

Knowledge, Attitudes and Perspectives among senior Nurse students for the use of mHealth: A quantitative study in Greece and Cyprus

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Abstract

mHealth is relatively new concept with rapid increase in the past years, where smartphones and tablets were introduced. Smartphones have turned into hand-held computers, where one now can download large amount of different apps that are related to health, with just a few touches on the smartphone screen. In 2016, it is estimated that more than 3.2 billion of mHealth apps were downloaded, which are 7% more the year before (research2guidance, 2016).

Some apps can be used for the management of different chronic diseases, to reduce the cost of treatment, and at the same time increase the treatments' outcomes. The users are able to manage their disease from an app, anytime and anyplace. Nevertheless the user must be able to recognize that the application cannot suggest him/her with treatments.

Nurse students are the backbone of the hospital, but also the community (as they also give treatment at patient's houses or nursing homes). Nurses are often responsible for the patients' treatment and training; this includes not only medication, but as well as the best usage of patients' tools such as mHealth apps. Unfortunately Greece and Cyprus are lacking educational courses in this field, as it can be seen from the curricular of Technological Educational Institute of Crete (TEI Crete) and Cyprus University of Technology (CUT) (CUT, 2016; TEI Crete, 2017).

The aim of the presented study is to identify the knowledge and attitudes of senior nurses' students in mHealth, so that this can inform how mHealth in the future can be introduced in the nursing schools curriculum.

Online questionnaires were used to obtain information from senior nurse students from TEI Crete and CUT.

61.7% of the students were smartphones users, 90.5% of these were using their smartphones for social media and only 38.3% had downloaded a mHealth app. When the students were asked how satisfied they are with their knowledge on mHealth, the CUT students' mean rank was 46.25 while the TEI Crete students' was 40.16 ($U=490.5$, $p=0.16$). Additionally when they were asked if they want to learn more about mHealth, the CUT students were more positive with mean rank 58.61 while the mean rank of TEI Crete was 36.63 ($U=268$, $p>0.001$).

The rapid development of mHealth from no medical related users, such as chronic patients, is addressing new challenges in health care. Nurse students must be well prepared and ready to give advice on how to use this rapidly developing technology. This implies that nurse educators must give the nurse students courses and practice in this emerging field of self-management. This study shows that the investigated nursing schools have not included education about the emerging mHealth field into their curriculums, and it is assumed that this is the case for most nursing schools as well. Additionally no medical related users are more into using those kinds of applications creating a gap between nurses and patients.

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Chapter I: E-Health and mHealth

1.1: What is E-health?

Eysenbach (2001), described e-health as the emerging field of health information, where information about health can be reached from internet. He mentioned that it is not only matter of technology development, but also developing an attitude that contributes to the improvement of health care in local and global aspects. For the purpose of the current study, a definition from Eysenbach (2001) for e-health will be used: “e-health is an emerging field in 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 characterizes not only a technical development, but also a state-of-mind, a way of thinking, an attitude, and a commitment for networked, global thinking, to improve health care locally, regionally, and worldwide by using information and communication technology” (Eysenbach, 2001).

Nowadays, consumers, medical and non–medical related, tend to use Information and Communication Technologies (ICTs) more and more, not only for entertainment but for medical advices as well. By using these technologies for medical advice, the consumers are overcoming different physical barriers, like distance and time. In the same time, by using this kind of technology allows them to have access to more reliable sources, making better decisions when it comes to health related issues.

This technology is well known as e-health. It can be characterized as an umbrella to different ICT tools, such as telemedicine and mobile health (mHealth). Medical staffs are using these tools in order to get access to information, give treatment, manage

diseases and get in touch with other professionals and patients (Eysenbach, 2001; EU Policy).

The World Health Organization (WHO) gave a definition to eHealth describing it as: “eHealth is the use of information and communication technologies (ICT) for health. Examples including treating patients, conducting research, educating health workforce, tracking diseases and monitoring public health” (WHO, 2016).

European Union is an active member for the development of different eHealth services, as they try to promote it all over the union, due to the fact that electronic health is a new trend with multiple uses. They have a strategy called “research in health sector”, which allows the collaboration between health care providers and citizens, in order to improve their knowledge on eHealth information systems, addressing benefits and barriers that might face, when they are using this technology. In addition, it gives the researchers motivation to improve their own knowledge, as the researchers can produce and develop new ideas in a daily base (European Commission, 2016).

In 2013, Cook and colleagues used a simple but efficient tool in order to let the patients describe the pain after surgeries. In few words, the medical staff uses an iPad in order to collect patients’ data and then sent it direct to the “cloud” (Cook et al, 2013). Cloud has been described from the National Institute of Standards and Technology (NIST) as: “a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources, including networks, servers, storage, application” (Blank and Gallagher, 2011). Moving back to Cook and colleagues (2013), by using cloud computing, they were able to see the

positive attitude of patients for this technology as well as they were able to introduce them to it. By using ICT, they could increase patients' satisfaction as it was given to them the opportunity to be part of their treatment. This can reduce the meta-surgical pain and at the same time can reduce the in hospital treatment, as patients are more aware and informed about their current health status (Cook et al, 2013).

Moving on, in another research they agreed with the above statement and they also added that the more the patients are engaged with their health, the better outcomes they have in general. In addition, in the same paper, they mentioned that the more the patient use this technology the more they ask question to their physicians, coming to a quick conclusion that the awareness of patients will help the medical staff not only to take faster decisions about health issues, but also will reduce the amount of time is spending for each patient in general (Ricciardi et al, 2013).

Chou and colleagues in (2015), they used data from the National Health Interview Survey (NHIS) from 2009-2013, in order to indentify how the attitudes on eHealth is been developed. When it comes to the management of chronic diseases, eHealth is the tool for communication, scheduling appointments and used online prescriptions. In their research, the focus group was more than 12.600 patients with diabetes and age over 18 years old. By using this data, they could see an increase of the adoption of different eHealth services, including appointments using the internet from 2.6% (2009) to 5.2% (2013), usage of e-mail for communication with health care providers from 4.4% (2009) to 7.3% (2013), usage of online prescriptions from 7.4% (2009) to 9.1% (2013) (Chou et al, 2015). It can be seen that patient awareness has been increased year by year, making the health care providers responsible for their

training for this kind of technologies.

Using eHealth in general does not mean that everything is being working perfectly. Kaye and colleagues support that medical staff face some barriers when they are using eHealth. These barriers are associated with the fact that:

- They do not have sufficient evidences for the benefits of this technology
- Lack of sufficient motivation and appropriate support for health care providers as well as the relationship between provider and patients
- Product competition.
- Privacy issues (Kaye et al, 2010).

1.2: mHealth - an evolving technology area

European Commission defined mHealth as: “Mobile Health (mHealth) is a sub-segment of eHealth and covers medical and public health practice supported by mobile devices. It especially includes the use of mobile communication devices for health and well-being services and information purposes as well as mobile health applications” (European Commission, 2016).

1.2.1: Smartphones and applications (apps)

Smartphones can be characterized as hand held computers that can manage multiple tasks in the same time, whenever you are. By using smartphones different functions can be used, such as internet browsing, e-mail, voice, text, and video communication as well as downloading various applications.

Applications have been described by Hadjipanayis and colleagues “are downloadable software programs that have been developed to run on a computer mobile device to

accomplish a specific purpose” (Hadjipanayis et al, 2016).

In addition, smartphones have some interesting sensors under the “hood”, which can be used from different applications. Some of those sensors are:

- Ground Position System (GPS) which can track the smartphone position and use it for maps (Kende, 2015).
- Accelerometer and Gyroscope Sensor which allows the device to indicate the orientation of the device (Patil et al, 2015)
- Communication sensors such as Wi-Fi, NFC, Bluetooth and mobile networks, which allows the user to connect to the internet and search for online information as well can share personal data, including pictures, videos, music, pdf files and so more.
- Smartphone camera (pictures and Video) (Kende, 2015).

1.2.2: The use of Smartphones

In the recent years, a new field in mHealth came with the rapid develop of the smartphones. It has been estimated that in 2011 were 35% smartphone adult users in the United States of America, while this number, for December 2016, reached the 77% of all mobile users (PEW Research, 2017). According to Smith and Page (2015) report, smartphone users are using their smartphone for:

- Health and information conditions (62%)
- Online Banking (57%)
- Information for places to live (44%)
- Job seeking (43%)
- Government services and/or information (40%)
- Online/distance learning (30%)

- Online job application (18%) (Smith and Page, 2015).

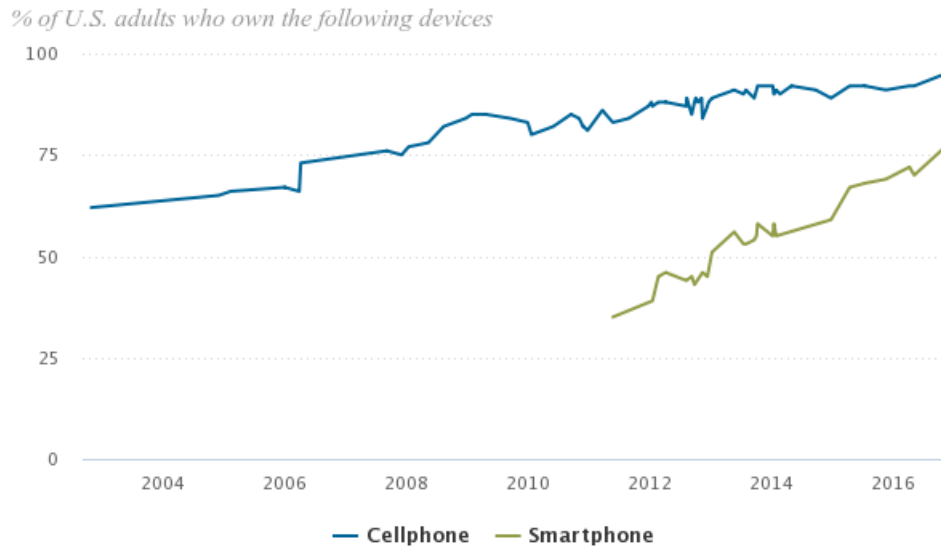


Figure 1: PEW Researcher Cellphone usage from 2004 to December 2016 and Smartphone usage from 2011 to 2016 (PEW Research, 2017)

The rapid evolution of smartphones allows users to be more active and look at any place and any time what they want, just with few touches on smartphone screen. A survey that took place in 40 nations from 25th of March to 27th of May 2015 showed that the social economical factors, for the majority of those 40 nations, do not apply for the use of smartphone among the ages of 18-34. On the other hand, it can be seen that in European countries and U.S.A, adults that are older than 35 years tent to be more active smartphone users than the developing countries adults of the same age group (Poushter and Stewart, 2016). In Table 1 the result of the survey can be summarized.

Table 1 Use of Smartphones among different countries separated in two age groups (Poushter and Stewart, 2016)

	Age			Diff
	Total %	18-34 %	35+ %	
US	72	92	65	+27
Canada	67	94	58	+36
France	49	85	35	+50
Germany	60	92	50	+42
Italy	60	88	52	+36
Poland	41	75	25	+50
Spain	71	91	64	+27
UK	68	91	60	+31
Russia	45	76	29	+47
Ukraine	27	56	13	+43
Turkey	59	81	39	+42
Jordan	51	60	41	+19
Lebanon	52	74	37	+37
Palest. ter.	57	73	39	+34
Israel	74	87	67	+20
Australia	77	95	70	+25
China	58	85	43	+42
India	17	27	9	+18
Indonesia	21	39	7	+32
Japan	39	77	31	+46
Malaysia	65	88	46	+42
Pakistan	11	13	7	+6
Philippines	22	31	14	+17
South Korea	88	100	83	+17
Vietnam	35	56	17	+39
Argentina	48	71	35	+36
Brazil	41	61	26	+35
Chile	65	86	50	+36
Mexico	35	54	22	+32
Peru	25	41	15	+26
Venezuela	45	60	35	+25
Burkina Faso	14	17	10	+7
Ethiopia	4	–	–	–
Ghana	21	27	15	+12
Kenya	26	34	14	+20
Nigeria	28	39	13	+26
Senegal	19	26	12	+14
South Africa	37	46	30	+16
Tanzania	11	14	6	+8
Uganda	4	6	2	+4

1.2.3: mHealth applications

The mHealth applications are software that can enable users to search for information about specific diseases, manage their own disease and track their health and collect health related data. These applications can use some of the sensors that

have been mentioned earlier, so that they can “communicate” with the consumers (FDA, 2015).

In a recent report of 2016, it is estimated that there are more than 250,000 applications available, in major app stores (Google Play and iTunes) with almost 3.2 billion of downloads, which are 7% more than the year before. Moving on the developers of these applications, it can be seen that 13% of them are be called the “Garage developers”, as they usually are one or two members on the developing of any application with the motto “we do this to help others”, while in the same time they are not related with any medical knowledge (research2guidance, 2016).

The number of the available health applications in apps store is enormous, but in the same time consumers, and more specific the medical staff, should be aware that not all of these applications are well made for the patients. More specific FDA says that “mobile medical apps policy does not regulate the sale or general consumer use of smartphone or tablets”. While they continue by saying that they do not consider apps stores as medical manufactures. This can lead to another quick conclusion where consumers should be aware that even if they download an application from the app store they should also be aware that most of them, if not all of them, have not be approved from FDA or any other regulation organization (FDA, 2015).

1.2.4: The importance of mHealth

Free et al. (2013), described mHealth as a developing technology that will give the users the ability not only to communicate between each other (medical staff with no medical staff or medical staff with other medical staff), but it could be used to support their knowledge as well as it is helping them to keep reminders. More

specific, in their systematic review, they selected 42 articles and found that using this technology allows the medical staff in making better decision while, there were no evidence for educational purpose, as an app could also improve the knowledge of the user (Free et al, 2013).

In the curriculum of the University of Illinois at Chicago (UIC), they are describing mHealth as a more patient-centric model of health, as the main focus is the patient. They continue by saying that mHealth is an important technology for patient engagement, as the patient is more responsible for his own health, making him/her part of the decision making process (Orzechowski, 2016).

Additionally, by using mHealth the needed paperwork in hospital can be reduced. Every patient will have his/her own folder in the “cloud”, which it will be accessible by the medical staff, including nurses and physicians. Moreover, the needed work to save and transfer all this printed information will be eliminated, while all this will be accessible through a mobile device.

To move on, one characteristic of mHealth is that anyone can have access from anywhere. That means, that medical staff can earn information for anything they want, including patients’ medical record, information about medical updates and feedback about those updates from other fellow workers from all over the world. On the other hand, having access from anywhere at any place and time means that patients/users are exposed to more threats, as they can be accessed from no authorized users.

1.2.5: Security and Privacy

Security and privacy is probably one of the most important parts of mHealth, as the consumer must be familiar with terms and conditions of the application used, while most of the times they just click “agree” without reading what is has been stated. Plachkinova and colleagues (2015) in their research, they concluded that security and privacy issues are associated with the lack of regulations on the mobile app stores. As some of these applications are taking advantages on the users in order to obtain different unauthorized information and forward them to others for research or commercials.

While in the same research, they continue by saying that consumers must read the terms and conditions of each application and be able to understand the policy that the manufactures are using. In addition, some more strategies in order to avoid this kind of uncertainty it could be the reduction of downloaded application on their devices. It is well known that most of the users, medical or no-medical related, are downloading several applications and they almost never read terms and regulations. Despite the fact that is not a solution, according to Plachkinova, by reducing the amount of the available health applications, the risk of exposing will be reduced dramatically (Plachkinova et al, 2015).

Many authorizations such as Food and Drug Administration (FDA) (fda.gov, 2017), CE certification (<http://europa.eu>, 2017) and Medicine and Healthcare products Regulatory Agency (MHRA) of England (gov.uk, 2017) have addressed the issues about health and medical application security. They used different standards in order to avoid health related exposed issues. Moving on, by taking into account privacy issues, the applications should provide information about terms and

conditions inside it, making the patients more aware about health exposal issues and giving the users the ability to feel more secure (Boulos et al, 2014).

1.2.6: Standards

Boulos and colleagues (2014) stated that in order to consider an application as a medical one, some standards needed to be follow. In addition, by following those standards has to be address so that the consumers (medical staff and no-medical staff) will be aware of what kind of application they are using and from whom. More specific a list of some standards will be shown below:

- Must provide all the information about the developers of the application, including medical related professionals.
- Must contain a references list.
- Must contain any sponsor information, if they have any.
- Unbiased coverage of facts

In addition, the developers should have in mind that the users are not all at the same level of knowledge. It is very important for the developers when are creating an application, to take into account the different variables of the future users (Boulos et al, 2014).

Chapter II: Chronic Diseases and mHealth for management

In the current chapter the impact of mHealth, and more specific of the health applications, on chronic diseases will be described. Three cases will present in order to understand the importance of mHealth.

2.1: The burden of chronic diseases

“Noncommunicable diseases, also known as chronic diseases, are not passed from person to person” (WHO, 2015) and “non-infectious” (Kime and Oh, 2013). “They are of long duration and generally slow progression” (WHO, 2015). According to World Health Organization (WHO), more than 38 million people are dying from different types of chronic diseases, almost 16 million of them before the age of 70. Developing countries are the leading area of these diseases with 75% deaths. An amount of 17.5 million people are dying from cardiovascular diseases, 8,2 million from different kinds of cancer, 4 million from respiratory diseases, and 1,5 million from diabetes (WHO, 2015).

Most of the times the cost for treatment and management of these diseases, is very high. Muka and colleagues (2015) said that, the cost of chronic diseases could be as high as 600 billion USD. Taking this value it is important not to underestimate the fact that chronic diseases can be expensive during their management (Muka et al, 2015).

By using mHealth, for the management of this kind of disease, can help not only the patient, but also the government and the whole hospital community, to reduce the treatment cost, due to the fact that many chronic patients can get treatment at their

houses. mHealth can help them to get in touch with their physician, to monitor their current status, get reminders for treatment and medication, educated and so more. In other words, by using mHealth the cost will be radically reduce as the patients can now use any mobile device at their house, including smartphones, tablets and medical sensors (Hamine et al, 2015; Lopez and Javitt, 2014).

Different applications are being used from the patients in order to manage their diseases. For this reason three chronic conditions have been selected in order to address the importance of mHealth: diabetes, obesity and cardiovascular diseases. The choice of those diseases is not random as they are connected to each other directly or indirectly.

2.2: mHealth and Diabetes

According to the 7th edition of Diabetes Atlas, more than 415 million adults living with any type of diabetes while there are around 320 million adults in high risk of developing diabetes, because of impaired glucose tolerance. In the same research, it is estimated that by 2040 there will be more than 642 million adults with some kind of diabetes.

The management is challenging, as it can be affected from different risk factors, depending on the type of diabetes. Type 1 and Type 2 are the most common types of diabetes. Additionally there are different risk factors for each one as:

Type 1: risk factors as been seen from Diabetes Atlas:

- Family history.
- Genetics.
- Infections.
- Other environmental influences.

Type 2: risk factors as been seen from Diabetes Atlas:

- Excess body Weight.
- Lack of physical exercise.
- Nutrition
- Genetics.
- Family history
- Past history of gestational diabetes.
- Ageing.

The management of both types is different, as for type 1 diabetes, the patients are insulin depended, and they need to measure their blood glucose before and after any meal. In the same time, they need to calculate all their intakes, including food and drinks, as well as they have to avoid some foods with high nutritious impacts on their disease.

Type 2 diabetes might use some oral medication in order to have a normal balance to their blood glucose. To continue, patients can manage their disease by increasing their physical activity and changing their dietary (International Diabetes Federation, 2015).

Many applications for smartphones have been created in order to help patients to manage their diabetes. Diabetes Diary, from the Norwegian Centre for eHealth research, is an application that can help patients to track their disease.

This application is simple and easy to use as the patient can record their blood glucose levels, the amount of insulin they use, the carbohydrates they took, and track their physical activity. While the patients are recording their data, it gives them the ability to check their current status using graphics, for example it can show them which time of day they have the highest or the lowest amount of blood glucose in their body. This can be also seen with the colors of the application as they use yellow, green and red to make it easier for the patients to understand their current situation. Yellow is when the amount of blood glucose is higher than the regular amount in their body, red is when they have less amount of blood glucose in their body, while green is when the amount of blood glucose is in at the regular values (Diabetesdagboka, 2016).

Nurses are playing a vital role in the engagement of patients with their health applications. They should be well trained and ready to answer all the questions the patients might have. In the research of Park and colleagues (2016), it said that each patient is in different level of knowledge when it comes to the technology and diabetes management. Nurses and the health care providers in general, they need to identify the current knowledge of each patient and give them the appropriate advice, when it comes to diabetes management through mHealth (Park et al, 2016).

2.3: mHealth and Obesity

Obesity is one of the main risk factors for the development of type II diabetes. As it can be seen in the “Obesity Society”, almost 90% of type II diabetes patients are overweight or suffer from obesity. However, lifestyle changes and weight reduction can prevent or delay the development of type 2 diabetes by 5-10% (Obesity Society, 2015).

mHealth applications that are associated with behavioral changes, they can be used from overweight and obesity people. Different mechanisms are used in order to motivate them in weight reduction, so they could reduce the risk factors for the development of type II diabetes. In addition, reducing their weight will improve their confidence in general, making them feel better for themselves.

Applications are using mechanisms that help them to self-monitor their daily life, set goals for their situation, giving them different rewards and supporting them. Furthermore, education is one of the most important parts of an application, text, video and picture can motivate the users to continue their effort on the road to weight reduction (O’Malley et al, 2014).

The adoption of this kind of technology is very high as it was described in Whisner and colleagues (2015) survey, where they demonstrated that in 2012, 38% exercise, 31% dietary intake and 12% weight apps were among the most popular health applications. This snapshot can lead to a quick conclusion, that the industry of mobile health is rapidly accepted by different users (Whisner et al, 2015).

In the same research they collected data from fifteen different applications. They found out that most of the applications were multifunction as they were focused on

more than two features. The list below shows the results as being seen in their survey.

- Goal-setting, in fourteen apps
- Current Weight, in all fifteen apps
- Physical activity, in eleven apps
- Calories focused, in twelve apps
- Data share on social media, in nine apps
- Supportive features, in four apps
- Incentives/game fiction, in three apps
- Meal planning or recipes suggestion, only in one app (Whisner et al, 2015).

Additionally, O'Malley and colleagues (2014), in a randomized control trial (RCT) in twelve adolescents they found similar results for the behavior change (O'Malley et al, 2014). Whisner and colleagues (2015) added that the communication between the developers and the users will increase the satisfaction between the users and the application. They suggest minor changes on the user interfaces and in some functions to improve the particular application they used for their research (Whisner et al, 2015).

Samuel and colleagues (2014) said that nurses need to be part of the development of this kind of application, as they need to make adjustments to fit into the workflow. In the same research they said that the voice of nurses is important in the development of these applications as they are the frontline of educating and teaching patients/users how to use those kinds of applications (Sample et al, 2016).

2.4: mHealth and Cardiovascular diseases

The department of Australian Health defines the cardiovascular disease (CVD) as “a collective term for diseases of heart and blood vessels”. This term can include Coronary Heart Disease, Heart Failure and Cardiomyopathy, Congenital Heart Disease, Peripheral Vascular Disease, Stroke, and so more (health.gov.au, 2015).

It has been estimated that more than 17 million of people are dying from cardiovascular diseases, making them the leading cost of death among adults. By 2030, this number will reach more than 23.6 million. Cardiovascular diseases are responsible for 1 in 3 deaths; while an average of 2200 people die in the United States from CVD daily, which means that every 40 seconds someone is dying from a cardiovascular disease. Congenital heart diseases are the leading cost of deaths globally, among all the cardiovascular diseases, with approximately 1 to 7 deaths only in the United States.

Some of the main risk factors can be associated with health behaviors such as smoking, physical inactive, nutrition and obesity. While some risk factors can be associated with health conditions such as high cholesterol, high blood pressure and diabetes (Mozaffrian et al, 2015).

mHealth could help patients to improve or reduce their risk factors on the development of any CVD type. As it was described from Neubeck and colleagues in 2015, an application for CVD should be simple, providing the necessary information for medication and treatment, while it can also track the behavior-changes of the patients, biometric data tracing on demand and giving rewards for tasks that the patients had accomplished. In addition, this app should be personalized, it must have

the ability to share information in the social networks but in the same time it should consider the privacy issues of the patient exposal (Neubeck et al, 2015).

On the other site, Piette and colleagues (2015) said that patients should develop a portfolio of different mHealth applications so that they can accomplish their tasks. Because of the complexity of their disease, the medical staff and the patients need to identify their needs in order to develop a different mHealth portfolio. Different patients have different needs. There is a need to discuss with the medical staff what they should be aware of. For example, a non-diabetic patient will not need an application for diabetes management, while a non-smoker will not need an application for smoking sensation. In addition, nutrition must be part of all the patients' application portfolio for their management. Nevertheless, all the applications must contain some form of communication with the medical staff, this could include SMS, Multimedia Messages and on demand communication with the medical staff, while the importance of privacy must be the priority when they are choosing and using any health related applications (Piette et al, 2015).

Those issues must be discussed with the nurses as they spent more time with the patient. This communication can be performed inside as well as outside the hospital community. Nevertheless, the nurses must be well trained before they start using these kinds of applications and be ready to overcome any issues that might be occurred during the usage procedure.

Chapter III: Use, benefits and challenges of mHealth among different groups

In this chapter, Physicians, Patients, Nurses and Nurse Students will be analyzed in order to understand the use of mHealth from their perspective. The relation between each group and mHealth will be discussed as well as the advantages and challenges coming up by their relation.

3.1: Physicians

The need to move from physician office to the patient's bed side address new challenges on how physicians can deliver evidence based treatment. By using smartphones, they can have access at the information right next to the patient. In a research from Mobasheri et al (2015), it was described that 72% of the general populations were using smartphones and another 23% said that they were using tablet computers, while in the USA the rates are 65% for smartphones and 48% for tablets. Those numbers are summarizing that people are using smartphones no matter of their occupation. In the same article, they made a research on the use of smartphones and tablets among medical staff (Physicians, n=284 and Nurses, n=555). It was found out that 98.9% of the physicians use a smartphone while 92.6% said that they were using their smartphone in clinical practice. Continuing their research they found that another 73.5% of the physicians also use tablet computers, while it is not clear if they were using it during their visits to patients (Mobasheri et al, 2015).

This technology gives the ability to make better decisions on treatment but in the same time they have to face some barriers.

Advantages

- Access to specialized physicians: In rural areas, where most of the times are been occupied with General Practitioners (GPs), lot of patients are visiting them for advice and/or treatment. Patients having different diseases can make GPs work harder. By using mHealth, they can get in touch with specialists and take advices on how to give treatment or medication. By using forms of a simple phone call or SMS, they can come in contact with the specialist at anytime (Khan et al, 2015). In addition, by using more advance techniques such as e-mail, video calling and conference, or even social networks can share medical related information in different formats (audio, video, photo) while these advance technologies can also been used for communication as well (Ventola, 2014).
- Information storage and time management: Physicians have the ability to manage their time-table and check their appointments with the use of their smartphones. Moving forward, they are using smartphones to take notes for patients or even take pictures so that they can evaluate them and share them with others, so that they can get another opinion, while they can compare them with older ones that have been previous stored in the “cloud”. They can also record audio, so that they can share it again and take advice or second opinion from specialists.
- Access to Electronic Patient Record (EPR): By using their smart device, physicians can access to the patient’s EPR so that they can add information or check lab results of a patient. As a result physicians are more independent as they do not have to go back and forth to their office to search for information, or waiting time searching through the classic paper records. With few touches on their smartphone’s screen, they can

get all the information they need at the point of care, right on their hands (Ventola, 2014).

- Clinical Decision Support Systems (CDSS): CDSS has been used by physicians to take the correct decisions making them more confident in their practice. Smart devices can help physicians to take better decisions at patient's bedside. Moreover, using smart devices in cooperation with the patient will might also affect the patient, as they are going to give them the chance to be part of their practice, making him/her feel as he/she is the main subject for them. The use of smart device can create a strong bond of trust between physician and patient. Last but not least, by using CDSS can help the physicians to reduce errors on medication and treatment at the point of care, as they can follow guidelines from this process on demand (Patel et al, 2015).
- Medical education and training: Ventola in 2014, proposed that by using smart device can help physicians to have continues medical education so that they can get inform for the latest innovation techniques they should use during their practice. Nevertheless, they can evaluate their knowledge on specific areas, as they are already practicing and comparing them with others in order to see what is better to apply during their practice. The reason they could use smart devices is because they are easy to use, as they can get access to medical journals with few touches on the screen and because of the portability of the smart device they can gain access anywhere and anytime (Ventola, 2014).

Challenges

- Technical issues: Probably one of the biggest challenges that physicians could face, is that the system sometimes is complicated and might crash, making their life harder, especially at the point of care.

- Unprofessional use: Some studies have shown that some patients are seeing the use of smart device as unprofessional, because they assumed that the physician is not giving them the appropriate attention.
- Personal use: Another issue is that sometimes the physicians are using the smart device to access no medical related information, while they are at the patient's bedside; this could lead to delays in patient's treatment and medication (Johnson et al, 2014).
- Privacy: Physicians, as they share information on the "cloud", they have some concerns on whom and when someone is having access to the information they uploaded. Especially when they are using pictures, they have to be extremely careful with whom they are sharing this kind of information (Zhang et al, 2015).
- Lack of communication: Looking all the time on a smart device can lead them to lack of communication with their patients, as they pay more attention on what is on the screen and not what does the patient has to tell them (Johnson et al, 2014).

3.2: Patients

Nowadays, Smartphones are widely used, daily by everyone. This rapid adoption can be proven from the PEW research in 2011, where they found out that 35% of the American population were smartphone users. This number was almost the double in 2015 (64%). It is well known that people are using smartphones more and more. In the same research they said that, from over all the smartphone users, 62% were using their smartphone to search about health related information, as it was mention in previous chapter (Smith and Page, 2015).

The rapid adoption of this technology gives the consumers the ability to download applications on their smart devices, empowering them to control their own health. In 2015, it was estimated that there were more than 250,000 health applications (research2guidance, 2016), while 4 years earlier there were just 40,000 (Atienza et al, 2015). Even though there are so many applications, this does not necessarily mean that they also follow the FDA, or other regulation organizations, standards (FDA, 2015).

By using mHealth patients can manage their own health, as they can track their health behaviors, by using applications on their smartphones. Patients nowadays are more aware about health conditions, as they can easily search for health information on the internet. Nevertheless, this can improve their confidence and try to improve their current health status. The concept of empowering patients is not new, as it has been known that well informed patients will have better outcomes during their treatment. By giving patients the ability to be part of the treatment plan can increase their satisfaction and can enable them in better health decisions making. As it was described by Calvillo et al (2013) “an empowerment patient should be educated to think critical, make informed decisions and then adjust to prescribed care plans” (Calvillo et al, 2013).

Considering the high adoption of this kind of technology, it is quite clear that patients are more depended to their smartphones and health application than their medical team. This can be proven from the white paper of Elsevier Clinical Solution (2015), as they said that most of the applications are used for general health and fitness. Using in-mobile sensors allows the patients to measure their vitals, or how many steps they

have walked during the day. These applications are just created from different developments/developers and they do not follow any standards. In addition, by using those kind of applications might affect the consumers' privacy, as many times the later asking to give their approval for access to personal data, including pictures, videos, location and so more.

In the same article, they searched in Apple's iTunes and they found that only 16,000 from the 43,000 health and fitness applications, in total, have a "genuine" health content. From them, less than 160 applications are really using the in-sensors and less than 50 of them are actually related with the measurements of health conditions. This information shows us the importance of awareness when someone is using an application that is related with health and/or fitness (Elsevier Clinical Solution, 2015).

At the same time, patients might have some concerns on how to use different medical application, while they could affect their private life. In Atienza et al (2015), they found out that these concerns have to do with the type of information, when and where the information is been accessed, whom is accessing the information and what is the purpose of accessing this information. These concerns are real as the medical staff should inform the consumer/patient, about the application, before they can access their data (Atienza et al, 2015).

It is important not to underestimate the fact that lot of consumers are downloading different applications to manage their health, that is why health care professionals need to find new methods on how to transfer their knowledge, on how to choose and use different medical applications, to patients (Calvillo et al, 2013).

Steinhubl and colleagues said that mHealth could empower patients' (consumers) to manage their health, but in the same time it can manipulate them and misinformed them about their conditions. In the same article, they referred to an application that could use smartphone's camera so that it could measure the blood pressure and then suggest solutions for it. The consumers must be well prepare when they are using these kind of applications as most of the times they are not familiar with how this technology works, and even worst they are not using scientific online information when it comes to their treatment (Steinhubl et al, 2015).

3.3: Nurses

Nurses are known to be the backbone both inside and outside the hospital community, as they are spending more time with the patient than any other medical staff. Nurses need to write reports of what they have done to each patient, give medications, treatment, training and so much other important information for the patient and other medical staff. Because of the complex of their work, sometimes they cannot give as much attention as they want to their patients, which this will lead to other issues such as lack of trust or slowing the treatment plan. Usually the recovery time of a patient after an operation is an average of 7 days recovery, but this could be increase to 12 days and it is well known to the health care community the faster recovery the better outcomes in the future (Pimmer et al, 2014).

mHealth is now used in the nursing field in order to reduce the time nurses spend on other work, such as writing reports, or making medication rounds. By using mHealth they have lot of positive outcomes, but in the same time they have to address some issues that they might come out of that use.

Advantages

- Communication between colleagues and patients: mHealth, and more specific the use of smartphones, it is used from the nurses to reach their colleagues both inside and outside the hospital so that they can get information for a patient, or get answers at any questions they have on a treatment/medication and other health related issues. By using smartphones and communication skills could improve the outcomes of their patients.

Nurses can also use mHealth to communicate with patients, most of the time, in community nursing, as they are giving them advice through the phone, or by e-mail and SMS (Free et al, 2013).

- Access to patient data and clinical data at point of care: Nurses are using smart devices in order to obtain access to patient's data, so that they can give treatment. This can lead to the reduction of medical errors, as they are using it most of the time next to the patient, making better decisions for the treatment plan. It is important for them to reduce as much errors as possible so that the patient will stay fewer days in hospital, and as for the nursing community they could spend more time with the patient and discuss other medical related issues.
- Reducing medication errors: As it was mentioned earlier, mHealth could help them to reduce errors, by giving them guidelines or general medication information, such as side effects. By using this information, they can see if they have progress with the current medication, what other alternatives they have and make the correct adjustments to the treatment plan, if needed.

- Smart devices as educators: By using smart devices, nurses can have access to electronic medical journals in order to improve their knowledge in different health related subjects. By doing that, they can improve their knowledge and give evidence based treatment. In the same time, they can look for online information at patient's bedside so that they are more confident during their practice.
- Mobile application during Practice: Nurses are using different health applications during their practice, enable them to store and examine results at the point of care. Nurses do not have to walk back and forth to their office to add or search information for each patient. By using different applications on their smart device they can get access to that information and add some more information in it. While it is also environmental friendly, as they do not need to carry pen and paper with them, so that they could take notes and transfer them to the EPR later (Doswell et al, 2013; Labrique et al, 2013).

Challenges

It can be seen that nurses are facing the same issues with the physicians, when it comes to use of mHealth. One of the most important issues they faced is probably the patient's attitude, as patients' think that nurses are not giving much attention to their needs. Nurses should inform the patients for what are they are doing and why they are using smart devices before they start using it. This could be a better approach and could increase the satisfaction from both sides. In addition, they have to respect the patient's opinion, if the patient does not accept the use of any smart device, from the nurses, during their practice/visit.

Another challenge that nurses might face is the use of camera, as they have to be informed about privacy issues they have to face and overcome, so that they can make more secure decisions, as their priority is the patient satisfaction and safety (Pimmer et al, 2014; Mickan et al, 2014).

3.4: Communication between patients and nurses

Nurses are responsible for patients' medication, treatment and education, making them the first line of defense for all the patients. Communication is part of their daily life as they can ask key questions to the patients in order to identify the patient's current mood. It is important in their daily workflow to check the patients' mood as they need to make the correct adjustments, so that they can improve it. They need to relieve the patient's pain and make them feel safe in the hospital, but also in the community.

By using communication techniques, nurses can educate patient for self management, as in some point they will need to leave from their side. In addition, the more educated the patients are the better outcomes they will have after hospitalization. Nevertheless, communication between nurses and patients can create a bond of trust as the patients are more open to address any problems that they might face, increasing the satisfaction in both sides (Kourkouta and Papathanasiou, 2014).

mHealth applications can help in this process, as in these days patients can have access to their health information, with just a few touches on a smartphone or a tablet computer screen. This can increase the communication among the medical team in general as the patients are able to track their daily life and share their data

with the medical team. Nurses can teach patients on how to choose among many applications that exists, the better for them. In addition, by using mHealth patients can communicate with the medical staff from distance and at anytime, over passing physical barriers and reducing the cost at the same time (Olla et al, 2015).

Nurses' priority is to identify the knowledge and the attitudes of their patients so that they can improve their outcomes. It is important to provide the patients with evidence based medical information. By using their communication techniques they can find the base line, of knowledge and attitude, of each patient separately and they can make the necessary adjustments (Prasad et al, 2014).

Moving on, its' important not to underestimate the fact that giving the patients so many responsibilities could be a boomerang to its outcomes. It is important to explain to the patient that being part of the treatment plan does not mean that they can make decisions all by themselves. Communication with nurses or other medical staff is mandatory before any decision is taken. This is not limited only for medication but also for health applications, as they might not be familiar with any regulations and/or privacy concerns (Dykes et al, 2015).

In the other side, medical staff must not underestimate the data given by the patient. In Shimamoto and colleagues (2015), it is been said that underestimated patients data could lead to a gap, in between the nurse and the patient, which could "destroy" the communication bond that has been created. It is important to minimize or eliminate that gap between nurses and patients (Shimamoto, 2015).

Another issue is the attitude that medical staff has against mobile applications and patients' involvement, as some of the nurses and clinicians have some concerns for

the outcomes of this kind of technology. Additionally, nurses and clinicians addressing more issues that have to do with whenever the patient would like to share health information with them (Groshek et al, 2015).

3.5: Nurse Students

The evolution of the technology addresses new opportunities in the education of nurse and medical students. More specific, the use of smartphones has shown that it gives the nurse/medical students different functions that could be used during their practices and education, by making them one of the kind technologies.

Some of the benefits and barriers will be present, as nursing students are the future backbone, of the healthcare community, and they need to know what they are facing when they are using their smartphones.

Advantages

Different researches have shown that nurses that have been train in different kind of technologies, such us telemedicine, the use of Electronic Patient Record, or the use of mobile devices during their practice, were significant more confided when they were facing real life situations. Moreover, researches have shown that using smartphones for learning has better outcomes than pen and paper, when it is been used to record and evaluate patient symptoms (Pimmer et al, 2014).

In another research, it is said that using smartphones at the point of care, its supports nurse students learning and increasing the processes of decision making. Using smartphones at the point of care can also be used as a drug references, or for diagnosis and to examine laboratory results during their practice (Sedgwick et al,

2016).

Moving on, using smartphones it could help nurse and medical students to communicate with different formats, such as phone calls, SMS, Multimedia Message Service (MMS) and e-mails (Pimmer et al ,2014).

Educational tools', such as medical journals, are also very important for students as they can gain access at any place and any time, making learning inside and outside the university community easier. This can make the students more independent on when and how they are learning.

At the same time, by using smart devices, students can save time as they can use their smartphones anywhere making them more flexible, while in the same time they can plan their own timetable (Boruff and Storie, 2016).

Challenge

Low quality of information sometimes can lead the nurse students in the wrong decision making that could affect the patients' outcome. Addressing this issue it is important that nurse students have to be well trained before they can use this kind of technology.

Tran et al (2014) said that even though students are using smartphones to get access to different health related information, they are not satisfied, as the role of the educational system is lacking in training them (Tran et al, 2014).

Privacy is another major issue that students have to face, as some times they share sensitive information in social media, exposing the patient's privacy. This unprofessional behavior can damage their professional image, making it harder for

them to work after graduation. Nevertheless this unprofessional use could affect the trainer's professional image, as he/she is responsible for the students at that current moment (Hay et al, 2016).

Using smartphone for clinical decision must be a supplement for their knowledge and not to be used as the main instrument. Sometimes false inputs can lead the nurse students to negative outcomes again, so educators have to teach nurse students on how to evaluate the results first, before they use their smartphones to confirm their results.

Using smartphones, during classes or in front of the patient, for personal communication is unprofessional and this could lead the students to adopt "unhealthy" behaviors at their future environment (Fuller and Joynes, 2015).

Chapter IV: Curricular among different Universities and countries

The use of smartphone among young adults is well established as it can be seen from PEW research, between October 3rd and 27th 2014, they got in touch with almost 3200 responders by Web and mail. From all the participants, around 2200 were smartphone users and 402 of them were between the age group 18-29. From all the smartphone users 62% said that they use their smartphone in order to get information about health (Smith and Page, 2015). By viewing these numbers, it is clear that people are using their devices in order to obtain health information about health conditions but simultaneously, it raises some concerns about how efficient are the information they obtain. Young adults, and more specific nurse students, should be well informed on how to use and choose different health information and/or applications.

It is well known that most European Countries are using Electronic Patient Record (EPR). Different Universities provide their medical related students, and more specific nurses, with different information about electronic health and similar concepts. However it is not clear if they are giving information about mHealth and its threats. This phenomenon can be seen from the curricula of different Universities. For example, Cyprus University of Technology (C.U.T), in their official curricula for nurse students, they have two classes for the use of ICT in the health field but they do not make it clear if they are teaching them something about mHealth (CUT, 2016). In addition, the Technological Educational Institute of Crete (T.E.I. Crete), they have one mandatory class in the first semester of their studies. Later in their studies, students can choose whether they want to learn more about ICT related courses or

not. However, as the university mentioned before it is not completely clear if they teach their students about mHealth (TEI Crete, 2017). Table 2 gives details about those courses.

Table 2: ICT Courses related to health in TEI Crete and CUT

	1 st Semester	4 th Semester	5 th Semester	6 th Semester
C.U.T	Introduction in health Informatics	Computer science and nursing		
T.E.I Crete	Introduction in nursing computing (Mandatory)	Integrated information systems in health (Selected from students)	Spreadsheet in nursing (Selected from students)	Access and Electronic Health Record (Selected from students)

On the other hand, some universities do not have any courses related with ICT at all and this can lead to the conclusion that during their courses are learning how to use EPR, even though they do not have any information about that in their curricular. It is well known that most European Countries are using EPR, but it is still not clear if they have any lectures for mHealth. Examples can be seen from UiT The Arctic University of Norway as they do not have any details about ICT or similar lectures in their curricula (UiT, 2017).

Borycki and Foster (2014) raised an issue for Australia and Canada, as they said that the curricular of those countries is lacking on how to educate their future nurses. It is important to mention that those countries have some lectures for ICT related to health but it is not clear if they have some lectures for the use of mobile health. Moving on, in the same research they conclude that governments and universities

should include programs that are associated with ICT and nursing so that the future nurses, and medical staff in general, following the new trends (Borycki and Foster, 2014). A year later Mather and Cummings (2015), agree with the previous statement for Australia and they continue by saying that even though that students are learning the basics about eHealth and its potentials, they lack in the field of mobile health. Moving on they said that nurse students graduating without sufficient knowledge on how eHealth and mHealth will work ineffectively and inefficiently (Mather and Cummings, 2015).

In 2014, at the international congress on nursing informatics, they suggest that a new curricular should be developed in order to cover the new digital age. It is important to prepare the future nurses on how to use and manage all the information they obtain from different sources including mobile applications (Topaz et al, 2015).

While the previous problem was addressed, in a recent research from Liu and colleagues (2016), they said that based in their current curriculum, in major cities of China, nurses students are lacking in knowledge of mHealth. They continue by saying that some universities are offering some ICT lecture, but they are not focusing on mHealth (Liu et al, 2016).

In the other hand, in the curriculum of the University of Illinois at Chicago (UIC), it seems that there are some courses for mHealth, but it is not clear what kind of information the students have about it (Orzechowski, 2016).

4.1: Aims of the study

The rapid adoption of this technology will address new issues when the delivery of care is its priority. In addition, medical staff and more specific nurses should be well prepared so that they can use it for best practice. Moreover, this technology should be introduced to the nurse students so that they can use the full potentials when they start practicing, right after they graduate.

Thus, the overall aim of this study is to identify the current status, perspectives and potential of senior nurse students related to the emerging use of mHealth in the society.

The specific aims are:

1. What kind of device and what kind of applications do the senior nurse students use?
 - 1.1. Where do nurse students find information about mHealth?
 - 1.2. How do senior nurse students think using mHealth could improve their knowledge inside the university community and in the future, where they are going to practicing their knowledge?
 - 1.3. What are the most important functions and features of mHealth applications, from the health care provider point of view?
2. What is the senior nurse students' current knowledge status about mHealth and similar concepts, such as telemedicine, EPR and so more?
 - 2.1. Do senior nurse students want to learn more about mHealth and similar concepts?
3. How often do senior nurse students use social media to obtain knowledge about health, and how useful do they find them?

Chapter V: Method

5.1: Questionnaire

Questionnaires were chosen as it was easier for the subjects to answer it as well as it could reach more subjects. According to the book "Questionnaires Volume I" of Blumer (2004), the writer refers to the open/close questions, saying that close format questions permitted rapid and inexpensive coding, which allows the gathering of data faster and get the results easier (Blumer, 2004). In addition, in another book referring to the advantages of the questionnaires, the writer says among others that the advantages of this method are mostly the low cost and the low amount of time that is needed for the data collection (Merkouris, 2008).

For the purpose of the current study, the questionnaire that has been used is a result of literature review. Close questions (Yes or No and scale 1 to 5) were used to answer the researcher questions.

Online questionnaires have been chosen, mostly because the target groups were from different countries and as it is easier to collect and analyze the data. In addition, by using online questionnaires it does not affect the sample as there is no face to face communication or any expression that could affect the data gathering. Furthermore, the collected data are more accurate, as the results will answer the researcher questions and not the personal opinion of each of the sample group.

The online questionnaire was created in the LimeSurvey, which had the ability to collect the data and give the option to skip questions if the subject is not relevant with the purpose of the study. Additionally the use of the current service allowed the researcher to make adjustments during the survey, mostly grammar. If the

researcher was going to add or remove a question he should first stop the survey which initiated in data lost. The questionnaire was available from 31st of October 2016 to 28th of February 2017, from the current link: <http://hubro-survey.ehealthresearch.no/index.php/657413?newtest=Y&lang=en>.

Advantages of the questionnaire, as a survey tool, are:

- Reducing the probability of systematic errors, as the questions that are being addressed are the same for all the sampling.
- It is less expensive, while it needs fewer amounts of time and energy for its management.
- It is easier for collecting data form a big amount of people, while it is easier to analyze its data.
- It is completely anonymous.
- In it are answers there are not prejudice which could reflect of the subject to the researcher.

There were 28 questions in 5 different groups, from which the last group was no mandatory at all.

In addition, given answers were objective, as they could be recognized the same from different researchers, as correct or wrong. The time needed to complete the current survey was 8 minutes.

5.2: Pilot survey

As described be by Calitz “Pilot study is a mini-version of full-scale or a trial run done in preparation of the complete study”. Pilot study usually tries to answer or to

identify possible flaws that have to do with instructions, time limits, spelling and more. Moving on, pilot study could show unclear items in a questionnaire, while one of the most important function of pilot study, is to identify non-verbal behavior of participants, as it can give the researcher information about any embarrassment or discomfort of the subject (Calitz, 2009).

For the present study, the questionnaire was tested in pilot study 10 subjects, so that it would be clear whether the questions are in correct order and if there were any questions that could be modified in order to make it easier for understanding. At the end, the subjects were questioned the following:

- Is there something unclear or something that you would like to modify?
- Did you find it easy to complete each question and sub-questions?
- In your opinion, do you think it should be more questions and details?
- How much time did you spent to complete the questionnaire?
 - If they said that it took too much time: Why do you think it took too much time? How can we prevent that?

5.3: Recruitment

Electronic mails have been sent to nine different universities from all around the world. More specific, six of them were in Norway, one in Greece, one in Cyprus and one in Canada. Unfortunately, as for the universities of Norway, only one respond positive to participate in the current survey, but the student did not complete the survey. While another university responds to the electronic mail but, in the end, did not participate in the survey as it was not relevant with the current study, as they had only master students.

The current research took place between October 2016 and February 2017, at Technological Institute of Crete and Cyprus University of Technology. The senior nurse students of each university have been chosen to complete an online survey. The choice of this sample was not a coincidence, mostly because students have been trained in different subjects, such as human anatomy, pharmacology, Intensive care nursing and more. In addition, it is not clear if they had any previous experience, in the University community, for the use of mHealth, Telemedicine, EPR and similar concepts. On Table 3 respond details about universities are given.

Table 3: Universities' respond for participated in the current study

University	Respond/No Answer	Data
University of Tromsø (UiT), Norway	Respond	Decline
Nord University, Norway	Respond	No data
University of Oslo (UiO), Norway	Respond	No relevant
Høgskolen i Sørøst-Norge (HSN), Norway	No respond at all	–
University of Agder (UiA), Norway	No respond at all	–
University of Stavanger (UiS), Norway	No respond at all	–
Technological Institute of Crete (T.E.I Crete), Greece	Respond	Provide Data
Cyprus University of Technology (C.U.T), Cyprus	Respond	Provide Data
University Health Network (UHN), Canada	No respond at all	–

According to official data from both countries (Greece and Cyprus), the average ratio between teaching staff and students, for tertiary education in the academic year of 2013/2014, was 18.5 per teacher for Greece and 18.2 per teacher for Cyprus. In the Appendix II, Table 4, there are some more details about the differences in economic and health system, as well as the difference between the overall populations of the two countries [General Information for Greece (Hellenic Statistic Authorization) and Cyprus (Statistical Service)].

In both universities, there are mandatory 4-years of study for nurse students and they have some similarities in their curricula (Chapter IV, Table 2). However, a difference between C.U.T. and T.E.I. Crete is that the former has two mandatory courses which are associated with the use of different ICT services, while the later has one mandatory and three not mandatory courses, which students could choose during their studies.

For research purpose, the sample of the current study was senior nurse students from two Universities located in Greece and Cyprus. Senior nurse students were chosen instead of working nurse, because students are assumed to be more familiar with different technologies. Moreover, students were chosen so that we can see what is their current knowledge and attitude on different concepts, such as mHealth, EPR, Telemedicine and so more, so that we can make the correct adjustments in their curricular and improve their current knowledge. Additionally, senior nurse student were chosen because they are in the last year of their studies and they have already attended most of their courses.

5.4: Ethical Issues

In every research the protection of personal expose of the subject must be addressed. Approval for the current project has been obtained from the involved educational institutes was mandatory, before the data collection. The subjects were informed for the purpose of the research as well as they could withdraw at any point they wanted (Office for Human Research Protection, 1979).

There were no health related information, as the current study was focusing on senior nurse students' knowledge and attitude. Additionally, the questionnaire was completely anonymous and the subject could stop at any time they wanted to.

5.5: Statistical Analysis

For the data analysis, Statistical Package for the Social Science (SPSS) v23.0 has been used. Independent t-test was used among the two universities (CUT and TEI Crete), in order to identify differences among their current status of knowledge, as well for the attitudes they keep for mHealth, telemedicine EPR and similar concepts. In addition, independent t-test was also used to compare among usability of smartphone and tablet devices and the use of social media. The confidence interval (CI) was set to 95%. Mann-Whitney U test was used to compare the mean ranks between the two universities, showing the difference among the two groups. Using Mann-Whitney U test, we were able to compare the current knowledge and attitude on specific areas as well as in what point they agree or disagree with different statements for mHealth and similar concepts.

Chapter VI: Results

6.1: Demographics

The questionnaire was sent to n=100 nurse students from TEI Crete and CUT, from which n=18 were not complete or missed completed. Overall, n=82 senior nurse students answer the questionnaire, 78.0% (n=64) from TEI Crete (Greece) and 22.0% (n=18) from CUT (Cyprus). More specific, the number of nurse students in University of Crete is around 120, while in Cyprus there are 25 students per year/semester. The average age of them was 22.5 SD ± 4.1 years, most of the participants are in the age of 21. Most of the participants were female, more specific 84% were female and 16% were male (Table 5).

Table 4 Demographics of Senior Nurse Students

		n	%
Home University	<i>TEI Crete</i>	64	78.0
	<i>CUT</i>	18	22.0
Gender	<i>Female</i>	69	84,0
	<i>Male</i>	13	12.0
Age, years	<i>Mean Age ± SD (min-max)</i>	22.5 SD ± 4.1 (17-46)	

Moreover, as for their parents' educational level, most of the participants answer that was high school level. More specific, participants answer Elementary 18.3% (n=15), High School 50% (n=41), University studies 29.3% (n=24) and other 2.4% (n=2). As for their mother education High School was also the most prevalent. More specific, for Elementary they answer 23.2% (n=19), High School 47.6 (n=39), University studies 25.6% (n=21) and other 3.7% (n=3), other includes other tertiary degrees or diplomas (Table 6, Appendix II).

As for the Physician Visit in the past year the majority for both Universities answer

that they visit their physician 1-2 times, while the next most common answer was not at all, see Table 7. From those who answer positive to the previous question (≥ 1 times), the majority also ask for some kind of online information. More specific, from those who answer 1-2 times 21.5% (n=14) ask for some kind of health related mobile application, while 45.5% (n=30) ask for some kind of online health related information. In addition the students who answer 3-4 times 3.1% (n=2) ask for some kind of health related mobile application, while 15.2% (n=10) ask for some kind of online health related information and from those how visit their physician >5 times 4.6% (n=3) ask for some kind of health related mobile application, while 6.1% (n=4) ask for some kind of online health related information. The students had the option to choose either answers or no answer at all. There was no significant correlation between physician visit and their use of mobile health related applications $p=0.44$ and for physician visit and online information $p=0.4$ (Table 7).

Table 7: Request for mHealth information and/or online information by senior nursing students about their use of personal physician

Physician Visit in the past Year	<i>none</i>	16	19.5
	<i>1-2 times</i>	47	57.3
	<i>3-4 time</i>	12	14.6
	<i>>5 Times</i>	7	8.5
Ask for Online information	<i>1-2 times</i>	30	45.5
	<i>3-4 Time</i>	10	15.2
	<i>>5 Times</i>	4	6.1
Ask for a health application	<i>1-2 times</i>	14	21.5
	<i>3-4 Time</i>	2	3.1
	<i>>5 Times</i>	3	4.6

6.2: Current status of mHealth applications usage among TEI Crete and CUT senior nurse students

The two universities will be comparing so that the difference between two similar but at the same time different countries are using their smartphones and tablets. Additionally the perspectives of the nurse students for mHealth apps will be presented, more specific the students have given their opinion on how they see those mHealth apps and what else do they want from them to include in the next versions/future.

What kind of device and what kind of applications do the senior nurse students use?

For both Universities, most of the students were using only Smartphones. More specific 61.7% (n=50) of students, while 24.7% (n=20) were using both devices (Smartphone and Tablet). Tablet only users were 6.2% (n=5) and finally 7.4% (n=6) were no smartphone/tablet users at all. To this point, it is very important to mention that one of the participants did not finish the questionnaire after this question (Table 8).

Table 8: Use of smartphone and tablet among senior nurse students

Use of Smartphone/Tablet			
Device	No Smartphone/Tablet	n	6
		%	7.4%
Smartphone		n	50
		%	61.7%
Tablet		n	5
		%	6.2%
Both		n	20
		%	24.7%

As it can be seen, most of the users of both devices are using it for social media, like online social communities (Facebook, Twitter etc). As for Health and fitness application, it seems that senior nurses are not downloading them that often. This can be seen clearly in the first table for smartphone (Table 9, Table 10).

Table 9: Type of downloaded applications on Smartphones among senior nurse students

		Type of Applications on Smartphones between different OS									
		Social		Games		Health Apps		Education		Other	
		n	%	n	%	n	%	n	%	n	%
Smartphone	Windows	4	5.4%	3	4.1%	2	2.7%	2	2.7%	0	0.0%
	iOS	10	13.5%	4	5.5%	5	6.8%	3	4.1%	1	1.4%
	Android	53	71.6%	27	37.0%	21	28.8%	27	37.0%	1	1.4%
	Total	67	90.5%	34	46.6%	29	38.3%	32	43.8%	2	2.8%

Table 10: Type of downloaded applications on Tablets among senior nurse students

		Type of Applications on Tablets between different OS									
		Social		Games		Health Apps		Education		Other	
		n	%	n	%	n	%	n	%	n	%
Tablet	Windows	7	28.0%	4	16.0%	5	20.0%	6	24.0%	0	0.0%
	iOS	3	12.0%	1	4.0%	2	8.0%	0	0.0%	0	0.0%
	Android	11	44.0%	8	32.0%	6	24.0%	7	28.0%	0	0.0%
	Total	21	88.0%	13	52.0%	13	52.0%	13	52.0%	0	0.0%

When those types of applications are compared with the two Universities it can be seen a significant difference on health applications on smartphones. More specific CUT students use health applications at 55.6% while TEI Crete use it at 32.7% $t(71)=1.7, p=0.04$ (Table 11). Those numbers for tablets are 50.0% for CUT students and 50.0% for TEI Crete $t(22)=0.23, p=0.4$ (Table 12).

Table 11: Difference among application usage between senior nurse students at Universities and download mHealth applications on smartphones

Type of Applications on Smartphones between Universities					
	University				
	CUT		TEI Crete		p Value
	n	%	n	%	
Social Media	17	94.4%	50	89.3%	0.26
Games	11	61.1%	23	41.8%	0.08
Health Applications	10	55.6%	18	32.7%	0.04
Education Applications	4	22.2%	28	50.9%	0.12
Other	1	5.6%	1	1.8%	0.2

Table 12: Difference among application usage between senior nurse students at Universities and download mHealth applications on Tablets

Type of Applications on Tablets between Universities					
	University				
	CUT		TEI Crete		p Value
	n	%	n	%	
Social Media	5	83.3%	17	89.5%	0.35
Games	4	66.7%	10	52.6%	0.3
Health Applications	3	50.0%	10	55.6%	0.4
Education Applications	3	50.0%	11	55.0%	0.4
Other	6	100.0%	20	100.0%	-

On the tables 13 and 14, it can be shown the answers of tablet and smartphone users in the question *what health/fitness applications do you use on your smartphone*. On smartphone, the most frequent use is for lifestyle & stress, while the diet and nutrition option is the second most frequently used answer with only 3.5% difference. Women health and pregnancy was given in 31.0% (Table 13).

Table 13: Type of mHealth application usage on Smartphones among senior nurse students

Type of mHealth Applications used on Smartphones								
Operating System	Windows		iOS		Android		Total	
Type of Application	n	%	n	%	n	%	n	%
Reminders/Alerts	0	0.0%	4	13.8%	6	20.7%	10	34.5%
Women Health/Pregnancy	0	0.0%	1	3.4%	8	27.6%	9	31.0%
Disease Specific	0	0.0%	1	3.4%	5	17.2%	6	20.6%
Fitness	1	3.4%	0	0.0%	10	34.5%	11	37.9%
Lifestyle/Stress	0	0.0%	1	3.4%	12	41.4%	13	44.8%
Diet/Nutrition	0	0.0%	1	3.4%	11	37.9%	12	41.3%
Other	0	0.0%	0	0.0%	1	3.6%	1	3.6%

As for the tablets, it is shown that the most usual answers are the same as the smartphones. However, this time Diet and Nutrition option is coming first, while the lifestyle & stress second. In addition, for tablets “women health and pregnancy” applications are given only in 12.0% (Table 14).

When the two universities are compared on what kind of mHealth applications are been used on Smartphones it seems that there is no significant difference in between the two groups (Table 15, Appendix II).

Table 14: Type of mHealth application usage on tablets among senior nurse students

Type of mHealth Applications used on Tablets								
Operating System	Windows		iOS		Android		Total	
	n	%	n	%	n	%	n	%
Reminders/Alerts	1	4.0%	0	0.0%	4	16.0%	5	20.0%
Women Health/Pregnancy	2	8.0%	0	0.0%	1	4.0%	3	12.0%
Disease Specific	2	8.0%	1	4.0%	2	8.0%	5	20.0%
Fitness	2	8.3%	1	4.2%	2	8.3%	5	20.0%
Lifestyle/Stress	2	8.0%	0	0.0%	4	16.0%	6	24.0%
Diet/Nutrition	3	12.0%	1	4.0%	4	16.0%	8	32.0%
Other (None)	0	0.0%	0	0.0%	0	0.0%	0	0.0%

In addition, when the two universities are compared for the type of mHealth applications that students are using on their Tablets it can be seen that Women Health/Pregnancy has significant difference between the universities, this phenomenon can also be seen for Fitness and Diet/Nutrition. More specific for Women Health and Pregnancy CUT students respond to 0.0% while TEI Crete students respond to 14.3% $t(20)=1.8$, $p=0.04$, while for Fitness those number were 0.0% and 25.0% $t(27)=1.12$, $p=0.01$ and for Diet/Nutrition were 9.1% and 33.3% $t(28)=1.7$, $p=0.05$ (Table 16).

Table 16: Type of application use on tablet among Universities

Type of mHealth Applications used on Tablets among Universities					
	University				p Value
	CUT		TEI Crete		
	n	%	n	%	
Reminders Alerts	1	9.1%	4	19.0%	0.24
Women Health/ Pregnancy	0	0.0%	3	14.3%	0.04
Disease Specific	2	18.2%	3	14.3%	0.4
Fitness	0	0.0%	5	25.0%	0.01
Lifestyle Stress	1	9.1%	5	23.8%	0.14
Diet/Nutrition	1	9.1%	7	33.3%	0.05
Other (None)	11	100.0%	21	100.0%	-

Where do senior nurse students find information about mHealth?

As can be seen from Table 17 there are differences between CUT and TEI Crete for the sources that students get influence from. More specific Family and App Store Reviews have significant influence to them. Family for CUT has 0.0% influence while for TEI Crete this numbers are 13.5% $t(20)=2.8$, $p=0.005$, while App store reviews 0.0% for CUT and 4.1% for TEI Crete $t(20)=18$ $p=0.04$ (Table 17).

Table 17: Influence for mHealth adoption among senior nurse students among from CUT and TEI Crete Universities

Where do senior nurse students get Influence from in order to adopt mHealth					
University	CUT		TEI Crete		p Value
	n	%	n	%	
Friends	3	4.1%	11	14.9%	0.09
Family	0	0.0%	6	8.1%	0.005
Internet	4	5.4%	10	13.5%	0.28
Media Commercial	0	0.0%	2	2.7%	0.08
Medical Journals	2	2.7%	3	4.1%	0.4
Medical Staff	3	4.1%	6	8.1%	0.48
App Store Reviews	0	0.0%	3	4.1%	0.04
Other	3	4.1%	1	1.4%	0.7

How do senior nurse students think using mHealth could improve their knowledge inside the university community and in the future, where they are going to practicing their knowledge?

Table 18 shows the attitude of the participants who uses mHealth applications both in smartphones and tablets. It can be seen, senior nurse students find those applications very useful in their daily life, and they use it habitually, found them easy to use and entertaining. It can be assumed that those facts are interacted to each other. Many surveys occurred about the usability of the devices, as the users prefer an application that is easy to use and at the same time is enjoyable, so that later will continue use it in a daily base, and as a result the usage turns to a habit. In addition, this could lead to the improvement of knowledge, if the structure of application is correct according to

the standards mentioned earlier. Moreover, according to the table 18, it is seemed that in Cyprus, students seems to be more positive to the mHealth applications as they mostly answer “Agree” and “Strongly Agree” at the given question. On the other hand, in Crete, their answers are more spread, from “Neutral” to “Strongly Agree (Table 18). In addition when those statements are being compared between the two universities it is seems that there are not significant differences among them (Table 19, Appendix II).

Table 18: Attitude for mHealth among senior nurse students

		UNIVERSITY			
		CUT		TEI Crete	
		n	%	n	%
Useful in Daily Life	Strongly Disagree	0	0.0%	0	0.0%
	Disagree	0	0.0%	0	0.0%
	Neutral	0	0.0%	2	9.5%
	Agree	4	36.4%	11	52.4%
	Strongly Agree	4	36.4%	6	28.6%
Using mHealth is a habit	Strongly Disagree	0	0.0%	0	0.0%
	Disagree	0	0.0%	0	0.0%
	Neutral	1	9.1%	4	19.0%
	Agree	3	27.3%	11	52.4%
	Strongly Agree	4	36.4%	4	19.0%
Easy to use	Strongly Disagree	0	0.0%	0	0.0%
	Disagree	0	0.0%	1	4.8%
	Neutral	0	0.0%	2	9.5%
	Agree	3	27.3%	11	52.4%
	Strongly Agree	5	45.5%	5	23.8%
Entertaining	Strongly Disagree	0	0.0%	0	0.0%
	Disagree	0	0.0%	0	0.0%
	Neutral	1	9.1%	5	23.8%
	Agree	4	36.4%	12	57.1%
	Strongly Agree	3	27.3%	2	9.5%
Improves knowledge	Strongly Disagree	0	0.0%	1	4.8%
	Disagree	0	0.0%	0	0.0%
	Neutral	2	18.2%	0	0.0%
	Agree	2	18.2%	10	47.6%
	Strongly Agree	4	36.4%	8	38.1%

What are the most important functions and features of mHealth applications, from the health care provider point of view?

Tables 20 and 21 can be divided in three sections just to be easier to understand the answers give by students. Three sections are found: 1. Automatically Data Transfer, 2. Reminders, 3. Interaction. Starting with the first section, there are two subcategories, the automatically recording data and automatically transfer data to EPR. For both subcategories, both universities seems to think that those functions is from very to extremely important. As for the second section, there are another two subcategories as well, the first one it is a reminder for patient to add data to his/her health/fitness application and the second one is to remind the patient for medication, if needed. The sample in this section seems to tend at the same answers as the previous questions, without any spread as the previous one, which means that students from both universities are aware of what mHealth applications should have. The last section has to do with the interaction between the patient and the medical staff, as it is very important to identify the interaction between the two groups.

There are four subcategories, the first is for visual information to the patient, the other is about treatment plans, thirdly graphically display data for the information that the user entered and lastly, is for providing communication between medical staff and patients. Once more, the answers in this section seem to be all of them in the last two options, showing us that all the four of the function of the application are important.

As a general conclusion for tables 20 and 21, it can be said say that the application according to the medical staff is more important to have reminders, to ensure that patient will take the medicine at the appropriate time, or that she/he puts the

necessary data in the application and the interaction of the application seem to be valued as well (Table 20, Table 21).

When the two Universities are compared for what they think is important for a mHealth application it seems that TEI Crete finds slightly more important the previous statement when it is compared with CUT, which they tend to be more moderately. In addition there is no significant difference among them (Table 22 Appendix II).

Table 20: How important the senior nurse student thinks the following functions for health and fitness applications are? (Part I)

		UNIVERSITY			
		CUT		TEI Crete	
		N	%	n	%
Photo Video Text	Not at All	0	0.0%	0	0.0%
	Slightly Important	0	0.0%	0	0.0%
	Moderately Important	0	0.0%	0	0.0%
	Very Important	3	8.8%	11	32.4%
	Extremely Important	5	14.7%	9	26.5%
Auto Data Record	Not at All	0	0.0%	0	0.0%
	Slightly Important	0	0.0%	0	0.0%
	Moderately Important	0	0.0%	2	5.9%
	Very Important	2	5.9%	9	26.5%
	Extremely Important	6	17.6%	8	23.5%
Auto Data Transfer to EPR	Not at All	0	0.0%	1	2.9%
	Slightly Important	0	0.0%	1	2.9%
	Moderately Important	0	0.0%	0	0.0%
	Very Important	1	2.9%	7	20.6%
	Extremely Important	7	20.6%	9	26.5%
Patient Reminder Input	Not at All	0	0.0%	0	0.0%
	Slightly Important	0	0.0%	0	0.0%
	Moderately Important	0	0.0%	2	5.9%
	Very Important	2	5.9%	9	26.5%
	Extremely Important	6	17.6%	8	23.5%

Table 21: How important the senior nurse student thinks the following functions for health and fitness applications are? (Part II)

		UNIVERSITY			
		CUT		TEI Crete	
		n	%	n	%
Patient Reminder Medication	Not at All	0	0.0%	0	0.0%
	Slightly Important	0	0.0%	0	0.0%
	Moderately Important	0	0.0%	1	2.9%
	Very Important	1	2.9%	7	20.6%
	Extremely Important	6	17.6%	11	32.4%
Patients Treatment Plan	Not at All	0	0.0%	0	0.0%
	Slightly Important	0	0.0%	0	0.0%
	Moderately Important	0	0.0%	0	0.0%
	Very Important	1	2.9%	10	29.4%
	Extremely Important	7	20.6%	8	23.5%
Graphically Data	Not at All	0	0.0%	0	0.0%
	Slightly Important	0	0.0%	0	0.0%
	Moderately Important	0	0.0%	4	11.8%
	Very Important	3	8.8%	7	20.6%
	Extremely Important	5	14.7%	7	20.6%
Communication between Staff And Patient	Not at All	0	0.0%	0	0.0%
	Slightly Important	0	0.0%	0	0.0%
	Moderately Important	1	2.9%	3	8.8%
	Very Important	4	11.8%	7	20.6%
	Extremely Important	4	11.8%	8	23.5%

6.3: Students Knowledge and Attitudes on E-Health Concepts

In the current sub-chapter the current knowledge of senior nurse students will present in different concepts such as Telemedicine, EPR, mHealth, video-conferencing and so more. Additionally the attitude on those concepts will present.

What is the senior nurse students’ current knowledge status about mHealth and similar concepts, such as telemedicine, EPR and so more?

As can be seen from the tables below there was no significant difference between the two universities and their knowledge between different eHealth related concepts. More specific as it can be seen from the data below there was no significant difference between universities and different concepts knowledge (Table 23 Appendix II, Table 24).

Table 24: Differences among Universities knowledge of different E-Health related concepts

Mann-Whitney Test for Knowledge among Universities					
	University	n	Mean Rank	Mann-Whitney U	p-Value
Telemedicine	CUT	18	43.42	541.1	0.34
	TEI Crete	64	40.96		
Teleoncology	CUT	18	39.39	538	0.33
	TEI Crete	64	42.09		
Teledermatology	CUT	18	41.11	569	0.47
	TEI Crete	64	41.61		
Telecardiology	CUT	18	42.86	551.5	0.39
	TEI Crete	64	41.12		
Video-Conference	CUT	18	48.69	445.5	0.07
	TEI Crete	64	39.48		
mHealth	CUT	18	46.25	490.5	0.16
	TEI Crete	64	40.16		
EPR	CUT	18	48.33	453	0.08
	TEI Crete	64	39.58		

When students were asked if they were aware of any of the below authorization for mobile health the majority from both universities answer “none” with 77.8% for CUT and 79.7% for TEI Crete $t(80)=0.174$, $p=0.43$. The second most common choice between the above authorizations was the FDA for CUT 22.2% and TEI Crete 9.4%. There was a difference between the two but it was not significant $t(21.7)=1.2$, $p=0.12$. On the other hand it cannot be underestimate the fact that there was a difference between MHRA as CUT students were not familiar at all $n=0$ (0.0%) while TEI Crete students were some kind of familiar with it $n=4$ (6.3%) $t(63)=2.05$, $p=0.02$ (Table 25).

Table 25: Difference among knowledge of mHealth Regulations

	mHealth Regulations				
	CUT		TEI Crete		P Value
	n	%	n	%	
FDA	4	22.2%	6	9.4%	0.12
CE	2	11.1%	5	7.8%	0.33
MHRA	0	0.0%	4	6.3%	0.02
None	14	77.8%	51	79.7%	0.43

Do senior nurse students want to learn more about mHealth and similar concepts?

To the question if they were interested in taking courses in any of the following concepts, as can be seen from Table 26 and Table 27, that it is seems like CUT students are more interested in learning about those concepts. More specific for Telemedicine mean rank for CUT was 51.39 while TEI Crete mean rank was 38.72 ($U=398$, $p=0.013$), for Teleoncology 49.17 for CUT vs. 39.34 for TEI Crete ($U=438$, $p=0.049$), Telecardiology 49.53 for CUT vs. 39.24 for TEI Crete ($U=431.5$, $p=0.04$). As for Teledermatology was no significant difference between the two groups 48.92 for CUT vs. 39.41 for TEI Crete ($U=442.5$, $p=0.054$). For Video Conference it can be seen

very significant difference between the two groups 55.67 for CUT vs. 37.52 for TEI Crete (U=321, p=0.01). Moving on for EPR and mHealth seems to have both high significant differences between the two groups. More specific for EPR mean rank for CUT was 56.33 vs. 37.33 for TEI Crete (U=309, p>0.01), while for mHealth 58.61 for CUT vs. 36.69 for TEI Crete (U=268, p>0.01) (Table 26, Table 27).

Table 26: Differences in taking courses on different E-Health concepts among Universities

Mann-Whitney Test for Interest among Universities					
University		n	Mean Rank	Mann-Whitney U	p-Value
Telemedicine	CUT	18	51.39	398	0.013
	TEI Crete	64	38.72		
Teleoncology	CUT	18	49.17	438	0.049
	TEI Crete	64	39.34		
Tele dermatology	CUT	18	48.92	442.5	0.054
	TEI Crete	64	39.41		
Telecardiology	CUT	18	49.53	431.5	0.04
	TEI Crete	64	39.24		
Video Conference	CUT	18	55.67	321	0.01
	TEI Crete	64	37.52		
mHealth	CUT	18	58.61	268	>0.001
	TEI Crete	64	36.69		
EPR	CUT	18	56.33	309	>0.001
	TEI Crete	64	37.33		

Table 27: Interested in taking courses among different E-Health concepts

		Interest on learning among University			
		CUT		TEI Crete	
		n	%	n	%
Telemedicine	Strongly Disagree	0	0.0%	0	0.0%
	Disagree	0	0.0%	2	3.1%
	Neutral	2	11.1%	18	28.1%
	Agree	10	55.6%	35	54.7%
	Strongly Agree	6	33.3%	9	14.1%
Teleoncology	Strongly Disagree	0	0.0%	0	0.0%
	Disagree	1	5.6%	1	1.6%
	Neutral	1	5.6%	21	32.8%
	Agree	10	55.6%	28	43.8%
	Strongly Agree	6	33.3%	14	21.9%
Tele dermatology	Strongly Disagree	0	0.0%	0	0.0%
	Disagree	1	5.6%	2	3.1%
	Neutral	4	22.2%	25	39.1%
	Agree	7	38.9%	29	45.3%
	Strongly Agree	6	33.3%	8	12.5%
Telecardiology	Strongly Disagree	0	0.0%	0	0.0%
	Disagree	1	5.6%	1	1.6%
	Neutral	2	11.1%	20	31.3%
	Agree	8	44.4%	31	48.4%
	Strongly Agree	7	38.9%	12	18.8%
Video-Conference	Strongly Disagree	0	0.0%	0	0.0%
	Disagree	0	0.0%	2	3.1%
	Neutral	1	5.6%	25	39.1%
	Agree	11	61.1%	29	45.3%
	Strongly Agree	6	33.3%	8	12.5%
mHealth	Strongly Disagree	0	0.0%	0	0.0%
	Disagree	0	0.0%	2	3.1%
	Neutral	0	0.0%	21	32.8%
	Agree	10	55.6%	34	53.1%
	Strongly Agree	8	44.4%	7	10.9%
EPR	Strongly Disagree	0	0.0%	0	0.0%
	Disagree	0	0.0%	3	4.7%
	Neutral	2	11.1%	15	23.4%
	Agree	6	33.3%	38	59.4%
	Strongly Agree	10	55.6%	8	12.5%

6.4: Social Networks and Health education

Social networks are very important in the students influence. For that purpose the attitude among different social networks will presented.

How often do senior nurse students use social media to obtain knowledge about health, and how useful do they find them?

In table 28 we can see that students from both universities are seems to use social networks for health education. It can be assumed that they are using social media so that they can communicate with colleagues and exchange information, as well to watch online videos to improve their skills (Table 28).

Table 28: Social Network usage in general and for health education

Social Networks and Health Education		University				Total %
		CUT		TEI Crete		
		n	%	n	%	
Social Networks	No	2	11.8%	7	11.5%	11.5%
	Yes	15	88.2%	54	88.5%	88.5%
Social Networks for Health Education	No	4	28.6%	18	33.3%	32.4%
	Yes	10	71.4%	36	66.7%	67.6%

In table 29 it can be summarized how often they use the social networks for health education and it seems that YouTube and Google+ are most used from TEI Crete in order to obtain some kind of health information. In the other hand, CUT seems to use more often Facebook and then YouTube and Google+. It can be assumed that they use the Facebook in order to get in touch with colleagues and professors, while it is not that clear (Table 29).

Table 25: Usage of Social Networks for Health education

		University			
		CUT		TEI Crete	
		n	%	n	%
Twitter	Never	4	40.0%	17	47.2%
	Rarely	1	10.0%	1	2.8%
	Every once in a while	1	10.0%	2	5.6%
	Sometimes	2	20.0%	4	11.1%
	Almost Always	0	0.0%	2	5.6%
Facebook*	Never	0	0.0%	6	16.7%
	Rarely	0	0.0%	5	13.9%
	Every once in a while	0	0.0%	6	16.7%
	Sometimes	5	50.0%	5	13.9%
	Almost Always	5	50.0%	6	16.7%
YouTube	Never	1	10.0%	3	8.3%
	Rarely	0	0.0%	2	5.6%
	Every once in a while	0	0.0%	4	11.1%
	Sometimes	5	50.0%	11	30.6%
	Almost Always	3	30.0%	10	27.8%
LinkedIn	Never	4	40.0%	20	55.6%
	Rarely	0	0.0%	1	2.8%
	Every once in a while	0	0.0%	2	5.6%
	Sometimes	3	30.0%	4	11.1%
	Almost Always	1	10.0%	0	0.0%
Pinterest	Never	6	60.0%	19	52.8%
	Rarely	0	0.0%	2	5.6%
	Every once in a while	1	10.0%	2	5.6%
	Sometimes	0	0.0%	2	5.6%
	Almost Always	0	0.0%	1	2.8%
Google +	Never	1	10.0%	2	5.6%
	Rarely	0	0.0%	3	8.3%
	Every once in a while	2	20.0%	3	8.3%
	Sometimes	2	20.0%	6	16.7%
	Almost Always	4	40.0%	15	41.7%

As can be seen from the table 30 students from both Universities are using social networks for educational purposes. It is very important to mention here that there

was a significant difference on Facebook as it seems that CUT Students use it more often than TEI Crete students. More specific TEI Crete students mean rank was 20.10 while CUT Students 35.75 (U=57.5, p>0.001). While for other social media those numbers are not significant at all, more specific for Twitter the mean rank was 22.82 for TEI Crete vs. 25.95 for CUT (U=155.5, p=0.24). Moving on, for YouTube those numbers were 22.78 vs. 26.10 (U=154, p=0.24), while for LinkedIn were 22.31 vs. 27.80 (U=1374, p=0.11). When the students were asked about Pinterest TEI Crete mean rank was 21.90 vs. CUT 23.94 (U=164, p= 0.32) and for Google+ they answer 23.26 vs. 24.35 (U=171.5, p=0.41) (Table 30).

Table 30: Difference of usage for social networks among universities and health education

Average Usage of Social Networks among Universities					
	University	n	Mean Rank	Mann-Whitney U	p-Value
Twitter	TEI Crete	36	22.82	155.5	0.24
	CUT	10	25.95		
Facebook	TEI Crete	36	20.10	57.5	>0.001
	CUT	10	35.75		
YouTube	TEI Crete	36	22.78	154	0.24
	CUT	10	26.10		
LinkedIn	TEI Crete	36	22.31	137	0.11
	CUT	10	27.80		
Pinterest	TEI Crete	36	21.90	164	0.32
	CUT	10	23.94		
Google+	TEI Crete	36	23.26	171.5	0.41
	CUT	10	24.35		

In the table 31 we can see how the students feel about social networks and how do they affect their education in health. Here the situation is clearer as the students from CUT find YouTube tutorials very helpful for the education. Moreover, Google+ tends to be helpful as well, while they found Facebook somewhat helpful. This can lead to a primary conclusion that they are more positive in optical visual guidelines

on how to make specific procedures. As for TEI Crete it can see that students find Google+ more helpful for health education, while the rest are more spread. Both groups seem that they do not prefer Twitter for health education at all (Table 31).

Table 31: Usefulness of social networks for health education

		University			
		CUT		TEI Crete	
		n	%	n	%
Twitter	Not at all	2	20.0%	15	41.7%
	Not Really	0	0.0%	6	16.7%
	Neutral	3	30.0%	3	8.3%
	Somewhat	2	20.0%	1	2.8%
	Very much	0	0.0%	0	0.0%
Facebook	Not at all	0	0.0%	4	11.1%
	Not Really	0	0.0%	8	22.2%
	Neutral	2	20.0%	8	22.2%
	Somewhat	5	50.0%	6	16.7%
	Very much	3	30.0%	2	5.6%
YouTube	Not at all	0	0.0%	2	5.6%
	Not Really	0	0.0%	2	5.6%
	Neutral	0	0.0%	7	19.4%
	Somewhat	6	60.0%	11	30.6%
	Very much	4	40.0%	8	22.2%
LinkedIn	Not at all	0	0.0%	6	16.7%
	Not Really	0	0.0%	4	11.1%
	Neutral	3	30.0%	7	19.4%
	Somewhat	2	20.0%	0	0.0%
	Very much	1	10.0%	2	5.6%
Pinterest	Not at all	1	10.0%	6	16.7%
	Not Really	1	10.0%	2	5.6%
	Neutral	1	10.0%	4	11.1%
	Somewhat	1	10.0%	5	13.9%
	Very much	1	10.0%	0	0.0%
Google +	Not at all	0	0.0%	1	2.8%
	Not Really	0	0.0%	1	2.8%
	Neutral	2	20.0%	4	11.1%
	Somewhat	3	30.0%	12	33.3%
	Very much	5	50.0%	10	27.8%

In the table 32 it can see the mean rank of usefulness of different social media among the two universities. It seems to be a significant difference between the two groups. More specific TEI Crete students found Facebook useful into their knowledge at mean rank 19.94 while for CUT student was 36.30 (U=52, $p>0.001$) as for YouTube those numbers where 21.19 vs. 31.80 (U=97, $p=0.011$). Additionally it can be seen that there is a slight difference between the usefulness of Google+ TEI Crete mean rank 36 vs. 29.40 for CUT (U=121, $p=0.051$). Significant difference cannot be seen for other social networks. It can be assumed that social networks affect more CUT students than TEI Crete (Table 32).

Table 32: Usefulness of social networks for health education among universities

Average Usefulness of Social Networks among Senior Nurses Students					
	University	n	Mean Rank	Mann-Whitney U	p-Value
Twitter	TEI Crete	36	22.25	135	0.1
	CUT	10	28.00		
Facebook	TEI Crete	36	19.94	52	>0.001
	CUT	10	36.30		
YouTube	TEI Crete	36	21.19	97	0.011
	CUT	10	31.80		
LinkedIn	TEI Crete	36	22.15	131.5	0.085
	CUT	10	28.35		
Pinterest	TEI Crete	36	23.11	166	0.34
	CUT	10	24.90		
Google+	TEI Crete	36	21.86	121	0.051
	CUT	10	29.40		

Chapter VII: Discussion

Over in all n=82 students answered the online survey, from which n=18 where from Cyprus Technological University (CUT) and n=64 from Technological Educational Institute of Crete (TEI Crete). The majority of the students were females and mean age $22.5 \text{ SD} \pm 4.1$ years. For their father education 50% answered High School, while for their Mother education 47.6% answered High School as well.

57.3% of the participants had visited their physician 1-2 times last year. While from those whom answer, that they visit their physician at least one time in the past year, 21.5% ask for some kind of application and another 45.5% ask for some kind of online health information.

Moving forward, most of the students are smartphone users and they prefer Android Operating System, they use their smartphones for Social network apps (Facebook, Twitter, etc) at 90.5%, while they are using their smartphones to download some kind of health related application at 38.3%. It seems that they prefer to communicate with others more than to look for some kind of health or fitness information. As for tablet computers those applications are similar, 88% use their tablets for social network apps and 52% for health related apps. It is important to mention that games and education are also 52% when it comes to tablets.

Most of the students got some kind of influence from internet and friends. In addition, health and fitness application users have some kind of reminder alerts, fitness tracer lifestyle stress and diet/nutrition apps. In addition, they said that those kind of apps are kind of useful in their daily life, easy to use and entertaining, while

there was a small difference among the two universities for how these applications can improve their knowledge, as TEI Crete were more positive than CUT, but there was no significant difference between the two ($U=93$. $p=0.17$).

Moreover, most of the students want the applications to provide them with multimedia information about patients, to auto record data and transfer them to the EPR. To provide reminders to the patient for appointment and medication as well to input data and last but not least to provide the medical staff graphically data and be able to communicate with other medical staff and patients.

Most of the students are quite satisfied with their knowledge for Electronic Patient Records (EPR) but they are not that satisfied about their knowledge for mHealth. In addition, they are very interesting in learning more about mHealth and related concepts. It can be assumed that they are aware of their potentials and usefulness in the near future.

88.5% of the senior nurse students are using social networks, while from them 67.6% are using social networks for their health education. More specific, most of them they use YouTube and Google+, while there is a difference for the use of Facebook as CUT students use it more often than TEI Crete mean rank was 35.70 while vs. 20.10 ($U=57.5$, $p>0.001$). Both universities think that YouTube provides better knowledge than most of the social networks, while there is also some difference between the two Universities with CUT Students be slightly more positive than TEI Crete Student, mean rank 31.80 vs. 21.19 ($U=97$, $p=0.011$). While as for Facebook it seems that CUT students find it more useful than TEI Crete students with mean rank 36.30 vs. 19.94 ($U=52$, $p>0.001$).

It can be seen that students are not using that much health related applications but they are interested in learning more about them. In addition, they are using social networks more often to find health related information, and more specific they prefer videos for that.

7.1: Smartphone and Tablet applications

Most of the students are using Android OS on Smartphones and on Tablet computers, while the second most common for smartphones is iOS while for Table computers is Windows OS. Students are using more social applications on both devices while Health related applications are in the bottom line. This is kind of different from other studies that they have been conducted in the general population. It can be seen from Smith and Page (2015), where in their report they said that almost 75% of the participants age 18-29 they use their smart device in order to obtain some kind of health related information, while it is not clear if they have download any health related application (Smith and Page, 2015). It can be assume that nurse students are not educated enough on those kind of applications because both universities do not offer this kind of courses in extend that they should do. In addition, in another research from Page (2015), where he finds out that most of the young participants (age 18-24) of his research were depended on social media applications for communication (Page, 2015). This is related with the current study as most of the users are at the age of 22.5 (SD \pm 4.1) years and they are using their devices for social networks.

There are too many apps that can be related in the categories of mHealth, some of them are diet/nutrition, fitness applications, medications reminder and/or alerts, disease specification and so more. Nurse students' seems to use them but not as

much as non medical related population. As it can be seen from Boulos and colleges (2014), most of the non medical users tend to use their smartphone applications to gain information about health related issues, while sometimes those applications gives them solutions to some kind of health related issues. On the other hand, not all of those applications are bad habit, as they can encourage the user to be more active or to remind the user for medication (Boulos et al, 2014). This can help users to reduce weight and follow their own target goals. It can be assumed that nurses do not use those kinds of applications not because they do not find them useful but probably because they do not need them, or they do not have time to give the appropriated attention to them. In this point it is interesting to refer to the women health and pregnancy application as it seems that only few from the senior student nurse women are using this kind of application, it is not that clear if they are not familiar with those kind of applications or if they do not find those kind of apps useful.

Moving on, senior nurse students are more into using some kind of applications when they discuss it either with their friends or if they read about an app on the internet, but even though they get some influence from those sources, the users' rate is not that high. In addition, Gowin and colleagues (2015), in their qualitative study among college students and the use of health and fitness applications, they said that around 50% of their participants n=27 where influenced from a family member or a friend. It is not clear if the previous study involves medical related students, so it is hard to assume that nurse students are more familiar with where to search for information about some kind of health or fitness application.

Most of the students said that using mHealth and fitness applications are useful to their lives. In addition, they wanted those apps be easy to use and entertaining. The previous statements were also mentioned in Gagnon and colleagues (2016), were in their systematic review they identified them as two of the most important adopting factors for an app (Gagnon et al 2016). It is clear that users, which are related with medical professions, are more into adopting those kinds of apps when they find them useful, easy to use and at the same time entertaining.

7.2: mHealth knowledge and awareness

Overall students are somehow aware of different concepts. It seems that they know the basics about mHealth but they need more training on it. When the students were asked if they are familiar with any of regulatory authorization most of them answered “None”. This is important because there are so many applications related to health and fitness apps that they could give advice to patients and they could lead them to self-treatment which most of the times will harm them. In 2015 Dehling and colleagues made a research on mobile applications on Android and iOS devices, they discovered more than 24,400 health related applications and they concluded that there is a big threat out there when people are using these kinds of applications. They continue by saying that it is important to use standards in order to avoid any harm in the future, which could be associated with privacy issues and exposal, but even worst with self-treatment suggestions (Dehling et al, 2015). For the current study this information can be used to make the students more aware on what they are about to face in the near future and why it is important to know about regulatory authorizations.

In addition, it can be seen that most of the nurse students are interested in taking some courses about mHealth. This could mean that they are interested in this concept because they find it important, as the technology is been daily evolving. In a systematic review for Gagnon and colleagues (2016), they identified some more factors that could lead to the adoption and empowerment of medical professional users for adopting and learning more about mHealth. More specific, in their review they said that using mHealth could help them, medical users, to organize their schedules easier, empower the patient to have more control on his/her own treatment and reduce time on treatment, as patients could just send an e-mail or multimedia message in order to ask for an advice. In addition, the medical staff could rapidly act by calling directly the patient, when the patient is monitoring his/her vitals such as blood pressure, heart pulse, temperature, blood glucose and so more (Gagnon et al, 2016).

7.3: Social Networks

Students are using social networks to obtain health related information and this can be seen form Usher and colleagues (2014), which they said that medical relate students have the skills to use them and obtain some kind of health information. They continue by saying that universities need to amplify this kind of knowledge and provide the students with necessary knowledge (Usher et al, 2014). As for the current study, the students are very positive for the adoption of social media and they find it useful when it is related with health education.

7.4: Limitations

As most of the studies, this study had some limitations. First limitation can be associated with the lack of participant universities. The results could be different if some universities answered positively to the request. In addition to that, because most of the universities that had received an e-mail to participate in the current study, they were more developed than the universities that participated in the study after all, they could have provided more information on the current knowledge of different countries among Europe and Canada. Moreover, the two universities are representing only a small amount of institutes both in Cyprus and Greece, as it was hard to get in touch with all the universities from both countries.

Another limitation is associated with the lack of literature, as far as it is know that this is one of the first researches that has be done to obtain information from nurse students and their perspectives about mHealth and related concepts.

Last, but not least, was the time of the study, as the current study had a limitation of approximately nine months, which it needed to search for literature and at the same time setting limits for the data collection. If there was more time the research could have a follow up after some lectures so that it could compare the before and after the lecture knowledge and attitudes.

Chapter VIII: Conclusion

Over in all, nurse students are quite familiar with the concept of mHealth, and they really want to learn more about it. In addition, they do not seem to know lot of things about regulations and standards when it comes to choosing among different health and fitness applications.

What needs to be done first is to give them the motivation to learn more, by making them more active into researches and identifying their needs. In addition, we need to provide them with the latest guidelines in order to recognize when an application could be harmful for them or for their future patients as well.

Moreover, the educators must be aware for the purposes of the social media and how social media could affect the students' knowledge. It is better for the educators to find reliable sources that are associated with health information and present them to the nurse students. This could help the students to obtain knowledge more sufficiently, than the ordinary university lectures, as they can search more by themselves and make the students more active to their own education.

Moving on, the educators should have an interaction with their students to learn from them. Most of the times, students are more familiar with new technologies and as for the purpose of the present study they are even more familiar with new health and fitness applications. It is important to listen to them and make the correct adjustments to the curricular. It is important to introduce mHealth as part of the curricular as it is well known, in the medical society, that the best solution to cure something is to prevent it. This quote can be associated for mHealth when it comes to download an application where students need to be aware of what they are

downloading and how the application works.

A further research is needed as this technology is evolving too fast and the needs of the population are changing daily. In addition, it should focus in more wide population and not only in senior nurses as differences can be seen among different age groups and level of education.

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Appendix I

Questionnaire

Knowledge and Attitudes about Mobile Health in nurse students: the use of Smartphones and Tablets

This questionnaire is part of a research project on the attitude and knowledge of nursing students with regards to the use of mHealth, as part of a masters thesis in Greece and Norway.

ONLY FOR SENIOR NURSE STUDENT'S!!

There are 28 questions in this survey

A: Demographics

A1: Age: _____

A2: Gender: Female , Male

A.3. Home University\Institute

T.E.I Crete , UiT , Other _____

A.4. Current Semester: _____

A.5. Father's Education

None , Elementary , High School , Higher Education , Other: _____

A.6. Mother's Education

None , Elementary , High School , Higher Education , Other: _____

A.7. Ethnicity: _____

A.8. Home Town: _____

A.9. How many times (approximately) did visit your physician in the past year?

None , 1-2 , 3-5 , >5

A.10. Have you ever asked your physician to recommend you any health application and/or give to you any advice where to find online information?^{1,2}

Health Application

Online information

B: Information and Communication Technologies (ICT) Knowledge

B1: How satisfied are you with your knowledge of these concepts?

	Not at all	Slightly	Moderately	Very	Extremely
Telemedicine	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Teleoncology	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Teledermatology	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Telecardiology	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Video-Conferencing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mobile Health (mHealth)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Electronic Health Record	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

B2: I would be interested in taking courses in the following concepts?

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Telemedicine	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Teleoncology	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Teledermatology	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Telecardiology	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Video-Conferencing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mobile Health (mHealth)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Electronic Health Record	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

B3: Are you Aware of any of the following regulatory marks on mobile apps? (tick all that apply)

US FDA EU CE UK MHRA None

B4: What do you think would be the most beneficial format for this teaching to be delivered?

Online learning package Lecture Workshop Self-help guide Other: _____

C: Use of Smartphones and Tablet Computers

C1: Do you own a Smartphone and/or tablet?

Smartphone , Tablet , Both , Neither (If you answer "Neither" go to Section D.)

C2: What operating system do you use on your smartphone (If you use)?

iOS Android Windows Other _____

C3: What operating system do you use on your Tablet Computer (If you use)?

iOS Android Windows Other _____

C4: What applications do you use on your smartphone?

Social (Facebook/Twitter) , Game , Health and Fitness , Education , Other: _____

C5: What types of health/fitness applications do you use on your smartphone (only if you answer Health and Fitness in question C4)?

Medical Reminders & Alerts , Women's Health & Pregnancy , Disease Specific Fitness Tracker , Lifestyle & Stress , Diet & Nutrition , Other: _____

C6: What applications do you use on your Tablet?

Social (Facebook/Twitter) , Game , Health and Fitness , Education , Other:

C7: What types of health/fitness applications do you use on your Tablet (only if you answer Health and Fitness in question C6)?

Medical Reminders & Alerts , Women's Health & Pregnancy , Disease Specific

Fitness Tracker , Lifestyle & Stress , Diet & Nutrition , Other: _____

C8: Was your choice of application influenced by any of the following ^{3,4}

Friends , Family , Internet , TV/Radio Commercials , Medical Journals ,

Medical Staff , App store reviews , Other: _____

C9: How strongly do you agree or disagree with the following statements about

health and fitness applications?

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Are useful in my daily life	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I use them habitually	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Are easy to use	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Are entertaining	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Improves my health knowledge	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

C10: How important do you think the following functions for health and fitness application, from the healthcare staff point of view ^{5,6,7} ?

	Not at all	Slightly Important	Moderately Important	Very Important	Extremely Important
Provides information to users in multiple formats (photo, video, text)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Automatically records data	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Automatically transfers data to Electronic Health Record	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reminds the patient to input data	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reminds the patient to take medication	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Displays the patient's treatment plans	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Graphically displays data	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Provide communication between medical staff and patients	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

D: Social Networks

D1: Do you use Social Networks

Yes , No

D2: Do you use Social Networks for your own health education?

Yes , No

D3: How often do you use social networks for your own health education?

	Never	Rarely	Every once in a while	Sometimes	Almost Always
Twitter	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Facebook	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
YouTube	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
LinkedIn	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Pinterest	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Google+	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

D4: How useful do you find social networks for your own health education?

	Not at all	Not Really	Neutral	Somewhat	Very much
Twitter	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Facebook	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
YouTube	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
LinkedIn	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Pinterest	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Google+	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

E: Contact information

Would you like to give us your e-mail for receiving research results and/or participation in future project?

Research results

Future project

e-mail: _____

Thank you for your time

Questionnaire References

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Appendix II Tables

Table 4: Demographic Information for Greece and Cyprus

	Greece	Cyprus
Population (2011)	10,816,286	862,000
GDP (2011)	207,029 (million Euros)	19,731.1 (million Euros)
GDP (2015)	176,023 (million Euros)	17,637.2 (million Euros)
Tertiary Education Teaching Staff (2013/14)	14,805	1,848
Tertiary Education Students (2013/14)	273,425	33,674
Tertiary Education Graduate Students (2013/14)	51,542	7,765
Money spent on Health (2010)	22,263.3 (million Euros)	1,237.0 (million Euros)
Money spent on Health (2013)	15,776.5 (million Euros)	1,230.0 (million Euros)

Table 6: Parents Education among Senior Nurse Students

Fathers Education	<i>Elementary</i>	15	18.3
	<i>High School</i>	41	50
	<i>University</i>	24	29.3
	<i>Other</i>	2	2.4
Mothers Education	<i>Elementary</i>	19	23.2
	<i>High School</i>	39	47.6
	<i>University</i>	21	25.6
	<i>Other</i>	3	3.7

Table 15: Type of application use on smartphone among Universities

Type of mHealth Applications used on Smartphones among Universities					
	University				p Values
	CUT		TEI Crete		
	n	%	n	%	
Reminders Alerts	4	40.0%	6	33.3%	0.4
Women Health/ Pregnancy	3	30.0%	6	33.3%	0.4
Disease Specific	3	30.0%	3	16.7%	0.2
Fitness	3	30.0%	8	44.4%	0.2
Lifestyle Stress	3	30.0%	10	55.6%	0.1
Diet/Nutrition	3	30.0%	9	50.0%	0.2
Other	1	10.0%	0	0.0%	0.2

Table 19: Attitude difference for mHealth among the universities

Mann-Whitney Test among Universities and Different Statements					
	University	n	Mean Rank	Mann-Whitney U	p-Value
Useful in Daily Life	CUT	11	16.27	113	0.45
	TEI Crete	21	16.62		
Habitually	CUT	11	16.67	113.5	0.46
	TEI Crete	21	16.40		
Easy To Use	CUT	11	17.55	104	0.31
	TEI Crete	21	15.95		
Entertaining	CUT	11	16.86	111.5	0.43
	TEI Crete	21	16.31		
Improves my Knowledge	CUT	11	14.45	93	0.17
	TEI Crete	21	17.57		

Table 22: What do senior nurse students want from mHealth applications to have

Mann-Whitney Test among Universities and what they want from an mHealth Application					
	University	n	Mean Rank	Mann-Whitney	p-Value
Photo/Video/Text	TEI Crete	21	16.74	110.5	0.41
	CUT	11	16.05		
Auto Data Record	TEI Crete	21	15.88	102.5	0.21
	CUT	11	17.68		
Auto Data Transfer EPR	TEI Crete	21	15.60	96.5	0.29
	CUT	11	18.23		
Patient Reminder Input	TEI Crete	21	15.88	102.5	0.29
	CUT	11	17.68		
Patient Reminder Medication	TEI Crete	21	16.79	109.5	0.4
	CUT	11	15.95		
Patients Treatment Plan	TEI Crete	21	15.45	93.5	0.17
	CUT	11	18.50		
Graphically Data	TEI Crete	21	15.79	100.5	0.27
	CUT	11	17.86		
Communication Staff And Patient	TEI Crete	21	16.21	109.5	0.4
	CUT	11	17.05		

Table 23: Current knowledge of different E-Health concepts according to senior nurse students

		Knowledge Satisfaction among Universities			
		CUT		TEI Crete	
		n	%	n	%
Telemedicine	Not at all	3	16.7%	6	9.4%
	Slightly	5	27.8%	21	32.8%
	Moderately	3	16.7%	24	37.5%
	Very	6	33.3%	11	17.2%
	Extremely	1	5.6%	2	3.1%
Teleoncology	Not at all	7	38.9%	15	23.4%
	Slightly	4	22.2%	26	40.6%
	Moderately	3	16.7%	13	20.3%
	Very	3	16.7%	5	7.8%
	Extremely	1	5.6%	5	7.8%
Teledermatology	Not at all	7	38.9%	20	31.3%
	Slightly	5	27.8%	23	35.9%
	Moderately	2	11.1%	14	21.9%
	Very	3	16.7%	5	7.8%
	Extremely	1	5.6%	2	3.1%
Telecardiology	Not at all	6	33.3%	16	25.0%
	Slightly	3	16.7%	19	29.7%
	Moderately	4	22.2%	21	32.8%
	Very	4	22.2%	4	6.3%
	Extremely	1	5.6%	4	6.3%
Video-Conference	Not at all	1	5.6%	16	25.0%
	Slightly	7	38.9%	14	21.9%
	Moderately	3	16.7%	21	32.8%
	Very	4	22.2%	11	17.2%
	Extremely	3	16.7%	2	3.1%
mHealth	Not at all	2	11.1%	15	23.4%
	Slightly	8	44.4%	19	29.7%
	Moderately	2	11.1%	21	32.8%
	Very	3	16.7%	6	9.4%
	Extremely	3	16.7%	3	4.7%
EPR	Not at all	0	0.0%	4	6.3%
	Slightly	3	16.7%	12	18.8%
	Moderately	3	16.7%	15	23.4%
	Very	7	38.9%	24	37.5%
	Extremely	5	27.8%	9	14.1%