



**FACULTY OF MEDICINE
DEPARTMENT OF NURSING**

Habib Ullah Raj

**NURSES' KNOWLEDGE AND ATTITUDE TOWARD
USING MOBILE HEALTH APPLICATION: A STUDY IN
FINLAND AND LITHUANIA**

Professional Bachelor Thesis

The study programme of general practice nursing

State code 6531G08040

Study field of Nursing and Midwifery

Author: Habib Ullah Raj

(signature)

(date)

Supervisor: PhD. Assoc. Prof. Viktorija Piščalkienė (Kauno Kolegija)

(signature)

(date)

Lecturer Friis Aila (XAMK)

(signature)

(date)

Lecturer Tarja Turtiainen (XAMK)

(signature)

(date)

Kaunas 2019

ABSTRACT

Raj H U. Nurses' knowledge and attitude toward using mobile health application: a study in Finland and Lithuania. Professional Bachelor's final thesis. Supervisor Ph.D. Assoc. Prof. Piščalkienė V. kolegija/University of Applied Sciences. Faculty of Medicine, General Practice Nursing study programme. Kaunas, 2019. 41 p.

Relevance of the study: Digital health concept is transforming the healthcare sector swiftly. mHealth technology is considered one of the fastest adaptive technology in the healthcare industry. Nurses spend most of their time in direct patient care. So, it is important to analyze nurses' knowledge and attitude using mobile health application. There are a lot of studies were conducted to identify and measure the importance of mHealth technology. There are few studies regarding mHealth and nursing, but those studies did not compare nurses' knowledge and attitude between Finland and Lithuania.

Aim of the study: To identify Finnish and Lithuanian nurses' knowledge and attitude toward using mobile health application.

Objectives of the study: 1. To describe available mHealth application in nursing practice using scientific literature. 2. To evaluate the nurses' awareness and experience level regarding the mHealth application. 3. To measure the knowledge and attitudes of nurses toward using mHealth. 4. To identify any differences in knowledge and attitudes of nurses between Finland and Lithuania.

Research methods: The whole study follows the exploratory research approach. Scientific literature was analyzed. A quantitative research method is used to collect information from 120 Finnish nurses and 61 Lithuanian nurses with a pre-constructed questionnaire.

Conclusions: Most of the nurses are familiar with mHealth technology and their regulatory authorities. Lithuania nurses received less training or education about mHealth comparing to Finnish nurses, but they are more interested to learn mHealth and other digital health concepts. Majority of participants considered automatically record data and transfer it to the electronic health record are the most important mHealth functions. Both Finnish and Lithuanian nurses identified the lack of infrastructure like no Wi-Fi access, lack of awareness to recommend the best apps are the biggest barrier to mHealth usage. Hospital administration should develop modern infrastructure and provide necessary training to the nurses. Nurses should update their mHealth knowledge by attending training, seminar, conference etc.

Scope of the thesis - the paper consists of 51 pages, 19 tables, 8 figures, 47 sources of information.

TABLE OF CONTENTS

ABSTRACT	ii
LIST OF TABLES AND FIGURES	iv
INTRODUCTION	1
1. LITERATURE ANALYSIS.....	4
1.1. mHealth.....	4
1.2. Nursing and mHealth	10
1.3. Security and privacy of mHealth application	19
1.4. Standards of mHealth application.....	19
2. RESEARCH SETTINGS AND METHODOLOGY.....	21
2.1. Research settings.....	21
2.2. Research Design	21
2.3. Method of Data Collection	22
2.4. Sampling	22
2.5. Statistical analysis.....	23
2.6. Ethical Consideration.....	23
3. RESULTS.....	24
3.1. Characteristics of the study group.....	24
3.2. Current status of smartphone usages	25
3.3. Current status of mHealth usage among nurses.....	27
3.4. Use of mHealth application in patient care.....	29
3.5. Nurses' attitudes on the mHealth concept	30
3.6. Nurses' level of mHealth use.....	34
3.7. Concerns and barriers to using mobile apps in nursing practice	36
CONCLUSION	39
RECOMMENDATION.....	40
REFERENCES	41
APPENDICES	45
Appendix 1 Questionnaire	45
Appendix 2 Research Permission.....	52

LIST OF TABLES AND FIGURES

List of tables:

Table 1.1 Definition of mHealth.....	5
Table 1.2 Classifications of mHealth adopted from Aungst (2014).....	6
Table 1.3 mHealth classification by Mosa (2012).....	7
Table 1.4 Twelve common areas of mHealth applications by Labrique (2013)	7
Table 1.5 Usages for Mobile Devices and Apps by Health Care Professionals (Ventola, 2014)	8
Table 3.1 Demographics of the study participants (n=182)	24
Table 3.2 Area of Nursing management with gender and country variant.....	25
Table 3.3 Types of applications downloaded by the nurses	26
Table 3.4 Types of health-related apps used by nurses	27
Table 3.5 Frequency of using mHealth apps	27
Table 3.6 Factors influencing the choice of mHealth apps	28
Table 3.7 Usage of mHealth apps in patient care	29
Table 3.8 Importance of mHealth functions	31
Table 3.9 Nurses' attitude toward using mHealth apps	32
Table 3.10 Correlation of attitude toward using mHealth with other factors.....	33
Table 3.11 Self-assessment of nurses' mHealth knowledge	34
Table 3.12 Nurses' interest in taking courses among different eHealth concepts	35
Table 3.13 Nurses' concerns about using mHealth apps	36
Table 3.14 Barriers to using mobile apps in nursing practice	37

List of figures:

Figure 2.1 The research process model adopted form (Asikainen, 2015).....	21
Figure 3.1 Operating system of smartphone or tablet PC.....	26
Figure 3.2 Knowledge of mHealth Regulatory authorities.....	29
Figure 3.3 mHealth recommendation to the patient	30
Figure 3.4 Usefulness of the mHealth apps in nursing care	31
Figure 3.5 Importance of mHealth functions	32
Figure 3.6 Training received by nurses	35
Figure 3.7 Barriers to using mobile apps in nursing practice.....	37

ABBREVIATIONS

AACN: American Association of Colleges of Nursing

CDC: Centers for Disease Control and Prevention

EDD: Estimating delivery date

eHealth: Electronic health

EHR: electronic health record

ERS: Electronic record systems

FDA: Food and Drug Administration

FIMEA: Finnish Medicines Agency

ICU: Intensive care unit

mHealth: Mobile health

MHRA: Medicine and Healthcare products Regulatory Agency

PCMH: Patient-Centered Medical Home

VVKT: Valstybinė vaistų kontrolės tarnyba

WHO: World Health Organization

INTRODUCTION

Smartphone and mobile technology are the fastest adopted technology in the history of humanity as they offer low-cost and real-time communication (Waegemann, 2010). According to the Ericsson (2018), the total number of the mobile user was around 7.9 billion in first quarter of 2018 with 5.5 billion wireless internet or mobile broadband users. The advancement of mobile technology has expanded into a new area of digital health, known as mHealth (mobile health) to address health priority with their innovative application (WHO, 2011). The world is facing a critical healthcare worker shortage with communicable and non-communicable diseases affecting millions of people all over the world. As stated by the World Health Organization (WHO), 2.4 million healthcare workers are working worldwide at the basic healthcare settings and public health sectors are ready to adopt mHealth technology (Pradhan, 2017). Mobile health (mHealth) application is a crucial component of telehealth sector. The increased usage of mobile devices and apps by health professionals like nurses, physicians, pharmacist etc. have made healthcare delivery easier for supporting evidence-based medicine and clinical decision-making.

Over the past few years, healthcare settings and facilities have transformed enormously using mobile phones and mobile health devices (Ventola, 2014). According to Ventola CL, (2014) the transformation is partially accompanying to the availability of medical health applications. When used properly, a mobile health application has the power to save patients' nurses' and doctors' valuable time and money. Collins (2012) believes that the mobile health application will involve the patients in their own treatment by self-monitoring and it will help to provide better public health. Mobile devices and application have transformed healthcare settings. They allow healthcare personals to access evidence-based support and patient-centered management systems in a systemic method which improves clinical decision making and improves patient outcome (Ventola, 2014).

Despite the rise of mobile health application and devices, very few professional studies and regulations exist for the use of mobile health applications (mHealth apps) in the public health sector. Chiauzzi, Rodarte, and DasMahapatra (2015) reported a lack of research on the use of mobile health applications by the nurses. A survey conducted by the Royal College of Nursing (2013) finds the awareness of telehealth amongst nurses is rising but more work is required to develop the awareness, knowledge, and understanding of the benefits that mobile health application can bring to nursing practice (Barret & Wallis, 2013).

Motivation for the study: The topic of this study was chosen as the author himself is interested in digital health, and specifically in mobile health's prospective to achieve great financial

benefits in the healthcare sector. The idea occurred during the author's exchange period at XAMK. The exchange was conducted during fall 2017 and spring 2018. Later, the scope of the study was acknowledged in association with the authors' supervisor from the client organization.

Problem of the study: Firstly, there are no similar studies conducted in Finland and Lithuania to identify nurses' knowledge and attitudes towards using mobile health apps and recommending health apps to patients. Most studies have been performed in the United States.

Secondly, nurses are considered as a potential channel for the diffusion of mobile health apps to patients. These studies (Samples, 2014), (Wyatt, 2012) have however not investigated nurses' knowledge and attitudes about mobile health apps in depth. Thus, we have little knowledge about how nurses think about mobile health apps and how they act. There is a lack of studies if nurses really recommend health apps to patients and what their reasons are for doing so or not. Furthermore, we have little knowledge if nurses realize the quality issues of mobile health apps and how they judge the quality.

Henceforth, a study is needed to disclose the real situation in order to understand how nurses think about mobile health apps and what drive or hinder their decision making about using mobile health apps and recommending health apps to patients, and further to think about what we can help with.

Aim of the study: The rapid advancement of mobile health technology and its adaptation in the health care sector will address a new issue when the priority is care delivery. In addition, health professionals and to be precise nurses should be well equipped and trained so that they can use and promote mobile health technology in best practice. The topic of the study, Nurses' knowledge and attitude toward using mobile health application: A study in Finland and Lithuania, is a relatively recent topic which is why the purpose of the study is of descriptive and explorative nature. Therefore, in general aim of this study is to identify the nurses' knowledge and attitude toward mobile health application.

Objectives of the study: The specific objectives are:

1. Describe available mHealth application in nursing practice using scientific literature.
2. Evaluate the nurses' awareness and experience level regarding the mHealth application.
3. Measure the knowledge and attitudes of nurses toward using mHealth.
4. Identify any differences in knowledge and attitudes of nurses between Finland and Lithuania.

Research question: “What are Finnish and Lithuanian nurses’ knowledge and attitude toward using mobile health application?” According to the definitions of research purposes, research questions are structured as follows:

1. Type of mHealth application and devices used by nurses?
2. What are the sources of mHealth information for nurses?
3. What are nurse’s opinions about using the mHealth application at healthcare settings?
4. What are the most significant features and functions of mHealth applications?
5. What is the nurses’ existing knowledge status about digital health concepts, such as mHealth, telemedicine, eHealth, and so more?
6. Do nurses want to learn more about mHealth and other digital health concepts?
7. What are the barriers of using mobile apps in nursing practice?

Research methods: The whole study follows the exploratory research approach. Scientific literature will be analyzed in the literature analysis section. A quantitative research method is used to obtain information from a sample of individuals with the use of questionnaires. A pre-constructed questionnaire is used to collect data by following the survey research method. After that survey data will be analyzed. Detailed information of the research method and data collection method are discussed in Research Design and the method of data collection is discussed in the following section 2.3 below.

Research structure: This study contains the introduction of the research problem, motivation, the objective of the study and three main chapters: literature analysis, empirical research, and data analysis. The literature analysis of the study highlighted the main perceptions of mobile health application and its operation in nursing. In chapter two, methodology and research settings are described. After that survey data was analyzed and the result was visualized in chapter three. Finally, the success of the study will be discussed in conclusion and recommendation will be given according to the study objective and findings of the study.

Professional competences, which need to be achieved in the thesis: (According to Minister of Health of the Republic of Lithuania on the approval of Lithuanian Medical Standard MN 28:2011 “General Practice Nurse. Rights, Duties, Competencies, and Responsibilities”)

- Know the principles of health promotion and disease prevention;
- Have a knowledge mHealth application;
- Define the nursing demands of the mHealth application.

1. LITERATURE ANALYSIS

This chapter describes the impact of mobile health technology and health application in healthcare settings. This chapter also labels the effect of mHealth application in nursing care. The reader will get a clear perception of this swiftly developing health technology by further exploration. More precisely, this chapter will concentrate on the impact of mobile health (mHealth) application in the nursing profession and how mHealth application can shape the patient-centered care as well as clinical practice. Topics discussed in this chapter include:

- Definition of mobile health (mHealth)
- Benefits of mHealth application in the healthcare settings
- The use of mobile devices in healthcare service delivery
- mHealth application in nursing education
- mHealth application for nursing practice
- Challenges of using mHealth in nursing and preparing for future nursing
- Security, privacy and standard of mHealth

1.1. mHealth

Tsoromokos et al. (2016) projected that in recent years, mHealth technology brings the revolution and reshape the service of healthcare. They also forecasted that the smartphone will not be used as a communication device but also as a medical device which will allow us to monitor and disease diagnosis from a distance. mHealth technology will improve the quality of healthcare delivery at a reduced cost (Tsoromokos et al., 2016).

1.1.1 Definition of mobile health (mHealth)

For the first time in the year 2000, Mobile health was defined as “*unwired e-med*” by Laxminarayan and Istepanian. The term ‘mHealth’ was first described as “*emerging mobile communications and network technologies for healthcare*” by Professor Robert Istepanian (Istepanian et al., 2005). But there is no standardized or single definition of mHealth has been established yet.

Global Observatory for eHealth (GOe) defined mHealth or mobile health as “*medical and public health practice supported by mobile devices, such as mobile phones, patient monitoring devices, personal digital assistants (PDAs), and other wireless devices*” (Kay et al., 2011).

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, 2017)

WHO defined mHealth as “*mHealth is an integral part of eHealth, which refers to the cost-effective and secure use of information and communication technologies in support of health and health-related fields*” (WHO, 2018).

Table 1.1 Definition of mHealth

Study	Definition
(Jovanov & Zhang, 2004)	<i>“mHealth refers to the emerging mobile communications and network technologies for healthcare”.</i>
(Mechael, 2009)	<i>“It is a subset of eHealth using mobile devices to deliver health services to the patients”.</i>
(Bardram, Baldus, & Favela, 2006)	<i>“It refers to the application of embedded wireless devices to track health-related parameters”.</i>
(Akter, D’Ambra, & Ray, 2010)	<i>“It is a personalized and interactive service which provides ubiquitous and universal access to medical advice and information to any users at any time over mobile platform”.</i>

1.1.2 Mobile health device

According to WHO (2011), mobile health devices are mobile phones, personal digital assistants (PDAs), patient monitoring devices, and other wireless devices which support medical and public health practice. European Commission (2014) includes personal guidance systems and medical devices or sensors (e.g., bracelets or watches) which are connected to lifestyle and wellbeing apps, additional health information and medication reminders provided by SMS and telemedicine provided wirelessly as mobile health devices.

Mobile health devices and applications can monitor and access various aspects of individuals’ health condition by understanding activity level and basic bio-signs like temperature, heart rate, blood pressure, blood glucose. According to Esquivel (2013), mHealth can lead to individual empowerment. mHealth can detect serious illness early by spotting a risky biomarker before physical symptoms appear and lead to early intervention. mHealth has the potential to reduce healthcare cost and improve the outcome (Asikainen, 2015).

According to a recent report from Lux Research (2014), the mobile health market will grow \$41.8 billion in 2023. The firm predicts that clinical vital signs monitoring devices will grow a \$16 billion markets in 2023. In the meantime, mobile health applications will also grow \$7 billion in 2023 (Lux Research, 2014)

1.1.3 Mobile health application

Mobile health technologies improve health and healthcare delivery in new and innovative ways as the usage and adoption of this technology growing rapidly. People can manage their own health and wellness by mobile health application which will promote healthy living. If needed, people can gain access to his/her vital information. According to FDA, 3.4 billion smartphone and tablet users (e.g. health care professionals, consumers, and patients) will have downloaded mobile health applications by 2018 (FDA, 2018).

FDA (2018) defines mobile health application as “medical devices that are mobile apps, meet the definition of a medical device and are an accessory to a regulated medical device or transform a mobile platform into a regulated medical device”. Consumers can use both mobile health apps and mobile apps to manage their own health and wellness while other mobile health application aims to help health care professionals improve and facilitate patient care (FDA, 2018)

1.1.4 Classifications of mobile health application

Aungst (2014), classified mobile health application into four categories which are also divided into four subcategories. Full classification is shown in Table 1.2

Table 1.2 Classifications of mHealth adopted from Aungst (2014)

mHealth	Patient-centered	Health promotion
		Patient communication
		Health tracking
		Medication reminders
	Clinician centered	Electronic health record and electronic prescribing
		Productivity
		Communication
		Medical calculator
	Reference	Disease reference
		Clinical reference
		Drug reference
		Medical literature

	Education	General medical education
		Specialist medical education
		Continuing medical education
		Patient education

Mosa (2012) classified mobile health application based on medical practice; seven categories for healthcare professionals, education apps for students, disease management apps with chronic illness for patients.

Table 1.3 mHealth classification by Mosa (2012)

mHealth	For healthcare professionals	Disease diagnosis
		Drug reference
		Medical calculators
		Scientific literature search
		Clinical communication
		Hospital Information System client applications
		Medical training
	For students	Education apps
	For patients	Disease management with chronic illness

But Labrique (2013) suggested that mHealth covers 12 areas which is shown in Table 1.4 below.

Table 1.4 Twelve common areas of mHealth applications by Labrique (2013)

Client education & behavior change communication (BCC)	Sensors & point-of-care diagnostics
Registries/vital events tracking	Data collection and reporting
Electronic health records	Electronic decision support
Provider-to-provider communication	Provider work planning & scheduling
Provider training & education	Human resource management
Supply chain management	Financial transactions & incentives

1.1.5 Benefits of mHealth application in the healthcare settings

Healthcare delivery services have been transformed by mobile devices and mobile health application. Healthcare professionals are able to deliver evidence-based decision support and patient management systems in a systemic way which will improve patient outcome and clinical decision making (Ventola, 2014). The mobile device prevents medical errors and provides accurate services as

they have fewer barriers related to time and location (Mosa, Yoo, & Sheets, 2012). Mobile healthcare devices are portable, flexible and easily accessible which make healthcare delivery service more convenient (Wallace, Clark, & White, 2012). O’Neill (2013) refers to the convenience of the mHealth application as healthcare professionals and medical students have instant access to updated information like guidelines, reviews, and medical literature. Ventola C. L. (2014) and Mickan et al, (2013) observed that the completeness and accuracy of patient documentation are significantly better than paper as mobile devices provide accurate diagnostic coding and detailed description of clinical findings. Mickan et al, (2013) observed fewer errors and discrepancies in the recording of neonatal patient weight in intensive care and to create discharge order lists when mobile devices (e.g. PDAs) were used. According to Mickan et al, (2013), mobile health devices and application has increased the efficiency and productivity of healthcare professionals. Healthcare professionals can spend more time on direct patient care mobile devices take less time for accessing, retrieving and recording patient data (Ventola, 2014).

1.1.6 Mobile devices usages in healthcare service delivery

Healthcare professionals use mobile devices for better communication and information resources at healthcare settings. According to Mosa (2012), healthcare professionals require access to many resources at healthcare settings, like clinical software applications (e.g. medical calculators, disease diagnosis aids), communication capabilities (e.g. voice calling, text, video conferencing, and e-mail), informational resources (e.g. drug references, textbooks, medical literature, guidelines) and hospital information systems (e.g. picture archiving and communication systems, electronic medical records, electronic health records, clinical decision support systems, and laboratory information systems). Mosa (2012) mentioned that stationary computers did not support the mobility in healthcare settings prior to the development of mobile devices so some hospitals introduced ‘computer on wheel’ or ‘workstation on wheel’ which was portable and mobile information system.

Table 1.5 Usages for Mobile Devices and Apps by Health Care Professionals (Ventola, 2014)

Information Management	Write notes
	Dictate notes
	Record audio
	Take photographs
	Organize information and images
	Use e-book reader

	Access cloud service
Time Management	Schedule appointments
	Schedule meetings
	Record call schedule
Health Record Maintenance and Access	Access EHRs and EMRs
	Access images and scans
	Electronic prescribing
	Coding and billing
Communications and Consulting	Voice calling
	Video calling
	Texting
	E-mail
	Multimedia messaging
	Video conferencing
	Social networking
Reference and Information Gathering	Medical textbooks
	Medical journals
	Medical literature
	Literature search portals
	Drug reference guides
	Medical news
Clinical Decision-Making	Clinical decision support systems
	Clinical treatment guidelines
	Disease diagnosis aids
	Differential diagnosis aids
	Medical calculators
	Laboratory test ordering
	Laboratory test interpretation
Patient Monitoring	Monitor patient health
	Monitor patient location
	Monitor patient rehabilitation
	Collect clinical data
	Monitor heart function
Medical Education and Training	Continuing medical education
	Knowledge assessment tests
	Case studies
	E-learning and teaching

	Skill assessment tests
	Surgical simulation

Healthcare professionals use medical devices and application for the health record maintenance and access; communications and consulting; administration; reference and information gathering; and medical education which are categorized in the table above.

1.2. Nursing and mHealth

Nurses are the pillar of healthcare settings as they are spending the more time than any other healthcare personals. Besides caring for patients, nurses must write a report and all the documentation related to nursing care, treatment, care plan, discharge, medication, and training. Because of complex nursing responsibilities, they are not able to provide the required attention to the patients which lead to overstay at the hospital and delayed the recovery (Pimmer, et al., 2014). By using mHealth technology in nursing care, hospitals can reduce the time for documentation like report writing, vitals reporting, medication round and increase direct patient care. According to a survey of 500 healthcare professionals, 81 % of healthcare professionals believe that health apps will increase their knowledge of patients' conditions and 46 % believe that they will introduce mHealth apps to their practice in the next five years (Research Now Group, Inc., 2015).

1.2.1 mHealth application in nursing education

The American Association of Colleges of Nursing (AACN) suggested to include skills in using information systems, communication devices, and patient care technologies that support safe in nursing education to improve patient outcomes. (Mailloux, 2011). Murphy & Barry (2017), observed the development of mobile application in the area of nursing education and practice. According to Murphy & Barry (2017), mobile application allows instant access to educational resources like nursing content, medication references, 3D anatomy images and language translation, disease and procedure information, medical definitions in the primary education for nurses. To support and enhance learning during clinical placement, the mobile application also offers virtual education and provide access to services such as state licensure exam for nursing practice (Murphy & Barry, 2017).

There are thousands of mobile health applications available for nurses. The most common mHealth applications are to help evaluate lab and diagnostic studies, drug manuals, and differential diagnosis guides. Using professional medical mobile devices may improve effectiveness and competence in nursing practice. Mobile health application may assist nurses to complete professional

development, stay up-to-date with latest research and nursing literature, communicate with other health care professionals, compute drug dosage, calculate physiologic assessments like BMI (body mass index), MAP (mean arterial pressure), Glasgow coma scale, Apgar score, Stroke scale and others (Bonsall, 2016). Calinici (2017), observed changes in learning pattern for nursing students. Nursing students from the 21st century, expect to use mobile technology in their formal and informal learning environment. Mobile application helps nursing students to access and create multimedia materials, produce digital narratives and explore emerging literacies (Calinici, 2017).

A study by Mosa et al. (2012), a systematic review of smartphone utilization in healthcare, has identified eleven application designed for nursing students which focus on nursing education. Another study by Wittmann-Price et al. (2012), with senior nursing students, investigate the students' insights about smartphone use during a 10-week clinical traineeship. The frequency of using a smartphone and mobile health application during their training was ranged from 2 to 55. The study identified that mobile health application makes patient care easier and faster, increased confidence in medication delivery and safety (Wittmann-Price et al., 2012)

3D4Medical is a revolutionary medical and fitness company who make 3D technology applications for healthcare professionals for medical educational purpose. They have been developing medical and anatomical products since 2009. Heart Pro III is a mobile application for the nursing student to visualize anatomy in a more adaptive and explorative way. This apps allows nursing student or nurses to view a 3D graphics animation of "human heart". Learners can zoom, rotate or cut parts of hearts. Instead of just reading or viewing still images of hearts, learners can visualize animation of heart disease and function for endocarditis. This mobile is very useful and easy to explain when nurses try to educate patients (3D4Medical, 2018). Eko Core is another mobile educational tool used by the nursing student which combines a digital attachment with a mobile app for auscultation instruction to the traditional analog stethoscope. This mobile application can visualize the heart sound in the mobile phone by wireless, Bluetooth enabled tool. This application can record, store or share patient's heart sounds for future reference. This can also help to coordinate care with doctors and integrate results into the patient's electronic health record (EHR) (Murphy & Barry, 2017).

There are thousands of similar mobile applications available in all forms of nursing education today. A study conducted by Lee (2015), gauged the effectiveness of mobile-based discussion versus computer-based discussion with nursing students on self-focused learning methods like academic motivation, flow state, readiness, and learner-interface interaction. Because of the potential for portability and immediacy of mobile devices, students reacted positively to mobile technology and if

the learning technology is time-consuming or with high response time, students reflect negatively. The study concludes that mobile-based discussion is the most effective teaching methods and e-learning tools should be portable, instant, and interactive (Lee, 2015).

1.2.2 mHealth application for nurses: Practice

In the past, nursing specialties roles had been learned or mastered only through experience and personal mentoring which was time-consuming and difficult to adopt. But now a day, mobile health application made it incredibly easy to perfect any critical nursing skills. Specialty-based mHealth application along with above mentioned educational mobile application make a nurse more confident during nursing practice. A nurse can access more relevant, updated and targeted information into practice. Healthcare research is expanding rapidly every second and mobile health applications can help a nurse to keep up with modernized healthcare knowledge (Murphy & Barry, 2017). Mobile health apps can be useful in every specialty; preventive care, primary care, acute care, home care, critical care and in care coordination. This will be discussed in the following sections.

mHealth application in preventive care

By using mHealth technology in preventive care, nurses can proactively aware and empower patients to manage their health. Chronic disease self-management, adjustment of lifestyle and health promotion are essential in preventive care settings which will reduce the healthcare cost and improve the health outcome. Chronic illnesses like cardiovascular disease, respiratory disease, cancer, and diabetes are the main reason for the death of two-thirds of the world's population (Sarasoehn-Kahn, 2013). By empowering the patients to use mHealth tools to manage chronic illnesses can improve overall health. And nurses have a vital role to play here. But it is important for nurses to understand the potential and limitations of mobile health technologies in order to educate and empower patients to manage their own healthy lifestyle (Samples, 2014).

Sarasoehn-Kahn (2013), explained that to improve medical outcomes, it is important to engage patients. Chronic health conditions like obesity and hyperglycemia can be managed by mobile health application. The nurse will help the patient to choose the right mobile application and wearable fitness-tracking device, connect the device to a diet application and provide necessary information and instruction to use the application and the device. Then the patient can generate data on the application by the device and transmit the data to the nurse by a dedicated patient portals which will be monitored

by the nurse on a day to day basis. All this data can be integrated into the patient's electronic health record.

A nurse could instruct a newly diagnosed diabetic patient about the wireless blood glucometer and mobile food application. Then nurse could remotely process and analyzes the data of patient's blood glucose daily by using a computer program. The use of such health-related mobile application involves patients in their care to improve overall health outcomes (Samples, 2014).

mHealth application in primary care

In primary care, nurses use mobile health (mHealth) application more frequently. The Agency for Healthcare Research and Quality (2016) recognizes that the primary care system is indispensable to achieve high-quality, accessible, efficient health care. And by implementing Patient-Centered Medical Home (PCMH) can transform the organization and delivery of primary care (AHRQ PCMH Resource Center, 2016). In this model, primary care is patient-centric, and all the patient data should be shared between all health professionals. Mobile health application is the easiest and affordable solution to achieve the goal. The mobile application supports the PCMH model which enables the real-time patient data to the PCMH care team.

MedSnapID (MedSnap 2016) is another example of a mHealth application which involves logging and tracking of patients' medication. Medication management is a time-consuming and inaccurate process. MedSnapID identifies the medication by a smartphone camera and recognizes serious drug interactions. This application can maintain medication history and documentation process to integrate with patient's electronic health data.

American Congress of Obstetrics and Gynecology developed ACOG App (2016), a mobile application, which can simulate the pregnancy wheel for estimating delivery date (EDD). Another OB-specific app, Prevent Group B Strep (CDC 2016), can prevent and manage group B strep infection in mothers and newborns. This mobile health applications can provide up-to-date information on women's health and OB care. This app can collaborate not only with nurses but also with Obstetricians and Gynecologists. These apps are easier to use for the patient as well for the nurses. Also, these apps provide more effective and accurate data because of many inputs (Murphy & Barry, 2017).

mHealth application in acute care

Mobile health application also supports effectively in acute care settings. In acute care, nurses must input high volumes of information through electronic health records (EHRs). This time-

consuming task can be replaced or reduced by EHR-tethered apps which allow writing back to the EHR database and allow nurses to spend more time in direct care than just inputting patient data. This app can read barcode med administration, order entry, e-prescribing, and documentation entry including the capture of clinical photos (Murphy & Barry, 2017). IBM MobileFirst developed an app called 'Hospital RN' which allows nurses a central view of the patient and team information on their iPhone. Nurses will get critical labs, safety alerts, device alarms, bed alarms, patient request notifications in the app. Nurses can edit, see and send updated notifications, tasks and messages to their entire care team – from their iPhone, iPad or Apple Watch. This app can improve coordination and save nursing time by restructures the nurses' workflow, merging interventions and re-sorting of the interventions based on time or on priority (IBM MobileFirst, 2016). Hospital Lead is another application, particularly for the nurse manager. This apps provides a unique view into patient and facility information that matches the needs and priorities of nurse and nurse manager. Nurse manager can filter the view by a nurse, discharge status, overdue and critical tasks, among other data. Hospital Lead app combines multiple hospital databases into an interconnected view. Nurse manager can easily identify the key information from the app. Nurse manager can differentiate an occupied room or vacant room by color coding and admit patient waiting in the emergency department. By this app, nurse manager can analyses patients average stay for their diagnosis and schedule patient discharge which will lead to a smooth workflow in the hospital (IBM MobileFirst, 2016).

Complicated critical care scales, medical formulas, scores, and classifications can be simplified by a mobile application designed for ICU. MedCalX (MedCalX™ 2015) is an ICU app to support workflow, critical thinking and decision making in intensive and emergency care unit. This app was developed over a period of 15 years. Each formula has detailed information and reference and can easily share the results (MedCalX, 2016). This app makes calculation easily and swiftly while bringing a multitude of information together such as ATRIA Score, FIB-4 Score, SMRT-CO Score, qSOFA, MASCC Score, PaO₂ / FiO₂ Ratio and so on. Users can enhance the experience by adding notes and flag in certain calculators as favorites (MedCalX, 2016).

mHealth application in home care

Home care nurse travels to their patients' home and provides care. They often need remote access to patients' EHRs and monitor their progress. Home care apps make their work more cost effective, efficient and supportive to improved results. The needs for mobility in home care has a similar priority to primary and acute care. As home care nurse has no consistent physical venue of

care, it is very difficult for them to carry paper-based forms, documentation tools, and reference materials all the time.

For over a decade, home care EHRs have been used on the laptops which were not convenient. Nowadays, home care EHRs have advanced to web-based platforms as well as mobile applications. These web platform or mobile apps allow nurses to access clinical data, share data with care team, document care process, revise treatment plan, consult doctors, apply for renewal of prescription (Weaver & Teenier, 2014). Mobile application for home care follows the practice guideline, protocols, and regulatory documentation, furthermore, apps provide faster and simpler documentation. It is easy for nurses to take a photo (like wound progression) and upload to the patients' EHRs than writing a report. Mobile devices are much lighter than laptops, it enhances patient satisfaction by maximizing face time with patients.

Home care apps provide support for scheduling, time reporting, track mileage. 'Home RN', 'DeVero', 'Efficca' provide similar service like electronic visit verification, present treatment plan. These apps also allow nurses to complete point-of-care documentation easily and enable real-time communication with other care team members or with the office (Murphy & Barry, 2017).

mHealth application in care coordination

Care coordination is one of the biggest challenges in the healthcare sector. There is a big gap in care and information when a patient is transferred between care environment. To ensure better health, better care, and lower cost, healthcare settings should use mobile apps for analysis and patient management. Data analysis provide the understanding and 360⁰ views of the patients. This analysis helps a care coordinator to identify the appropriate management strategies according to the segment of the patient: health well; at risk; chronic care; acute care. In order to improve quality, a care coordinator can evaluate and re-evaluate their strategies of care (Murphy & Barry, 2017).

To maintain a broad view of a patient in a healthcare setting, care coordinators use mobile application for data analysis and disease-specific drill down. Big data analysis intersects workflows as well as standardize operational and clinical data to construct a risk model. Care coordinator utilizes the geographic and socioeconomic patterns of patients in emergency and acute care. Care coordinators can ensure effective patient outcome by accessing patient disease registries and available workforce list on their mobile devices. The mobile application allows a care coordinator to manage patient population with an automated and multimode communication platform which will enhance the efficiency and effectiveness of the healthcare setting (Murphy & Barry, 2017).

Mobile health technology expanding asthma management rapidly for adults and children. These apps provide early warning for asthma triggers, medication reminders, symptom diaries, references, and education to manage asthma. These apps allow customizing the action plan for more tailored asthma management. Propeller (Propellerhealth, 2018) is a mobile health application with sensors and spirometry to track medication use and lung function with a record of time, date and place. This device is easy to use with mobile apps and desktop web application which has a smart notification, patient dashboard, and communication tools with doctors or nurses.

American Geriatrics Society (2016) offers an easy-to-use mobile application called 'iGeriatrics' for free clinical information. This application age-specific and cross-cultural assistance for care providers as well as geriatrics cultural navigation, geri-psych consultation, guidelines for fall prevention and management of atrial fibrillation. This is an ideal application for adult-gerontology acute care nurse practitioner because of customization of age-associated disease registries capability.

1.2.3 The value of mobile application with the power of analytics

In section 1.2, the benefits of mobile health apps were demonstrated. It provides the best care and patient safety. Data access, integration, and management are easier with the help of mHealth technology. It also improves accuracy and productivity in healthcare service. Healthcare organization are concentrating in four areas to get the full potentials of mHealth technology;

- Investing in mHealth initiatives: to increase access, convenience, and efficiencies.
- Developing new engagement and health strategies: for better health outcomes through secure mobile technologies.
- Creating a better decision-making process and high-performance experience for their clinicians.
- Gaining insight through cognitive systems and data analytics to provide more custom-made and proactive health interventions.

Every day nurses face challenges with the flooded patient data. New sources of integration and advanced technologies add more data every second. It will be quite impossible for nurses to reach a definite conclusion and provide proper care unless all the data is analyzed and interpreted the findings. The mobile application can support and determine the effective and efficient action by the power of big data analysis. It will provide the right information at right time in the right context (Murphy & Barry, 2017).

1.2.4 Challenges of using mHealth in nursing

There are also some challenges to use mHealth technology which provide patient-generated data and automatically convert it medical knowledge. For example, a patient or a user can easily alter or manipulate data of a wristband. If the user sat or stand still and mimic steps by moving the arm back and forth, the wristband will generate data of 12,000 steps which is inaccurate. So, nurses face challenges to rely on this non-observed data from mHealth device collected in a community setting. A noncompliant patient can manipulate mHealth data if s/he forgets or unwilling to take medication as prescribed. Nurses can regularly educate patient on behavioral changes for a better lifestyle and motivate them to take care of their own wellbeing.

There are some other issues like health regulation and device safety. There are some different and strict regulation if any device is used for ‘medical’ purpose than self-tracking or monitoring device. This is the nurse’s responsibility to choose the right types of mHealth tools and recommend the appropriate mobile health application to the patient and their families. So, nurses should have accurate knowledge of mHealth tools and application, how they work, what kind of outcome we can expect and how to evaluate them correctly (Samples, 2014).

To ensure patients’ self-management effectively, it is important to get real-time feedback of their behavior and health conditions. Nurses must empower them as perform self-care and monitor themselves. To understand disease dynamics, develop effective tactics to improve health outcome and deliver tailored care at an appropriate time and place, it is necessary to access real-time data. To achieve the goal, mHealth technology and nurses will play a critical role in collecting real-time data and delivering personalized care respectively (Samples, 2014).

1.2.5 mHealth communication between patients and nurses

Nurses are the first line of defense in the healthcare system for all the patients. They are responsible for patients’ wellbeing, treatment, care, care plan, medication, and education. Determining patients’ mood is a vital factor in patients’ treatment. To identify the patients’ current mood, nurses can ask key questions to the patients. Communication plays an important role to reduce the pain of the patients and make a safe place in the hospital as well in the community. Patients need to leave alone at some point, so nurses can them self-management techniques through effective communication. After hospitalization, better outcomes come from a better-educated patient. Good communication can build trust between nurses and patient which will lead any patient to address more

openly any problems and it will increase the satisfaction level in patients and nurses (Kourkouta & Papathanasiou, 2014).

mHealth application can help to build a bridge between nurses and their patients. Nowadays, patients also have the right to access their health data. Patients can track their own health data regularly and share them with the care team which will improve the communication between patient and care team. Nurses can educate patients to choose the appropriate application for them. mHealth application allows a patient to communicate with the care team from any place at any time and this will reduce cost and overcome physical barriers (Olla et al., 2014).

To improve the health outcome and provide evidence-based care, it is important to identify the patients' attitudes and knowledge. Nurses can find the base-line of patients' attitude and knowledge by using communication techniques and make required adjustments (Prasad et al., 2014). Although patients are part of the care plan, they cannot make decisions by themselves. Nurses need to educate them to communicate with the care team not only for medication but also for mobile health apps (Dykes, et al., 2015). The bridge of trust could be destroyed if nurses or other care team underestimate the data provided by the patients. The gap between patients and nurses should be eliminated or minimized.

1.2.6 Preparing for mHealth's future in nursing

The use of mobile health technology will provide access to important custom-made individual health data in patient-level research and patient-centered preventive care. Banaee (2013) predicted that the maximum usage of mobile health technology can be achieved by integrating mobile device data into patients' electronic record systems (ERS). It will be chaotic for nurses to manually obtain data from mHealth technology then synthesize and incorporate them into patients' ERS.

To provide ideal support for a patient, it is necessary to analyze and interpret patient-generated data into meaningful medical knowledge. Real-time patient-generated data interpretation and analyzing capability do not exist in most current healthcare settings. To shift several hundred data points manually into the real-time data stream is an impossible hindrance in the context of current workflow and pressure in the most healthcare environment. To incorporate mHealth device data into healthcare information infrastructure algorithms can synthesize real-time patient-generated data by detecting anomalies, performing pattern recognition and patient-specific customization (Banaee et al., 2013). Various companies offer algorithms to analyze fitness device data for common devices such as iHealth, MapMyFitness, Fitbit, RunKeeper, Strava, Cycling Analytics, Nike+, FatSecret, Garmin and Withings.

Nurses spend most of their time with direct patient care and healthcare technologies. So, nurses should be at the center point in the decision-making conversation for introducing new mHealth technologies. If nurses are involved in designing, developing and implementing new mHealth technology that will improve patient care as well as workflow (Samples, 2014).

1.3. Security and privacy of mHealth application

Security and privacy are one of the biggest concerns of mHealth application. Patients, most importantly healthcare providers should be familiar with familiar with the terms and conditions. But, most of the users do not read the terms, just press ‘agree’ and move forward. Plachkinova et al. (2015) identified the lack of regulations on mobile app stores are the biggest security and privacy issues of mobile health applications. Some of these apps acquire unauthorized personal information and forward them to a commercial company or research company. Plachkinova et al. (2015) suggested all user, medical or non-medical, must read the terms and conditions in order to understand manufacturers’ policy of each application. They also recommended uninstalling the mobile apps which are not used by the users. This action will reduce the risk of exposing sensitive personal health data (Plachkinova et al., 2015).

Many authorizations like CE certification of EU, Food and Drug Administration (FDA) of USA and Medicine and Healthcare products Regulatory Agency (MHRA) of UK have addressed the concern of the security of health and medical application. To avoid health-related data expose issues, they use different standards for health applications. Boulos et al. (2014) suggested the apps providers should make the users more aware about exposure of health-related data by providing the information of terms and condition inside the apps. Then users will feel more secure to use those apps.

1.4. Standards of mHealth application

Boulos et al. (2014) explained that health application must follow some additional standards in order to consider apps as a medical application. Additionally, these standards should be addressed clearly and promptly so that the medical professionals and non-medical professionals be aware of the type of the application and manufacture or developer of the application. More specific standards are listed below:

- ✓ All medical application must provide all developers information
- ✓ All information on medical professionals must be included
- ✓ Must provide full references list

- ✓ All information about sponsors must be provided
- ✓ Must provide neutral facts coverage

Additionally, developers should consider the level of knowledge of the users and the different variables of future users (Boulos et al., 2014).

In Lithuania, Valstybinė akreditavimo sveikatos priežiūros veiklai tarnyba is the regulatory authority to regulate any medical health devices. They follow EC medical device directives. All medical devices in Lithuania must bear the CE marking.

In Finland, the National Supervisory Authority for Welfare and Health (Valvira) regulate all medical health devices. Same as Lithuania, all medical devices in Finland must contain CE marking. They also provide post-market surveillance and control.

2. RESEARCH SETTINGS AND METHODOLOGY

This chapter illustrated the entire research methodology and how it is executed. This part contains an incisive illustration of study site; Mikkeli Central Hospital, Finland and Kaunas Clinics, Lithuania as well as mHealth strategies for both countries. Research design, research methodology, data collection procedure, and data analysis strategy are also discussed in this chapter.

2.1. Research settings

This study was conducted in Mikkeli, Finland, and Kaunas, Lithuania. More specifically, this study was conducted in the biggest hospital in Mikkeli and in Kaunas. Both hospitals have educational cooperation with author's home institution and exchange institution. Author has done most of his clinical training in both of this hospital. It was easier for the author to access the research sites. The author was residing in both cities during the research, it helped to reduce the cost of transportation.

2.2. Research Design

Myers (2009) defines research design as *“a strategy of inquiry which moves from the underlying philosophical assumptions to research design and data collection. The choice of research method influences the way in which the researcher collects data”* Research design is the preparation of research project design to define the research problem. Research design facilitates numerous research operation to reduce effort, time and money. The research design is developed based on the research problem. The topic of this study is relatively new, and no literature or study was found which compare the attitude of Finnish and Lithuanian nurses toward using mHealth application. In this study, the quantitative research methodology was followed, and an exploratory nonexperimental survey design approach was carried out. The research process summary of this study is illustrated in the figure below.

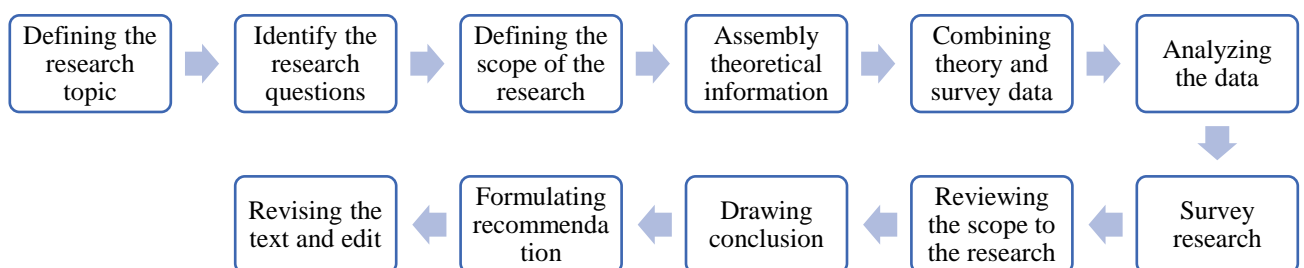


Figure 2.1 The research process model adopted form (Asikainen, 2015)

The method of data collection is discussed in the following section 2.3 below.

2.3. Method of Data Collection

Survey research is followed to perform data collection. A self-administered pre-constructed questionnaire was developed in order to evaluate the opinions of Finnish and Lithuanian nurses about the mHealth application. Babbie (2013) defined questionnaire as “an instrument, specifically designed to elicit information that will be useful for analysis”. It is important to include questions which are relevant to the research objectives. The style, general format and the order of questionnaire need to consider while developing the questionnaire along with other aspects (Babbie, 2013). Andreou (2017) mentioned that using questionnaires as a survey tool is cost-effective and data can be collected in a short period of time. As the questions are all same for the participants, it will reduce the systematic error probability. To collect data for this study, the questionnaire is used as a survey tool because of it easier to collect data anonymously from a large sample size and analyze effortlessly.

The questionnaire was developed in order to estimate nurses’ motivation, duration, and frequency of mobile health application use. This questionnaire will also evaluate nurses’ views of the mHealth application as a tool in healthcare settings. Moreover, exploration of nurses’ insight of possibilities and importance of mHealth application were included in the questionnaire.

In the questionnaire, respondent’s opinions were captured by closed-ended questions, rating questions, Likert scale questions, and multiple-choice questions. To develop the questionnaire, Webropol 3.0 survey software is used. Webropol 3.0 survey software is also used to analyze and visualize the survey data. But a paper version of the questionnaire was used to collect data from the respondents because it is convenient for nurses to answer them. To decrease or omit understanding errors based on language difficulties, a Finnish translated questionnaire was provided to the nurses in Mikkeli Central Hospital and a Lithuanian translated questionnaire was provided to the nurses in Kaunas Clinics. A brief description of the study was attached to the questionnaire in order to provide them a clear insight to answer the question unbiased and correctly. To increase the response rate, it was informed to the respondents that all the survey data was anonymous and confidential.

2.4. Sampling

The targeted population of this study is the nurses of Finland and Lithuania. More specifically, the study population was limited to those who work were working in Mikkeli Central

Hospital, Finland and Kaunas Clinics, Lithuania. The study in Finland took about two weeks and about ten days in Lithuania.

The accuracy of research depends on sampling. Cluster random sampling method was used in this study as cluster sampling reduces variability and it is a more feasible approach. Cluster sampling allows large sample population and sample can be taken from multiple sites. However, the sample size was not predetermined.

2.5. Statistical analysis

The following phases of the study are to analyze the data that has been generated through the questionnaire. Quantitative assessment allows analyzing data among certain aspects. To analyze data, a statistical analysis program Webropol version 3.0 will be used. Webropol survey tools are based on Online Analytical Processing which is efficient and provides the view of multidimensional results quickly. It is safe to assume based on the literature discussed above, there is a correlation between mobile health application and the care provided in the hospital. An exploratory factor analysis will be implied within the survey data in order to identify correlating aspects. To identify the differences between the attitude of Finnish and Lithuanian nurses toward using mHealth application, an independent t-test was used. To compare the current knowledge and attitude on using mobile health application Mann-Whitney U test will be used.

2.6. Ethical Consideration

Data privacy and the protection of confidentiality is important in every research. Before data collection, this study project was approved by the educational institution. To collect data from the healthcare settings, a letter of permission to conduct research was submitted to the Mikkeli health care ethical committee board and Kaunas bioethics committee. This study is approved by the University and both ethics committee in Finland and Lithuania.

As the current study was concentrating on nurses' attitude and knowledge on mobile health application, there is no health-related information. The participation of the survey was voluntary, and the purpose of the study was informed to the participants. More importantly, the survey was completely anonymous.

3. RESULTS

3.1. Characteristics of the study group

The first part of the analysis will characterize the research participants. The questionnaire was sent to n=130 nurses from Mikkeli Central Hospital and n=70 nurses from Kaunas Clinics. Overall, n=190 nurses answer the questionnaire. After a quality check, 182 of the returned questionnaires were considered for further analysis. The respondents were 66.4 % from Finland (n=121) and 33.6 % from Lithuania (n=61). Most respondents were female (72.53 %) and overall aged between 36-40 years (29.12 %) or 31-35 years (24.18 %). Overall, 96 % of the respondents are nurses (n= 168) and 91 % of them are working in hospital inpatient settings. A demographic overview of the study group is illustrated in Table 3.1.

Table 3.1 Demographics of the study participants (n=182)

Country	Finland (n= 121)		Lithuania (n=61)		Total (n=182)	
	n=	%	n=	%	n=	%
Gender						
Female	75	62.5	57	93.4	132	72.5
Male	45	37.5	4	6.6	50	27.5
Age (years)						
<20	0	0	2	3.3	2	1.11
20-25	7	5.8	19	31.2	26	14.36
26-30	16	13.3	14	22.9	30	16.57
31-35	33	27.5	11	18.0	44	24.31
36-40	46	39.3	6	9.8	52	28.73
41-45	14	11.7	6	9.8	20	11.05
46-50	2	1.7	2	3.3	4	2.21
>50	2	1.7	1	1.6	3	1.66
Length of practice (years)						
<1	3	2.5	13	21.3	16	8.9
1-5	24	20.3	24	39.3	48	26.7
6-10	66	55.9	9	14.7	76	42.2
11-15	20	16.9	6	9.8	26	14.4
16-20	3	2.5	5	8.2	8	4.4
>20	2	1.7	4	6.6	6	3.3
Setting of nursing practice						

Hospital inpatient	104	86.5	60	98.4	164	90.6
Hospital outpatient	16	13.5	1	1.6	17	9.4
Community	0	0	0	0	0	0
Private practice	0	0	0	0	0	0

Above Table 3.1 exhibited that male nurses represent the 27.5 % of the study group. But 85 % of male respondents are from Finland.

The respondents of the survey are mostly working in emergency care, intensive care, and general medicine department.

Table 3.2 Area of Nursing management with gender and country variant

Area of Nursing management	Finland	Lithuania	Total
Cardiology	2	0	2
Geriatrics	6	6	12
Pediatrics	0	1	1
Emergency care	37	21	58
Intensive care	45	13	58
General medicine	29	16	45
Surgery	2	4	6
Others	0	0	0
Total	121	61	182

Table 3.2 presented the details of the nursing management of the respondents. Around 90 % of the respondent are working in emergency care, intensive care or general medicine nursing department. There was no significant correlation between the area of nursing management and country of practice $r=0.0048$, neither with gender, $r= 0.095$. Here, 'r' is the Pearson's correlation coefficient. The closer the value is to 1 or -1, the stronger the linear correlation.

3.2. Current status of smartphone usages

The study shows that 99 % of the participants (n=180) are using or have access to a smart device like a smartphone or tablet. Among them, iPhone OS / iOS (Apple) is a most common operating system, 57 % of participants are using iPhone while 41 % uses an android phone. Only 10 % of the participant choose windows operating system. iPhone is the most popular among the Finnish nurses (63 %) comparing to Lithuanian nurses. There are not many differences between iPhone users and

Android phone users among Lithuanians. Figure 3.1 shows the differences in smartphone operating system among Finnish and Lithuanian nurses.

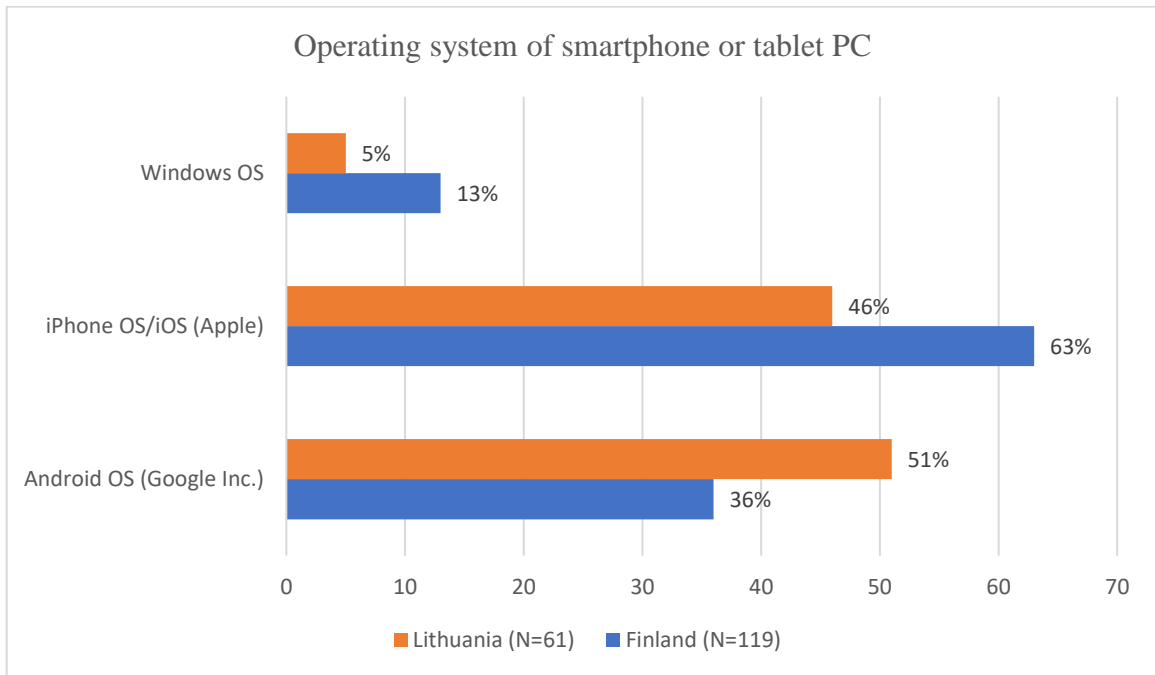


Figure 3.1 Operating system of smartphone or tablet PC

There is no surprise that most of the participants (97 %), Finnish or Lithuanian, download social media application on their phone. Health and Lifestyle apps are also popular among all nurses. Education-related apps are also popular (40 %).

Table 3.3 Types of applications downloaded by the nurses

Types of apps downloaded	Finland		Lithuania		Total	
	%	n	%	n	%	n
Games	7	8	20	12	11	20
Education	36	43	48	29	40	72
Books	13	15	15	9	13	24
News	24	28	44	27	30	55
Social media	97	115	97	59	97	174
Health and Lifestyle	90	107	62	38	81	145
Business	12	14	10	6	11	20
Other	0	0	0	0	0	0
Total		330		180		510

Table 3.3 shows the details of what types of apps are downloaded by participants. Respondents were free to choose more than one options. The trend of downloaded apps is quite similar

among Finnish and Lithuanian nurses. But Finnish nurses downloaded slightly more health and lifestyle-related apps than Lithuanian nurses.

3.3. Current status of mHealth usage among nurses

About 99 % of the participants are aware of the availability of mobile health application. Among them, at least 95 % of nurses are using a smartphone to obtain or manage health-related information or specific health information. Details of different types of health-related information are identified below.

Table 3.4 Types of health-related apps used by nurses

Types of health-related apps	Finland		Lithuania		Male		Female		Total	
	%	n	%	n	%	n	%	n	%	n
Medical Reminders & Alerts	41	49	36	21	50	22	37	48	39	140
Women's Health & Pregnancy	19	22	47	27	18	9	32	41	28	99
Disease Specific	29	35	47	27	37	18	35	45	35	125
Fitness Tracker	34	40	50	29	38	19	38	50	38	138
Lifestyle & Stress	73	87	60	35	67	33	70	90	69	245
Diet & Nutrition	63	75	21	12	60	29	45	58	49	174
Total		308		151		130		332		921

Table 3.4 shows no significant correlation between the types of health-related apps used by the nurses and their country of practice or gender. Overall, the most popular types of health apps are related to lifestyle & stress and diet & nutrition. Diet & nutrition related apps more popular in Finland while women's health & pregnancy related apps are popular in Lithuania.

Around 47 % of the nurses have 4-6 health-related apps in their smartphone and 41 % of nurses have 1-3 apps. Only 7 % of the respondents have more than 6 apps in their smartphone. Overall, 6 % of the participants (n=10) are not using any health-related apps currently.

Table 3.5 Frequency of using mHealth apps

Frequency	Finland		Lithuania		Total	
	%	n	%	n	%	n
Not at all	2	2	13	8	6	20
1 time/day	16	19	30	18	20	74

2-5 times/day	76	90	50	30	67	241
6-10 times/day	7	8	8	5	7	26
>11 times/day	0	0	0	0	0	0
Total		119		61		180

67 % of the nurses use health-related apps 2-5 times a day while 20 % of the participants use at least once a day. Table 3.5 shows the detailed overview. This study also investigated the factors influencing the choice of health-related mobile application. Table 3.6 illustrates the influencing factors for choosing the mHealth application.

Table 3.6 Factors influencing the choice of mHealth apps

Factors influencing the choice of mHealth apps	Finland		Lithuania		Total	
	%	n	%	n	%	n
Friends	7	8	20	12	11	40
Family	10	12	20	12	13	48
Internet	85	101	64	38	78	279
TV/Radio Commercials	2	2	14	8	6	20
Medical Journals	19	22	24	14	20	72
Medical Staff	60	71	41	24	54	191
App store reviews	71	84	85	50	75	269
Others	0	0	0	0	0	0
Total		300		158		919

Both Finnish and Lithuanian nurses rely on internet and app store reviews when it comes to choosing mobile health applications, 78 %, and 75 % respectively. There are no significant differences of factors in Finland and Lithuania. 54 % of the participants trust the medical staff's recommendation.

Nurses were asked if they were aware of any mHealth apps regulatory authorities mentioned below. 181 participants responded to that question. They knew at least one of the mentioned authorities. 53 % - 63 % of the participants knew about FDA (USA), CE certification (EU) or FIMEA (Finland). MHRA (UK) was the least known regulatory authority among them with 34 %. There is a strong correlation ($r=0.9$) between the nurse's knowledge about FIMEA (Finland) and Finnish nurses as FIMEA regulate all the health-related device and application in Finland. But in Lithuania, about 90 % of the nurses have knowledge about CE certification (EU) while 47 % of nurses knew about VVKT (Lithuania).

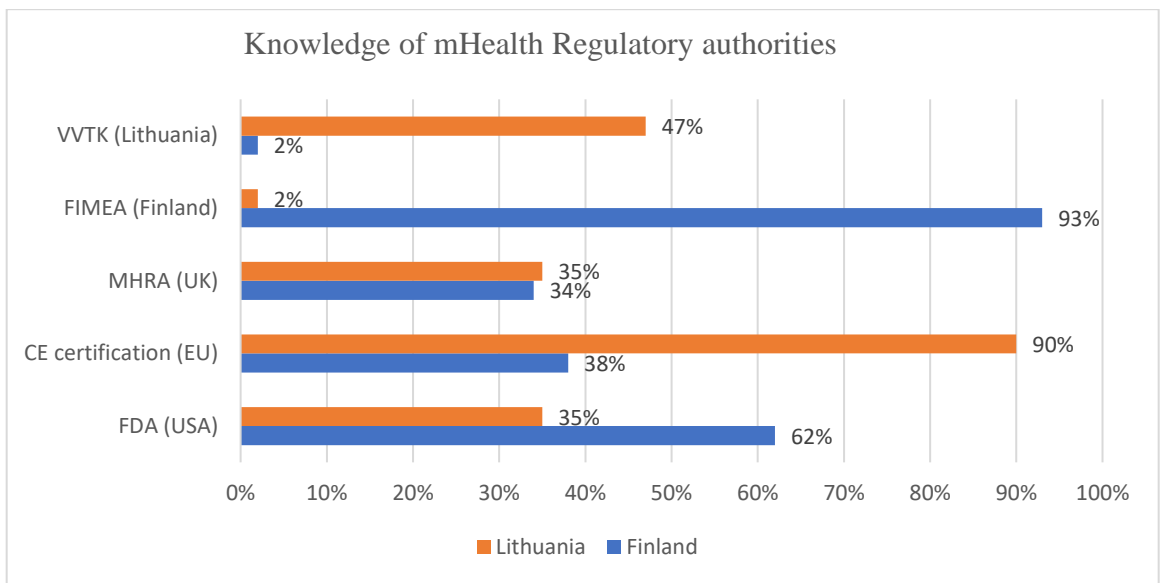


Figure 3.2 Knowledge of mHealth Regulatory authorities

Figure 3.2 illustrates the knowledge of mHealth regulations authority among Finnish and Lithuanian nurses. Participants were able to choose more than one options.

3.4. Use of mHealth application in patient care

One of the main objectives of this study to identify the current status of mHealth usage in patient care and find any differences of practice in Finland and Lithuania. For exploration, nurses were asked, if they are currently using the mHealth application in patient care. Overall, 76 % of the respondents, are using the mHealth application in patient care. But there is a big gap between the usage of mHealth apps in patient care between Finland and Lithuania. In Finland, about 92 % of nurses are using the mHealth application in patient care compared to Lithuania, only 43 % of the nurses use any mobile health application in patient care.

Table 3.7 Usage of mHealth apps in patient care

Usage of mHealth apps in patient care	Finland		Lithuania		Total	
	%	n	%	n	%	n
Yes	92	111	43	26	76	137
No	8	9	57	35	24	44
Total		120		61		181

Table 3.7 also demonstrated that male nurses are most likely to use mHealth application by 20 % in patient care.

Nurses were asked that if they recommend mHealth apps to their patients. 182 respondents answered the question. To identify the value of the recommendation, the t-test algorithm was used. Figure 3.3 shows the result of the t-test.

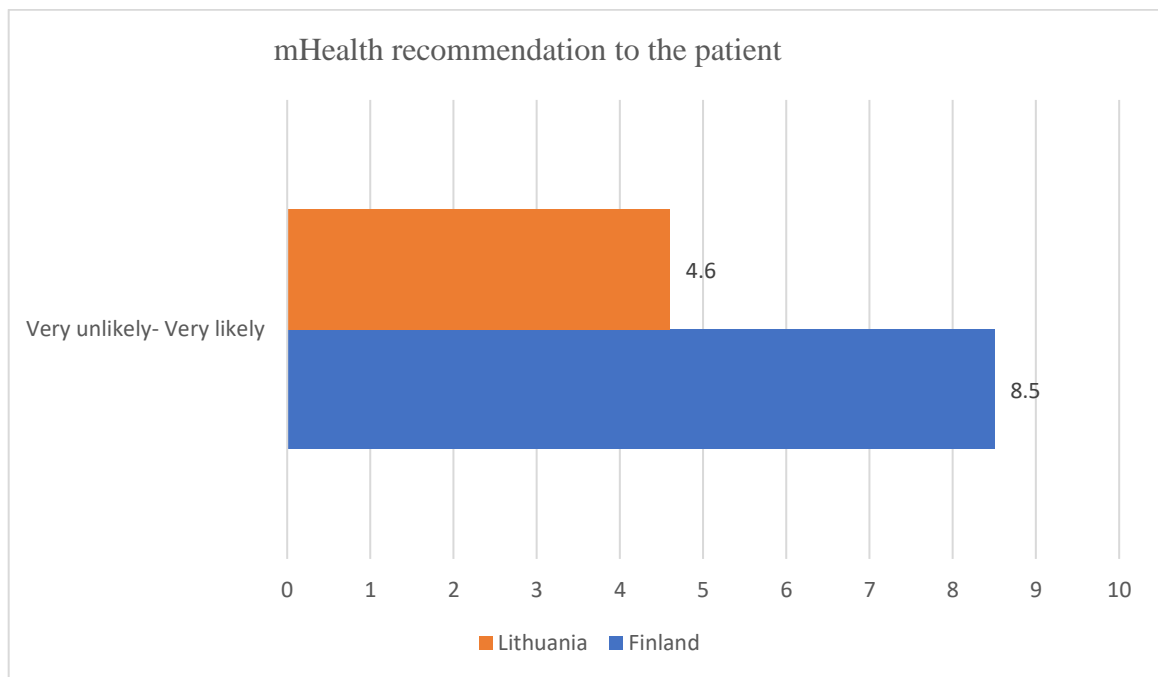


Figure 3.3 mHealth recommendation to the patient

The average of overall recommendation is 7.2, Standard Deviation 2.6, and Confidence Interval is 0.7576. There is a big gap of 3.9 for mHealth apps recommendation to the patients among Finnish nurses and Lithuanian nurses.

3.5. Nurses' attitudes on the mHealth concept

To analyze the attitudes of nurses on the mHealth concept, it is important to understand how the nurses think the usefulness of mHealth in nursing care. Nurses were asked to rate the usefulness of mHealth application in nursing practice from 1-5, here 1= 'not useful at all' and 5= 'very useful'. More than 80 % of the respondents (n=141) rated 4 or 5. On the other hand, only 4 % of respondents (n=9) rated 1 or 2. The average of the value is 4.2 and maiden 4.5.

Table 3.4 shows the detail of usefulness of mHealth apps with the country of practice variation. There is no difference between the two countries overview.

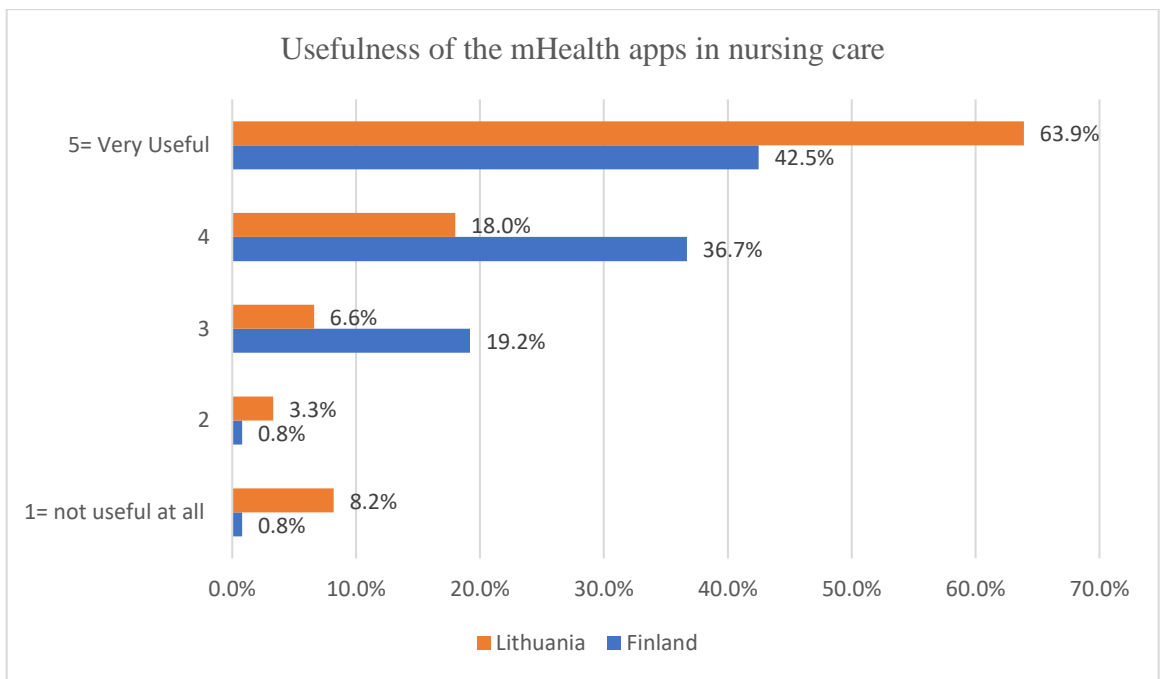


Figure 3.4 Usefulness of the mHealth apps in nursing care

To measure the importance of mHealth functions in healthcare settings, participants were asked to rate the mHealth functions according to their importance. The respondents rated the importance from ‘extremely important’ to ‘not at all’.

Table 3.8 Importance of mHealth functions

mHealth functions		Not at all	Slightly Important	Moderately Important	Very Important	Extremely Important	Total	Average	Standard deviation
		n	1	4	56	99	22	182	3.75
Provides information to users in multiple formats (photo, video, text)	%	1	2	31	54	12			
Automatically records data	n	1	1	36	88	56	182	4.08	0.76
	%	1	1	20	48	31			
Automatically transfers data to Electronic Health Record	n	0	3	30	88	60	181	4.13	0.74
	%	0	2	17	49	33			
Reminds the patient to input data	n	2	10	40	75	54	181	3.93	0.92
	%	1	6	22	41	30			
Reminds the patient to take medication	n	3	16	38	70	54	181	3.86	1
	%	2	9	21	39	30			
Displays the patient’s treatment plans	n	5	23	45	62	45	180	3.66	1.07
	%	3	13	25	34	25			

Graphically displays data	n	10	26	32	71	43	182	3.61	1.05
	%	5	14	18	39	24			
Provide communication between medical staff and patients	n	7	18	38	83	35	181	3.67	1.02
	%	4	10	21	46	19			
Total		29	102	317	637	370	1455	3.84	

Table 3.8 visualized 8 functions mHealth functions with the rating of importance. ‘Automatically transfers data to electronic health record’ has the highest rating and ‘graphically displays data’ has the lowest rating. A low standard deviation (0.71-1.15) indicates that there has not been significant disagreement between the respondents.

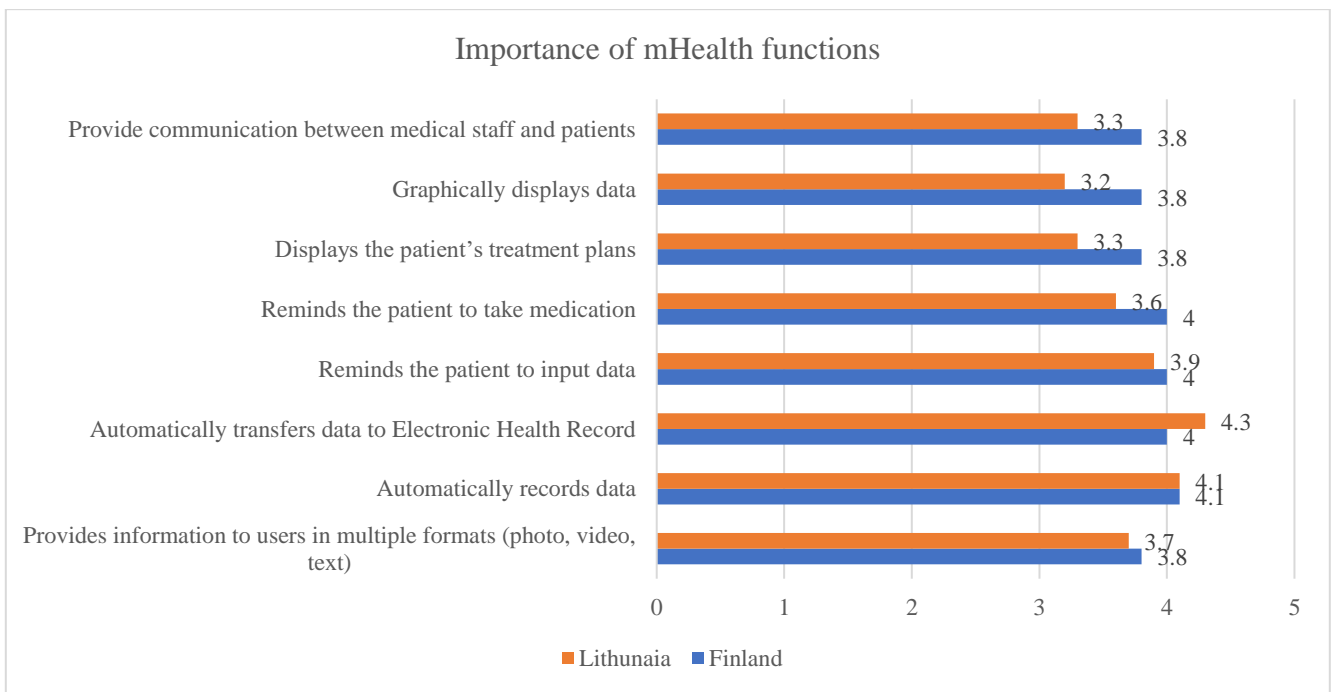


Figure 3.5 Importance of mHealth functions

Figure 3.5 also validates the difference between Finnish and Lithuanian nurses' opinion about the importance of mHealth functions.

Table 3.9 Nurses' attitude toward using mHealth apps

Using mHealth		Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Total	Average	Median
Using mHealth enables me to accomplish nursing task more quickly	n	2	24	37	59	60	182	3.83	4
	%	1	13	20	32	33			
Using mHealth improves the quality of nursing work I do	n	3	14	36	73	56	182	3.91	4

	%	2	8	20	40	31			
Using mHealth make me do my nursing work easily	n	5	18	30	71	58	182	3.87	4
	%	3	10	16	39	32			
Using mHealth make me improve my job performance	n	2	20	33	69	58	182	3.88	4
	%	1	11	18	38	32			
Using mHealth enhance my effectiveness on my job	n	4	13	41	71	53	182	3.86	4
	%	2	7	23	39	29			
Using mHealth gives me greater control over my work	n	3	23	34	72	50	182	3.79	4
	%	2	13	19	40	27			
Using mHealth is completely compatible with my current situation	n	12	23	29	75	43	182	3.63	4
	%	7	13	16	41	24			
Learning to operate mHealth is easier for me	n	10	21	34	59	58	182	3.74	4
	%	5	12	19	32	32			
In the hospital, I see mHealth being used for many tasks	n	17	46	32	58	29	182	3.2	3
	%	9	25	18	32	16			
mHealth is very visible in the hospital where I work	n	30	48	37	39	28	182	2.93	3
	%	16	26	20	21	15			
Using mHealth require a lot of mental efforts	n	43	42	43	40	14	182	2.67	3
	%	24	23	24	22	8			
Using mHealth is often frustrating	n	55	63	13	30	21	182	2.45	2
	%	30	35	7	16	12			
Total		186	355	399	716	528	2184	3.48	4

To analyze further, nurses were asked how mHealth using could help them for a better outcome. It will determine the nurses' attitude toward using mHealth. Table 3.9 presents detailed information about nurses' attitude toward using mHealth application. Later correlation of their attitude will be identified.

Table 3.10 Correlation of attitude toward using mHealth with other factors

Correlation	Country of practice: Finland/Lithuania	Recommendation of mHealth apps to patient: Yes/No	Knowledge of mHealth: Extremely satisfied/Not satisfied at all
Using mHealth enables me to accomplish nursing task more quickly	-0.4008	0.6131*	0.6267*
Using mHealth improves the quality of nursing work I do	-0.4687	0.6559*	0.6864*
Using mHealth make me do my nursing work easily	-0.4561	0.5897*	0.5986*
Using mHealth make me improve my job performance	-0.4594	0.6318*	0.7255**

Using mHealth enhance my effectiveness on my job	-0.4032	0.5884*	0.6491*
Using mHealth gives me greater control over my work	-0.4607	0.6066*	0.6526*
Using mHealth is completely compatible with my current situation	-0.6021*	0.6644*	0.6935*
Learning to operate mHealth is easier for me	-0.3346	0.4969	0.6091*
In the hospital, I see mHealth being used for many tasks	-0.6190*	0.5846*	0.6416*
mHealth is very visible in the hospital where I work	-0.5868*	0.5424*	0.4958
Using mHealth require a lot of mental efforts	0.1854	-0.4492	-0.5152*
Using mHealth is often frustrating	0.3814	-0.6303*	-0.6673*

To analyze further, nurses were asked how mHealth using could help them for a better outcome. It will determine the nurses' attitude toward using mHealth. Table 3.9 presents detailed information about nurses' attitude toward using mHealth application. Later correlation of their attitude will be identified.

Table 3.10 indicates that there is some significant correlation between nurses' attitude toward using mHealth and some other factors like which country do nurses work, how they recommend mHealth to their patient or how satisfied are they with their knowledge of mHealth. The nearer the correlation coefficient is 1 or -1, the stronger the correlation is. The table above highlighted the strongest correlation coefficient over 0.5 or -0.5. '**' indicates the strength of the correlation.

3.6. Nurses' level of mHealth use

To identify the nurses' level of mHealth use, it is vital to monitor nurses' own assessment of their mHealth knowledge.

Table 3.11 Self-assessment of nurses' mHealth knowledge

Self-assessment of nurses' mHealth knowledge		Country of practice			
		Finland		Lithuania	
		%	n	%	n
	n=182		n=121		n=61
1= Not at all likely	2.75	0.83	1	6.56	4
2	3.3	0	0	9.84	6
3	7.14	0.83	1	19.67	12
4	7.69	2.48	3	18.03	11
5	10.44	9.92	12	11.48	7
6	9.89	9.92	12	9.84	6
7	12.64	14.05	17	9.84	6
8	14.84	16.53	20	11.48	7
9	19.78	28.1	34	3.28	2
10= Extremely likely	11.54	17.36	21	0	0
Average	6.74	7.79		4.64	

Table 3.11 projected the self-assessment of nurses' mHealth knowledge. Finnish nurses have better mHealth knowledge (avg= 7.79) comparing to Lithuanian nurses (avg= 4.64). Overall knowledge of the participants is 6.74.

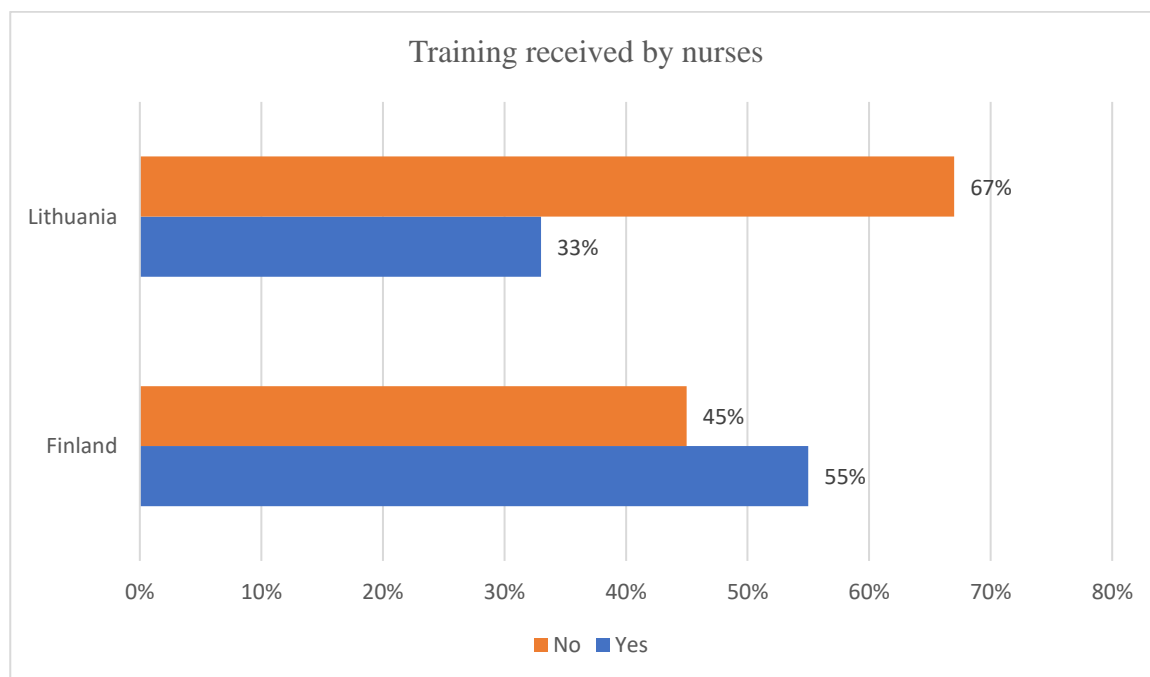


Figure 3.6 Training received by nurses

Overall, 53 % of nurses did not receive any training or education regarding mHealth apps. But the number is much higher when it comes only for Lithuanian nurses, two-thirds of them did not receive any sorts of training. There is a significant correlation ($r = 0.7445$) between mHealth training of nurses and mHealth application to their patients. Nurses who received mHealth training are more likely to recommend mHealth to their patients.

Table 3.12 Nurses' interest in taking courses among different eHealth concepts

		Country of practice			
		Finland		Lithuania	
		%	N=120	%	N=61
Telemedicine	Strongly Disagree 1 %	1	1	0	0
	Disagree 2 %	0	0	7	4
	Neutral 36 %	38	46	31	19
	Agree 51 %	54	65	43	26
	Strongly Agree 11 %	7	8	20	12
	Average	3.66		3.75	
Video-Conferencing	Strongly Disagree 0 %	0	0	0	0
	Disagree 3 %	3	3	5	3
	Neutral 21 %	26	31	11	7
	Agree 45 %	37	44	62	38
	Strongly Agree 31 %	35	42	21	13

	Average	4.04		4.00	
Mobile Health (mHealth)	Strongly Disagree 1 %	1	1	0	0
	Disagree 1 %	0	0	3	2
	Neutral 18 %	24	29	5	3
	Agree 42 %	48	57	30	18
	Strongly Agree 23 %	28	33	62	38
	Average	4.01		4.51	
Electronic Health Record	Strongly Disagree 1 %	1	1	0	0
	Disagree 3 %	2	2	5	3
	Neutral 11 %	13	16	7	4
	Agree 41 %	47	56	30	18
	Strongly Agree 45 %	38	45	59	36
	Average	4.18		4.43	
eHealth	Strongly Disagree 1 %	1	1	0	0
	Disagree 2 %	0	0	7	4
	Neutral 18 %	20	24	15	9
	Agree 45 %	52	62	30	18
	Strongly Agree 35 %	28	33	49	30
	Average	4.05		4.21	

Error! Reference source not found. exhibited that both Finnish and Lithuanian nurses are willing to participate in education or training on different eHealth concepts. Lithuanian nurses show slightly higher interest than Finnish nurses.

3.7. Concerns and barriers to using mobile apps in nursing practice

Privacy and security concerns were discussed in the earlier section. This study also identified the nurses' opinion regarding this concern about mHealth apps.

Table 3.13 Nurses' concerns about using mHealth apps

Concerns about using mHealth application N=181	Country of practice				Receive training of mHealth Apps?			
	Finland		Lithuania		Yes		No	
	%	n=120	%	n=61	%	n=85	%	n=94
None 9.89 %	3.33	4	22.95	14	2.35	2	17.02	16
Concerns about data security 35.71 %	28.33	34	49.18	30	35.29	30	36.17	34
Concerns about the technical reliability of the devices 32.97 %	26.67	32	45.9	28	41.18	35	26.6	25
Concerns about the reliability of the software 58.79 %	68.33	82	39.34	24	69.41	59	47.87	45
The mobile apps or devices are too complicated to use 57.69	73.33	88	26.23	16	64.71	55	50	47

Overall, 59 % of the participants are concern about the reliability of the software and 58 % of them think mobile apps or devices are complicated to use. Around 33 % - 36 % of the respondents have some concerns about data security and technical reliability of the devices. But Lithuanian nurses

showed more concern about data security (49 %) than Finnish nurses. Lithuanian nurses find mobile apps or devices are less complicated than Finnish nurses (73 %). Nurses who received any training or education are slightly more concern than who didn't have any training.

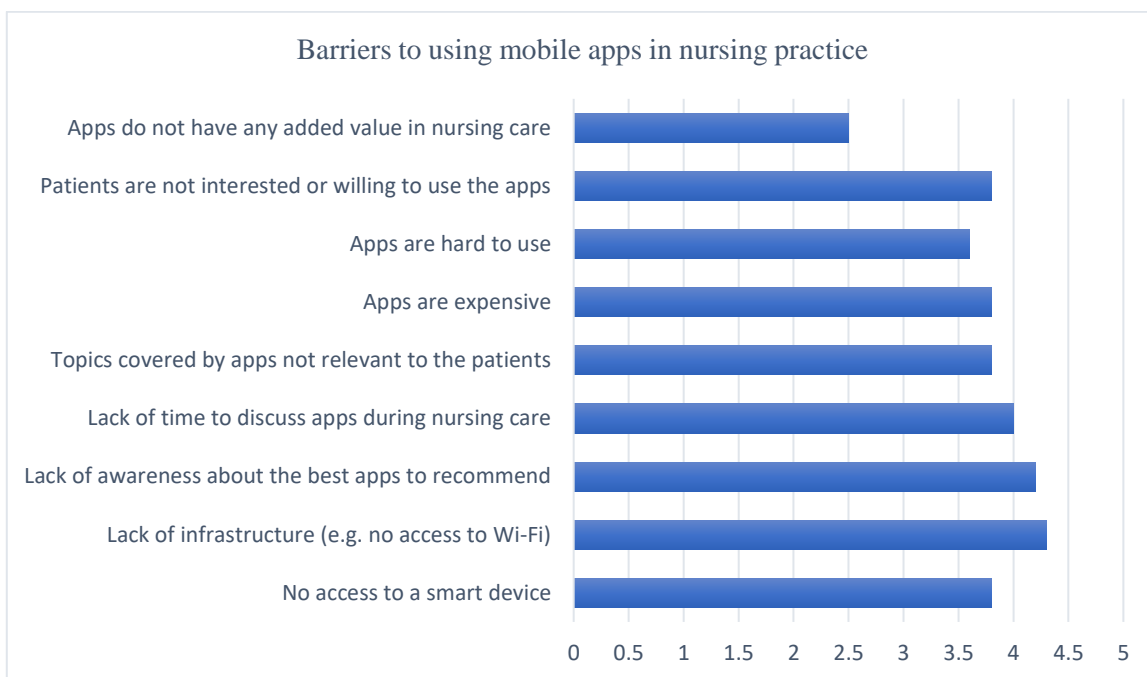


Figure 3.7 Barriers to using mobile apps in nursing practice

Figure 3.7 exhibits the barriers to using mobile application in nursing care. Both Finnish and Lithuanian nurses identified (Avg. 3.9) that there are some barriers to implement mHealth in nursing practice.

Table 3.14 Barriers to using mobile apps in nursing practice

		Country of practice			
		Finland		Lithuania	
		%	n	%	n
No access to a smart device	: Strongly disagree 0 %	0	0	0	0
	: Disagree 3 %	3	3	3	2
	: Neutral 27 %	26	31	30	18
	: Agree 57 %	66	79	39	24
	: Strongly agree 13 %	6	7	28	17
	Average	3.75		3.92	
Lack of infrastructure (e.g. no access to Wi-Fi)	: Strongly disagree 0 %	0	0	0	0
	: Disagree 1 %	0	0	2	1
	: Neutral 17 %	20	24	11	7
	: Agree 34 %	31	37	41	25
	: Strongly agree 48 %	49	58	46	28
	Average	4.29		4.31	
Lack of awareness about the best apps to recommend	: Strongly disagree 0 %	0	0	0	0
	: Disagree 1 %	1	1	2	1

	: Neutral 12 %	14	17	7	4
	: Agree 52 %	63	76	28	17
	: Strongly agree 36 %	22	26	64	39
	Average	4.06		4.54	
Lack of time to discuss apps during nursing care	: Strongly disagree 3 %	3	3	3	2
	: Disagree 7 %	4	5	13	8
	: Neutral 17 %	18	21	16	10
	: Agree 31 %	30	36	33	20
	: Strongly agree 42 %	46	55	34	21
	Average	4.12		3.82	
Topics covered by apps not relevant to the patients	Strongly disagree 2 %	3	3	0	0
	Disagree 10 %	7	8	16	10
	Neutral 18 %	18	21	20	12
	Agree 45 %	53	64	28	17
	Strongly agree 25 %	20	24	36	22
	Average	3.82		3.84	
Apps are expensive	Strongly disagree 3 %	3	4	2	1
	Disagree 14 %	6	7	31	19
	Neutral 20 %	22	26	16	10
	Agree 27 %	27	32	28	17
	Strongly agree 36 %	43	51	23	14
	Average	3.99		3.39	
Apps are hard to use	Strongly disagree 6 %	6	7	5	3
	Disagree 12 %	4	5	28	17
	Neutral 18 %	15	18	25	15
	Agree 40 %	50	60	20	12
	Strongly agree 24 %	24	29	23	14
	Average	3.83		3.28	
Patients are not interested or willing to use the apps	Strongly disagree 5 %	6	7	5	3
	Disagree 9 %	3	4	20	12
	Neutral 21 %	17	20	30	18
	Agree 32 %	33	39	33	20
	Strongly agree 32 %	42	50	13	8
	Average	4.01		3.30	
Apps do not have any added value in nursing care	Strongly disagree 13 %	8	10	21	13
	Disagree 10 %	3	4	25	15
	Neutral 13 %	13	15	15	9
	Agree 47 %	56	67	28	17
	Strongly agree 17 %	20	24	11	7
	Average	3.76		2.84	

The table above explained how nurses identified the obstacle of mHealth development. It also differentiated the view of Finnish nurses and Lithuanian nurses. Lack of infrastructure (e.g. Wi-Fi), and lack of awareness about the best apps to recommend are the main barriers to using mHealth apps in nursing care. Recommendation will be provided based on the findings of this part.

CONCLUSION

1. It is established from the scientific literature that mHealth is widely used in healthcare settings. Adaptation of mHealth in nursing practice is rapidly increasing. Using mHealth in patient care will allow nurses to spend more time in direct patient care.

2. Most of the nurses are acquainted with the mHealth concept and they are interested to learn more about mHealth concept along with other eHealth concepts. They are also familiar with health standard and regulatory authorities. They are using the mHealth application on daily basis. But unfortunately, the majority of the participants did not receive any education or training about mHealth apps or devices. And their choice of mHealth application is often influenced by the internet or apps store review. Medical journals and stuff are less likely to influence the recommendation of mobile health apps.

3. Most of the participants, consider that some mHealth functions like automatically record data and transfer it to the electronic health record are very useful in nursing practice. They consider providing information to their patient in multiple formats like the photo, video, amination, are very important. They also deliberate that using mHealth application will improve the effectiveness and quality of nursing care along with simplifying their work. But they also have some concern about data securities, technical reliability of mobile devices and software. They also identified the lack of infrastructure like no Wi-Fi access, lack of awareness to recommend the best apps are the barrier of mHealth adaptation in nursing care.

4. There are not many significant differences in knowledge and attitude between Finnish and Lithuania nurses regarding mHealth usage. Both share similar knowledge about mHealth although Finnish nurses received more training or education regarding mHealth than Lithuanian nurses, Lithuanian nurses are more likely to attend further mHealth or eHealth education. But Lithuanian nurses know more about EU regulatory authorities than Lithuanian authorities while Finnish nurses are very familiar with Finnish regulatory authorities. Both Finnish and Lithuanian nurses find it difficult to choose the right mobile application as there are no specific guidelines regarding mobile health applications. Finnish nurses are more likely to use mHealth in patient care and recommend the mHealth application to their patients than Lithuanian nurses. Both nurses share the same concern about barriers to mHealth developments.

RECOMMENDATION

For nurses:

- Attend additional training or education regarding mHealth or eHealth concepts as digital health concept is rapidly transforming healthcare sector.
- Follow mHealth and eHealth regulation regularly.
- Share experience, concern, and recommendation with the hospital regulatory committee.

For hospital administration:

- Arrange the necessary training or education for nurses.
- Consider nurses' opinion on updating mHealth or eHealth regulation.
- Build modern infrastructure for mHealth adoption

Further research

- As mHealth technology evolving rapidly, a further study is required with a wide study population including nurses, doctors, and hospital authorities.

REFERENCES

1. 3D4Medical. (2018). *3D4Medical*. Retrieved December 01, 2018, from 3D4Medical website: <https://3d4medical.com/>
2. AHRQ PCMH Resource Center. (2016). *Agency for Healthcare Research and Quality*. Retrieved March 19, 2018, from PCMH Resource Center: <https://pcmh.ahrq.gov/>
3. Akter, S., D'Ambra, J., & Ray, P. (2010). User perceived services quality of mHealth Services around the world. *18 th European Conference on Information Systems*. Pretoria.
4. Andreou, P. (2017). Knowledge, Attitudes and Perspectives among senior Nurse students for the use of mHealth. A quantitative study in Greece and Cyprus. Tromsø: UiT Norges arktiske universitet. Retrieved June 19, 2018, from <https://munin.uit.no/bitstream/handle/10037/12761/thesis.pdf>
5. Asikainen, A. M. (2015). *Revenue Models of Mobile Health Applications: Free-to-play applications*. Kuopio: Savonia-ammattikorkeakoulu. Retrieved February 15, 2018, from <http://www.theseus.fi/handle/10024/88337>
6. Aungst, T. D., Clauson, K. A., Misra, S., Lewis, T. L., & Husain, I. (2014). How to identify, assess and utilise mobile medical applications in clinical practice. *International journal of clinical practice*, 68(2), 155-162. Retrieved January 28, 2017
7. Babbie, E. R. (2013). *The Practice of Social Research* (13th ed.). Cengage Learning. Retrieved August 13, 2018, from http://jsp.ruixing.cc/jpkc_xingfa/JC_Data/JC_Edt/lnk/20161105194206236.pdf
8. Banaee, H., Ahmed, M. U., & Loutfi, A. (2013). Data mining for wearable sensors in health monitoring systems: a review of recent trends and challenges. *Sensors*, 13(12), 17472-17500. Retrieved July 28, 2018, from <https://www.mdpi.com/1424-8220/13/12/17472/htm>
9. Bardram, J. E., Baldus, H., & Favela, J. (2006). Pervasive computing in hospitals. In A. Mihailidis, & J. E. Bardram, *Pervasive Computing in Healthcare* (pp. 49-75). CRC Press. Retrieved July 25, 2018, from <https://pdfs.semanticscholar.org/66e0/4b6c441a7cb6987251c042c82f2e9c4423ed.pdf>
10. Barret, D. I., & Wallis, A. (2013). Nurses' attitudes towards telehealth: the Royal College of Nursing eHealth survey. *International Journal of Integrated Care*, 13. Retrieved November 1, 2018
11. Bonsall, L. (2016, July 19). *Wolters Kluwer*. Retrieved July 04, 2018, from NursingCenter Blog: <https://www.nursingcenter.com/ncblog/july-2016/mobile-healthcare-applications-part-3-nursing-educ>
12. Boulos, M. K., Brewer, A. C., Karimkhani, C., Buller, D. B., & Dellavalle, R. P. (2014). Mobile medical and health apps: state of the art, concerns, regulatory control and certification. *Online journal of public health informatics*, 5(3), 229. Retrieved June 11, 2018, from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3959919/>

13. Calinici, T. (2017). Nursing Apps for Education and Practice. *Journal of Health Medical Informatics*, 8(262), 2. doi:10.4172/2157-7420.1000262
14. Dykes, P. C., Stadel, D., Dalal, A., Clements, M., Collins, S., Chang, F., & Lehmann, L. S. (2015). Strategies for managing mobile devices for use by hospitalized inpatients. *AMIA Annual Symposium Proceedings* (p. 522). American Medical Informatics Association. Retrieved July 15, 2018, from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4765634/>
15. Ericsson. (2018). *Mobile subscriptions worldwide Q1 2018*. Telefonaktiebolaget LM Ericsson. Retrieved November 17, 2018, from <https://www.ericsson.com/en/mobility-report/reports/june-2018/mobile-subscriptions-worldwide-q1-2018>
16. European Commission. (2017, May 9). *European Union*. Retrieved December 11, 2017, from European Union website: <https://ec.europa.eu/digital-single-market/en/mhealth>
17. FDA. (2018, August 10). *U.S. Food and Drug Administration*. Retrieved November 01, 2018, from U.S. Food and Drug Administration Website: <https://www.fda.gov/medicaldevices/digitalhealth/mobilemedicalapplications/default.htm>
18. IBM MobileFirst. (2016). *IBM MobileFirst for iOS – Healthcare*. Retrieved March 14, 2018, from IBM MobileFirst: <https://www.ibm.com/us-en/marketplace/ibm-mobilefirst-for-ios--healthcare/details>
19. Istepanian, R., Laxminarayan, S., & Pattichis, C. (2005). *M-Health: Emerging Mobile Health Systems*. New York: Springer.
20. Jovanov, E., & Zhang, Y. T. (2004). Introduction to the Special Section on M-Health: Beyond Seamless Mobility and Global Wireless Health-Care Connectivity. *IEEE Transactions on Information Technology in Biomedicine*, 405-414. Retrieved January 25, 2017
21. Kay, M., Santos, J., & Takane, M. (2011). mHealth: New horizons for health through mobile technologies. *World Health Organization*, 64(7), 66-71. Retrieved July 14, 2017, from http://www.who.int/goe/publications/goe_mhealth_web.pdf
22. Kourkouta, L., & Papathanasiou, I. V. (2014). Communication in nursing practice. *Materia socio-medica*, 26(1), 65-67. Retrieved June 14, 2018, from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3990376/>
23. Labrique, A. B., Vasudevan, L., Kochi, E., Fabricant, R., & Mehl, G. (2013). mHealth innovations as health system strengthening tools: 12 common applications and a visual framework. *Global Health: Science and Practice*, 1(2), 160-171. Retrieved June 12, 2017
24. Lee, M. (2015). Effects of mobile phone-based app learning compared to computer-based web learning on nursing students: pilot randomized controlled trial. *Healthcare informatics research*, 21(2), 125-133. Retrieved July 02, 2018, from <https://synapse.koreamed.org/DOIx.php?id=10.4258/hir.2015.21.2.125>
25. Lux Research. (2014). *mHealth Showdown: Consumer and Clinical Devices' Battle for Market Dominance*. Boston: Lux Research. Retrieved July 28, 2018, from <https://members.luxresearchinc.com/research/report/14612>

26. Mailloux, C. G. (2011). Using the essentials of baccalaureate education for professional nursing practice (2008) as a framework for curriculum revision. *Journal of Professional Nursing*, 27(6), 385-389. doi:10.1016/j.profnurs.2011.04.009
27. Mechael, P. N. (2009). The case for mHealth in developing countries. *Innovations: Technology, Governance, Globalization*, 4(1), 103-118. doi:10.1162/itgg.2009.4.1.103
28. MedCalX. (2016). *MedCalX*. Retrieved July 17, 2018, from MedCalX website: <http://medcalx.ch/>
29. Mickan, S., Tilson, J. K., Atherton, H., Roberts, N. W., & Heneghan, C. (2013). Evidence of Effectiveness of Health Care Professionals Using Handheld Computers: A Scoping Review of Systematic Reviews. *Journal of Medical Internet Research*, 15(10), e212. doi:10.2196/jmir.2530
30. Mosa, A. S., Yoo, I., & Sheets, I. (2012). A systematic review of healthcare applications for smartphones. *BMC medical informatics and decision making*, 12(1), 67. Retrieved January 28, 2017
31. Murphy, J., & Barry, A. (2017). Mobilizing the Nursing Workforce with Data and Analytics at the Point of Care. In C. Delaney, C. Weaver, J. Warren, T. Clancy, & R. Simpson, *Big Data-Enabled Nursing* (pp. 313-329). Cham: Springer. doi:10.1007/978-3-319-53300-1_17
32. Olla, P., Butrico, C., & Pichette, C. (2014). mHealth: Multidisciplinary Verticals. In S. Adibi, *mHealth Multidisciplinary Verticals* (pp. 279-298). Boca Raton: CRC Press. Retrieved December 01, 2018
33. Pimmer, C., Brysiewicz, P., Linxen, S., Wlters, F., Chipps, J., & Gröhbiel, U. (2014). Informal mobile learning in nurse education and practice in remote areas- A case study from rural South Africa. *Nurse Education Today*, 34, 1398-1404. Retrieved May 14, 2018
34. Plachkinova, M., Andrés, S., & Chatterjee, S. (2015). A Taxonomy of mHealth Apps--Security and Privacy Concerns. *48th Hawaii International Conference on System Sciences (HICSS)* (pp. 3187-3196). Hawaii: IEEE. doi:10.1109/HICSS.2015.385
35. Pradhan, N. (2017). *Use of Mobile health applications in obstetric care: A review*. Tromsø: UiT The Arctic University of Norway. Retrieved January 15, 2018, from <http://hdl.handle.net/10037/11274>
36. Prasad, A., Sorber, J., Stablein, T., Anthony, D., & Kotz, D. (2014). Understanding user privacy preferences for mHealth data sharing. In S. Adibi, *mHealth: multidisciplinary Verticals* (pp. 545-568). Boca Raton: CRC Press. Retrieved December 01, 2018
37. Propellerhealth. (2018). *Propeller Health*. Retrieved November 14, 2018, from Propeller Health website: <https://www.propellerhealth.com/the-propeller-solution/>
38. Research Now Group, Inc. (2015, March 17). *Research Now Group, Inc. news room*. Retrieved June 18, 2018, from Research Now Group, Inc. website: <https://www.researchnow.com/newsroom/mobile-medical-apps-good-health-new-study-research-now-reveals-doctors-patients-say-yes-infographic/>

39. Samples, C. N. (2014). Nursing and mHealth. *International Journal of Nursing Sciences*, 330-333.
40. Sarasohn-Kahn, J. (2013). A role for patients: the argument for self-care. *American journal of preventive medicine*, 44(1), S16-S18. Retrieved May 17, 2018, from <https://www.sciencedirect.com/science/article/pii/S0749379712006411>
41. Ventola, C. L. (2014). Mobile devices and apps for health care professionals: uses and benefits. *Pharmacy and Therapeutics*, 39(5), 356–364. Retrieved December 14, 2017, from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4029126/>
42. Waegemann, C. P. (2010). mHealth: the next generation of telemedicine? *Telemedicine and e-Health*, 16(1), 23-26. Retrieved November 25, 2017
43. Wallace, S., Clark, M., & White, J. (2012). It's on my iPhone': attitudes to the use of mobile computing devices in medical education, a mixed-methods study. *BMJ open*, 2(4), e001099. doi:10.1136/bmjopen-2012-001099
44. Weaver, C., & Teenier, P. (2014). Rapid EHR development and implementation using web and cloud-based architecture in a large home health and hospice organization. *Nursing Informatics*, 201, 380-387. Retrieved December 17, 2017, from <http://ebooks.iospress.nl/publication/36618>
45. WHO. (2011). *World Health Organization*. Retrieved January 6, 2018, from World Health Organization Website: http://www.who.int/goe/publications/goe_mhealth_web.pdf
46. WHO. (2018). *Use of appropriate digital technologies for public health*. Geneva: World Health Organization. Retrieved November 20, 2018, from http://apps.who.int/gb/ebwha/pdf_files/WHA71/A71_20-en.pdf
47. Wittmann-Price, R., Kennedy, L., & Godwin, C. (2012). Use of personal phones by senior nursing students to access health care informations. *Journal of Nursing Education*, 51(11), 642-646. doi:10.3928/01484834-20120914-04

APPENDICES

Appendix 1 Questionnaire

Name of the study: “Nurses’ knowledge and attitude toward using mobile health application: A study in Finland and Lithuania”.

This survey questionnaire is a part of the research project on the knowledge and attitude of nurses towards the usage of mHealth in Finland and Lithuania, as part of a Bachelor thesis. This survey is completely anonymous, protected by data privacy and confidentiality. This survey is approved by Mikkeli healthcare ethical committee board and Kaunas bioethics committee.

There are 27 questions in this survey and it takes about 7 minutes to complete.

1. Country

Mark only one oval.

- Finland
 Lithuania

2. Age

Mark only one oval.

- <20
 20-25
 26-30
 31-35
 36-40
 41-45
 45-50
 >50

3. Country of practice

Mark only one oval.

- Finland
 Lithuania

4. Profession

Mark only one oval.

- Nurse
 Practical nurse
 Other: _____

5. Length of practice (years)

Mark only one oval.

- <1
- 1-5
- 6-10
- 11-15
- 16-20
- >20

6. Setting of nursing practice

Mark only one oval.

- Hospital inpatient
- Hospital outpatient
- Community
- Private practice

7. Area of practice

Mark only one oval.

- Cardiology
- Geriatrics
- Pediatrics
- Emergency care
- Intensive care
- General medicine
- Surgery
- Other: _____

8. Do you use a smartphone or tablet PC?

Mark only one oval.

- Yes
- No

9. Operating system of your smartphone or tablet PC

Mark only one oval.

- Android OS (Google Inc.)
- iPhone OS / iOS (Apple)
- Windows OS
- BlackBerry OS
- Other: _____

10. What type of applications do you download at your smartphone?

Check all that apply.

- Games
- Education
- Books
- News
- Social media
- Health and Lifestyle
- Business
- Other: _____

11. Are you currently using your smartphone or tablet PC to obtain or manage health-related

Mark only one oval.

- Yes
- No

12. Are you aware of the availability of Mobile health applications for smartphones?

Mark only one oval.

- Yes
- No

13. What types of health-related application do you use on your smartphones?

Check all that apply.

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

14. How many health applications do you currently have on your smartphone?

Mark only one oval.

- 0
- 1-3
- 4-6
- 6-10
- >11

15. How often do you use health application?

Mark only one oval.

- Not at all
- 1 time/day
- 2-5 times/day
- 6-10 times/day
- >11 times/day

16. Was your choice of application influenced by any of the following?

Mark only one oval.

- Friends
- Family
- Internet
- TV/Radio Commercials
- Medical Journals
- Medical Staff
- App store reviews
- Other: _____

17. Do you use mobile health application in patient care?

Mark only one oval.

- Yes
- No

18. Do you recommend mobile health application to your patient?

Mark only one oval.

	1	2	3	4	5	6	7	8	9	10	
Very unlikely	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very likely

19. How Important do you think the following functions for mobile health application, from the healthcare staff point of view?

Mark only one oval per row.

	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	<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"/>
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"/>
Others	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

20. How do you rate the usefulness of the Health Apps for your Nursing practice?

Mark only one oval.

	1	2	3	4	5	
Not useful at all	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very useful

21. Your opinion about using mHealth technology in Nursing practice

Mark only one oval per row.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Using mHealth enables me to accomplish nursing task more quickly	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Using mHealth improves the quality of nursing work I do	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Using mHealth make me do my nursing work easily	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Using mHealth make me improve my job performance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Using mHealth enhance my effectiveness on my job	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Using mHealth gives me greater control over my work	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Using mHealth is completely compatible with my current situation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Learning to operate mHealth is easier for me	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
In the hospital, I see mHealth being used for many tasks	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
mHealth is very visible in the hospital where I work	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Using mHealth require a lot of mental efforts	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Using mHealth is often frustrating	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

22. Are you Aware of any of the following regulatory marks on mobile apps?

Check all that apply.

- FDA (USA)
- CE certification (EU)
- MHRA (UK)
- FIMEA (Finland)
- VVKT (Lithuania)
- Other: _____

23. How satisfied are you with your knowledge mHealth concepts?

Mark only one oval.

	1	2	3	4	5	6	7	8	9	10	
Not at all likely	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Extremely likely

24. Did you receive any training or education regarding Health Apps?

Mark only one oval.

- Yes
- No

25. Would you be interested in taking courses in the following concepts?

Mark only one oval per row.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Telemedicine	<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"/>
eHealth	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Others	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

26. Which concerns do you have about using mHealth application?

Check all that apply.



- None
- Concerns about data security
- Concerns about the technical reliability of the devices
- Concerns about the reliability of the software
- The devices are too complicated to use
- Other: _____

27. What are the barriers to using mobile apps in nursing practice?

Mark only one oval per row.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
No access to a smart device	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lack of infrastructure (e.g. no access to Wi-Fi)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lack of awareness about the best apps to recommend	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lack of time to discuss apps during nursing care	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Topics covered by apps not relevant to the patients	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Apps are expensive	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Apps are hard to use	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Patients are not interested or willing to use the apps	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Apps do not have any added value in nursing care	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Appendix 2 Research Permission

Etelä-Savon sosiaali- ja terveystalvelujen ky.	Viranhaltijapäätös	Pykälä Mu	Sivu
Johtajaylihoitaja	26.4.2018	11	1
1. Asia	Tutkimusluvan myöntäminen Habib Ullah Raj		
2. Asiaselostus	Health apps used and counselled by nurses in health promotion in Finland and Lithuania Tutkija: Habib Ullah Raj, Kaakkois-Suomen ammattikorkeakoulu ja Kauno Kolegija Tutkimuksessa selvitetään sairaanhoitajien kokemuksia ja millaista kiinnostusta hoitajilla on terveyssovellusten käyttämisestä yksityiselämässä sekä ammatillisesti. Tutkimus suoritetaan kyselytutkimuksena Suomessa ja Liettuassa.		
3. Päätös	Myönnän luvan tutkimuksen suorittamiseen Etelä-Savon sosiaali- ja terveystalvelujen osastolla 33, osastolla 34, dialyysissä, päivystyksessä sekä teho-osastolla ja valvontayksikössä.		
4. Päätös asetettu yleisesti nähtäväksi, paikka ja aika	Etelä-Savon sosiaali- ja terveystalvelujen kuntayhtymän kirjaamo 30.4.2018 klo 9.00-15.00.		
5. Toimivalta	Johtoryhmä 14.3.2017 § 58.		
6. Allekirjoitus, paikka ja pvm	Mikkelissä 26.4.2018  Senja Kuiri Johtajaylihoitaja		
7. Lisätiedot	Lisätietoja päätöksestä antaa johtajaylihoitaja Senja Kuiri, puh. 044 3512650 tai sähköposti senja.kuiri(at)essote.fi.		
8. Jakelu	Habib Ullah Raj lehtori Aila Friis, XAMK osastonhoitaja Kirsi Lahti osastonhoitaja Satu Pulkkinen osastonhoitaja Päivi Ylönen osastonhoitaja Anne Lirkki osastonhoitaja Marju Peurala		
9. Muutoksenhaku	Oikaisuvaatimusohje liitteenä		
10. Tiedoksiantajan allekirjoitus	Pvm <u>26.4.2018</u> Tiedoksiantaja <u></u>		

Etelä-Savon sosiaali- ja terveystalvelujen ky.	Viranhaltijapäätös	Pykälä	Sivu
Johtajaylihoitaja	26.4.2018	Mu 11	2

Oikaisuvaatimusohjeet

Liite

<i>Oikaisuvaatimus-oikeus</i>	<p>Tähän päätökseen tyytymätön voi tehdä kirjallisen oikaisuvaatimuksen.</p> <p>Oikaisuvaatimuksen saa tehdä se, johon päätös on kohdistettu tai jonka oikeuteen, velvollisuuteen tai etuun päätös välittömästi vaikuttaa (asianosainen). Oikaisuvaatimuksen voi tehdä myös kuntayhtymän jäsenkunta ja sen jäsen.</p>
<i>Oikaisuvaatimusviranomainen</i>	<p>Oikaisuvaatimusviranomainen, jolle oikaisuvaatimus tehdään: Etelä-Savon sosiaali- ja terveystalvelujen kuntayhtymän hallitus Osoite: Etelä-Savon sosiaali- ja terveystalvelujen ky., Kirjaamo Porrassalmenkatu 35-37, 50100 Mikkeli Faksi: 015 351 2505 Sähköposti: kirjaamo@essote.fi</p>
<i>Oikaisuvaatimusaika ja sen alkaminen</i>	<p>Oikaisuvaatimus on tehtävä 14 päivän kuluessa päätöksen tiedoksisaannista. Jäsenkuntien ja niiden jäsenten katsotaan saaneen päätöksestä tiedon kun pöytäkirja on asetettu yleisesti nähtäväksi. Asianosaisen katsotaan saaneen päätöksestä tiedon, jollei muuta näytetä, seitsemän päivän kuluttua kirjeen lähettamisestä, saantitodistuksen osoittamana aikana tai erilliseen tiedoksisaantitodistukseen merkittynä aikana. Oikaisuvaatimusaikaa laskettaessa tiedoksisaantipäivää ei oteta lukuun.</p>
<i>Oikaisuvaatimuksen sisältö ja toimitaminen</i>	<p>Oikaisuvaatimuksen mukana tulee olla päätös, johon oikaisua vaaditaan sekä selvitys siitä päivästä, mistä oikaisuvaatimusta koskeva aika edellisen mukaan on luettava.</p> <p>Oikaisuvaatimuksesta on käytävä ilmi vaatimus perusteineen ja se on tekijän allekirjoitettava. Tarvittaessa oikaisuvaatimuksen tekijää on pyydetävä täydentämään vaatimusta.</p> <p>Oikaisuvaatimus on toimitettava oikaisuvaatimusviranomaiselle ennen oikaisuvaatimusajan päättymistä.</p>