

Exploring the Digital Divide as a Barrier to Use of a Personal Health Record in the Elderly

Eliana FRUTOS^{a,1}, Juan DESCALZO^a, Giuliana COLUSSI^a, Romina RAPISARDA^a,
Fernando PLAZZOTTA^a and Daniel LUNA^a

^aHealth Informatics Department, Hospital Italiano de Buenos Aires, Argentina

Abstract. The digital divide can hinder the ability of elderly patients to fully benefit from PHRs. They are “digital immigrants”, not having the life-long exposure to technology as younger generations, as well as physical and cognitive disabilities. The aim of this study was to explore the digital divide as a barrier for the use of a PHR in older adults (> 69 years of age) and describe the use of a PHR in an elderly population in Argentina. We conducted a cross sectional study which included older adults who attended the Coronavirus vaccination campaign in 2021. Data were collected through a survey encompassing digital divide factors and use of the PHR. A total of 128 participants agreed to complete the survey, 60.15% reported using the PHR. We found a statistically significant correlation of education level, having a personal computer and internet access with PHR use. Concerning PHR users, 45.45% reported needing assistance to use it. Although the elderly population represents a large portion of patients, there is not enough research done on their use experience using eHealth solutions. There is pending work in the eHealth field to integrate these elders into current PHRs and help them enjoy their benefits.

Keywords. Personal Health Records, Digital divide, Elderly, Consumer Health Informatics.

1. Introduction

The digital divide is the gap between those who have access to and benefit from modern information technology and those who don't [1]. Originally, the focus was set to access, mainly to computers and an internet connection. Nowadays, this divide is understood as a gap in the ability to use and gain benefits from technology, not only limited by access [2]. There are many factors acting on this divide such as gender, socioeconomic level, education and age [3]. The elderly are a group particularly at risk, as they are "digital immigrants", not having the life-long exposure to technology as younger generations [4], as well as physical and cognitive disabilities [5].

The world's population is rapidly aging, primarily in developing countries. In 2019, there were 703 million people aged 65 years or older (9.1% of the global population), this number is projected to double to nearly 1.5 billion in 2050 [6]. The increasing proportion of older adults presses upwards pressure on overall healthcare spending, as

¹ Eliana Frutos, Health Informatics Department, Hospital Italiano de Buenos Aires, Tte. Gral. Juan D. Perón 4190, C1199ABB Buenos Aires, Argentina; E-mail: eliana.frutos@hospitalitaliano.org.ar.

the use of medical care services rises with age, as well as per capita costs of healthcare [7-8].

Personal health records (PHRs) may be a valuable tool for older adults to manage their personal health information and self-manage their health and conditions [9-10]. They have been shown to provide long-term positive net value for organizations [11]. Using PHRs patients may view information like laboratory results and medication history, securely message their physicians, request prescription refills, and schedule appointments [12]. Factors influencing the digital divide in this population may hinder their possibilities to fully adopt PHRs and their benefits, this must be taken into account in design and implementation [5].

The goal of this study is to explore the digital divide as a barrier for the use of a PHR in older adults (> 69 years of age) and describe the use of a PHR in an elderly population in Argentina.

2. Methods

2.1 Setting

Our study took place at Hospital Italiano de Buenos Aires (HIBA), a community-based tertiary care hospital located in Buenos Aires, Argentina. HIBA is a HIMSS Level 7+ organization with an in-house developed health information system [13]. An integrated PHR has been available since 2007. Its main functionalities include: appointment scheduling, test results visualization, patient-practitioner secure messaging, health information sharing, medication management, and different teleconsultation modalities. At present, it has approximately 400,000 registered users. HIBA has its own health insurance called Plan de Salud (PS) with over 150,000 affiliates.

2.2 Design, participants and data collection

We conducted a cross sectional study which included older adults who attended the Coronavirus vaccination campaign between March and April 2021.

Eligible participants were included if they were older than 69 years old and affiliated to HIBA PS. Those physically or mentally unable to answer were excluded. Participants consented orally to participation.

Data were collected through a survey designed by an interdisciplinary team of health informatics specialists, sociologists and psychologists. The survey encompassed demographic characteristics, educational level, internet connection, access to electronic devices, use of PHR, need of assistance to use the PHR and functionality usage.

2.3 Ethical considerations

The research project was approved by the institutional ethics committee (CEPI # 4501). The study was performed in full agreement with current national and international ethical regulations.

3. Results

A total of 128 participants agreed to complete the survey. The median age was 77 (IQR 6) years old and the female sex was predominant (61.71%).

All surveyed had a HIBA PHR account but only 60.15% reported using it. Most non-users' PHRs were managed by someone else, usually a family member.

We explored variables related to the digital divide as internet access and electronic devices. We found a statistically significant correlation of having a personal computer ($p < 0.001$) and internet access ($p = 0.003$) with PHR use. Also evidenced with the variable education ($p = 0.03$).

Table 1. Baseline characteristics, digital divide and a comparison between users and non-users.

	Total = 128	Users (N=77)	Non-users (N=51)	p value
Baseline characteristics				
Female sex	61.71% (79)	68.83% (53)	50.98% (26)	0.52
Age, in years*	77.6 (IQR 6)	77 (IQR 6)	78 (IQR 6)	0.07
Education				0.03
Primary	14.84% (19)	11.68 % (9)	19.60% (10)	
Secondary	37.50% (48)	24.67% (19)	56.86% (29)	
Tertiary	23.44% (30)	28.57% (22)	15.68% (8)	
University or higher	24.22% (31)	35.06% (27)	7.84% (4)	
Digital divide				
Internet access	88.28% (113)	98.70% (76)	72.54% (37)	0.003
Electronic device access				
PC**	71.87% (92)	89.61% (69)	45.09% (23)	<0.001
Smartphone	92.18% (118)	97.40% (75)	84.31% (43)	0.22

*Median (Interquartile Range)

**PC=Personal computer

Concerning PHR users, 45.45% reported needing assistance to use it. Regarding PHR features, scheduling appointments (96.10%), review test results (84.41%) and teleconsultations (76.05%) were the most frequently used.

4. Discussion

In this study, we attempted to explore the digital divide in elderly users and non-users of a PHR and describe its use with the objective of rethinking effective ways to engage this population in the adoption of personal health records.

It is often assumed that the elderly population are non technology users [14], however our results showed that 88.28% had internet access, 71.87% had a personal computer and almost all the surveyed had smartphones. As the years go by this is a changing reality, the preconceptions about older adults from decades ago are no longer

true today. They have a higher level of connectivity, use smart devices and connect to the internet to keep in touch, socialize, manage their finances and consume media [15]. There is pending work in the eHealth field to integrate these elders into current PHRs and help them enjoy their benefits. This area is also critical when considering the possibilities of AI in PHRs, enhancing patient's experience (such as study interpretation support and presenting relevant information), understanding their perspective and attitudes towards AI and technology is key for successful implementation and AI-supported PHR enhancements.

When exploring the difference between PHR users and non-users, having a smartphone couldn't be correlated with PHR use, however having a personal computer was statistically significant ($p < 0.001$) and may be related with regular internet usage and a higher skill level regarding information technology. Computer literacy has been described as a common barrier for PHR use in works such as Jabour et al [16].

Another determinant for use is education level, our results ($p = 0.03$) are consistent with similar findings reported in the literature. Educational level is a known determinant of health. A higher education gives people the tools they need to access the health system and effective self-care. Advanced education may be a proxy for higher socioeconomic status. Both factors have been described as determinants of the digital divide [17].

Almost half of the participants who used the PHR (45.45%) said they needed some kind of assistance. While they may be aware of its functionalities and willing to use it they couldn't manage it by themselves completely. This division in assistance needed shows that this is an heterogeneous population regarding their usability and accessibility needs. It should be a strong point to take into consideration when designing PHRs: both accessibility options for the elderly and taking into account that not only the patients themselves may be users, but also families and caregivers. Similar findings have been reported by Kim et al [18].

Although the elderly population represents a large portion of patients, there is not enough research done on their use experience using eHealth solutions. Not fully understanding their needs and usage patterns may cause PHRs design to "not fit" properly into their daily lives, homes and needs. It is necessary to study the elderly in their different contexts. Many are living in nursing or retirement homes, which may be simpler to approach for researchers, in contrast with adults who live in their own homes. It's easy to group them into a single label, hiding their true complexity.

While there are many studies in the literature researching PHR use and the digital divide, most have a Northamerican or European setting. These could not adequately represent the population of developing countries such as Argentina, where the education and socioeconomic realities are different. Our research is relevant because it is the first to explore PHR use and the digital divide in an elderly population in our local context.

This study has some limitations. This is a single-center study and sample size ($n = 128$) was limited for practical reasons, which impacts the generalizability of this work. The older adult participants may not be representative of the general older adult population affiliated to PS, nor the general elderly population of Argentina, as private medicine patients represent a wealthy strata. On another note, patients had to be physically able to travel to the hospital to receive the vaccine, these could be sources of bias in our sample.

As a future line of work, we intend to explore more aspects of the digital divide, PHR user satisfaction and usability, expand our sample size and collaborate with other medical centers. This study is foundational to future work and research in the area.

5. Conclusion

The digital divide can hinder the ability of elderly patients to fully benefit from PHRs. The findings from this study revealed that many digital divide factors are related with PHR use among older adults, as has been reported in the literature. More research is necessary, applying a usability approach, to explore their needs and patterns of use, as well as their capabilities. In the future, more of our users will be older adults, it is necessary that health informatics professionals begin to take them into account as relevant eHealth consumers.

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