Promoting Changes in Diet and Physical Activity in Breast and Colorectal Cancer Screening Settings: An Unexplored Opportunity for Endorsing Healthy Behaviors

Annie S. Anderson, Dionne Mackison, Callum Boath, and Robert Steele

Abstract

The importance of diet, physical activity, and weight management in breast and colorectal cancer prevention is widely recognized. While there may be many ‘teachable moments’ that could be used to assess and initiate changes in these behaviors by health professionals (to complement public health campaigns), there is little evidence that lifestyle is discussed within cancer screening settings. The lack of advocacy about lifestyle in these settings may endorse poor health behaviors, in particular the absence of guidance to visibly obese patients. To fully use the teachable moment, patients need to be aware of the relationship between diet and physical activity and the risk of cancer and to be able to relate guidance to personal behaviors. Results from cardiovascular and diabetes prevention programs provide evidence about the components of effective behavior change programs which could be used in the screening setting. Findings from interventions initiated in the colorectal cancer screening setting suggest that such programs can be delivered but it is not clear how acceptable these are in routine health services. Effective interventions delivered in this setting also offer an important opportunity to contribute to the reduction of the overall burden of chronic non-communicable diseases. Cancer Prev Res; 6(3); 165–72. ©2013 AACR.

Introduction

The role of food, nutrition, physical activity, and the prevention of cancer has been extensively reviewed (1), and estimates for disease reduction indicate that around one third (2) of the most common cancers could be prevented by changes in these health behaviors (in addition to reductions achieved through tobacco control). There have been many efforts to change diet and physical activity behaviors through public health education programs, but it is clear that moving evidence on lifestyle and cancer prevention to everyday practice and policy needs the synergy of actions from a wide range of stakeholders. For example, The American Cancer Society (3) make community action recommendations to create a supportive social and physical environment to facilitate healthful behavior change. In addition, the World Cancer Research Fund/American Institute for Cancer Research (2) highlights 9 stakeholder communities (e.g., health professionals, media, government, schools) for concerted action.

The general public perceive health professionals as experts in matters relating to disease prevention and management; thus individual patient communications on health behaviors can endorse the messages of public health campaigns. Advocacy for changing health behaviors by health professional organizations and individual professional action (including acting as role models) has been widely used in tobacco control and has been considered an important contributor to gaining support for the development of meaningful government policies. Although there is widespread recognition that health promotion is central to the provision of health care (4), the potential of health care systems (including hospitals and clinics) to promote appropriate diet, physical activity, and body weight is an area that is largely underdeveloped. Recent initiatives such as the “health promoting health service” and “every contact counts” in the United Kingdom provide opportunities to deliver evidence-based programs.

Cancer screening and early detection services as an opportunity for endorsing lifestyle change by health professionals

In 2008, Demark-Wahnefried and colleagues (5) published guidance for physicians on advising patients about cancer prevention and lifestyle including taking advantage of teachable moments (e.g., before and after cancer screening, on the diagnosis of a premalignant lesion and after the diagnosis of cancer in patients or their family members), but there is little evidence that such interventions take place on a routine basis. It is timely therefore to review factors that may
impact on diet and physical activity interventions for cancer risk reduction within early detection (screening) settings and consider ways to maximize the potential for promotion of behavior change in these arenas.

A number of studies have assessed lifestyle behaviors in patients attending cancer screening/early detection services although these largely relate to lung and cervical cancer screening and smoking. In breast and colorectal cancer, diet, alcohol, physical activity, and excess body weight have been implicated in etiology. Therefore, discussion of these behaviors can relate directly to site-specific cancer risk reduction and provide some justification for lifestyle communications within these respective screening programs.

It is recognized that lifestyle interventions in the screening setting will only reach people who choose to participate in such programs. In many cases, this means people from areas of low social deprivation with higher education levels and better access to affordable health care. It might be hypothesized that participants are more likely to have favorable health behaviors. However, a number of studies (6, 7) in the colorectal screening domain have reported inappropriate dietary intakes, levels of physical activity, and body weight among screening participants. In addition, disease screening has been said to awaken curiosity about health conditions and provides an opportunity to consider preventative actions (8).

In the breast cancer setting, advice on diet and exercise is not routinely provided although there is evidence that women would welcome this (9). This issue may be particularly relevant for body weight, where the lack of guidance to visibly obese patients may signal lack of medical concern. It is recognized that there are challenges in discussing weight management in a clinical setting and that staff may be uneasy about confronting patients with the issue of weight management, especially if their training has not included guidance on how to broach the topic or how to apply intervention techniques. There is, however, some evidence that people may find it more acceptable to discuss the topic with health care staff rather than with friends or peers (10) and may respond positively to intervention advice from health care professionals.

Research from the colorectal cancer screening environment (11, 12) indicates that patients diagnosed with adenomas are not exposed to prevention messages within the clinical colonoscopy setting. The lack of advocacy on lifestyle change in these settings may in fact endorse poor health behaviors as it is recognized that the absence of guidance may produce a "health certificate effect" so that patients who receive negative (i.e., no abnormally detected) results may feel no need to modify their lifestyle (13). Larsen and colleagues (13) reported observational findings for a range of lifestyle behaviors in colorectal cancer screening which indicated that a negative (i.e., normal) screening outcome was significantly associated with weight gain and control subjects (people who has not undergone screening) had significantly better improvements in smoking habits and exercise after a 3-year follow-up period. However, Hoff and colleagues (14) found that patients with positive (i.e., suspicious for cancer) results for screen-detected polyps tended to reduce their smoking habits and had a smaller increase in body mass index (BMI) over a 13-year period than those with negative (i.e., normal) results. In their review of screening and lifestyle behaviors, Van der Aalst and colleagues (15) concluded that the psychologic impact of screening peaks shortly after screening but then returns to baseline values in the long-term and careful consideration should be given to timing of health promotion interventions.

Referrals to early detection services may also arise through family history and genetic testing procedures. A family history of cancer may be a powerful motivator to consider disease risk and a stimulus to engage in healthy lifestyles (including screening). However, it is unlikely that family history per se is sufficient to avoid high-risk behaviors. Spector and colleagues (16) reported that in 50,844 black and white women who had a sister with breast cancer, there were no indications that they were more likely to engage in healthy lifestyle behaviors than the general population. Likewise, in a study of health and lifestyle behaviors among persons at risk of Lynch syndrome, Burton and colleagues (17) reported that 10% of 319 people with the disease and 20% of 110 unaffected relatives reported 3 or more risk behaviors with 20% and 12%, respectively, reporting zero risk behaviors. Higher risk behavior scores were associated with being male, having less education, and age less than 50 years. While there are no trials to show that lifestyle change would specifically reduce colorectal cancer risk in this patient subgroup, such changes are likely to provide overall health benefits. The authors concluded that genetic counseling offers a promising avenue for education and behavioral risk reduction in persons with familial or genetic predisposition. Current work in the genetic screening arena is focused on encouraging patients to undertake cancer screening procedures and there is little evidence of promotion of healthy lifestyles, but this setting offers the opportunity to discuss the importance of healthy lifestyle at a time when patients are focused on the disease rather than in the general context of having a family history of cancer.

Delivering lifestyle programs in screening settings—can it be done?

The largest program of lifestyle interventions delivered in collaboration with early cancer detection services is the American "Well-Integrated Screening and Evaluation for Women Across the Nation" (WISEWOMAN) program which targets low-income, under- and uninsured women ages 40 to 64 years. The program works in conjunction with the National Breast and Cervical Cancer Early Detection Program (NBCCEDP) and aims to reduce cardiovascular risk by providing screening for high blood pressure, hypercholesterolemia, and abnormal glucose levels and deliver lifestyle interventions on diet, physical activity, and smoking. Breast cancer screening is also provided, although the relationship between results and lifestyle risk are not known to be discussed. Early research results indicated that the program had been successful in reducing hypertension,
BMI, and dietary fat as well as increasing physical activity in this hard to reach group. Between 2008 and 2010, it is estimated that 43,000 women participated in at least one lifestyle intervention session (18). This program shows the feasibility of bringing early detection services and lifestyle activities together to support changes in health behaviors. However, the focus on cardiovascular risk may miss the opportunity to fully develop concepts of cancer prevention. For example, current evidence suggests that modest alcohol intakes (>10 g/d) are associated with increased breast cancer risk (1) but may confer cardioprotective effects and lead to confusion on risk versus benefits of alcohol consumption.

Despite the association between physical inactivity, alcohol, and obesity in the etiology of breast cancer, few studies have reported using the breast cancer screening/early detection setting to promote diet and exercise interventions for primary prevention of cancer. Friedenreich and colleagues (19) recruited women in the ALPHA study of exercise intervention on adiposity outcomes through targeted mailings to the Alberta Breast Screening Programme but also used posters and brochures distributed to family physicians and media campaigns. In total, 320 postmenopausal women ages 50 to 74 years were randomized to undertake 45 minutes of moderate to vigorous exercise 5 times a week. The intervention included 3 facility-based sessions and a comprehensive educational package, incentives, regular newsletters, and a website. Women in the control group were asked to maintain their regular activity and all participants were asked not to change their diet. After a 1-year follow-up period, the intervention groups showed significantly greater losses in adiposity markers (body weight, body fat, subcutaneous abdominal fat) than in control participants. It is notable that of 3,454 women assessed for eligibility, 320 were randomized (1,840 failed to meet the eligibility criteria) so while this study completed its aims in terms of efficacy, it may not be fully predictive of population effectiveness.

A number of intervention studies (7, 20–23) focusing on diet and physical activity behaviors in cancer prevention have been delivered in conjunction with colorectal cancer early detection investigations or screening programs (Table 1). Most studies have targeted older adults when the disease is more likely to present and most studies have succeeded in recruiting men (who are generally considered to be less interested in preventative behaviors). Some, but not all, interventions have been offered to people with adenomas, so that perceived cancer risk is likely to have varied between study groups. In addition, some studies have recruited asymptomatic screening patients who are more likely to engage in prevention behaviors, whereas others studies have recruited patients referred for colonoscopy due to symptoms who may be motivated to have medical treatments but have less interest in preventative behaviors.

It is notable that the most common dietary focus has been on increasing intakes of fruits and vegetables. Most of these studies were conducted before the WCRF report of 2007 (1) and have not fully taken account of more recent evidence relating to a range of dietary components and body size. Ongoing work in this arena (24) includes a focus on weight management with guidance on dietary composition and physical activity to achieve weight targets in patients diagnosed with colorectal adenomas.

Most interventions have used health behavioral theories (ref. 25; e.g., The Theory of Planned Behaviour, Trans-theoretical model, Social Learning Theory) to guide educational, motivational, and behavioral strategies. The delivery of the interventions have varied in intensity and communication media and have shown less reliance on traditional, face to face counseling with a greater emphasis on mailed and telephone delivery routes. All approaches have used some form of personal assessment of the target behavior and tailored (personalized) feedback.

All the intervention studies have reported significant effects on the target behaviors, although these have been modest with the exception of Smith-Warner and colleagues (23) who reported an increase from 7.3 servings of fruits and vegetables at baseline to 11.9 servings at 12 months of follow-up. However, it is notable that the baseline intake was not far off the goal of 8 servings/d (7.3 and 6.7 servings in the intervention and control groups, respectively) which suggest that participants were already showing considerable care in dietary choices. Overall, these studies suggest that diet and physical activity interventions in these settings are successful in promoting changes in these behaviors. However, it is likely that more intensive approaches may be needed to address weight management issues.

In addition, it is not clear how applicable or acceptable these approaches might be in routine early cancer detection settings for the general population. For example, the proportion of people approached about the intervention studies who were then randomized varied from 22% (23) to 67% (22). Smith-Warner and colleagues (23) reported reasons for not wishing to take part as ‘lack of interest’ (38%), ‘time and travel constraints’ (14%), and medical reasons (9%). It is plausible that some of these responses reflect lack of interest in the study procedures (e.g., measurement procedures) although the findings suggest that intervention programs need to take account of barriers to engagement and to identify routes to increase interest in the target population.

**Lessons from diabetes and cardiovascular disease**

One reason for lack of diet and physical activity programs in cancer care settings may be related to skepticism from health care professionals about the ability of individuals to change their diet and physical activity levels. However, results from diabetes prevention programs (26) have shown that, with appropriate support, these behaviors can be altered with significant clinical effects. Likewise, in the cardiovascular arena, it has been shown that individual dietary interventions in primary prevention can achieve modest improvements in diet and cardiovascular disease risk status (27). Although both diabetes and cardiovascular prevention research have the advantage of early disease biomarkers and the capability to show the impact of
Table 1. Diet and physical activity interventions in colorectal cancer early detection/screening settings

<table>
<thead>
<tr>
<th>First author (reference)</th>
<th>Country</th>
<th>Number of subjects</th>
<th>Characteristics of participants</th>
<th>Early detection setting</th>
<th>Behavioral focus</th>
<th>Intervention delivery procedures/behavioral strategies/behavioral theory</th>
<th>Follow-up period</th>
<th>Results</th>
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<tbody>
<tr>
<td>Baker and colleagues (20)</td>
<td>UK</td>
<td>742</td>
<td>55–64 y flexible sigmoidoscopy (adenoma status unknown)</td>
<td>Fruits and vegetables</td>
<td>Mailed</td>
<td>6 wks</td>
<td>Intervention (IV) vs. control</td>
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<td>Daily fruit servings increased significantly more in IV group (+0.59; CI, 0.47–0.71) vs. (+0.14; CI, 0.03–0.026)</td>
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<td>Daily vegetable servings increased significantly more in IV group (+0.47; CI, 0.36–0.59) vs. (+0.12; CI, 0.01–0.23)</td>
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<td>Total daily servings increased significantly more in IV group (1.06; CI 0.87–1.25) vs. (0.26; CI, –0.08 to 0.25)</td>
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<tr>
<td>Caswell and colleagues (21)</td>
<td>UK</td>
<td>74</td>
<td>50–69 y colorectal cancer screening (with adenomas)</td>
<td>Physical activity</td>
<td>One personal contact plus mailed literature</td>
<td>3 mo</td>
<td>Intervention vs. control:</td>
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<td>Fiber intake score significantly increased from (30 ± 11 to 41 ± 113) vs. no change in control (31 ± 8 to 30 ± 11) where score &lt;30 equals &lt;20 g/d, 30–40 equals 21–30 g/d, &gt;40 equals &gt;30 g/d)</td>
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<td>Fruit and vegetable intake increased from 4.8 ± 2.5 to 7.9 ± 3.1 portions/d vs. 4.8 ± 3.1 to 7.3 ± 4.2 (NS). Physical activity increased from 50 ± 49 to 85 ± 72 vs. 68 ± 74 to 79 ± 70 mins/d (NS)</td>
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<td>IV achieving all 3 lifestyle recommendations increased significantly to 47% vs. 13%</td>
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Table 1. Diet and physical activity interventions in colorectal cancer early detection/screening settings (Cont'd)

<table>
<thead>
<tr>
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<th>Results</th>
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<tbody>
<tr>
<td>Emmons and colleagues (7) USA</td>
<td>1247</td>
<td>40+ y</td>
<td>Colonoscopy/ flexible sigmoidoscopy (with adenomas)</td>
<td>Red meat</td>
<td>Initial telephone delivery (motivational and goal setting), plus 4 monthly telephone counseling calls. Computer-generated tailored print progress reports, tailored self-help materials</td>
<td>8 mo</td>
<td>Intervention vs. control</td>
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<td>Multiple risk factor score significantly reduced by 47% vs. 35%</td>
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<td>Significant differences in red meat (reduction) and (increased) multivitamin usage and physical activity risk factors</td>
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<td>No significant differences in smoking, alcohol, fruits and vegetable risk factors</td>
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<td>523 female</td>
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<td>Fruits and vegetables</td>
<td>Social cognitive theory</td>
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<td>724 male</td>
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<td>Multivitamin intake</td>
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<td>Alcohol use</td>
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<td>Robb and colleagues (22) UK</td>
<td>365</td>
<td>58-59 y</td>
<td>Flexible sigmoidoscopy (no adenomas)</td>
<td>Physical activity</td>
<td>Mailed standard leaflet intervention</td>
<td>6 mo</td>
<td>Intervention vs. control</td>
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<td>Five a day intake increased significantly more in tailored group (9% vs. 2% in standard care and 5% decrease in control). OR, 2.28; CI, 1.09-4.96</td>
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<td>215 female</td>
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<td>Physical activity or</td>
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<td>150 male</td>
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<td>Alcohol</td>
<td>Mailed standard leaflet plus tailored feedback with praise/ encouragement</td>
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<td>Those meeting recommended physical activity increased by 7% in the tailored group vs. 2% standard care and 1% control NS</td>
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<td>No change in alcohol</td>
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interventions in relatively short-term periods, the methodologies for supporting behavior change remain relevant for cancer prevention and control.

The necessary components for lifestyle modification (including weight management) in diabetes prevention trials have been reported as provision of 4 to 6 months of frequent intervention contact to achieve at least 5% body weight reduction with feedback and social support delivered for sustained weight loss (28). Out-with the intensive trial setting, the nationwide Finnish Type 2 Diabetes Prevention program (FIND2D) uses a brief (14 question) risk assessment tool, behavioral strategies, individual counseling or group visits and has already shown significant weight loss and reduction of diabetes. While this type of intervention could not easily be delivered within all early cancer detection settings, there may still be the opportunity to deliver brief interventions (as a form of endorsement for behavior change) with referral to relevant community-based intervention programs.

Whilst there is significant evidence available on potentially effective approaches for effective lifestyle change, this area deserves further exploration as new technologies (e.g., web-based programs, smart phones) and social media communications are developed.

Moving forward: challenges to address in promoting changes in diet and physical activity in early cancer detection settings

It is plausible that behavior change programs which target high-risk groups are more effective than those targeting the population at large. Thus, adults who have had a “health scare” may experience a “teachable moment” and will be more motivated to engage in and adhere to lifestyle advice. However, Stead and colleagues (11) have argued that after diagnosis of a colorectal adenoma, patients need to be aware of the risk factors for adenoma and relate these to personal behaviors before the teachable moment opportunity can be used. They also noted that while there is a shared and accepted understanding of the relationship between smoking and lung cancer, there is much less awareness of the relationship between colorectal cancer, diet, and physical activity. The lack of communications on lifestyle messages by colorectal cancer professionals and missed opportunities for advocacy were also reported by Stead and colleagues (11).

These findings have been echoed by Dowswell and colleagues (12) who found that patients ages 60 to 74 years who had been diagnosed with an intermediate- or high-risk adenoma believed that their current dietary and physical activity behaviors were good and they perceived no risk between current health behavior and diagnosis. They suggested that intervention programs should tailor the intervention to individuals and target the lack of knowledge about the etiology of colon cancer and the lack of motivation to change behavior. One useful development in this area could be routine use of lifestyle risk assessment (29) and feedback (already used in diabetes prevention) delivered as part of cancer screening which has the potential to

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<th>Follow-up period</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smith-Warner and colleagues (23)</td>
<td>USA</td>
<td>202</td>
<td>57 female</td>
<td>Colonoscopy (with adenomas)</td>
<td>Fruits and vegetables (8 servings/d)</td>
<td>Face to face meeting (nutrition counseling)</td>
<td>12 mo</td>
<td>Intervention vs. control. Fruit and vegetable intake increased from 7.3 ± 3.3 to 11.9 ± 3.3 portions/d vs. 6.7 ± 2.8 to 6.2 ± 2.2 portions/d. Target intake was met by 86% vs. 17% (significant).</td>
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Cancer Prev Res; 6(3) March 2013

Cancer Prevention Research

Published OnlineFirst January 16, 2013; DOI: 10.1158/1940-6207.CAPR-12-0385
increase engagement with health promotion. Diet and physical activity intervention programs in early detection settings based on health behavior theory have been reported to improve diet more effectively than those without a theoretical basis (30). While the optimal intensity and format of intervention communications is unclear, minimal contact procedures have been shown to initiate health behavior change and offer the opportunity for widespread engagement. In addition, many existing community-based interventions (e.g., walking groups) offer opportunities for engaging in lifestyle change.

However, intervention programs are often less likely to reach the most vulnerable population groups (including men) who are also less likely to participate in early detection services. Although this review has focused on diet and physical activity, it is possible that targeting multiple risk factors may maximize the impact of the intervention (31), but there is little evidence to support this approach as a population-wide strategy given the difficulties that many people have in achieving even one lifestyle change goal.

Building bridges between cancer prevention and screening should be seen as one strand of a multicomponent cancer control strategy which presents a unique opportunity for endorsement of consistent lifestyle messages from respected cancer health care professionals. This approach also offers an important opportunity to contribute to the reduction of the overall burden of chronic noncommunicable diseases.

Disclosure of Potential Conflicts of Interest
No potential conflicts of interest were disclosed.

Authors' Contributions
Conception and design: A.S. Anderson, R. Steele
Development of methodology: A.S. Anderson, D. Mackison
Acquisition of data (provided animals, acquired and managed patients, provided facilities, etc.): A.S. Anderson, R. Steele
Analysis and interpretation of data (e.g., statistical analysis, biostatistics, computational analysis): A.S. Anderson, C. Boath
Writing, review, and/or revision of the manuscript: A.S. Anderson, D. Mackison, C. Boath, R. Steele
Administrative, technical, or material support (i.e., reporting or organizing data, constructing databases): D. Mackison, C. Boath
Study supervision: A.S. Anderson, R. Steele

Received September 11, 2012; revised December 22, 2012; accepted December 28, 2012; published OnlineFirst January 6, 2013.

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