Ubiquitous Health: A Health Promotion Approach

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***Abstract*—Current ubiquitous health service research has primarily focused on the detection of health problems with the use of biometric sensors. Current commercially available ubiquitous health services are available in limited settings. It is also not as cost-effective as some have claimed. In this article the health promoting framework is introduced as a potential alternative that can fill the holes that current ubiquitous health systems have failed to fill. An example application of such a framework is proposed with the overall goal of providing an inexpensive, easily accessible preventative health tracker.**

I. Introduction

In the last decade, ubiquitous health research has focused significantly on creating and improving low-cost health status monitoring systems (mobile health screenings) in order to combat increasing health-care costs caused by an aging population, among other factors [6]. The aim is to lower the cost-based barrier of such systems in an effort to increase their use.

So far these research initiatives have had a positive effect on the health-care system. One such effect is that many patients are now able to monitor their conditions from home. However, their implementation has been severely limited.

One goal of this paper is to shed light onto why ubiquitous health monitoring has not yet become ubiquitous in use. Another is to detail the limitations of the current health paradigm being catered to in said research. The central purpose, however, is to introduce a new paradigm in which these limitations can be mitigated.

II. Assumptions of Ubiquitous Health Monitoring

There are a handful of assumptions that researchers make when describing their systems.

A. Health Monitoring

Ubiquitous health monitoring systems have historically been designed to help prevent the development of disease and disorder. The systems are fine-tuned to recognize such developments in order to alert the physician or user with the goal of initiating an intervention. For diabetics, the alert is based on blood sugar levels and the intervention is to administer insulin into the blood stream.

Since these systems are designed to detect the development of disease and disorder, it is curious that the term Health Monitoring is used at all. What really is being monitored, in an extremely focused way, is sickness. Thus, any mention of historical and current ubiquitous health monitoring will henceforth be referred to as sickness monitoring.

1) Low Patient Costs: It is theorized that an increase in use of ubiquitous health services will decrease the number of fatalities while also saving taxpayers money [2], [7]. An examples of this comes from appropriately scheduled screenings, which are theorized to decrease mortality rates in conditions like colorectal and breast cancer by 15-20 percent [8].

Unfortunately, the most unhealthy segments of the US population have historically had the least access to health screenings [5]. People without insurance live sicker and die younger, which adds an extra expense to taxpayers and causes cost shifting considerations for hospital and other emergency care service [2].

Unfortunately, the increased use of new technology has been cited as the largest factor in rising health-care costs [2]. This is an aspect that is either only indirectly cited or completely missing in a majority of health sensor research publications.

2) Health-care Provider Costs: What some have characterized as the real cost-savings of such sys-

tems has been theorized to come from an eventual fully implemented telehealthcare system [9]. According to the AT&T Center for Telehealth Research and Policy, if the whole health industry were to switch over to telehealth, the overall savings would be in the billions every year [9]. Yet, there is hesitation by the health providers due to claims that a telehealth overhaul would decrease their revenues significantly [9]. This is a hurdle that is rarely mentioned, but it further implies that current ubiquitous methods are still not cheap enough.

B. Widespread Availability

When it comes to implemented health screenings, there are major inequalities in who receives them. The presence and type of health insurance have been consistently predictive of access to care and the provision of screening services [5]. Persons lacking health insurance and persons insured by Medicaid are less likely to receive such screenings, leading to increased chances of being diagnosed with late stage cancer and other such conditions [5]. This demographic is also most likely to have poor health habits, which only exassurbates this issue [5].

At this point in time, commercially available ubiquitous sickness monitoring systems are primarily used in a health-care setting, where the patient must either be able to afford the service or have insurance that covers it. If screening services continue to be limited to people with money and/or select health care plans, improving overall quality of the services will have little impact on rates of early detection as those in most need of such monitoring will be left out.

III. Health Promotion

It is clear that the problem of limited access to ubiquitous sickness monitoring won't be solved overnight. Until it is solved there needs to be a more economical method to aid the underprivileged. Instead of systems recognizing and acting on abnormalities, we propose a system that focuses on improvement in a patient's overall health metrics from sickness to beyond the nominal range. New methods can be developed aid a person's ability in improving their health beyond the cult of the average.

The ability to promote optimal levels of health, not just normal or safe levels is something that has great promise. For instance, half of all heart attacks occur in people with cholesterol levels considered to be in the normal range [1]. That's a coin flip away from a heart attack when a patient is in the safe zone. Basically, trend is to start treatment/prevention in sight of pre-existing conditions is outdated.

Medical research has provided a laundry list of habits that not only prevent health problems, but also promote good health. We now have the capability to create habits that promote optimal levels of health, not just normal or safe levels. While some people may not choose to follow the path of optimal health, it would be immoral not to allow those that would choose such a path a chance to flourish.

IV. Health Promotion App: First Step

While the health promotion paradigm does distinguish itself from sickness monitoring they both still face the same obstacles in regard to widespread use of ubiquitous health devices. So as a first step, instead of focusing on measuring sickness via proprietary health devices, a potential system could instead facilitate the creation of good healthy habits with the use of a mobile/web application.

The application need not be complicated. A simple web-app that allows patients to track and harvest health promoting habits will suffice as a good first step with the goal of incrementing the system to include more ubiquity as the market allows.

A. Health Monitoring for Health Promotion: The Future

In the future, health monitoring could be used to extend the basic system described above. The focus would be on evolving with the underpriveledged with the goal of useability by anyone at any income level at any time. There is already an abundant amount of literature on potential ubiquitous health services and devices. The main research focus of this application would be to determine when new app service and device extensions could be added while still being accessable to the lowest common denominator.

V. Conclusion

Historically, ubiquitous health monitoring systems have left much to be desired. The poor and under-insured don't have access, and the methods are stuck in an outdated sickness management

paradigm. A ubiquitous health framework that helps educate people while also helping develop health promoting habits was proposed as a potential solution.

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