Support for e-Health Services Among Elderly Primary Care Patients

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Abstract

Background: E-health has a substantial potential to improve access to as well as support efficient and effective care for the elderly. Questions remain and must be addressed, however, regarding the challenges faced by the elderly in the use of this technology. The aim of the study was to assess the attitude (needs) and preferences of the elderly in a selected region of Poland regarding selected e-health services and the factors associated with them. **Materials and Methods:** The study was conducted among 286 patients over 60 years of age being served by general practitioners in southwest Poland's Lower Silesia Province. The assessment pertaining to e-health was based on a specially designed questionnaire. **Results:** Nearly one-third of the study respondents had a computer at home, and 61% of these (19% of all surveyed elderly) used it. Twenty-two percent of respondents used the Internet, at least occasionally, whereas 62% used mobile phones. Approximately 41% (n = 116) of the elderly had a favorable attitude toward e-health services (labeled here as supporters) and were willing to use it if/when offered an opportunity to do so. A substantial majority (84%) of supporters expressed a desire to receive simple medical recommendations via mobile phone or a computer, although significant majorities (61% and 60%, respectively) would like to receive the results of tests by e-mail or short message service reminders for scheduled visits or prescribed medications. Slightly less than half (47%) of e-health supporters would request appointments online. Among the more important factors associated with support of e-health services were urban residence, higher education, and normal cognitive function, as well as having a computer, Internet access, or a mobile phone. **Conclusions:** The majority of elderly patients in this Polish community are not overly enthusiastic about using information and communications technology tools in their healthcare. Nevertheless, a substantial percentage (41%) among this group support selected e-health services.

Key words: elderly, e-health services, information and communications technology tools, preferences, attitudes

Introduction

Modern information and communications technology (ICT), including the Internet and mobile phones, have become indispensable tools in most, if not all, sectors of modern society, including healthcare. E-health can be

defined as the use of ICT, especially the Internet, to enable healthcare and improve health in the population. It provides a new method for using health resources.^{1,2} In a broader sense, the term characterizes also a new way of working, an attitude, and a commitment for networked, global thinking, to improve healthcare locally, regionally, and worldwide by using ICT.²⁻⁴ E-health technologies have the potential to improve access to healthcare, support information exchange, reduce costs, and improve public and individual health through personalized medicine and aggregated health data.^{5,6} Nowadays, e-health technologies are on a rapid course of development and adoption by mainstream medicine, especially in situations where the patient and the provider are separated by physical or functional distance. Although the traditional patient has been somewhat passive as a recipient of healthcare services, the modern patient is more willing and able to assume a more proactive role in health-seeking behavior by virtue of the ubiquitous Internet and mobile electronic devices.^{4,7,8} To meet the growing expectations of patients, numerous Web platforms now provide their users with useful medical information. Increasingly, medical centers as well as primary healthcare facilities are now offering remote electronic services⁹⁻¹¹ such as access to a patient's electronic health record and personal health record,^{12,13} online health services such as e-registration and e-prescribing, short message service (SMS) reminders for appointments and prescribed medicines,¹⁴⁻¹⁷ and, most importantly, clinical applications such as teleconsultation/diagnosis^{4,18} as well as telemonitoring of the electrocardiogram, blood pressure, blood glucose levels, and other parameters.^{4,5,19}

Research performed in Poland indicates growing interest in the use of the Internet for medical purposes, defined here as e-health, making e-health an important and desirable element of healthcare for many citizens.^{10,20-22} In Poland, a steady positive trend of Internet use in seeking information on all aspects of health and disease has been documented.^{20,21,23} The same trend has been observed in other European countries as well as in other regions of the world.^{11,23-26} For example, in 2005, 42% of the Polish adult population used the Internet for medical or other health purposes. In 2007, this percentage increased to 53%, and in 2012, the latest available data, it was approximately 64%.²⁰⁻²² If we take into consideration only Internet users, the percentage is over 80%. However, the availability of computers and Internet access in households differs greatly depending on place of residence and the level of urbanization. According to the Central Statistics Office in Poland,^{27,28} in urban areas significantly more households are equipped with computers and have Internet access, compared with households in rural areas. On the other hand, during the last 5 years, in rural settings the percentage of households with a computer and Internet access has increased much faster (an average of 7 percentage points per year) than among

households in large cities (5.5 percentage points) and small towns (4.6 percentage points).²⁸

As expected, the younger generation is more adept in the use of ICT tools in everyday life compared with the older generation, which tends to be more afflicted with morbidity and disability that both limit physical dexterity and possibly lead to reluctance to learn new ways of doing things.^{24,29,30} This is especially significant because the world population is rapidly aging as a result of both longer life expectancy and declining fertility rates. Between 2000 and 2050, the proportion of the world's population over 60 years of age will double from about 11% to 22%. In absolute terms, the number of people 60 years of age or older is expected to increase from 605 million to 2 billion in the same period.³¹ The most rapid increase is among those 80 years of age or older. In Poland, current estimates place the percentage of people 65 years of age and over at 13.8%.³² In 2007 an estimated 3% of Poland's population was 80 or more years old. This percentage is expected to increase to 4.2% in 2020 and 5.5% in 2030.³³

These demographic changes imply a significant increase in the demand for healthcare on a global scale. Innovative solutions such as e-health may produce greater efficiency in care delivery for the elderly. Hence, it is increasingly important and timely to learn about the opinions, perspectives, and concerns regarding e-health in this segment of the population.

There is a dearth of research and, therefore, inadequate information available on the needs, views, and attitudes of the elderly population in the use of e-health services. The objective of this study is to shed light on the elderly and e-health by assessing the attitudes and perceptions of a sample of elderly people among the population of one region of Poland, specifically, their acceptance of a selected range of e-health services for their healthcare and medical care.

Materials and Methods

SUBJECTS

A two-stage sampling scheme was implemented to represent elderly patients in a selected Lower Silesia district in Poland. The first stage consisted of a random selection of eight general practitioner practices from a total of 250. The second stage consisted of listing all patients 60 years of age or older and screening them for participation in this survey. This second stage resulted in a total of 400 patients who were recruited to participate in this study. The eight randomly selected general practitioner practices, four urban and four rural, were included in the survey, and each clinic was required to invite the first 50 elderly patients who came for an appointment to participate in the survey. Hence, 400 patients were recruited from the total patient population using the selected eight general practices in Lower Silesia Province in Poland. Of the 400 patients eligible to participate in the survey, 286 agreed to do so and gave their informed consent. Each participant was then given a subsequent appointment with a physician (254 patients in a clinic office, 32 in their home) for personal interviews to collect the data. The survey was completed between August and December 2012.

The assessment of the needs and preferences of this sample *vis-à-vis* a range of e-health services was based on a formal interview

schedule that was designed for this study. Respondents were queried verbally regarding computer ownership and Internet use as well as their ability to use mobile phones and, subsequently, to express their preferences for use of these ICT tools in their care (see *Appendix*). Respondents were provided with the comprehensive information about the objectives and scope of the survey. The questionnaire was given verbally by community nurses who were especially trained for the study and was supplemented with sociodemographic features and information about general health of respondents (e.g., age, gender, education, place of residence, chronic diseases, etc.).

A comprehensive geriatric assessment was completed for each respondent, including detailed medical history and physical examination, an assessment of a mental status (memory, counting, orientation, concentration, attention, language functions) based on the Folstein Scale Mini-Mental State Examination,³⁴ and evaluation of the emotional state using a geriatric depression scale.³⁵ The level of functional capacity was measured by the Barthel ADL Index,³⁶ which assesses the ability to perform basic activities of daily living such as dressing, eating, moving, maintaining personal hygiene, sphincter control, and others. The status of the respondents' musculoskeletal system and the risk of falls were also assessed by a simple timed "up and go" test,³⁷ which evaluated the patient's movement from sitting to standing and walking for short distances. The appropriate tests designed for older people were performed by family physicians who received special training for this study. The survey protocol was approved by the Bioethical Committee at Wrocław Medical University (statutory activity number 481/2010).

DATA ANALYSIS

The respondents were grouped into two sets: supporters and nonsupporters. This was determined on the basis of comparisons of average scores regarding acceptance of a range of e-health services. The respondents who gave a positive answer "Yes" to the question about the willingness to use e-health services were categorized as supporters; the respondents who gave a negative answer "No" or were undecided ("I don't know") were categorized as nonsupporters. The assessment of predictors of these two groups (supporters and nonsupporters) was based on the significance of differences between means, estimated by *t* test for normally distributed variables. In the case of non-normally distributed variables, the Welch test was used. For qualitative variables, chi-squared tests were performed to determine statistical significance. All tests were two-sided, and significance level was set at $p=0.05$. Statistical analysis was performed via Statistica version 9.0 software (Statsoft Inc., Tulsa, OK).

Results

CHARACTERISTICS OF THE RESPONDENTS

Among the 400 elderly invited to participate, 286 consented to participate (71.5% response rate). The study group included 103 males (36%) and 183 females (64%), and the mean age was 73.8 ± 7.7 years. Two age categories were distinguished: 60–74 years of age ($n=138$) and 75–90 years of age ($n=148$). Forty-one percent of respondents ($n=117$) lived in urban areas, and 59% ($n=169$) lived in rural areas.

More than two-thirds of respondents lived with other family members (68%, $n = 194$); the remaining 32% lived alone. More detailed information about the study population is provided in *Table 1*.

USE OF COMPUTERS AND THE INTERNET AND SUPPORT OF E-HEALTH SERVICES AND ASSOCIATED FACTORS

Nearly one-third (31%) of the study respondents had a computer at home, and 61% of these (19% of all surveyed elderly) used it. Twenty-two percent of respondents used the Internet, at least occasionally, whereas mobile phones were used by 62%. As mentioned earlier, the study population was divided into two main groups based on attitude

toward e-health: Group I included supporters of e-health services (40.6% of respondents), and Group II included nonsupporters/undecided regarding e-health services (59.4% of respondents). Group I used computers ($p = 0.025$) and the Internet ($p = 0.005$) significantly more frequently than those in Group II and, similarly, used a mobile phone ($p = 0.002$) more often as well (*Table 1*). Further review of *Table 1* finds that supporters of e-health (Group I) had more formal education than nonsupporters/undecided (Group II) regarding these services. In Group I, significantly more people had higher formal education than those in Group II (47% versus 28%, $p = 0.001$), and a significantly lower percentage of supporters (18%) than nonsupporters

(30%) had primary/vocational education with similar attitudes toward e-health ($p = 0.022$). There was also a statistically significant relationship between place of residence and support for e-health. A significantly ($p = 0.018$) greater percentage of supporters (49%) than nonsupporters (35%) lived in urban areas. There was no significant difference in the percentages of respondent supporters and nonsupporters living alone or with family members. Similarly, with regard to age, sex, and chronic conditions, no important differences were observed between the two groups.

ATTITUDE TOWARD SELECTED E-HEALTH SERVICES AND ASSOCIATED FACTORS

Among supporters of e-health services (Group I), as shown in *Table 2*, a significant majority (84%) had a favorable attitude toward receiving simple medical recommendations from a doctor via mobile phone or a computer. Sizeable majorities (61% and 60%, respectively) expressed willingness to receive medical test results and SMS reminders for scheduled visits to the health center and/or prescribed medications. However, only 47% of all respondents would register for a medical appointment online, 36% supported teleconsultation, and 39% approved of telemonitoring for health parameters (e.g., blood pressure, blood glucose, body weight, etc.).

Multivariate analysis of different types of e-health services was conducted among the group of e-health supporters (*Table 2*). Age, place of residence, education, and use of ICT tools (computer, Internet, and mobile phone) proved to be the most significant. The subgroup of the oldest respondents (75–90 years) was significantly more

Table 1. Selected Demographic Characteristics, Health Conditions, and Computer and Internet Use

CHARACTERISTICS	ALL RESPONDENTS (N= 286)	GROUP I (E-HEALTH SUPPORTERS) (N= 116)	GROUP II (E-HEALTH NONSUPPORTERS/ UNDECIDED) (N= 170)	P
Sex				
Men	36%	39%	34%	0.387
Women	64%	61%	66%	
Age (years) (mean ± SD)	73.8 ± 7.7	74.8 ± 7.2	73.1 ± 8.1	0.069
Age groups (years)				
60–74	48%	49%	48%	0.868
75–90	52%	51%	52%	
Education				
Basic/vocational	25%	18% ^a	30% ^a	0.022 ^a
Secondary	39%	35%	42%	0.234
Higher/some higher	36%	47% ^a	28% ^a	0.001 ^a
Residence place				
Urban	41%	49% ^a	35% ^a	0.018 ^a
Rural	59%	51% ^a	65% ^a	
Residence type				
Alone	32%	36%	29%	0.212
With family	68%	64%	71%	
Chronic diseases ^b				
Yes	87%	85%	89%	0.317
No	13%	15%	11%	
Computer use	19%	25% ^a	14.5% ^a	0.025 ^a
Internet use	22%	30% ^a	16% ^a	0.005 ^a
Mobile phone use	62%	73% ^a	55% ^a	0.002 ^a

Data are percentages unless indicated otherwise.

^aSignificant differences between groups.

^bIn particular, hypertension, coronary heart disease, heart failure, diabetes, dementia, and hypothyroidism, among others.

Table 2. Types of e-Health Services and Factors Affecting Their Use

VARIABLE, CATEGORY	ONLINE REGISTRATION	P	SMS REMINDERS	P	TELECONSULTATION	P	TELEMONITORING	P	MEDICAL TEST RESULTS REPORTING (SMS, E-MAIL)	P	SIMPLE MEDICAL RECOMMENDATIONS (SMS, E-MAIL)	P
E-health supporters												
All (n=116)	46.6		60.3		35.6		38.8		61.2		83.6	
Sex												
Men (n=45)	52.9	0.345	64.7	0.505	35.3	0.925	38.2	0.931	61.7	0.939	79.4	0.401
Women (n=71)	43.9		58.5		35.8		39.0		61.0		85.4	
Age group (years)												
60-74 (n=57)	40.5	0.218	46.4	0.002 ^a	37.3	0.728	33.9	0.309	51.8	0.032 ^a	87.5	0.358
75-90 (n=59)	51.9		74.6		34.2		43.1		71.2		81.3	
Education												
Basic/vocational (n=21)	15.9		27.3		22.7		20.5		34.1		93.2	
Secondary (n=41)	40.0	<0.001 ^a	55.0	<0.001 ^a	30.0	<0.001 ^a	35.0	<0.001 ^a	55.0	<0.001 ^a	80.0	0.187
Higher/some higher (n=54)	78.9		78.9		57.9		57.9		84.2		89.5	
Residency place												
Urban (n=57)	64.2	<0.001 ^a	88.9	<0.001 ^a	47.2	0.016 ^a	50.1	0.012 ^a	86.8	<0.001 ^a	76.8	0.048 ^a
Rural (n=59)	30.9		29.1		21.8		27.3		36.4		90.2	
Residency type												
Alone (n=42)	47.0	0.945	69.5	0.125	36.1	0.855	43.2	0.287	64.4	0.330	79.3	0.318
With family (n=74)	46.4		55.1		35.3		36.3		59.4		86.0	
Computer use												
Yes (n=29)	75.8	<0.001 ^a	78.3	0.022 ^a	69.0	<0.001 ^a	72.4	<0.001 ^a	82.8	0.006 ^a	79.3	0.464
No (n=87)	36.8		54.3		24.1		27.6		54.0		85.1	
Internet use												
Yes (n=35)	80.0	<0.001 ^a	75.0	0.033 ^a	76.0	<0.001 ^a	72.0	<0.001 ^a	84.0	0.004 ^a	81.3	0.585
No (n=81)	38.5		53.9		25.3		29.7		56.0		84.6	
Mobile phone use												
Yes (n=85)	56.5	<0.001 ^a	71.7	<0.001 ^a	44.7	<0.001 ^a	45.9	0.01 ^a	74.1	<0.001 ^a	80.0	0.082
No (n=31)	19.4		29.0		9.7		19.4		25.8		93.5	

Data are percentages.

^aSignificant differences between groups.

SMS, short message service.

interested in getting SMS reminders than the subgroup of younger elderly (60–74 years) (75% versus 46%, respectively; $p=0.002$). Similarly, the percentage of respondents (71%) in the 75–90-year-old group who were more willing to receive results of medical test by SMS or e-mail was higher than in the group of “younger” patients (52%) in the 60–74-year-old group ($p=0.032$). With regard to the place of residence, elderly living in urban areas were far more interested in e-health services than rural residents. This was especially the case for online registration for a doctor’s visit (64% versus 31%; $p<0.001$), receiving SMS reminders (89% versus 29%; $p<0.001$), teleconsultation (47% versus 22%; $p=0.016$), telemonitoring (50% versus 27%; $p=0.012$), and receiving medical test results electronically (87% versus 36%; $p<0.001$). The only e-health service receiving a significantly larger percentage of support among rural than urban respondents was receiving simple medical advice without the need for a personal check-up visit to the doctor (77% versus 90%; $p=0.048$). There was a strong positive correlation between education and various types of e-health applications; the higher the education level, the higher the frequency of interest in e-health services. As would be expected, use of ICT tools was significantly associated with all mentioned types of e-health services except receiving online simple medical recommendations. No additional significant associations were found between types of e-health solutions and other variables as sex and type of residency.

COMPREHENSIVE GERIATRIC ASSESSMENT

As part of a comprehensive geriatric assessment, the Mini-Mental State Examination was conducted among respondents to determine significant differences in support for e-health services (Table 3). The average score for all respondents was 26.5 points. This is the lower limit of normal values. A significant difference ($p<0.001$) between supporters and nonsupporters of e-health services occurred in the overall average scores (28.3 points for supporters versus 25.3 points for nonsupporters). This indicates normal cognitive function among members of Group I and the likelihood of a mild cognitive impair-

ment requiring further assessment in Group II. There were no significant differences between Groups I and II in emotional status (geriatric depression scale), functional status (Barthel Index), and efficiency of movement (timed “up and go” test). Additionally, the average number of chronic diseases did not differ significantly between the groups. The results of the comprehensive geriatric assessment reveal that for all intents and purposes the only significant difference is in cognitive function among supporters and non-supporters of e-health applications.

Discussion

Typically, the elderly have less familiarity and mastery of ICT skills, and more so with advancing age.^{29,38–40} Additionally, the international e-health project conducted in Poland in 2005–2007 on a randomly selected population of 1,000 adults revealed that among the elderly (60–80 years of age), only 22% were using the Internet; however, among this group, 63% (14% of the total elderly population) had searched for information pertaining to health, diseases, or health problems at least once during the 12 months prior to the survey.^{20,23} By comparison, a Kaiser Family Foundation national survey of older Americans found that 31% of seniors (65 years of age or older) had ever gone online, and 21% of them had gone online to look for health and medical information.⁴¹ In turn, according to a survey by Tak and Hong⁴² of older adults with arthritis, 26.6% of elderly respondents had a computer at home with access to Internet, and 39% of them had sought arthritis information on the Internet (10.5% of all older adults). Our study showed comparable results, with 31% of respondents having a computer at home and 22% of older patients going online at least from time to time.

Among our study population 41% of the elderly proved, by our definition, to be supporters of e-health services and declared the desire for having them in the near future. This is an encouraging result. As might be expected,^{11,22,23,43,44} uses of computer, Internet, and mobile phone were strongly related to the acceptance of e-health services both generally and in particular types of e-health applica-

tions. Women predominated among e-health supporters (women, 61%; men, 39%). When all respondents were included the difference was slightly higher (women, 64%; men, 36%). We might speculate that this difference may be due to both longer life expectancy and more frequent reporting to the doctor for advice. A significantly higher percentage of e-health service supporters had higher levels of education than nonsupporters. This has also been reported by several other studies.^{23,42–47} Additionally, a significantly larger percentage of e-health supporters scored higher on the Folstein scale, indicating normal cognitive functioning. This is a significant

Table 3. E-health and Comprehensive Geriatric Assessment Among Respondents (Main Tests)

COMPREHENSIVE GERIATRIC ASSESSMENT	ALL RESPONDENTS (N= 286)	GROUP I (E-HEALTH SUPPORTERS) (N= 116)	GROUP II (E-HEALTH NONSUPPORTERS/ UNDECIDED (N= 170)	P
MMSE test (0–30 points)	26.50±3.45	28.28±2.78 ^a	25.28±4.08 ^a	<0.001 ^a
Geriatric depression screening scale (0–15 points)	3.18±2.61	3.28±3.65	3.11±1.87	0.606
Barthel scale (0–100 points)	94.32±10.62	93.02±14.95	95.21±8.24	0.113
TUG test (s)	10.86±4.52	10.52±3.39	11.1±5.22	0.293
Number of chronic diseases (n)	2.30±1.44	2.40±1.49	2.23±1.41	0.329

Data are mean±SD values.

^aSignificant differences between groups.

MMSE, Mini-Mental State Examination; TUG, timed “up and go.”

finding because normal cognitive functioning is directly related to the functioning of older people in their surroundings, high quality of their life, and so-called “successful aging.”^{48–50} Prevalence of dementia syndromes in the population over 65 years is estimated at about 10–20%.^{48,51,52} Extensive analysis of international epidemiological studies showed that the proportion of patients with dementia increases logarithmically with age from about 1% at 65 years of age to about 30–40% after 80 years of age.^{48,53,54} Normal cognitive functioning proved to be an essential factor influencing the potential support for, acceptance, and use of e-health services in the near future.

Furthermore, our survey revealed a significant relationship between place of residence of the elderly and support for e-health applications. Older people living in urban areas were significantly more interested in use of ICT tools and different types of e-health services; the strongest association ($p < 0.001$) concerned online registration for medical appointments, receiving SMS reminders of planned visits or taken drugs, and online reporting about medical test results. The effect of urban residence has also been reported by others, mostly for the general population.^{20,23,27,43–45,55} For example, Cresci et al.⁴⁵ found that among urban older adults, computer users compared with nonusers had higher levels of education, were younger, were more likely to be employed, had higher annual incomes, were healthier, and were more active in their respective communities. Our research did not show significant differences between the groups of supporters/nonsupporters with regard to age and physical efficiency but confirmed significant associations between support for e-health services and higher education and urban residence. However, among the elderly, age did not appear as a differentiating factor between supporters and nonsupporters, but it is noteworthy that among supporters, respondents in the age group of 75–90 years turned out to be more interested in getting SMS reminders and receiving results of medical tests by SMS or e-mail than those 60–74 years of age. This may be related to a higher incidence of memory disorders and functional disability, but we have no direct evidence of that.

The findings of a recent publication concerning acceptance of e-health solutions among Polish patients with chronic respiratory conditions⁴⁴ are consistent with those of this survey. Higher education and the use of computers and the Internet are significantly related to the acceptance of the most popular e-health applications, regardless of gender. However, contrary to our findings, place of residence was not a significant factor affecting the acceptance of e-health services in that study.⁴⁴ As regards different types of e-health applications, our respondents indicated receiving simple medical recommendations via a mobile phone or a computer, online reporting about medical test results, and SMS reminders for scheduled visits or prescribed drugs as the most relevant. More advanced forms of interactions such as teleconsultation with the doctor and/or other health professionals and telemonitoring of important health parameters had the lowest level of acceptance among e-health supporters. Similar results were presented by Duplaga⁴⁴ and others^{47,56}; however, online scheduling of appointments with physicians—highest rated in the study of Duplaga⁴⁴—in our survey was one of the services that gathered lower interest. On the other hand, the two study

populations were not the same. Our study population consisted of older patients, whereas the study of Duplaga⁴⁴ the population consisted of people with a high incidence of chronic conditions. Moreover, in the study of Duplaga,⁴⁴ respondents were under the highly specialized care of a tertiary-care referral center, whereas in our study the elderly were recruited from the population of patients served by general practitioners.

It is useful to add here that the general acceptance of e-health services by older patients has been confirmed in other recent studies.^{30,57,58} Most elderly expressed positive attitudes towards using e-health and found the services useful, convenient, and easy to use.³⁰ The attractiveness of such services was directly related to the compatibility of the services with personal needs and the older people's perception of whether new technology can be of benefit to them.^{30,58} So it seems to be worthwhile to assess whether, how much, and how the attitude, needs, and acceptance of e-health solutions may change after demonstrating to the elderly the basic use of ICT tools and related facilities and benefits (e.g., in the form of a short educational course).

LIMITATIONS

This study was conducted in the southwestern, highly urbanized Lower Silesia Province in Poland with higher and relatively easy access to ICT tools. Hence, it can be expected that use of computers, mobile phones, and the Internet by the elderly in general may be lower than we observed. Furthermore, the response rate was relatively low (71.5%), which could suggest that those patients who refused to participate in the study may have had negative feelings about telemedicine and e-health. However, the fact that participation required an additional visit to the clinic seems to be more likely a discouraging factor. Moreover, the e-health service spectrum addressed in the study was not complete. Assessment of the attitude of respondents toward other e-health solutions (e.g., access to a patient's electronic health record or access to the doctor's Web site) can also become important issues to be addressed in future research.

Although some of these results have been reported in the published literature, more definitive research is needed, especially research that relies on large random samples. On the other hand, to our knowledge, this has been the first Polish study focused on the assessment of attitudes and potential acceptance of ICT tools and e-health services among the general elderly population.

Conclusions

Aging societies worldwide reflect an accompanying increase in demand for personalized health services. This will, in turn, put increased pressure on the medical care providers and infrastructure while increasing the national burdens of medical costs. It is important that the elderly are faced with increasing problems of geographic and functional access to health services. These challenges require innovative solutions that have been demonstrated to transcend access problems and reduce costs for both provider and patient. This study presents evidence of significant interest in e-health services among an elderly population in one region of Poland. The findings indicate

that 19% of elderly patients had and can use computers, and 62% can use their mobile phone. The Internet is used from time to time by 22% of the elderly. The most important predictors influencing the growth of interest of e-health services were higher education, normal cognitive function, and living in an urban area as well as computer, Internet, and mobile phone use. Depending on the type of e-health solutions, a variable level of commitment in e-health services was observed, and the kind of service that has been declared of most interest was receiving from the doctor simple medical recommendations on a mobile phone or a computer.

Elderly patients are certainly not among the most active and enthusiastic users of ICT tools, although more than 40% were willing to benefit from the e-health services by obtaining information on their health, receiving reminders for scheduled visits to the health center or medication instructions, consulting the doctor at a distance, or monitoring important health parameters relevant to them. These people, however, need to become aware of the e-health alternatives that are offered to them and the benefits they might accrue. Older patients are now at the cusp of the modern information society.

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Disclosure Statement

No competing financial interests exist.

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(Appendix follows →)

Appendix

Table A1. Questionnaire for Patients: Computer, Internet, Mobile Phone Use, and Preferences for Use of Different Types of e-Health Services

QUESTION	ANSWERS
Do you have a computer at home?	Yes No
Can you use a computer?	Yes No
Can you use the Internet?	Yes No
Do you have your own mobile phone and are able to use it?	Yes No
Would you like to receive information about your health from your doctor via a mobile phone or computer?	Yes No I don't know
If yes, which of these telemedicine services in particular would you like to use?	
<ul style="list-style-type: none"> • online registration for a medical appointment 	Yes No I don't know
<ul style="list-style-type: none"> • SMS reminders of planned visits or prescribed drugs 	Yes No I don't know
<ul style="list-style-type: none"> • teleconsultation via the personal computer or mobile phone 	Yes No I don't know
<ul style="list-style-type: none"> • remote monitoring of basic health measurements (e.g., blood pressure, electrocardiogram, heart and lung auscultation, blood glucose concentrations, weight, temperature, etc.) 	Yes No I don't know
<ul style="list-style-type: none"> • remote/online reporting about medical test results 	Yes No I don't know
<ul style="list-style-type: none"> • receiving simple medical recommendations directly via a mobile phone or computer 	Yes No I don't know
SMS, short message service	