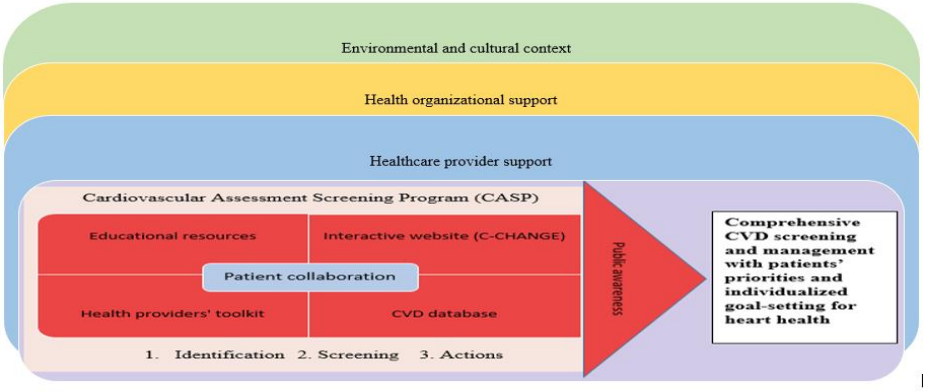

Figure 2.1 Logic Model for the Cardiovascular Assessment Screening Program (CASP)

2.9.1 The screening program. Central to the program is the implementation of the CASP screening process with patients that has three steps as described in this section.

2.9.1.1 Step 1. The first step in the screening program involves the identification of patients aged 40-74 years that come into NP practice for care. Age-eligible patients are then given a Heart Health Assessment (HHA) pamphlet with the Heart Disease and Stroke Risk Profile questions to complete (risk assessment profile questions adapted from the Cardiovascular Health Assessment Program with permission). To determine whether patients are appropriate to be screened, the NPs uses the HHA risk profile, the Eligibility for Heart Health Screening Form A and the Decision to Screen Form B. Appendix F contains the HHA pamphlet, Eligibility for Heart Health Screening Form A, and the Decision to Screen Form B.

2.9.1.2 Step 2. The second step involves screening by the NPs once the patients have been identified as eligible. The NPs use an interactive website and an online decision tool created by our researchers to simplify the screening process according to current CPGs. The NPs complete the specific components of screening checklist for each eligible patient and enter the data into the CVD database designed for CASP.

2.9.1.3 Step 3. The last step involves actions by the NPs to follow-up with the results of the screening tests. Those patients at CVD risk require appropriate follow-up on lifestyle recommendations, medications, referral to interprofessional team members, or further diagnostic tests. The NPs' recommendations are based on the most recent CPGs according to the C-CHANGE guideline (Tobe et al., 2018); these are summarized in the

CASP website according to health condition. Counselling on behaviour change utilizing motivational interviewing assists NPs and patients to improve individualized goal setting utilizing the My Heart Healthy Plan. Appendix E contains My Heart Healthy Plan. Resources and external links on motivational interviewing techniques and assessing the patient's readiness to change according to the trans-theoretical model using the readiness to change ruler developed by researchers, were available to NPs in the CASP intervention. Assessing the patient's self-efficacy would be important way to determine level of motivation for behaviour change (Rollnick, Miller and Butler, 2008). Scheduling of regular follow-up appointments assists the patient and NP to achieve individualized goals that have been developed.

2.9.2 CASP intervention components. The logic model in Figure 2.1 shows that the CASP intervention is comprised of four components: educational resources, an interactive website, healthcare providers' toolkit and the CVD database. These were identified as key modes of delivery for the intervention content to promote a change in the screening behaviour of the NPs. These components were used to address the educational needs of the NPs, streamline the screening process for efficiency since time was a concern, and share key tools and strategies for CVD screening. The CASP components were available in an electronic format and this provided feasible access to screening services within the community practice settings, even in rural and remote areas addressing the identified barrier of lack of access to services. The CASP website contained an interactive algorithm that assisted NPs in clinical decision-making and management of patients according to current CPGs (C-CHANGE) translating evidence

into practice. Patients also had a unique code to access information on the CASP website. Both the knowledge user and patient partners on our research team were able to review CASP, and to provide important suggestions for improvement prior to finalizing these components. The development of these CASP components considered adult learning principles in terms of the following: a) focusing resource materials at the education level of NPs; b) building on prior knowledge and experiences of NPs; c) providing relevant information in a time-sensitive manner; and d) offering opportunities to share experiences to optimize the CVD screening process (Arghode, Brieger, & McLean, 2017; Hoffman, Klein, & Rosenzweig, 2017).

2.9.3 Patient collaboration. At the centre of the CASP intervention is patient collaboration meaning that there must be patient engagement and collaboration in order for the CASP screening implementation to be a success. Because changing behaviour was identified as being difficult for patients, CASP incorporated a process for patients to decide what specific goals were a priority for action by completing My Heart Healthy Plan (adapted from the document: *Checking in on my plan sheet* and used with permission from the Centre for Collaboration, Motivation and Innovation, BC Ministry of Health). Appendix F contains My Heart Healthy Plan.

2.9.4 Environmental and cultural context. The outermost section of the logic model depicts the environmental context, illustrating the necessity of considering the environmental and cultural context in the development of an intervention, which is consistent with the KTA Framework with guideline adaption (Harrison et al., 2013; Graham et al., 2006).

2.9.5 Health organizational support and healthcare provider support. Figure 2.1 also depicts the health organizational support and the healthcare provider support that is critical for CASP to be implemented. Gaining the support of key people within organizations and the HCPs who implement CASP is instrumental to success. Having a facilitator to promote and assist with the implementation of CASP throughout the organization is important for sustainability of this program into the future.

2.9.6 Public awareness campaign. Lastly, for the implementation of CASP to be successful, a public awareness campaign that emphasized the importance of CVD screening for the public could lead to increased comprehensive screening and individualized goal-setting for heart health. There is a need to increase public awareness about the NP's role in CVD screening. For this dissertation research, the public awareness campaign was limited to NP offices for recruitment purposes.

2.10 Evaluation of CASP

The second phase of the mixed methods study was an RCT that tested the effectiveness of the theory-informed screening intervention CASP on comprehensiveness of CVD screening by NPs. Ten NPs from across NL were randomized to either the intervention group implementing CASP (68 patients), or the control group providing usual care (99 patients). In addition to collecting data on comprehensiveness of screening and addressing screening results, questionnaires were distributed to both the NP and patient participants at the end of the RCT. Details of the phase 2 methods and results are reported elsewhere.

In phase 3 of this mixed methods study, the integration of the results from phase 2, including the feedback obtained from NPs and patients, with the results of phase 1 were used to further refine CASP. During the integration phase, researchers evaluated whether the CASP intervention components addressed the barriers and facilitators identified in phase 1 by evaluating the completed NP and patient feedback questionnaires. Researchers confirmed the CASP intervention components that were effective strategies to change provider behaviour and to increase uptake of CVD screening (according to C-CHANGE). The feedback questionnaires from NPs and patients at the end of phase 2 were used to evaluate whether the BCTs, methods of delivery, and intervention content were effective in changing the behaviour of the clinician and increasing comprehensive CVD screening. We evaluated the results to determine whether there was confirmation, congruence, or discordance of the findings to further refine the components of the CASP intervention.

Column 4 of Table 2.2 summarizes some key results of the RCT that are relevant for each of the themes identified in phase 1 as shown in column 1. Overall, CASP was effective in promoting comprehensiveness of screening, but it is the process-oriented results that are most relevant to this paper on the development of CASP. For example, all of the NPs in the intervention group stated post-intervention that CVD screening was easy to do in clinical practice utilizing the interactive algorithm with current CPGs, whereas 75% of all participants at baseline said it was difficult. More felt supported by their organization and fewer identified time as a constraint post intervention compared to baseline. All of the NPs and the majority of the patients used the resources that were

provided during the implementation of the intervention. When following up with patients after the screening process was complete, the NPs shared the laboratory results, physiological findings, and new diagnoses with patients. Priorities for heart health were determined by both the NPs and their patients. There was 94% congruence between patients and NPs in terms of priorities for action for heart health. Individualized goals, documented by the patients, were supported by the NPs to improve heart health in the future. The CVD database facilitated documentation of patient data and NPs' and patients' priorities for action. The NPs appreciated the education and training provided early in the research process, and provided feedback that the education content was appropriate. Based on these results, few refinements were identified as being necessary to the processes and tools of CASP. Further implementation of CASP will however focus on promoting organizational support, securing a facilitator, and assessing needs for additional educational or other resources. Details of the results of the RCT conducted in phase 2 of this mixed methods study are reported elsewhere.

2.11 Discussion

This article has summarized the approach used for the development of the CASP intervention in phase 1 of a mixed-methods research study. The research problem from the clinical setting was addressed by conducting a qualitative research study using focus groups and individual interviews to obtain input on strategies and to determine the barriers and facilitators associated with intervention implementation and behaviour change of the NP in the local context. The TDF was then applied to the themes that emerged to find a real-life solution that could be used in clinical practice.

The TDF has been applied by researchers to determine barriers and facilitators to behaviour change, adherence to national guidelines, and other knowledge translation of evidence into practice (Backman et al., 2015; French et al., 2012). Many studies have described the barriers and facilitators of recommended practice and have utilized the TDF as a guide to develop interventions aimed at translating evidence from clinical guidelines into practice (Hofstede et al., 2013). Other studies have described the matching of the theoretical domains of the TDF with behaviour change techniques (Atkins et al., 2017; Cane, O'Connor, & Michie, 2012). Even fewer studies have described the specific modes of delivery for the intervention components that are relevant to clinical practice (Backman et al., 2015; French et al., 2012). This study also applied the TDF as a framework, used of the behaviour change taxonomy for BCTs and identified modes of delivery relevant to the local context for CASP intervention development. This research also adds another important element by identifying the importance of having patient buy-in for intervention success. By engaging patients and knowledge users in the research process, further improvements can occur in the design, implementation, and dissemination of research evidence into practice.

Our research adds to the body of knowledge of implementation science. The development of an intervention containing current evidence such as C-CHANGE guideline that can be applied in daily clinical practice is important to translate evidence into practice. The interactive C-CHANGE algorithm was developed as part of the CASP intervention to simplify the complex nature of CVD screening and to enhance provider adherence and effective decision-making according to current evidence. This intervention

can be used to enhance patient care through utilizing current evidence for CVD screening and can identify and manage individuals at high risk in a timely manner. Using an exploratory sequential mixed methods study with a knowledge translation framework enabled researchers to gain the perspectives of participants, and to design an intervention that added critical elements necessary for CVD screening that were relevant to the local context. Phase 3 integration confirmed that it was important to add these components to address the concerns and suggestions identified in phase 1 and to understand the value of using this research design.

This research also adds to the nursing body of evidence by providing useful tools and training methods that can be utilized in a supportive environment to incorporate screening and management into clinical practice. NPs can add this useful screening tool to enhance identification and management of patients in their daily routine. New knowledge to enhance patient-centred care may direct more focus on the patient-driven priorities for action that could lead to more sustainable behaviour change and improved heart health in the future.

Our study has some limitations. The qualitative research study in phase 1 that identified barriers and facilitators was based on a small sample of HCPs, patients, and administrative personnel due to the time constraints of dissertation research. The intervention was implemented with NPs; however, it is intended to be used by other HCP groups so some of the materials would need to be modified to be applicable to all HCPs in the future. Finally, the research occurred in one eastern province with a small

population base, and therefore may not be generalizable to the wider Canadian population.

2.12 Conclusion

Focus groups and interviews with various key informants identified the main barriers and facilitators related to CVD screening and management of CVD risk factors in NL and influenced the development of a tailored intervention called CASP for one Canadian province. Using interpretive description and pragmatism as the philosophical basis was important to answer the clinical practice issue of knowledge translation of evidence into practice. The CASP intervention was further guided by the application of the TDF to ensure that it contained appropriate theoretical domains, informed by the BCT taxonomy for the selected behaviour change techniques, and had realistic modes of delivery or strategies for implementation in the local context. Online intervention components created during this research enhanced the delivery of provider information to promote evidence-informed practice. The use of a mixed methods study with a qualitative phase and the TDF helped in the development of a theory-informed intervention CASP. Successful testing of CASP with NPs and the integration of findings showed the value of the components added to be a contextually relevant intervention, a key aspect of the KTA Framework. Addressing the barriers, facilitators, and strategies identified in the local context was important for the development of an intervention that can be successfully integrated into daily clinical practice.

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CHAPTER 3 Evaluating the Effectiveness of the CASP Intervention

The Chapter 3 manuscript describes the results of phase 2 of the mixed methods study, the RCT. The intended audience is practitioners, researchers, and government officials.

JB conceptualized the study, collected the data, interpreted the results, performed data analysis and wrote the manuscript. DM contributed to the conceptualization of the research design and study. DM and CD contributed to the data analysis, interpretation, and discussion. DM, CD, and KP reviewed and suggested revisions, and approved the manuscript.

3.1 Abstract

BACKGROUND: There is inconsistent utilization of clinical practice guidelines (CPGs) for cardiovascular disease (CVD) screening and management by healthcare professionals to identify CVD risk factors early and to intervene using current recommendations. A mixed methods study was conducted to develop and test a novel intervention called the Cardiovascular Assessment Screening Program (CASP) that contained current CPGs, the Canadian-Cardiovascular Harmonized and National Guideline Endeavour (C-CHANGE). Phase 2 of the mixed methods study tested CASP with nurse practitioners (NPs) across one Canadian province, Newfoundland and Labrador (NL). **METHODS:** Ten NPs were recruited and then randomly allocated to either the intervention group testing CASP or the control group providing usual care. As a result of attrition, a total of eight NPs participated in the RCT. The NPs in the intervention group recruited 68 patients; whereas, the NPs in the control group recruited 99 to participate in the RCT. A database was used in the intervention group to document screening of risk factors, priorities, and actions; control group patients' charts were reviewed by researchers. **RESULTS:** Comprehensiveness of screening (9 to 10 risk components) increased significantly in the NP intervention group using CASP versus the NP control group providing usual care after controlling for the effect of the NP with an adjusted RR = 43.9, 95% CI [13.3, 144.2], $p < .0001$. Sixty-five percent (65%) of the patients in the intervention group were at moderate to high risk for having a CV event in the next 10 years; the level of CVD risk was unknown (96%) for control group patients. The recommendations made by intervention group NPs matched patient priorities 94% of the time; 75% of the

intervention group patients developed individualized goals for heart health.

CONCLUSION: CASP, an innovative CVD screening program, was effective to identify CVD risk factors early through comprehensive screening, priorities for action, and individualized goal-setting for heart health.

Keywords: Clinical practice guidelines, nurse practitioner, cardiovascular, screening.

3.2 Introduction

Although specific guidelines for cardiovascular disease (CVD) screening are available in the UK, the USA, Canada, and Australia, there is inconsistent identification, management, and documentation of CVD risk factors by healthcare providers (HCPs) (Unverzagt, Oemler, Braun, & Klement, 2014). When screening for CVD risk factors, often single risk factors or conditions are addressed rather than using a comprehensive approach to identify multiple risk factors simultaneously in a systematic manner (Dyakova et al., 2016). Comprehensive strategies for identification and improved documentation of risk factors can lead to identification of individuals at high CVD risk and enhance management and monitoring by HCPs (Kennedy, Su, Pears, Walmsley, & Roderick, 2019). Improvements in the communication between providers and patients about CVD risk factors can lead to identification of priorities and individualized goal-setting to improve heart health and to promote healthy aging.

Although a variety of HCPs are involved in CVD screening, the focus of this study was on the role that nurse practitioners (NPs) perform in CVD screening, prevention, and management. NPs are ideally positioned within the healthcare system to

identify risk factors, order specific diagnostic tests, prescribe current therapies, refer patients to other team members, and engage in individualized counseling to contribute to the reduction of CVD morbidity and improve health outcomes (Farrell & Keeping-Burke, 2014). NPs work in both urban and rural settings and they are often the only providers in very remote areas. Patients in these remote rural areas may otherwise have difficulty accessing appropriate CVD risk factor assessment and management.

Reported elsewhere, the qualitative findings of a mixed methods study were used to inform the development of the Cardiovascular Assessment Screening Program (CASP). In phase 1 of a mixed methods study, a theory-informed intervention CASP, was developed. The methodological philosophy of interpretive description (Thorne, 2016) and pragmatism were embraced as the foundation for this mixed methods research study to derive new nursing knowledge and to better understand the real-life issue from the clinical context (Thorne, 2016). The results of phase 1 are reported elsewhere. This article reports on the results of phase 2 of a mixed methods study in which an randomized controlled trial (RCT) was conducted to determine whether implementation of CASP by NPs resulted in increased comprehensive CVD screening of community dwelling adults aged 40-74 years without established vascular disease.

3.3 Background

CVD screening and management is critically important since CVD causes significant mortality and morbidity worldwide (WHO, 2017). Finding strategies to increase the uptake of CVD screening according to current evidence is important to

reduce the CVD burden and to promote healthy aging. Criteria outlined and published originally by WHO, and later revised by the National Screening Committee (NSC) in the UK described principles that should be met before screening for a disease or condition (NSC, 2013). According to the UK model, criteria for appraising the viability, effectiveness, and appropriateness of a screening program are the following: a) the condition must be an important public health problem, b) the screening test(s) must be simple and valid, c) the treatment for the condition must be effective, and d) there must be evidence that screening for the condition can reduce morbidity and mortality. Screening for CVD meets the criteria set out in the UK model for screening based on the original WHO Report.

CVD is an important health problem causing significant mortality and morbidity that with effective screening and management of risk factors, can lead to better patient outcomes. More people die annually from CVD than from any other cause; CVD is the number one cause of death globally (WHO, 2017). The morbidity caused by CVD has a significant impact on individuals, families, and communities. Costs are related to high rates of hospitalization, disability, drug utilization, and invasive diagnostic procedures; CVD also causes significant decrease in the quality of life for many individuals and families (Canadian Institute for Health Information, 2014).

Screening tests used in a timely manner for the identification of CVD risk conditions such as dyslipidemia or hypertension can prevent further escalating costs and burden to the healthcare system (Anderson et al., 2013; Lindsay et al., 2013; Grover & Lowensteyn, 2011). The screening tests for risk conditions are safe, precise, validated,

and acceptable to the population. For example, screening for hypertension using a BP monitor is a valid and reliable test. Also, screening for other CVD risk factors such as diabetes and dyslipidemia meet the requirements of a simple, safe, and precise measurement process. Because screening for CVD is so complex, measuring risk factors singly is not enough; it is also important to consider total or global CV risk such as the Framingham Risk Score (FRS) or other risk assessment scores validated for different populations (Willis, Davies, Yates, & Khunti, 2012; Grover & Lowensteyn, 2011).

Earlier treatment of CVD leads to better outcomes than later treatment, thus earlier detection through screening is warranted (National Screening Program, 2014). There are effective treatments available for each modifiable risk factor for CVD. For example, optimizing insulin dosage for the treatment of Type 2 diabetes can significantly reduce morbidity (Zinman et al., 2015). A systematic review of systematic reviews provides evidence of a decrease in morbidity and mortality associated with screening and management of individual risk factors for CVD (Alvarez-Bueno et al., 2015).

In summary, CVD is a significant public health problem with validated and acceptable screening tests to detect CVD. There are effective treatments available for identified risk factors and evidence that screening programs can reduce risk of CVD morbidity and mortality. Therefore, screening for CVD in a comprehensive manner is warranted.

3.4 Current CVD Screening Initiatives

There are three main examples of CVD screening initiatives at the population level, notably those in the UK, the USA, and Australia, that involved screening for CVD and other chronic conditions. In the UK, HCPs are mandated to offer the National Health Service (NHS) Health Check Program to healthy adults aged 40-74 years who have no prior diagnosis of CVD (NHS, 2015). In the USA, the Million Hearts Initiative (MHI), a federally funded nation-wide initiative focused on primary and secondary CVD prevention was initially aimed to prevent one million MIs and CVAs over five years from 2011-2017. Centers for Disease Control (CDC) Reports claim that half a million people have been saved thus far with this initiative that has recently been extended until 2022 (CDC, 2019). In Australia, a Health Check Program has recently been launched with the intention to detect, treat, and reduce the CVD burden in the population (National Heart Foundation of Australia, 2020). However, in Canada, there has been no national comprehensive program implemented although there are separate initiatives presently occurring at the provincial level.

These national programs have been shown to be effective for CVD prevention in their countries of origin, but they may not be relevant or easily adopted in different contexts. There is one provincial initiative ongoing in Canada that has been shown to be effective called the Cardiovascular Health Awareness Program (CHAP). This provincial initiative began in Ontario about 10 years ago and has a target population of adults aged 65 years and older. CHAP is a community-based initiative that is limited in scope since it mainly focuses on blood pressure (BP) assessment by trained volunteers, however,

information about other key risk factors such as smoking and dietary habits are captured through a screening questionnaire. CHAP volunteers then communicate abnormal BP findings to primary care providers for follow-up (Kaczorowski et al., 2011).

Despite having current CPGs available for CVD prevention, screening, and management, there is inconsistent implementation of guidelines (Unverzagt, Oemler, Braun, & Klement 2014). We do not know specifically about uptake of CVD screening guidelines because of a lack of prevalence data on screening rates. There is also concern about implementation of the comprehensive C-CHANGE guideline by HCPs in clinical practice (S. Tobe, personal communication, October 12, 2017). Finding innovative ways to enhance guideline awareness and implementation that is relevant to the context can potentially optimize patient outcomes and reduce CVD morbidity and mortality.

The Knowledge to Action (KTA) Framework (Graham et al., 2006) with guideline adaption (Harrison et al., 2013) was used to guide the development, implementation, and evaluation of the CASP intervention. The KTA Framework emphasizes the importance of the alignment of any intervention based on expert knowledge with the local context, practice, and system. In phase 1 of this mixed methods study, the qualitative phase, the CASP intervention was developed following the exploration of the barriers, facilitators, and strategies related to CVD screening through focus groups and interviews with patients, providers, and administrators locally. This article is focused on the results of the quantitative phase 2 of the study, an RCT to evaluate the implementation of CASP intervention with NPs and patients. This is

consistent with the final stage of the KTA cycle to monitor the knowledge use and to evaluate the implementation process.

3.5 The CASP Intervention

The development of the CASP intervention was intended to simplify the complex nature of screening for CVD to make it more user-friendly and to enhance provider adherence and effective decision-making according to current evidence. CASP is a novel intervention utilizing an innovative algorithm based on the Canadian Cardiovascular Harmonized National Guidelines Endeavour (C-CHANGE) 2018 to enhance the ability of HCPs to identify and manage individuals at CVD risk using current evidence in a timelier manner. The logic model for CASP is shown in Figure 3.1 and in Appendix B.

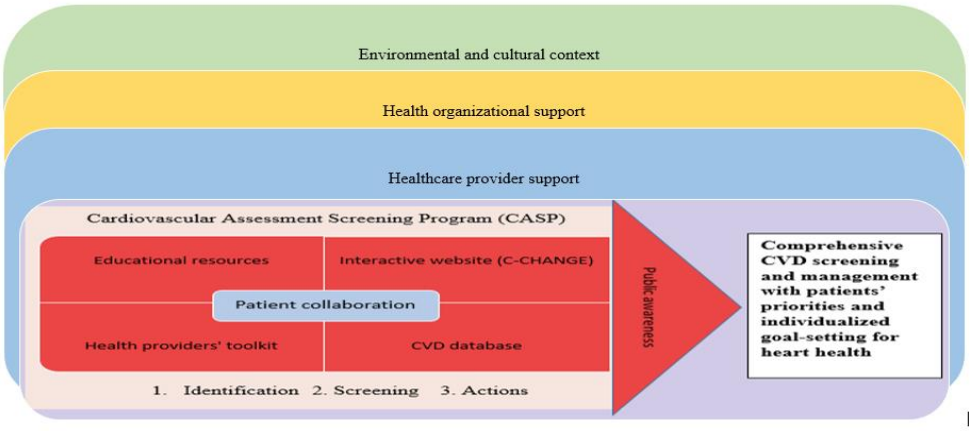

Figure 3.1 Logic model of the Cardiovascular Assessment Screening Program (CASP)

Overall, within the environmental context of organizational support, implementation of the screening process by the NPs who receive appropriate education and training, including patient collaboration throughout the screening process should lead to increased comprehensive CVD screening by NPs and enhanced individualized patient

goal setting. Central to the program is the implementation of the CASP screening process with patient collaboration.

Step 1 of the screening process involves the identification of patients aged 40-74 years that come into NP practice for care. Age-eligible patients are then given a Heart Health Assessment (HHA) pamphlet with the Heart Disease and Stroke Risk Profile questions to complete (risk assessment profile questions adapted from the Cardiovascular Health Assessment Program with permission). To determine whether patients are appropriate to be screened, the NPs uses the HHA risk profile, the Eligibility for Heart Health Screening Form A, and the Decision to Screen Form B. Appendix F contains the HHA pamphlet, the Eligibility for Heart Health Screening Form A, and the Decision to Screen Form B.

Step 2 involves screening by the NPs once the patients had been identified as eligible. The NPs use an interactive website and an online decision tool created by our researchers to simplify the screening process according to current CPGs. The NPs complete the specific components of screening checklist for each eligible patient and enter the data into the CVD database designed for CASP.

Step 3 involves actions by the NPs to follow-up with the results of the screening tests. Those patients at CVD risk require appropriate follow-up on lifestyle recommendations, medications, referral to interprofessional team members, or further diagnostic tests. The NPs' recommendations are based on the most recent CPGs according to the C-CHANGE guideline (Tobe et al., 2018); these are summarized in the

CASP website according to health condition. Counselling on behaviour change utilizing motivational interviewing assists NPs and patients to improve individualized goal setting utilizing the My Heart Healthy Plan. Appendix E contains My Heart Healthy Plan. Scheduling of regular follow-up appointments assists the patient and NP to achieve individualized goals that have been developed.

The CASP intervention consists of four main components: an educational resource, an interactive website, a health providers' toolkit, and a CVD database. The educational resource consists of an online module to enhance providers' knowledge of CVD, screening, and the use of assessment tools and devices. Another component is an interactive website that houses the C-CHANGE algorithm decision tree to simplify the C-CHANGE guideline to assist practitioners in clinical decision-making based on the most current evidence. The website also contains a separate section for patient use that provides access to provincial resources and contact information. The third component of CASP intervention is a health providers' toolkit that contained devices for risk assessment such an automated BP monitor (if not already available in the office setting), digital weigh scales, measuring tape, handouts, and brochures for patient counselling. The fourth component is an electronic CVD database created by researchers with technical assistance from the Newfoundland and Labrador Centre for Health Information (NLCHI) for this study. This database was used by NPs implementing CASP to record patient data electronically, guide them through the key steps of screening, and to transfer files securely to NLCHI to be de-identified for researchers. Both the knowledge user and

patient partners on our research team were able to review the CASP and to provide important suggestions for improvement prior to finalizing these components.

CASP provides a comprehensive approach to CVD screening to simplify the process of identifying and managing CV risk factors in a timely manner. CASP focuses on changing providers' behaviour and enhancing patient-provider interactions to reduce CVD risk with the goal of improving heart health and promoting healthy aging.

3.6 The RCT Study

3.6.1 Aims.

3.6.1.1 Primary aim. Aim 1: To determine whether implementation of CASP resulted in increased comprehensiveness of CVD screening.

Hypothesis (H_0): There will be no difference in comprehensiveness of CVD screening between the NP intervention group, compared to the NP control group providing usual care.

***3.6.1.2 Secondary aims*.** Aim 2: To evaluate whether or not implementation of CASP led to identifying multiple CVD risk factors and determining the patients' level of CVD risk in comparison to the control group.

Aim 3: To evaluate NPs' and patients' priorities for heart health based on implementation of the CASP intervention compared to usual care.

Aim 4: To evaluate NPs' and patients' experiences with the CASP intervention.

3.6.2 Design. A two-group, non-blinded, randomized controlled trial design was conducted. Block randomization was completed to allocate the NPs from the four Regional Health Authorities across NL into either the intervention or the control group. Using a random number generator in STATA, NPs (with patient participants) were allocated to either the intervention or control group (STATA, 2013). The RCT consisted of an eight-month screening and follow-up period with NPs screening and following up with patients in community-based settings in the intervention group. Visits to four clinics by the principal investigator (PI) were carried out in different community clinics to complete reviews on charts of the control group patients.

3.6.3 Setting and participants.

3.6.3.1 Community-based clinics. Community-based clinical practices in four regional health authorities across Newfoundland and Labrador (NL) participated in this trial.

3.6.3.2 Nurse practitioners. A convenience sample of ten NPs were recruited to participate in this study. Inclusion criteria for NPs were that each NP had to be practicing in a community clinic setting with access to healthy, asymptomatic patients between the ages of 40 and 74 years. NPs had to have the ability to collect the patient data and to be able to perform routine follow-up. Prior to the data collection period, two NPs withdrew from the study (one from the intervention group and one from the control group) so there were eight remaining NPs who participated in the RCT.

3.6.3.3 Patients. Patients were recruited by the NPs in community-based practices. Inclusion criteria for the patients were the following: a) were between the ages of 40-74 years of age, b) had no established CVD or vascular disease, and c) were willing to participate in the study.

3.6.4 Sample size calculation and randomization. The sample size estimation for this study was determined using the proportion of eligible patients who were comprehensively screened as the outcome measure of interest. A study that considered the effectiveness of a national risk assessment program for patients aged 40-74 years found that approximately 40% had complete Health Checks and 60% had partial Health Checks among high risk patients in the UK National Health Service Health Check Program (Artac et al., 2013). The sample size for this proposed study was calculated based on the assumption that 40% of the screening will be comprehensive in the control group practices. The research team decided that comprehensive screening of 70% of patients seen by the NPs in the intervention group during this study would indicate an effective intervention. Using a two-sided alpha of 0.05 and 90% power, the sample size was calculated to be 250 patients (125 patients per group). Considering that patients would need to provide consent to participate in this study the research team assumed that 20% of those approached would refuse. This meant that 300 patients with 150 patients per group would be required. To be realistic about workload, each NP would need to recruit 30 patients. If 10 NPs were recruited, each NP would need to recruit 30 patients. The duration of the data collection period varied by NP according to the number of eligible patients seen and ranged from two to eight months. Once all of the NPs were

recruited, NPs were allocated to either the experimental group or the control group. Since it was not possible to randomly allocate patients to groups, NPs were allocated and the effect of the NP was controlled for in the analysis.

3.6.5 Intervention

3.6.5.1 Intervention group. NPs randomized to the intervention group completed CVD screening over two patient visits using the using the CASP intervention. During the initial visit, the Heart Health Assessment Form was completed by the patient followed by a focused history and physical exam by the NP. During the follow-up visit, the NP shared blood work results, FRS, and heart age, and then provided an opportunity for patients to identify priorities and goals for a heart health action plan.

3.6.5.2 Control group. For NPs randomized to the control group (usual care), no adjustments were made to the NPs' daily routine or the usual care provided to patients. The NPs in the control group participated in webinar education sessions different from the webinar held with the intervention group, and were instructed to follow usual practice to screen patients for CVD. The NPs were given instructions on recruiting patients and obtaining consent.

3.6.6 Outcome measures

3.6.6.1 Primary outcome. Comprehensiveness of CVD screening by NPs was assessed following implementation of the CASP intervention at the completion of the trial period. The number of risk components screened for was calculated. These components were documented by the NPs following history taking, physical examination,

obtaining blood work results, or computing the FRS in accordance standard instructions provided in the CVD database. Comprehensive CVD screening by NPs required nine or ten of the following risk components to be documented during study implementation: a) patient's age, b) family history of premature coronary artery disease (CAD), c) FRS, d) smoking status, e) body mass index (BMI), f) waist circumference, g) blood pressure (BP), h) lipid profile, i) A1C, and j) stress. If six to eight of the risk components were documented then this was considered to be a moderate level of screening. If NPs obtained only three to five risk components, this was categorized as limited screening. Minimal screening was defined as obtaining only one or two risk components.

3.6.6.2 Secondary outcomes. The secondary outcomes were the following: the identification of multiple CVD risk factors and determining the patients' level of CVD risk using the FRS; the identification of NPs' and patients' priorities for heart health; and gaining the NPs' and patients' experiences with the CASP intervention.

3.6.7 Data collection. The collection of patient data for the RCT was different for the NP intervention group compared to the NP control group. For the intervention group, NPs documented patient data in the CVD database. At the end of the data collection period, the database files on which the NPs documented were securely transferred to NLCHI to be de-identification prior to being sent to the researchers for analysis.

In contrast, for the NPs in the control group the researchers made arrangements with the NPs in designated communities to review the charts of those patients who had consented to participate in the RCT. The Chart Review Form, developed by the

researchers, was used by the researchers to obtain information from the patients' charts. Examples of the type of information extracted from the patients' charts were the following: demographics, history and physical findings, physiological measurements, laboratory data, and NP recommendations for patient care during clinical visits. The Chart Review Form can be found in Appendix F.

At the end of data collection period, the NPs in both the intervention group and the control group gave each participant a Patient Feedback Questionnaire Form to complete and mail back to the researcher in a pre-paid envelope. This questionnaire was developed by the researchers and was pre-tested with patient partners for content validity. The Patient Feedback Questionnaire Form for the intervention group patients contained Likert-type questions and short answer questions related to their experiences participating in CASP. The feedback form completed by the control group patients had different Likert-type questions about their interest in participating in a CVD screening program in the future. The Patient Feedback Questionnaire Forms can be found in Appendix F.

Feedback was obtained from all the NPs on their experiences in participating in the RCT using NP Feedback Questionnaires developed by the researchers. The NP participants were sent the feedback questionnaires electronically to be returned confidentially to the Nursing Research Unit at Memorial University. The NP Feedback Questionnaires were different for the NPs in the intervention group compared to the control group. Both NP questionnaires contained a series of questions that were asked previously on the NP Profile Questionnaire (pre-questionnaire). The researchers were able to compare the answers in the pre and post-questionnaires, to determine changes in

the NPs' knowledge, attitudes, and behaviour post-intervention. The remaining questions on the questionnaires were related to either the NPs' experiences being involved in the intervention or the control arm of the RCT. The questionnaires contained both Likert-type questions and short answer questions. Appendix F contains the NP Profile Questionnaire and the NP Feedback Questionnaires for the intervention and control groups.

3.6.8 Endpoints. Data collection was completed once the NPs had enrolled and screened thirty (30) patient participants each or at the end date of the data collection for the study, November 2018.

3.6.9 Validity, reliability, and rigour. Multiple strategies were used to recruit NPs and patients from a variety of locations across the province of NL to ensure that study participants were representative of the target population. To minimize selection bias, the recruitment process was the same for NP participants in both groups and they were assessed and found to have similar baseline characteristics.

A number of measures were taken to address the threats to internal validity. The NPs were not blinded, but trained in data collection and adhered to procedures explained. Some of the tools and instruments used were known to be valid and reliable, for example, the FRS, patients' blood tests, and standardized methods to obtain electronic BP measurements. Other measures such as the CVD database and data extraction form, used for the chart review, were assessed by experts and content validity can be assumed.

To control for confounding, several strategies were used. NPs in the intervention and control groups were assessed for similarities at baseline. Block randomization was used to allocate NP practices to either the intervention or control group. Appropriate statistical testing was used to control for the effect of the NP and the study had adequate power to detect statistically significant differences. The rigour of the study was therefore enhanced because of the methods used to minimize selection bias and key threats to internal validity, control for confounding, and promoting statistical conclusion validity.

3.6.10 Ethical considerations. Approval was obtained from the Health Research Ethics Board (HREB) and the Research Proposal Approval Committees (RPACs) in the regional health authorities prior to commencement of the study. Key ethical considerations of potential risks and benefits, informed consent, confidentiality, and cost considerations were addressed.

The potential benefits and risks of participating in the study were clearly outlined on the NP and patient consent forms. Appendix F contains the consent forms for the NPs and patient participants.

3.6.11 Data analysis. The data collected were analyzed using Stata 13 statistical software (STATA, 2013). The relative risk was calculated for the primary outcome using generalized linear modelling to control for the effect of the NP.

Descriptive statistics were used to compare differences between the intervention and the control group in terms of the identification of patients at risk for CVD, the priorities identified by the patients and the NPs, and the recommendations made by the

NPs. Differences between patient baseline characteristics were tested using χ^2. Content analysis was done on the responses to the short answer questions on the NP and patient feedback questionnaires to assess the specific components of the screening program and to determine the factors that influenced patients' and NPs' participation in the screening process.

3.7 Results of the RCT

3.7.1 Baseline characteristics

3.7.1.1 NP baseline characteristics. A total of eight NPs participated in the RCT study. The NPs in both groups were comparable in age, with most NPs over 45 years. Only one NP in the intervention group was in a younger age category 25-34 years. Both intervention and control groups were similar in gender representation with each group having three female NPs and one male NP. Three of the NPs in the intervention group had less than 10 years working as NPs compared to those NPs in the control group who all had over 10 years of experience. Almost all NPs were involved in professional development and attended conferences at least every three years with the exception of one NP in the intervention group that reported rarely attending conferences. Although there were some variation in the NPs' baseline characteristics, these were controlled for in the statistical analysis.

The study was conducted in eight community-based practices in four regional health authorities (RHAs) across the province of NL, Canada. The NPs in the intervention group (4 NPs) had equal representation from all RHAs in NL. In the control

group, there were three NP participants in Eastern Health (EH) and one NP participant in Central Health (CH), with no representatives in either Western Health (WH) or Labrador-Grenfell Health (LGH). The NP Profile Questionnaire (pre-questionnaire) was given to the NPs in the intervention group and the control group after consent was obtained, to determine baseline knowledge, attitudes, and behaviour related to CVD screening. At baseline, all NPs agreed that screening for CVD was important, but that there was limited time to do so in daily clinical practice. The importance of screening according to Choosing Wisely Campaign was important to all NPs in the intervention group and 66% of those in the control group. Most NPs (75%) in the intervention group disagreed that CVD screening was easy to do in daily clinical practice compared to 100% of NPs in the control group who thought that screening was easy to do. At baseline, some NPs in the intervention group (25%), and control group (33%), thought that accessing current CPGs to follow up on the results of CVD screening with patients was difficult to do.

3.7.1.2 Patient baseline characteristics. There were 167 patient participants in total, with 68 patients in the intervention group and 99 patients in the control group. We did not obtain the planned number of patients because of the time limitations of dissertation research. As shown in Table 3.1, baseline characteristics of patient participants in the intervention and control groups were similar with the exception of the distribution of patients across NL. In the intervention group, patient participants were equally distributed throughout all regional health authorities; the patient participants in the control group were from two regional health authorities only, namely Eastern Health and Central Health. Participants in the intervention group were similar to those in the

control group in terms of education, age, and gender. Table 3.1 also shows the results of patients' documented comorbidities for the intervention group compared to the control group. There was considerable variation in the proportion of the patients with comorbidities in the NP practices. In the intervention group NP practices, there were similar proportions of patients with renal dysfunction and dyslipidemia and more variation for hypertension and diabetes. The intervention group had a higher proportion of comorbidities documented compared to the control group participants. In the control group, comorbidities were unknown in 21% to 66% of the patients because of lack of documentation in the patients' charts, compared to fewer than 10% of patients in the intervention group having unknown comorbidities, which were documented in the CVD database. Between group differences were compared using χ^2.

Table 3. 1 Baseline Characteristics of Patient Participants

Baseline Characteristics		**Intervention[1]**	**Control[1]**
Regional Health Authority	Eastern	14.1% (10)	69.7% (69)
	Central	16.9% (12)	30.3% (30)
	Western	42.2% (30)	0% (0)
	Labrador-Grenfell	26.8% (19)	0% (0)
Education	Less than high school	26.7% (19)	46% (6)
	High school	45.1% (32)	38.4% (5)
	Undergraduate	21.1% (15)	15.4% (2)
	Graduate degree	7% (5)	0% (0)
Age	Mean	55 years	56 years
	Range	40-74 years	40-74 years
Gender	Males	25% (18)	23.2% (23)
	Females	75% (50)	76.8% (76)
Blood pressure	Normal	63% (43)	52% (51)
	Abnormal	38% (25)	16% (16)
	Unknown	0% (0)	32% (32)

Baseline Characteristics		Intervention[1]	Control[1]
Diabetes	Normal	65% (44)	45.4% (45)
	Abnormal	26% (18)	15.1% (15)
	Unknown	9% (6)	39.3% (39)
Dyslipidemia	Normal	27% (27)	35% (24)
	Abnormal	33% (33)	30% (30)
	Unknown	8% (8)	45% (45)
Renal dysfunction	Normal	59% (40)	29% (29)
	Abnormal	15% (22)	4% (4)
	Unknown	9% (6)	66% (66)

[1] % (N): the percentage and number of patients in each group with the identified characteristic; there were 68 patients in the intervention group and 99 patients in the control group.

3.7.2 Comprehensiveness of CVD screening by NPs. There was a statistically significant difference between intervention group NPs doing comprehensive screening (identifying 9-10 components) compared to control group providing usual care. A greater proportion of patients received comprehensive screening in the intervention group (90%; n=61) versus the control group (2%; n=2) RR = 43.9, 95% CI [13.4, 144.2], $p < .0001$, adjusted for the effect by NP. The patients in the intervention group much more likely (43 times) to have comprehensive screening compared to the control group patients. The CI was wide, but even the lower limit was 13.4 indicates a significant effect of CASP on comprehensive screening. As shown in Table 3.2, all of the NPs in the intervention group performed moderate or comprehensive screening, as previously defined, compared to the control group where the majority of NPs did limited or minimal CVD screening. There was variation in the degree of comprehensiveness of screening by NPs in the intervention group. Two of the NPs screened comprehensively virtually all of the time; the other two

NPs screened comprehensively about 70-80% of the time due to extenuating circumstances. As an example, there were seven patients who had a moderate level of screening rather than comprehensive because these patients did not return for their follow-up appointment. Therefore, the patients did not have the required blood work (lipid profile and A1C level) completed or the FRS calculated for comprehensive screening.

Table 3. 2 Degree of Comprehensive Screening Comparison between Groups

Degree of Comprehensive CVD Screening	Intervention[1]	Control[1]
Comprehensive CVD screening[2] (9-10 components)	**90% (61)**	2% (2)
Moderate CVD screening[3] (6-8 components)	**10% (7)**	1% (1)
Limited CVD screening[3] (3-5 components)	0%(0)	**54% (54)**
Minimal CVD screening[3] (1-2 components)	0% (0)	**42% (42)**

[1]% (N): the percentage and number of patients in each group with the identified characteristic; there were 68 patients in the intervention group and 99 patients in the control group.
[2] Comprehensive CVD screening was based on the NPs obtaining information from the patients on 9 or 10 of the following components: age, family history of premature coronary artery disease, Framingham Risk Score, smoking status, body mass index, waist circumference, blood pressure, lipid profile, A1C, and stress.
[3] Screening was categorized as moderate if 6-8 components were evaluated, as limited if 3-5 components were evaluated and minimal if 1-2 components were evaluated.

3.7.3 Identification of multiple risk factors and level of CVD risk.

3.7.3.1 Multiple CVD risk factors identified. Patients had more risk factors documented by NPs in the intervention group compared to the control group. As shown in Table 3.3, the patient participants in the intervention group had a high number of risk

factors including premature family history of CVD, smoking, hypertension, diabetes, obesity, renal dysfunction, and dyslipidemia for CVD. In the intervention group, over 70% of patients had four or more risk factors for CVD, with a mean age of 56 years. The majority of males (72%) and females (70%) had a high number risk factors (4 to 10 risk factors). The majority of the patients in the control group (68%) had up to three risk factors documented by NPs. There were no patients in the control group with 7-10 risk factors documented in their charts. The mean age of 56 years for females and 54 years for males was similar in both groups.

Table 3. 3 CVD Risk Factors in the Intervention and Control Group Patients

Number of risk factors	Intervention Patients[1]	Sex[2]		Control Patients[3]	Sex[4]	
7-10	18% (12)	Female	14% (7)	0% (0)	Female	0% (0)
		Male	27% (5)		Male	0% (0)
4-6	53% (36)	Female	56% (28)	5% (5)	Female	4% (3)
		Male	44% (8)		Male	8% (2)
2-3	23% (16)	Female	28% (14)	46% (46)	Female	46% (35)
		Male	11%(2)		Male	48% (11)
0-1	3% (2)	Female	2% (1)	22% (22)	Female	21% (16)
		Male	5% (1)		Male	26% (6)
Unknown	3% (2)	Female	0% (0)	26% (26)	Female	29% (22)
		Male	11% (2)		Male	17% (4)

[1] % (N) the percentage and number of patients in the intervention group; there were 68 participants.
[2] % (N) the percentage and number of participants according to breakdown by sex; there were 50 females and 18 males.
[3]% (N) the percentage and number of patients in the control group; there were 99 participants.
[4]% (N) the percentage and number of participants according to breakdown by sex; there were 76 females and 23 males.

3.7.3.2 Determining the level of CVD risk. Ninety-one percent (91%) or 62 patients seen by the NPs in the intervention group had their risk of having a CV event in the next 10 years assessed using the FRS available on the CASP website; only 9% of patients in the intervention group did not have a FRS recorded. In comparison, the risk

for having a CV event was largely unknown for 96% (92 patients) in the control group because the FRS was documented on only 7 patients (4%). Due to lack of information in the control group, it was not possible to test for significant differences between the intervention and control groups.

Using the FRS available in CASP, 8% of the patients in the intervention group were identified as being a high risk for a CV event, while 10% were categorized as moderate risk and 72% were categorized as low risk. With the majority of patients in the control group not having an FRS recorded, only 2% were identified as high risk, 2% as moderate risk, and 3% as low risk.

Since the majority of the intervention group patients had more than four different CVD risk factors identified, researchers were expecting a higher number of patients in the high and moderate risk categories using the FRS. Based on data obtained from the CVD database, researchers were able to recalculate the FRS utilizing an updated FRS calculator for the intervention group patients. The additional factors in the updated FRS calculator compared to the original FRS calculator were the diastolic BP and the premature family history of coronary heart disease (Canadian Cardiovascular Society [CCS], 2019). Table 3.4 shows the revised categorization of risk using the updated version of the FRS, with many of the intervention group patients (65%) at high or moderate risk of having a CV event in the next 10 years. Seventy-seven percent (77%) of males compared to 61% of females were categorized in the moderate to high risk groups.

Table 3. 4 Recalculated FRS with Intervention Group Patients at High, Moderate, or Low CVD Risk

Framingham Risk Score (FRS)	Intervention[1]	Male[2]	Female[3]
High Risk (>20%)	28% (19)	55% (10)	18% (9)
Moderate risk (10-20%)	37% (25)	22% (4)	43% (21)
Low risk (<10%)	27% (18)	5% (1)	34% (17)
Unknown risk	9% (6)	16.6% (3)	6% (3)

[1] % (N) the percentage and number of all patient participants; there were 68.
[2] % (N) the percentage and number of males; 18 participants
[3] % (N) the percentage and number of females; 50 participants

3.7.4 Effectiveness of CASP for the Identification of NP and Patient Priorities for Heart Health. The CASP intervention required NPs to identify priorities for patient management based on the results obtained from CVD screening and the current CPGs and document this in the CVD database. Priorities for patient management were defined as identifying specific risk factors to be addressed to improve heart health. Some examples of NP priorities were the following: reducing salt intake, losing weight, controlling glucose level, or increasing physical exercise. There was variation in the proportion of patient priorities identified by each NP in the intervention group. However, all NPs identified two to three patient priorities for at least 75% of the patients. Ninety-four percent (94%) of the priorities for heart health identified by the NPs were the same as the priorities identified by the patients. Over three quarters (80%) of the patients identified two or more priorities for improving heart health.

Most of the NPs (93%) documented that they did lifestyle counselling to address patients' identified risk factors. Referrals to interprofessional team members were made by NP for 30% of the patients to improve risk factors. NPs prescribed medications for

patients with newly diagnosed risk conditions such as dyslipidemia, hypertension, and diabetes to optimize management and to reduce CV risk.

It was not possible to compare the control group because the NPs did not clearly document in the patients' charts patient identified priorities related to CVD management. Generally, the priorities or plans for improving heart health were not clearly recorded in the patients' charts in the control group, rather NP plans were documented related to managing single risk factors such as hypertension or diabetes and did not include any patient identified priorities.

3.7.5 NPs' and patients' experiences with the CASP intervention. Analysis of both the patient and NP feedback questionnaires revealed that specific components of CASP promoted screening, management, and follow-up using a patient-centred approach.

3.7.5.1 NPs' experiences. Both the intervention and control group NPs were asked about their experiences post-intervention. There were several differences identified between the NPs in the intervention group compared to the NPs in control group providing usual care. For example, screening according to Choosing Wisely Campaign was more important for the NP intervention group (100%) compared to the NP control group (66%). Furthermore, in the intervention group, 75% of the NPs often used motivational interviewing when communicating CVD screening results compared to 33% of the NPs in the control group. In addition, all of the NPs (100%) in the intervention group said they participated in individualized goal-setting compared to 66% of the NPs in the control group.

The NPs in the intervention group were also asked for their feedback on CASP in the NP Feedback Questionnaires previously discussed. NPs identified several components of CASP as being important for promoting CVD screening and management such as screening according to Choosing Wisely Campaign; communicating results of CVD screening using motivational interviewing with patients; and, participating in individualized goal-setting using a patient-centred approach.

3.7.5.2 Patients' experiences. According to the patient participants, the Heart Health Assessment Pamphlet, My Heart Healthy Plan and the CASP website were effective components of the intervention. Following completion of the Heart Health Assessment Form, patients learned about their level of CVD risk and eligibility for CVD screening. The majority of patients (72%) utilized the CASP website but about 26% of patients did not find the website useful or were not familiar with using it to find strategies for heart health. All patients who participated in the CASP intervention arm recommended that family and friends have CVD screening done in the future. Patients in the control group stated that they would be interested in learning more about CVD screening and participating in a CVD screening program if it was available.

3.8 Discussion

The research problem identified in the literature was the inconsistent utilization of CPGs for CVD screening. Screening for risk factors for CVD is known to be sporadic, occurring opportunistically rather than systematically and comprehensively. CASP is a program that was designed to enable NPs to perform comprehensive screening to identify

risk factors, perform physiological measurements, analyze abnormal results and provide guidance on management of risks using current evidence. By improving screening, there would be improved identification of risk factors by HCPs so that they could be managed appropriately. In addition, patient engagement was assessed as this is important for ensuring that the patient was at the center of care and the key driver behind the goals leading to behaviour change related to modifying risk factors and conditions.

In this RCT, we tested the effectiveness of CASP utilizing NPs working in community practice settings who had access to the target patient population aged 40-74 years. Patient engagement was achieved with these individuals with whom NPs already had a trusted relationship. NPs were able to manage and follow-up with the patients to develop personalized goals leading to the successful implementation of CASP. The implementation of the CASP intervention was successful to increase comprehensive screening, to identify multiple risk factors, to determine the level of CVD risk, and to increase patient engagement in setting priorities and individualized goals for heart health. The discussion is organized around the key findings related to these outcomes.

3.8.1 Effect on comprehensiveness of CVD screening. CASP was successful in promoting comprehensiveness of CVD screening of patients, with 90% of the patients in the intervention group having been screened on 9 or 10 of the components of the CVD risk assessment, compared to the control group where 96% of the patients had minimal or limited screening. The differences were both statistically significant RR = 43.9, 95% CI [13.4, 144.2], $p < .0001$, adjusted for the effect by NP, and dramatic. The CI was wide because of the small sample size, but even the lower limit of 13 indicates a significant

effect of CASP on comprehensive screening. Because there may be differences in the screening practices of the NPs, we used generalized linear modelling to control for the effect of the NP and still found a significant effect of CASP on comprehensiveness of screening.

As previously discussed, there are few national screening programs for comparison, and they do not focus on comprehensiveness of screening as a measure of success. The UK program, for example, measures success in risk factor assessment by the proportion of the population who are participating in the National Health Service (NHS) Health Check Program or the uptake of the program in different regions. There is evidence from a recent quasi-randomized controlled trial with an outcome measure of NHS Health Check attendance that showed that attendance rose from 12% to 30% between 2011 and 2015 (Kennedy, Su, Pears, Walmsley, & Roderick, 2019). Other programs, such as the Million Hearts Initiative (MHI) or CHAP, measured their success by the number of patients who had risk factors identified, rather than looking at the process of screening. One MHI study utilized a nation-wide improvement program for outpatient care that identified patients with risk factors requiring interventions and measured success by determining the proportion of patients receiving pharmacotherapy, smoking cessation interventions, having controlled hypertension, diabetes mellitus, and dyslipidemia (Eapen et al., 2014). The CHAP trial identified CVD risks by giving individuals self-assessment forms to complete and conducting automated BP on individuals over 65 years and sharing this information with physicians and pharmacists (Kaczorowski et al., 2011). For example, the measurement of success for CHAP was

based on whether there was a reduction in the number of myocardial infarctions recorded at a regional hospital. We feel that looking at comprehensiveness of screening is an important outcome measure since CASP was developed to address the issue of sporadic screening, not just suboptimal identification of risk factors.

3.8.2 Identification of multiple CVD risk factors and determining level of CVD risk. The CASP program guided the NPs in what risk factors to assess and how to screen for them, and facilitated documentation of both what was screened for and what was found. Because of the limited documentation in the charts of the patients in the control group, and the limited or minimal screening done on the control patients, it was unclear what their actual risks were for CVD. In contrast, the risk factors of patients in the intervention group were clearly identified, with 53% having 4-6 risk factors identified and 18% having 7-10 risk factors identified. Furthermore, the majority of patients in the intervention group who had over four risk factors for CVD were at a relatively young age between the ages of 55-59 years for both males and females. CASP was therefore effective in helping identify patients' risk factors early so that they could be managed, a key step in the prevention of CVD. In this study, females had many risk factors at a young age comparable to males at a similar age. It is important for clinicians to consider both males and females equally when screening earlier to identify risk factors, and to manage both males and females according to current CPGs to reduce the risk of developing CVD.

It is not surprising that CASP was able to effectively identify risk factors since other screening programs have been shown to be effective in identifying risk factors, such

as hypertension, type 2 diabetes, chronic kidney disease, and vascular disease (Kelsall, Fernando, Gwini, & Sim, 2018; Kennedy, Su, Pears, Walmsley, & Roderick, 2019; Lindholt et al., 2019 & Ye et al., 2014), including in higher risk groups. For example, in Australia, 500 000 blue collar workers who had health checks completed showed statistically higher prevalence ratio PR = 1.19, 95% CI [1.17, 1.20] of type 2 diabetes risk and CVD risk and risk factors compared to white collar workers such as managers or other professional groups (Kelsall et al., 2018).

In addition to identifying presence of risk factors, CASP also had significant positive effect on the completion of the FRS, which is currently recommended by the CCS (2019) and the C-CHANGE guideline (2018) as the most appropriate predictor of having a CV event in the next 10 years (CCS, 2019; Tobe et al., 2018). In the intervention group, 91% of the patients had the FRS completed compared to only 9% in the control group. Identification of a patient's risk score can be beneficial in two ways. First, identification of patients in a higher risk category may prompt NPs to manage these patients more assertively and continue to monitor these patients more frequently in effort to reduce their CVD risk level. It may also lead to increased action that leads to reduced risk. For example, in a prospective study with a partnership between pharmacists and the employee wellness program in British Columbia in 2019, called the Cardiovascular Assessment and Medication Management by Pharmacists at the UBC Site (CAMPUUS), the identification of high-risk individuals in the work setting was completed. One-on-one counselling with pharmacists provided strategies for patients to reduce their risk; the

researchers found that there was 1% reduction in FRS scores in terms of changes in level of the employees' risk in a one year follow-up (Gobis et al., 2019).

There was an issue with the version of the FRS used in CASP however. With the version used, only 8% of the intervention group patients were categorized as being at high risk for a CV event in the next ten years, and 10% were at moderate risk. The recalculation of the FRS scores based on the patient data (using an updated FRS tool that included assessment of additional factors) showed that the original scores underestimated the number of patients at risk. Using the updated FRS, 28% of the intervention group patients were categorized as being at high risk for a CV event, and 37% were at moderate risk. These proportions were more congruent with the high number of risk factors the patients had. NPs were notified of the recalculation so they could work with their patients accordingly. One key lesson learned in this was the importance of the choice of risk assessment tools and ensuring use of the most up-to-date version of valid and reliable tools appropriate for the population being studied.

3.8.3 Management of high-risk patients. The comprehensive screening by the NPs in the intervention group led to increased recognition of the patients' multiple risk factors, new diagnoses of specific conditions, and determination of the level of CVD risk. It was important for the NPs and patients to act on this information so CASP included tools and guidance for intervention and risk factor management; this occurred in a timelier manner than would have occurred without the screening. The NPs did take and document actions relevant for the patient priorities they identified, such as new prescriptions for medications, referrals, and patient counselling. It was beyond the scope

of this study however to evaluate the appropriateness of the management strategies implemented by the NPs. A future study can assess the longer term effects of CASP on patient behavior and outcomes.

Other screening programs have found that increased screening led to increased use of appropriate medications and increased referrals (Kennedy, Su, Pears, Walmsley, & Roderick 2019; Lindholt et al., 2019). There is also evidence of improved patient outcomes. For example, in a six year follow-up matched cohort study in England with 127 891 NHS Health Check participants and 322 910 controls, there was evidence of reductions in risk factor values. Compared with controls, Health Check participants had lower BMI, BP levels, and reduced smoking rates of 17% compared to 25% in controls, OR = .90, 95% CI [0.87, 0.94], $p < .001$) (Alageel & Gulliford, 2019).

In Canada, the CHAP community-based initiative showed statistically significant reductions in hospital admissions for myocardial infarctions with a rate ratio = 0.87, 95% CI [0.79, 0.97], $p = .008$ and congestive heart failure rate ratio = 0.90, 95% CI [0.81, 0.99, $p = .029$ in the intervention groups communities, but not for stroke rate ratio = 0.99, 95% CI [0.88, 1.12], $p = .89$ one year following implementation of CHAP (Kaczorowski et al., 2011). Identifying risk factors in a timely manner can have a profound effect on the patients' lives and on the management of these risks by NPs to promote healthy aging.

3.8.4 Effect on patient engagement, setting priorities, and individualized goal-setting with CASP. As HCPs, we have been traditionally taught that as the "experts" of health knowledge we are in control of determining priorities and are

responsible for the actions of the patients in our care. This approach is both inappropriate and ineffective in changing behaviour (Rollnick, Miller, & Butler, 2008). Focusing on patient-centred care and shared decision-making rather than provider driven priorities, and use of motivational interviewing in patient-centred approaches, have been shown to enhance behaviour change in individuals (Waldron, van der Weijden, Ludt, Gallacher, & Elwyn, 2011; Lundahl et al., 2013). Furthermore, a recent qualitative study in the UK promotes the use of a risk report that could be communicated with the patient to support risk understanding and promote strategies for risk reduction in the future (Hawking, Timmis, Wilkins, Potter, & Robson, 2019). Communication of risk results, discussion and sharing of priorities and goals, and use of motivational interviewing therefore were all important aspects of CASP.

The vast majority (92%) of the patients in the intervention group had priorities set by the NPs and 80% had patient-identified priorities for improving heart health, with 94% of the priorities identified by the NPs being the same as the priorities identified by the patients. Articulation of the patient-identified priorities indicates that the NPs were able to have that discussion with their patients, take a patient-centred approach, and start to engage them in health promotion activities. Investigating the congruence between priorities for action following communication of risk assessment results and focusing on patient-centered goal-setting related to heart health has not previously been studied to our knowledge. A future study can evaluate the effectiveness of this shared priority-setting on patient behaviours and outcomes.

3.8.5 Strengths of the CASP intervention. The findings have shown that CASP was effective in promoting screening, identification of patient risk factors for CVD, patient engagement in priority setting, and implementation of risk factor management strategies. NPs and patients gave feedback on the program overall and on its specific components. One of the main strengths of the CASP intervention that likely contributed to its effectiveness was that it was designed using evidence from research studies on effective interventions that have been used previously to improve adherence to CPGs and to promote positive patient outcomes (Shanbhag et al., 2018; Chan et al., 2017; Jeffrey et al., 2015; Njie et al., 2015; Unverzagt, Oemler, Braun, & Klement, 2014). Effective interventions such as educational strategies, clinical decisions support systems (CDSSs), and clinical reminders found in the literature were components of CASP. For example, the CASP intervention operationalized the current cardiovascular screening and management guideline C-CHANGE (2018) using a CDSS, a novel electronic algorithm. CASP provided clinical reminders to identify and document risk factor information in an electronic format CVD database that was easily retrievable by practitioners during study implementation. Having access to electronic health records and opportunities to document patient data has been shown to improve care and patient outcomes (Alageel & Gulliford, 2019).

Another strength of CASP was that it operationalized current CV screening and management guidelines (C-CHANGE, 2018) in an electronic format so they were more user-friendly for the NPs to perform comprehensive assessments in the clinical setting. In addition, CASP was developed with the end-users in mind with input from an NP

knowledge user and patient partners. In this mixed methods study, the CASP intervention was developed based on the findings of phase 1 with consideration of the barriers, facilitators, and strategies for knowledge use and application of the Theoretical Domains Framework (TDF) to identify appropriate strategies. In this RCT, phase 2 of the mixed methods study, we evaluated the implementation of the C-CHANGE guideline, intertwined in the CASP intervention, in daily clinical practice of NPs. In phase 3, the integration phase, results from both phase 1 and phase 2 were analyzed to draw conclusions about the appropriateness of the various components. The results from phase 1 and phase 3 are reported elsewhere. Overall, however, using the mixed methods design ensured a systematic and comprehensive approach was taken for development and evaluation of the intervention. This was consistent with recommendations of the Knowledge to Action (KTA) Framework with the integration of guideline adaptation (Harrison et al., 2013; Graham et al., 2006), which was used as a framework for this study.

3.8.6 Limitations of the CASP intervention. There are several limitations to the CASP intervention related to time and resources needed for orientation, use of current guidelines, and facilitation of CASP and generalizability of results. The time that it takes for orientation and integration of CASP components into routine practice may become a barrier to implementation in terms of resources in different regional health authorities. The CPGs integrated within the CASP intervention are current at the present time, but there must be a strategy to ensure that the guidelines remain current in the future within CASP. There is a need for maintenance of the CASP online tools to ensure that the CPGs

remain current and relevant over time. Determination of who could facilitate the implementation of CASP is important since researchers were instrumental in orientation and support during the CASP intervention, but not having a designated person to facilitate implementation remains a potential barrier to use.

3.8.7 Sustainability of the CASP intervention. Integration of CASP into NP practice is potentially feasible across the province of NL. Making the CASP tools, website, CVD database, and links to newer and different resources a part of current practice for NPs and other HCPs could increase screening and risk factor management in this province. Organizational support is critical for change in practice, therefore, having buy-in from administration within the regional health authorities is important. Having a facilitator to support the implementation of CASP within the organization would assist in the sustainability of this intervention. Dissemination of findings to government officials to promote province-wide adoption of the CASP intervention would be ideal to encourage practitioners and the public to be aware of the importance of CVD screening. Finally, public awareness campaigns to encourage asymptomatic patients to access the screening program and to know their risks for CVD would be important for sustainability of the CASP intervention in the future.

3.8.8 Strengths and limitations of the study. One main strength of the study was that it addressed a gap in the literature related to screening for CVD. This evidence-informed intervention was successful in promoting comprehensive CVD screening and thus adds another tool that can be used by NPs and other practitioners. Another main strength is that several strategies were taken to promote rigour of the data collected. The

NPs, for example, were trained in the use of CASP, data collection, and supported by the researchers throughout to promote application of CASP and integrity of the data. In addition, generalized linear modelling was used to control for the effect of the NP on the comprehensiveness of screening.

Limitations of the study related to the small sample size, choice of risk factors for screening, choice of the risk assessment tool used, the short duration of the study, and generalizability. There was a small sample size of NPs and patients which limited the ability to use regression to control for potential confounders other than the effect of the NPs. The main outcome of interest was the comprehensiveness of CVD screening, with ten risk components chosen from the C-CHANGE guideline for inclusion in the assessment. The question remains about whether we focused on the correct risk factors for screening comprehensively. There are other CVD risk factors that may be considered more important to use in a definition of comprehensive CVD screening that were not included by researchers in this study, but could be assessed in a future study. In addition, the FRS was chosen as the risk assessment tool as it is recommended by the guidelines, but the version used underestimated risk for a CV event compared to the updated version. There are many global risk assessment tools available that need to be appropriate for the population so future implementation of CASP would need to evaluate them and choose the best tool or tools. For example, a decision would need to be made to identify the best global risk assessment tool to use, taking into consideration that our population studied had a large number of First Nations people screened. As previously discussed, the short duration of the study precluded assessing the impact of the intervention on patient

behavior and outcomes. Finally, because this intervention was designed based on input from a few patients and professionals in one Canadian province as well as implemented by a small number of NPs with only two regions represented in the control group, results may not be generalizable to the other populations or health providers.

3.8.9 Next steps. It is important to share knowledge of successful interventions and increased access to other providers to improve patient care and reduce CVD risk. Plans will be discussed with the regional health authorities for wider distribution and use of CASP, addressing its sustainability and also evaluating its use by other health providers. Future research will focus on assessing the risk behavior change of patients based on individualized goals and heart health plans developed during this study, and on evaluating the impact on patient health outcomes, NP practice, and the healthcare system.

3.9 Conclusion

The implementation process of CASP was successful and led to positive outcomes in terms of improving uptake of guidelines in clinical practice, identifying multiple patient risk factors needing action, and providing opportunities for patient-centred care and individualized goal-setting to improve heart health. Implementation of CASP by NPs and other HCPs could enhance the uptake of the C-CHANGE guideline and potentially reduce CV risk of the population in the future.

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CHAPTER 4 Recruitment of Healthcare Providers as Participants in Research

The intended audience for the manuscript is novice and experienced researchers interested in learning more about how to successfully recruit healthcare providers into research studies.

JB conducted the integrated literature review, scanned the abstracts, selected relevant journal articles, analyzed results, and wrote the manuscript. DM scanned abstracts, reviewed journal articles, guided manuscript outline and writing. DM, CD, and KP reviewed, suggested revisions, and approved the manuscript.

4.1 Abstract

As researchers we know that recruitment of participants is critical to conducting any type of research study. Recruitment of a sufficient number of healthcare providers (HCPs) such as nurses and nurse practitioners (NPs) as participants is essential to generate high quality research results to address issues that are significant for clinical practice and patient care. Often the recruitment process reported in research studies consists of only one or two sentences identifying the recruitment strategies used. This very brief description of recruiting participants does not capture the reality of the challenges and time that it takes to actually recruit an adequate sample. This manuscript describes the challenges that we experienced in trying to recruit a sufficient number of HCPs, specifically NPs, into a randomized controlled trial. Based on our experience, as well as a review of the literature on recruitment of health professionals, we share our recommendations for novice and even experienced researchers trying to recruit busy professionals as participants. Key findings were not just about reaching the target participants, but actually using strategies to stimulate their interest and persuading them to be involved from the beginning. Important things to consider for successful recruitment are making an effort to meet with professionals face to face and building relationships with administrators and other staff within organizations or agencies. Other lessons learned were to ensure to allot extra time for recruitment to allow for unanticipated challenges and to utilize multimodal strategies simultaneously to ensure a more timely execution of the recruitment process.

Keywords: recruitment, healthcare provider, nurse practitioner, research.

4.2 Introduction

As researchers, we know that recruitment of participants is critical to conducting any type of research study. Whether the study design is qualitative, quantitative, or mixed methods, it is not possible to implement a study without the involvement of participants of the target group. It is critical to be successful in recruiting participants into research since having an appropriate sample means that one can reach saturation or obtain a variety of different perspectives for a qualitative study (Morse et al., 2015; Thorne, 2016), or have enough participants to attain sufficient power in a quantitative study (Groves et al., 2012). Recruitment of a satisfactory number of healthcare providers (HCPs) such as nurses and nurse practitioners (NPs) as participants is essential to generate high quality research results to address issues that are significant for clinical practice and patient care (Raymond, Profetto-McGrath, Myrick, & Strean, 2018; Rendell, Merritt, & Geddes, 2007; Riis, Jensen, Maindal, Bro, & Jensen, 2016). What novice researchers and even more experienced researchers may not realize, is how challenging this recruitment process can be!

The recruitment of participants for research studies is often briefly described in only one or two sentences in journal articles, which does not reflect the reality of the time and effort it actually takes to recruit enough participants to obtain an adequate sample. Prior to developing the research proposal for the randomized controlled trial (RCT) that was the second phase of a mixed methods study, we had reviewed the literature about recruitment strategies and considered our experiences with recruitment in the first phase. Although we thought we had developed a good plan for recruitment, we encountered

difficulties and had to add new strategies. We ultimately had a sufficient sample, but did not attain the anticipated sample size, and the recruitment process slowed down the research. Our goal was to recruit a total of 10 NPs, but it took several months to obtain this small sample. Two NPs ultimately did not participate because of the delays in starting and changes to their circumstances. Each NP recruited patients; the final sample size of patients was sufficient but the research process was slowed because of the difficulties with recruitment of NPs.

It was important for us to learn from our experiences so we returned to the literature about recruitment of health professionals and reflected on our planning process and strategies used. In doing so, we realized that we had focused more on reaching our target audience of NPs than on strategies to stimulate their interest and persuade them to get involved. Recruitment is a complex iterative process that requires multimodal strategies (Luck, Chok, & Wilkes, 2017; Riis, Jensen, Maindal, Bro, & Jensen, 2016; Broyles, Rodriguez, Price, Bayliss, & Sevick, 2011) aimed at convincing the target population to participate. While actually connecting with the potential participants is of course essential, researchers also need to use realistic study designs and methods to facilitate participation (Signorelli et al., 2017; Williamson et al., 2007) and gain the support from healthcare organizations where the target HCPs work (Arends et al., 2014).

The purpose of this paper is to share specific recruitment strategies found in the literature that can be used to recruit health professionals, based on supporting and convincing potential participants to participate in a study, and not just reaching them and informing them about the study. Expanding one's conceptualization of recruitment

planning to look beyond accessing the target group can help identify key strategies to build success and reduce frustration. This is the article that we wished we had available and thoroughly read before developing and executing what we thought was a well laid out recruitment plan for a dissertation research study.

4.3 Overview of Our Research Study and Recruitment of Participants

Our research focused on developing and testing an innovative cardiovascular (CV) screening intervention to be used by HCPs to identify CV risk factors and to provide early intervention and management of patients in order to reduce CV risk. The research design was a multi-phase exploratory mixed methods study with a qualitative phase, a quantitative phase, and an integration phase. The recruitment of HCPs was critical to both the qualitative phase (phase 1) that informed the intervention development, and the quantitative phase (phase 2), the RCT that tested the intervention. This paper will focus on the recruitment process used for the NPs in the RCT as that is where we faced the most challenges.

For the RCT, we originally planned four recruitment strategies, three of which were implemented simultaneously. The first strategy was to inform the senior leaders within health care and regional health authorities (RHAs) about the study. This helped with obtaining administrative support and with informing NPs about the study. In one RHA, the Director of Nursing assisted in the recruitment of the NPs by providing the names of six potentially interested NPs, three of whom agreed to participate in our study. Other leaders with whom the Primary Investigator (PI) spoke directly provided the names

and contact information of the NP managers, but not the NPs themselves. The second strategy was communicating with the executive board of the provincial NP special interest group to send out notifications to the NP members across the province. Since the PI was a member of this organization, it was anticipated that this strategy would be successful in recruiting a few members to participate in our study, but only two NPs were recruited. The third recruitment strategy was snowballing. This process involved asking the NPs who had been recruited to speak with their colleagues about also being participants in our study. This strategy was successful in recruiting just one NP as a participant. The fourth strategy, which was planned but not implemented, involved contacting the professional nursing organization to ask if they could assist in the recruitment of NPs by sending out a notice about the study by email. But the cost to send this email message specifically to NPs was much more than was expected and had not been anticipated in the budget. At the time, we did not think the cost of this strategy was worth the financial investment. In hindsight, involving the professional organization in the recruitment efforts may have further supported our recruitment success.

In each of these strategies, the NPs were sent a study information sheet that explained details of the study, what was expected and why the study was important. We had designed the intervention cognizant of their busy work schedules, based on the information obtained in phase 1 and after consultation with a knowledge user. HCPs in phase 1 had indicated their support for CV screening in general and for the components of the intervention specifically, so we expected that they would be interested in the opportunity to participate. We are reasonably sure that the majority of NPs in the

province (N=171) received the information about the study, but we are unsure if they read it, and they clearly had not been convinced by the information to enrol in the study!

With limited success after implementing the initial recruitment plan, we added additional strategies over a period of four months. Our original recruitment plan was focused on bringing awareness of the research study to leaders and potential participants. We spent little time thinking through the details of how to convince these busy health professionals to participate in our study until after the recruitment process had begun. The additional strategies added in the updated recruitment plan were more NP-centred, such as checking messaging, sending recruitment materials to assist the NPs to recruit their patients, monetary and non-monetary incentives for the NPs, and personalizing contact with potential participants. These supplemental strategies required that numerous amendments be submitted to the research ethics board, which resulted in delays to study implementation and increased workload for the research team, but eventually led to attaining the sample of NPs needed.

4.4 Recruitment of Healthcare Providers into Research Studies

After reflection and reviewing the literature again, developing a plan for recruitment to convince HCPs to participate in research involves thinking through the entire study upfront prior to launching into specific recruitment strategies. Designing a plan to recruit participants means that researchers have to think through the details of how the study will unfold and the implications for the role of the target group contributing to the study. Expectations of potential participants have to be realistic in

terms of their interest, time, feasibility, and benefits of being involved, and need to be communicated with them in an effective enticing manner. Researchers also need ~~to~~ a plan for supporting participants who have been successfully recruited.

Based on our experience and the literature, we have six main recommendations for promoting success in recruiting HCP participants: a) plan study methods to facilitate participation; b) articulate clear participant role expectations; c) prepare recruitment materials with clear messages to entice participation; d) reach potential participants physically and mentally; e) plan strategies for support; and f) build in sufficient time. For each of these recommendations, examples from our experience with recruiting NPs into the RCT is highlighted.

4.4.1 Plan study methods to facilitate participation. As researchers know, the design of the study is dependent on the research questions that need to be answered (Grove, Burns, & Gray, 2016). Most research questions come from issues identified in clinical practice that need to be addressed, or from gaps found in the literature that are important to explore. While the need for scientific rigour will direct specific methods, one can and should plan interventions and study methods with the participant in mind. One has to think ahead about what participants are being asked to do in the research study, such as fulfilling specific responsibilities, completing training sessions, or changing their daily routine, and build in strategies to make it easier for them**.** In our study, for example, NPs were required to complete CV screening of patients so we developed a computer-based data entry form that both guided them in what and when to screen and allowed them to document their activities and data. To help them easily access

information from clinical practice guidelines and patient resource material, we created an innovative website, clinical decision-making algorithm, and an HCP tool kit. We also included webinars, one-on-one training, and support phone calls with the PI to ensure that the NPs had the training they needed to implement the intervention and document their actions. Training is a key strategy for success of implementation and communication about training should be included during recruitment (Alberti & Atkinson, 2017; Veitch, Hollins, Worley, & Mitchell, 2001; Williamson et al., 2007).

One recommendation from the literature was involving HCPs in the recruitment plan, which means finding a knowledge user who is a member of the specific target group who will eventually benefit from the results of the study (Campbell et al., 2016; Broyles, Rodriguez, Price, Bayliss, & Sevick, 2011; Riis, Jensen, Maindal, Bro, & Jensen, 2016; Weierbach, Glick, Fletcher, Rowlands, & Lyder, 2010). For our study, we included a knowledge user on our research team to help us understand the reality of clinical routines of NPs in community settings in order to be realistic about the participant role during study recruitment and implementation. The NP knowledge user was able to review the intervention website, the innovative algorithm, and the HCP toolkit for relevance and usability, and made recommendations for changes prior to the commencement of our study. Utilizing a knowledge user helped to ensure the study components were relevant and assisted in the recruitment of NPs.

4.4.2 Articulate clear role expectations during recruitment. Participants must understand what their exact role will be during study implementation, so clear expectations must be articulated during the recruitment process (Alberti & Atkinson,

2017). The majority of expectations were easy to articulate, as they were related to the methods of the intervention (e.g., identify and screen patients) and to the data collection (e.g., complete the data collection forms). We also had to comprehend the time demands of NP daily practice in order to envision adding realistic tasks to their busy days (Alberti & Atkinson, 2017). The participant role must be realistic in terms of the time commitment and additional work required to partake in the study (Marks, Wilkes, Blythe, & Griffiths, 2017). In our research, even though screening for CVD risk factors was a familiar role for NPs in clinical practice, completing the research forms and entering information into the study database did create more work in their daily routine**.** Being able to provide a reasonably accurate estimate of the time required to participate in the study must be communicated with potential participants during recruitment in order to help them understand the commitment.

It can be difficult to communicate role expectations in written recruitment material, as potential participants may have questions that cannot be easily answered in an information letter. We therefore submitted an amendment to the ethics board to be able to contact NPs directly by phone to talk about the study expectations and to provide an opportunity for potential NP participants to ask questions directly to the PI. In doing so, NPs interested in participation could obtain a more realistic idea of the time commitment required and clarification about the role they would need to play in the study.

4.4.3 Prepare recruitment materials with clear messages to entice participation. Researchers need to ensure that the research questions are relevant to the

target population and ones that they should be interested in, and ensure the purpose and outcomes of study are important to them (Im et al., 2006; Keating, 2014; Luck, Chok, & Wilkes, 2017; Marks, Wilkes, Blythe, & Griffiths, 2017). A knowledge user can verify that the study is relevant to potential participants and share insider knowledge that can influence the recruitment success (Broyles, Rodriguez, Price, Bayliss, & Sevick, 2011; Riis, Jensen, Maindal, Bro, & Jensen 2016; Weierbach, Glick, Fletcher, Rowlands, & Lyder, 2010). In our experience, the main research question of the RCT was focused on whether the implementation of a newly developed CV risk screening program by NPs was effective in promoting comprehensive screening of patients. We knew from phase 1 that NPs were interested in screening, so the challenge for phase 2 recruitment was in ensuring the information shared when inviting participation captured their interest.

It is important to succinctly share all aspects of the research study that are relevant, but not so much as to discourage potential participants with too many details. We used our NP knowledge user to help with messaging so that NPs would understand the relevance of the main research question and the implications for improving NP clinical practice and patient care, as well as key details of what was involved in participation. Rather than focusing primarily on the methods of the study, our recruitment materials were revised to also promote understanding of the time commitment and the benefits of the study for individual participants and overall.

4.4.4 Reach potential participants physically and mentally. There are two aspects of reaching potential participants that need to be considered: connecting with them physically so that they know about the opportunity to participate, and connecting

with them mentally so they will be interested in participating and persuaded to do so. There are a number of strategies available for informing potential participants about a study, including sending out emails, using social media, placing posters in strategic locations, and attending group meetings (Marks, Wilkes, Blythe, & Griffiths, 2017; Luck, Chok, & Wilkes, 2017; Riley, 2016; Johnson et al., 2010). Getting contact information of potential participants is a crucial first step, and having key contacts within an organization, as we had, can be very helpful. We did not use social media, but in future studies we would utilize whatever social media platform is popular with the target group (Marks et al., 2017).

Once contact information is obtained, personalizing all correspondence is a more effective strategy than using mass emails or impersonal approaches (McKinn, Bonner, Jansen, & McCaffery, 2015). Initially, our email correspondence was not personalized ~~so~~ and did not result in successful recruitment. Even though most of the NPs knew the PI who was trying to communicate details about the study, requesting busy professionals' assistance through email may result in the delete key being pressed more often than one would like. Sending out emails alone was not enough, so we added personalized contact, both written and in person by phone or at meetings such as special managers' meetings. One of the key strategies for recruitment identified in the literature related to connecting with the target group is taking the time to meet face-to-face with groups or individually (Arends et al., 2014; Johnson et al., 2010). Being able to speak with individuals provided them with the opportunity to have questions answered and gave us the opportunity to reinforce the value that we placed on their expertise and participation.

In our revised recruitment plan, we added a number of strategies to show our appreciation of our participants' involvement that resulted in increased recruitment success. We provided non-monetary incentives such as letters of appreciation that could be used towards gaining a leadership premium. Credit hours could also be verified towards a continuing competency program for NPs who participated in the research study. We also offered a financial token of appreciation to both the NP and patient participants to help the recruitment process.

4.4.5 Plan strategies for support. Having sufficient research funding and organizational support are required for conducting research but also has implications for recruitment. Obtaining the necessary funding for the study recruitment is critical for many reasons. For example, having financial support will enable researchers to travel to meet potential participants or to hold recruitment meetings. Providing refreshments at such meetings shows that researchers appreciate the time taken to learn about the study (Broyles, Rodriguez, Price, Bayliss, & Sevick, 2011). Having research funding also enables researchers to provide monetary incentives, which have been shown to be effective in engaging health professionals to become involved in research studies (Pit, Vo, & Pyakurel, 2014; Treweek et al., 2013). The amount of money being offered to participants may also influence recruitment (Ngune, Jiwa, Dadich, Lotriet, & Sriram 2012; Caldwell, Hamilton, Tan, & Craig, 2010). The addition of a financial token of appreciation for both NPs and patients facilitated recruitment in our study.

A definitive plan to gain access to the organization and to obtain support from key players such as administrators and managers should be created early (Hysong et al.,

2013). Our recruitment plan involved contacting senior leaders to gain their support and permission to contact NPs in their workplaces. Many more hours than expected were spent emailing and eventually phoning specific managers in order to get NP work email addresses. Having support from administrative staff members proves beneficial and can assist in the recruitment of clinicians in the organization (Johnston et al., 2010). In addition, keeping staff informed about the study is important since these individuals can greatly influence accessibility to administrators and managers as they often act as gatekeepers (Johnston et al., 2010). The need to be kind and respectful of their time is paramount, as they can make or break success in gaining support from the right people. Even though gaining support took time, having help within the organizations where our participants were employed was valuable and added credibility to the importance of participating in the study when trying to convince the NPs directly during the recruitment process.

Participants need ongoing support once they are in the study (Alberti & Atkinson, 2018). This is especially true if technology or software will be used during the research study. Contacting the Information Technology (IT) department early will ensure efficient use of time since computer issues and software glitches are certain to occur. In our study, we made IT support available to address any issues that might occur with the study website or database, and the researchers provided encouragement and support on other aspects of the study. We let potential participants know of the availability of this support as part of the information shared during recruitment.

4.4.6 Build in sufficient time. Recruitment took much longer than expected partially because finding contact information and sending out recruitment materials took more time than anticipated, but mostly because the addition of new strategies required that amendments be sent to the research ethics board prior to implementation. Five amendments related to recruitment of both the NPs and their patients were made to the ethics research board: a) changes in recruitment materials; b) use of both non-monetary and tokens of appreciation for NPs and patients, c) obtaining permission to ask NP managers to relay information about the study to NPs in the same workplace; d) contacting the NPs who participated in the first phase of the mixed methods study to determine potential interest in participating in the RCT; and e) connecting with NPs by phone to speak in a personalized manner and answer study questions directly. The process of submitting amendments and waiting for approval required a lot of time and effort and resulted in delays. Decisions made by ethics boards and other external agencies are not in the researchers' control, so building in time for delays into the recruitment plan will reduce frustration. Adding a research assistant to assist with recruitment and employing multiple strategies simultaneously rather than sequentially could also ensure more timely execution of the recruitment process.

4.5 Conclusion

Recruitment of HCPs, such as NPs and nurses, as participants into research studies is important to address clinical problems, but can often be quite challenging. In our mixed methods study, we experienced issues in the recruitment of HCPs; especially when recruiting NPs into the RCT in phase 2. We looked at the literature again focusing

on recruitment of HCPs into research to gain new knowledge and to find effective strategies. Key lessons were the need to focus on more than just reaching the target audience, but on using strategies to stimulate their interest and persuading them to be involved from the beginning. Other things needed to contribute to success are to build relationships with administrators and other staff within organizations or agencies and to allot extra time in the recruitment plan. This paper might be helpful to novice or even experienced researchers who are interested in improving recruitment success when conducting research with health professionals in the future.

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CHAPTER 5 Conclusion

Chapter 5 provides an overview of the mixed methods study and the methodological issue of recruitment. This chapter also discusses key findings from the three manuscripts and presents key recommendations for education, practice, and future research.

5.1 Introduction

This dissertation research involved a multi-phase exploratory sequential mixed methods study that was conducted over a period of two years, from 2016 to 2018, and resulted in the development and evaluation of a theory-informed intervention. The purpose of this mixed methods study was to address the research problem identified in the literature of the inconsistent use of current cardiovascular disease (CVD) screening clinical practice guidelines (CPGs) by healthcare providers (HCPs) in clinical practice (Unverzagt, Oemler, Braun, & Klement, 2014). In keeping with the philosophy of interpretative description and pragmatism, a real-life issue was addressed by developing a contextually-relevant theory-informed intervention to increase the uptake of CPGs by HCPs. The overarching aim for the study was to determine successful strategies that increase utilization of CPGs in daily clinical practice.

The Knowledge-to-Action (KTA) Framework (Graham et al., 2006), with guideline adaptation (Harrison et al., 2013), was used to guide this mixed methods study. The initial steps of the KTA Framework focus on identifying the barriers and facilitators to knowledge use and tailoring the intervention to the local context. Evaluating the implementation of the knowledge use and determining its impact on patients, providers, and the system are the final steps of this framework.

In phase 1 of our research, the barriers, facilitators, and strategies were identified according to the KTA Framework and the contextually relevant Cardiovascular Assessment Screening Program (CASP) intervention based on current guidelines (C-CHANGE) was developed. Phase 1 involved the development of an intervention that was

informed by focus groups and interviews with patients, providers, and managers from October 2016 to May 2017. The various themes that emerged related to the barriers, the facilitators, and the strategies for CVD screening were considered in relation to the development of the CASP intervention. The Theoretical Domains Framework (TDF), along with selected behaviour change techniques, and modes of delivery (Michie et al., 2013) were used to develop the intervention components of CASP relevant to the local context.

In phases 2 and 3 of our study, we completed the final steps of the KTA cycle. In phase 2, a randomized controlled trial (RCT) was conducted in Newfoundland and Labrador (NL) in which four nurse practitioners (NPs) implemented the CASP intervention and conducted screening with 68 patients while four NPs provided usual care to 99 patients in the control group. The intervention group NPs documented data in the study database while the researchers conducted reviews on the control group participants' charts during that same time period.

Phase 3 involved integration of the results from phases 1 and 2 to answer the overarching research question to determine effective strategies to enhance HCPs' use of evidence-based CPGs for CVD screening and management of patients. This integration was important to determine what components of the CASP intervention were successful to enhance knowledge translation of evidence into practice.

This chapter summarizes the key findings of the study which were reported in Chapters 2 and 3 of this dissertation, as well as lessons learned about recruitment as

reported in Chapter 4. Recommendations for education, practice, and research are also summarized.

5.2 Key Results: Development of CASP

The results of the development of CASP from phase 1 with refinements from the integration phase 3 were described in detail in the first manuscript (Chapter 2) of this dissertation. Phase 1 data analysis revealed different perspectives from various professionals and members of the public about the barriers, facilitators, and strategies for CVD screening and management in the province of NL. The themes related to barriers that emerged were: ambiguity and uncertainty around responsibility for CVD screening; lack of knowledge and skills for comprehensive screening using the C-CHANGE guideline; questioning the necessity of screening in light of the Choosing Wisely Campaign; lack of time and commitment for CVD screening; lack of dedicated resources and organizational supports for CVD screening; behaviour change is difficult for patients; and (patients') lack of access to services. Two themes about facilitators for CVD screening were related to knowing who and when to screen patients, and secondly, utilizing components and tools from previously successful provincial screening initiatives for the development of CASP. Potential strategies identified that could be used for CVD screening were related to the importance of training of HCPs to ensure consistent implementation of CASP, and using public awareness campaigns for patient engagement.

The CASP intervention was developed based on themes related to the barriers, facilitators and strategies for CVD screening, the Theoretical Domains Framework (French et al., 2012), the behaviour change technique taxonomy (Michie et al., 2013), and

modes of delivery of the intervention components. A logic model for CASP was developed that was initially based on the literature, and then refined following integration of research results. This logic model depicts what the components of CASP and how they are related to each other. The CASP logic model has been described in detail in the first manuscript (Chapter 2) of this dissertation. CASP contained tools, strategies, and resources to be used by NPs to comprehensively screen and manage patients in their clinical practices across NL.

Following the phase 3 integration of the results of phase 2 with phase 1, the various components of CASP were confirmed as successful strategies that could be used to increase comprehensive CVD screening by HCPs with the people of NL. The recommended strategies to enhance cardiovascular screening in NL were the following: ongoing support from healthcare organizations, health provider support and education and training related to CVD screening, access to current guidelines in an electronic format, accurate documentation in an electronic database, and engagement of patients throughout the screening process. The evaluation indicated that these components should be continued, with refinements made to enhance support from the local environmental and cultural context, healthcare organizations and HCPs within these organizations in order for the CASP screening intervention to be implemented successfully. A public awareness campaign related to the importance of CVD screening would also be important to implement to promote or comprehensive screening and individualized goal-setting for heart health.

5.3 Key Results: Evaluation of CASP

The details of the data analysis and results of phase 2 are described in the second manuscript (Chapter 3) of this dissertation. Four key findings from the results of the RCT conducted in phase 2 were that CASP was effective for the following: a) promoting comprehensive screening by NPs; b) identifying multiple risk factors and determining patients' level of CVD risk; c) identifying NPs' and patients' priorities for heart health; and d) engaging patients in screening and developing individualized goal-setting for heart health.

The CASP intervention was effective in promoting comprehensive CVD screening by NPs in NL. There was a statistically significant difference between intervention group NPs doing comprehensive screening (assessing 9-10 components) compared to control group NPs with a RR = 43.9, 95% CI [13.4, 144.2], $p < .0001$ adjusted for the effect by NP. All of the NPs in the intervention group performed moderate or comprehensive screening compared to the control group where the majority of NPs performed limited or minimal CVD screening.

Patients had more risk factors documented by NPs in the intervention group compared to the control group. The intervention group patients had a high number of CVD risk factors such as premature family history of CVD, smoking, hypertension, diabetes, obesity, renal dysfunction, and dyslipidemia. The implementation of the CASP intervention by NPs was effective in identifying patients at risk for having a CV event within the next 10 years using the Framingham Risk Score (FRS). Ninety-one percent (91%; n = 62) patients seen by the NPs in the intervention group had their risk of having

a CV event in the next 10 years assessed using the FRS; only 9% (n= 6) of patients in the intervention group did not have a FRS recorded. In comparison, the risk for having a CV event was largely unknown for 96% (n=92) in the control group because the FRS was documented on only seven patients (4%).

The CASP intervention required NPs to identify priorities for patient management based on the results obtained from CVD screening and the current CPGs. Priorities for patient management were defined as identifying specific risk factors to be addressed to improve heart health. Some examples of NP priorities were the following: reducing salt intake, losing weight, controlling glucose level, or increasing physical exercise. There was variation in the proportion of patient priorities identified by each NP in the intervention group. However, all NPs identified two to three patient priorities at least 75% of the time. Furthermore, 94% of the priorities for heart health identified by the NPs were the same as the priorities identified by the patients. Over three quarters (80%) of the patients identified two or more priorities for improving heart health. In comparison, patient priorities related to heart health were largely undocumented in the charts of patients in the control group.

CASP was effective in promoting a patient-centred approach to care by engaging patients to participate in the screening process with NPs and also in promoting individualized goal-setting for actions to improve heart health. Patients used My Heart Healthy Plan to determine which goals were going to be focused on with support provided by regular follow-up visits with NPs to promote positive behaviour change. Analysis of both the patient and NP feedback questionnaires revealed that CASP

promoted screening, management, and follow-up, and that CASP had several successful components using a patient-centred approach.

5.4 Methodological Issues: Recruitment Challenges

The third manuscript (Chapter 4) highlights the lessons learned about moving beyond accessing the target population to focusing on six main recommendations for recruiting HCPs into research studies. During this mixed methods study, we encountered issues in the recruitment of HCPs, occurring mainly when recruiting NPs for the RCT. By focusing on this methodological issue experienced during our research study and delving deeper into the research literature, we gained insight into effective recruitment strategies for HCPs. Six main recommendations for researchers to consider in a recruitment plan were discussed in detail in Chapter 4. The emphasis of most of the recommendations related to focusing on more than just reaching the target audience and instead on using strategies to stimulate their interest and persuading them to be involved, as well as obtaining organizational support. Expertise on the topic of recruitment of HCPs was gained from reviewing the literature and reflecting on our experience. This knowledge can be both shared with novice and experienced researchers and applied in future research studies.

5.5 Strengths and Limitations of This Research Study

One main strength of the study was that it addressed a gap in the literature related to screening for CVD. This evidence-informed intervention was successful in promoting CVD screening and thus adds another tool that can be used by NPs and other practitioners. Another main strength is that several strategies were taken to promote

rigour of the data collected. The NPs for example were trained in the use of CASP and data collection, and supported by the researchers throughout to promote application of CASP and integrity of the data. Also, obtaining patient collaboration and personalized goal-setting for heart health emphasized the importance of patient-centred care and could potentially lead to behaviour change. Having a facilitator to promote and assist with the implementation of CASP throughout the organization is important for sustainability of this intervention into the future.

Limitations of the study related to choice of risk factors for screening, choice of the risk assessment tool used, the short duration of the study, and generalizability. The main outcome of interest was the comprehensiveness of CVD screening, with ten factors chosen from the C-CHANGE guideline for inclusion in the assessment. The question remains whether we focused on the correct risk components for screening comprehensively. There are other CVD risk factors that were not included by researchers in this study that may be considered more important to use in a definition of comprehensive CVD screening; these could be assessed in a future study. In addition, the FRS was chosen as the risk assessment tool as it is recommended by the guidelines, but the version used underestimated risk for a CV event compared to the updated version. There are many global risk assessment tools available that need to be appropriate for the population so future implementation of CASP would need to evaluate them and choose the best tool or tools. The short duration of the study precluded assessing the impact of the intervention on patient behavior and outcomes. Finally, because this intervention was designed based on input from a few patients and professionals in one Canadian province,

and implemented by a small number of NPs, results may not be generalizable to the other populations or health providers.

5.6 Recommendations for Education

There are opportunities to enhance the education of HCPs, especially for NPs and nurses, in relation to CVD health promotion. Focusing on CVD prevention and health promotion to enhance competencies, knowledge, and skills may lead to improved patient outcomes individually and at the population level. If NPs and nurses could take a leadership role in providing effective preventative care, they need to know how to evaluate. NPs and nurses need to know how to evaluate and implement evidence-informed care in relation to CVD prevention. The educational resources developed for this research study focused on providing evidence-based knowledge and skills for identifying risk factors using valid and reliable instruments. Performing focused history and physical examination for CVD was required during the implementation of CASP. NPs were given clear direction on calculating global risk scores and heart age for individuals and for determining the patients' level of CVD risk.

Resources were also made available to enhance the knowledge level and to assist NPs with counselling of patients to assess readiness for change and to help patients set realistic goals for heart health. Improving the knowledge level of advanced practice nurses such as NPs, may also lead to the mentoring of nurses and other health professionals to become more competent in assessing readiness for change and self-efficacy of individuals with unknown CV risk within their clinical practices.

5.7 Recommendations for Practice

In congruence with the initial phases of the KTA Framework, gathering input from a variety of patients, providers, and administrators in phase 1 of this study was instrumental for ensuring that the development of an evidence-based intervention was relevant to clinical practice within the local context. Promoting the CASP intervention in daily clinical practice can be effective in increasing comprehensive CVD screening and identifying priorities for action to reduce CVD risk and promote healthy aging. Even though NPs and patients were used in the testing of this intervention during the RCT, the intention of this research intervention was to involve other members of the interprofessional team. Having an electronic intervention that can be integrated within the current HealtheNL provincial health record would be valuable tool to be used within regional health authorities and clinical practice of NPs, nurses, physicians and others across NL. Gaining organizational support and promoting a public awareness campaign around the importance of CVD screening and about the NP's role in CVD screening that may lead to the sustainability of the CASP intervention in the future. This program is generic and, therefore, is appropriate for men as well as women. NPs can address the issues unique to women by tailoring the program. The public awareness campaign can also focus women's heart health to ensure the message about identifying risk for CVD early is communicated.

5.8 Recommendations for Research

There are research opportunities in utilizing interprofessional teams and different patient populations as target participants in the future. There are many opportunities to

adapt the current CASP intervention to be used with different HCPs in the interprofessional team such as physicians, dietitians, and community health nurses working in community or other settings. Details of how the intervention could be specifically tailored to meet the unique needs of vulnerable populations who could benefit from evidenced-informed guidelines could address health inequities across the province. Even areas that are very remote and isolated could likely benefit from the CASP intervention implementation and enhanced interactions and collaboration between the providers and patients; this could be evaluated in a future study. Implementing CASP with patients who already have established CVD would also be important to screen and manage multiple CVD risk factors simultaneously to improve quality of life. Obtaining a larger sample size in future research could address the generalizability of the results so that other regions could utilize this intervention in the future. Finally, the full impact of the CASP intervention on patients, providers, and the healthcare system could be evaluated in future research by examining longer term behaviour change and patient outcomes.

5.9 Conclusion

This mixed methods study is important and contributes to the existing literature. Utilizing mixed methods research to develop an intervention is well documented in the literature (van Beljouw et al., 2014; Straus, Moore, Uka, Marquez, & Gulmezoglu, 2013). Ensuring that the intervention is contextually relevant is important and has been shown to improve implementation of evidence-based guidelines (Harrison et al., 2013). Focusing

on the comprehensiveness of CVD screening and simplifying complex CPGs is unique and adds new knowledge to the knowledge translation literature.

This mixed methods study adds knowledge to the nursing literature contributing to the nursing metaparadigm of environment, nurse, person, and health. This study considered the influences of the environmental context in the development of the CASP intervention and in determining successful strategies for the intervention implementation. This study provides evidence of an effective intervention that can be utilized by NPs and other HCPs in clinical practice. This study also considered the value of engaging patients and knowledge users (NPs) throughout the research process in the design and implementation of the intervention and the importance of person-centred care. Finally, this study contributes to the nursing literature in promoting strategies aimed at reducing CVD risk for people and promoting healthy aging of the population.

5.9 References

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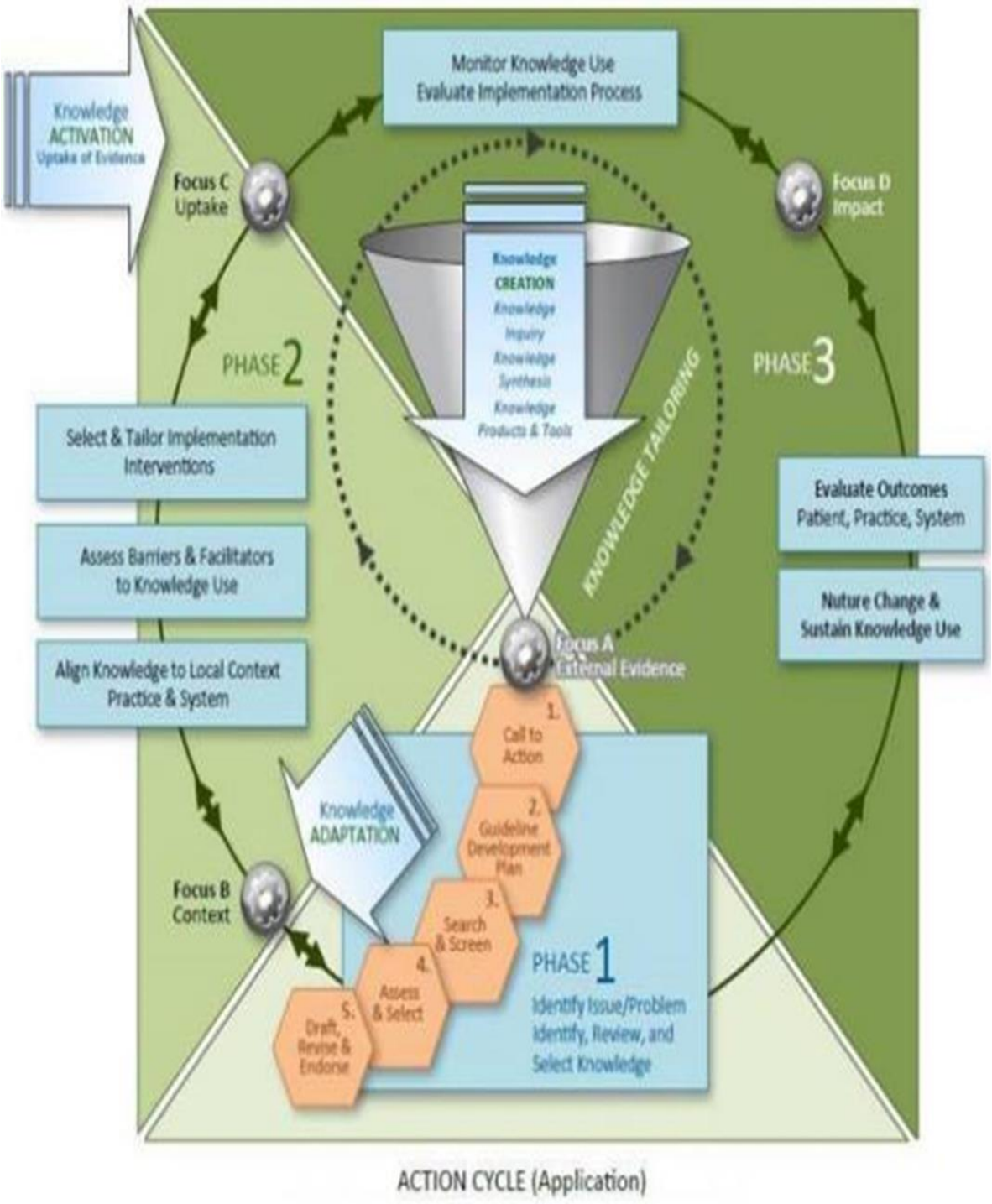
APPENDIX A: Knowledge-to-Action (KTA) Framework

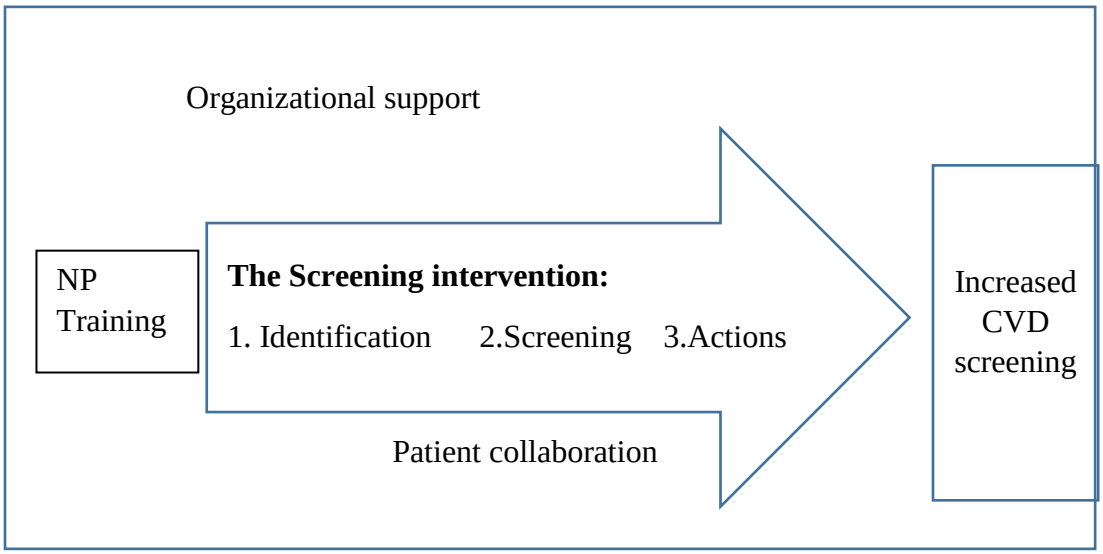
Knowledge to Action (KTA) Framework



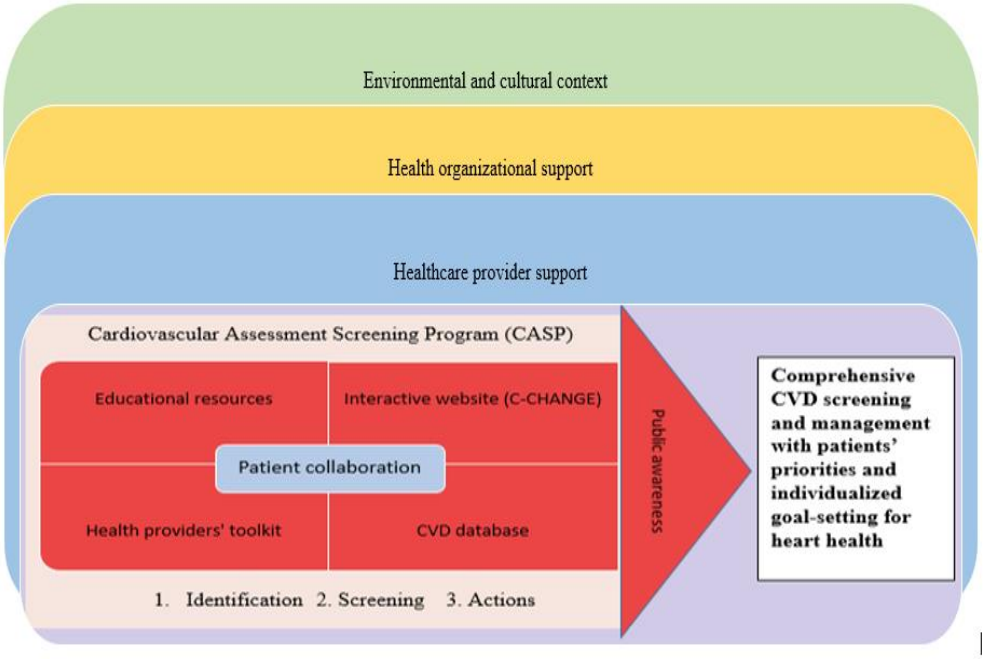
Knowledge to Action (KTA) Framework (Graham, Logan, Harrison 2006) with integration of guideline adaptation (Harrison et al., 2013)

APPENDIX B: Logic Model for CASP

Logic model for proposed screening intervention



Final Logic Model for CASP



APPENDIX C: Health Research Ethics Approval for Mixed Methods Study

NEWFOUNDLAND AND LABRADOR
HREB
HEALTH RESEARCH ETHICS BOARD

Ethics Office
Suite 200, Eastern Trust Building
95 Bonaventure Avenue
St. John's, NL
A1B 2X5

September 09, 2016

100 Forest Road

St. John's, NL A1A 1E5

Dear Ms. Bruneau:

Researcher Portal File # 20170664
Reference # 2016.230

RE: "Exploring strategies to facilitate screening for cardiovascular disease to promote healthy aging."

This will acknowledge receipt of your correspondence.

This correspondence has been reviewed by the Chair under the direction of the Health Research Ethics Board (HREB). ***Full board approval*** of this research study is granted for one year effective **September 1, 2016**.

This is your ethics approval only. Organizational approval may also be required. It is your responsibility to seek the necessary organizational approval from the Regional Health Authority (RHA) or other organization as appropriate. You can refer to the HREA website for further guidance on organizational approvals.

This is to confirm that the HREB reviewed and approved or acknowledged the following documents (as indicated):

- Application, approved
- Revised Recruitment letter for focus groups, approved

- Revised recruitment letter for individual interviews, approved
- Revised Focus Group and Interview questions, approved
- Proposed screening intervention, approved
- Planned-Action Framework, Knowledge to Action Cycle, approved
- Telephone script and email letter to key leaders, approved
- Recruitment poster for the general public, approved
- Budget, approved
- Information letter, approved

This approval will lapse on September 1, 2017. It is your responsibility to ensure that the Ethics Renewal form is submitted prior to the renewal date; you may not receive a reminder. The Ethics Renewal form can be found on the Researcher Portal as an Event form.

If you do not return the completed Ethics Renewal form prior to date of renewal:

- ***You will no longer have ethics approval***
- *You will be required to stop research activity immediately*
- *You may not be permitted to restart the study until you reapply for and receive approval to undertake the study again*
- *Lapse in ethics approval* ***may result in interruption or termination of funding***

You are solely responsible for providing a copy of this letter, along with your approved HREB application form; **to Research Grant and Contract Services** should your research depend on funding administered through that office.

Modifications of the protocol/consent are not permitted without prior approval from the HREB. **Implementing changes without HREB approval may result in your ethics approval being revoked, meaning your research must stop**. Request for modification to the protocol/consent must be outlined on an amendment form (available on the Researcher Portal website as an Event form) and submitted to the HREB for review.

The HREB operates according to the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans (TCPS2), the Health Research Ethics Authority Act (HREA Act) and applicable laws and regulations.

You are responsible for the ethical conduct of this research, notwithstanding the approval of the HREB.

We wish you every success with your study.

Sincerely,

Ms. Patricia Grainger (Vice-Chair, Non-Clinical Trials Health Research Ethics Board)

CC: Dr. Donna Moralejo

HREB

Ethics Office
Suite 200, Eastern Trust Building
95 Bonaventure Avenue
St. John's, NL
A1B 2X5

July 04, 2017

MUN School of Nursing
Education Building, ED 5004
St. John's, NL
A1B 3X8

Dear Dr. Bruneau:

Researcher Portal File # 20180318
Reference # 2017.117

RE:"Implementing and Testing a Cardiovascular Assessment Screening Program (CASP) to Promote Healthy Aging"

This will acknowledge receipt of your correspondence.

This correspondence has been reviewed by the Co-Chair under the direction of the Health Research Ethic Board (HREB). ***Full board approval*** of this research study is granted for one year effective **June 15, 2017.**

This is your ethics approval only. Organizational approval may also be required. It is your responsibility to seek the necessary organizational approval from the Regional Health Authority (RHA) or other organization as appropriate. You can refer to the HREA website for further guidance on organizational approvals.

This is to confirm that the HREB reviewed and approved or acknowledged the following documents (as indicated):

MARK THE DATE

This approval will lapse on June 15, 2018. It is your responsibility to ensure that the Ethics Renewal form is submitted prior to the renewal date; you may not receive a reminder. The Ethics Renewal form can be found on the Researcher Portal as an Event Form.

If you do not submit the completed Ethics Renewal form prior to date of renewal:

- ***You will no longer have ethics approval***
- *You will be required to stop research activity immediately*
- *You may not be permitted to restart the study until you reapply for and receive approval to undertake the study again*
- *Lapse in ethics approval* ***may result in interruption or termination of funding.***

You are solely responsible for providing a copy of this letter, along with your approved HREB application form; **to Research Grant and Contract Services** should your research depend on funding administered through that office.

Modifications of the protocol/consent are not permitted without prior approval from the HREB. **Implementing changes in the protocol/consent without HREB approval may result in your ethics approval being revoked, meaning your research must stop.** Request for modification to the protocol/consent must be outlined on an amendment form available on the Research Portal website as an Event Form and submitted to the HREB for review.

The HREB operates according to the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans (TCPS2), ICH Guidance E6: Good Clinical Practice Guidelines (GCP), the Health Research Ethics Authority Act (HREA Act) and applicable laws and regulations.

You are responsible for the ethical conduct of this research, notwithstanding the approval of the HREB.

We wish you every success with your study.

Sincerely

Dr. Mark Borgaonkar (Acting Co-Chair, Clinical Trials)
Health Research Ethics Board

APPENDIX D: Research Documents for Chapter 2

- Research Study Information Letter
- Promoting Heart Health Screening Study Recruitment Poster
- Focus Group/Individual Interview Questions for Health Professionals
- Focus Group/Individual Interview Questions for the Public
- Interview Questions Health Administrators/Managers
- Proposed CVD Screening Intervention

Research Study
Information Letter

TITLE: Exploring strategies to facilitate screening for cardiovascular disease to promote healthy aging.

INVESTIGATOR(S): Jill Bruneau
CO-INVESTIGATORS: Donna Moralejo, Catherine Donovan, Karen Parsons

SPONSORS: Newfoundland and Labrador Centre for Applied Health Research & ARNNL.

You have been invited to take part in a research study. Taking part in this study is voluntary. It is up to you to decide whether to be in the study or not. You can decide not to take part in the study. If you decide to take part, you are free to leave at any time. This will not affect your usual health care or employment status, as applicable.

Before you decide, you need to understand what the study is for, what risks you might take and what benefits you might receive. This information letter explains the study.

Please read this carefully. Take as much time as you like. If you like, take it home to think about for a while. Mark anything you do not understand, or want explained better. After you have read it, please ask questions about anything that is not clear.

The researchers will:

- **discuss the study with you**
- **answer your questions**
- **keep confidential any information which could identify you personally**
- **be available during the study to deal with problems and answer questions**

1. **Introduction/Background**:

   Cardiovascular disease (CVD), such as heart disease and stroke, are the leading cause of death in Canada and is the second leading cause of death in the province of Newfoundland and Labrador (NL). Having heart disease or a stroke may also result in long hospital stays, costly medications, and special heart procedures. Screening for heart disease early can lead to healthier lives for people as they age. In NL, screening for heart disease or stroke is not always consistently done for individuals aged 40-74

years. It is possible to develop or adapt a screening intervention program based on what others have done, but it is not known if such a program would meet our needs here in NL. If we explore different perspectives of health professionals and adults to meet our needs, we can develop a relevant program.

2. Purpose of study:

To obtain different perspectives on the barriers, facilitators, and strategies associated with systematic screening for heart disease in NL.

3. Description of the study procedures:

You will be asked to participate in an individual interview or a focus group to discuss your perspective on a program to increase screening for cardiovascular disease (CVD) in NL. You will be asked to discuss your opinion about the barriers and facilitators associated with screening for CVD. You will also be asked to look at a preliminary screening program to see if it is relevant for adults in NL.. These interviews can take place in person or by phone. The focus groups and interviews will be recorded on a digital recorder. They will be at a time and place that is convenient for you.

4. Length of time:

You will be asked to participate in one focus group or interview over the next six weeks at a place of your convenience. Each interview or focus group will last 60-90 minutes.

5. Possible risks and discomforts:

It is possible that participating in the focus group or an interview or looking at the screening program may cause some emotional upset. You can leave the focus group or stop the interview at any time. If participating in this focus group or interview is upsetting to you, we recommend that you discuss your concerns with your healthcare provider (general practitioner or nurse practitioner). If you would like, we will give you information for the 24 hour mental health crisis line.

6. Benefits:

It is not known whether this study will benefit you.

7. Liability statement:

Signing this form gives us your consent to be in this study. It tells us that you understand the information about the research study. When you sign this form, you

do not give up your legal rights. Researchers or agencies involved in this research study still have their legal and professional responsibilities.

8. What about my privacy and confidentiality?

Protecting your privacy is an important part of this study. Every effort to protect your privacy will be made. However it cannot be guaranteed. For example, we may be required by law to allow access to research records.
Other people taking part in the focus group may know your name and hear your comments. All members of the focus group will be reminded to:

- respect the privacy of each member of the group
- treat all information shared with the group as confidential

Access to records
The members of the research team will see study records that identify you by name. Other people may need to look at your study records that identify you by name. This might include the research ethics board. You may ask to see the list of these people. They can look at your records only when supervised by a member of the research team.

Use of your study information
The research team will collect and use only the information they need for this research study.

This information will include your:

- age
- sex
- information from study interviews and focus groups

Your name and contact information will be kept secure by the research team in Newfoundland and Labrador. It will not be shared with others without your permission. Your name will not appear in any report or article published as a result of this study.

Information collected for this study will be kept for five years.
If you decide to withdraw from the study, the information collected up to that time will continue to be used by the research team. It may not be removed. This information will only be used for the purposes of this study.

Information collected and used by the research team will be stored at the MUN School of Nursing, Education Building, 5th floor in a secured area only accessible to faculty and staff. Files will be kept on an encrypted hard drive and locked filing cabinet with only one key that will be kept by Jill Bruneau, the person responsible for keeping it secure.

Your access to records
You may ask the researcher to see the information that has been collected about you.

9. Questions or problems:

If you have any questions about taking part in this study, you can meet with the investigator who is in charge of the study. That person is:

Jill Bruneau
709-777-8153.

Or you can talk to someone who is not involved with the study at all, but can advise you on your rights as a participant in a research study. This person can be reached through:

Ethics Office at 709-777-6974
Email at info@hrea.ca

This study has been reviewed and given ethics approval by the Newfoundland and Labrador Health Research Ethics Board.

Promoting Heart Health Screening Study

Would you like to be a part of improving screening rates for heart health in Newfoundland and Labrador?

Are you between 40-74 years old?

You may qualify to participate in our study.

We are looking for volunteers to participate in a focus group to learn more about how to improve heart health screening for people in Newfoundland and Labrador.

To hear more about this study or to ask if you can take part, please contact a member of our research team: Jill Bruneau at 777-8153, jill.bruneau@mun.ca

Eligible participants will be reimbursed for out of pocket expenses.

MEMORIAL UNIVERSITY

Focus Group/Individual Interview Questions

(Members of the health professional groups)

Opening script: *Thank you for agreeing to participate in this [focus group/interview] today. We really appreciate your time and interest in the topic of screening for heart disease in NL. We do ask that you keep our discussion confidential so please do not to discuss what we have talked about with friends, family, or coworkers outside this room. You do not have to respond to any questions that you are not comfortable to answer. Your comments will not be linked to in any way to your name or no one will be able to identify you in any way. Thank you again for your participation. So, today's discussion is about ways to increase screening for cardiovascular disease in NL. There are three main steps in the screening process. We are going to talk about each of these and then have a general discussion. Step 1 is identifying patients to screen. Step 2 is actually carrying out the screening process. Step 3 is about acting on the screening test results.*

[**Prompt:** Step 1. Identification of patients to screen]

First, we are going to talk about ways that we can identify people who need to be screened.

1. Do you routinely screen patients for CVD? If no, whose responsibility is it? What is the best way to identify people to screen for CVD?
2. How do you usually identify people to screen for CVD?

    a. **Prompt:** Do you review patient's charts, current patient rosters, or do you have clinical reminder systems (electronic or paper-based) that flag charts according to the patient's age? Do you receive referrals from other professionals to screen patients?
    b. What works for you?
    c. Does it work well?
    d. What are some issues related to screening for CVD?
    e. Are there lessons to be learned from screening for other conditions?

3. Is knowing who to screen a problem?
    a. When do you specifically screen men? Women? Children?
4. What kind of organizational supports would help you with screening patients for CVD? (For example: more time, EHR, incentives, policy to make it a priority, etc).

[Prompt: Step 2. Screening patients]

Now we are going to talk about actually screening the patients by taking measurements (such as measuring waist circumference, calculating BMI or taking a blood pressure) or

using other tools to screen (such as CPGs, Framingham global risk assessment) and discuss some of the barriers or issues that may be occurring. Now let's talk about screening.

5. We have a preliminary program developed based on the C-CHANGE guideline. Would you be comfortable with using C-CHANGE? What kind of access do you need to find the C-CHANGE guideline? Would this table help you? [show C-CHANGE table]

6. What CPGs do you use for screening adults in your practice? What guidelines would be useful to access to help you know what to screen for and when?

We also suggest that you use a global CV risk tool

7. What tools (global risk assessments) do you use to screen for CVD risk factors in your clinical practice?
    a. Is there any concerns with using the Framingham Risk Tool?
    b. Do you use another tool?
    c. How do you use this tool?
    d. Would you be comfortable to change your approach?
    e. Do you use the online calculator?
    f. Do you calculate the "Heart Score"?

Part of the screening process involves doing physical measurements

8. What physical measurements do you perform when screening patients?
    a. Body mass index
    b. Weight measurement
    c. Height measurement
    d. Waist circumference measurement
    e. Blood pressure measurement
    f. What do you use as measurement tools?
    g. Do you take blood samples in the clinic?
    h. Do *you* normally take these physical measurements?
    i. Are there barriers or issues associated with taking physical measurements?

9. Would you use the proposed screening intervention in your clinical practice? Why or why not? (Show one page explanation of proposed screening intervention).
    a. What would you need to convince you or to help you implement this screening initiative?
    b. What suggestions do you have to improve this proposed screening intervention?

10. Is it easy to get participants to engage in a screening intervention for CVD?

[**Prompt:** Step 3. Acting on the results of screening]
Next, we want to know what sort of actions are required after completing the screening process.

11. Where do you document your findings related to screening patients?
    a. Do you use the electronic health record (EHR)?
    b. Does the EHR work for you?
    c. Is it easy to find information for follow-up after screening patients?
    d. What system do you use?

12. After screening patients, how do you follow-up on the results of testing and screening? What do you need to be able to follow-up on screening results (tools and resources)? Do you set up appointments or phone patients when results come back? Do you send referrals to other practitioners? Do you do patient education yourself?

Part of following up on screening results is asking patients to change behaviour or to follow advice.

13. Are you familiar with motivational interviewing? Behavioural change counselling (Ask, Advise, Assist)? How do you ensure that you are providing patient-centred care?

14. Do you have any suggestions for patient engagement for following through with your suggestions after being screened? Is there something that needs to be included
    in the preliminary program to help with patient engagement?

[Prompt: General questions about screening]

Now we would like your opinion on some more general questions related to screening.

15. What are some barriers to implementing a screening intervention? What suggestions do you have to address them?
16. What are some facilitators to implementing a screening intervention?

17. Are there any other strategies to increase CVD screening?

18. How important would training be for this intervention? Would you want to have tools or would you like to have training related to this screening intervention?

19. Do you have any suggestions for screening patients based on your own experience?

Focus Group/ Individual Interview Questions

(Members of the general public)

Opening script: *Thank you for agreeing to participate in this [focus group/interview] today. We really appreciate your time and interest in the topic of screening for heart disease in NL. If you haven't given me your signed consent form, you can give it to me now. We do ask that you keep our discussion confidential so please do not to discuss what we have talked about with friends, family, or coworkers outside this room. You do not have to respond to any questions that you are not comfortable to answer. Your comments will not be linked to in any way to your name or no one will be able to identify you in any way.*

[Prompt: Identification of patients to be screened]

First of all, we would like your advice on how to best contact you to get you involved in screening for heart disease.

1. Would you like to participate in a screening program to assess your risk for heart disease or stroke? Why or why not?

2. What is the best way to get you involved in screening? Invitations to be sent via regular mail, email, or a telephone call from your HCP?

3. When do you think it is the best time for you to be screened for heart disease? What age?

[**Prompt:** Screening process]

Now, we are going to talk about the screening process itself and what that means.

4. What concerns do you have about the actual screening tests (such as getting your BP taken, physical measurements like your height, weight, or having a blood test done)?

5. Are you interested in knowing about your overall risk for developing heart

   disease?

6. What are some barriers (or things that make it difficult) to participate in a screening program?

7. What are the facilitators (or things that make it easier) to participate in a screening program?

8. What can the healthcare provider do to address the concerns and barriers that you have identified?

[Prompt: Acting on screening test results]

After the screening tests are completed, your healthcare provider wants to share the results of these tests or measurements with you and make some recommendations.

9. Would you follow recommendations (or advice) from a healthcare provider that could possibly reduce your risk of developing CVD in the future?

10. What makes it difficult to follow the advice given to you by a healthcare provider?

11. What makes it easier to follow the advice given to you by a healthcare provider?
    a. Would printed materials be helpful?
    b. Website resources?
    c. Would a dietician be helpful to make changes to your diet?
    d. Counselling by your healthcare provider?
    e. Group support to make necessary changes?

A screening program is being developed and we need your advice on whether or not you think it will work or what changes should be made before using it
.

[Prompt: Proposed screening intervention]

12. Would you participate in this screening program? Why or why not?
13. What would you change about this screening intervention?

Interview Questions

(Health Administrators/Managers)

Opening script: *Thank you for agreeing to participate in this interview today. We really appreciate your time and interest in the topic of screening for heart disease in NL. If you haven't given me your signed consent form, you can give it to me now. We do ask that you keep our discussion confidential so please do not to discuss what we have talked about with friends, family, or coworkers outside this room. Thank you again for your participation today. So, today's topic is about ways to increase screening for heart disease in NL.*

[Prompt: Support for health professionals to do screening for CVD]

First of all, we would like your opinion on what can be done to support NPs or others to screen for CVD in their clinical practice.

1. What are your thoughts about NPs doing systematic CVD screening? Why?

2. If it can be supported, what can be done from an organizational support point of view?
    a. Prompt: Organizational support according to the literature means providing time, resources, EHR, relief from other responsibilities, etc.

    b. What needs to be done to ensure that it can be implemented in terms of other responsibilities currently performed by HCPs?

[**Prompt:** Proposed screening intervention]

Now, we would like your opinion on a provisional or tentative screening initiative that has been developed. These are the elements of the program and how they are related. (Show one page of proposed screening intervention and explain it).

3. Are you willing to support this provisional CVD screening intervention and encourage NPs to implement it? Why or why not? Do you think that it would be useful for other HCPs?

4. From your perspective, what suggestions do you have for improvements or effective strategies for the successful implementation of this screening intervention?

5. What kind of supports can you provide for an initiative such this screening intervention?

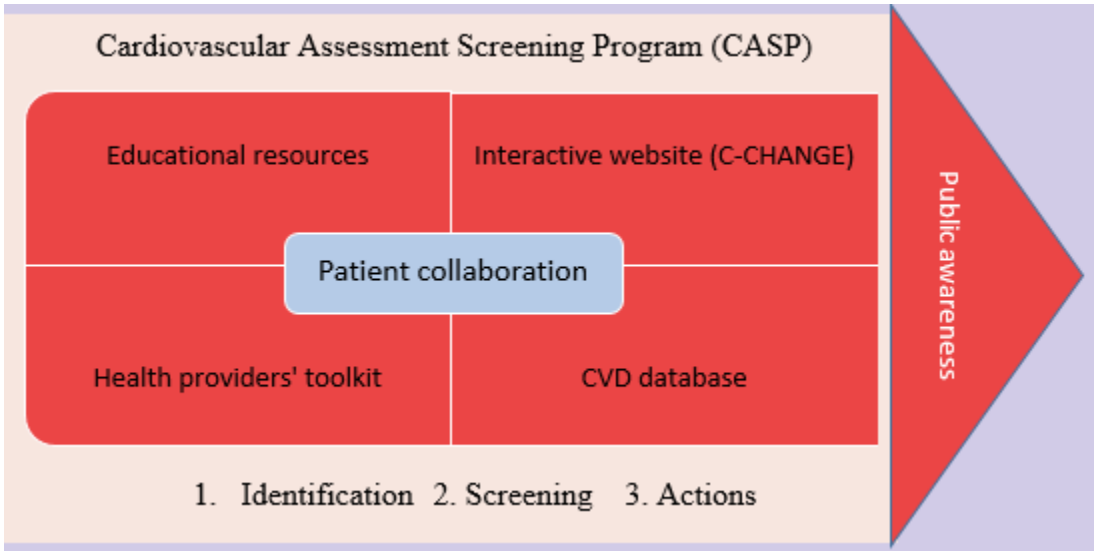
Proposed CVD Screening Intervention

Three main parts of the screening intervention:	Tools for implementation
1. Identifying eligible patients	➢ Review current patient lists to find individuals aged 40-74 years, ➢ Use clinical reminder systems in electronic or paper-based charts to cue screening when a patient turns 40 or 50 years of age. ➢ Get referrals from other HCPs to screen specific patients.
2. Screening of patients	➢ Perform physical measurements (weight, height, BMI, waist circumference, BP) ➢ Use screening tools like the global risk CV assessment (Framingham, Score-Canada). ➢ Ask patients to complete self-assessment. ➢ If abnormal results from screening tests, refer to specialist, start new medications, or book follow-up appointment. ➢ Document findings in electronic health record if available or in paper file.
3. Follow-up & risk management of patients a. Tools will include: i. Current guidelines ii. References iii. Resources available b. Referrals & other follow-up actions c. Goal-setting	➢ Use tools for management the C-CHANGE guideline, links to websites https://www.preventioninhand.com/For-Practitioners/Professional-Guidelines/C-CHANGE-Guideline.aspx ➢ Table from C-CHANGE in Appendix 1 ➢ Online risk assessment tools ➢ Communication of risk to patient including risk score, "cardiovascular age" score, BP results, blood test results, BMI, WC. ➢ Make referrals to other specialists and team members, ➢ Order additional tests, ➢ Counsel on behavior change using motivational interviewing ➢ Prescribing recommended medications ➢ Schedule follow-up appointments. ➢ Individualized goal setting using patient-centred care, self-management. www.swselfmanagement.ca

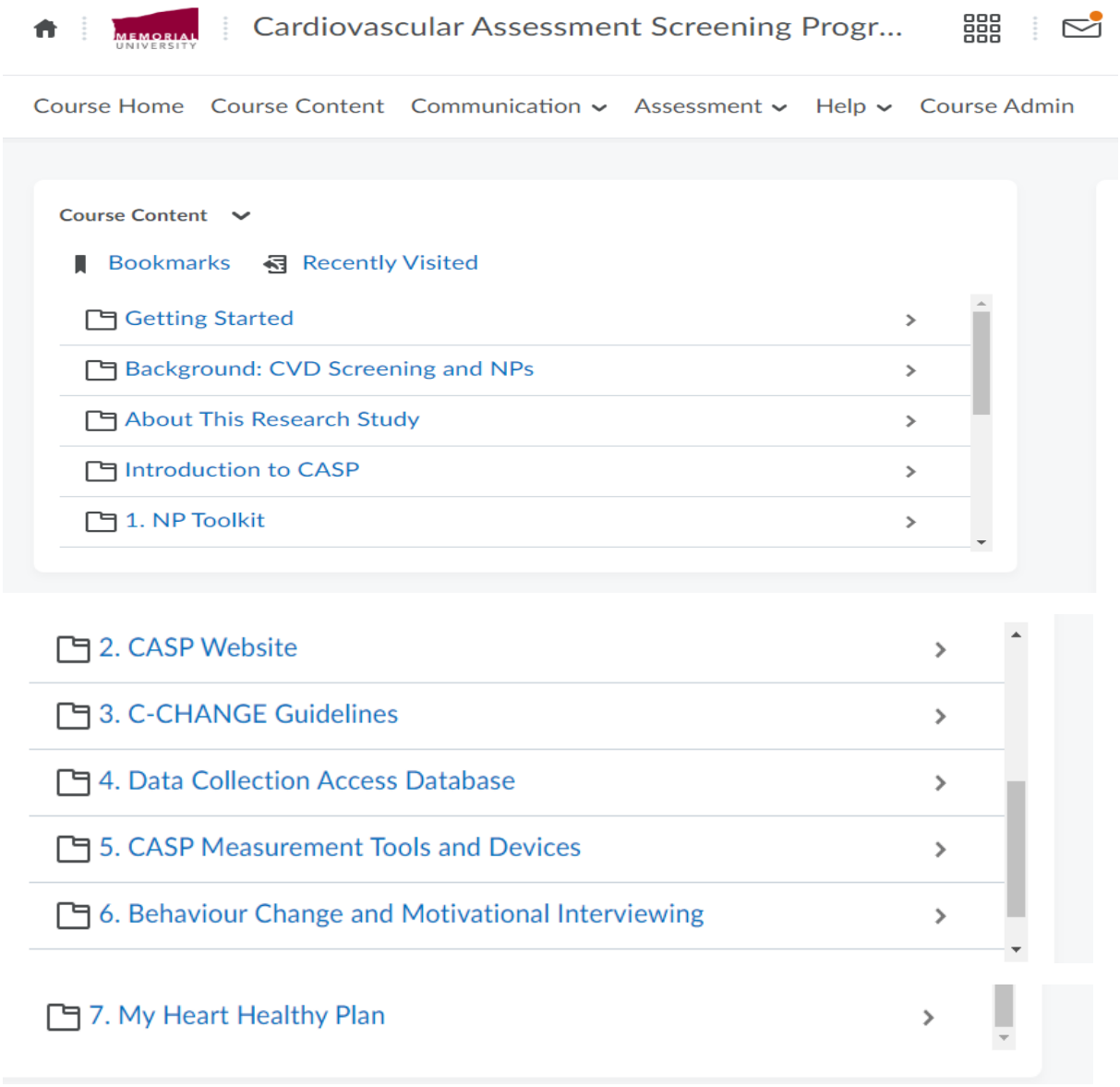
APPENDIX E: Cardiovascular Assessment Screening Program (CASP) Components

- CASP Components
- CASP Educational Resources (Online Educational Module)
- CASP Measurement Tools and Resources (examples)
- Healthcare Providers' Toolkit Contents
- My Heart Healthy Plan
- CASP Website
- CASP CVD Database

CASP Components



CASP Educational Resources (Online Educational Module)



CASP Measurement Tools and Resources (examples)

Framingham Risk Score[1]

Risk assessment tool for estimating a patient's 10-year risk of developing cardiovascular disease

The risk assessment tool below uses information from the Framingham Heart Study as recommended by the 2009 CCS Canadian Cholesterol Guidelines to predict a person's chance of developing cardiovascular disease in the next 10 years, modified for family history (double the CVD risk percentage if any CVD present in a first degree relative before age 60). In men over 50 or women over 60 of intermediate risk whose LDL-C does not already suggest treatment, hsCRP can be used for risk stratification. Please enter your patient's information in the fields below.

Age:	Years	*
Gender:	Female Male	*
Total cholesterol:	mmol/L	*
HDL cholesterol:	mmol/L	*
Smoker:	Yes No	*
Diabetes:	Yes No	*
Systolic blood pressure:	mm Hg	*
Is the patient being treated for high blood pressure?	Yes No	*

Calculate risk

This online assessment tool is intended as a clinical practice aid for use by experienced healthcare professionals. Results obtained from this tool should not be used alone as a guide for patient care.

Heart Age* Predictor Using BMI

Adapted from the "Framingham Study Heart Age Calculator. A project of the National Heart, Lung and Blood Institute and Boston Univer

The Heart Age calculator is meant to be used by individuals 30 to 74 years old who have no history of cardiovascular disease (e.g., heart a

Sex:

M F

Age (years): 30

Systolic Blood Pressure (mmHg): 125

Treatment for Hypertension:

Yes No

Current smoker:

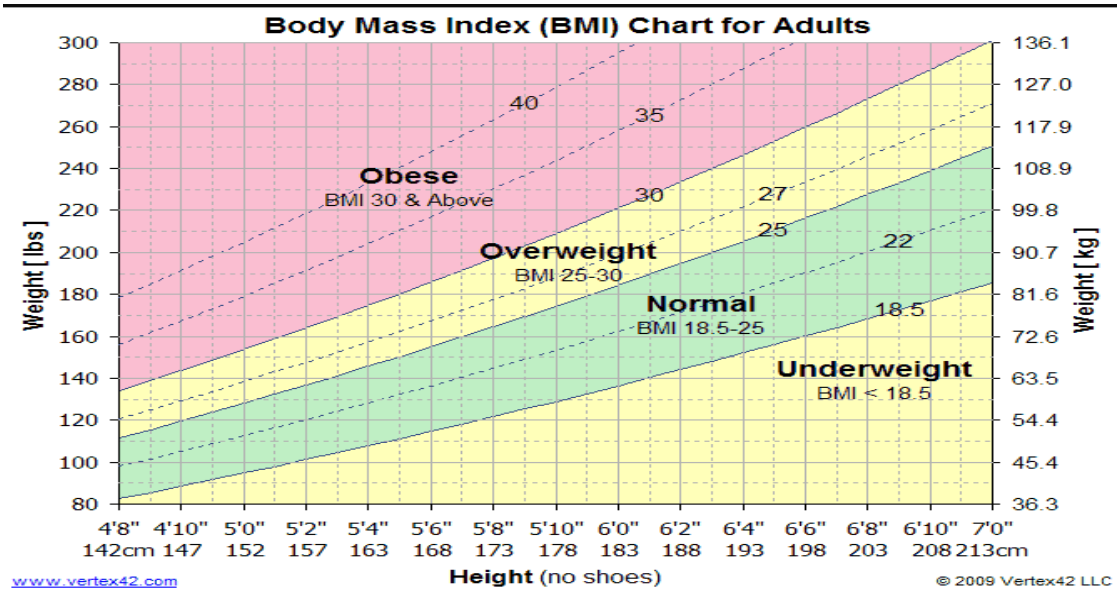
Yes No

Diabetes:

Yes No

Body Mass Index: 22.5

Calculate



BMI Chart

You can also calculate your BMI using this formula:

BMI = weight(kg)/height(m)^2

Health Risk Classification According to Body Mass Index (BMI)

Classification	BMI Category (kg/m^2)	Risk of developing health problems
Underweight	< 18.5	Increased
Normal Weight	18.5 - 24.9	Least
Overweight	25.0 - 29.9	Increased
Obese class I	30.0 - 34.9	High
Obese class II	35.0 - 39.9	Very high
Obese class III	>= 40.0	Extremely high

DIABETES CANADA

Search

MYDC BLOG | MEMBERSHIP | SHOP | DONATE

ABOUT DIABETES | DIABETES & YOU | IN YOUR COMMUNITY | RESEARCH | HOW YOU CAN HELP | PUBLICATIONS & NEWSLETTERS | CLINICAL PRACTICE & EDUCATION

Diabetes & You > Healthy Living Resources > Weight Management > Body Mass Index (BMI) Calculator

BODY MASS INDEX (BMI) CALCULATOR

SHARE PRINT

- LIVING WITH TYPE 1 DIABETES
- LIVING WITH TYPE 2 DIABETES
- LIVING WITH GESTATIONAL DIABETES
- LIVING WITH PREDIABETES
- COMPLICATIONS
- HEALTHY LIVING RESOURCES
  - Blood Sugar & Insulin
  - Dental Care
  - Diet & Nutrition

Body Mass Index (BMI) is a measure of body fat based on height and weight.

How to calculate Body Mass Index

Body Mass Index is a simple calculation using a person's height and weight. The formula is BMI = kg/m^2 where kg is a person's weight in kilograms and m^2 is their height in metres squared.

A BMI of 25.0 or more is overweight, while the healthy range is 18.5 to 24.9. BMI applies to most adults 18-65 years.

Why isn't BMI used for muscle builders, long-distance athletes, pregnant women, the elderly or young children?

BMI is not used for muscle builders, long distance athletes, pregnant women, the elderly or young children. This is because BMI does not take into account whether the weight is carried as muscle or fat, just the number. Those with a higher muscle mass, such as athletes, may have a high BMI but not be at greater health risk. Those with a lower muscle mass, such as children who have not completed their growth or the elderly who may be losing some muscle mass may have a lower BMI. During pregnancy and lactation, a woman's body composition changes, so using BMI is not appropriate.


0.0
lb
ETEKCITY


HOW TO TAKE AN ACCURATE
WAIST MEASUREMENT
HEART &
STROKE
FOUNDATION
Finding answers. For life.
0:03 / 2:30
YouTube

Healthcare Providers' Toolkit Contents

NP Toolkit

You have been sent an NP Toolkit with three components: 1. Patient Educational Materials, 2. CASP Research Materials, 3. NP Tools for screening and management of patients in your clinic. Below is a list of the items contained in the NP Toolkit for the three components. The links for the Research forms are also contained on the CASP Website in case you require additional materials during implementation of the study.

1. Patient Education Materials:

Wallet Blood Pressure Record
How to Manage Your Cholesterol
Heart & Stroke Just Breathe
Hypertension Canada Understanding and Managing Your Blood Pressure
BP Action Plan
Heart & Stroke Stressed Out Page
Heart & Stroke Time to Get Moving Page
Heart & Stroke Time to Eat Well

2. CASP Research Materials

- Heart Heath Assessment Pamphlet
- Patient Informed Consent Form
- NP Script (for getting consent)
- Heart Health Research Poster
- Eligibility for Heart Health Screening Form (Part A)/Decision to Screen (Part B)
- Tracking Form for Heart Health Screening
- Laboratory Requisition (see sample requisition)
- My Heart Healthy Plan

3. NP Tools for patient screening and management

- Heart & Stroke Healthy Waist Measurement Tape
- 5As of Obesity Management Booklet
- 5As Obesity facts
- 5As Checklist
- Best Weight booklet
- What's New Hypertension Canada Guidelines 2017
- Hypertension in Diabetes
- Measuring Blood Pressure the right Way Card
- Readiness ruler coloured chart
- Readiness ruler example
- Facts about plant sterols and cholesterol management
- Healthy Plate Sheet
- Meals Made Easy
- Get Active Questionnaire
- Digital Body Weight Scale
- Automated BP monitor (please use the automated device in your office)

MY HEART HEALTHY PLAN

October 2017

Your plan may go perfectly or it may not, which is normal when people try new things.

My action plan is: (Example: Go for a 30 minute walk on Monday, Wednesday and Friday morning at 9am)

_____

My goal is: (Example: Make walking a part of my life at least three days of the week)

_____

Choose how to check-in. Use the questions on the other side as a guide:

A. Do-it-yourself check-in:
Make an appointment with yourself to look at how it went

B. Check-in with someone else:
You can check in with someone else. They can:

- Help you find new ideas
- Just listen or offer support
- Not give advice
- Let **you** decide what will work for you

A check-in helps you learn what worked, what didn't and what you want to do next!

My plan to check-in:

To support myself to complete and learn from my plan I will check in with:

A. Myself. I will sit down on the _____ at_____ and _____.

B. Someone else. We will check in by _____ (phone, text, in person.) on the _____ at _____.

It's about learning:

Your plan may go perfectly or not; there will still be things to learn. You may learn:

- What you like and what you don't

- What makes sense for you and what does not!

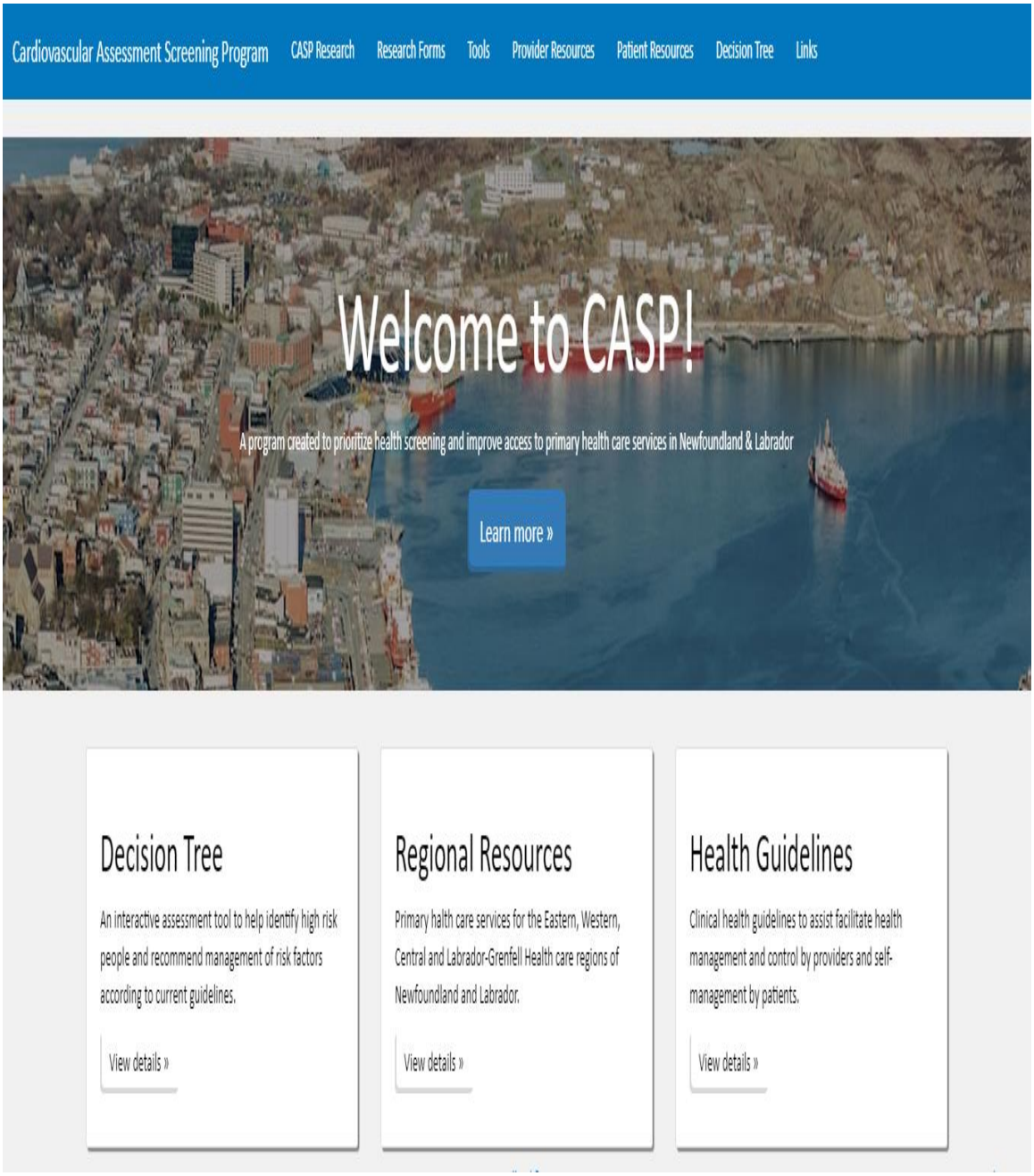
Check-in Question Guide

Remember, checking on the plan isn't about finding success or failure, it's about learning. You didn't fail if you learned something! If your plan went well, celebrate!

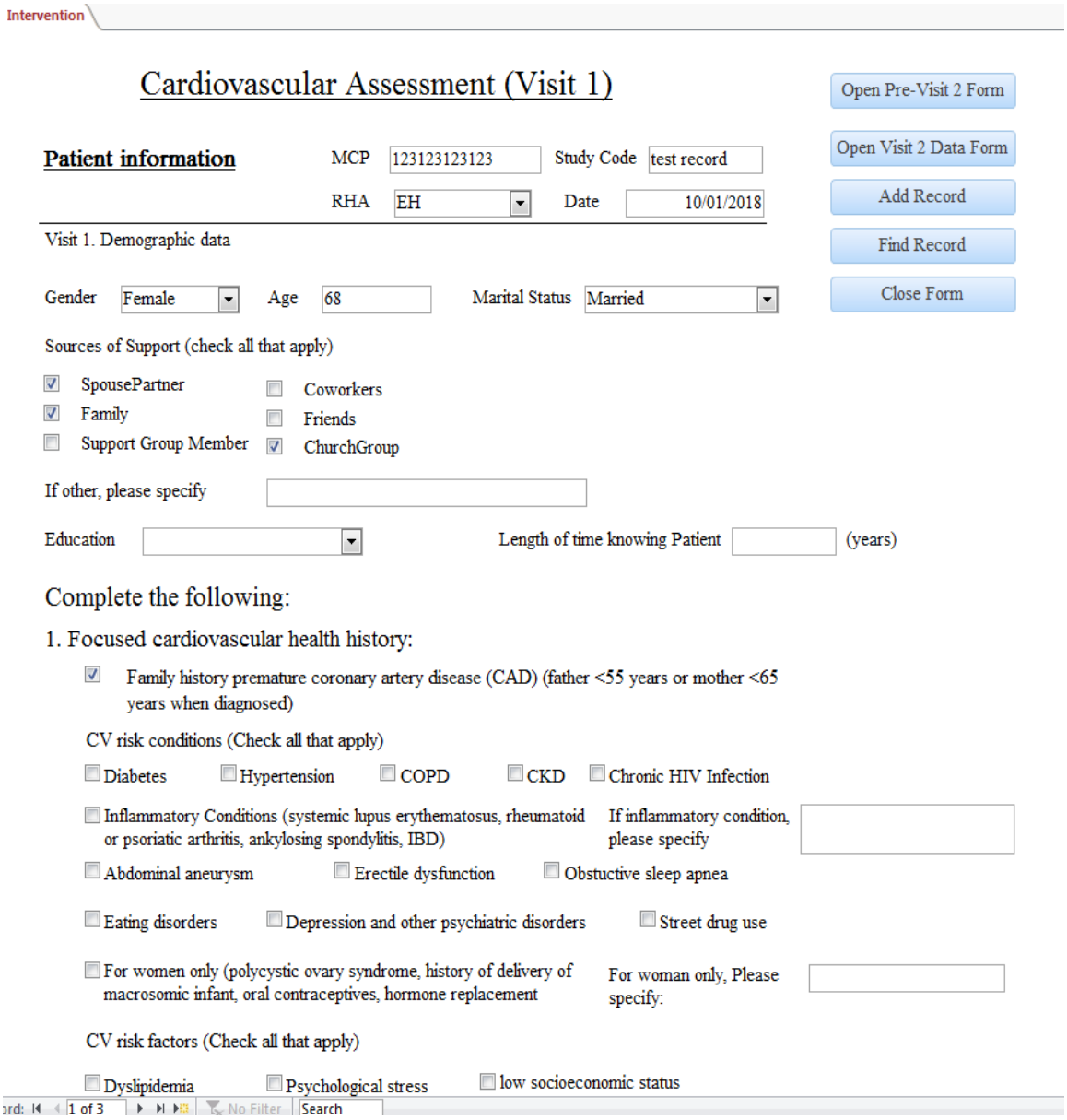
The Question	My Experience
How did it go with the plan?	**My plan:**
What did you learn?	**I learned:**
What do you want to do next?	**Next I want to:**
If you are going to make another plan, write it here! **My new plan:** (What is it? When am I going to start? How long?) **Start date_____**	
How sure are you that you can complete your plan? **What would make you more confident?** **Re-write your plan if needed.**	

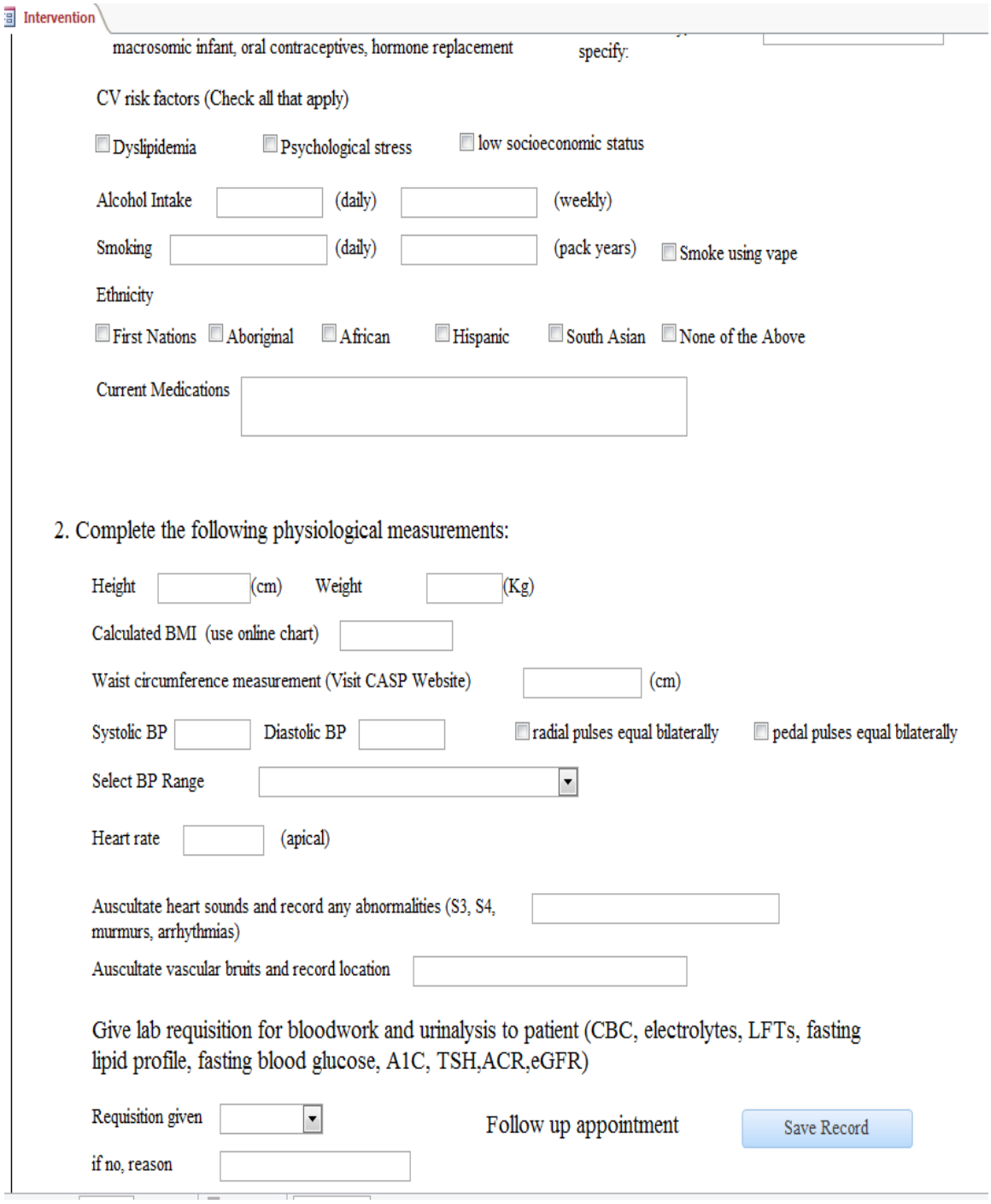
Adapted and Used with permission from: Centre for Collaboration, Motivation and Innovation www.centrecmi.ca and Patients as Partners at the BC Ministry of Health in the development of the "*Checking in on my plan sheet".*

CASP Website



CASP CVD Database




Intervention
macrosomic infant, oral contraceptives, hormone replacement
specify:
CV risk factors (Check all that apply)
Dyslipidemia
Psychological stress
low socioeconomic status
Alcohol Intake
(daily)
(weekly)
Smoking
(daily)
(pack years)
Smoke using vape
Ethnicity
First Nations
Aboriginal
African
Hispanic
South Asian
None of the Above
Current Medications
2. Complete the following physiological measurements:
Height
(cm)
Weight
(Kg)
Calculated BMI (use online chart)
Waist circumference measurement (Visit CASP Website)
(cm)
Systolic BP
Diastolic BP
radial pulses equal bilaterally
pedal pulses equal bilaterally
Select BP Range
Heart rate
(apical)
Auscultate heart sounds and record any abnormalities (S3, S4, murmurs, arrhythmias)
Auscultate vascular bruits and record location
Give lab requisition for bloodwork and urinalysis to patient (CBC, electrolytes, LFTs, fasting lipid profile, fasting blood glucose, A1C, TSH,ACR,eGFR)
Requisition given
Follow up appointment
Save Record
if no, reason

Visit 2 Form:

MCP 123123123123 Visit_Date 12/01/2018

Priority area(s) determined with patient:

1. Weight loss
2. Healthy eating
3. Drink more water
4.

Individualized goals for My Healthy Heart Plan

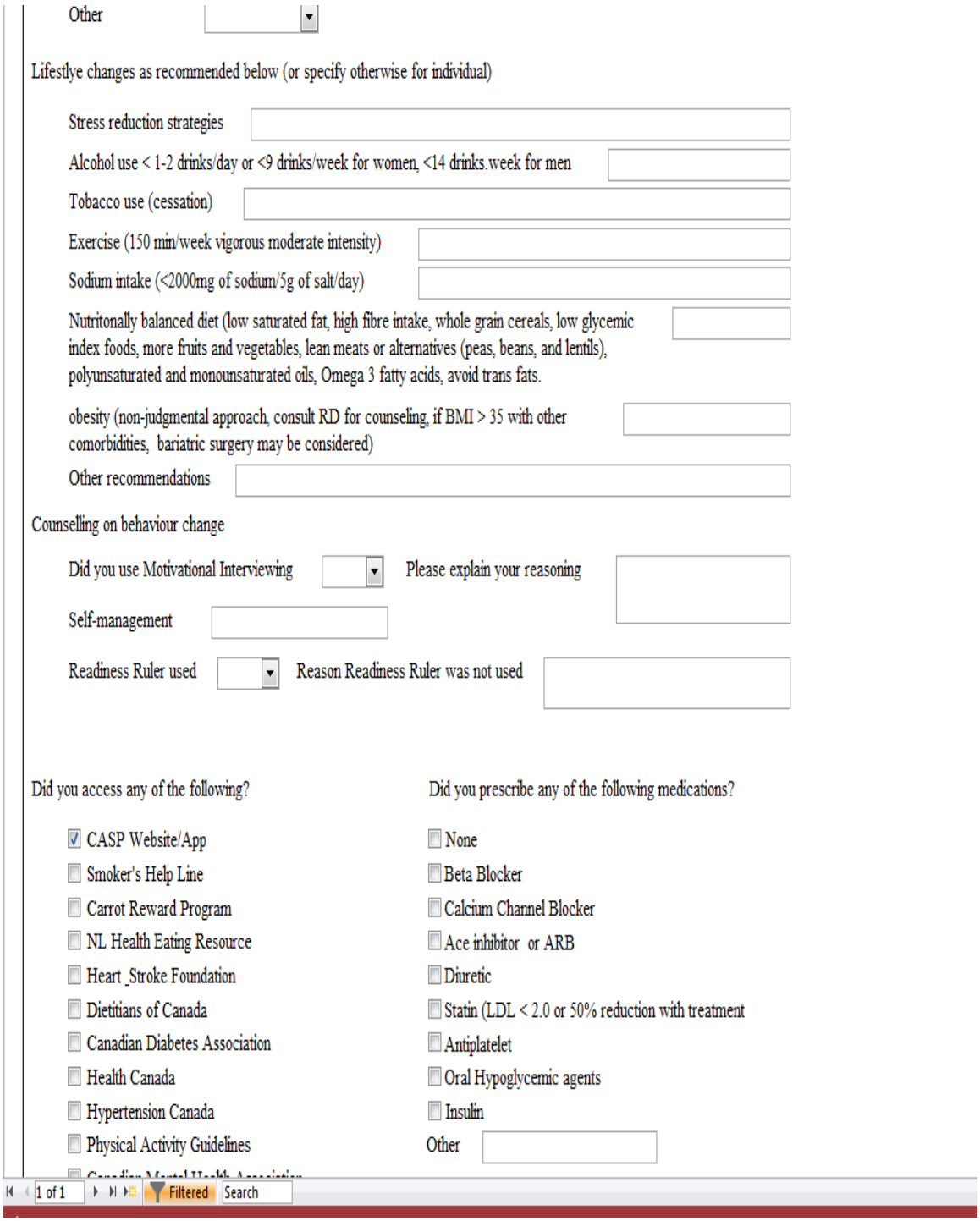
1.
2.
3.
4.
5.

Referrals to interprofessional team:

- Physician
- Physician Specialist
- Dietitian
- Physiotherapist
- Pharmacist
- Public Health Nurse
- Diabetes Educator
- Social Worker
- Psychologist
- Other

Further Testing Required

- Check BP with every visit (if appropriate)
- 12 lead ECG (Only if indicated such as arrhythmis, proteinuria, reduced pulses, or vascular bruits and consistent with Choosing Wisely NL)
- Echocardigram (if abnormal heart sounds present but not previously documented, apical pulse displaced, ventricular arrhythmias)
- If FBG 5.6-6.0 (plus > one risk factor),A1C 5.5-5.9% OR FBG 6.1-6.9 and A1C 6-6.4%, then order 2 hour PG in 75g OGTT test)
- Other


Other
Lifestlye changes as recommended below (or specify otherwise for individual)
Stress reduction strategies
Alcohol use < 1-2 drinks/day or <9 drinks/week for women, <14 drinks.week for men
Tobacco use (cessation)
Exercise (150 min/week vigorous moderate intensity)
Sodium intake (<2000mg of sodium/5g of salt/day)
Nutritonally balanced diet (low saturated fat, high fibre intake, whole grain cereals, low glycemic index foods, more fruits and vegetables, lean meats or alternatives (peas, beans, and lentils), polyunsaturated and monounsaturated oils, Omega 3 fatty acids, avoid trans fats.
obesity (non-judgmental approach, consult RD for counseling, if BMI > 35 with other comorbidities, bariatric surgery may be considered)
Other recommendations
Counselling on behaviour change
Did you use Motivational Interviewing
Please explain your reasoning
Self-management
Readiness Ruler used
Reason Readiness Ruler was not used
Did you access any of the following?
CASP Website/App
Smoker's Help Line
Carrot Reward Program
NL Health Eating Resource
Heart _Stroke Foundation
Dietitians of Canada
Canadian Diabetes Association
Health Canada
Hypertension Canada
Physical Activity Guidelines
Did you prescribe any of the following medications?
None
Beta Blocker
Calcium Channel Blocker
Ace inhibitor or ARB
Diuretic
Statin (LDL < 2.0 or 50% reduction with treatment
Antiplatelet
Oral Hypoglycemic agents
Insulin
Other
1 of 1
Filtered
Search

APPENDIX F: Research Documents for Chapter 3

- Request Letter to Access Health Records of Control Group Participants
- Request Letter for NLCHI to Develop CVD Database
- Confirmation Document from NLCHI for CVD Database Development
- Recruitment Email for Healthcare Leaders
- Recruitment Letter for Nurse Practitioners
- Research Study Information Sheet
- Initial Recruitment Email for NP Managers to Assist the Recruitment of Nurse Practitioners
- Follow-up Email Request for NP Managers for Recruitment of NPs
- Follow-up Telephone Script for NP managers for Recruitment of NPs
- NP Informed Consent Form (Intervention and Control)
- Patient Recruitment Poster for NP Clinics
- Heart Health Assessment Pamphlet for Patient Participants
- Patient Informed Consent Form (Intervention)
- Patient Informed Consent Form (Control)
- NP Profile Questionnaire (Intervention and Control)
- Eligibility for Heart Health Screening Form (Part A)
- Decision to Screen Form (Part B)
- Tracking Form for Heart Health Screening (Intervention)
- Cardiovascular Screening Checklist (Intervention group)
- Record of Potential Participants (Control)
- Chart Review Form (Control)
- NP Feedback Questionnaire (Intervention)
- NP Feedback Questionnaire (Control)
- Patient Feedback Questionnaire (Intervention)
- Patient Feedback Questionnaire (Control)

Request Letter to Access Health Records of Control Group Participants

June 20th, 2017

To whom it may concern,

I am a PhD student at Memorial University of Newfoundland School of Nursing and I am writing to request access to health records as part of the ethical protocol for the purposes of a research study that is a randomized controlled trial (RCT) entitled: "**Implementing and testing a cardiovascular assessment screening program to promote healthy aging."** We are interested in finding out whether or not the implementation of the screening program by NPs (intervention group) will be effective in improving comprehensive screening of people (40-74 years) in Newfoundland and Labrador (NL) compared to usual care provided to patients by NPs (control group).

This study has received ethics approval from the HREA and RPAC as well as other regional health authorities across NL. This study is anticipated to take place between September, 2017 and December, 2017.

We are requesting access to health records within your regional health authority for purposes of a retrospective chart review on patient charts in the NP control group who have consented to participate in the study. On specific dates agreed upon by the NP clinics and the researchers, the office clerks will pull patient charts, the researcher will read through the charts and record information on a chart review form into a secure database of an encrypted laptop. Please see Chart Review Form attached.

If you have any questions or require further clarification, please contact the principal investigator, Jill Bruneau, at jb4276@mun.ca

Thank you for your time in considering this request.

Sincerely,

Jill Bruneau PhD(c) NP
Doctoral student
MUN School of Nursing

Request Letter for NLCHI to Develop CVD Database

June 20th, 2017

Ms. Michele Butler
Information Request Coordinator
Newfoundland and Labrador Centre for Health Information (NLCHI)
Health Analytics and Evaluation Services
70 O'Leary Avenue, St. John's, NL A1B 2C7

Dear Ms. Butler,

I am a PhD student at Memorial University of Newfoundland School of Nursing conducting a randomized controlled trial (RCT), entitled: "**Implementing and testing a cardiovascular assessment screening program (CASP) to promote healthy aging.**" We are interested in finding out whether or not the implementation of the screening program by nurse practitioners (NPs) (intervention group) will be effective in improving comprehensive screening of people aged 40-74 years in Newfoundland and Labrador (NL) compared to usual care provided to patients by NPs (control group). This study is evaluating the effectiveness of CASP.

We are requesting that NLCHI develop an Access Database for the intervention arm of this study. This Access Database will be used by the NPs to enter patient data during the implementation of this RCT. Once data collection is completed, the Access Database files will be sent securely by the NPs to NLCHI. In addition to the requests to develop the Access Database and to receive the Access Database files from the NPs, we are also requesting that NLCHI de-identify the data and then send the de-identified data to me, the principal investigator.

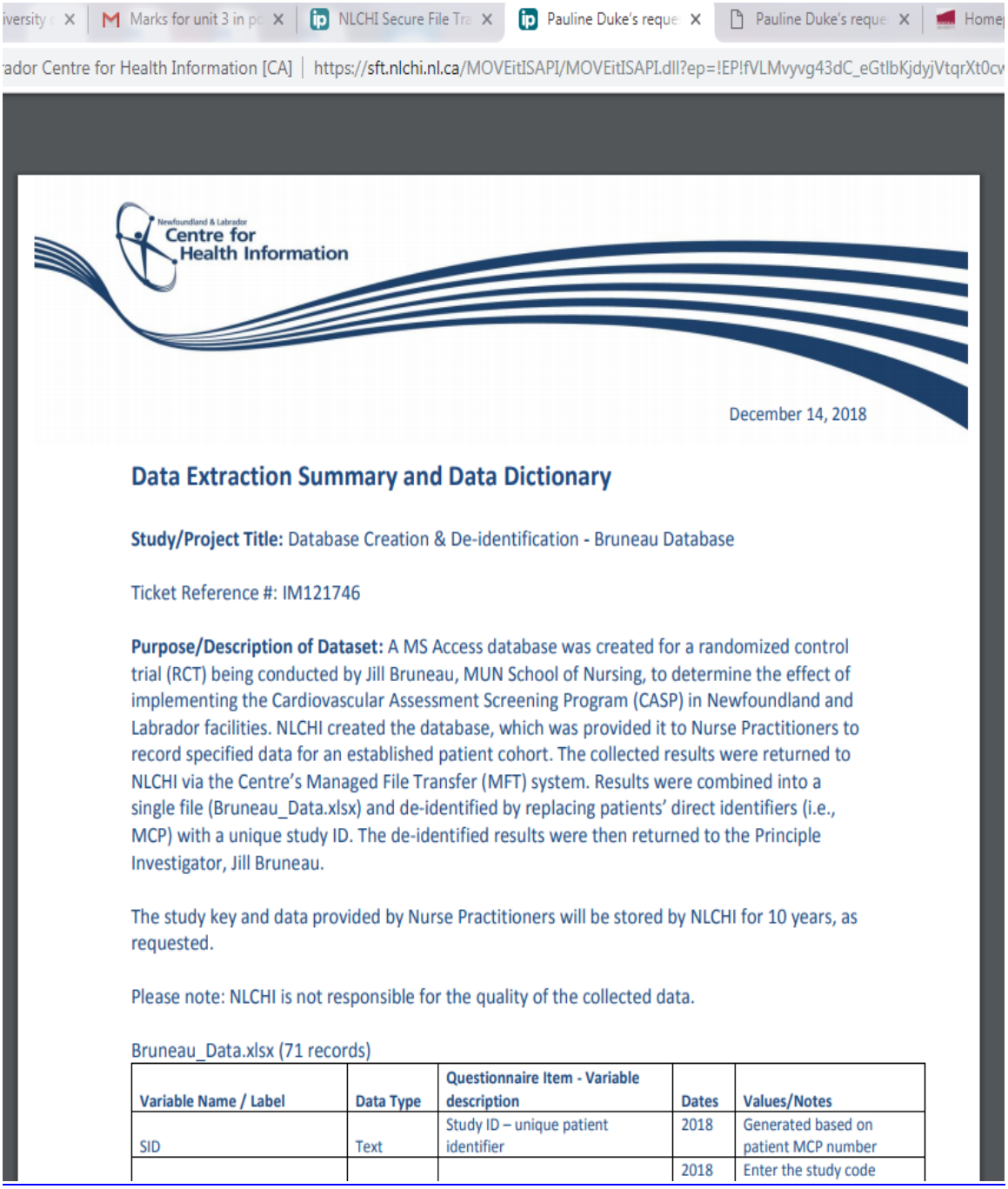
This study has received ethics approval from the HREA and RPAC as well as other regional health authorities across NL. This study is anticipated to take place between September, 2017 and December, 2017.

If you have any questions or require further clarification, please contact me at jb4276@mun.ca

Thank you for your time in considering this request.

Jill Bruneau
Principal Investigator
jb4276@mun.ca

Confirmation Document from NLCHI for CVD Database Development



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ador Centre for Health Information [CA] | https://sft.nlchi.nl.ca/MOVEitISAPI/MOVEitISAPI.dll?ep=!EP!fVLMvyvg43dC_eGtlbKjdyjVtqrXt0cv

Newfoundland & Labrador Centre for Health Information

December 14, 2018

Data Extraction Summary and Data Dictionary

Study/Project Title: Database Creation & De-identification - Bruneau Database

Ticket Reference #: IM121746

Purpose/Description of Dataset: A MS Access database was created for a randomized control trial (RCT) being conducted by Jill Bruneau, MUN School of Nursing, to determine the effect of implementing the Cardiovascular Assessment Screening Program (CASP) in Newfoundland and Labrador facilities. NLCHI created the database, which was provided it to Nurse Practitioners to record specified data for an established patient cohort. The collected results were returned to NLCHI via the Centre's Managed File Transfer (MFT) system. Results were combined into a single file (Bruneau_Data.xlsx) and de-identified by replacing patients' direct identifiers (i.e., MCP) with a unique study ID. The de-identified results were then returned to the Principle Investigator, Jill Bruneau.

The study key and data provided by Nurse Practitioners will be stored by NLCHI for 10 years, as requested.

Please note: NLCHI is not responsible for the quality of the collected data.

Bruneau_Data.xlsx (71 records)

Variable Name / Label	Data Type	Questionnaire Item - Variable description	Dates	Values/Notes
SID	Text	Study ID – unique patient identifier	2018	Generated based on patient MCP number
			2018	Enter the study code

Recruitment Email for Healthcare Leaders

July 2, 2017

Dear [healthcare leader],

I am writing to tell you to about a research study that we are about to start in Newfoundland and Labrador (NL). As a [healthcare leader], you should be aware of such initiatives and I am also asking for your assistance in informing other senior administrators about the study. One strategy for recruitment of nurse practitioners (NPs) to the study will be through nursing leaders.

I have attached an information sheet about this research study which is titled "Implementing and Testing a Cardiovascular Screening Program (CASP) to Promote Healthy Aging:" In brief, it is a randomized controlled trial with NPs to evaluate the effectiveness of a new CV screening intervention in promoting screening for cardiovascular disease (CVD). CASP was developed following consultations with NPs and other key stakeholders, and consists of tools NPs can use to facilitate comprehensive screening and follow-up actions that are consistent with current clinical practice guidelines and the Choose Wisely NL recommendations. Screening and associated interventions are part of the mandate of NP practice, so additional resources are not required. However, participation in the short data collection period (4-6 weeks) will result in more time spent on screening activities than might have otherwise occurred.

The research project has received ethical approval from HREA and from RPAC and equivalent committees in each RHA. We have received a letter of support from the Department of Health and Community Services that confirms that this research study aligns with many of the provincial strategic goals to promote healthy aging in our communities.

Would you please inform other [CEOs and other leaders] by forwarding this email and attached Research Study Information Sheet to other leaders within the regional health authorities? I will follow up with the directors to request their assistance with recruitment of NPs.

If you have any questions, please let me know by contacting me at jb4276@mun.ca. Thank you for your support.

Sincerely

Jill Bruneau NP PhD(c)
Doctoral student
MUN School of Nursing

Recruitment Email for Nurse Practitioners

July 2nd, 2017

Dear nurse practitioners,

You are invited to participate in a research study being conducted as part of my PhD dissertation focused in cardiovascular health promotion. Other research committee members are Dr. Donna Moralejo, Dr. Catherine Donovan, Dr. Karen Parsons, a nurse practitioner working in a primary healthcare setting as well as patient partners from both rural and urban centres. Phase 1 of this study has already taken place and has informed the development of the cardiovascular screening program to be relevant to nurse practitioners in Newfoundland and Labrador.

Phase 2 of this study is entitled: "**Implementing and testing a cardiovascular assessment screening program (CASP) to promote healthy aging."** We are interested in finding out whether or not the implementation of the screening program by nurse practitioners will be effective to improve comprehensive screening of people aged 40-74 years in NL. We are also interested in learning about the factors that influence patients' and nurse practitioners' participation in program implementation. If you choose to participate, you will be randomly selected to be in either the intervention group or the control group. The intervention group will receive training on program materials to implement the program. The control group will be provided with program materials at a different time.

All of the information collected will be kept completely confidential. Results of the study will be shared with all NPs as well as participating patients if requested. Participation in this study is completely voluntary. A letter of support has been given to researchers by the Department of Health and Community Services. This study has been given ethics approval by the NL Health Research Ethics Board (HREB) and the Regional Health Authorities (RHAs) across NL.

If you are interested in participating in this study or if you have any questions before making your decision, please email me at jb4276@mun.ca.

Sincerely,

Jill Bruneau

Jill Bruneau PhD(c) NP
Doctoral student
MUN School of Nursing

Research Study Information Sheet (for Nurse Practitioners)

Why is this research study important?
Cardiovascular disease (CVD), such as heart disease and stroke, is the leading cause of death in Canada and the second leading cause of death in Newfoundland and Labrador (NL). Having heart disease or a stroke may also result in long hospital stays, costly medications, and special heart procedures. Screening and early intervention for heart disease and stroke can lead to healthier lives for people as they age. In NL, screening for heart disease or stroke is not always consistently done for individuals aged 40-74 years. The Cardiovascular Assessment Screening Program (CASP) was developed for this study following discussions with health professionals and patients. The purpose of CASP is to identify high risk people and recommend management of risk factors according to current guidelines.

What is the purpose of this research study?
To evaluate the effectiveness of CASP.

What will happen during the study and who will be involved?
This study is a randomized controlled trial (RCT). Nurse practitioners (NPs) across NL who agree to participate will be randomly assigned to one of the two groups: the intervention or the control. The NPs in the intervention group will be asked to recruit, from their practice, about 30 individuals, aged 40-74 who have no established heart disease. The NPs will use the CASP tools to screen the individuals, recommend follow-up actions, as well as document actions and results. The control group will recruit 30 eligible patients and carry on with regular practice. The charts of the control group patients will be reviewed by the researchers. At the end of the study, the CASP tools will be given to NPs in the control group. To acknowledge the time and effort required to participate in this study, NPs will be given a VISA gift card of $100.00.

How long will it take for this research study to be completed?
NPs in the intervention group will be expected to screen individuals over two visits. The initial assessment may take up to 30 minutes. The second visit appointment may take up to 40 minutes. The NPs in the control group will carry on with usual care; identifying patients and completing documentation will take five minutes per patient. For each NP, data collection will take 4-6 weeks and will be completed once 30 patients have been identified for the study. The researcher will review the charts of eligible patients in the control group.

What are the benefits of doing this research study?
Evaluating and refining CASP can result in comprehensive and consistent screening by NPs with appropriate follow-up actions in patient-oriented research. Implementation of CASP will strengthen the participation of NPs in CVD prevention and health promotion

and a valuable toolkit for CVD screening will be available to other healthcare providers in NL.

More information? Please contact Jill Bruneau NP PhD(c), Principal Investigator, Memorial University School of Nursing, 709-777-7258, jill.bruneau@mun.ca.

Initial Recruitment Email for NP Managers

July 2, 2017

Dear [NP managers],

I am writing to invite you to assist in recruitment of participants for a research study entitled: "Implementing and testing a cardiovascular assessment screening program (CASP) to promote healthy aging." We are interested in evaluating the implementation a heart health screening program by nurse practitioners for adults aged 40-74 years across Newfoundland and Labrador. Results of this study are intended to increase systematic screening in NL and to promote healthy aging in this province.

Would you please assist in recruitment of nurse practitioners as participants of this research study within the regional health authorities? If yes, I am asking you to forward the recruitment letter and Research Study Information Sheet attached to this email and then potential participants can contact me directly if they are interested in participating in the study.

Thank you for considering this request to assist in recruitment of participants for this study. If you should have any questions please email me at jb4276@mun.ca.

Sincerely,

Jill Bruneau NP PhD(c)
Doctoral student
MUN School of Nursing

Follow-up Email Request for NP Managers for Recruitment of NPs

November 10, 2017

Dear [name of NP manager],

I am writing to request your support in recruiting of nurse practitioners (NPs) in your region for a nursing research study that will evaluate the effectiveness of a Cardiovascular Assessment Screening Program (CASP).

The NP participants should be currently working in a community or an outpatient setting and have access to a patient population between the ages of 40-74 years without diagnosed cardiovascular disease. The NPs in the intervention group (10) will be given resources to assist them in the screening and management of patients (a toolkit including a newly designed website with resources for both NPs and patients). They should be able to do at least one follow-up visit with each patient. The NPs in the control group (10) will continue with usual practice, but will be given access to these resources following study completion. The study is funded by NL SUPPORT and has received ethics approval.

The NPs may be interested in participating in this research for many reasons, in addition to promoting healthy aging. The educational training associated with this study can be used towards formal hours for the Association of Registered Nurses of Newfoundland and Labrador (ARNNL) Continuing Competency Program. Also, the NPs participating in this research can gain points towards the Registered Nurses Union of Newfoundland and Labrador Leadership Premium by attending the training sessions and webinars. As well, to acknowledge the time and effort to recruit, screen, and manage the patient participants, a $100.00 Visa gift card will be given to each NP who completes this study.

Would you be able to approach NPs and ask them if I could contact them directly to explain about participation in this study? If NPs are interested, could you please give me their contact information? I will contact you by phone about this and any other suggestions you may have about promoting participation in this research. In the meantime, if you have any questions, please call me at 709-777-7258 or email me at jill.bruneau@mun.ca.

Thank you for your support in the recruitment of NPs for this study.

Sincerely,

Jill Bruneau NP PhD(c)
Doctoral student
MUN School of Nursing

Follow-up Telephone Script for NP Managers

Hello [manager's name],

My name is Jill Bruneau and I am a doctoral student from Memorial University School of Nursing conducting a research study on heart health screening that will begin this September, 2017. I am calling to see if you had received an email two weeks ago asking for your assistance in recruiting nurse practitioners for this study.

1. **Did you receive this email? (Yes or No)**
    a. **If No,** I can resend this email today. We are trying to recruit NPs in your organization for this study. Would you be willing to forward this email with the NP recruitment letter and Research Study Information Sheet to NPs in your region? (yes or no)
        i. If yes, do you have any further questions? Thank you again for your time and assistance in helping to recruit NPs for this study
        ii. If no, do you have any further questions about this study?

    b. **If Yes**, did you have an opportunity to forward the NP recruitment letter and Research Study Information Sheet to the NPs in your region? (yes or no).
        i. If yes, do you have any questions? Thank you again for your time and assistance in helping to recruit NPs for this study.
        ii. If no, do you have any questions? Would you be willing to forward this email with the NP recruitment letter and Research Study Information Sheet to NPs in your region?

Thank you again and enjoy your day!

Good-Bye.

Consent to Take Part in Research (NPs)

TITLE: Implementing and testing a cardiovascular assessment screening program (CASP) to promote healthy aging.

INVESTIGATOR(S): Jill Bruneau
SUPERVISOR: Donna Moralejo
CO-INVESTIGATORS: Catherine Donovan and Karen Parsons

You have been invited to take part in a research study. Taking part in this study is voluntary. It is up to you to decide whether to be in the study or not. You can decide not to take part in the study. If you decide to take part, you are free to leave at any time. This will not affect your employment in a regional health authority.

Before you decide, you need to understand what the study is for, what risks you might take and what benefits you might receive. This consent form explains the study.

Please read this carefully. Take as much time as you like. If you like, take it home to think about for a while. Mark anything you do not understand, or want explained better. After you have read it, please ask questions about anything that is not clear.

The researchers will:

- discuss the study with you
- answer your questions
- keep confidential any information which could identify you personally
- be available during the study to deal with problems and answer questions

4. Introduction/Background:

Cardiovascular disease (CVD), such as heart disease and stroke, are the leading cause of death in Canada and is the second leading cause of death in the province of Newfoundland and Labrador (NL). Having heart disease or a stroke may also result in long hospital stays, costly medications, and special heart procedures. Screening for heart disease early can lead to healthier lives for people as they age. In NL, screening for heart disease or stroke is not always consistently done for individuals aged 40-74 years. A screening program was developed for this study following discussions with health professionals and patients. This research will involve implementing and

evaluating this newly developed program with nurse practitioners and patients across Newfoundland and Labrador (NL) to promote healthy aging in this province.

2. Purpose of study:

To evaluate the effectiveness of a new heart health screening program called the Cardiovascular Assessment Screening Program (CASP).

3. Description of the study procedures:

NPs across NL who agree to participate in this randomized controlled trial (RCT) will be randomly assigned to one of the two groups: the intervention group or the control group. The NPs in the intervention group will be asked to recruit, from their practice, about 30 individuals, aged 40-74 who have no established heart disease. The NPs will use the CASP tools to screen the individuals, recommend follow-up actions, as well as document actions and results. The control group will carry on with usual practice. Their charts will be reviewed by the researchers once recruitment has been completed. At the end of the study, the CASP tools will be given to NPs in the control group. The NPs in both the intervention and the control groups will be asked to complete questionnaires at the beginning and the end of the study.

4. Length of time:

NPs in the intervention group will be expected to screen approximately 30 individuals at the clinic where they are employed over a time period of 4-6 weeks. The initial assessment may take up to 30 minutes. The second visit appointment may take up to 40 minutes to complete.

The NPs in the control group will carry on with usual care and identify 30 patients for participation. Once 30 patients have been identified to participate in the study, then data collection for the control group will be completed. The principal investigator will review the charts of the eligible patients in the control group.

5. Possible risks and discomforts:

There are no potential risks to participate in this study. There may be extra time associated with implementing the intervention as a NP providing care to patients.

6. Benefits:

It is not known whether this study will benefit you. To acknowledge the time and effort required to participate in this study, you will be given a VISA gift card of $100.00.

7. **Liability statement**:

Signing this form gives us your consent to be in this study. It tells us that you understand the information about the research study. When you sign this form, you do not give up your legal rights. Researchers or agencies involved in this research study still have their legal and professional responsibilities.

8. **What about my privacy and confidentiality?**

Protecting your privacy is an important part of this study. Every effort to protect your privacy will be made. However it cannot be guaranteed. For example we may be required by law to allow access to research records.

When you sign this consent form you give us permission to

- Collect information from you
- Share information with the people conducting the study
- Share information with the people responsible for protecting your safety

Access to records

The members of the research team will see health and study records that identify you by name.

Other people may need to look at the study records that identify you by name. This might include the research ethics board. You may ask to see the list of these people. They can look at your records only when supervised by a member of the research team.

Use of your study information

The research team will collect and use only the information they need for this research study.

This information will include your

- age
- sex
- number of years working as an NP
- information from study questionnaires

Your name and contact information will be kept secure by the research team in Newfoundland and Labrador. It will not be shared with others without your permission. Your name will not appear in any report or article published as a result of this study.

Information collected for this study will be kept for five years.

If you decide to withdraw from the study, the information collected up to that time will continue to be used by the research team. It may not be removed. This information will only be used for the purposes of this study.

After your part in this study ends we may also contact you at a later date in the future if further information if needed. You can contact the principal investigator (PI) to obtain a copy of the study summary and recommendations. The PI plans to do a follow-up study related to this topic in the future that would be approved by the research ethics board.

Information collected and used by the research team will be stored at MUN School of Nursing, Education Building, Room 5004, on the St. John's campus in a locked filing cabinet. Jill Bruneau is the person responsible for keeping it secure. Information on computers that are password protected and encrypted hard drives.

Your access to records
You may ask the researcher to see the information that has been collected about you.

9. **Questions or problems:**

If you have any questions about taking part in this study, you can meet with the PI who is in charge of the study. That person is:

Jill Bruneau at 709-777-7258
Or you can speak to my supervisor: Dr. Donna Moralejo 709-864-3603

Or you can talk to someone who is not involved with the study at all, but can advise you on your rights as a participant in a research study. This person can be reached through:

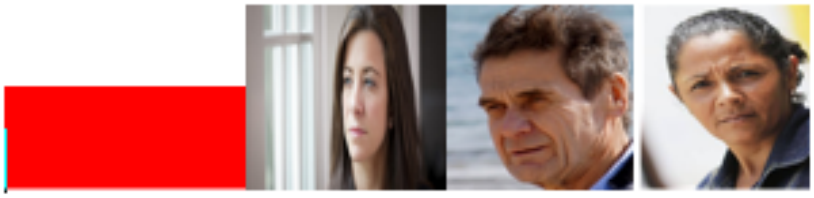
Ethics Office at 709-777-6974
Email at info@hrea.ca

This study has been reviewed and given ethics approval by the Newfoundland and Labrador Health Research Ethics Board.

After signing this consent you will be given a copy.

Patient Recruitment Poster for NP Clinics

Heart Health Research Study



Heart Health Assessment
Newfoundland & Labrador

Do you want to know *your* "heart age"?

If you are between 40-74 years old, you may qualify to participate in our study.

We are looking for volunteers to take part in a research study. There will be at least two visits with a nurse practitioner to have heart health screening and personalized management.

Complete the Heart Disease and Stroke Risk Profile today!

To hear more about this research study please talk to a nurse practitioner in your clinic today or contact a member of our research team: Jill Bruneau at 777-7258, jill.bruneau@mun.ca

Newfoundland & Labrador Centre for APPLIED HEALTH RESEARCH

ARNNL EDUCATION & RESEARCH TRUST

MEMORIAL UNIVERSITY

Heart Health Assessment Pamphlet for Patient Participants

Heart Disease and Stroke Risk Profile

1. In general, would you say that your health is:
   □ Poor □ Fair □ Good □ Very good □ Excellent?
2. Your current weight _____ height_____
3. Do you have a family history of heart disease or stroke? □Yes □No
4. Have you ever had a stroke or mini-stroke? □Yes □No
5. Have you ever had a heart attack? □Yes □No
6. Have you been told that your cholesterol is high? □Yes □No
7. Are you taking pills for your high cholesterol? □Yes □No
8. Have you been told that you have diabetes? □Yes □No
9. Have you been diagnosed with high blood pressure? □Yes □No
10. Are you currently taking prescription pills for high blood pressure? □Yes □No
11. If you take pills for high blood pressure, do you take them each day? □Yes □No
12. Have you smoked cigarettes in the past 10-15 years? □Yes □No
13. Do you smoke cigarettes or cigars every week? □Yes □No
14. Typically, do you drink alcohol every day? □Yes □No
15. Do you eat high fat, processed or fast foods every week? □Yes □No
16. Do you eat less than four servings of fruits and vegetables a day? □Yes □No
17. Do you feel overwhelmed or stressed on more than one day of the week? □Yes □No
18. Are you active for less than 20 minutes per day on most days of the week? □Yes □No
(eg. Brisk walking, active gardening, swimming, dancing, running, or biking)
19. Do you live alone? □Yes □No
20. Do you have dependents at home? □Yes □No
21. Have you used street drugs or someone else's prescription drugs recently? □Yes □No
22. Are you currently taking any prescription medications? Please list them below._____
_____
_____
23. Is there anything else that you would like to share about yourself? □Yes □No

Take action! Talk with your health care provider about your risk for heart disease or stroke

Heart Health Assessment

What is Heart Health Assessment?

Heart health assessment or screening is being offered to people in Newfoundland and Labrador over the age of 40 years who may or may not have risk factors for heart disease and stroke.

What are the risk factors for heart disease and stroke?

- High blood pressure
- High cholesterol
- Low activity levels
- Smoking
- Family history
- Stress

What Can I Expect?

- You can complete the Heart Disease & Stroke Risk Profile on the back of this pamphlet. Bring this completed form to your health care provider to share your health information.
- Your health care provider will review your heart health history and will then collect more information about you.
- The check is based on straightforward questions family history, risk factors, and measurements such as height, weight, and blood pressure.
- You will also have to get a simple blood test to measure your cholesterol level and other important tests and then come back for another appointment with your health care provider to review the results.
- If there are any warning signs, then together you can work with your health care provider to do something about it.
- Following the check, you will work to

How Do I Find Out More?

- See your health care provider to arrange your appointment today.
- For more information contact:

✓ Heart & Stroke Foundation 753-8521 www.heartandstroke.ca
✓ Dietitians of Canada www.dietitians.ca
✓ Canadian Diabetes Assoc. www.diabetes.ca
✓ Health Canada www.hc-sc.gc.ca
✓ Hypertension Canada www.hypertension.ca
✓ Physical activity www.csep.ca/guidelines
✓ Stress management www.cmha.ca
✓ Smoking www.smokershelp.net

➢ **Educating yourself and becoming a good self-manager of your health is the most important thing you can do to prevent heart disease and stroke!**

This pamphlet has been developed from research supported

Patient Consent to Take Part in Research
(Intervention)

TITLE: Implementing and testing a cardiovascular assessment screening program (CASP) to promote healthy aging.

INVESTIGATOR(S): Jill Bruneau
SUPERVISOR: Dr. Donna Moralejo
CO-INVESTIGATORS: Dr. Catherine Donovan and Dr. Karen Parsons

You have been invited to take part in a research study. Taking part in this study is voluntary. It is up to you to decide whether to be in the study or not. You can decide not to take part in the study. If you decide to take part, you are free to leave at any time. This will not affect your health care.

Before you decide, you need to understand what the study is for, what risks you might take and what benefits you might receive. This consent form explains the study.

Please read this carefully. Take as much time as you like. If you like, take it home to think about for a while. Mark anything you do not understand, or want explained better. After you have read it, please ask questions about anything that is not clear.

The researchers will:

- discuss the study with you
- answer your questions
- keep confidential any information which could identify you personally
- be available during the study to deal with problems and answer questions

2. Introduction/Background:

Heart disease and stroke is the leading cause of death in Canada and is the second leading cause of death in the province of Newfoundland and Labrador (NL). Having heart disease or a stroke may also result in long hospital stays as well as costly drugs and tests. Screening for heart disease earlier can lead to healthier lives for people as they age. A recent study explored different perspectives of health providers and patients to develop a heart health screening program for NL to promote healthy aging.

2. Purpose of study:

To evaluate the effectiveness of a new heart health screening program called the Cardiovascular Assessment Screening Program (CASP).

3. Description of the study procedures:

There are two different groups of participants in this study, the intervention group and the control group. You will be asked to participate in one of these groups. Patients in the intervention group may be asked to do the following:

1. Fill out a questionnaire about your family history of heart disease, risk factors, medical conditions, and medications that you are taking
2. Answer questions about your heart health with a nurse practitioner (NP).
3. Have a physical exam to check your heart and blood vessels.
4. Give a blood sample of about 12ml (3 tubes) and a urine sample of about 30 ml at your nearest agency or hospital.
5. Have another appointment with the nurse practitioner to get the results of blood tests/procedures.
6. Provide feedback about your experience in this study by completing a questionnaire that will be given to you by the nurse practitioner to be mailed back to the researchers.
7. Allow us to review your health record

4. Length of time:

You may be expected to come to the clinic for another appointment with the nurse practitioner over the next month. The first appointment may take about 30 minutes. The second appointment may take up to 40 minutes to complete. You will decide with the NP whether other visits are required.

5. Possible risks and discomforts:

Possible risks of being in the study are physical in terms of having a blood test done since you may bleed or have a bruise. You may also become upset from learning about a new health issue that requires further tests or treatment. If you become upset, the NP will talk with you, or we will arrange time to speak with a counsellor.

6. Benefits:

It is not known whether this study will benefit you.

7. Liability statement:

Signing this form gives us your consent to be in this study. It tells us that you understand the information about the research study. When you sign this form, you

do not give up your legal rights. Researchers or agencies involved in this research study still have their legal and professional responsibilities.

8. **What about my privacy and confidentiality?**

Protecting your privacy is an important part of this study. Every effort to protect your privacy will be made. However it cannot be guaranteed. For example we may be required by law to allow access to research records. A copy of this consent will be put in your health record.

When you sign this consent form you give us permission to

- Collect information from you
- Collect information from your health record
- Share information with the people conducting the study
- Share information with the people responsible for protecting your safety

Access to records

The members of the research team will see health and study records that identify you by name. Other people may need to look at your health records and the study records that identify you by name. This might include the research ethics board. You may ask to see the list of these people. They can look at your records only when supervised by a member of the research team.

Use of your study information

The research team will collect and use only the information they need for this research study.

This information will include your

- age
- sex
- family history
- medical conditions
- medications
- the results of tests and procedures during the study
- information from questionnaires

Your health information will be kept secure by the research team in Newfoundland and Labrador. It will not be shared with others without your permission. Your name will not appear in any report or article published as a result of this study.

Information collected for this study will be kept for five years.

If you decide to withdraw from the study, the information collected up to that time will continue to be used by the research team. Blood and urine samples will be

discarded once the tests are completed. It may not be removed. This information will only be used for the purposes of this study.

After your part in this study ends, we may continue to review your health records to check that the information we collected is correct. We may need to review your record at a later date in the future if further information if needed. You can contact the principal investigator (PI) to obtain a copy of the study summary and recommendations. We would like to follow your progress after this study and may need to contact you at a later date if you agree to participate. The PI plans to do a follow-up study related to this topic in the future that would be approved by the research ethics board.

Information collected and used by the research team will be stored in a locked file at the Memorial University School of Nursing, Education Building, Room 5004, St. John's, NL. Jill Bruneau is the person responsible for keeping it secure.

Your access to records
You may ask the researcher to see the information that has been collected about you.

9. **Questions or problems:**

If you have any questions about taking part in this study, you can meet with the investigator who is in charge of the study. That person is:

Jill Bruneau 709-864-3623
Or you can speak to my supervisor(s): Dr. Donna Moralejo 709-864-3603

Or you can talk to someone who is not involved with the study at all, but can advise you on your rights as a participant in a research study. This person can be reached through:

Ethics Office at 709-777-6974
Email at info@hrea.ca

This study has been reviewed and given ethics approval by the Newfoundland and Labrador Health Research Ethics Board.

After signing this consent you will be given a copy

Patient Consent to Take Part in Research

(Control)

TITLE: Implementing and testing a cardiovascular assessment screening program (CASP) to promote healthy aging.

INVESTIGATOR(S): Jill Bruneau
SUPERVISOR: Dr. Donna Moralejo
CO-INVESTIGATORS: Dr. Catherine Donovan and Dr. Karen Parsons

You have been invited to take part in a research study. Taking part in this study is voluntary. It is up to you to decide whether to be in the study or not. You can decide not to take part in the study. If you decide to take part, you are free to leave at any time. This will not affect your health care.

Before you decide, you need to understand what the study is for, what risks you might take and what benefits you might receive. This consent form explains the study.

Please read this carefully. Take as much time as you like. If you like, take it home to think about for a while. Mark anything you do not understand or want explained better. After you have read it, please ask questions about anything that is not clear.

The researchers will:

- discuss the study with you
- answer your questions
- keep confidential any information which could identify you personally
- be available during the study to deal with problems and answer questions

5. Introduction/Background:

Heart disease and stroke is the leading cause of death in Canada and is the second leading cause of death in the province of Newfoundland and Labrador (NL). Having heart disease or a stroke may also result in long hospital stays as well as costly drugs and tests. Screening for heart disease earlier can lead to healthier lives for people as they age. A recent study explored different perspectives of health providers and

patients to develop a heart health screening program for NL to promote healthy aging.

2. **Purpose of study:**
   To evaluate the effectiveness of a new heart health screening program called the Cardiovascular Assessment Screening Program (CASP).

3. **Description of the study procedures:**
   There are two different groups of participants in this study, the intervention group and the control group. The intervention group will have patients of NPs who are evaluating CASP and, therefore, will be asked questions, will have a physical exam, and will require blood work to be taken. The control group will have patients of NPs who will provide usual care and the health records will be reviewed. At the end of the study, the CASP tools and resources will be given to NPs in the control group. You are being asked to participate in the control group. We will be reviewing your health record for information about heart health and your visit to the NP. You will also be asked to complete a brief patient feedback questionnaire about your thoughts on heart health screening. You will be given a small token of appreciation of a $10.00 gift card by the nurse practitioner

4. **Length of time:**

   You will decide with the NP whether other visits are required.

5. **Possible risks and discomforts:**

   There are no known risks of participating in this study.

6. **Benefits:**

   It is not known whether this study will benefit you.

7. **Liability statement:**

   Signing this form gives us your consent to be in this study. It tells us that you understand the information about the research study. When you sign this form, you do not give up your legal rights. Researchers or agencies involved in this research study still have their legal and professional responsibilities.

8. **What about my privacy and confidentiality?**

   Protecting your privacy is an important part of this study. Every effort to protect your privacy will be made. However, it cannot be guaranteed. For example, we may

be required by law to allow access to research records. A copy of this consent will be put in your health record.

When you sign this consent form you give us permission to

- Collect information from you
- Collect information from your health record
- Share information with the people conducting the study
- Share information with the people responsible for protecting your safety

Access to records

The members of the research team will see health and study records that identify you by name. Other people may need to look at your health records and the study records that identify you by name. This might include the research ethics board. You may ask to see the list of these people. They can look at your records only when supervised by a member of the research team.

Use of your study information

The research team will collect and use only the information they need for this research study.

This information will include your

- age
- sex
- family history
- medical conditions
- medications
- the results of tests and procedures during the study
- information from study questionnaires

Your health information will be kept secure by the research team in Newfoundland and Labrador. It will not be shared with others without your permission. Your name will not appear in any report or article published as a result of this study.

Information collected for this study will be kept for five years.

If you decide to withdraw from the study, the information collected up to that time will continue to be used by the research team. It may not be removed. This information will only be used for the purposes of this study.

After your part in this study ends, we may continue to review your health records to check that the information we collected is correct. We may need to review your record at a later date in the future if further information if needed. You can contact the principal investigator to obtain a copy of the study summary and

recommendations. We would like to follow your progress after this study and may need to contact you later if you agree to participate. The PI plans to do a follow-up study related to this topic in the future that would be approved by the research ethics board.

Information collected and used by the research team will be stored in a locked file at the Memorial University School of Nursing, Education Building, Room 5004, St. John's, NL. Jill Bruneau is the person responsible for keeping it secure.

Your access to records
You may ask the researcher to see the information that has been collected about you.

9. **Questions or problems:**

If you have any questions about taking part in this study, you can meet with the principal investigator who is in charge of the study. That person is:

Jill Bruneau 709-777-7258
Or you can speak to my supervisor(s): Dr. Donna Moralejo 709-864-3603

Or you can talk to someone who is not involved with the study at all but can advise you on your rights as a participant in a research study. This person can be reached through:

Ethics Office at 709-777-6974
Email at info@hrea.ca

This study has been reviewed and given ethics approval by the Newfoundland and Labrador Health Research Ethics Board.

After signing this consent, you will be given a copy

Nurse Practitioner Profile Questionnaire

	NP Profile Questionnaire	Strongly Agree	Agree	Disagree	Strongly Disagree	Not Applicable
	Question	**1**	**2**	**3**	**4**	**5**
1.	It is important to screen for cardiovascular disease (CVD) in adults 40-74 years in NL.					
2.	It is important for NPs to know about clinical practice guidelines (CPGs) for CVD screening in primary care settings.					
3.	It is difficult is it to find Canadian CPGs that are focused on CVD prevention.					
4.	CVD screening is important to my clinical practice setting.					
5.	CVD screening is a priority for the regional health authority where I work.					
6.	CVD screening in accordance with the NL Choosing Wisely Campaign is important.					
7.	It is difficult to identify patients who need to be screened for CVD.					
8.	It is difficult to find time to screen patients for CVD.					
9.	It is easy to do CVD screening in daily clinical practice.					

10.	My patients collaborate with me to make decisions about improving heart health.					
11.	I can easily access CPGs for following up on the results of screening for CVD.					
12.	It is important to communicate results of screening tests to my patients.					
13.	I communicate using motivational interviewing when helping a patient to change unhealthy behaviour.					
14.	I participate in individualized goal-setting with my patients in daily clinical practice.					
15.	My patients are interested in changing unhealthy behaviours.					
16.	I participate in patient-centred care in daily clinical practice.					
17.	I believe that screening improves heart health.					
18.	I would like resources to help me screen patients for CVD.					
19.	I use a computer every day to enter patient data.					
20.	I email or text my patients information.					

21.	I send referrals to interprofessional team to optimize patient care.					
22.	I use e-consult to contact specialist physicians to optimize patient care.					
21.	I am:	Male	Female			
22.	I am in the following age category:	25-34 years	35-44 years	45-54 years	Over 55 years	
23.	I have had experience working as an NP for this time period:	Less than 5 years	More than 5 years	Between 5-10 years	Over 10 years	
24.	I attend conferences related to my NP clinical practice:	Every year	Every 2 years	Every 3-5 years	Rarely	Never

Eligibility for Heart Health Screening Form (Part A)

Identify age-eligible patients Code:

Name of clinic_____

1.	**The patient is between 40-74 years old**	☐ **Yes**	☐ **No**
2.	**The patient was given Heart Health Assessment Pamphlet**	☐ **Yes**	☐ **No**
3.	**The patient was given a consent form**	☐ **Yes**	☐ **No**

☐ **Date completed**_____

☐ **Clerk's initials**_____

Decision to Screen Form (Part B)

Decision to screen patient Code:

Name of clinic_____

The patient will have heart health screening ☐ **Yes** ☐ **No**

If going to be screened, why?

Reasons:

- □ Initiated by patient
- □ Initiated by NP
- □ Patient has one or more risk factors for CVD

  (Dyslipidemia, hypertension, family history, stress, overweight or obesity, sleep apnea, excess alcohol use, smoking, or unhealthy diet)
- □ Other reasons

_____
_____

If not going to be screened, why?

Reasons:

- □ Diagnosed cardiovascular disease (Angina, MI, Arrhythmia, CHF)
- □ Diagnosed cerebrovascular disease (previous TIA or CVA)
- □ Not interested in being screened at all
- □ Not interested in being screened today so another appointment has been arranged
- □ Recently screened (past three months)
- □ Other reasons:

☐ **Initials**_____

☐ **Date completed**_____

Tracking Form for Heart Health Screening (Intervention)

On this form, record the date, the number of patients who are between the ages of 40-74 years, and the number of Eligibility for Heart Health Screening Form As that you completed. At the end of each day, compare your clinic census with the patient's names and ages to ensure that you have captured all of the patients who are eligible to have heart health screening done.

Please place completed forms in the research study envelope located in a secure area in your manager's office. The research study envelope will be picked up at the end of the data collection period. If you have any questions about completing this form, please contact Jill Bruneau at jb4276@mun.ca. Thank you!

Tracking form Code:

Date	Number of 40-74 year old patients	# of Form As completed

Cardiovascular Screening Checklist (Intervention group)

Complete this form for patients who between the ages of 40-74 years and who have consented to participate in the Cardiovascular Assessment Screening Program.

Patient data Code:

Visit 1 **Date:_____**

Demographic data:

- □ **Gender**
  - Male_____
  - Female_____

- □ **Age** _____years

- □ **Marital status**
  - Married
  - Living with partner
  - Single
  - Divorced
  - Widowed

- □ **Sources of support (check all that apply)**
  - Spouse/partner_____
  - Family_____
  - Support group members_____
  - Coworkers_____
  - Friends_____
  - Church group_____
  - Other_____(specify)

- □ **Level of education**
  - Less than high school
  - High school diploma
  - Undergraduate degree
  - Master's degree or higher

- □ **Length of time knowing patient _____ (years)**

□ **Complete the following:**

1. **Focused cardiovascular health history**
    - □ **Family history premature coronary artery disease** (CAD) (father <55 years or mother <65 years when diagnosed)
    - □ **CV risk conditions (check all that apply)**
        - o Diabetes
        - o Hypertension
        - o Abdominal obesity
        - o Inflammatory conditions (systemic lupus erythematosus, rheumatoid or psoriatic arthritis, ankylosing spondylitis, IBD)
        - o COPD
        - o CKD
        - o Chronic HIV infection
        - o Abdominal aneurysm
        - o Erectile dysfunction
        - o Obstructive sleep apnea
        - o Eating disorders
        - o Depression and other psychiatric disorders
        - o Street drug use
        - o For women only (polycystic ovary syndrome, history of delivery of macrosomic infant, oral contraceptives, hormone replacement therapy)
    - □ **CV risk factors (check all that apply)**
        - o Dyslipidemia
        - o Psychological stress
        - o First Nations, Aboriginal, African, Hispanic, or South Asian ancestry
        - o Alcohol intake_____(daily)_____(weekly)
        - o Smoking rate_____(daily)_____(pack years)

2. **Complete the following physiological measurements:**
    - Height_____(cm)
    - Weight_____(cm)
    - Calculate BMI (use online chart)_____
    - Waist circumference measurement (see diagram and use Heart & Stroke Measuring Tape) _____cm
    - Check BP using automated device (provided)_____/_____mmHg
        - Low range (below 90/60mmHg)
        - Normal range (<130/80 mmHg (diabetes) or <140/90 mmHg)
        - High range (>130/80 mmHg (diabetes) or > 140/90 mmHg)
    - Heart rate_____ (apical)
    - Auscultate heart sounds & record any abnormalities (S3, S4, murmurs, arrhythmias) _____
    - Auscultate vascular bruits & location (eg. carotid, femoral)_____

3. At the end of Visit 1
    - Give bloodwork requisition to patient (CBC, electrolytes, LFTs, fasting lipid profile, fasting blood glucose, A1C, TSH, ACR, eGFR)
    - Arrange for a follow-up appointment

Pre-Visit 2

☐ Review patient's blood work results and highlight abnormalities to communicate with patient during Visit 2

☐ Access Framingham Score online calculator and calculate CVD risk https://www.cvdriskchecksecure.com/FraminghamRiskScore.aspx

Level of CVD risk identified for patient (global risk)

- Low risk (<10% risk of having a CV event in next 10 years)
- Moderate risk (10-20% risk of having a CV event in next 10 years)
- High risk (>20% risk of having a CV event in next 10 years)

☐ Determine “heart age” using online calculator from the Framingham Heart Study (https://www.cdc.gov/vitalsigns/cardiovasculardisease/heartage.html)

- Actual chronological age _____years
- Calculated heart age_____ years

☐ Priority areas identified by NP

1.
2.
3.

Follow-up Patient-Centred Priority Areas

Visit 2 **Date:** _____

Priority area(s) determined with patient:

1.
2.
3.
4.

Individualized goals for Healthy Heart Plan

1.
2.

3.

4.

5.

☐ Initials_____

Follow-up

☐ **Referrals to interprofessional team:**

- □ Physician_____(date)
- □ Physician specialist_____(date)
- □ Dietician_____(date)
- □ Physiotherapist_____(date)
- □ Pharmacist_____(date)
- □ Public Health Nurse/ Community Health Nurse_____(date)
- □ Diabetes team_____(date)

☐ **Further testing required**

- □ Check BP with every visit (if appropriate)
- □ 12 lead ECG (only if indicated such as arrhythmias, proteinuria, reduced pulses, or vascular bruits and consistent with Choosing Wisely NL)
- □ Echocardiogram (if abnormal heart sounds present but not previously documented, apical pulse displaced, ventricular arrhythmias)
- □ If FBG 5.6-6.0 (plus > one risk factor), A1C 5.5-5.9% **OR** FBG 6.1-6.9 and A1C 6-6.4%, then order 2 hour PG in 75g OGTT test
- □ Other _____

☐ **Lifestyle change as recommended below (or specify otherwise for individual)**

- □ Stress reduction strategies_____(sleep 7-9 hours)_____
- □ Alcohol use < 1-2 drinks/day or < 9 drinks/week for women, <14 drinks/week for men
- □ Tobacco use (cessation) _____
- □ Exercise (150 min/week vigorous moderate intensity)_____
- □ Sodium intake (<2000mg of sodium/5g of salt/day)_____
- □ Nutritionally balanced diet (low saturated fat, high fibre intake, whole grain cereals, low glycemic index foods, more fruits and vegetables, lean meats or alternatives (peas, beans and lentils), polyunsaturated and monounsaturated oils, Omega 3 fatty acids, avoid trans fats _____
- □ Obesity (non-judgmental approach, consult RD for counseling, if BMI > 35 with other comorbidities, bariatric surgery may be considered)_____
- □ Other recommendations_____

☐ **Counselling on behavior change**

- □ Use motivational interviewing_____
- □ Self-management_____

☐ **Did you access any of the following resources or recommend any of these resources for this patient? (Check all that apply)**

- □ Heart Health Screening Website/App
- □ Smoker's Help Line www.smokershelp.net
- □ Carrot Reward Program https://www.carrotrewards.ca/en/
- □ NL Health Eating Resource www.healthyeatingnl.ca/about
- □ Heart & Stroke Foundation www.heartandstroke.ca
- □ Dietitians of Canada www.dietitians.ca
- □ Canadian Diabetes Association www.diabetes.ca
- □ Health Canada www.hc-sc.gc.ca
- □ Hypertension Canada www.hypertension.ca
- □ Physical Activity guidelines www.csep.ca/guidelines

- □ Canadian Mental Health Association www.cmha.ca
- □ C-CHANGE Guideline www.preventioninhand.com

☐ **Did you prescribe any of the following medications?**

- □ None
- □ Beta blocker
- □ Calcium channel blocker
- □ Ace inhibitor or ARB
- □ Diuretic
- □ Statin (LDL < 2.0 or 50% reduction with treatment)
- □ Antiplatelet (only if chronic stable angina, remote PCI, or CABG)
- □ Oral hypoglycemic agents or insulin
- □ Other_____

☐ **Follow-up appointments scheduled?**

- □ Appointment date_____(date)
- □ Appointment date_____(date)

☐ Initials_____

Record of Potential Participants (Control)

On this form, record the date that your patients were seen in the clinic. Indicate whether your patient is between 40-74 years of age and whether he/she has diagnosed CVD (coronary heart disease, peripheral vascular disease, abdominal aortic aneurysm). Then, record whether the patient is eligible to participate in the research study. If patient is eligible and has provided consent to participate in the study, record the patient's MCP number. Please place completed forms in the research study envelope located in a secure area in your manager's office. The research study envelope will be picked up by the researcher. If you have any questions about completing this form, please contact Jill Bruneau at jb4276@mun.ca. Thank you!

Date *(DD/MM/YYYY)*	**Patient between 40-74 years old** *(Yes or No)*	**Patient has established CVD (atherosclerosis)** *(Yes or No)*	**Patient is eligible to participate in the study** *(Yes or No)*	**Patient MCP #** *(Record MCP# only after patient has consented to participate in the study)*

Chart Review Form (Control)

Patient information Code:

Date:_____

1. Demographic data

- □ **Gender**
  - Male_____
  - Female_____

- □ **Age** _____years

- □ **Marital status**
  - Married
  - Living with partner
  - Single
  - Divorced
  - Widowed

- □ **Sources of support (check all that apply)**
  - Spouse/partner_____
  - Family_____
  - Support group members_____
  - Coworkers_____
  - Friends_____
  - Church group_____
  - Other_____(specify)

- □ **Level of education**
  - Less than high school
  - High school diploma
  - Undergraduate degree
  - Master's degree or higher

Patient assessment

2. History & physical (key findings identified by NP)

3. Was the patient's blood pressure checked? ☐ Yes ☐ No
   If yes, what was the reading?

4. Were blood tests ordered by the NP? ☐ Yes ☐ No
   If yes, which ones were ordered?

5. Was the Framingham Risk Score calculated? ☐ Yes ☐ No
   If yes, what was the result?

6. Were any patient priority areas identified by the NP? ☐ Yes ☐ No
   If yes, which ones?

Follow-up

7. Were further tests ordered by the NP? ☐ Yes ☐ No
   If yes, what was ordered?

8. Were any referrals made to other healthcare providers? ☐ Yes ☐ No
   If yes, what referrals were made?

9. Were recommendations made by the NP? ☐ Yes ☐ No

   If yes, list recommendations.

10. Were any new medications prescribe? ☐ Yes ☐ No

    If yes, what was prescribed?

11. Other comments?

☐ Initials_____

Nurse Practitioner Feedback Questionnaire (Intervention)

For questions 1-19, please mark an X in the appropriate space to indicate whether or not you *Strongly Agree*, *Agree*, *Disagree,* or *Strongly Disagree* with the following statements. If you have not used these tools or resources, please indicate by placing an X in the column *Not Applicable.* For questions 20-37, please make your comments in the space provided. Thank you.

		Strongly Disagree	**Disagree**	**Agree**	**Strongly Agree**	**Not Applicable**
	Question	**1**	**2**	**3**	**4**	**5**
1.	It is important to screen for cardiovascular disease (CVD) in adults 40-74 years in NL.					
2.	It is important for NPs to know about clinical practice guidelines (CPGs) for CVD screening in primary care settings.					
3.	It is difficult is it to find Canadian CPGs that are focused on CVD prevention.					
4.	CVD screening is important to my clinical practice setting.					

		Strongly Disagree	Disagree	Agree	Strongly Agree	Not Applicable
5.	CVD screening is a priority for the regional health authority where I work.					
6.	CVD screening in accordance with the NL Choosing Wisely Campaign is important.					
7.	It is difficult to identify patients who need to be screened for CVD.					
8.	It is difficult to find time to screen patients for CVD.					
9.	It is easy to do CVD screening in daily clinical practice.					
10.	My patients collaborate with me to make decisions about improving heart health.					

		Strongly Disagree	Disagree	Agree	Strongly Agree	Not Applicable
11.	I can easily access CPGs for following up on the results of screening for CVD.					
12.	It is important to communicate results of screening tests to my patients.					
13.	I communicate using motivational interviewing when helping a patient to change unhealthy behaviour.					
14.	I participate in individualized goal-setting with my patients in daily clinical practice.					
15.	My patients are interested in changing unhealthy behaviours.					
16.	I participate in patient-centred care in daily					

		Strongly Disagree	Disagree	Agree	Strongly Agree	Not Applicable
	clinical practice.					
17.	I believe that screening improves heart health.					
18.	I would like resources to help me screen patients for CVD.					
19.	I spoke with the patient about the screening test results.					
20.	My Healthy Heart Plan was useful to focus on what the patient needed to do.					
21.	I will discuss My Healthy Heart Plan with my patients at future appointments.					
22.	How would you describe your experience with using the screening program overall?					

		Strongly Disagree	Disagree	Agree	Strongly Agree	Not Applicable
23.	Did you find the training process prior to implementation helpful? Why or why not?					
24.	Did you have support from your organization to implement the screening process?					
25.	Did the patients collaborate with you throughout the screening process?					
26.	Were the patients engaged in setting individualized goals during implementation of the screening program?					
27.	Do you feel that the therapeutic relationship with your patients has improved					

		Strongly Disagree	Disagree	Agree	Strongly Agree	Not Applicable
	following implementation of the screening program? Why or why not?					
28.	What was the easiest part of the screening program to implement?					
29.	What was the most difficult part of the screening program to implement?					
30.	Do you have any suggestions to improve the screening program?					
31.	Do you feel that there is benefit for the extra time that you spent implementing the screening program?					
32.	Do you believe that screening improves heart health? Why or why not?					
33.	Is it easier to screen patients					

		Strongly Disagree	Disagree	Agree	Strongly Agree	Not Applicable
	for CVD following implementation of the program? Please explain.					
34.	Do you feel satisfied with the care provided to patients during implementation of this program? Why or why not?					
35.	Have you received positive feedback from your patients about participating in the screening program? Please explain.					
36.	Would you recommend family and friends to participate in this screening program? Why or why not?					

Nurse Practitioner Feedback Questionnaire (Control)

For questions 1-3, please mark an X in the appropriate space to indicate whether or not you *Strongly Agree*, *Agree*, *Disagree,* or *Strongly Disagree* with the following statements. If you have not used these tools or resources, please indicate by placing an X in the column *Not Used.* For questions 4-14, please make your comments in the space provided. Thank you.

			Strongly Disagree	**Disagree**	**Agree**	**Strongly Agree**	**Not Applicable**
		Question	**1**	**2**	**3**	**4**	**5**
1.		It is important to screen for cardiovascular disease (CVD) in adults 40-74 years in NL.					
2.		It is important for NPs to know about clinical practice guidelines (CPGs) for CVD screening in primary care settings.					
3.		It is difficult is it to find Canadian CPGs that are focused on CVD prevention.					
4.		CVD screening is important to my clinical practice setting.					
5.		CVD screening is a priority for the regional					

			Strongly Disagree	Disagree	Agree	Strongly Agree	Not Applicable
		health authority where I work.					
6.		CVD screening in accordance with the NL Choosing Wisely Campaign is important.					
7.		It is difficult to identify patients who need to be screened for CVD.					
8.		It is difficult to find time to screen patients for CVD.					
9.		It is easy to do CVD screening in daily clinical practice.					
10.		My patients collaborate with me to make decisions about improving heart health.					
11.		I can easily access CPGs for following up on the results of screening for CVD.					

			Strongly Disagree	Disagree	Agree	Strongly Agree	Not Applicable
12.		It is important to communicate results of screening tests to my patients.					
13.		I communicate using motivational interviewing when helping a patient to change unhealthy behaviour.					
14.		I participate in individualized goal-setting with my patients in daily clinical practice.					
15.		My patients are interested in changing unhealthy behaviours.					
16.		I participate in patient-centred care in daily clinical practice.					
17.		I believe that screening improves heart health.					
18.		I would like resources to help me screen					

			Strongly Disagree	Disagree	Agree	Strongly Agree	Not Applicable
		patients for CVD.					
19.		The Record of Potential Participant Form was useful tool to gather information about the patient.					
20.		The researchers were able to answer questions that I had about the study.					
21.		I usually speak with the patients about the screening test results.					
22.		Do your patients collaborate with you to make decisions about improving heart health?					
23.		Would you be interested in resources to help you screen patients for CVD? Why or why not?					
24.		Were patients interested in engaging in changing unhealthy behaviours?					

			Strongly Disagree	**Disagree**	**Agree**	**Strongly Agree**	**Not Applicable**
25.		Did you find the training process prior to participating in the study helpful? Why or why not?					
26.		What type of support do you have from your organization to participating in the study?					
27.		How would you describe your experience with participating in the study overall?					
28.		What was the easiest part of being involved with the study?					
29.		What was the most difficult part of being involved with the study?					
30.		Do you have any suggestions to improve the study?					
31.		Do you believe that screening improves heart					

			Strongly Disagree	**Disagree**	**Agree**	**Strongly Agree**	**Not Applicable**
		health? Why or why not					
32.		Would you recommend family and friends to participate in a screening program? Why or why not?					

Patient Feedback Questionnaire (Intervention)

For questions 1-11, please mark an X in the appropriate space to indicate whether or not you **Strongly Agree, Agree, Disagree, or Strongly Disagree** with the following statements. If you have not used these resources or does not apply to your circumstances, please indicate by placing an X in the column **Not Applicable**. For questions 12-13, please make comments in the space provided. Thank you.

		Strongly Agree	**Agree**	**Disagree**	**Strongly Disagree**	**Not Applicable**
	Question	**1**	**2**	**3**	**4**	**5**
1.	The Heart Health Assessment Pamphlet was easy to complete.					
2.	The Heart Health Assessment Pamphlet informed me about my risk factors for heart disease and stroke					
3.	Completing the Heart Health Assessment Pamphlet made me feel anxious.					
4.	Completing the Heart Health Assessment Pamphlet was easy to do.					
5.	The nurse practitioner spoke to me about my risk factors for heart disease and stroke.					
6.	The nurse practitioner gave me helpful information about how to lower my risk for heart					

		Strongly Agree	Agree	Disagree	Strongly Disagree	Not Applicable
	disease and stroke.					
7.	I spoke with the nurse practitioner about my screening test results					
8.	I will talk with the nurse practitioner about My Healthy Heart Plan at my next visit.					
9.	My Healthy Heart Plan helped me to focus on what I needed to do.					
10.	The information on the Heart Health Screening Website was helpful to me.					
11.	I would recommend my family and friends have this type of screening done. If yes, go to question 12. If no, go to question 13.					
12.	Why would you recommend this screening program? Please explain.					
13.	Why would you **not** recommend this screening program? Please explain.					

Patient Feedback Questionnaire (Control)

For questions 1-11, please mark an X in the appropriate space to indicate whether or not you **Strongly Agree, Agree, Disagree, or Strongly Disagree** with the following statements. If this does not apply to your circumstances, please indicate by placing an X in the column **Not Applicable**.

	Strongly Agree	**Agree**	**Disagree**	**Strongly Disagree**	**Not Applicable**
Question	**1**	**2**	**3**	**4**	**5**
The nurse practitioner spoke to me about my risk factors for heart disease and stroke.					
The nurse practitioner gave me helpful information about how to lower my risk for heart disease and stroke.					
I spoke with the nurse practitioner about my screening test results.					
I am interested in participating in a heart health screening program.					
I am interested in learning more about making changes to improve my heart health.					

THE END