

## Chapter II

# E-Health Technology for Detecting and Managing Chronic Disease

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### ABSTRACT

*The authors of this chapter present an overview of the health and economic challenges that healthcare infrastructures are experiencing and the growing concern of providing healthcare to increasing numbers of individuals age 60 and above. They also discuss how comprehensive disease management programs that combine **e-health** technology with community-based health and/or social services can support the long distance diagnosis and clinical monitoring of chronic disease states such as **cardiovascular disease** among communities with poor access to quality healthcare. By sharing lessons learned from their prior work and studies found in the literature, they discuss e-health projects that improve access to healthcare and disease management among homebound, chronically ill seniors by introducing **mobile units** to service rural communities in nontraditional settings (e.g., food pantries, soup kitchens, church-based services, and senior daycare programs). The authors demonstrate how today's e-health systems can allow healthcare providers to screen, diagnosis, treat, and manage patients in the home or community-based delivery settings, reducing the need for costlier facilities and services, decreasing patient isolation (by increasing interactions with those who are homebound or live in remote regions) and increasing disease management and patient compliance. The authors argue that e-health technology must remain in the forefront of global thinking in order to better serve the health needs of an aging world population, reduce costs, and alleviate a dwindling healthcare workforce.*

## INTRODUCTION

Longer life spans, and high risk factors associated with less than favorable lifestyle choices [e.g., higher fat consumption, lack of physical exercise, misuse of alcohol, tobacco and other drugs] and resource-limited settings [e.g., access to specialty healthcare providers in remote regions where chronic diseases are uncontrolled] are posing significant health and economic challenges to existing healthcare infrastructures.

*Globally the number of persons aged 60 years or over is expected to triple, increasing from 672 million in 2005 to nearly 1.9 billion. Whereas 6 out of every 10 of those older persons live today in developing countries, by 2050, 8 out of every 10 will do so. An even more marked increase is expected in the number of the oldest-old (persons aged 80 years or over): from 86 million in 2005 to 394 million in 2050. In developing countries, the rise will be from 42 million to 278 million, implying that by 2050 most of the oldest-old will live in the developing world. (United Nations, 2005)*

In the United States, long-term care costs have doubled each decade since 1970 and researchers expect to see increasing numbers of the “oldest old” receiving home-based care in the future (Kinsella, Velkoff, 2001). Along with age typically comes a greater incidence of chronic disease. Overtime, unmanaged chronic disease is debilitating and leads to far more serious and costly disease states [e.g., uncontrolled diabetes leads to heart and kidney disease, lower extremity amputation, and retinopathy].

Of the 58 million deaths in developed and developing countries, approximately 35 million are a direct result of heart disease, stroke, cancer, chronic respiratory diseases and diabetes. These chronic diseases are the number one killers of adults in the world and, in the next ten years, are expected to increase by 17 percent (WHO, 2005). On an international level, **cardiovascular disease**

(CVD) leads all other chronic diseases as the number one cause of death (WHO, 2005). Seven million people die of CVDs [e.g., heart attack and stroke] each year (Mackay, Mensah, 2004) and persons with established CVD are at the highest risk of cardiovascular death and account for half of all deaths due to CVD.

The number of Disability Adjusted Life Years [DALYs] or “healthy years of life lost” to CVD is expected to increase in 2030 by 20 percent in the United States, 30 percent in Portugal, 64 percent in Brazil, 57 percent in China and 95 percent for India (Leeder, et al. 2004). These numbers represent the total burden of disease, as opposed to simply the resulting deaths. CVD accounts for 10 percent of DALYs lost in low- and middle-income countries and 18 percent in high-income countries (WHO, 2005). The far-reaching effects of CVD [e.g., high blood pressure, heart attack, stroke, arteriosclerosis, to name only a few] can strike individuals during the prime years of life, which increases the likelihood of lost wages and the inability to care for themselves or family members.

Costs associated with managing chronic disease can be substantial for governments, payers and/or consumers. The practice of medicine in many parts of the world is to diagnose and treat acute disease episodes. This may be a contributing reason as to why chronic disease is becoming the primary inflator of healthcare budgets. It is predicted that chronic disease will consume more than two thirds of the United States’ budget by 2025 if the status quo continues. The economic impact of CVD and stroke in 2006 totaled \$403.1 billion in the United States alone (American Heart Association, 2006). [This figure includes direct costs such as physicians and other professions, hospital and nursing home services, medication, home health care and other medical durables; and indirect costs such as lost productivity resulting from morbidity and mortality.]

Poor management of congestive heart failure (CHF) places this patient population on the top

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