Populomics, an Emerging E–Health Response to Contemporary Healthcare Realities

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INTRODUCTION

There is increasing interest in the role of technology in health care and public health. Several researchers have predicted a coming revolution in health care similar to the transformations that occurred in the finance and retail industries upon the widespread adoption of computer technology (Abrams, 2006; Crane & Raymond, 2003; Gibbons, 2005, 2006). In biomedical research, computer technology has catalyzed the emergence of whole new disciplines such as regulomics, proteomics, phenomics, and pharmacogenetics (Gibbons, 2005). Telemedicine, e-prescribing, Electronic Medical Records, and computerized physician order entry systems are emerging as important tools to improve the quality of health care even though the broad health care transformation historically envisioned has not yet occurred (Crane & Raymond, 2003).

Several important factors, however, are suggesting a need for significant changes in traditional health care and medical research systems. These include (1) the growing proportion of people living over the age of 65; (2) the increasing prevalence of chronic diseases; (3) increasing global urbanization; and (4) the increasing recognition of disparities (inequalities) in health and health care (IOM Committee on Quality of Healthcare in America, 2001). In the United States over the last century, many acute and communicable diseases have either vanished or become much less prevalent. Over the same time period, there has been a rise in the prevalence of chronic conditions and diseases. To date, approximately 60% of UK citizens and 50% of US citizens report having at least one chronic disease (IOM Committee on Quality of Healthcare in America, 2001; National Health Service, 2004). Cardiovascular disease is now the number one cause of mortality in developed nations. Although chronic diseases usually result in symptoms and/or death in the later decades of life, the origins of these diseases can often be traced to the first decades of life. To complicate matters further, the elderly often have more than one chronic condition at the same time.

The rapid increase in urbanization that is occurring worldwide is increasingly causing many people living in the inner cities to experience an urban health penalty. This is due to the concentration of economic decline, job loss, and major health problems often found in urban centers (Andrulis, 1997). In addition, significant racial and ethnic disparities (inequalities) are often found in the urban environment. These disparities appear resistant to interventions and policies designed to reduce or eliminate them (Acheson D, 1998; Macintyre, 1997; Smedley, Stith & Nelson, 2003). Increasing evidence suggests that disparities arise as a result of complex interactions among socioeconomic factors; behavior, biologic, and environmental factors; and disease that are related to race and ethnicity (Smedley et al., 2003; Haynes & Smedley, 1999; Faber & Krieg, 2002; Amick, Levine, Tarlov & Walsh, 1995; Evans, Barer & Marmor, 1994). As such, multifaceted approaches that extend beyond the current medical model are needed to improve health status (Andrulis, 1997), particularly in the urban environment.

In general, the major health care systems of the world function as acute disease treatment systems. Chronic diseases, however, occur and progress over long periods of time, often without obvious personal health impact. They then slowly lead to progressive declines in health, punctuated by intermittent episodes of acute illness. Effectively managing the acute episodes of a chronic disease often does little to the natural progression of the disease or the prevalence of the disease in the population. Effectively preventing illness and promoting health among patients with chronic diseases will undoubtedly require a technological infrastructure that can enable the real-time monitoring of physiologic, behavioral, and environmental data simultaneously among large numbers of patients. All this will need to occur prior to the need for hospitalization and also during sometimes lengthy periods of time between acute episodes of illness.
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