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Chronic Diseases Caring With The Use Of Mobile Heath Technology

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Degree Thesis in Health Care and Social Welfare, Vaasa

Education: Nurse, Bachelor of Health Care

Vaasa / 2019

BACHELOR'S THESIS

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Title: Chronic Diseases Caring with the use of mHealth Technology

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Date November 2019 Number of pages 48

Abstract

Challenges facing people with chronic conditions often are covered below the surface and go unaddressed for longtime, until acute or serious complications arise to the person, even when recognized are poorly cared because of ineffective caring management system used. Chronic diseases care management is complex procedure, often requires long-term care plan, well-coordinated system and team work with well-informed professionals able to assess, evaluate, anticipate and react well to emerging health deviations according to the nature of situations.

The aim of this project is to shed more light on how mHealth technology can be used in chronic diseases care management to facilitate caring activities. Theoretical framework used in this research is based on chronic care model by Edward Wagner and his colleagues. The research is a qualitative literature review in an inductive content. Results of the study indicate that mHealth services has great potential in chronic diseases caring whenever used well. However, the finding of this research also indicates that matter involving patient's safety and patient's rights to privacy, data confidentiality, and issue of therapeutic relationship, reliability and accuracy in data are areas that need continuous analyzation throughout the use of mHeath technology.

Language: English Key words: Chronic diseases, mobile health (mHealth), Caring

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1. Introduction

Living with chronic condition is challenging and difficult not only to the patients but also to healthcare providers and people close to the patients. Chronic diseases confront patients with a spectrum of needs that requires them to alter their behavior, lifestyles, and in some case their aspirations .Regular medical examinations, frequent interactions with healthcare providers, diet adjustment, regular decisions making, engaging in activities to promote well-being both physically as well as psychologically, are examples of activities a person with chronic condition can find himself undertaking following diagnosis.

Often individuals with chronic diseases or chronic illness undergo various stages in theirs diseases journey. During those stages they experience various changes that takes place in their bodies. The changes alter normal function of physiological process within the body and result into various symptoms. While each chronic diseases has its own distinguish symptoms depending on the nature and pathogenic pathway of the disease. Most chronic conditions associated with regular pains, fatigue, weight loss or weight gain, psychological changes, mood changes, emotional changes, physical changes, as well as impairment in functional capacity. Following diagnosis people with chronic diseases tend to be in the state of distress, confusion, anger, grief, sadness (Verhaak et al., 2005, 789), the outcome of such behaviors can result into psychiatric disorders, most commonly depression and anxiety (Verhaak et al., 2005, 789). According to Katon, Lin & Kroenke (2007, 155) depression and anxiety are common psychiatric disorders in people with chronic diseases or chronic illness than those without (Katon et al., 2007). Similarly depressed patients report to have worse physical health comparable with patients without depression (Wells et al., 1989, 977).

According to Verhaak (2005) patients with cancer diseases, heart diseases, arthritis, high blood pressure, diabetes, chronic lung diseases, neurogenic diseases and migraine manifest high rate of depressive symptoms than other people (Verhaak et al., 2005, 789).

While patients face such challenges, healthcare professionals particularly nurses also encounter multiple challenges in their own daily responsibilities as they attend to people with chronic conditions. Heavy workload, communication problems, the issue of poor compliance or non-compliance to patients, problem of inadequacy resources, dealing with adverse drugs reaction incidence and multimorbidity are examples of challenges facing nurses. In addition, nurses also have responsibility of protecting own health against any health intruders being physically, emotionally, psychologically and socially. In the absence of good working environments, the challenges can cause frustration, psychological distress, fatigue, dismay and exhaustion of job responsibilities in nurses and result into negative outcome in term of quality care and the whole caring process. Under such scenario people with chronic diseases are the one likely to suffer the most.

Irrespective of the stated challenges, people with chronic diseases and chronic illness deserve quality care that address well their needs as needed. The goals of care in chronic diseases differ depending on type of disease, condition of the patient and stage of disease reached, treatment assigned as well as available resources. In some cases the goals of chronic care are not to cure rather to enhance functional status, minimize distressing symptoms, prolong life through secondary prevention and enhance quality of life (Grumbach, 2003). Even under such circumstances healthcare professionals still have obligation to work according to their codes of conducts.

Research work in this area suggest that management of chronic diseases need to be dynamic varying over time depending on disease etiology, physiology and resources available. “Chronic diseases management often requires a long-term care plan whereby adherence to chronic disease management plan is critical to achieve improved health outcomes, quality of life to patients and cost-effective healthcare” (Viswanathan, Golin et al., 2012). The care management of chronic diseases need to involve routine monitoring of disease progress involving recording of important information’s such as vital signs and other clinical indicators symptoms of disease, also need to involve long-term programs focusing on evaluating treatment compliance but also implementing programs that facilitate and initiate patient’s self-care ability. Such programs are important in chronic diseases care management for overall outcome of care in term of improving quality of life of the patients but also towards reduction of acute exacerbations and premature death. This makes management of

chronic disease to be challenging and difficult, particularly in places where health systems have limited resources, few healthcare professionals and the places where the distance between healthcare facilities and people is far apart. In a research study done between year 1997 to 2012 covering wider range of chronic diseases with the aim of investigating the quality of life to the people living with chronic diseases, it was found that “individuals living with chronic diseases are at high risks of developing depressive symptoms, cognitive impairment, insomnia, adverse health risk behavior when do not receive a care that meet well their needs (Megari, 2013). The earlier stated factors are the main leading contributing factors of functional limitation to people with chronic diseases. These factors facilitate quick development of disabilities to a person and pave way for emerging of new chronic diseases or chronic illness to an individual person with chronic conditions (Megari, 2013).

This imply that an effective care management of chronic condition is one that aim first to reduce the possibility of developing additional chronic condition to a person with chronic disease and mitigates symptoms that might appear in the absence of good care services. Narrowing possibility of new rise of chronic condition to a person with chronic disease and decreasing deterioration of physical and function status through engaging people with chronic condition in caring activities of their own health, can help to reduce the risk of disability development and help to improve quality of life in individuals living with chronic disease.

Tinetti (2004) state that, even though people with chronic conditions are confronted with similar spectrum of needs, individual with chronic diseases and chronic illness differ on their preferences towards the type of care they want to engage and the importance they place on health outcomes afterwards. While some prioritize maintenance of functional independence over intensive medical management and others are willing to tolerate the inconvenience and risks of adverse effect associated with complex multiple medications regimens if linked to longer survival even if is at expenses of quality of life and the opposite (Tinetti et al., 2004). Therefore providing environments that allow individuals with chronic diseases to be partner in the activities involving their own health and be able to take part in care plan preparation activities become of great importance for effective care management outcome not only to the patients but also to healthcare providers, family members and community in general .

As an outcome, this thesis work aims to explore the use of mobile health (mHealth) as a tool with enormous potential to impact chronic disease care management activities due to its availability, portability, and technological capacity of the services that can be used to involves patients with chronic condition in caring process, improve communication during caring, but also reduce burden of work in nurses and contribute to effectiveness of their works. The ability of this devices to allow communication between patients and healthcare providers using digital channel in such way the users can be mobile yet continue to maintain direct communication with his counterpart (healthcare professional) at any place and any time without problem offer unique features in chronic condition caring process. These gives opportunity for continuous communication between care providers and patients, continuous data collection between the two parts, continuously patient monitoring and continuous education tailoring between the two parts. The formal environments are key characters to enhance chronic diseases care managements and the outcome can have big impact in patient's outcome in term of reduction of premature death, acute exacerbations incidence, and disability brought by chronic diseases as well as can play a significant role in improving quality of life in patients living with chronic diseases. The study is a literature review in a qualitative analysis contest with aim of highlighting the potential of mHealth in management of chronic diseases.

2. Background of the study

The rapid increase in number of people living with chronic diseases and chronic illness in recent years globally are overwhelming. Chronic diseases and chronic illness are causing enormous burden on patient`s lives, higher workload in healthcare sector as well as substantial impact on societies lives. When not managed well chronic diseases or chronic illness can led to regular hospitalization, long-term disability, reduction of quality of life in an individual and premature death. There are many chronic disease trending now globally, where most of them are long lasting diseases. Example of such diseases are; cardiovascular diseases, strokes, cancers diseases, diabetes, obesity, respiratory diseases, arthritis, HIV/AIDS diseases, Alzheimer's disease, Parkinson's diseases, kidney diseases and septicemia.

WHO statistics report year 2014 indicate that chronic diseases account for more than 70% of all deaths globally, causing 41 million to lose their lives and die prematurely

because of chronic diseases or illness that most of them still can be avoided or delayed (WHO, 2014).According to another survey study conducted in Belgium in the period of ten years from year 1997 up to 2008 to investigate the contribution of chronic diseases to the population in Belgium, it was found that chronic diseases are the second causes of disability in the population(Yokota et al.,2015). Also in another study report conducted in Netherland it was found that chronic diseases do not only cause overwhelming increase in mortality and disability to the society, also it was found that chronic disease and chronic illness are the main contributing factors of psychological problems, social, and economic problem to the patients and people close to the patients (Baanders et al., 2007).

Although different measures have been commenced to deal with the situation, the trend is still troublesome, indicating that the demand of further research in chronic diseases is still on big demand. The puzzle remain to be "what types of caring methods suite well in management of chronic diseases, furthermore what tools can be used in caring to produce positive outcome in the manner that is holistic, sustainable, and cost effective so that the challenges facing patients, healthcare providers, family members, society and the entire healthcare sectors are address more effectively .

2.1 Mobile health

Although there is no standardize definition of mHealth (mobile health) internationally, the term mHealth (mobile health) refer to the use of mobile devices and other wireless devices to provide medical care. It includes the uses of devices such as mobile phones, tablets, patients monitoring devices, personal digital assistants (PDAs) and other wireless devices.

In mHealth system, healthcare services or health information's are delivered to the recipient inform of voice, short message, pictures or video mainly through third and fourth generation of mobile telecommunication systems (3G and 4G systems). Apart from that the formal can also be delivered through other means such as positioning system (GPS), as well as Bluetooth technology. (WHO, 2011)

New mobile generation such as smartphone poses many functional facilities that can be of great deal when integrated in chronic diseases caring particular in those patients

who are still in the initial stage of their diseases journey. Under careful consideration and conduction of regular evaluation on its outcome result in relation to its application in caring process they are likely to make great impact when it come to the caring of long-lasting diseases and chronic illness. The exceptional functional characteristics present in new mobile generation can contribute much in chronic diseases management when used effective. Such functional characteristics present in mHealth devices includes; ability to provide feed-back, interactivity, ability to provide beeps, flashing screens and vibrations, being mobile and be able to be taken wherever the person goes, ability to receive and store pictures, video and voices (audios) and many other functionalities. The formal mentioned functionalities can used as a mean to facilitate knowledge transfer between patient and care providers but also can be used to address various needs of the patients such as psychosocial need, emotional problems and help to improving patient´s adherence during treatment period.

2.2 Chronic diseases

There are many definitions suggested to define the term chronic diseases by professionals from public health, medical and academic institutions, or various organizations. Among those definitions there is small variation on the view of what chronic diseases really mean which causes some disease to be included or excluded as chronic diseases. For instance, some definition includes diseases such as COPD, Asthmas, HIV, Hepatitis and all types of Cancer as chronic diseases while others omit chronic respiratory conditions such as COPD and Asthmas in the list of chronic diseases (Bernell &Howard, 2016). For the purpose of this study the term chronic disease means human health conditions or diseases that persist for long period of time and its effect come with time such as diabetes, Cardiovascular diseases (CVD), Cancers, HIV/AIDS, Hepatitis, Arthritis, Asthma, and other similar diseases.

3. Theoretical framework

Theoretical framework used in this literature review is based on chronic care model by Edward Wagner and his colleagues (1998). The model was developed by Edward Wagner and his colleagues in United States in the mid-1990's to provide

recommendation guidelines that are evidence-based to be followed when caring people with chronic diseases or chronic illness in the organization particular at primary care setting. The model is population-based and seek to create practical, supportive, evidence-based interaction between an informed, activated patient and prepared, proactive practice team (Wagner et al., 2001). Initial the model aimed to provide guidelines in caring of people with diabetes, then later it was found to be also effective in the care of heart failure, asthma as well in caring of other types of chronic diseases. The focus of the model centered on improving chronic care outcome by preventing (limiting) rapid diseases progression taking place within various steps during disease´s course.

Chronic care model is built on the assumption that chronic disease differs from normal diseases, therefore the type of care used in such situation ought to be different. The recommendation suggest that such care should be good, cost effective and different from primary care since chronic diseases condition tend to last longer than another type of diseases, hence ought to differ from other caring management implemented in ordinary diseases.

E.H. Wagner and his colleagues argue that many patients who suffer from chronic diseases and chronic illness often do not receive adequate long-term care as needed. The reason being that, the type of care tailored to them is conventional primary care, a type of care that is mainly designed to handle acute condition mainly focusing on clinical encounter to diagnose signs and symptoms. Under such type of care often patients receive little information about their condition which in most case only brief them of their health condition followed by patient-initiated follow-up care. This type of care is not enough to cope with long-term diseases conditions incurable one that often can last longer with a person (Wagner; 1997).

Chronic care model proposes a care recommendation framework guideline that seek to support patients in self-management of their condition by enhancing their own skills in the manner that will engage broader team work together such as community care agencies and others but also the model implement component that involves inclusion of tracking system to monitor patients progress throughout the entire disease journey together with delegation of organization central role. (Wagner; 1998)

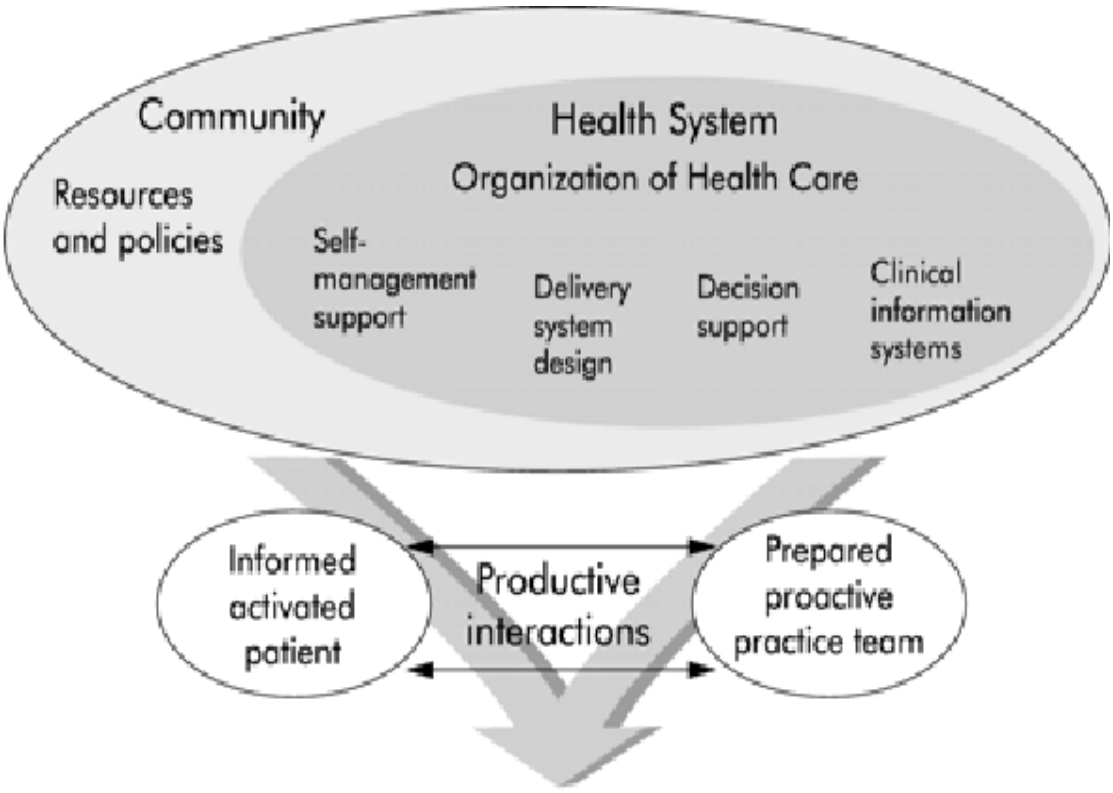
Several research studies have been conducted in different time to investigate effectiveness of applying chronic care model in various chronic diseases such as diabetes, asthma, heart failure and cancer. As a result, the outcome of those research works have indicated that the model has proven to cause significant improvement results when integrated in caring of chronic diseases. This has been revealed by presence of significant reduction of frequent visit to emergence facilities done by patient with chronic diseases or illness, reduction in length of hospital stay involving people with chronic diseases, furthermore also integration of chronic care model has proven to cause significant reduction in cost of care of chronic diseases (Bodenheimer et al., 2002). The results indicate that good outcome occur when the care plan is integrated into patient`s routine care activities where the intervention set up are in the manner that is comprehensive. (Coultier et al., 2015)

In summary, the model identifies six fundamental areas that require attention in order to improve chronic care outcomes when dealing with care managements involving variety of chronic diseases. The areas are following:

1. Self-Management Support. This part emphases on providing supportive means to patients with the focus of raising patient`s confidence and awareness skills in order to give capacity for patients to manage their own body health but also to build patient ability to take control of their healthcare programs.
2. Decision Support. Decision support part emphasizes the need to promotes clinical care practices in accordance with proven guidelines founded under evidence –based source which are in lines with patient`s preferences. For instance, making use of specialist expertise advices and primary care professionals, embedding evidence-based guidelines into daily clinical practices, uses of proven education methods to render knowledge to the patients and others.
3. Clinical Information System. This part focus on improving information systems by making use of registry such patient registries to identify high-risk areas on patients and develop disease registry. It includes the work of organizing patient´s data together with population data to facilitate efficiency of the system and give chance for presence of effective care that address well patients' needs or concerns. For example, integrating timely reminder for patients but also for healthcare providers, establishing coordinate care to allow ease flow of information between patient and care providers, establishment of

environments that is able to monitor easily practice team performance patient and care provider as well as able to monitor the efficiency of performance of the entire care system.

4. Delivery System Designer. Delivery system designer concern with implementing team-based patient care system that clarify roles and tasks of patient but also making sure that all the care providers who take part in the patient care are centralized with up-to-date information about patient` status but also can make follow-up regular apart from doing only standard procedures. It includes the means to give patients understanding of their situation that fit with their cultural background.
5. Health system. Health system or organization support the part that mainly focus on creation of mechanisms that ensure safety of the care but also seek to maintain quality of the care. For instance, presence of means that encourage open and systematic handling of errors or quality matters or create culture organization culture that is built under quality-driven care by implementing components in the care that seek to identify effort concerning preventive care measures that when utilized can limit or delay rapid diseases progression and translate them into clear goals.
6. Community. This seek to encourage patients to use effectively community resources such as encouraging patient to participate in community programs, encouraging patients to form partnerships with community organizations to support and develop interventions that is able to fill the gaps of service as needed, but also seek to advocate for policies that aim to improve patient care.



The chronic care model (Adapted from Wagner, 1998, 10)

4. Aim of the Study and Research questions

The aim of this research study is to elicit knowledge and understanding of mobile health (mHealth) and its merits on chronic diseases care management. The study intends to shade more light on existing advantages of mHeath technology in chronic diseases care management particularly outside formal healthcare institutions with an intention to make patients an active partner in caring process and reduce workload to nurses.

This study seeks to answer the following questions

i. What are the merits associated with mHealth integration in chronic care management?

ii. What are things nurses should take into consideration on regular bases when using mHealth services on chronic care management?

5. Methodology discussion

This section presents the overall approach used by researcher in the gathering and analyzing of data in order to provide appropriate answers to the research questions raised earlier on, it also presents the ethical aspect. The type of methodology used in any research works often depend on nature of the research questions intended to be addressed in the research process (Dillon, 2005). The methodology used by respondent during this research work was systematic literature review methods using qualitative analysis content where inductive content analysis method was chosen over deductive. The reason for the choice was to find wide pool of information from previous research works addressing similar subject at different angles of view but still in line with the subject of the thesis. This was important in order to help respondent to find clear, reasoning and useful convincing results that are scientifically founded in line with the thesis subject.

Systematic literature review methods is the research study methods that collects, analyses and summarizes the overviews of the knowledge gathered from current and previous studies with the purpose of presenting knowledge about the subject and find vivid evidence about the subject to justify why such subject is worth of consideration or rather why further study on the subject should be considered. Researchers when using this method first chose a topic followed by defining research questions followed by selection of literatures that seek to provide answers according to framed research questions. Afterward analyzing of retrieved results from appraised literature tend to begin followed by grouping of the literature into theme whereby final assessing of the compiled literature tend to commence with the aim of answering the research question that are in line with topic of study (Aromataris, 2014).

5.1 Ethical Issues

Patient empowerment, increasing efficient of care, cost reduction, prevention of rapid diseases progression, increase of healthcare service accessibility to patients are examples of some benefits associated with integration of mHealth in chronic diseases caring. Despite the presence of such huge benefits and interesting promises surrounding the move there are moral concern that need analysis and critical thinking before making the move. Irrespective of benefits associated with the use of mHeath technological in the care of chronic disease, there are still uncertainties around various areas. Include the following areas; patent safety issues, privacy and data confidentiality, decreasing of therapeutic relationship between care providers and patients as well as the issue of reliability and accuracy.

Unfortunate, very often whenever technological tools are used in caring industry, there is a possibility of compromising patient´s safety. This occur when healthcare providers or patient themselves fall to distinguish what is right or wrong, as well as between what is necessary (must be done to the healthcare receiver) and what activities are additional but important for the best outcome of caring. Under the absence of better education in healthcare providers but also in patients the safety of patients is likely to be compromised. The reason being the fact that application of technology such mHealth can provide gap in nursing activities and give channel to the presence of various routes that allow dictation of caring process and remove ability of nurses to have analytical analysis and critical thinking that is able to interpret the logic behind digital numerical values.

The outcome of that together with failure to abide on the recommendations can cause the promises associated with the use of mHealth in the care of chronic diseases to become mere dreams but also may even cause the start of problems that marks the begin of deterioration of health status of the patients. This suggest that merits associated with the use of mHealth in chronic diseases care are not always positive instead they can raise several ethical dilemmas and consequences when wrong decisions are made by users (McWay et al., 2010, 174). In such situations nurses are expected to act professionally in the best interest of patients according to their codes of works so that the type of care they provide to patients using mHealth technology system remain to be a care that meet the needs of patients but also are able to protect patient`s dignity, provides patient`s autonomy and preserve patient`s privacy as

recommended by legal and ethical mandates for their works even if some situations are difficult to decide what is right and what is wrong (McWay et al., 2010, 174).

Therefore, it is nurse's responsibility to use their knowledge, efforts and wisdom to protect patients against any harm that come with the use of mHealth systems and ensure that the risks of harm will not lie on patient's side, because patients with chronic diseases are more prone to life threatening problem where most of them have no knowledge about them, neither have no knowledge how to protect against them. Below are several areas that need frequent evaluations and careful consideration whenever mHealth is used in chronic diseases caring process as described below;

5.1.1 Therapeutic relationship

Therapeutic relationship is the relationship between patient and health care provider built under mutual trust and respect between the two parts (Forchuk, Westwell et al., 2000). It includes being sensitive and assist with gratification patients' needs physically, emotionally and spiritually. Therapeutic relationship is an essential part of caring activities. Good therapeutic relationship built under effective communication and information sharing between patient and healthcare providers that bring together the two parts in harmony. It can be brought by verbal and nonverbal communication where healthcare provider interacts with his client or patient interact health care provider in the manner that the two parts become equal partner in caring process (Forchuk, Westwell et al., 2000). For instance, good therapeutic relationship enables nurses to well understand These can be established under listening to the patients and responding to patients' emotions and unmet needs through various means such having conversations with clients, keeping eyes contacts during conversation, conducting face expressions or showing other body language and other means.

While it cannot be denied that face to face environment or face to face interventions are good atmosphere in building good therapeutic relationship between patients and healthcare providers, however relationship built under digital atmosphere like the one that can come with the use of mHealth services on people with chronic diseases can play a vital role in setting good atmosphere for continuous communication between patients and healthcare providers by providing pathway for communications, creating

a bond with patients, establishing trust and create a sense of connection from patients perspective(Rouleau, Geneviève et al., 2017).

The major advantage that come with the use of mHealth in chronic diseases lie on the ability of involving people with chronic diseases to take active roles in monitoring their health through collection of data related to their activities and conditions. Under such environment nurse's way of thinking when carrying their responsibility need to adjust and be able to respond appropriately in the manner that the use of technology will only increases efficiency in their work and not replay the fundamental role of the work. Therefore, adding knowledge on information, acquisitions, distribution in term of technological aspect become of great need to nurses. In this case nurse's ability to observe, interpret, recognize and analyses critically should go in hand with the use of technology.

In summary, the respondent in all his work during this research found no evidence to support that mHeath technology application distract or unleash presence of good therapeutic relationship between patients and nurses or healthcare providers rather the technology can be used to increase efficiency in surveillance of health condition of people with chronic condition even when face to face meeting is not possible. The respondent strongly believe that human therapeutic relationship should continue to be primary components of healthcare interaction in chronic condition care management under the help of mHealth technology where mHealth technology should not be used to replace nurse's fundamental objective role in caring, rather should be a mean to facilitate operational processes, interactions and working environment.

5.1.2 Patient empowerment and self-management

The claim that mHealth devices equipment tools empower patients and support patient's autonomy through self-management need critical assessment to examine the extend and types of autonomy these devices can provide to the patients. This is because self-management as caused by these devices can result patients to have a tendency of complying only with the strict medical regime rather than enhancing self-

determination to patients. Something that can utter patient`s behavior and cause the person to dependent of device to perform specific medical task hence the patient become dependent instead of being really empowered because such person cannot perform such task on his own under the absence of such devices. (Owen & Cribb, 2017)
In additional to the formal, the use of mHeath in chronic diseases caring can jeopardize health relationship between patients and care-providers, for instance nurse-patient relationship or doctor-patient relationship which is vital in assessment of patient status during diseases journey

5.1.3 The issue of confidentiality, patient`s privacy and data control.

Confidentiality in healthcare refers to the obligation of professionals who have access to patient's records to keep patient`s information protected without exposing to other people or other sources without patient consents (Kruse, Clemens Scott et al., 2017, 127). Confidentiality is important because it the root of all medical care since it provide trust to the patient an essential factor in the presence of patient- nurse relationship and key component of quality care. (McWay, 2010, 174)

Though patient´s medical information are vital objects in designing the type of care or treatment need by patients, however it is still inappropriate to disclosure patient`s information without his consents due to the reason that disclosing patient`s information may threat patient`s dignity, reputation and opportunity. Furthermore, also disclosing patient information without his consents can put that patients in the state that can facilitate deterioration of patient`s health condition by putting the patient into stressful state, embarrassing condition and even harm the patient afterward.

Even though mHeath contribute in supporting patient autonomy, however this area require careful consideration because data that are collected and processed by mHealth devices often contains also sensitive information and because of technology use in term of mHealth that data can be accessed easily by other parts because of the fact that stay in the devices for period of time whereby during that time the possibility of getting in contact with another person increases but also data can be reproduced to other sources without even first and second parts being aware of the matter therefore data protection precaution measures should be laid out in advance.

5.1.4 Increasing wide accessibility to healthcare services

Although mHealth increase the range of accessibility to healthcare services in people with chronic diseases so that are able get health informations from healthcare providers without even being to hospital. However it can be a source of problem and error in caring process particularly when healthcare rely much on technology and neglect the main principle of care. This is because mHeath intervention causes people who are in most need of care and happen to have problems associated with language, illiterate, economic problem or others to be overlooked and hence excluded automatically in program. For example, people with problems associated with language, illiterate, economic problem or others can be overlooked and hence become excluded automatically in program. For instance elders people who had less desire to use technology regularly such smartphones can be excluded in follow up program as a result of the tendency of nurses to assume that everything around them is fine since there is no alarm from devices that indicate danger, also people with disability who happen to have chronic diseases can find themselves excluded from certain program with similar assumptions and many other groups of people falling into this category.

5.1.5 Increasing efficiency and aiding in diseases progress prevention

Though mHealth increases efficiency in diseases prevention by providing platform to monitor various situation of the diseases regularly regardless of the distance existing between patient and care-provider, or by providing good management devices tools, there are many uncertainties surrounding mHeath that involves different issues such as safety, reliability and accuracy issues. For example, when the device produces false results due to technical errors, the outcome of that can cause wrong information flow that affect decision making to the patient himself or healthcare provider. The outcome of that is likely to mislead patients and care provider as well as cause unexpected to respond from them.

5.2 Data collection

The search of data for this study were done using different search database where articles to be used in the study were retrieved using EBSCO, CINAHL which was accessed through EBSCO but also using PubMed.

EBSCO is an academic search elite that contain accurate and reliable information while PubMed is a free search engine that include article from various fields, on the other hand CINAHL is a database library that contain literatures most in-depth from various journals such as field of nurse and allied health.

With the use these search engines articles were retrieved and gave various information with different view on the concept under the study of my thesis. In order to get information that is more specific to the subject, the use of Boolean operators (and, or) between chronic diseases and mobile heath were applied in between, also the search years was limited to the last 20 years, however preference was given to the most recent years bearing in mind that technology change with time but still in case there was an article that seem to contain important point outside that range was taken into consideration. The articles used for this study work were seven and the preferred language used in choosing of articles was only English language as shown in table 1 below.

Table 1

Data base used to search	Number of articles evolved	Number of relevant articles	Selected articles
EBISCO	20	9	2
PUBMED	59	15	4
CINAHL	16	10	1

The Appendix 1 shows the summary of articles used in data analysis.

5.2.1 Inclusion and Exclusion criteria

Following decision of the choice of thesis subject and research questions formulation, inclusion and exclusion criteria of the thesis was formulated in order to identifying articles that will provide accurate and relevant information to the subject throughout the study time. This was important in order to make sure that only articles that meet the criteria are used in drawing conclusion of the study.

Inclusion criteria

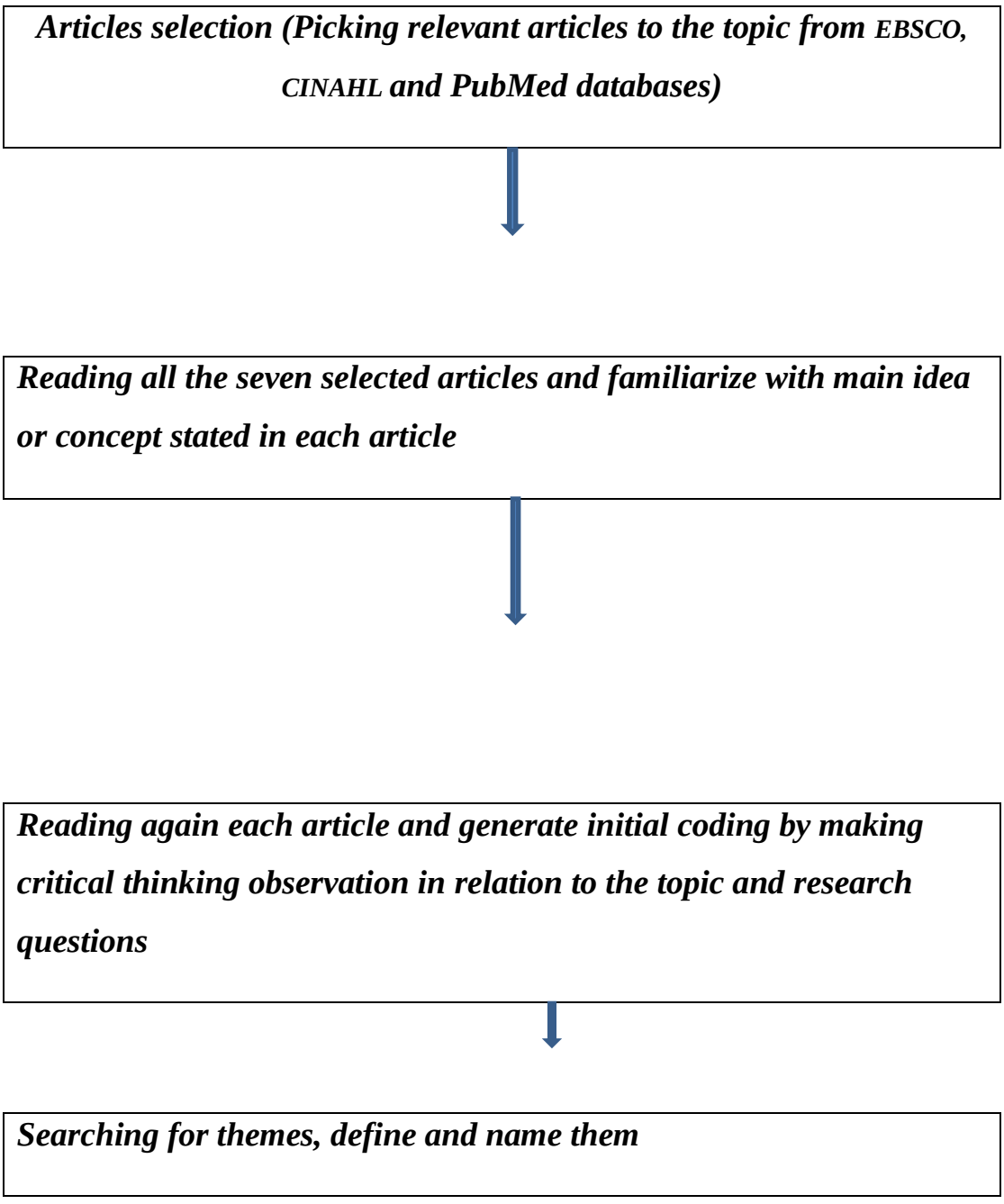
The inclusion criteria following in choosing articles in this study were following criteria as follow; The articles used in this research work were obtained from either academic database namely EBSCO, CINAHL or from PubMed database. To find the articles relevant to the topic the title of the topic and research question were taken into consideration and key words such as chronic diseases management care and mobile health (mHealth) and their synonyms were used. Retrieved articles were supposed to be published in English with free access to it or no price tag attached to it since the study was not sponsored. The preferred year of publication of chosen articles was from 2000 to 2019, this was important in order to ensure that update information on the subject considered in drawing conclusion of the study since the subject involves technology and innovation of technology in term of technological advancement is worth of consideration. However, articles containing concepts ideas articles published prior to year 2000 were also included whenever found to contain relevant information, however such articles were kept in check to limit occurrence of outdated concept in the review. Such room of flexibility in selection of articles was considered because of the dynamic nature of technology within mobile industry as a result twenty articles were considered for review of this study however only seven articles were used.

Exclusion criteria

In order to insure reliability of study outcome, setting specific parameters that ensure all articles used in reviewing process meet important criteria of inclusion therefore all article that did not meet one of the criteria were discarded as described below:
All articles from non- evidence sources or non- scientific material were excluded from the study. Articles that do not show full content of the work and those articles that are written in another language apart from English language were discarded. Also article

whose year of publication was below 1995 were discarded even if the concept stated seem to be convincing to avoid inclusion of outdated concept.

Table 2. Summary to show how the preparation of result was undertaken



Reviewing the defined themes in the relationship existing with the topic and research question

Report writing

5.3 Data analysis

Data analysis is systematic process of evaluating data using analytic (logical) technique or statistical tools or both with the purpose of discovering useful information. Data analysis is an important process of research study, it helps to ensure that the outcome of the research do not mislead readers neither do not distort scientific finding discovered earlier (Shepard, 2002).

There are several methods used to analyze data during research process. However, this research study used qualitative content analysis method as a means of analyzing data during the study.

According to Elo and Kyngäs (2008) qualitative content analysis is a tool to describe phenomena, learn to understand and identify different processes to build new knowledge bases. According to Polit and Beck (2012) qualitative content analysis is a method that involves breaking down data into smaller units, coding them and naming the units according to the content they represent as well as grouping coded material based on shared concepts. Qualitative content analysis seeks to provide knowledge and understanding of the phenomena which is being studied but also help researchers to understand the subject under investigation in a subjective and scientific manner through evaluation of content, investigation of recurrent themes of various research work, and weighing out the implacability of the subject being investigated. With the help of qualitative content analysis, researchers can see the details and uniqueness of

reoccurring themes within the range of phenomenon meaning rather than relying only on reoccurrence of concept or texts (Hsieh et al., 2005).

Qualitative content analysis can be conducted either inductively or deductively. Both inductive and deductive content analysis processes involve three main phases which are; preparation, organization and reporting of the results materials. The preparation phase involves gathering of suitable data for content analysis, interpretation of the collected data, and selecting the unit of analysis (Elo & Kyngäs, 2008). Though both inductive and deductive consist of similar phases as stated earlier, the two differ from each other, for instance in an inductive approach the organization of phase include open coding, creating categories and making abstraction while in deductive approach coding are closed since code or concepts are delivered before the analysis. Furthermore, deductive approach often aims on testing theory or testing existing concept while inductive approach concerned with generation of new theory or concepts(idea) from collected data (Elo & Kyngäs, 2008).

After consideration of the nature of the study and other factors surrounding the subject, inductive approach was chosen over deductive approach in this the study and since the study used inductive approach all concepts were delivered from previous study works an open coding system.

As stated earlier inductive process consist three main phases which are; preparation, organization and reporting. The preparation involves all process of choosing material for analysis whereby in this study the choosing of analysis material involved choice of articles which was done in accordance with parameter stated earlier. In this case the respondent chose the articles first, then he read the chosen articles several time to find meaningful units of information by distracting from original texts and analyze them to find central meaning. Then the analysis was of material was done by identifying meaningful unit of information from the chosen material and mark them which led to the next phase of organizing data.

Organization of data was done by dividing smaller unit of information formed from previous phase into different groups that have something in common called subcategories (subtheme). After that all subcategories with something in common were combined into larger categories (themes), thereafter analysis was done by following of results.

6. Result of the study

The following section describes main categories that were formed in this research study and how the results answer the research questions.
As stated earlier in the previous chapter qualitative content analysis was used to analyze the chosen articles. Eight articles were selected for this study. The chosen articles were read through several time to get the general idea in relation to the topic. Then existed similarities between the articles in relation to the aim of the study and study questions were pointed out and wrote in a separate paper. Statements representing various contents with similar meaning were formed as subcategories of the study whereby subcategories were only considered for the study if they happen to have at least two citations that back them from two different articles which were chosen for this study

6.1.1 Mobile health as means to empower people with chronic conditions

Empowering patients emerge as the main theme associated with the use of mobile health in patient with chronic diseases. The very concept has been stated repeatedly in almost all chosen articles, only with different words. Empowering patients means to provide patient with skills, environment and opportunity to participate in decisions and activities concerning their wellbeing. It may include tailoring education concerning various tools to assess their condition and recognize symptoms alarming danger in their body as the patients pass various stages in their diseases journey, may include procedure of providing road map of expected diseases progress, giving advice about where, when and to whom to seek help whenever unfamiliar symptoms appear, proving knowledge how to use their medication in a recommended manner and appropriate way or teaching patients copying techniques that will help patients to copy with their condition.
For example in a study conducted by Hamine, Gerth-Guyette, Faulx, Green and Ginsburg (2015) the authors state that “There is a clear recognition that mHealth tools have the potential to impact patients who are less inclined to engage in traditional health services”… mHealth offers a way to address barriers to care and to reduce health disparities (Hamine, S et al., 2015).

Lähdesmäki (2015) state that, engagement and activation of chronic disease patients are important in chronic diseases care", she continue by stating that, "one way to engage people with chronic diseases is to have patients monitoring their condition at home, which will also provide healthcare with new knowledge not currently available to them" (Lähdesmäki, 2015, 62 -68).
Therefore mHealth application contains the means and materials to empower patients who suffer from chronic diseases to move from being passive recipient of care and become active partner in the care process. The devices and ability to narrow the gap between patients and healthcare providers and make them connected, ability to alert by sending reminder, voice or alarms can make patient to remain in track. While education and motivation are the pillars of patient empowerment, mobile heath facilitate the above means by providing conducive environments to the patients to begin the move. For instance, presence of various application in mobile apps can help to monitor patient activities, can act as a tool to educate patients in more simplified form using pictograms, live picture, video and others means. This increase the chance of patients to take responsibility over their treatment and facilitate in habits changes in more efficient and engaging manner.

Mobile health devices improve services delivery and impact patient outcome. There is strong attachment between people have and mHealth devices such as mobile phones and other devices. The tendency to carry them everywhere, opens opportunities to the patients to be able to monitor closely symptoms associated with the disease facing them but also present to them opportunity of connecting patients with providers of health care in the manner that is easier, quicker and reliable. Lähdesmäki(2015) state that "Goals and plans are good starting point, but the execution of those plans needs continuations; continuous reinforcement and connectivity(Lähdesmäki, 2015, 34)."
Mobile health tools poses important features that play a key role in motivating, retaining connection and empowering patients in assessment of own wellbeing as well as taking responsibility in caring process something that is very important in patient with chronic diseases. The three core features integrated in the design of this technology have remain to be same as technology develop over time. This has allowed the existing techniques to adapt the change that come with technological innovation. The ability of mobile health to deliver material contents of education to

the patient in a personalized content, make it more appropriate tool worth of consideration in the care of chronic diseases care (Michael de Ridder at al., 2017).

However, the need for change is initiated either by patient herself or healthcare professional. The change will not be possible if there are some obvious problems like lack of time, gap between patients and healthcare providers, knowledge gap, difficult family situation and other problems (Lähdesmäki, 2015, 63). Therefore, empowering patients empowering patients by engaging them to be active partner and take more responsibility is important for their own benefit when dealing with diseases condition that last longer with the patients. The formal will benefit the patient physically, psychologically as well as socially but also will play part in revive the spiritual aspect to see that the patient is still have something to play even if is seeming to be small part.

6.1.2 Building bridge for behavior change

The progression of chronic diseases and the quality of life of a person living with chronic disease differ from one person to another. The factors underpin the presence of such difference include; the nature and type of the diseases itself, external factors as well as internal environment surrounding the person such as genetics make up of a person. Understanding knowledge of the diseases from patient point of view, level of motivation and willingness of the patient to live according to advices given by professionals, and the type of care received by a person have got great contribution to enable person to have quality life when having certain chronic disease . Although the above factors contribute to the outcome of diseases in term of progression, life expectancy and quality of life lived by a person with chronic disease, however change of behavior have big impact on the state of disease progression and quality of life. Lähdesmäki state that “the personal behaviors of people count for nearly half of the estimated determinant of early mortality” (Lähdesmäki, 2015, 24). Behavior changes is an important aspect in chronic disease prevention and chronic disease management. Behavior changes in this case refer to modification of lifestyle in term of habits such as eliminating bad habit like smoking, unhealthy eating habit and inactive behaviors().Lähdesmäki Aija state that, “Most people recognize which features of their behavior are unhealthy, however changing such behavior is often not easy”. She continues by stating that, “People who live alone are more likely to have unhealthy

lifestyle choices, she continues by stating that stressful situations at work, absence of conducive environment at home can make adopting to healthy lifestyle harder to the person." on the other hand negative emotions like depression, anxiety and hostility can influence person`s choices. Some researcher argues that personal behavior account for nearly half of the estimated determinants of early mortality. (Lähdesmäki, 2015, 23-25).

The formal indicates that changing of behavior is an important aspect to worthy of consideration in management of chronic diseases. Current studies are increasingly recognizing behavior changes as a crucial element of health and wellbeing of a person living with chronic condition. There are many researches works conducted in this area to find out the best way to influence behavior changes in person living with chronic disease or chronic condition. The outcome of such works has indicated that information tailored to the patient on single event such as doctor visitation and others or single health promotion are not effective enough to influence positive behavior changes rather information tailored to patient continuously throughout the entire disease course are the one likely to influence changes. To have positive impact on behavior changes, information should come from credible sources like professional people in the field or credible public figure either from direct speech of a person or via indirect platform such as film, brochures and any other form of testimonies in recorded or written form. In addition to that such information should take into consideration other component of a target person such as patient health condition, patient`s health literacy, age, culture and incorporate learning aids such as pictograms and other to facilitate understanding to the target person. (Lähdesmäki, 2015, Beratarrechea, Andrea et al., 2012, Michael de Ridder et al., 2017). Mobile health services (mHeath) have the ability to put patient and care providers in touch even when they are far apart from care institutions. According to research study done by Yi and his fellow it was found that, "Mobile Health encourage and facilitate behavior changes through advice and recommendation from medical experts and healthcare professionals as well as by providing reminders to improve medication or treatment adherence (Yi, Jae Yoon et al., 2018).This tendency strengthen education tie between the two parts which gives high possibility of information flow between the two parts which in turn does poses big chance to trigger behavioral changes and influence patient to adapt good health habits to incorporate lifestyle due to the fact that mHealth

establish good environment that provide health information direct to the patient or target group in various form such us audio, picture or pictograms, demonstration videos, or words and provides ability and set a direct communication link between patient and care providers and hence increases patient`s knowledge. Due to that reason mHealth if integrated in chronic diseases management activities poses big chance to influence patient´s attitude towards behavior change. Also, the fact that mobile health applications allow the patient to get right information when needed but also gives chance to the healthcare providers to get information concerning patients' health condition in term of diagnosis, treatments and symptoms increases the chance to address any divergence normal health as quicker as possible before the problem reach far and become difficult to reverse it. Furthermore also, the possibility that can be established by mobile health service for patients to communicate with care provider quicker irrespective of distance existing between the two parts can help to reduce discouragement, frustration and other and cause the patient to feel near to the care.

6.1.3 mHeath as to facilitate patient`s self-management

Patient's self-management is an important element in management of any chronic condition. Ability to facilitate self-management to the patients determine sustainability and effectiveness of the type of care suitable for management of chronic conditions.

Patient's self-management is defined as the ability of the individual in conjunction with family, community and healthcare professionals to manage symptoms, treatments, lifestyle changes and psychosocial, cultural and spiritual consequence of the health conditions (Schulman-Green, Dena et al., 2012). It includes varieties of tasks which a person with disease or chronic condition must engage such as; gaining understanding of the diseases or illness, learning problem solving skills, developing confidence in management of treatment regimens, changing or maintaining lifestyle activities, but also coping with emotional situation(Lorig&Holman, 2003, Bodenheimer et al., 2002).

Patient self-management often is not a phenomenon that exist on its own rather comes to existence through people via their influences under the presence of good relationship with the patients. Such influence can come directly or indirectly from

people such as healthcare providers, family members, friends, people who had been in similar situation or witness people who had pass under similar circumstance, but also can come from community. While physical contact through various activities can influence patient-self management, technology use such mobile health and others have impact on patient self-management directly but also indirectly. Although self-management alone is not the solution to solve the problem of chronic diseases or chronic illness however, does has significant role to play in the management of chronic condition.

Most patients with chronic diseases understand the importance of self-management however, statistics show that only few of them engage in self-care activities (Yi, Jae Yoon et al; 2018). This imply that more effort should be directed to motivate patients to engage in the process while technology platforms such as mHealth become an important partner to facilitate such move. Various researches finding have indicated that more patients with chronic condition show interest to use healthcare tools that are designed in accordance with their daily routines and habits (Hamine, S et al; 2015). Activity monitoring has potential to engage patients as advocates in their personalized care, as well as offer healthcare providers real world assessments of their patients' daily activities patterns (Chiauzzi et al., 2015). As more activity data is gathered in the context of disease progression and severity, the ability to use objectively captured data as early predictors of disease severity can have a profound impact in disease understanding and care delivery (Chiauzzi et al., 2015). The ability to measure activity through a variety of methods will enable patients with chronic condition to assume greater control in their healthcare (Chiauzzi et al., 2015). People with chronic condition find more motivation and strength to engage in activities concerning their wellbeing than using the tradition way of care. In addition to that, mHealth provide social support to the patient due to the reason that it can utilize data that are consistently tracked outside traditional healthcare setting and provide recommendation and consultation from health professionals within short time but also gives patients ability to monitor the progress of their condition and receive feedback quicker than in traditional methods. (Yi, Jae Yoon et al., 2018, Hamine, S et al., 2015).

For instance, in a study done in Korea by Yi and his colleagues to review to study the impact of mHealth integration in chronic diseases in relation to its influence on

patients self-management, it was found that more patients preferred to use mHealth service than traditional health practice due to the reason that mHealth services utilize data that are consistently tracked outside traditional healthcare setting and provide real time recommendations and consultations based on the information. Another reason was the fact that mHealth do not require high intensity neither high cost treatments in the reason that it reduces frequent visitation to healthcare professionals hence only it requires consistent consultation, check-up, and monitoring of patient health status activities that can be done at home by patient via mHealth applications. Other patients preferred it over traditional health practice due to its ability to include reminder alarms, ability to give platform for telephone counselling but also its uniqueness to provide personalized feedback based on input data concerning general disease information, behavior change regimens, and heath consultation. (Yi, Jae Yoon et al, 2018)

Although there is insufficient evidence to generalize the positive impact of mHealth intervention on facilitation of patient's self-management as indicated by some researcher in the articles. However, all articles in study accept the fact that mHealth have big impact in facilitation of patient self-management behavior, the insufficient of evidence in this case do not indicate the article oppose the formal rather it is the result of weak methodology used in the research process in those works since sample used in most of the study was smaller less than 100 but also the majority apply similar research design (randomized design method which can be source of error in case most data will come from similar age group .

Therefore, Mobile Heath (mHealth) applications has positive impact on patient self-management than tradition health practices.

6.1.4 mHeath as a means to facilitate adherence and compliance

Non-adherence and poor adherence to medications as well as noncompliance and poor compliance to professional advices, are another obstacle facing healthcare system among people living with long lasting diseases. The impact of patient's poor adherence and non-adherence affect patients and go beyond patients and affect community and the entire healthcare system (Hamine, S et al. 2015).

There are many factors that contributes to non-adherence and poor-adherence such as lack of resources needed either financially or socially, disability, lack of motivation or low confidence to medication or advices, but also can be outcome of changes taking place in patient`s body either physical, emotionally or psychologically which often lead s to anger, depression, confusion and denial of the patient (Hamine, S et al., 2015, Bousquet, J et al., 2017). Nurses, doctors and other healthcare providers have responsibility to determine the causes of non-adherence or poor adherence to each patient to be able to provide the type of care that will be useful to the patient as needed (WHO, 2003).). For instance, people with multiple condition, elderly people and psychiatric patients are at high risk with respect to poor adherence. Using of mHealth application services devices such as the use of mobile phone can affect patient compliance since mHealth devices contain variety of application that are capable of engaging patients in their intended program before the beginning of the program but also during the beginning of intended programs by sending reminder message, sound alarm or color blinking signs. Furthermore also under the presence of mHealth service people with chronic conditions can get in touch with healthcare provider faster and ask advice at any time to healthcare professional on the matter that he prefer to put more effort according to his preferences or on the matter that need more clarification. Therefore mHeath technology increase the posibility in people living with chronic diseases to abide on recomended programs, futhermore it decreases nonintentional incidence to miss planned programs.

6.1.5 mHeath and cost reduction

The cost of care and management of chronic diseases differ from one patient to another patient depending on different factors such as; the type of disease involved, stage of disease, age of the patient, health status, environment surrounding the patient, type of care used and other factors. Presence of chronic diseases imposes costs on patient, relative, community and country to sustain the care and management of the patients. The costs affect first the patient themselves and their families or societies but also affect the entire health care sectors countrywide and globally. Mobility, disability and mortality caused by chronic diseases cause unexpected situation in patient or society.

Though it is difficult to determine the impact of mobile technology implication in chronic disease caring in term of cost reduction numerically, several studies have been conducted on different areas to examine the effect of m-health technology on healthcare cost reduction. The outcome of these studies has indicated that mobile health technology is cost-effective in term of preventing disability, morbidity or premature death caused by chronic diseases (Rogers et al., 2011). For instance according to Ostojic (2005) in Asia it was found that m-health improves asthma control, found that SMS costs each patient 0.67 Euro and each physician 1 Euro per week while in another study done in china in Zhejiang University 2007 in patient with diabetes, it was found that SMS and telephone reminders improve appointment attendance rates and cause cost of care to drop and become 35% to 45% less expensive from original cost (Beratarrechea A et al., 2014). This imply that m-health technology when used effectively in appropriate manner in the care of chronic diseases can reduce cost of care by preventing condition that would happen to the patient when specific intervention delayed and result into deterioration of quality of life. Disability associated with failure of discovering of alarming symptoms in earlier stages, poor abiding of treatment plans, rapidly decrease of cognitive system and evolving of psychiatric associated condition such as, anxiety, depression is likely to decrease since people with chronic diseases or chronic condition will be participate both physically and mentally in the caring process of their health with the use of this devices which can assist in reducing of premature death.

6.2 Nursing consideration

The use of technology is one way to improve quality, efficiency and safety in healthcare delivery, however if not taken with care can introduce unforseen dangers and risks that can overpower the merits of using technology in caring. With regard to the formal nurses have to prepare to deal with some challenges that come with the use of mobile health (mHealth) technology in caring of chronic diseases. Below are suggestions that nurses should take into consideration in relation with the use of mHeath technology in chronic diseases caring activities

6.2.1 Non-maleficence

The issue of non-maleficence is very important in nursing activities and become very important whenever technology is used. Nurses have an obligation to avoid harming to the patient but also have obligation not to allow harm to happen to the patients because of negligence tendency or habits. When using mHealth technology in caring, nurses have an obligation to arrange face to face visitation to their clients to evaluate the progress of their clients on several occasions instead of relying only on technology. Furthermore also nurses have obligation to interprete the digital results into a reality and take action basing on patient`s situations.

6.2.2 Therapeutic relationship

Therapeutic relationship is an essential part of caring activities. Human therapeutic relationship should continue to be primary components of healthcare interaction in chronic condition care management under the help of mHealth technology whereby mHealth technology should not be used to replace nurse's fundamental objective role in caring, rather should be a mean to facilitate operational processes, interactions and working environment. Therefore nurses should remember to maintain therapeutic relationship with patients even in the use of mHeath technology.

6.2.3 Balancing autonomy and responsibility

Autonomy should come hand-in-hand with patient`s responsibility, nurses should attend to people with chronic diseases with a spirit of partnership approach knowing that autonomy to patients alone can never result in the best outcomes in term of improving health outcome in those people with chronic condition rather a balance between the two.

6.2.4 Confidentiality, patient`s privacy and data control

Even though mHeath contribute in supporting patient autonomy, however this area require careful consideration because data that are collected and processed by mHealth devices often contains also sensitive information and because of technology use in term of mHealth that data can be accessed easily by other parts because of the fact that stay in the devices for period of time whereby during that

time the possibility of getting in contact with another person increases but also data can be reproduced to other sources without even first and second parts being aware of the matter therefore data protection precaution measures should be laid out in advance.

7. Critical Review

The outcome of this research work is the result of reviewing evidence based scientific literatures from previous research works conducted through systematic review method as stated earlier. The respondent in this work was aware of the fact that trustworthiness ought to be present in his work from the beginning of the work to the end. In response to that the subject of the thesis was chosen first, then the research design was thoroughly carefully considered and selected to enable gathering of data that will be trustworthy. In addition, collected data were carefully handled without neglecting any evolving ideas during the progress, this was done in order to eliminate bias in the work. The respondent encountered the following problem during this work, first is the challenge of accessing recent articles of the subject that was only available upon subscriptions. The respondent felt that his work could had been much easier if he was permitted to access to such article, collected data from those articles could have make the understanding of some areas of his subject more understandable. Irrespective of the stated reason, the respondent still satisfied with the full utilization of the articles that were available hence he feels satisfied with the results of his work irrespective of that challenge.

Another area is the use of older publications. The respondent would have preferred to use the data from articles that are not more than five years due to the reason that technology advancement evolve faster. However, the respondent discover that a lot of relevant articles and journal had their bases on literatures that was conducted twenty years ago therefore he decides to include even older articles that have relevant information concerning the subject.

In order to address the issue of trustworthy of this work, validity, reliability, credibility and dependability were addressed, whereby these aspects were all kept in mind during the entire thesis process. For instance, in this work credibility and

dependability of the study were pursued through providing background and presenting the importance of the subject. The respondent describes clearly why the subject was worthy of consideration.

On the other hand, validity and reliability of the study was taken into consideration as well. Validity refer to the level in which the research method used has been able to achieve the aim of the study while reliability refers to the degree in which assessment tools produces stable and consistent results (Graneheim & Lundman, 2004). As stated earlier the aim of this study was to elicit knowledge and understanding of mobile health (mHealth) and its merits on chronic diseases care managements and provide answers to the research questions using information and knowledge from scientific based sources which imply the validity of the study. Similarly, in this study the reliability of the study lies on the fact that; the study results yield results that are the same or compatible with earlier research done the subject or within components that form the main subject of this study.

As a result; the respondent believe that this work has attained its ultimate aim due to the fact that it was able to achieve the aim of the study using scientific based sources whereby the data used to prepare the results was convincing since the respondent used enough sources that appropriate and convincing, also the respondent used 5 articles to analyses the data but also more study were used to validate them. In additional to the formal the interpretation presented in this study were more grounded and sufficiency.

8. Conclusion

The findings of this research work indicate that an effective chronic diseases care management is the one that meet well the need of its clients; physically, psychologically, emotionally, socially and spiritually. For that to happen the following three main characteristics should be part of the care managements; good communication channels between healthcare team and patient, presence of supporting environments that enhance patient`s self-management ability, but also presence of mechanism that monitor and assess patient's condition on regularly bases and give feedback of progress to both patients and healthcare professionals. The outcome of

this research suggests that lack of access to patients' information, absence of continuous communication between patients and healthcare providers, lack of coordination healthcare team members together with poor access of patient's information are the main contributing factors for poor caring services to people with chronic conditions. These factors can impact effectiveness of caring and affect the quality of life of patients with chronic diseases.

Mobile health (mHealth) technology stand as an opportunity with promises able to merge the gap across differences through the uniqueness of its features. It provides environments that addresses physical aspects of people with chronic diseases by increasing patient's independence in term of physical functioning capacity, it addresses physiological aspects of people with chronic diseases by empowering them, also it addresses social aspects by providing environments that make them to partner in their own care in a social context. Supporting patient's self-management ability, improving information flow between patients and health care, acting as a bridge in aiding patient's behavior change, acting as a mean of facilitating adherence to treatment, but also can act as a means to support patient's decision making when encountering various situation concerning their health status. Furthermore when used well reduces the burden of works in healthcare providers, improve communication among the main partners in caring process but also increase efficiency in management of chronic disease caring.

However in order to harness the benefits of this service, more efforts will be needed to be directed into design phases to find out a solution that integrate the features available so far into single application (apps) and modify the applications in the manner that will able to collect required data in more users friendly manner basing on user`s ages, cultures, health literacy level, sex but also in a manner that will be easily accessible to health care professionals without developing a tendency of relying too much on the services and make these services as a way of caring instead of using them as a tool to assist caring process. Furthermore, also healthcare professionals such as nurses using mHealth services need to revive their knowledge in relation to their own role in processing information, interpreting and noticing warning signs that comprehend what is likely to happen in various situations and be able to apply the use

of technology appropriately but also safely without losing human element associated with caring and replace with technology usage.

References

Hamine, S., Gerth-Guyette, E., Faulx, D., Green, B. B., & Ginsburg, A. S. (2015). Impact of mHealth chronic disease management on treatment adherence and patient outcomes: a systematic review. *Journal of medical Internet research*, *17*(2), e52.

Yi, J. Y., Kim, Y., Cho, Y. M., & Kim, H. (2018). Self-management of Chronic Conditions Using mHealth Interventions in Korea: A Systematic Review. *Healthcare informatics research*, *24*(3), 187–197. doi:10.4258/hir.2018.24.3.187

Rouleau G, Gagnon MP, Côté J, Payne-Gagnon J, Hudson E, Dubois CA. Impact of Information and Communication Technologies on Nursing Care: Results of an Overview of Systematic Reviews. *J Med Internet Res*. 2017 Apr 25;19(4):e122.

Schulman-Green D, Jaser S, Martin F, Alonzo A, Grey M, McCorkle R, Redeker NS, Reynolds N, Whittemore R.(2012). Processes of self-management in chronic illness. *Journal of nursing scholarship : an official publication of Sigma Theta Tau International Honor Society of Nursing*, *44*(2), 136–144

Michael Kourakos, Evangelos C.Fradelos, Ioanna V. Papathanasiou, Maria Saridi, Theodora Kafkia.(2018) Communication as the Basis of Care for Patients with Chronic Diseases. American Journal of Nursing Science. Special Issue: Nursing Education and Research.
Vol. 7, No. 3-1, 2017, pp. 7-12.

Sobnath DD, Philip N, Kayyali R, et al. Features of a Mobile Support App for Patients With Chronic Obstructive Pulmonary Disease: Literature Review and Current Applications. *JMIR Mhealth Uhealth. 2017;5(2):e17*. Published 2017 Feb 20. doi:10.2196/mhealth.4951

Voinov, B., Richie, W. D., & Bailey, R. K. (2013). Depression and chronic diseases: it is time for a synergistic mental health and primary care approach. *The primary care companion for CNS disorders*, *15*(2), PCC.12r01468.

Megari K. (2013). Quality of Life in Chronic Disease Patients. *Health psychology research*, *1*(3), e27. doi:10.4081/hpr. 2013.e27

Hudon C, Fortin M, Haggerty J, Loignon C, Lambert M, Poitras ME. Patient-centered care in chronic disease management: a thematic analysis of the literature in family medicine. Patient Education and Counseling. 2012;88(2):170-6.

Viswanathan M, Golin CE, Jones CD, Ashok M, Blalock SJ, Wines RC, Coker-Schwimmer EJ, Rosen DL, Sista P, Lohr KN. Interventions to improve adherence to self-administered medications for chronic diseases in the United States: a systematic review. Ann Intern Med. 2012 Dec 4;157(11):785–95.

Leonard BE. The concept of depression as a dysfunction of the immune system. *Curr Immunol Rev*. 2010;6(3):205-212.

Nunes V, Neilson J, O'Flynn N, Calvert N, Kuntze S, Smithson H, Benson J, Blair J, Bowser A, Clyne W, Crome P, Haddad P, Hemingway S, Horne R, Johnson S, Kelly S, Packham B, Patel M, Steel J (2009). Clinical Guidelines and Evidence Review for Medicines Adherence: involving patients in decisions about prescribed medicines and supporting adherence. London: National Collaborating Centre for Primary Care and Royal College of General Practitioners.

Katon W, Lin EH, Kroenke K. The association of depression and anxiety with medical symptom burden in patients with chronic medical illness. *Gen Hosp Psychiatry* 2007; 29: 147-155.

P.F.M. Verhaak, M.J.W.M. Heijmans, L. Peters, M. Rijken. Chronic diseases and mental disorder. Social Science & Medicine: jrg. 60, 2005, nr. 4, p. 789-797

Moussavi S, Chatterji E, Verdes A, et al. Depression, chronic disease and decrements in health: results from WHO surveys. Lancet. 2007; 370:851–858

Fernandez-Mendoza J, Vgontzas AN. Insomnia and its impact on physical and mental health. *Curr Psychiatry Rep*. 2013;15(12):418.

Ratzan SC, Parker RM. 2000. Introduction. In: *National Library of Medicine Current Bibliographies in Medicine: Health Literacy*. Selden CR, editor; , Zorn M, editor; , Ratzan SC, editor; , Parker RM, editor. , Editors. NLM Pub. No. CBM 2000-1. Bethesda, MD: National Institutes of Health, U.S. Department of Health and Human Services.

Maes, M., Bosmans, E., Meltzer, H. Y., Scharpe, S., & Suy, E., (1993). Psychiatric disorders and immune activity. *Advances: The Journal of Mind-Body Health, 10,* 49-52.

Emil Chiauzzi, Carlos Rodarte, Pronabesh DasMahapatra. "Patient-Centered Activity Monitoring in the Self-Management of Chronic Health Conditions." *BMC Medicine, 2015, 13:77.*
(Chiauzzi et al., 2015)

Lee MS, Shin JS, Lee J, et al. The association between mental health, chronic disease and sleep duration in Koreans: a cross-sectional study. BMC Public Health. 2015; 15:1200. Published 2015 Dec 1. doi:10.1186/s12889-015-2542-3

Moro-García, M. A., Alonso-Arias, R., López-Vázquez, A., Suárez-García, F. M., Solano-Jaurrieta, J. J., Baltar, J., & López-Larrea, C. (2012). Relationship between functional ability in older people, immune system status, and intensity of response to CMV. Age (Dordrecht, Netherlands), 34(2), 479–495.

Ciler Erdag G. Health literacy as basic determinant of health (Sagligin temel belirleyicisi olarak saglikokuryazarligi). Yildirim F, Keser A (Editors). HealthLiteracy (Saglik okuryazarligi). Ankara University Press,Ankara, 2015.

Bodenheimer, T., MacGregor, K., & Stothart, N. (2005). Nurses as leaders in chronic care. *BMJ (Clinical research ed.), 330*(7492), 612–613. doi:10.1136/bmj.330.7492.612

Webb, T. L., Joseph, J., Yardley, L. & Michie, S. 2010. Using the Internet to Promote Health Behavior Change: A Systematic Review and Meta-äanalysis of the Impact of Theoretical Basis, Use of Behavior Change Techniques, and Mode of Delivery on Efficacy. Journal of Medical Internet Research, 12 (1)

Forchuk, C., Westwell, J., Martin, M., Bamber Azzapardi, W., Kosterewa-Tolman, D. & Hux, M. (2000). The developing nurse-client relationship: Nurses' perspectives. Nurse Scientist, 6(1), 3-10.

Cassileth BR, Lusk E, Strouse TB, et al. Psychosocial status in chronic illness. N Engl J Med 1984; 311:506-511

Turner, J., & Kelly, B. (2000). Emotional dimensions of chronic disease. *The Western journal of medicine*, *172*(2), 124–128.

Vliet Vlieland TP; 2002. Managing chronic disease: evidence-based medicine or patient centered medicine? Health Care Anal, 2002; 10(3):289-98.

Yokota, R. T., Berger, N., Nusselder, W. J., Robine, J. M., Tafforeau, J., Deboosere, P., & Van Oyen, H. (2015). Contribution of chronic diseases to the disability burden in a population 15 years and older, Belgium, 1997-2008. *BMC public health*, *15*, 229. doi:10.1186/s12889-015-1574-z

Baanders, Arianne N; Heijmans, Monique J. W. M; 2007. The Impact of Chronic Diseases: The Partner's Perspective. *Family & Community Health: October-December 2007 - Volume 30 - Issue 4 - p 305–317*

Bernell, S., & Howard, S. W. (2016). Use Your Words Carefully: What Is a Chronic Disease?. *Frontiers in public health*, *4*, 159. doi:10.3389/fpubh.2016.00159

World Health Organization 2002, Innovative care for chronic conditions: building blocks for action: global report, p 11.

World Health Organization, 2011.Global Observatory for eHealth series - Volume 3.World Health Assembly. Geneva Switzerland, 2011

Ezzati M, Lopez A. D, Rodgers A, Murray C. J. L. Geneva: World Health Organization; 2005. Comparative quantification of health risks: global and regional burden of diseases attributable to selected major risk factors.

Esther P.W.A. Talboom-Kamp; Noortje A. Verdijk; Marise J. Kasteleyn; Mattijs E. Numans; Niels H. Chavannes;2018. From chronic disease management to person-centered eHealth; a review on the necessity for blended care. Clinical eHealth, ISSN: 2588-9141, Vol: 1, Issue: 1, Page: 3-7

Wagner EH: Chronic disease management: what will it take to improve care for chronic illness? Eff. Clin. Pract. 1(1), 2–4 (1998).

Wagner EH, Austin BT, Davis C, Hindmarsh M, Schaefer J, Bonomi A: Improving chronic illness care – translating evidence into action.Health Aff. (Millwood) 20(6), 64–78 (2001).

Wagner EH**.** Managed care and chronic illness: health services research needs. Health Serv Res. 1997; 32:702-14.

Bodenheimer, T., Wagner, E. H.& Grumbach, K. 2002. Improving primary care for patients with chronic illness. The Chronic Care Model, part 2. JAMA, 288 (15), 1909-1914.

Colter, A.,Entwistle. V. A., Eccles, A, Ryan, S., Shepperd, S. & Perera, R. 2015. Personalisedcare planning for adults with chronic or long-termhealth conditions. Cochrane Database of Systematic Reviews, Issue 3, 1-131

Rogers-Dillon, R.H. (2005). Hierarchical qualitative research teams: Refining the methodology. Qualitative Research, 5, 437–454.

Aromataris, E., & Pearson, A. (2014). The systematic review: an overview. AJN The American Journal of Nursing, 114(3), 53–58.

Shepard, R.J. (2002). Ethics in exercise science research. Sports Med, 32 (3): 169-183.

Elo, S. & Kyngäs, H.2008.The qualitative content analysis process,found in: Journal of advanced Nursing, 62(1), 107–115

Hsieh, H.-F., & Shannon, S.E. (2005) Three approaches to qualitative content analysis. Qualitative Health Research, 15(9), 1277-1288.

Owens J, Cribb A . 'My Fitbit Thinks I Can Do Better!' do health promoting wearable technologies support personal autonomy? *Philos Technol* 2017*;* 74.doi*:10.1007/s13347-017-0266-2*

McWay, Dana. (2010). Legal and Ethical Aspects of Health Information, Third Edition. New York: Cengage Learning. Chapter 9

Beratarrechea, A., Lee, A. G., Willner, J. M., Jahangir, E., Ciapponi, A., & Rubinstein, A. (2014). The impact of mobile health interventions on chronic disease outcomes in developing countries: a systematic review. *Telemedicine journal and e-health: the official journal of the American Telemedicine Association*, *20*(1)

Bousquet, J., Arnavielhe, S., Bedbrook, A., Bewick, M., Laune, D., Mathieu-Dupas, E., … MASK study group (2018). MASK 2017: ARIA digitally-enabled, integrated, person-centred care for rhinitis and asthma multimorbidity using real-world-evidence. *Clinical and translational allergy*, *8*, 45. doi:10.1186/s13601-018-0227-6

Hamine S, Gerth-Guyette E, Faulx D, Green BB, Ginsburg AS. Impact of mHealth chronic disease management on treatment adherence and patient outcomes: a systematic review. *J Med Internet Res*. 2015;17(2):e52. Published 2015 Feb 24. doi:10.2196/jmir.3951

Pereira K, Phillips B, Johnson C, Vorderstrasse A (2015) Diabetes technology and therapeutics 17: 55-63.

Kerr C, Murray E, Morris R, Bottomley C, Stevenson F, et al. (2010) The potential of web-based interventions for heart disease self-management: a mixed methods investigation. *JMIR* 12: e56.

Mosa ASM, Yoo I, Sheets L (2012) A systematic review of healthcare applications for smartphones. *BMC Med Inform Decis Mak* 12: 1.

Rogers A, Kirk S, Gately, CM, CR Finch (2011) Established users and the making of tele-care work in long term condition management: implications for health policy. *Soc Sci Med* 72: 1077-1084.

Magnezi R, Grosberg D, Novikov I, Ziv A, Shani M (2015) Characteristics of patients seeking health information online via social health networks versus general Internet sites: A comparative study. *Inform Heal Soc Care* 40: 125-138.

Church K, De Oliveira R (2013) What's up with whatsapp?: comparing mobile instant messaging behaviors with traditional SMS. *In Proceedings of the 15th international conference on Human-computer interaction with mobile devices and services*: Pp: 352-361.

Kruse, C. S., Smith, B., Vanderlinden, H., & Nealand, A. (2017). Security Techniques for the Electronic Health Records. *Journal of medical systems*, *41*(8), 127.

Chatzimarkakis J. (2010). Why patients should be more empowered: a European perspective on lessons learned in the management of diabetes. *Journal of diabetes science and technology*, *4*(6), 1570–1573.

McAllister, M., Dunn, G., Payne, K., Davies, L., & Todd, C. (2012). Patient empowerment: the need to consider it as a measurable patient-reported outcome for chronic conditions. *BMC health services research*, *12*, 157.

Kate R. Lorig, Halsted R. Holman. (2003) Self-management education: History, definition, outcomes, and mechanisms, *Annals of Behavioral Medicine*, Volume 26, Issue 1, August 2003, Pages 1–7.

Tinetti, M., Bogardus, S. and Agostini, J. (2004) Potential pitfalls of disease-specific guide-lines for patients with multiple conditions, N Engl J Med, 351: 2870–4.

WHO (2003) Adherence to Long-Term Therapies. Evidence for Action. Geneva: World HealthOrganization.WHO (2002)

Bodenheimer T, Lorig K, Holman H, Grumbach K.(2002) Patient Self-management of Chronic Disease in Primary Care. *JAMA.* 2002; 288(19):2469–2475.

Graneheim, U.H &Lundman, B. (2004) Qualitative content analysis in nursing research: concepts, procedures and measures to achieve trustworthiness. Nurse Education Today (24) 105–112.

Grumbach, Kevin. "Chronic illness, comorbidities, and the need for medical generalism." *Annals of family medicine* vol. 1,1 (2003): 4-7. doi:10.1370/afm.47

Turner, J., & Kelly, B. (2000). Emotional dimensions of chronic disease. *The Western journal of medicine*, *172*(2), 124–128.

Bernell, Stephanie, and Steven W Howard. "Use Your Words Carefully: What Is a Chronic Disease?" *Frontiers in public health* vol. 4 159. 2 Aug. 2016, doi:10 3389/fpubh.2016 00159

Tecmark (2014) Smartphone Usage statistic 2014- UK survey of smartphone users

Appendix 1. Summary of the selected articles

Author(s)	year	Article title	Description of the article
Aija Lähdesmäki	2015	Mobile application for chronic disease self-management: building bridge for behavior change	The articles investigate how mobile applications in chronic diseases can assist in changing patient behavior.
Hamine, S., Gerth-Guyette, E., Faulx, D., Green, B. B., & Ginsburg, A. S.	2015	Impact of mHealth chronic disease management on treatment adherence and patient outcomes: a systematic review.	The article aims on discovering the impact of mHealth on treatment adherence in relation to patient outcome following its implication
Beratarrechea, A., Lee, A. G., Willner, J. M., Jahangir, E., Ciapponi, A., & Rubinstein, A	2014	The impact of mobile health interventions on chronic disease outcomes in developing countries: a systematic review	Researchers in this article the impact of mobile health intervention on chronic diseases outcome in general
Rogers A, Kirk S, Gately, CM, CR Finch	2011	Established users and the making of tele-care work in long term condition management: implications for health policy	The article investigates the impact of integration of tele-care on management of long-term condition focusing on social aspect
Yi, J. Y., Kim, Y., Cho, Y. M., & Kim, H.	2018	Self-management of Chronic Conditions Using mHealth Interventions in Korea: A Systematic Review.	The article reviews the effectiveness of mHealth applications in facilitating self-management to patients

			with chronic conditions in Korea.
Sobnath, D. D., Philip, N., Kayyali, R., Nabhani-Gebara, S., Pierscionek, B., Vaes, A. W., Kaimakamis, E.	2017	Features of a Mobile Support App for Patients with Chronic Obstructive Pulmonary Disease: Literature Review and Current Applications	The article reviews the current status of mobile support App in patients with Chronic Obstructive Pulmonary Disease
Emil Chiauzzi, Carlos Rodarte, Pronabesh DasMahapatra.	2015	Patient-Centered Activity Monitoring in the Self-Management of Chronic Health Conditions.	The article investigates the impact of activity tracking and personal data collection using monitoring wearable devices and its potential in patient's self-management in patients with chronic health condition.