Editorial

An ounce of prevention

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Life expectancy worldwide increased dramatically in the 20th century. While most babies born in 1900 lived 50 years or less, life expectancies now exceed 80 years in several countries, and there is no indication of a tapering off of this trend in the 21st century. With the exception of immunizations, these increases are not as much attributable to medical breakthroughs as they are to changes in lifestyle and better living conditions including clean water and better nutrition (1). Can the same be said for decreases in cancer mortality?

Three major accomplishments within one decade ushered in an era in which many cancers were no longer just matters of bad luck, but instead could be addressed through personal behavior. The Pap smear was invented in the 1920's, but did not begin becoming widely used as the first cancer screening test until it was recommended by the American Cancer Society (ACS) in the 1960's. In 1965, the Surgeon General of the United States declared smoking hazardous to health. Mammography as we know it today was invented in the 1960's and again became widely used after the ACS recommendation was issued in 1976 (2).

While estimates vary, the World Health Organization suggests that at least one-third of all cancers can be prevented through lifestyle strategies including weight management, nutrition, vaccination, and not using tobacco products. Smoking alone is responsible for over 6 million annual deaths worldwide and is the number one preventable cause of death in the world (3). And though estimates are harder to come by, it is safe to say than another percentage of cancers can be detected early and cured. But early detection also has a behavioral component in that providers have to offer and patients have to access these services (4).

In cancer control, our biggest gains have arguably come through tobacco control and cervical cancer screening. In fact, it has been estimated that a 2% reduction per annum in tobacco use could result in 7.7 million fewer deaths from tobacco-related cancers worldwide in a 10-year period (5). Similarly, cervical cancer was at one time the top cancer cause of death in women in the United States and still remains second in many countries. The decline in the United States is a result of the availability of regular Pap testing, which still remains unavailable in many countries. Further drastic declines can be expected in countries with access to HPV vaccination (6,7).

While singing the praises of cancer prevention and control, one cannot ignore the existing health disparities. Low-income countries have limited access to modalities in common use in high-income countries. Even within high-income countries, often all things are not equal. In the United States, racial and ethnic minorities, low income people, and rural communities often suffer from a disproportionate burden of cancer. Care may not be acceptable, affordable, or accessible. For example, the working poor are generally on hourly wages. Even if health insurance and transportation are available, something as simple as a mammogram would mean not getting paid for those hours away from work, which could be devastating for a family living from paycheck to paycheck. On top of that, some racial and ethnic minorities have been found to be more susceptible to certain cancers or susceptible at younger ages.

While the social determinants of health that lead to health disparities, such as poverty and education, are more often than not beyond the scope of healthcare and public health professionals, it is within our realm to expand our understanding of how and the extent to which these factors influence health. It is also within our scope of practice to encourage our systems to think creatively and

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become flexible as to how services are offered. This could include offering nontraditional hours or developing new partnerships, for example with pharmacies, to make services more accessible at the community level.

On January 30, 2015, United States President Barrack Obama announced his precision medicine initiative. Precision medicine takes into account individual differences in lifestyles, genes, and environment to create more individualized approaches to prevention and treatment (8). Precision medicine promises to address, among other things, why some people respond to cancer treatment while others do not. That is, their response is a function of their individual genetic make-up as influenced by their environment and lifestyle factors.

With this promise of precision medicine also comes the likelihood of widening the chasm of health disparities for low-income and rural communities. An example of an early development in precision medicine is the drug ivacaftor, which corrects a defect in about 5% percent of cystic fibrosis cases. The cost for a drug that cannot be used in 95% of patients: $300,000 per year (9). Further, precision medicine requires the expertise of physicians and other professionals specifically trained in genetics. In the United States, as of 2011, there were about five clinical geneticists per million population. While this is a substantial increase from 2007 when there were approximately as many physician-geneticists as there have been astronauts in space, we could assume most of these clinical geneticists are located in urban academic centers. We can also assume that very few clinical geneticists can be found in low-income countries (10,11).

We can hope for a day when precision medicine is as ubiquitous as the polio vaccine; in the meantime, it behooves us to continue to focus on assisting the general public as well as health care providers in understanding cancer risk and responding accordingly. This should include working toward accessible, acceptable, and affordable prevention and early detection. Countries worldwide have been working for years, and with some success, to reduce the numbers of people using tobacco products. This is generally accomplished through policy change to decrease access to and affordability of tobacco products and social norms change to decrease acceptability of tobacco use. While obesity represents a modifiable risk factor for many diseases, nutrition and physical activity interventions have been harder to translate to general use. As straightforward as Pap testing and HPV vaccination is for cancer prevention and early detection, these are still out of reach for many communities worldwide, and genetic counseling and testing for mutations that increase the risk of developing cancer are even less accessible.

As we discover new strategies in cancer control we must also consider the characteristics of these innovations that will influence translation and diffusion into practice. Of course we would expect any important innovation to have a relative advantage over the current standard of care in preventing or detecting cancer. But beyond that we must consider:

(I) Simplicity—how easy or hard is it for our intended audience to use? While HPV vaccination has the relative advantage of preventing many HPV-related cancers, the three shots required can be difficult for many;

(II) Compatibility—is the innovation a good fit with the intended audience? Colonoscopy to prevent colorectal cancer continues to be a hard sell because of the unpleasant nature of the test;

(III) Cost—can the intended audience afford the innovation? Genetic testing is price-prohibitive for many (12).

Failure to address these factors also has the effect of increasing health disparities worldwide.

So researchers interested in social and behavioral strategies for cancer control still have our work cut out for us. We still have the opportunity to make the biggest impact, to move the cancer mortality needle so to speak, through changes in systems, policy, and behavior. The old saying, "an ounce of prevention is worth a pound of cure" could not hold more true. Further, with this approach, we free up healthcare resources to address those cancers that do not lend themselves to prevention or early detection. Finally, as breakthroughs are made, we can use these same approaches to translate and diffuse them into clinical practice. While behavior change will not ever make the evening news, addressing modifiable risk factors and health disparities in fact represent the greatest potential in cancer prevention and control.

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