The Association between Cardiovascular Risk Factor Screening & Health Behaviours: A Rapid Review of the Evidence

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Key Take Home Messages

- There is insufficient high-quality evidence to suggest that the addition of one-time cardiovascular risk factor screening (e.g., cholesterol and blood pressure screening) in a community setting (e.g., workplaces) will lead to an improvement in health behaviours (e.g., dietary and exercise behaviours).
- One-time screening for cardiovascular risk factors cannot be considered therapeutic, but possibly as an educational tool; there is a poor predictive value for one-time screening of total cholesterol and blood pressure.
- Across both reviews, there was minimal follow-up of study participants; the majority of the follow-up was short-term (e.g., a few months post-intervention) and the impact of screening for cardiovascular risk factors on long-term health behaviours is unclear.
- There is some evidence to indicate low adherence with follow-up to see a doctor among those screened for total cholesterol and identified as at risk.
- There is potential for those screened as negative (e.g., normal cholesterol) to fall under the false pretence that they do not need to start or continue to engage in healthy behaviours (i.e., the 'certificate of health' effect).
- Individual screening for cardiovascular risk factors is a primary care responsibility.
- The lack of high-quality evidence regarding the impact of cardiovascular risk factor screening on health behaviours provides further support for the decision made to discontinue the HeartMobile program, and a screening component will not be included in the *Comprehensive Workplace Health Model* at this time.

Executive Summary

Issue & Context
In operation from 1992 to August 2010 through the Workplace Health Team, the HeartMobile (HM) program provided cardiovascular disease risk factor screening (i.e., screening for total cholesterol, body mass index (BMI) and blood pressure) for working adults in Peel. In 2010 the Workplace Health Team adopted the *Comprehensive Workplace Health Model,* which includes strategies such as an *Employee Health and Needs Assessment* (EHNA), education and policies for supportive environments. However, it was unclear as to whether individual screening for cardiovascular risk factors should be included as an assessment component of ongoing and future workplace health initiatives.

Research Question
Does screening for cardiovascular risk factors improve health behaviours or health-promoting behaviours among adults?

Literature Search
A systematic search of the literature was conducted through the Ovid search engine platform and selection of the MEDLINE database. The search strategy retrieved 18 results, of which one systematic review was deemed relevant; an additional relevant systematic review, which had yet to be indexed, was retrieved through a scan of Google Scholar. In total, 2 relevant systematic reviews were retrieved.

Critical Appraisal & Findings
The Critical Appraisal Skills Programme (CASP) tool for systematic reviews was used to appraise the quality of the two systematic reviews. One systematic review was appraised as

moderate quality, and the other as strong quality. The evidence from both reviews suggests that screening for cardiovascular risk factors has a positive impact on health or health-promoting behaviours. However, the critical appraisal process revealed many methodological limitations to the reviewed evidence, as well as unanswered questions and major gaps in the research. Therefore based on the evidence, it was determined that it would be premature to recommend the addition of cardiovascular risk factor screening to the *Comprehensive Workplace Health Model*.

Applicability and Transferability

Throughout the applicability and transferability meeting, staff discussed the role of screening for cardiovascular risk factors as a potential component of the *Comprehensive Workplace Health Model*. In light of the poor predictive value of one-time screening for factors such as blood pressure and total cholesterol, staff agreed that one-time screening in workplaces can only be considered educational, not therapeutic. Staff also identified additional considerations (e.g., training needs and areas for future research) for moving forward with the new comprehensive approach to workplace health.

Conclusion

In light of the appraised evidence (i.e., insufficient high-quality evidence) as well as the factors discussed in the applicability and transferability meeting, the Workplace Health Team will not include a cardiovascular risk factor screening component in the *Comprehensive Workplace Health Model* at this time.

The Workplace Health team will continue to adapt and enhance the new comprehensive approach to workplace health through ongoing review and consideration of research evidence, as well as input from stakeholders (e.g., companies) and staff.

1 Context & Issue

Cardiovascular diseases are the most common cause of mortality among Canadians (1). In 2006/2007, approximately 5% and 1.5% of Peel residents aged 20 and older received treatment for ischaemic heart disease and stroke, respectively (1). Associated risk factors for heart disease include physical inactivity, tobacco use, overweight and obesity, and high blood cholesterol (1).

The Peel Health Workplace Health Team provided screening for cardiovascular disease (CVD) risk factors (i.e., total cholesterol, body mass index (BMI), blood pressure) for working adults in Peel, from 1992 to 2010, through the HeartMobile (HM) Program. Based on data from 2005-2009, the HM Program reached an average of 64 workplaces and 3020 participants annually; with an average annual cost to run the program during this time of approximately $120,000-$130,000 and an average cost of $43 per participant. A formal outcome evaluation of the HM Program has not been completed and likely would not be possible due to very limited data on various outcome measures, such as awareness and knowledge of cardiovascular risk factors, as well as participant follow-up with their primary care health professional (e.g., family physician). A final decision was made in August 2010 to discontinue the HM Program for various reasons.

In moving forward, the Workplace Health Team adopted the *Comprehensive Workplace Health Model* in order to assist workplaces in creating supportive environments that promote health and prevent chronic disease. The *Comprehensive Workplace Health Model* addresses three key elements of health: organizational culture (i.e., social environment), occupational health and

safety (i.e., physical environment), and personal health practices[1]. The model includes strategies such as an *Employee Health and Needs Assessment*[2] (EHNA) and *Organizational Needs Assessment* (ONA), education for employers and employees, and policies for supportive environments.

In light of the adoption of the *Comprehensive Workplace Health Model*, there was discussion regarding whether the screening component of the HM program should carry forward into future workplace health initiatives. It was unclear as to whether one-time individual screening for cardiovascular risk factors should be included as an assessment component of the model. The current review examines the evidence of the impact of screening for cardiovascular risk factors on health (or health-promoting) behaviours (e.g., modifications to diet) among adults.

[1] Health Canada initially developed the three-pronged approach to healthy workplaces; the model was subsequently modified and adopted by the National Quality Institute, to form the basis for the Canada Awards for Excellence, Healthy Workplace.

[2] The Employee Health and Needs Assessment (EHNA) is a tool that will be administered to employees to identify behaviours that may increase risk for chronic disease; employees will receive a report with health messages. Employers will also take part in the Organizational Needs Assessment (ONA) and will then receive aggregate information about the health of their employees and organization in order to develop a comprehensive workplace health plan.

2 Anecdote

In August 2010, the manager and supervisor of the Workplace Health Team met with the Medical Officer of Health, Dr. Mowat, to discuss options for both continuing and discontinuing the HM Program. A final decision was made (for various reasons) to discontinue the HM Program.

Throughout the discussion, questions were raised regarding the screening component of the HM program and whether screening should be included in future workplace health initiatives (e.g., the HRA component of the comprehensive workplace health approach). In particular, questions were raised concerning the strength of the evidence regarding various CVD screening measures. For example:

- *Are total cholesterol, BMI and blood pressure valid indicators of cardiovascular morbidity and mortality?*
- *Among individuals who undergo these screening measures, what proportion will follow-up with a physician, what proportion will receive treatment, and of those that are treated, how many will survive?*
- *Is providing individualized screening to Peel residents in alignment with a population health approach?*

Dr. Mowat requested that a literature review be completed to explore some of these questions. With an aim to investigate these questions and inform ongoing and future workplace health initiatives, this report focuses on the impact of screening for cardiovascular risk factors on health behaviours (e.g., modifications to diet) or health-promoting behaviours among adults.

3 Research Question

The research question for the current literature review is: 'Does screening for cardiovascular risk factors improve health behaviours or health-promoting behaviours among adults?' Refer to the conceptual model in Appendix A. The research question can be described in the PICO format, as follows:

Population (P) =	Adults (aged 18-65 years)
Intervention (I) =	Screening for cardiovascular risk factors
Control/Comparison (C) =	No screening
Outcome (O) =	Health behaviours, health-promoting behaviours

3.1 Search Strategy

The literature search was conducted systematically using the Ovid search engine platform, with selection of the MEDLINE database. The search strategy included the Medical Subject Heading (MeSH) 'Mass Screening', and both MeSH and text words were applied for all three screening measures (i.e., total cholesterol, blood pressure, BMI), as well as for relevant outcomes (e.g., health behaviours). Refer to Appendix B for the search strategy.

Inclusion criteria for the search were systematic reviews and meta-analyses, including the Cochrane Database of Systematic Reviews, and articles published in the year 2000 and later. Exclusion criteria were single studies and articles published prior to the year 2000. No language or geographic restrictions were placed on the search.

The search strategy retrieved 18 results, and one systematic review was identified as relevant based on a review of titles and abstracts. Relevance criteria were established based on the PICO, and include: a focus on screening as the primary intervention (i.e., not just one component of a larger, multi-faceted intervention), and that screening specifically for cardiovascular disease was examined for its impact on health or health-promoting behaviours (e.g., review not relevant if it only included screening for early detection of cancer).

An additional systematic review that met inclusion and relevance criteria was retrieved through an informal scan of *Google Scholar*. This scan was conducted during the 'test' PICO phase, whereby several PICO questions were examined as potential research questions for the current literature review. This review was not retrieved through the OVID-Medline search because it was published online in 2010 and was not indexed at the time the search was conducted.

In total, 2 relevant systematic reviews (2, 3) were retrieved through the search strategy. Refer to the literature search flowchart in Appendix C.

4 Critical Appraisal & Synthesis of Findings

4.1 Critical Appraisal Tools

The Critical Appraisal Skills Programme (CASP) tool for systematic reviews (‘*10 questions to help you make sense of reviews’*) was used to assess and document the quality of the two systematic reviews. In addition, the healthevidence.ca quality assessment tool for review articles and its accompanying dictionary were referred to and used to inform the critical appraisal process. The three final questions in the CASP tool (i.e., questions 8-10) were not discussed as part of the critical appraisal as they are specific to the subsequent applicability and transferability stage of the literature review process.

4.2 Systematic Review # 1: Deutekom et al.

The systematic review by Deutekom et al. examined seven randomized controlled trials (RCTs) related to the impact of risk factor screening and screening for early detection of disease on health behaviours among healthy adults aged 18 and older (2). Four of the seven RCTs focused on screening for cardiovascular disease risk factors (e.g., cholesterol) (2). Health behaviour outcomes across the primary studies included smoking habits, diet, exercise, alcohol consumption and adherence to guidelines for healthy living (2).

Deutekom et al. examined changes in health behaviour outcomes across primary studies from baseline to follow-up within intervention (i.e., screened or received screening results) and control groups (i.e., not screened or did not receive screening results) (2). Overall, the authors reported that trials on risk factor screening indicated a positive impact on health behaviour outcomes,

while the evidence on early detection of disease screening was too limited to conclude its impact on health behaviour outcomes (2). Refer to Appendix D for the details of the systematic review in the form of a data extraction table.

The systematic review by Deutekom et al. (2) was critically appraised as moderate quality. Although the review is recent (i.e., published in 2010), relevant (e.g., focused on healthy adults aged 18 and older) and includes highly rigorous primary studies (i.e., RCTs), there were concerns related to the methodology used by the authors in conducting the systematic review. The most significant of these concerns is that the authors did not identify or describe a quality assessment of the primary studies included in the review. Consequently, low quality primary studies may have been included in the review and influenced the overall conclusions. Additional concerns identified in the critical appraisal process relate to the authors' search strategy, as they did not search for unpublished studies, and limited their search to health-related databases. The authors' interpretation of the data may also be slightly misleading because although they note that the trials on risk factor screening suggest positive impacts on health behaviour outcomes, they neglect to mention there are an equal number of risk factor screening trials that showed *no difference* between the screened and unscreened group. Therefore, the potential for a neutral effect of screening for cardiovascular risk factors on health behaviour outcomes must be taken into consideration.

4.3 Systematic Review # 2: Bankhead et al.

The systematic review by Bankhead et al. aimed to examine the effects of cholesterol, breast cancer and cervical cancer screening on actual or intended health-promoting behaviours and

health-related beliefs (3). All study types were considered for the systematic review (i.e., experimental and observational), and a total of 174 articles were included (3). Relevant to the current literature review, health outcomes that were examined across all three screening types included those related to: diet, exercise, smoking cessation, weight change, and subsequent use of health services (i.e., adherence with follow-up) (3). Overall, the breast and cervical screening studies included fewer relevant health outcomes to the current literature review than the cholesterol screening studies. All relevant outcomes across the three screening types were considered in the critical appraisal process.

Bankhead at al. classified outcomes across primary studies as either beneficial or detrimental to health (3). The authors report that overall, positive associations were observed between all three screening types and health behaviours and beliefs, except for recommended follow-up after screening (e.g., adherence with follow-up to see a doctor) (3). Specifically for cholesterol screening, the evidence indicates a positive impact on diet, activity, and weight-related behaviours, and this was further substantiated with overall reductions in cholesterol levels among those diagnosed with high or moderately high cholesterol levels (3). However, the authors report inconsistent evidence for the effect of cholesterol screening on smoking cessation, and generally low adherence rates ($\leq 60\%$) with follow-up to see a doctor among participants with positive screens (3). Regarding the outcomes relevant to the current literature review, positive associations were observed for both breast cancer screening (e.g., diet, exercise, alcohol use, smoking) and cervical cancer screening (e.g., use of GP/health services, diet, exercise) (3); however, there were limited studies focused on cervical cancer screening that assessed relevant

outcomes. Refer to Appendix D for the details of the systematic review in the form of a data extraction table.

Numerous methodological limitations of the primary studies included in the Bankhead et al. review should be considered when interpreting the above results. The majority of studies included in the review are of an observational design (e.g., cohort studies) and limitations inherent to observational studies must be taken into account when applying the findings to program decisions. In particular, the authors emphasize the unclear temporal (i.e., cause and effect) relationship between screening and health behaviour outcomes (3). The majority of the breast cancer and cervical cancer screening studies collected information on screening and health behaviours concurrently due to a retrospective study design, and among the prospective studies, many did not collect baseline measures (3). Bankhead et al. caution readers to interpret the findings with caution, due to the limitations (e.g., bias and confounding variables) of cohort study designs (3). For example, across the cholesterol screening studies limitations include: voluntary participation (i.e., self-selection bias); heightened publicity of cholesterol screening during the time of the studies (i.e., potential confounder); lack of validity and reliability of tools used to measure behaviour change; inaccuracies of self-reports; and lack of comparisons across cultural and socio-demographic groups (i.e., limited generalizability) (3).

The systematic review by Bankhead et al. was critically appraised as strong quality. Although there are numerous methodological limitations of the primary studies included in the review, the authors demonstrated rigorous methods in conducting the systematic review. In particular, clear and systematic methods were described for selecting eligible studies and for conducting a quality

assessment of the included studies. Furthermore, detailed descriptions of all primary studies were provided in the appendices of the review, and the authors described at length the methodological concerns and limitations that should be taken into account when interpreting the results.

4.4 Overall Synthesis & Evidence Recommendation

In summary, the evidence from both reviews suggests that screening for cardiovascular risk factors has a positive impact on health or health-promoting behaviours (e.g., improved dietary and exercise behaviours) (2, 3). The evidence on the impact of screening for early detection of disease on health behaviours is generally limited to observational studies with many methodological limitations (2, 3).

Through the critical appraisal process, the Deutekom et al. (2) review was rated as moderate quality, and the Bankhead et al. (3) review was rated as strong quality. Although the Deutekom et al. (2) review is current and includes primary studies of the highest level of evidence (i.e., RCTs), there are concerns with the methods used by the authors in conducting the review, and the review is limited to seven trials. Bankhead et al. (3) demonstrated high quality methodology in conducting their review; however their findings must be interpreted with caution because of the inherent limitations of the included study designs (e.g., observational studies). Further investigation is also required on the many unanswered questions and concerns related to the evidence on cardiovascular risk factor screening, including:

- Majority of primary studies focused solely on cholesterol screening; the impact of screening for blood pressure and BMI on health behaviours is unclear.

- Variations in how screening 'status' is defined (e.g., screened versus not screened; screened and received results versus screened and did not receive results) (2, 3).
- Wide range and large variation in participant socio-demographics and settings across primary studies; creates difficulty in determining generalizability of results.
- Variations in the interventions offered (e.g., the extent of lifestyle-related education or counselling provided along with the screening).
- Limited evidence regarding the impact of cardiovascular risk factor screening on long-term health behaviours; the majority of the primary studies had a follow-up time of less than one year, many of which had a follow-up of only a few months post screening.
- Limited evidence examining the impact of screening on those that receive desirable results (e.g., potential unintended consequences - 'certificate of health' effect) (2, 3).
- Limited qualitative research to comprehensively examine the psychological impacts and potential unintended consequences of risk factor screening (3).
- Limited studies that explore a wide range of health behaviours, and large variations in how health behaviours are defined and measured (2, 3).

In light of the concerns listed above, the limitations outlined for each systematic review, as well as the results of the critical appraisal process, an evidence-based recommendation was developed.

Evidence Recommendation: There is insufficient high-quality evidence to suggest that the addition of one-time cardiovascular risk factor screening (e.g., cholesterol screening) in a community setting (e.g., workplaces) will lead to an improvement in health behaviours (e.g., diet

and exercise behaviours). Based on the reviewed and appraised evidence, it would be premature to recommend the addition of screening for cardiovascular risk factors (i.e., cholesterol, blood pressure, BMI) to the current *Comprehensive Workplace Health Model*.

5 Applicability & Transferability

The applicability and transferability meeting was held on December 15th, 2010; it was facilitated by Lori Greco (Knowledge Broker) and included participation from senior management as well as the majority of staff from the Workplace Health Team. The applicability and transferability worksheet, adapted from the National Collaborating Centre for Methods and Tools (NCCMT), was used to guide the discussion.

Although the current review is focused on the role of cardiovascular risk factor screening in improving health behaviours, much of the initial discussion of the applicability and transferability meeting was concerning the HM program. However, relevant and informative discussion occurred regarding the consideration of screening as an element of ongoing and future workplace health initiatives. This discussion is highlighted throughout the current section.

The Workplace Health Team staff noted that workplaces are asking for programs and services that are 'hands-on' and tangible; therefore screening for cardiovascular risk factors would likely be welcomed and accepted by workplaces. Staff also expressed that one-time screening for risk factors such as blood pressure and cholesterol is a service often offered to companies (e.g., through external vendors); offering screening for cardiovascular risk factors may be an effective way to initially engage companies.

The role of one-time screening for cardiovascular risk factors as a component of the *Comprehensive Workplace Health Model* was further discussed. There is a poor predictive value

for one-time screening of blood pressure and total cholesterol. The group agreed that one-time screening in workplaces cannot be considered therapeutic, but possibly an educational tool. The comprehensive model already includes educational and awareness building strategies which are likely more cost-effective than screening. There may be significant costs associated with screening working adults in Peel (e.g., equipment and trained staff) and therefore its cost-effectiveness, in light of the limited research, should be questioned.

In regards to the evidence gathered for the current review, staff expressed increased confidence in their ability to explain program and service delivery decisions to stakeholders. They also identified that there is likely to be increased political acceptability for program decisions that are supported by evidence.

In light of the new comprehensive approach to workplace health, staff expressed needs for additional training and skill development in the areas of long-term program planning, consultation and evaluation. In addition, key considerations for moving forward include: to determine the 'hook' required to engage workplaces in the comprehensive approach; and further exploration of the literature in various topic areas (e.g., nutrition, stress, physical activity).

6 Final Recommendations & Next Steps

Considering the evidence recommendation outlined in section 5.4 (i.e., insufficient high-quality evidence) as well as the factors discussed in the applicability and transferability meeting, the Workplace Health Team will not add a cardiovascular risk factor screening component to the *Comprehensive Workplace Health Model* at this time. The key factors used to inform the final decision are the following:

- There is very weak evidence to support the use of one-time individual screening for cardiovascular risk factors to improve health behaviours.
- Across both reviews, there was minimal follow-up of study participants; the majority of the follow-up was short-term (e.g., a few months post-intervention) and the impact of screening for cardiovascular risk factors on long-term health behaviours is unclear.
- There is some evidence to indicate low adherence with follow-up to see a doctor among those screened for total cholesterol and identified as at risk (i.e., high or moderately high cholesterol levels).
- There is potential for those screened as negative (e.g., normal cholesterol) to fall under the false pretence that they do not need to start or continue to engage in healthy behaviours (i.e., the 'certificate of health' effect).
- There is a poor predictive value for one-time screening of total cholesterol and blood pressure; concern regarding the validity of the screening measures (e.g., false positives).
- One-time screening for cardiovascular risk factors cannot be considered therapeutic.
- Individual screening for cardiovascular risk factors is a primary care responsibility.

Moving forward, the Workplace Health team will continue to adapt and enhance the new *Comprehensive Workplace Health Approach* as they move forward with a shift in thinking about workplaces as determinants of health. This will be accomplished through the following considerations:

- Determine and effectively promote the 'hook' as well as the 'value added' and sustainability aspects of the *Comprehensive Workplace Health Model*.
- Ensure staff training needs are met to ensure quality service delivery of the *Comprehensive Workplace Health Model* (i.e. training related to planning, consultation, evaluation and evidence-informed decision making).
- Identify additional research questions and examine research, as needed, related to workplace health programs and policies across a variety of topic areas (i.e., nutrition, physical activity, stress management), as per the Peel Health 10-year strategic plan.
- Integrate programs and policies within the Comprehensive Workplace Health Model based on priority areas (e.g., sub-groups, topics), identified through research and through consultation with workplaces.

References

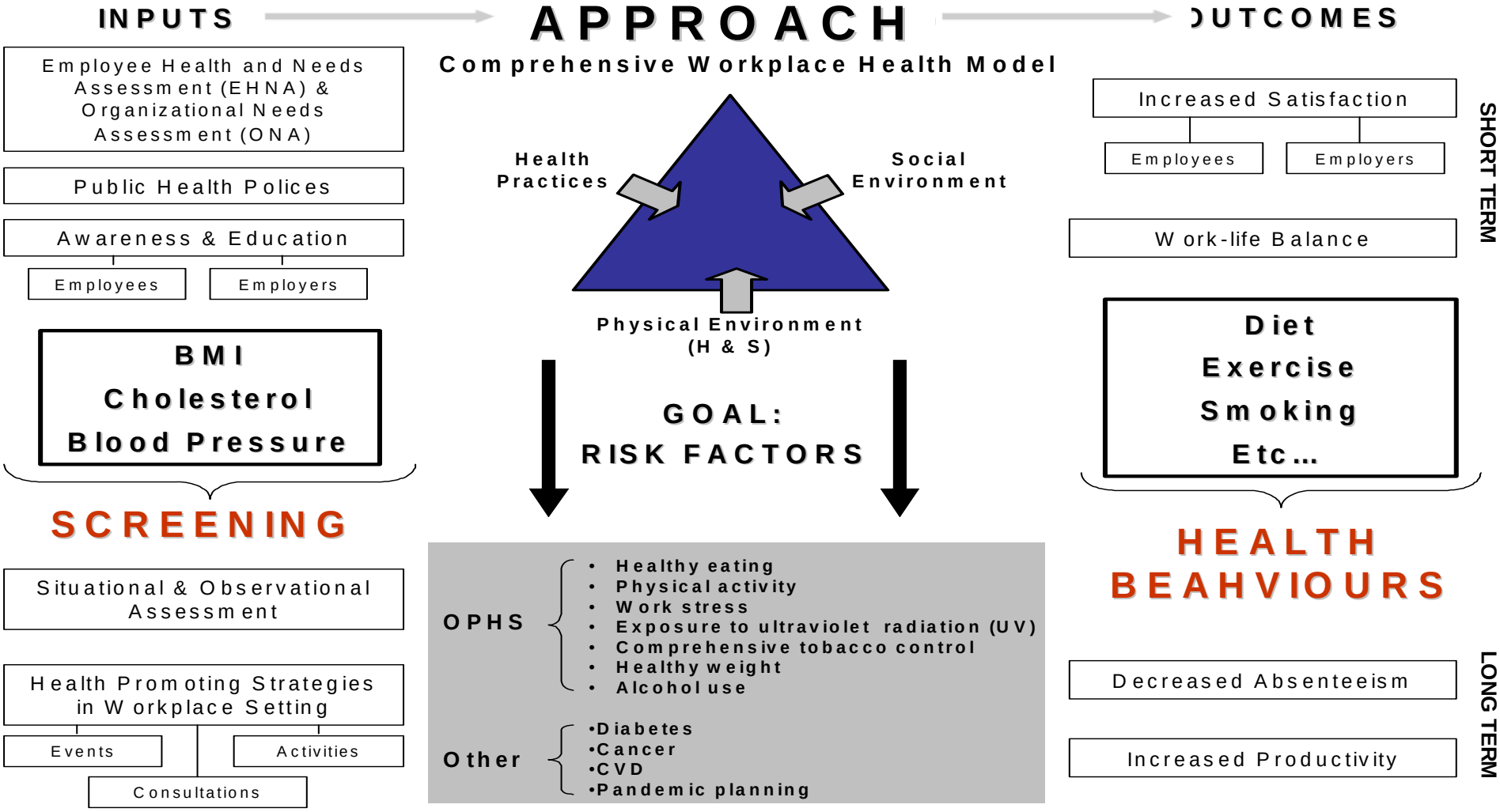
1. Region of Peel. A Picture of Health - A Comprehensive report of health in Peel. 2008. [Internet].; cited 12/8/2010]. Available from: http://www.peelregion.ca/health/health-status-report/chsr/index.htm.

2. Deutekom M, Vansenne F, McCaffery K, Essink-Bot ML, Stronks K, Bossuyt PM. The effects of screening on health behaviour: A summary of the results of randomized controlled trials. J Public Health (Oxf). 2010 Jul 28.

3. Bankhead CR, Brett J, Bukach C, Webster P, Stewart-Brown S, Munafo M, et al. The impact of screening on future health-promoting behaviours and health beliefs: A systematic review. Health Technol Assess. 2003;7(42):1-92.

Appendices

Appendix A: Concept Model (developed October 2010)



Appendix B: Search Strategy

Database: Ovid MEDLINE(R) <1950 to November Week 3 2010>
Search Strategy:

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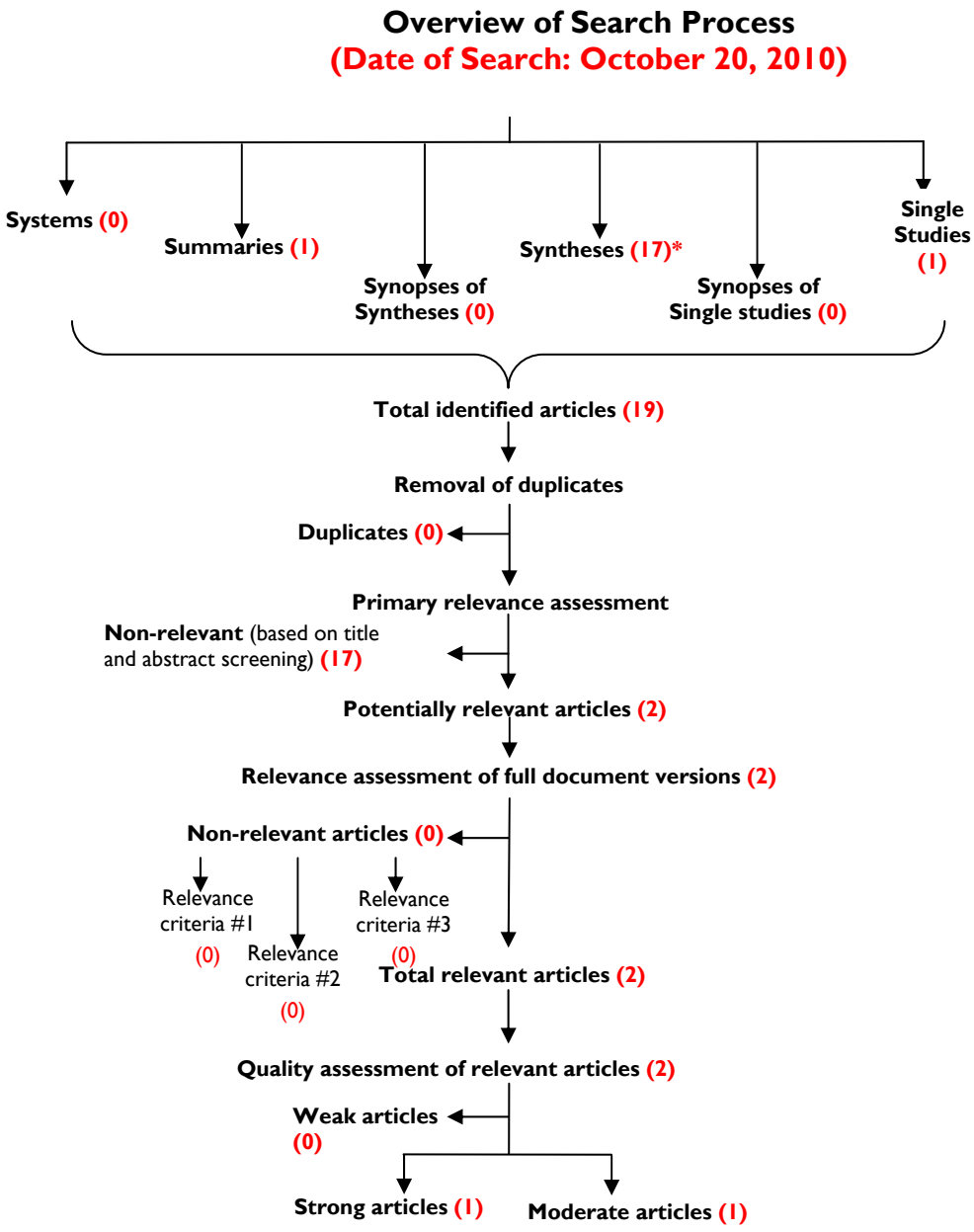
1 Mass Screening/ (70139)
2 Cholesterol/bl [Blood] (54153)
3 total cholesterol.tw. (26623)
4 body mass index/ (56117)
5 (body mass index or BMI).tw. (81501)
6 Blood Pressure/ (217797)
7 Hypertension/di, ep, pc [Diagnosis, Epidemiology, Prevention & Control] (32270)
8 screen$.tw. (341051)
9 1 or 8 (363127)
10 blood pressure.tw. (181762)
11 Hypercholesterolemia/di [Diagnosis] (885)
12 2 or 3 or 4 or 5 or 6 or 7 or 10 or 11 (461087)
13 exp Health Behavior/ (76048)
14 exp Health Promotion/ (41272)
15 health belief$.tw. (2484)
16 health promoting.tw. (2233)
17 health behavior$.tw. (5825)
18 13 or 14 or 15 or 16 or 17 (117616)
19 9 and 12 and 18 (742)
20 limit 19 to yr="2000 -Current" (415)
21 meta-analysis.mp,pt. (44254)
22 (search or systematic review or medline).tw. (141778)
23 cochrane database of systematic reviews.jn. (7458)
24 21 or 22 or 23 (169137)
25 20 and 24 (10)
26 cardiovascular$.tw. (199844)
27 12 or 26 (596650)
28 9 and 18 and 27 (934)
29 24 and 28 (20)
30 limit 29 to yr="2000 -Current" (19)*

***Note:** The original search was run on October 20th, 2010 however was re-run on December 6th, 2010 in order to generate the hits for each line. The updated search retrieved 19 hits (instead of the 18 hits retrieved on Oct. 20th), however one was a duplicate; therefore no new articles were retrieved.

Appendix C: Literature Search Flowchart



* A systematic search of the OVID search engine platform with selection of the MEDLINE database retrieved 16 of the 17 syntheses. As outlined in the search strategy section, an additional relevant systematic review was retrieved through a scan of *Google Scholar*.

Source: Health-evidence.ca. (2009, November 25). *Keeping Track of Search Results: A Flowchart.* Retrieved [insert date you downloaded this document e.g., January 13, 2010],

Link to tool: http://www.health-evidence.ca/public/tools/10/Keeping_Track_of_Search_Results_-_A_Flowchart.ppt

Appendix D: Data Extraction Tables

Items Reviewed	Review #1 (Deutekom et al., 2010)
General Information & Quality Rating for Review	
1. Author(s) and Date	Deutekom M., Vansenne F., McCaffery K., Essink-Bot ML., Stronks K., Bossuyt P., 2010
2. Country	The Netherlands & Australia
3. Quality Rating	Rated using CASP tool – Moderate strength • Recent review that includes highly rigorous study designs (i.e., RCTs), however there are some key concerns with the methodology of the review (e.g., no quality assessment of primary studies conducted by authors).
4. Objectives of Review	• To summarize the evidence from randomized controlled trials (RCTs) of the effects of risk factor screening and screening for early detection of disease, on health behaviours.
Details of Review	
5. Number of primary Studies Included	7 • 5 of 7 focused on risk factor screening • 2 of 7 focused on screening for early detection of disease
6. Types of Studies	Randomized controlled trials (RCTs)
7. Search Period	1966 & 1980 to May 2008
8. Number of databases searched	3 [National Library of Medicine (MEDLINE), Cochrane Controlled Trial Register (CCTR), EMBASE] • Also searched reference lists, requested unpublished studies among colleagues, contacted authors of relevant RCTs to request unpublished data on health behaviour variables.
9. Inclusion and Exclusion Criteria	• Inclusion: RCTs on screening healthy adults aged 18+; RCTs that include measurement of health behaviours; health behaviours defined as data on smoking habits, diet, exercise, alcohol consumption or adherence to health living guidelines. • Exclusion: trials that investigated health intentions only as outcome(s), or focused solely on improving screening uptake or follow-up screening; trials that investigated the impact on families and the social environment.
Details of Interventions	
10. Description of interventions	• Screening for risk factors (5 RCTs) - screening provided, sometimes in conjunction with advice/information/guidance o 4 trials focused cardiovascular disease (CVD) screening (e.g., cholesterol screening) o 1 trial focused on genetic screening for aldehyde dehydrogenase 2 (ALDH2) • Screening for early detection of disease (2 RCTs) o 1 trial focused on colorectal cancer screening (e.g., fecal occult blood test) o 1 trial focused on screening for hearing loss
11. Intervention settings	Study settings are not clearly described by review authors, however participants were included from a variety of settings (refer to 'target groups' below).
12. Theoretical frameworks	N/A
13. Target groups	Overall focus of review is to include trials of healthy adults aged 18 and over.

	• Screening for risk factors trials: patients (either gender, aged 40-59) from general practices in the UK; patients from primary practices in Canada without cholesterol testing in previous 5 years; patients (either gender, aged 36-64) from five general practices in UK; maintenance workers (either gender) from six hospitals in Canada; and male employees of a manufacturing factory in Japan. • Screening for early detection of disease trials: patients (either gender, aged 30-49) from general practices in Denmark; and men/women aged 50-55 living in two regions in Norway.
14. Primary Outcomes	Health behaviours: smoking habits, diet, exercise, alcohol consumption and adherence to guidelines for healthy living
Results of Review	
15. Meta-analysis?	No (small number of trials included and high heterogeneity in the interventions, participants, and outcome measures).
16. Main Results of Review	This review examined the changes in health outcomes from baseline (pre) to follow-up (post) within intervention (i.e., screened or received screening results) and control groups (i.e., not screened or not provided screening results). Results per health behaviour (as per review authors) comparing screened groups to unscreened groups in both risk factor screening and early detection of disease screening: • Smoking: 1 RCT = health behaviour better in screened; 1 RCT = no difference; 1 RCT = health behaviour worse in screened • Diet: 1 RCT = health behaviour better in screened; 1 RCT = no difference between groups and for participants who had normal screening results worse behaviour among those that received results versus not received results; 1 RCT = health behaviour worse in screened • Exercise: 1 RCT = health behaviour better in screened; 1 RCT = health behaviour worse in screened • Alcohol: 2 RCTs = no difference • Adherence to healthy living guidelines: 1 RCT = health behaviour better in screened; 1 RCT = no difference Overall results reported by review authors: • That the evidence on screening for risk factors (e.g., CVD risk factors) indicates a positive influence on health behaviours; whereas the evidence on the impact of screening for early detection of disease (e.g., colorectal cancer screening) on health behaviours is too limited to develop conclusions.
17. Comments/Limitations	Major limitations reported by authors: • Small number of studies included (i.e., 7 RCTs) • Review included published studies only • Search strategy only included MeSH term 'Mass Screening', no 'screening' text word used (therefore studies may have been missed through this search) Additional limitations (noted through critical appraisal): • No indication by the authors that quality assessment of the primary studies was conducted. • The reviewers did not necessarily try to identify all relevant studies (e.g., only health databases were searched). • The author's interpretation of the data may be slightly misleading because although they note that the trials on risk factor screening suggest positive impacts on health behaviour, there are an equal number of risk factor screening trials that showed no difference in health behaviour between the screened and unscreened group.

Items Reviewed	Review #2 (Bankhead et al., 2003)
General Information & Quality Rating for Review	
1. Author(s) and Date	Bankhead CR., Brett J., Bukach C., Webster P., Stewart-Brown S., Munafo M., Austoker J., 2003
2. Country	UK
3. Quality Rating	**Rated using CASP tool –** Strong
4. Objectives of Review	• Primary: To examine the effects of cholesterol, breast and cervical cancer screening on actual or intended health-promoting behaviours and health-related beliefs. • Secondary: To determine what the implications are for the National Health Service (NHS), including the cost-effectiveness of screening programs; to identify gaps in the literature, provide recommendations and describe a framework for further research in this topic area.
Details of Review	
5. Number of primary studies Included	174 (includes articles focused on both risk factor screening and screening for early/preclinical disease)
6. Types of Studies	All study designs included (e.g., RCTs, non-randomized interventions, cohort, cross-sectional, qualitative)
7. Search Period	1980 to 2000
8. Number of databases searched	11 [MEDLINE, PyschInfo, EMBASE, CINAHL, HealthStar, Science Citation Index (SCI), Social Science Citation Index (SSCI) FPHM database of Part 11 MFPHM theses, and University Databases of DPhil, PhD and MSc databases] • Also conducted handsearching of journals until April 2002 (however did not directly include any of these found articles in the systematic review; discussed only in the relevant sections)
9. Inclusion and Exclusion Criteria	• Inclusion: all study types; health-promoting behaviours and beliefs that occur as a result of cholesterol, breast and/or cervical screening. Health behaviour was defined by authors as "an activity likely to have an influence on health" and included behaviours such as: lifestyle-related changes (e.g., dietary improvements), uptake of preventive healthcare (e.g., immunisation), actual or intended reattendance at screening when next invited, future use of other screening services, and appropriate use of healthcare during illness (e.g., adherence to follow-up recommendations). • Exclusion: studies that examined anxiety, pain and/or discomfort caused by screening (unless related to impact on health-promoting behaviours and beliefs); studies focused on improving uptake of screening; longitudinal studies with incorrect temporal relationship (i.e., behaviours and/or beliefs not measures after screening); children and screening; effect of screening on families and social environment; non-English language articles.
Details of Interventions	
10. Description of interventions	Generally, three types of interventions were examined in the review: • Cholesterol screening (assumed by authors to be a blood test accompanied by basic lifestyle recommendations) • Breast screening (assumed by authors to be done by mammography) • Cervical screening (assumed by authors to be done by Papanicolaou Smear) Due to the large number of studies included in the review, the three 'types' of screening included, as well as the large differences across study design and other variables (e.g., settings, outcomes), there are large variations across and within intervention types.
11. Intervention settings	A wide range of intervention settings were included across the three screening types (details in appendices of review).

	• Cholesterol – 23 in open-access environment (e.g., supermarket, shopping mall, health fair, pharmacy); 14 in workplace environment; 12 in health-care setting; 2 in college setting; and others. • Breast screening – 54 studies as organized screening programs; 4 in workplace environment; 2 as fee-for-service mammography; and others. • Cervical screening- variety of settings including: GP practices/clinics, hospitals, organised screening programs.
12. Theoretical frameworks	Various theoretical models to the current review (e.g., Health Belief Model (HBM), Health Locus of Control model (HL)).
13. Target groups	The review focused on screening in adults. A wide range of target groups were included across the three screening types. Across the cholesterol focused articles, participants included adults from a wide variety of demographics (e.g., ethnicity, socioeconomic status).
14. Primary Outcomes	Actual or intended health-promoting behaviours (e.g., dietary improvements, reattendance at screening) and health beliefs (e.g., knowledge of disease and screening, perception of disease risk, embarrassment about screening).
Results of Review	
15. Meta-analysis?	No (high heterogeneity on a number of variables across studies, including study designs and outcomes)
16. Main Results of Review	For the purpose of the review, the authors categorized the outcomes of all primary studies as beneficial (+) or detrimental (-) to health, based on a judgment of both clinical and statistical significance. The main findings relevant to the current literature review (i.e., relevant health behaviours) across screening types are listed below. • Cholesterol Screening- positive effect of cholesterol screening on behaviours related to diet, exercise, weight change, and reduction in blood cholesterol levels, however inconsistent evidence for smoking cessation and overall low adherence rates (<60%) with follow-up to see a doctor. • Breast screening – positive association between breast screening and preventive health behaviours such as diet and exercise, however major methodological limitations of studies (e.g., no baseline measures) must be considered. • Cervical screening – positive association between cervical screening and use of GP/health services, as well as for other preventive health behaviours (e.g., smoking, diet, exercise), however limited studies assessing these outcomes and major methodological limitations must be considered.

17. Comments/Limitations	Some of the major limitations of the review and the included studies: • Less robust study designs included in the review (e.g., cohort, cross-sectional); the limitations inherent to those designs must be considered when reviewing the results (e.g., recall bias, inaccuracies of self-reports). • Unclear temporal relationship between screening and outcomes - many of the retrospective studies focused on breast and cervical screening collected information on screening and health behaviours concurrently, and many of the prospective studies did not collect baseline data, so difficult to attribute the positive associations to the screening versus other factors. • Limited generalizabilty of many primary studies because detailed socio-demographic data not provided. • Definition of screening status varied across studies (e.g., attenders/non-attenders, adherent/non-adherent). • Cholesterol screening: involved voluntary participation therefore those screened may have be more likely to change behaviour; lack of reliability and validity of tools to measure behaviour change; few studies examined impact on receiving desirable screening results; few studies investigated long-term changes in health behaviours; lack of qualitative studies to better understand impact of screening; lack of comparisons across socio-demographic groups • The categorisation of outcomes as beneficial (+) or detrimental (-) to health could be argued (e.g., although use of GP services labelled as beneficial but in some cases could be detrimental because of increased fear after screening) • Potential publication bias – non-English language articles excluded, search strategy did not capture unpublished High quality methods were used to conduct the review, including: clear and systematic methods for choosing eligible studies and for conducting quality assessment of primary studies, and detailed descriptions of all included primary studies provided in the form of tables in the appendices.

Appendix E: Applicability & Transferability Worksheet

Present at the applicability and transferability meeting: Lori Greco (facilitator, NCCMT), Dr. Megan Ward, Linda Pope, Maria Morais, Catherine Shea, Catherine Sim (Workplace Health Team co-op student), Raymond Langlois, Joanne Bak, Nancy Geronazzo, Carolyn Stephenson, Lynn I'Anson , Glenda Tokiwa

Note: throughout the worksheet, the "team" refers to the Workplace Health Team

Factors	Questions	Notes
Applicability (feasibility)		
Political acceptability or leverage	• Will the intervention be allowed or supported in current political climate? • What will the public relations impact be for local government? • Will this program enhance the stature of the organization? o *For example, are there reasons to do the program that relate to increasing the profile and/or creative a positive image of public health?* • Will the public and target groups accept and support the intervention in its current format?	• Anecdotally, as well as demonstrated through a process evaluation, the HeartMobile (HM) program had a strong profile in the community, demonstrated high client satisfaction, and was popular among local politicians. • The team questioned the impact of the discontinuation of the HM program on public relations and its political acceptability; however the need to be accountable for the resources spent on programs and services was discussed as important. • It may take years for a workplace to adopt or develop a comprehensive approach; the HM program provided immediate support and led to a quick and easy 'in' with the companies. • Team members paralleled their new roles to a sales job whereby they need to pitch the new comprehensive workplace health model to companies.
Social acceptability	• Will the target population find the intervention socially acceptable? Is it ethical? o *Consider how the program would be perceived by the population.* o *Consider the language and tone of the key*	• Peel workplace employees considered the HM program and its screening component as a valuable service. • Since the HM was discontinued, workplaces have been asking what services will be

	messages. o *Consider any assumptions you might have made about the population. Are they supported by the literature?* o *Consider the impact of your program and key messages on non-target groups.*	provided in place of it; particularly what will replace the screening component. • Peel workplace employees want something (e.g., a program) that is hands-on and specific. • Screening of workplace employees may lead to a 'diffusion' of information, knowledge and awareness (e.g., word of mouth). • The HM was a tangible and hands-on program; the team reports higher interest in the HM program (in the past) compared to the comprehensive workplace health model; however those companies that have adopted the comprehensive model have been very receptive. • If screening is not conducted in workplaces, then a 'hook' is needed; the Eat Smart! workplace cafeteria/vending program was discussed as a potential 'hook'. • Discussion regarding research on 'audit and feedback'; potential to highlight companies (e.g., through media release) that adopt the comprehensive workplace health model. • The team felt that more individuals were following up to see a doctor than what was reported in the draft literature review. • The poor predictive value of screening for blood pressure and total cholesterol was discussed; one time screening is not therapeutic but possibly educational. • Increased accountability and transparency for programs and services through the use of evidence to inform decisions would likely be well regarded by the community.
Available essential resources (personnel and financial)	• Who/what is available/essential for the local implementation? • Are they adequately trained? If not, is training available	• HM program was showing approximately 1% follow-up by participants to see a physician; cost-effectiveness must be considered.

	and affordable?
	• What is needed to tailor the intervention locally?
	• What are the full costs?
	  o *Consider: in-kind staffing, supplies, systems, space requirements for staff, training, and technology/administrative supports.*
	• Are the incremental health benefits worth the costs of the intervention?
	  o *Consider any available cost-benefit analyses that could help gauge the health benefits of the intervention.*
	  o *Consider the cost of the program relative to the number of people that benefit/receive the intervention.*
		• Questions and discussions regarding whether to target hard to reach sub-groups or go for 'quick wins' and hope for a ripple effect.
		• It's possible that the Comprehensive Workplace Health Model will reach more people than the HM program and it provides more value for mid-sized companies; it's possible that once this approach is adopted that it will be firmly embedded in the company and lead to long-term effects.
		• Moving forward, the team wants to consider the workplace as a determinant of health, not just a vehicle; target management and HR at workplaces and gain commitment.
		• Team members feel that they need additional training and skill development (e.g., training in business, program planning and consulting) to promote the new approach and provide ongoing support to workplaces.

Organizational expertise and capacity	• Is the intervention to be offered in line with Peel Public Health's 10-Year Strategic Plan (i.e., 2009-2019, 'Staying Ahead of the Curve')? • Does the intervention conform to existing legislation or regulations (either local or provincial)? • Does the intervention overlap with existing programs or is it symbiotic (i.e., both internally and externally)? • Does the intervention lend itself to cross-departmental/divisional collaboration? • Any organizational barriers/structural issues or approval processes to be addressed? • Is the organization motivated (learning organization)? o *Consider organizational capacity/readiness and internal supports for staff learning.*	• The group identified additional questions that still need to be answered in moving forward with the new Comprehensive Workplace Health Model (e.g., How do we get workplaces to 'buy in' (the 'hook'), Once the workplaces are engaged, what is the product/program? • Discussion regarding library services at Peel and potential to further explore the literature on various research questions related to workplace health; support for staff related to EIDM (e.g., moving evidence to practice) was discussed. • If screening was conducted, there may be significant resource costs associated (e.g., equipment and trained staff).

Transferability (generalizability)		
Magnitude of health issue in local setting	• What is the baseline prevalence of the health issue locally? • What is the difference in prevalence of the health issue (risk status) between study and local settings? o *Consider the Comprehensive Health Status Report, and related epidemiological reports.*	• The systematic reviews include participants from a wide variety of socio-demographics (e.g., age, gender, culture, country of residence). • This section not discussed in detail by group.
Magnitude of the "reach" and cost effectiveness of the intervention above	• Will the intervention appropriately reach the priority population(s)? o What will be the coverage of the priority population(s)?	• How do we service 'hard to reach' and/or vulnerable sub-groups?; the HM program was able to reach newcomer groups through venues such as the truck show.
Target population characteristics	• Are they comparable to the study population? • Will any difference in characteristics (e.g., ethnicity, socio-demographic variables, number of persons affected) impact intervention effectiveness locally? o *Consider if there are any important differences between the studies and the population in Peel (i.e., consider demographic, behavioural and other contextual factors).*	• Large variation across the primary studies in regards to participant socio-demographics (e.g., age, gender, culture); however comparisons of the impact of screening across socio-demographic groups were not made.

Proposed Direction (after considering the above factors):

Considering the limited evidence and the factors discussed above, the Workplace Health Team will not add a cardiovascular risk factor screening component to the *Comprehensive Workplace Health Model* at this time.

The Workplace Health Team will continue to adapt and enhance the comprehensive approach through ongoing review and consideration of research evidence, as well as input from stakeholders (e.g., companies) and staff. Key considerations and actions for the Workplace Health Team in moving forward include:

- To determine and promote the 'hook', as well as the value added and sustainability aspects of the *Comprehensive Workplace Health Model*
- To consult with staff regarding training needs and provide required training
- To identify additional research questions related to workplace health programs and policies across a variety of topic areas (e.g., nutrition, physical activity, stress management), as per the Peel Health 10-year strategic plan.
- To integrate programs and policies into the *Comprehensive Workplace Health Model* based on priority areas (e.g., sub-groups, topics), identified through research and through consultation with workplaces.

Form Completed by: Catherine Shea

Worksheet adapted from: Buffet C., Ciliska D., and Thomas H. National Collaborating Centre for Methods and Tools. November 2007. *Can I Use this Evidence in my Program Decision? - Assessing Applicability and Transferability of Evidence*.