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Primary Prevention, Aging, and Cancer: Overview and Future Perspectives

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Abstract

Cancer specific primary prevention efforts for the geriatric population are not well-understood and are currently underutilized, despite the rapidly growing elderly population. Lifestyle changes such as smoking cessation, dietary change, and increasing physical activity have been shown to decrease the incidence of cancer in younger populations. However, a multitude of conceptual, methodological, and dissemination challenges arise when the goal is to apply primary prevention of cancer to the elderly. The state of the science is reviewed to reveal barriers in the uptake of cancer specific primary prevention practices, including the lack of data for the applicability of clinical research findings to older populations. Under representation of older adults in behavioral trials and research programs is hindering progress in understanding the physical health and lifestyle choices of older people. Efforts directed towards prevention in terms of promoting health behaviors may not only be clinically advantageous, but also cost-effective. Additionally, models for translating research findings on primary prevention from younger individuals to the elderly population needs to be addressed. Practitioners need to better understand opportunities for cancer specific primary prevention could enhance chronic disease management.

Keywords

Primary prevention; Cancer; Behavioral research; Aging adults; Comorbidity

Introduction

Nearly all policy experts agree that cancer specific primary prevention is a vital area for future research and practice. Primary prevention, broadly defined as the protection of health

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by personal and community-wide efforts [1], consists of measures aimed at preventing the inception of a pathologic process or the occurrence of a disease. In relation to cancer, primary prevention mainly involves the avoidance or drastic reduction of exposure to carcinogenic risk factors [2]. Given the strong potential of primary prevention efforts to both lengthen and save lives, as well as improve quality of life, primary prevention efforts are an important area for future research and application in the elderly[3]. Unfortunately, primary prevention in aging populations suffers from a two-pronged problem. The first is a lack of attention to primary prevention efforts in medical settings in general [4-6], and second, while the incorporation of primary prevention into general primary care is difficult, further challenges arise when the focus of these efforts is on aging. This paper addresses the current literature on cancer specific primary prevention activities in cancer and aging, and provides future research directions for this field.

Defining the aging population: what is known about the differences between young-old, middle-old, and oldest-old?

Relatively little is known about the within-group variation in the aging population categorized by chronological age. Many studies combine the over 65 population into one homogenous group, despite there being significant differences between the young-old, middle-old (old-old), and oldest-old (very-old) [7] [8]. NCI's SEER data divide older age groups into 65-74, 75-84, and 85+ [9]. Incidence data show that 56% of all cancers occur in the 65+ population, but a more detailed evaluation shows that 26% of all cancers occur in the 65-74 age range, 23% in the 75-84 range, and only 7% in the 85+ range [9]. By 2030, one fifth of the U. S. population will be over 65 and the number who are aged 85 years and older will have more than doubled in size, from 4 million to approximately 8.5 million [10]. More than half of all cancers are already currently occurring in the over 65 population; with a growing aging population of people living longer, cancer incidence in this group is certain to increase. Consideration of strategies for cancer prevention in the elderly is therefore imperative.

Future priorities in primary prevention for aging populations

Primary prevention efforts target health behavior change in order to prevent clinical cancer and the associated effects. When considering primary prevention behaviors in healthy adults, the options that appear to most effectively reduce health risks include tobacco use reduction and cessation [11,12], dietary change [13] and physical activity increase (with a focus on obesity reduction) [14] [15]. Similarly, it is appropriate to consider primary prevention among cancer survivors, as well as among people who have never had cancer. In addition, improving quality of life through preventing depression and other negative mental health states is potentially critical in some subpopulations of older adults, if there is previous vulnerability to negative mental health outcomes. Additional primary prevention foci for future application may well include genetic testing for future cancer risk [16], depending on the family history of disease. The increase in cancer specific primary prevention behaviors benefits older adults twofold by additionally providing a much needed opportunity for increasing general functioning prevention behaviors.

Goals of primary prevention activities and interventions

It was difficult to identify a speaker for the pre-conference course who would address the area of primary prevention and aging. Hence, an important issue is the extent to which primary prevention efforts are even perceived as relevant to the aging population. There is a prevalent bias to believe that since all aging populations suffer from chronic disease, the focus should be on illness management and not on *prevention* from other diseases.

Therefore, obtaining a focus on primary prevention for older adults will be challenging both for the medical community, and the general public at large.

To address this issue, it may be necessary to first define what the goals of healthy aging are, and then to consider how primary prevention can play a role in facilitating healthy aging. Figure 1 presents two theoretical trajectories of aging, with different views of the timing of disease. In both models, individuals progress from optimal health to death, with the major difference evidenced in the manner of this progression. As can be seen, the first perspective illustrates that aging entails a series of small decrements in functional status. The eventual arrival of a life threatening illness produces more decrements and ultimately, death. The alternative illustration presented in this figure is the maintenance of functioning for as long as possible, even in the face of chronic illness, thereby preserving health until death. The second model is not realized yet for older adults, perhaps because of assumptions that getting older – by definition -- means gradually losing important functions and abilities. One reason for this focus on the inevitable progression through old age may be due in part to the lack of research into primary prevention in the context of aging.

Survey research on the goals of aging people themselves often indicates that maintaining good quality of life and promoting independence and mobility during the older adult years are of key importance [17]. These data speak suggest the importance to the elderly of promoting overall health in pre-disease states, as well as in survivorship. For example, sleep disturbance and poor sleep quality is a growing concern of elderly individuals and hence an increasing focus of aging research. Sleep is not only related to quality of life and mental health [18,19], but recently has been connected with obesity, an important risk factor for several cancers [20]. Therefore, improving sleep opportunity and quality could reduce the obesity prevalence among older people, which could contribute to reductions in cancer incidence and recurrence, as well as in other chronic diseases and associated pain states [21].

What are the important considerations for translating research findings into practice?

In recent years, translation of existing research findings into clinical and public health practice has gained more focus [22]. In the current structure of aging care, there are a number of issues that present considerable barriers to such translation. Although much of the clinical practice with older adults occurs in the primary care setting, there are no prompts or markers for primary care providers to consider aging as a unique condition. Additionally, most clinical tests recommended by the clinical preventive services task force are related to a specific disease state, many times seen by specialists rather than general practitioners, often leading to a specific diagnosis. Even when prevention prompts have clear research backing and are relevant to clinical disease, it has been difficult to integrate them into the primary care setting [23,24]. For example, presenting issue and diagnosis were shown priority over smoking cessation counseling in one study [24]. It is evident that the doctors in the primary care setting spend more time on presenting symptoms and diagnosis than dealing with preventive issues such as smoking cessation advice and assistance.

The little research that has focused on demonstrating the benefits of primary prevention activities for older adults has shown promising results. Tobacco reduction in elderly patients is a key example. Data show that when primary care providers actually make recommendations to older patients, the incidence of smoking cessation significantly increases [25,26]. Yet, it is difficult to motivate practitioners to adopt these types of primary prevention recommendations into routine practice [27,28]. From the provider side, older adults might appear to be uninterested in – or unable to – engage in preventive behaviors such as quitting smoking. Providers practicing in these areas not only face practical barriers

-- such as lack of funding and reimbursements – but also conceptual barriers, in that there are no age-specific smoking cessation recommendations for older adults. Even when recommendations for primary prevention behaviors are age specific, as is the case with exercise [29,30], many providers are still afraid to endorse these guidelines because of the possibility of injury or the likelihood of exacerbating existing health problems. Increasingly, these barriers should fade as evidence accumulates that lifestyle interventions for the elderly can be effective in moving even sedentary older adults to a more active lifestyle, and thereby reducing overall disability [31] [32].

Another one of the key barriers to the translation of primary care recommendations into the clinic for older adults is the issue of diffusion of responsibility for health care delivery [33]. Essentially, translation is a problem with roots in the American health care system. These roots include inadequate or complicated healthcare funding streams, multiple providers, tension between specialty care versus primary care, lack of behavioral and social expertise in the care team, etc. One cardiology study suggests that the only way to carry out research findings is to follow a rigorous system of checks and balances, each individual in the healthcare system responsible for their own part and reporting their findings [33]. These problems are not unique to older patients, but they are likely exacerbated due to progressively more frequent reliance on healthcare professionals as a support for health choices.

Some models of integrated healthcare delivery have been developed to better care for the elderly. An example of such a model is the Program of All-inclusive Care of the Elderly (PACE) model [34]. The model utilizes an interdisciplinary team approach with both acute and chronically ill elderly patients. Benefits of this program include shorter hospital stays, lower rate of hospital use, and suggested above 5 percent financial savings over the use of federally run Medicare and Medicaid [34]. At present, PACE has been subsumed by and works proactively with Medicare and Medicaid programs, but has its own government regulations. As a cost-effective approach to addressing the needs of the nation's elderly, PACE is a program package of Medicare/Medicaid and utilizes a comprehensive team approach to healthcare. PACE is an innovative model for health care delivery in older adults, but it has limitations that need to be overcome for general application. For instance, it is not designed for larger, more functional populations, but rather for populations of less than 200 adults, depending heavily upon the local PACE center. As a result, it is currently not an optimal model for care in rural and ethnic minority populations.

Integrating older adults into the healthcare team

To the extent that it is reasonable to try to integrate primary prevention efforts into primary clinical care, we must attempt to ensure the quality of that care, by focusing on systems of care that are coherent, affordable, and connected to each other and to patient's lives. For example, cancer survivors are likely to have some ongoing surveillance and contact with the healthcare system, but attention to follow up regarding primary prevention behaviors may be lacking. Training in the age-specific healthcare issues and primary prevention behaviors of the aging should begin in medical school and should continue through continuing education. This is a particular problem in that the number of fellows with training in aging is declining each year. Another option for improving the quality of care provided is to have older adults on the health care team, either in an advisory or an overview capacity with ongoing monitoring of health, symptoms, and general functioning. Whose health are they monitoring? Their own? Other peoples? Is this a peer type of system? Why is this good? What is the model? Indeed, quality assurance should focus on markers of care that encourage health promotion and primary care in aging.

One of the most complex issues related to cancer is addressing the diversity of life choices and living situations for older people. The complex issues involved in changes in social structure that often accompany the aging process, including transitions in living situations, and support systems, and their effects on mental and physical health are important and in need of more research focus. National data sources such as the National Center for Health Statistics [35], which produces the health and aging survey, the Population Centers funded by the NCCHD, as well as specific diversity-focused studies [36] [37], contain a collection of data that can provide findings important to aging. Particularly with changing health, loss of partners and support system, various group and structured living situations, all play a little understood role in health and need research attention. Surprisingly, little is understood about the effects of retirement on health, even though this is a pivotal event in the lives of aging most adults.

Specific research targets of primary prevention in older adults

Smoking cessation is the single most important behavior that older adults can engage in to promote health [38]. Areas of previous research include cessation strategies in patients who have previously been diagnosed with lung or head and neck cancer. However, little is known about the specific needs of elderly smokers attempting to quit smoking. Smoking cessation has been shown to prevent a decline in normal functioning, and improve health outcomes after two years, with larger benefits if quitting occurs in middle age [39]. Data on how best to use this information to motivate quit attempts in older adults, coupled with evidence-based information on how elderly people quit smoking most effectively, could significantly improve health outcomes for older adults.

Physical activity in older adults has received research attention, both to document the benefits of physical activity increases and the best methods to accomplish physical activity increases in aging populations. Increased physical activity has a positive impact on mental health, the ability to cope with treatments and symptoms, and on general functioning [40,41]. The risks of physical activity (e.g., injury, cardiovascular damage, etc) are generally outweighed by the risks of sedentary behavior (e.g., chronic disease, arthritis, etc) [42] [43]. Dietary change has received relatively less attention, as the functional benefits (e.g., improving quality of life) of improving diet quality are likely less than for physical activity change. Still, the role of diet in obesity prevention, and therefore chronic disease prevention, is well-established [44,45] [46]. Thus, improving diet quality and physical activity promotion in the older population is an important area for future research [47]. Interestingly, much of the existing diet research in older adults revolves around increasing eating behavior and caloric and nutrient intake. Yet, for many older adults in US, over-nutrition is more the problem [45] [48]. Taken together, smoking cessation, physical activity, and nutrition, need more research attention, and need to be studied in relation to each other.

The issues involved in primary prevention and healthy lifestyle choices have not been as much a direct focus of clinical care efforts as the evidence would warrant. Cultural and social issues appear to be more important influences on healthy choices, but these influences have not been extensively studied in older adults [49]. These potential influences includes mass media, greater expenses in extending life social support, and the loss of loved ones; all likely have some effect on choices regarding primary prevention, but these effects are not widely studied and deserve more attention. Exposure to such influences is exemplified by the fact that over 22% of older adults are now using the internet, comprising the fastest growing group to be accessing health information in this way [50].

Basic information in this area is saliently lacking, such as the preferred or most trusted sources of health information for different subgroups of older adults, but could be easily

gathered with new or existing research efforts. Ethnic and racial minorities have a large degree of medical mistrust, resulting in fewer trips to the doctor and fewer opportunities for identifying cancer specific preventive behaviors. African American males have the highest incidence of prostate cancer of any other racial group, and myriad impediments to uptake of prevention and screening behaviors. Barriers include culturally and gender-influenced beliefs about cancer prevention and screening, barriers related to the healthcare system, and religious influences, including the importance of spiritual beliefs and church support [51]. African Americans also have a cancer mortality rate 1.3 times higher than Caucasian Americans [52]. Effective interventions that are tailored to ethno-specific barriers can aid decreasing the health disparities found in cancer prevention.

From the systems perspective, the economics of primary prevention in older people is certainly a barrier to quality care. As an example, the cost-effectiveness of recommending weight loss to an 80 year old obese person has received little research attention. Different prevention activities have different payoffs, impacts and time courses at different points in the life course. For instance, introducing exercise could help to prevent some chronic diseases, but not others. What are the tradeoffs for an individual between increasing exercising for preventing cancer versus improving functional status? From an individual's perspective, the idea of prevention of chronic disease may have a distinct meaning for younger old than for the very old. For example, for very old people, because there is not very long time in which to reap the returns for the investment of time and effort.

Measurement Issues

There are multiple measurement and survey issues that complicate the study of cancer specific prevention behaviors among older adults. First, participation and response rates in research projects involving telephone or in person surveys are different from younger respondents. Initial survey participation rates are often higher in first time older survey respondents, but lower on participation in additional research project participation. However, once older adults consent to participate, they are more likely than their younger counterparts to complete participation [53]. Second, while willingness to participate often covaries with age, the differences might be due to issues other than older age. For example, although older adults report that they are hesitant to participate in studies, the reasons given are not related to their age but to concerns about the symptoms from the experimental treatment [54]. Health literacy is also an issue that can interfere with the participation of older adults; taking medications correctly and handling the side effects of polypharmacy can demand a level of health literacy that is relatively unusual in this age group. These issues may bias samples by age and undermine the reporting of accurate and applicable conclusions about age effects.

Functional issues that can impact research participation can also covary with age. For example, lowered attention span among some older adults, coupled with increasing respondent burden of long or complex surveys, may make participation difficult in one sitting. Hearing and vision degradation can also interfere with survey completion. Lower levels of cognitive functioning (that covary with age) can reduce the accuracy of self-report data. Fortunately, some of these confounds could be easily addressed in research procedures. An important goal of survey methodologists should be to develop methodologies that are age-blind by taking into account the age-related effects at the initial design stage when developing questionnaires and other assessment devices. This could even improve the survey experience for all respondents, not just older adults.

The advent of Internet-based research, including survey research and intervention research, provides new methodological challenges for research with older adults. Internet usage is

consistently lower in older adults, compared to any other adult age group. Although the gap appears to be decreasing in recent years, this aspect of the digital divide will cause Internet survey research to underrepresent older adults and may make the Internet less attractive to older adults as a channel for intervention. However, study findings consistently indicate that older adults can and will use computers and the Internet, if provided with appropriate training and support [55]. These studies refute the stereotype that older people cannot learn to understand and use new technology for information and support [55].

Research Design Issues

Key study design issues need particular research attention with respect to the older adult population. Longitudinal studies provide critical information on the effects of aging. Yet one of the more complicated research design issues is disentangling the effects of aging alone from cohort effects in the population. In cross sectional studies, which often compare older to younger adults, it is not evident whether effects are due to older adults' chronological age, or to generational effects. This issue must also be considered in any longitudinal study, and should at least be discussed, if not controlled for, in the design and analysis. A final design issue is whether the popular theoretical models are appropriate or relevant for older adults' issues. Most of the behavioral and social models [56] used to describe and explain human health-related behavior have been developed with more homogenous, younger populations. Whether or not these models similarly predict behavior in older populations is an empirical question that must be systematically addressed in future research studies.

Transdisciplinary research and practice

The field of aging involves multiple approaches and disciplines [57]. True collaborations between geriatric medicine and cancer prevention and control are needed if we are to achieve clinical-research benefits for older adults. An important question is whether cancer prevention can borrow models of care from geriatrics, as well as from other disciplines, to facilitate research in this area? It is sometimes said that geriatricians feel like second class citizens compared with other physicians. The salaries of geriatric doctors are lower than those of other specialties, thereby undermining the likelihood of newly trained physicians entering careers in geriatrics [58]. One potentially rich area for collaboration that takes a developmental perspective is the area of pediatrics and developmental social sciences. Lessons could be learned from pediatric medicine, as well as from developmental psychology. Understanding aging as a developmental process, and, indeed, as comprised of multiple developmental phases, would help to further the field of cancer specific primary prevention in older adults and better enable it to mature into a more informed clinical-research endeavor.

The role of aging organizations (AARP, GSA AGS, etc)

There are professional societies devoted to the study and practice of health and health care in aging. For example, the American Geriatrics Society is “dedicated to the health of older Americans” [59]. The society sponsors research regarding aging issues, increases professional awareness of the principles of geriatric medicine, and raises public awareness about the necessity for more accessible interdisciplinary geriatric healthcare [59]. Working with professional societies that focus on aging may be one of the long term solutions to the lack of attention to aging issues in the general population, especially in cancer specific primary prevention. In addition, many professional societies (e.g. American Psychological Association) also have a subgroup that focuses on aging, and some include a focus on aging at their national meetings. The challenge will be to engage these organizations with the idea of cancer prevention in older adults.

One area of activity that could be very helpful in bringing increased attention to aging is the effects of general public opinion and interest in aging issues. We have learned from other contexts that grassroots support from stakeholders – in this case older people and their advocates concerned with primary prevention issues -- is necessary to help focus research and policy efforts. The American Association of Retired People has contributed to the recruitment of healthy older adults to prevention trials, an important indication that their supporting membership is interested in prevention and can be mobilized to support and participate in this research.

Lastly, and perhaps most importantly, funding agencies can play a key role in shaping a national research agenda that is focused toward aging and prevention. The National Cancer Institute has organized itself into 8 programs in aging, and has created RFA opportunities that focus on aging. A recent supplement to the existing comprehensive cancer centers resulted in the creation of developing programs in aging research at several centers around the country. Primary prevention was not a strong component of these programs, but could be in the future. Other funding agencies could be encouraged to follow this trend of encouraging research in the nature, effects, and facilitation of healthy aging in the cancer context.

Research into the understanding and management of cancer specific primary prevention efforts in the aging population is in its early stages. Nonetheless, there is a strong base of research and interest from which to move forward, with a view to implementing translational research strategies into evidence-based practice plans. Notably, we are beginning to understand the epidemiology of aging and primary prevention health behaviors, although many gaps still remain. Studies so far indicate that, as in younger populations, facilitating the execution of health behaviors known to help prevent chronic disease can improve health. Understanding the role of health behaviors in improving or preserving more general functioning in older life is a new area of research that could lead to innovative health promoting recommendations for older adults. Finding methods to support all older adults in improving their primary prevention patterns should be a major focus of future research and practice.

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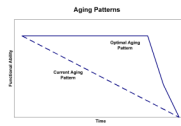


Figure 1.
Goals of primary prevention during aging