

Benefits & Barriers to Adoption of Health IT in an Elderly Low-Income, Minority Community-Based Environment

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Abstract—This paper provides a detailed discussion regarding the attitudes, benefits, and barriers to adoption of health IT for low income, minority, elderly populations in a community-based affordable housing setting. Results show that despite challenges to adoption of technology amongst minority populations, senior residents will adopt technology if they understand the benefits of these technologies for improving their health and for remaining independent, thereby enabling them to age-in-place.

I. INTRODUCTION

By 2030 it is expected that the number of Americans over the age of 65 years will have doubled to 72 million, which will make up 20% of the U.S. population [1]. Unfortunately, with longevity there is a greater risk of developing chronic diseases that require health care. Health disparities related to gender, race or ethnicity, education and income, exacerbate the problem for minorities [2]. For example, African Americans continue to have lower life expectancy than the overall population [3,4]. Compounded to this effect is the fact that many minorities are affected by socio-economic factors that contribute to these health disparities. More than 68% of African Americans are poor, marginally poor, or economically vulnerable [4]. Additionally, nearly 40% of African American women over 65 years old live alone compared to 19% for their white counterparts [3,4]. Additionally, minorities are more likely than whites to suffer from chronic illnesses such as hypertension, diabetes, and hear disease [2].

Concurrent with this aging phenomenon and the need for cost efficient health care in the United States, the country is undergoing a significant rise in the use of health care technologies. These include telecommunication, remote monitoring (i.e. physiologic and environmental), and health information technologies (IT), which offer tremendous

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opportunities to support the geriatric population toward their preference to “age in place” and remain independent in their own homes [5].

The objective of this research effort is to study the attitudes and practices about the use of home care technologies and health IT for telehomecare applications in a community-based affordable housing setting.

II. METHODS

This research was conducted in collaboration with the Community Preservation Development Corporation’s (CPDC) flagship affordable housing community, Edgewood Terrace, located in Washington D.C. At Edgewood Terrace, one of the community’s four apartment buildings, Edgewood Terrace III (ET3) with nearly 200 residential units, is dedicated specifically for low-income seniors. Eighty-six percent of residents were African American; 85% have incomes less than \$15,000/year; and 83% have a high school education or less. The minimum age of residents living in ET3 was 50 years old. The research study was approved by the Human Subjects IRB Committee at The Catholic University of America.

A. KAP Study: Resident Survey of Attitudes Towards Health Care Technologies and Health IT

Through a 2-hour focus group session conducted by a trained social worker with 10 residents at Edgewood Terrace, a survey instrument was developed to assess *knowledge, attitudes and practices* (KAP) of low-income seniors towards technology, specifically home health care technologies and health IT. The instrument was pre-tested in a follow-up focus group of 8 residents and modified based on input from the group. The final self-administered instrument was delivered to all residents in ET3.

B. Telemonitoring: Telehomecare Intervention for In-Residence Monitoring of Chronic Illness

With knowledge gained from the survey instrument, a telehomecare wellness intervention model was implemented whereby residents living in ET3 with diabetes and/or hypertension were enrolled in a telehomecare study to evaluate knowledge and practices with using telehomecare for chronic illness management. The goal of the study was to assess the utilization and benefits of telehomecare in a *health and wellness* intervention model. Subjects enrolled in the study with either hypertension and/or diabetes were followed for a period of 3-months using daily telemonitoring

using technology by Cybernet Medical Inc (Ann Arbor, MI) combined with regular videoconferencing with a researcher serving as the care manager. Just-in-time chronic illness management education (i.e. monitoring, diet, exercise, etc) was delivered by telephony over the first 4 weeks of the intervention. All physiologic monitoring data was automatically uploaded to a remote, encrypted server housing each subject's electronic health record (EHR).

III. RESULTS

A. KAP Study

Of the 200 residents in ET3, 85 completed the self-administered survey, a 43% participation rate [6]. The average age of subjects enrolled in the study was 73 years with a range between 55-106 years old. 55% of respondents were female and 79% African American with an additional 7% designated in other minority groups. Over 1/3 did not have a high school diploma and more than half had incomes less than \$10,000/year. A large majority (91%) lived alone.

Chronic Condition	% Respondents
Arthritis	57.3%
Hypertension	53.7%
Diabetes	29.3%
Pain	24.4%
Asthma	17.1%

Table 1: Prevalence of chronic illness in respondents.

A summary of respondents' health is provided in Table 1. Due to their high prevalence in this population along with the suitability for telemonitoring, hypertension and diabetes were selected as the chronic illnesses to be managed via the telehomecare intervention.

"I would use technology if it..."	% Agree or Strongly Agree
Allows me to communicate with clinician from home.	97
Calls for medical help as needed.	96
Helps me manage medications	90
Is something I wear daily to signal a nurse I'm OK.	89
Monitor if/when I fall in my home.	88
Detects if I'm able to get around as usual in my home.	86
Sends health data to my doctor.	85
Allows me to get health information from the Internet	82

Table 2: Reasons respondents would use technology.

Additionally, while many in the focus groups expressed a high level of discomfort with technology, many stated they would adopt technology for specific reasons. These reasons

are summarized in Table 2.

B. Telehomecare Intervention

Of the 22 residents recruited for the 3-month telemonitoring study [7], one withdrew prior to completion of the study and two were discontinued due to noncompliance. A total of 19 African American residents (11 males and 8 females) completed the study. The mean age of participants was 70.8±2.4 years ranging from 65 to 81 years old. Over 79% of subjects were single, widowed or divorced, or lived alone. All subjects had hypertension and 10 of 19 also had type 2 diabetes.

For diabetic participants, the telehomecare intervention (i.e. daily physiologic monitoring with tele-consultation and tele-education) resulted in significant improvements in hemoglobin A1C (HbA1C; decrease from 7.93±2.27 (pre-study) to 6.72±0.93 (post-study); p<0.05) and significant decrease in blood glucose levels within 4-weeks of initiating the study (month 1: 128.9±18.11 ml/dl to month 2: 116.7±13.51 ml/dl; p<0.05). Prior to the telehomecare intervention, 6 of 10 diabetic subjects had HbA1C readings above 7%, whereas by the end of the study this number was reduced in half. All subjects except for one experienced a reduction in H1A1C values, signifying improved control of blood sugars.

For hypertensives, the data did not show significant improvements in either systolic or diastolic pressures indicating that telemonitoring by itself is insufficient for improving outcomes. Other interventions in addition to monitoring may be necessary to affect change, such as implementation of dietary and exercise programs.

Both groups of subjects showed a high level of compliance with daily monitoring. Diabetic subject revealed a 95.4% compliance with daily monitoring (~1 missed monitoring day/mth). Subjects with hypertension also had high rates of compliance to daily monitoring 85% (~4 missed days/mth). Interestingly, two-thirds of subjects continued to self-monitor for up to 2 weeks after the study period ended.

Upon exit interviews, it was revealed that subjects experienced significant increases in self-management knowledge (p<0.05), self-efficacy with managing their chronic illness (p<0.05), and positive perception of telemedicine (p<0.05).

IV. CONCLUSION

While there may be initial fears and even suspicion of new technologies amongst low-income, minority seniors, our findings from this research suggest that seniors will adopt technologies, even those that may impact privacy, if they feel these technologies will have direct (perceived) benefits for them and their health and enable them to stay in their residences.

Through the use of home care technologies and health IT, telehomecare interventions such as those used in this research effort have potential to improve health outcomes

and prevent acute exacerbations of chronic illnesses through enhancement of awareness, compliance and self-management, enhanced self-efficacy, timely delivery of self-management education, and improved communication between community-based residents and care managers and health care providers.

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