Research Article

e-Health and knowledge assessment of students and academic staff recommendations for updating nursing curricula

Fatjona Kamberi[1], Jerina Jaho[2], Brunilda Subashi[2], Glodiana Sinanaj[2], Silda Caushaj[2], Irini Rapushi[2], Yllka Stramarko[2]

1. Independent researcher; 2. Ismail Qemali University of Vlore, Albania

The purpose was to assess the knowledge of nursing students and academic staff regarding eHealth. The web-based cross-sectional study was conducted using the Google form platform. The sample was the students and academic staff of the Faculty of Health, University of Vlore in Albania. In the final analysis, 145 individuals were included; 128 were women and 17 were men. The average age of the participants was 25.17 years, namely students (77.93%) and academic staff (22.07%). 48.97% of the participants reported that they considered themselves a little informed about eHealth, p=0.001. The most often cited obstacles to the use of eHealth were health professionals' lack of familiarity with and confidence in eHealth tools, patients' lack of interest in and awareness of digital health, or limited access to eHealth resources. Developing a health education module for eHealth that may be incorporated into the nursing curriculum to tailor patient care regimens is recommended.

Introduction

Digital health, or eHealth, is a term first used before 1999 and currently seems to serve as a "catch-all word" used to characterize not only "Internet Medicine" but also practically everything related to computers and medicine. The terms were first used by industry and marketing. They coined and used this term in line with other "e-words" such as e-commerce, e-business, e-solutions, and so on, in an attempt to convey the promises and principles of e-commerce (commerce electronic) in the health arena and to give an overview of the new opportunities that the Internet was opening in the field of

 doi.org/10.32388/C39WYW

health care. The Internet created new opportunities and challenges for the traditional healthcare information technology industry, and it seemed appropriate to use a new term to address these issues. This new term included digital health or e-Health, which needed a definition that best defined what digital health represents. E-Health involves more than a simple technological development. The term and concept are defined as follows: "E-health" is an emerging field at the intersection of medical informatics, public health, and business, referring to health services and information delivered or enhanced through the Internet and related technologies. In a broader sense, the term refers to not only technical development but also a state of mind, a way of thinking, an attitude, and a commitment to global network thinking to improve health care at local, regional, and national levels, all over the world using information and communication technology [1]. The World Health Organization (WHO) defines eHealth as *"the cost-effective and secure use of information and communication technologies in support of health and health-related areas including health care, health surveillance, health education, and scientific research"* [2] . E-Health is defined by the European Commission as *"... the use of modern information and communication technologies to meet the needs of citizens, patients, healthcare professionals, healthcare providers, and policymakers"* [3]. Depending on how people choose to define it, eHealth/e-Health or digital health includes a wide variety of sub-fields of digital health, such as: electronic health records; electronic medical records; telehealth and telemedicine; health information technology (IT) systems; consumer health IT data; virtual healthcare; and mobile health (mHealth) [4]. The benefits of using telehealth and telemedicine include: lowering health care costs; increasing patient access to health care-especially in areas not covered by adequate health care; improving the quality and continuity of care; Improved access to health care colleagues by distance care providers; increased accuracy in care delivery; improved use of digital health resources; expanded scope of medical services provided; increased access to continuing medical education; reduced time for diagnosis and treatment with accelerated consultations Improving digital health data collection in remote areas and increasing the productivity of health care staff [5]. According to studies, nurses are essential to the field of digital health. Once they have contributed to the creation of the care plan, they are in charge of the patient registration stage (which includes patient education), the daily review of incoming data, the triage of patient complaints, and the last stage of patient interviews regarding their experience with the digital health care system [6]. But even though virtual communication in nursing between healthcare organizations and healthcare professionals, as well as virtual communication between nurses and patients, are becoming more and more common, especially

nurses have encountered many challenges during the digitalization of the healthcare system, demonstrating a lack of adequate knowledge addressing the need for training and education in relation to the use of e-Health [7]. Where nurses play a crucial role, digital health has the potential to increase chronic disease prevention. The efficiency of preventative eHealth treatments and the contribution of digital health to bettering health promotion and illness prevention are the key points of this role [8]. They also play an essential role in the implementation of e-Health interventions for the primary, secondary, and tertiary prevention of chronic diseases [9]. The use of e-Health in healthcare has great potential, but in order to make sure that it is safe and of high quality, a number of requirements must be met, including the optimization of health research, the provision of evidence-based e-Health, consideration of blended care, or the blending of in-person and remote care, and personalized care for each patient [10][11]. In Albania, there is no scientific data regarding the knowledge of academic staff and nursing students as future nurses regarding e-Health. Through this study, we aimed to address this lack with an impact on the quality of teaching, learning, and health care of the population.

Materials and Methods

The aim of the study was to make an assessment of the knowledge of students and academic staff regarding e-Health. Specific objectives were: (1) evidence of the lack of knowledge regarding e-Health and the design of focused interventions based on evidence, mainly for updating nursing curricula. (2) Provide an overview of e-Health and its role in empowering patients to make health decisions, access health services, improve the quality of care provided, and improve patient health outcomes through a literature review. The study was cross-sectional and web-based using the Google forms platform and the institutional email address of both students and academic staff. The study population was the students of the Faculty of Health (bachelor and master study programs) and the academic staff of the same faculty. Data collection was performed through a self-administered questionnaire. The call for participation was distributed several times. The questionnaire was designed based on the literature and validation was performed through a pilot study. Data collection lasted for a period of one month throughout the year 2022. The literature-based questionnaire consisted of 3 sections. The socio-demographic data section, the digital health knowledge section, and the trustworthiness of digital tools section with Yes, No, and don't know rating scales. A set of questions that assessed the study participants' perceptions of obstacles to the expanded use of e-Health in clinical practice was

included. Only people who expressed a willingness to take part in the study were given the opportunity to complete the questionnaire just once.

Ethical aspects

The Faculty of Health, University of Vlore "Ismail Qemali", Albania has given the project ethical approval. The Helsinki Declaration on Medical Research's ethical standards, which include the inclusion of human participants in research, and the Checklist for Reporting Results of Internet E-Surveys (CHERRIESethical)'s guidelines were followed in the development of the study protocol [12]. All study participants had the chance to opt out at any time and were given the following features: voluntary participation, anonymity, and protection of personal data in line with applicable law. Additionally, participants were given the chance to provide informed permission through a required tick box where they indicated their agreement to take part in the study. The participant had to check this box in order to continue with the survey.

Data analysis

Demographic data and study findings were described using descriptive statistics given in mean, standard deviation (SD) for continuous variables, and percentages for categorical variables. To examine the statistical significance of relationships between variables, cross-tabulations (MxN) and the X2 test were used. Data were considered statistically significant at $p \leq 0.05$ values. The statistical program CD-C EpiInfoTM 7 software, version 7.1.3.10, was used for the analysis.

Results

Socio-demographic characteristics

In the final analysis of the study, 145 individuals were included; 128 were women and 17 were men. The average age of the participants in the study was 25.17 years. Most of the participants were students (77.93%) and academic staff (22.07%). 48.97% of the participants in the study reported that they considered themselves a little informed about e-Health, while 14.48% were not informed at all. Table 1 shows that 53.98% of students and 31.25% of academic staff believe they are uninformed about digital health.

Characteristics	Frequency n	Percent %
Gender		
Female	128	88.28
Male	17	11.72
Age (years)		
Mean	25.17	
SD Dev	±9.38	
Mode	19	
Category		
Student	113	77.93
Academic staff	32	22.07
How informed do you consider yourself about e-Health?		
Expert	4	2.76
Sufficiently informed	49	33.79
Little informed	71	48.97
Not at all informed	21	14.48
How informed do you consider yourself about e-Health?	**Academic staff n (%)**	**Students n (%)**
Expert	2 (6.25)	2(1.77)
Sufficiently informed	19(59.38)	30(26.55)
Little informed	10(31.25)	61(53.98)
Not at all informed	1(3.13)	20(17.7)
TOTAL	**145**	**100**

doi.org/10.32388/C39WYW

Table 1. Socio-demographic data of the study participants, n = 145

Questionnaire results - What does digital health mean?

Table 2 presents the results of the questionnaire related to knowledge about digital health. There are a total of four questions that assess knowledge. From the results, it is noted that for the questions, no statistical relationship is evident between the category of academic staff and students. The only question that showed a statistical relationship with the category was question 3, where p=0.0002.

The participants in the study, regardless of whether they were students or academic staff, showed a marked lack of knowledge about what digital health represents since a large percentage considered among both categories in the study answered they Don't know and no.

Questions	Expert n (%)	Sufficiently informed n (%)	Little informed n (%)	Not at all informed n (%)	P values
1. *How informed do you consider yourself to be about e-health?*					
Academic staff	2 (6.25)	19(59.38)	10(31.25)	1(3.13)	0,0011
Students	2 (1.77)	30(26.55)	61(53.98)	20(17.7)	
What does digital health mean?		**No n (%)**	**I do not know n (%)**	**Yes n (%)**	**P values**
2. *Digital health is the use of artificial intelligence to simulate the course of diseases, increase knowledge about them, and improve teaching opportunities.*		27(18.62)	52(35.86)	66(45.52)	>0.05
3. *Digital health is the use of electronic devices to assess and record biological parameters in the clinical environment.*		24(16.55)	52(35.86)	69(47.59)	
Academic staff		10(31.25)	2(6.25)	20(62.50)	0,0002
Students		14(12.39)	50(44.25)	49(43.36)	
4. *Digital health is the use of information and communication technology to treat patients, conduct research, educate health professionals, track the progress of diseases and monitor public health.*		12(8.28)	38(26.21)	95(65.52)	
Academic staff		3(9.38)	4(12.5)	25(78.13)	>0.05
Students		9(7.96)	34(30.09)	70(61.95)	
5. *Digital health is the use of electronically collected data for epidemiology, scientific research, and administrative purposes.*		22(15.17)	47(32.41)	76(54.41)	>0.05

Table 2. Knowledge about eHealth (digital health)

Table 3 presents the results of questions about the reliability of digital tools in health care. From this table, it can be seen that there was no statistical relationship between students and academic staff, p>0.05. Also, a significant percentage of participants in the study reported that they had no knowledge about the reliability of digital tools used in health.

Questions	No n (%)	I do not know n (%)	Yes n (%)	P values
1. Current technological, ethical, and transparency issues do not allow for a sufficient level of reliability.	35(24.14)	51(35.17)	59(40.69)	>0.05
2. Digital health tools have a good level of accuracy and specificity and are reliable.	23(15.86)	64(44.14)	58(40.0)	
3. The value of some of the tools in the diagnosis of diseases is not satisfactory and, therefore, the reliability is compromised.	19(13.10)	61(42.07)	65(44.83)	

Table 3. Questions about the reliability of digital tools

Table 4 presents the reports of the participants in the study regarding the knowledge they have about digital health tools. It is noted that about 35.87% of the participants reported that they had no knowledge of any of the health tools listed in the questionnaire. Meanwhile, the most popular tool reported was telemedicine and telecare (24.14%), followed by mHealth (11.74%). A statistical correlation in this regard was found between the two groups.

E-health tools you have heard of or know about	n	%	P value
Clinical Information Systems	12	8,28	0.001
Clinical Information Systems, Telemedicine and Telecare	13	8,97	
mHealth	17	11,72	
mHealth, Clinical Information Systems	6	4,14	
mHealth, Clinical Information Systems, Telemedicine and Telecare	4	2,76	
mHealth, Telemedicine and Telecare	2	1,38	
pHealth (patient-oriented health)	4	2,76	
Telemedicine and Telecare	35	24,14	
None of them	52	35.87	
TOTAL	**145**	**100,00**	

Table 4. E-health tools you have heard of or know about

Table 5 presents the reported results regarding the cited barriers to the wider use of e-Health. It is noted that about 26.9% (n = 39) of the participants have reported no opinion regarding this fact, while 17.24% of the participants have reported as a barrier the lack of knowledge about and trust in eHealth tools by health personnel. 15.17% of patients reported a lack of motivation and knowledge in digital health as a barrier, as well as limited access to eHealth tools. Approximately 11% of participants reported a lack of knowledge about and trust in eHealth tools among health personnel, as well as a lack of motivation and knowledge in digital health among patients or limited access to eHealth tools.

Questions	n (%)
Lack of motivation and knowledge of digital health on the part of patients or limited access to eHealth tools.	**22(15,17)**
Patients' lack of digital health motivation and knowledge, as well as limited access to eHealth tools. Lack of legal clarity for eHealth mobile applications.	1(0,69)
Patients' lack of motivation and knowledge in digital health, or limited access to eHealth tools. Lack of legal clarity for eHealth mobile applications. There is limited evidence about the validity of eHealth to justify the cost.	2(1,38)
Patients' lack of motivation and knowledge in digital health, or limited access to eHealth tools. Lack of transparency regarding the use of collected data.	3(2,07)
Lack of motivation and knowledge of digital health on the part of patients or limited access to eHealth tools. Lack of transparency regarding the use of collected data. Lack of legal clarity for eHealth mobile applications.	2(1,38)
Lack of motivation and knowledge of digital health on the part of patients or limited access to eHealth tools. There is limited evidence about the validity of eHealth to justify the cost.	6(4,14)
Lack of knowledge about and trust in eHealth tools by health personnel.	**25(17,24)**
Lack of knowledge about and trust in eHealth tools by health personnel. Lack of motivation and knowledge of digital health on the part of patients or limited access to eHealth tools.	**16(11.01)**
Lack of knowledge about and trust in eHealth tools by health personnel. Lack of motivation and knowledge of digital health on the part of patients or limited access to eHealth tools. Lack of transparency regarding the use of collected data. Lack of legal clarity for eHealth mobile applications. There is limited evidence about the validity of eHealth to justify the cost.	4(2.76)
Lack of knowledge about and trust in eHealth tools by health personnel. Lack of motivation and knowledge of digital health on the part of patients or limited access to eHealth tools. There is limited evidence about the validity of eHealth to justify the cost.	5(3.45)
Lack of knowledge about and trust in eHealth tools by health personnel. Lack of legal clarity for eHealth mobile applications.	4(2,76)
Lack of knowledge about and trust in eHealth tools by health personnel. Lack of transparency regarding the use of collected data. There is limited evidence about the validity of eHealth to justify the cost.	3(2,07)

Questions	n (%)
Lack of knowledge about and trust in eHealth tools by health personnel. There is limited evidence about the validity of eHealth to justify the cost.	6(4,14)
Lack of legal clarity for eHealth mobile applications.	4(2,76)
Lack of transparency regarding the use of collected data.	3(2,07)
I do not have an opinion.	**39(26,90)**
TOTAL	**145**

Table 5. Barriers to wider use of eHealth

Discussion

The study shows that the student participants had a lot of gaps in their knowledge of digital health. In this regard, the findings differ slightly from similar studies, which found that medical students know only one-third of the digital terms used in the survey on average. In contrast to our findings, where telemedicine and telecare were the most commonly known terms [13], the most commonly known terms are from the field of digital diagnostics, followed by medical databases, biosignals, and imaging. Also, gaps in knowledge were found among academic staff. The results are consistent with other studies which found that most of the knowledge in relation to digital health is not acquired as part of studies, suggesting the incorporation of digital topics and skills into academic and professional development curricula in healthcare [14]. Referring to question three in Table 2 "Digital health is the use of electronic devices to assess and record biological parameters in the clinical environment", our study surprisingly found that the academic staff were not at all informed in this regard, with a strong statistical association for this variable, p=0.0002. The findings differ from those of other comparable research where the majority of the study's personnel claimed high levels of digital literacy, expressed confidence in utilizing technology, and had favorable attitudes toward information systems [15]. Whether they were students or academic staff, Table 3 from our survey shows that about 35.87% of the participants stated that they knew nothing about the reliability of digital health tools. The results for this variable are not different from the literature, where similar studies found the same results [16] [17]. The knowledge that survey participants reported having about digital health technologies is

shown in Table 4. It should be mentioned that 35.87% of the participants said they were unaware of any of the healthcare digital tools given in the survey. In the meantime, telemedicine and telecare (24.14%) and m-health (11.74%) were the two most widely used tools. Between the two groups, a statistical correlation in this domain was found. In this regard, the reported results were similar to other studies which found that mHealth, or mobile health, and telehealth, or telemedicine, were the most widely used technologies associated with eHealth [18]. In addition, other research revealed that there is an urgent need to incorporate digital health into the curricula of programs for healthcare students due to the absence of eHealth competencies among academics [19]. Our study found a set of barriers that influence the wider use of eHealth. The most cited was the lack of knowledge about and trust in eHealth tools by health personnel. Lack of motivation and knowledge of digital health on the part of patients or limited access to eHealth tools, Table 5. In this regard, the findings are consistent with other studies, citing cost and access as major barriers to using e-Health, as well as training, integration, and personalized care [20].

Study strength and limitations

Our study has a few limitations. These include the web-based survey type, which enables easier participation of academic staff who are familiar with the use of technology; the cross-sectional study type; limited sampling; and response bias. As a result, our findings must be used as a benchmark for the knowledge that students and academic staff have of e-Health. It might offer reliable data for upcoming national studies as well as relevant suggestions for academic staff engaged in health promotion and education.

Conclusion

The online assessment of the knowledge of students and academic staff about e-Health revealed quite a few gaps in knowledge about e-Health among both academic staff and students. In terms of knowledge about what digital health represents, the participants in the study, regardless of whether they were students or academic staff, showed a significant lack of knowledge, as was clear from the study's participants' lack of awareness about the reliability of digital tools utilized in healthcare. A strong statistical relationship was found regarding knowledge of eHealth tools between students and academic staff. Students reported less knowledge about this, while academic staff reported less knowledge about mHealth. Telemedicine and telecare are the digital tools that are best known by both

students and academic staff. The most frequently reported barriers to widespread eHealth use have been: health personnel's lack of knowledge about and trust in eHealth tools; patients' lack of motivation and knowledge in digital health; and limited access to eHealth tools.

Recommendations

According to an evaluation of students' and academic staff's knowledge of e-Health, it is critical and necessary to develop focused interventions based on evidence, particularly for updated nursing curricula. The promotion of eHealth and digital health literacy among academic staff, students, and the community is also recommended. In order to empower patients in making healthcare decisions, accessing healthcare services, enhancing the quality of care given, and enhancing health outcomes, it is advised to educate and train academic staff in relation to digital health and its use in the delivery of health care.

References

1. ^ *Eysenbach G. What is e-health? J Med Internet Res 2001;3(2):e20 http://www.jmir.org/2001/2/e20/*
2. ^ *The Fifty-eighth World Health Assembly. WHA58.28 eHealth. Ninth plenary meeting, 25 May 2005 – Committee A, seventh report. http://apps.who.int/iris/bitstream/10665/20378/1/WHA58_28-en.pdf*
3. ^ *E-Health, healthy living and ageing. Rolling Plan 2022. https://joinup.ec.europa.eu/collection/rolling-plan-ict-standardisation/rolling-plan-2022*
4. ^ *Solomiia Fedushko, Liubov Shevchuk, Anastasiia Poritska, Ruslan Kravets, Oksana Tymovchak-Maksymets. E-Commerce and E-Health Strategies and Implementation Activities in the United Kingdom: Review Study. IREHI-2019: International Conference on rural and elderly health Informatics, Dakar, Sénégal, December 04-06, 2019*
5. ^ *AHRQ. Consumer Health IT Applications. Digital Healthcare Research Archive Informing Improvement in Care Quality, Safety, and Efficiency. https://digital.ahrq.gov/key-topics/consumer-health-it-applications*
6. ^ *Parimbelli E, Sacchi L, Budasu R, Napolitano C, Peleg M, Quaglini S. The Role of Nurses in E-Health: The MobiGuide Project Experience. Stud Health Technol Inform. 2016;225:153-7.*

7. ^Kicić M. E-zdravlje--savjetodavna uloga medicinskih sestara [E-health--the role of nurses]. Acta Med Croatica. 2014 Mar;68(1):65-9. Croatian.
8. ^Gagnon M, Ndiaye MA, Larouche A, et al. Optimising patient active role with a user-centred eHealth platform (CONCERTO+) in chronic diseases management: a study protocol for a pilot cluster randomised controlled trial BMJ Open 2019;9:e028554.
9. ^Monzani D., Pizzoli S.F.M. (2020) The Prevention of Chronic Diseases Through eHealth: A Practical Overvieë. In: Pravettoni G., Triberti S. (eds) P5 eHealth: An Agenda for the Health Technologies of the Future. Springer, Cham.
10. ^van der Kleij RMJJ, Kasteleyn MJ, Meijer E, Bonten TN, Houwink EJF, Teichert M, van Luenen S, Vedanthan R, Evers A, Car J, Pinnock H, Chavannes NH. SERIES: eHealth in primary care. Part 1: Concepts, conditions and challenges. Eur J Gen Pract. 2019 Oct;25(4):179-189.
11. ^https://www.euro.who.int/__data/assets/pdf_file/0007/337588/PB_25.pdf
12. ^Eysenbach G. Improving the quality of Web surveys: the Checklist for Reporting Results of Internet E-Surveys (CHERRIES) [published correction appears in doi:10.2196/jmir.2042]. J Med Internet Res. 2004;6(3):e34. Published 2004 Sep 29.
13. ^Baumgartner M, Sauer C, Blagec K, Dorffner G. Digital health understanding and preparedness of medical students: a cross-sectional study. Med Educ Online. 2022;27(1):2114851.
14. ^Lin Y, Lemos M, Neuschaefer-Rube C. Digital Health and Digital Learning Experiences Across Speech-Language Pathology, Phoniatrics, and Otolaryngology: Interdisciplinary Survey Study. JMIR Med Educ. 2021;7(4):e30873. Published 2021 Nov 5. doi:10.2196/30873
15. ^Kuek A, Hakkennes S. Healthcare staff digital literacy levels and their attitudes towards information systems. Health Informatics J. 2020;26(1):592-612. doi:10.1177/1460458219839613
16. ^Jahanpour Alipour, Abolfazl Payandeh. Assessing the level of digital health literacy among healthcare workers of teaching hospitals in the southeast of Iran. Informatics in Medicine Unlocked. Volume 29, 2022, 100868, ISSN 2352-9148.
17. ^Abdulrahman Jabour, Knowledge of E-health concepts among students in health-related specialties in Saudi Arabia, Informatics in Medicine Unlocked, Volume 25, 2021, 100654, ISSN 2352-9148.
18. ^da Fonseca, M. H., Kovaleski, F., Picinin, C. T., Pedroso, B., & Rubbo, P. (2021). E-Health Practices and Technologies: A Systematic Review from 2014 to 2019. Healthcare (Basel, Switzerland), 9(9), 1192.
19. ^Edirippulige S, Brooks P, Carati C, et al. It's important, but not important enough: eHealth as a curriculum priority in medical education in Australia. Journal of Telemedicine and Telecare. 2018;24(10):697-7

02.

20. ^*Sera Whitelaw, Danielle M Pellegrini, Mamas A Mamas, Martin Cowie, Harriette G C Van Spall, Barrier s and facilitators of the uptake of digital health technology in cardiovascular care: a systematic scoping r eview, European Heart Journal - Digital Health, Volume 2, Issue 1, March 2021, Pages 62–74,*

Declarations

Funding: No specific funding was received for this work.

Potential competing interests: No potential competing interests to declare.