LAPIN AMK

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BENEFITS OF TECHNOLOGY FOR NURSES AND RESIDENTS IN A NURSING HOME

A Descriptive Literature Review

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It is important to obtain information on the benefits that nurses, and residents can get from the use of technologies because technologies are getting more value and importance nowadays. Hence, the purpose is to identify the benefits that nurses, and residents get from technology in nursing home.

Descriptive literature review has been selected for this research. All together 7 articles and academic journals were selected for the detail findings of this study. Search engines like CINAHL EBSCO host, science direct and international e-search were used, and they are valid databases of Lapin amk.

Both residents and nurses are equally getting benefits from technologies. Benefits for residents includes safety, security, therapy, rehabilitation, prevention from fall, sleep management, time, and cost effectiveness. Whereas benefits for nurses includes reduction of burden, enhancement in performance, medicine management, effective communication, and helpfulness in educational purposes.

In this study, it has been observed that the technology is considered to be an important factor which affects the outcomes of care, satisfaction of residents and nurses as well as nurses performance.

Keywords like technology, nursing home, benefits, residents, caregivers, and nurses were used.

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1. INTRODUCTION

All the equipment which are connected to patients after the admission in any healthcare settings are technologies and it goes hand by hand with nursing profession (Doucette, et al. 2019).

Technologies refer to the systems, methods and the devices which are outcome of scientific knowledge being used for the practical purposes. All kind of technology provides nurses with different kinds of tools to improve and enable nurse-patient relationship. Even though they have given a lot of benefits for the nurses and patients on the same time they come up with some drawbacks and all the technologies are not 100% accurate. Additionally, technology can support and empower the patient, helping them to take control over their condition and enable the nurses who support them. A lot of barriers such as distance, time and language are being broken down due to the advancement of technology. (Dewsbury, 2019.)

The delivery of health care services is changing with time, and it seems to have some challenges due to increasing ageing population. Thus, the need of new technologies and care models have been greater. The use of technologies to transform the healthcare services are truly exciting and using mobile technologies to fasten the care in home and supporting patient choices via the timely provision of high-quality information seems like technologies have already occupied more space in this world. (Hamer 2012.)

The purpose of this thesis is to identify the benefits that nurses, and residents get from technology in nursing home. Likewise, the aim of this thesis is to determine the importance of technology in nursing profession and encourage nurses to utilize more technology in elderly care settings.

2. PURPOSE, AIM AND RESEARCH QUESTIONS

Purpose

    i.   The purpose of this thesis is to identify the benefits that nurses, and residents get from technology in nursing home.

Aim

    i.   The aim of this thesis is to determine the importance of technology in nursing profession and encourage nurses to utilize more technology in elderly care settings.

Research questions

    i.   What benefits do residents get from technology in nursing home?

    ii.   What benefits do nurses get from technology in nursing home?

3. THE MAIN CONCEPTS OF TECHNOLOGY AND NURSING HOME

3.1 Technology

Technology in general term is methods, techniques and processes that can be used to provide and get service to accomplish the objectives. Technology needs the input, and it gives the expected outcomes. There are nine elements of the technology, and they are digital access, digital commerce, digital communication, digital literacy, digital etiquette, digital law, digital right and responsibilities, digital health and wellness, and digital security. Digital access means electronically full participation in the society. Digital commence means buying and selling of goods and services through online or internet. Exchange of information through digital media or social media falls under communication element of technology. Digital etiquette includes the standards of conduct expected by other digital technology users. Technology has its own right and restriction so digital law takes care of it. All the technology has its own rights and responsibilities that governs them in any process. Hence, ethics are well maintained with digital right and responsibility element. Likewise, Privileges and freedom of technology and expected behavioral that also comes under it. The Digital health and wellbeing include the element of physical and psychological wellbeing related to use of technology. Finally, precautions that everyone who are using technology must take and follow is digital security element. It is very important aspect as it helps to maintain privacy and it also guarantee the personal safety and security of their network. (Yousef, 2009.)

Understanding Organizational and cultural premises for quality of care in nursing homes state that quality of care can be divided into two aspects: technical care and interpersonal care. Technical care can be defined as use of science and technological aspects to manage the health problems. Technical care quality extends the care provision and maximizes the health benefits without increasing risk. (Sigrid, 2015.) In this thesis, technology means all the sources and processes that can be used in the nurse-patient relationship which helps to maintain good quality of life of patient and makes the work of nurses convenient.

3.2 Nursing Home

Nursing home is the care facility where residents get proper nursing services. Mainly in the western societies, nursing home is getting more and more importance and it has played significant role in maintaining good care of elderly population. In Norway and other European countries, elderly care is recognized as the public responsibility. (Sigrid, 2015.)

Nursing home can be categorized into three categories based on the services they provide. They are intermediate care facilities, skilled nursing facilities, and skilled nursing facilities for special disabilities. In this kind of facilities, patients who are mobile and need less care are given services. ICF provide very basic service but medical, pharmaceutical and dietary services are available. According to author, intermediate care facilities must provide their service at least 8 hours per day. The Skilled Nursing Facility (SNF) is what we generally call nursing home because it provides 24-hour nursing supervision. Usually, those who are incapacitated, and need short- or long-term nursing care are likely to stay in skilled nursing home facility. Residents of skilled nursing facilities are mainly elderly people who may need assistance in daily activities. Some basic assistance that residents get in SNF include assistance in feeding, bathing, dressing, maintaining good hygiene, medication and walking. Likewise, skilled nursing facilities for special disabilities provides exactly the same facilities as SNF but for disable people who could have either physical disabilities or mental. Residents here could be of any age group (from adults to elders). In skilled nursing facilities for special disabilities, residents get the nursing services and care based on the illness they have. Facilities may be somehow different but the aim of all the facilities is same which is to provide best care based on the need of residents, maintaining good hygiene, improve their physical and mental condition with therapy and rehabilitation. All the facilities who are functioning to provide care need to be licensed from the state and they are monitored by inspector of health department of state to complying with state standards for care and services. (Wesley, 2019.)

4. TECHNOLOGY IN NURSING CARE

4.1 Ambient Assistive Living (AAL) technologies

No other disease is increasing at the speed of dementia. The total population affected by dementia calculated on year 2010 was 36 million and it has been estimated to double (66 million) until 2030 (Wortmann 2013).   Thus, this population have difficulties in their Activities of Daily Living (ADLs) and they need more supervision and assistance from caregivers or nurses. Hence, the research conducted in Singapore with dementia patients and nurses in nursing home concluded that Ambient Assistive Living (AAL) technologies play significant role in the quality care and to reduce stress of elderly care nurses. (Aloulou et al. 2013.)

AAL consists of different technologies like sensors, actuators, interaction devices – embedded in the living space of the patients to monitor and react to his contextual needs by providing computerized assistive services. These technologies are mainly targeted to improve the efficacy and efficiency of healthcare providers, improve therapy and rehabilitation, and enhance prevention and care. Remote monitoring can be used for mobility measurement and to estimate disturbance in motor activity of the residents in nursing home which helps to reduce the risk of accidents. Some audio and video tracking systems can be used to analyze their activities. Researchers also argue that ethical rights such as privacy, of the patients also should be taken into due consideration. Research Network Ageing Research Group (NAR) Germany expressed that acceptance to these technologies by dementia patients was low in initial phase and more likely to increase the acceptance with the increase of more dementia symptoms. (Aloulou et al. 2013.)

4.2 Information Communication Technology (ICT)

ICT stands for Information Communication technology. Along with the advancement in technology, the nursing care system has been completely changed. Technologies has drastically modified the nursing care delivery process as it has almost eradicated the face to face nursing care system with remote nursing care. These days nursing care is being

given over the technologies such as smart phones, and mobile applications. With this technology, one nurse can take care of larger population at once from distance. This also helps in the prevention of cross contamination and infections. Communication via technologies between nurse and patient seems to be fast, easy, and convenient. It also plays roles in the financial management for both nurses and patients. Also, ICT helps to saves the time. Medicines are being prescribed through technologies and nurse can easily suggest the methods of medicine intake through the technologies. Here is the attachment of picture which shows the changing ratio of face to face interaction toward e-health and e-medicine and what those ICT are in use. (While & Dewsbury, 2011.)

ICT has been shown in figure 1 and figure 2.

ICT systems	Applications	Frequently used terms across ICT system applications
Telephone	Landline	Telephone triage, telecare, telehealth, telemonitoring, telemedicine, health portals, mHealth, Apps, personal digital assistants (PDAs), Smartphone.
internet	Computer-based	
Satellite television	Television-based	
Mobile ICT	Mobile devices	

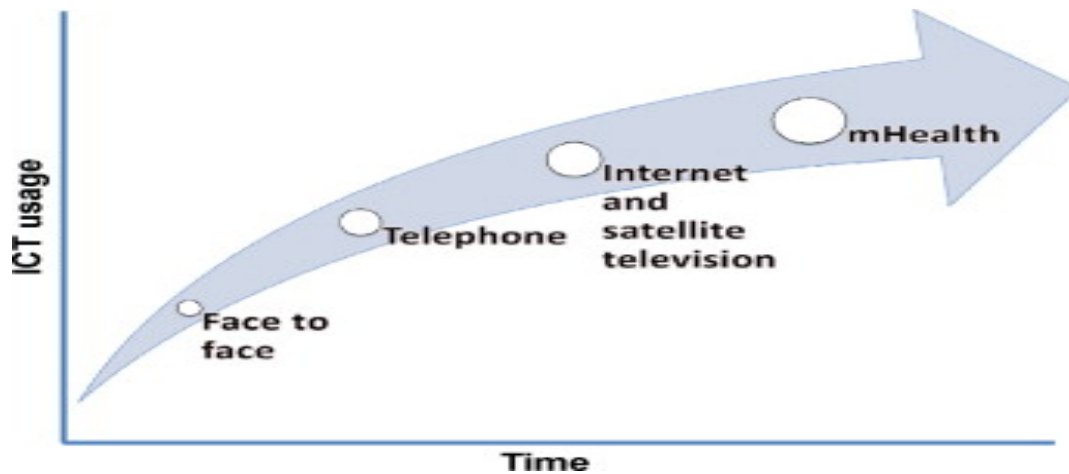Figure 1. Detailed ICT (While & Dewsbury, 2011).

Figure 2. ICT usage with change in time (While & Dewsbury, 2011).

The World Health Organization defines telehealth as the delivery of health care services where patients and health care providers are separated by distance. Telehealth or telemedicine is connected with ICT for exchange of information for the diagnosis, and treatment of diseases and injuries, research, and evaluation, and for the continuing education of health professionals. Telehealth contributes for achieving universal health coverage by improving assess for patients to quality, cost-effective, health services wherever they are. It is particularly important for those in remote areas, vulnerable groups, and ageing population. It can sufficiently benefit the health care professionals and clients from all perspectives. Because of ICT, e-health is getting popular. E-health is the process or system where patient actively participate from distance during diagnosis and treatment process using ICT technologies. (WHO 2016.)

4.2 Electronic Health Record (EHR)

Electronic Health record has almost changed the paper documentation into online or digital documentation. Digitalization in nursing can be defined as process of making nursing care easier, faster and convenient with the use of digital media. ICT, e-health, telemedicine, telehealth, and electronic health records are some examples of nursing digitalization. Therefore, in the world of technology, electronic health records have been considered as greatest achievement done by mankind. It helps the nurses to access and get a clear picture of the patient easily in a reliable manner. The current electronic health records help to provide international standards for interoperable applications that use

social, health, behavioral, economic, and environmental data to communicate, interpret and act genuinely upon healthcare information to foster precision medicine and a learning health system. (Evans 2016, 48-61.)

Finland has got the Kanta digital service which records all the health-related information. It includes prescription service which include latest prescription and expired prescription. Kanta is also pharmaceutical database where all necessary information about medicine can be found of patient. It also works as Patient Data Repository that helps to view the patients data and plays vital role in information sharing between healthcare service providers. Finally, Client data archive for social welfare service and sharing of medical certificates, etc. are also functions of it. Kanta stated that the information of patient's data is processed in reliable and safe manner. (Kanta, 2019.)

5. METHODS OF IMPLEMENTATION

5.1 Literature review

A literature review is simply a review article. The literature review surveys mainly article, books, and other sources also which are relevant to particular area of research. The literature review should enumerate, describe, summarize, and specially evaluate and clarify the previous research. Hence, literature review are the secondary sources and do not report the new and or original experimental work. (Coffta, M., 2010.) Also, this thesis is going to be the historical review which examines the concept over time (in this thesis sources published after 2010 has been reviewed and analyzed).

There are usually five common steps in writing the literature review. Step one is to decide the area of research, research question, aim and purpose. Step two is to search literature which can be academic journal, article, books, and other sources. Third step is to find relevant excerpts in the books and articles where we look at 5 major points (conclusion, findings, definition of terms, relevancy, and disagreement about the construct that we are investigating). Step four is to code everything with sub-categories, generic categories, and main category. And finally, after coding writing literature review begins with appropriate findings. (Golash, 2015.)

5.2 Data Collection

For this research, different databases were used in order to answer the research question. Finally, 7 research related to the topic were selected for the findings. Importantly, databases which were reliable and allowed by Lapin Amk were used. Those databases were: ScienceDirect, EBSCO, ProQuest, and International e-material search. If only abstract was available in those databases so in that case data were then collected from google scholar as it gave full access to the articles.   Following search words were used in order to collect the actual data: Technology in nursing home, Technology in Nursing Profession, Roles of Technology in Nursing homes, Staffs and Residents, Communication and Technology, Long-term care facilities, etc. Finally, articles answering the question about benefits of technology for nurses and residents were noted down in this thesis. Different factors were considered during selection process of articles or journals for this thesis, and they are enlisted below in figure 1.

Topic	Things to be in article or sources
Relation	Article should be related to the topic
Trustable	Source should come from trustable resources and databases.
Assessable	Source should be easily assessed with the link with the license from Lapin amk.
Language	Article should be either in Finnish or English.
Year	Article published after 2010 will be taken into this thesis.
Connection	Sources should be connected to the nursing and technological field.

Table 1. Article selection criteria for the thesis.

5.3 Data analysis

Analysis of data is the most skilled task in the research process. Analysis means the critical examination of assembled and grouped data for studying the characteristics of subject and for determining the patterns of relationship among the variables relating to it (Krishnaswami & Satyaprasad 2010).   In this thesis, an inductive approach has been used. The main differences between inductive and deductive approaches to research is that a deductive approach is concerned with developing a hypothesis based on existing theory while an inductive approach is related with generation of new theory emerging from the data and usually use research questions to narrow down the scope of the study. (Deborah, 2013.)

In the time of "big data" methodological technique of content analysis can be the most powerful tool in the research. Content analysis is versatile enough to apply to textual, visual, and audio data so content analysis has been used as an analysis method in this thesis (Stemler, S.E, 2015). Content analysis starts with the selecting the content to be analyzed. In this first phase, the medium (audio recording, video interview, articles newspaper, etc.) of the data should be decided and content should be related to the research questions where the core value and meaning of the thesis question should be included. In this thesis, the medium for content analysis were academic journals and researched articles from different trustable databases. Secondly, sub-categories were formed based on original expressions from reviewed articles which answered the research question. Likewise, many sub-categories having almost common logic and meaning were grouped as one generic category. Finally, all the generic categories were connected to one main category. (Erlandson & Brysiewicz, 2017.)

This analysis result has been illustrated below in table 2.

Sub-Category	Generic category	Main category
Technology helps in detection and prevention of fall. Technologies reduces the risks and supports the safety of people with dementia.	Technology enhances safety and security for people with dementia.	Benefits of technology for residents in nursing home.
Technology supports in management of sleeping patterns. Technology reduces anxiety and improves quality of life of people with dementia. Satisfaction and requesting right to the patient through technology.	Technology enhances sleep management, and satisfaction.	
Technology is time effective. Technology saves cost.	Technology is time and cost effective.	

Technology improves care, therapy, and rehabilitation. Technology reduces anxiety and improves quality of life of people with dementia. Technology reduces the workload and burden of nurses. Technology makes the care provider efficient and helps to improves their performance	Technology enhances quality of life, care, and rehabilitation. Technology improves the nurses performance and reduces their burden.	
Technology helps in accurate assessment and to trace the residents motor activities and emotions. Quality of care and outcomes of care can be evaluated with the presence of technologies.	Technologies helps to evaluate and assess the care needed.	Benefits of technology for nurses in nursing home.

Technology improves healthcare setting and work coordination		
Technology makes the communication easier and effective. Technology helps nurses to handle medicine properly.	Technology helps in medicine management and effective communication.	
Technology as written and recorded proof. Technology can be used clinical setting for educational and research purposes.	Technology works as evidence and it can also be used for educational purpose.	

Table 2. Data analysis phases for residents that nurses get from technologies in nursing home.

Table 2 explained shortly about the benefits that nurses and residents can get from technologies and same benefits has been expressed with all details in findings part.

6 FINDINGS

The main purpose of this study was to overview the benefits that nurses, and residents gets from technology in nursing home. Finally, this thesis came up with two main category and four generic categories and they are illustrated below:
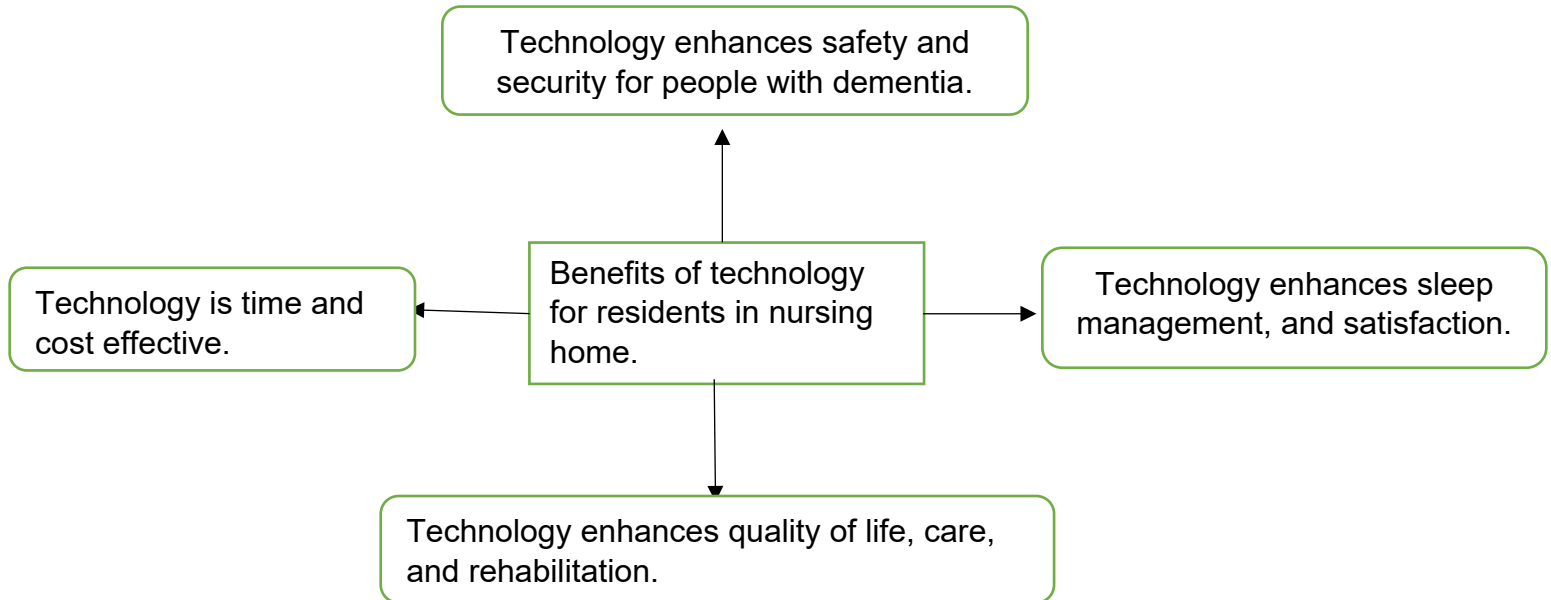
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                    ┌─────────────────────────────┐
                    │  Technology enhances safety  │
                    │  and security for people     │
                    │  with dementia.              │
                    └─────────────────────────────┘
                                  ▲
                                  │
┌──────────────────┐   ┌──────────────────┐   ┌──────────────────────┐
│ Technology is    │◄──│ Benefits of      │──►│ Technology enhances  │
│ time and cost    │   │ technology for   │   │ sleep management,    │
│ effective.       │   │ residents in     │   │ and satisfaction.    │
└──────────────────┘   │ nursing home.    │   └──────────────────────┘
                       └──────────────────┘
                                  │
                                  ▼
                    ┌─────────────────────────────┐
                    │ Technology enhances quality  │
                    │ of life, care, and           │
                    │ rehabilitation.              │
                    └─────────────────────────────┘
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Figure 3. Benefits of technology for residents in nursing home.

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                    ┌─────────────────────────────┐
                    │ Technology improves the      │
                    │ nurses performance and       │
                    │ reduces their burden.        │
                    └─────────────────────────────┘
                                  ▲
                                  │
┌──────────────────┐   ┌──────────────────┐   ┌──────────────────────┐
│ Technologies     │◄──│ Benefits of      │──►│ Technology works as  │
│ helps to         │   │ technology for   │   │ evidence and it can  │
│ evaluate and     │   │ nurses in        │   │ also be used for     │
│ assess the care  │   │ nursing home.    │   │ educational purpose. │
│ needed.          │   └──────────────────┘   └──────────────────────┘
└──────────────────┘              │
                                  ▼
                    ┌─────────────────────────────┐
                    │ Technology helps in medicine │
                    │ management and effective     │
                    │ communication.               │
                    └─────────────────────────────┘
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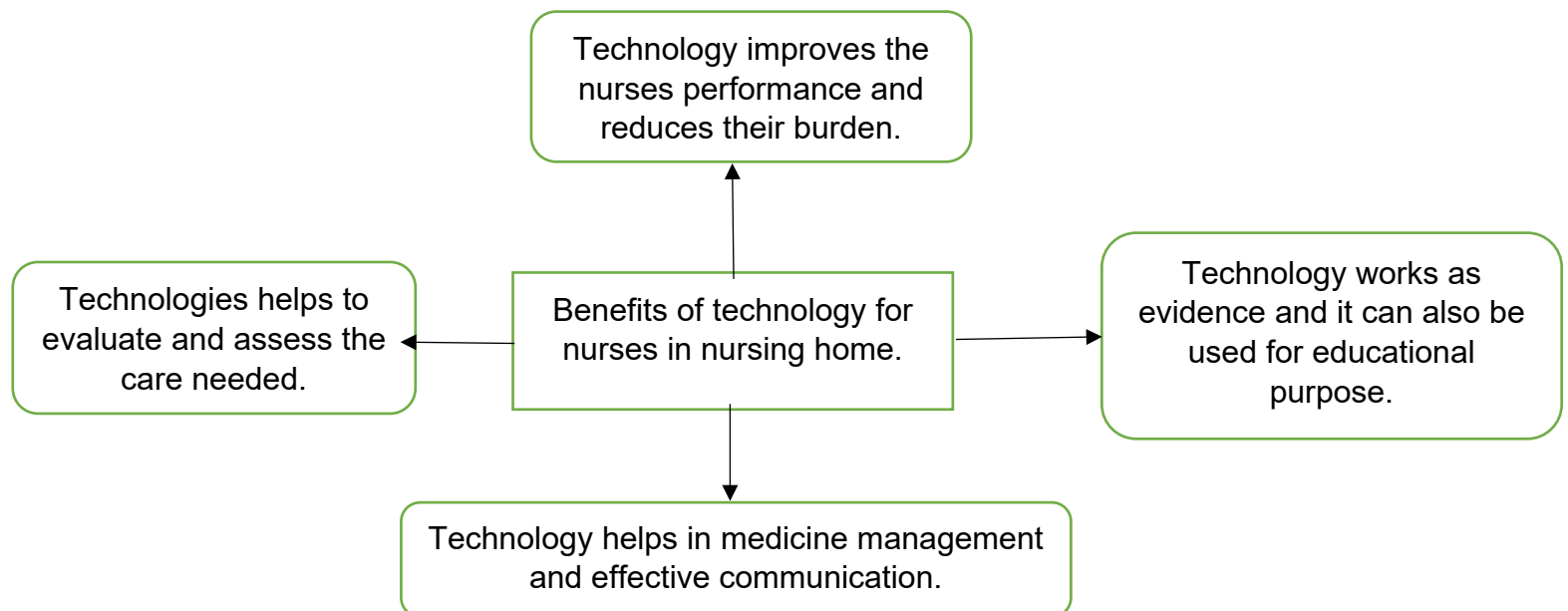
Figure 4. Benefits of technology for nurses in nursing home.

6.1 Benefits of technology for residents in nursing home.

Technology enhances safety and security for people with dementia.

This generic category was formed with two sub-categories and it has been drawn below. (Figure 5).
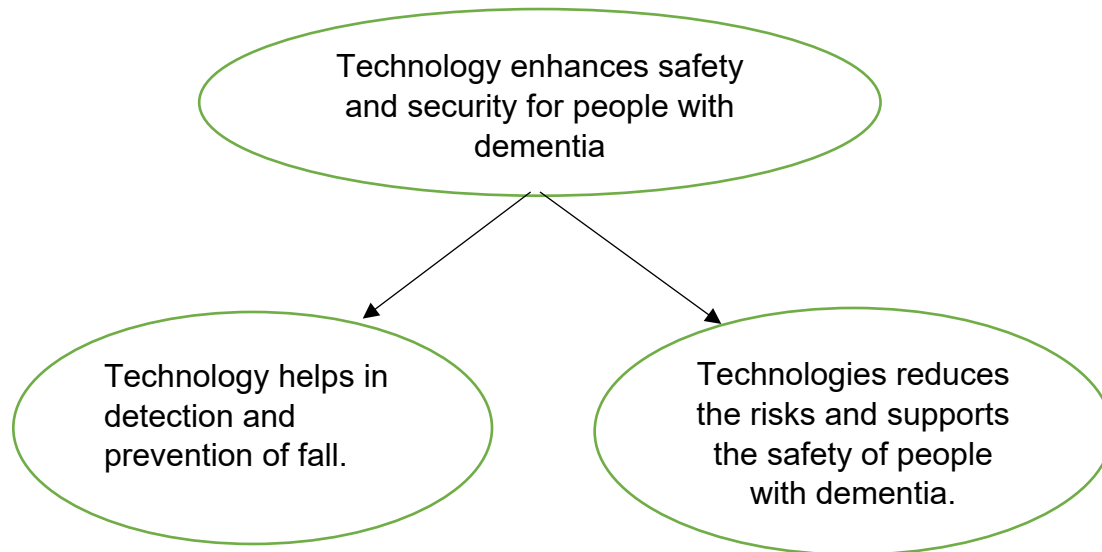
Technology enhances safety and security for people with dementia

Technology helps in detection and prevention of fall.

Technologies reduces the risks and supports the safety of people with dementia.

Figure 5. Technology enhances safety and security for people with dementia.

All together 4 different articles from the selected list showed the link that technology enhances safety and security for people having dementia.

According to the Authors (Aloulou et al. 2013), Ambient Assistive Living (AAL) technologies play significant role in the life of elderly people with dementia and other health issues. AAl includes the set of sensors, connecting devices and interacting devices that are embedded on the living space of patient's room which monitors and react to the need of the patient. Authur also mentioned that the problems which cannot be addressed from laboratory test can be identified from the use of technologies. Concerning mainly to dementia assistance, prototypes has been developed to help the patient ranging from different phase of cognitive decline (normal to severe cognitive impairment). In addition,

remote monitoring devices have been used to mobility measurement to estimate disturbance in motor activity of patient to reduce the risk of accidents. Likewise, residents in the nursing home can receive effective and fast services with the help of AAL technologies. (Aloulou et al. 2013.)

Article published on year 2017 by Vandenberg and team revealed that the technologies play significant role on the prevention of falls especially on physically weak residents, residents under anesthesia, and dementia patients. The sensor mat which was placed on the chairs and bed from where the residents could fall usually. When residents try to get off or fall, nurses get the notification or hear alarm. As a result, nurses could prevent residents from fall and after fall injury. (Vandenberg et el, 2017.)

Nijhof et el. (2012) explained about the usage of IST Vivago watch in the nursing home settings with the monitoring and interviewing with caregivers, nurses, and residents. This research mainly focused on the effects of intervention on the care delivery process with the help of watch technology. With the help of watch authors found out that, people suffering from dementia have lower day time activity and have more wake-up time during the night. The watch was used monitor the sleep time, sleep period and cardiac rhythm. Hence, they were allowed to sleep longer they have not slept well in previous night. After this research, residents became active in daytime activities and participated in other activities also. Hence, their social life and quality of life was enhanced with effected use of technology. (Nijhof et el. 2012.)

According to the research conducted in 2016 in Sweden about the use of mobile technology, concluded that it can be used in nursing home settings for simple examination like radiography. Authors explained that, transferring the vulnerable elderly from nursing home to hospital for basic examination was emotionally and physically stressful. Hence, they concluded that not transferring from care home to hospital for radiography reduced the anxiety of elderly residents. (Dozet et el. 2016.)

Technology enhances sleep management, and satisfaction.

This generic category was taken from two different sub-categories and they are-technology supports in management of sleeping patterns, & satisfaction and requesting right to the patient through technology. (Figure 6).
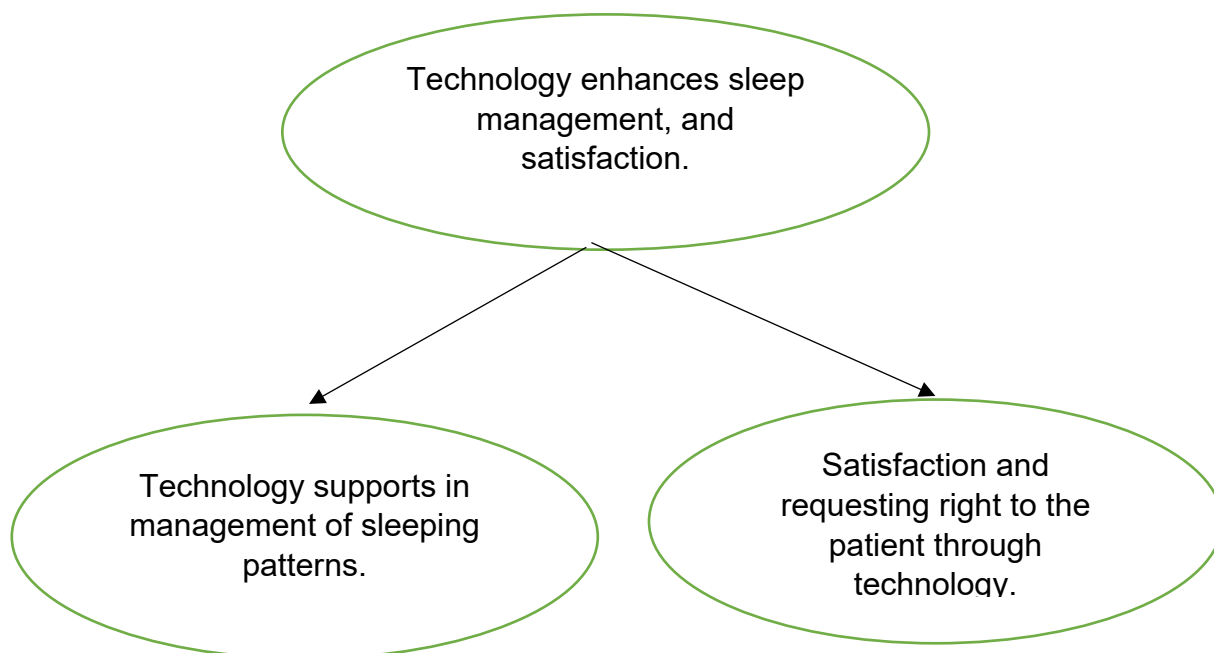
Figure 6. Technology enhances sleep management, and satisfaction.

The Vivago Watch was one of the effective technologies that was beneficial for residents because it helped to trace, analyze and record the sleeping patterns, time and intensity. With the help of this, caregivers were able to monitor the people with dementia during nighttime. In addition to that, it helped to change sleeping position and sleeping medication. Hence, technology supports in the management of sleeping patterns which improved their quality of life. Residents also became active in daytime activities after this technology has been introduced. (Nijhof el el. 2012.)

Call light system in the nursing home became popular because of its effectiveness. Call light system makes the alarm when residents press the call button which are placed next to them. This system gave the privacy to the residents so that they can have their quality

time. On the other hand, it gave the right for residents to ask for the help when needed. Also, in any sorts of emergency situations it was used. Residents could contact nurses easily, smoothly, and quickly which made them satisfied. (Haneen, & Huiyang, 2020.)

Technology is time and cost effective.

Technology is time and cost effective came from two sub-categories and they are-technology is time effective, and technology saves cost (Figure 7)
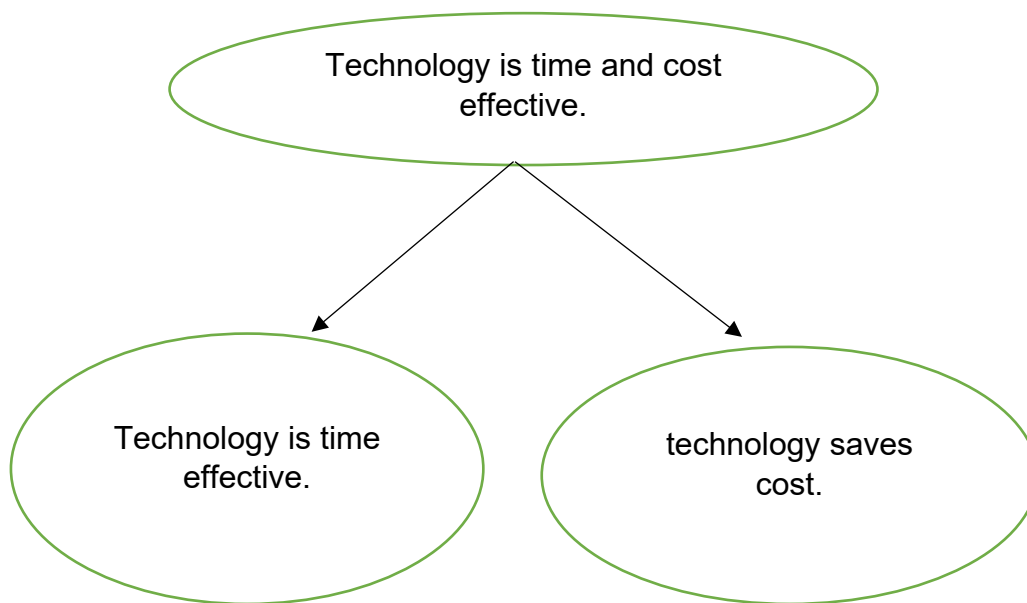

Figure 7. Technology is time and cost effective.

In Sweden research between nursing home and hospital were done to find out the cost effectiveness. For the research, radiography in hospital settings and mobile radiography in nursing home were performed. Seventy-one patients in hospital settings and 312 in nursing home were compared. After the comparison of both results, mobile radiography seems to be very cost effective and easier. Therefore, they concluded that advancement in mobile technology financially benefit the residents and they encouraged to have mobile radiography in nursing homes. (Dozet et el. 2016.)

Residents have right to have freedom and choose what they want. They also have right to privacy. Maintaining all these rights, technologies came up with call light system with the help of this, residents can call the nurses in any cases living in their room which saved their time. Once they call the nurses, nurses hear the alarm and come to help the needy residents. It has been boon for the residents who are physically impaired and cannot move. Author explained, this way residents got help in less time. (Haneen, & Huiyang, 2020.)

Technology enhances quality of life, care, and rehabilitation.

Technology improves care, therapy, and rehabilitation & technology reduces anxiety and improves quality of life of people with dementia are two sub-categories based on which this generic category was formed (Figure 8).

Technology enhances quality of life, care, and rehabilitation.

Technology reduces anxiety and improves quality of life of people with dementia.

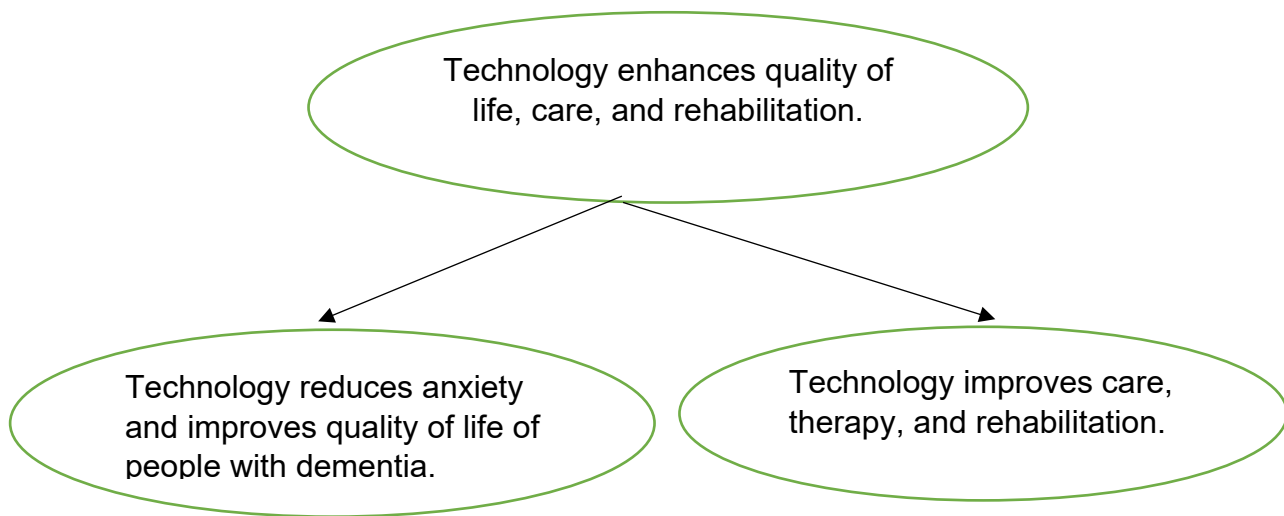Technology improves care, therapy, and rehabilitation.

Figure 8. Technology enhances quality of life, care, and rehabilitation.

In the field of dementia assistance, prototypes were developed for specific scenarios to assist patients during different stages of cognitive decline ranging from healthy ageing to severe cognitive impairment. Other remote monitoring systems are used for mobility measurement to estimate disturbances in motor activity of the patients to prevent risk of

accidents. Some systems use video and audio recording for patient tracking in order to analyze their activities. (Aloulou et al. 2013.)

IST Vivago watch played significant role to improve the quality of life. Vivago watch saved the sleeping hours and sleeping pattern of the residents and based on that they were treated. According to their sleeping habits and patters, medications were used and changed into another medicine if previous medicine was not effective. All these factors finally helped residents to have quality of life. (Nijhof et el. 2012.)

6.2 Benefits of technology for nurses in nursing home.

Technology improves the nurses' performance and reduces their burden.

This generic category was formed with the help of two different sub-category and three different articles. It has been drawn below (Figure 9)

Technology improves the nurses performance and reduces their burden.

Technology reduces the workload and burden of nurses.

Technology makes the care provider efficient and helps to improves their performance.
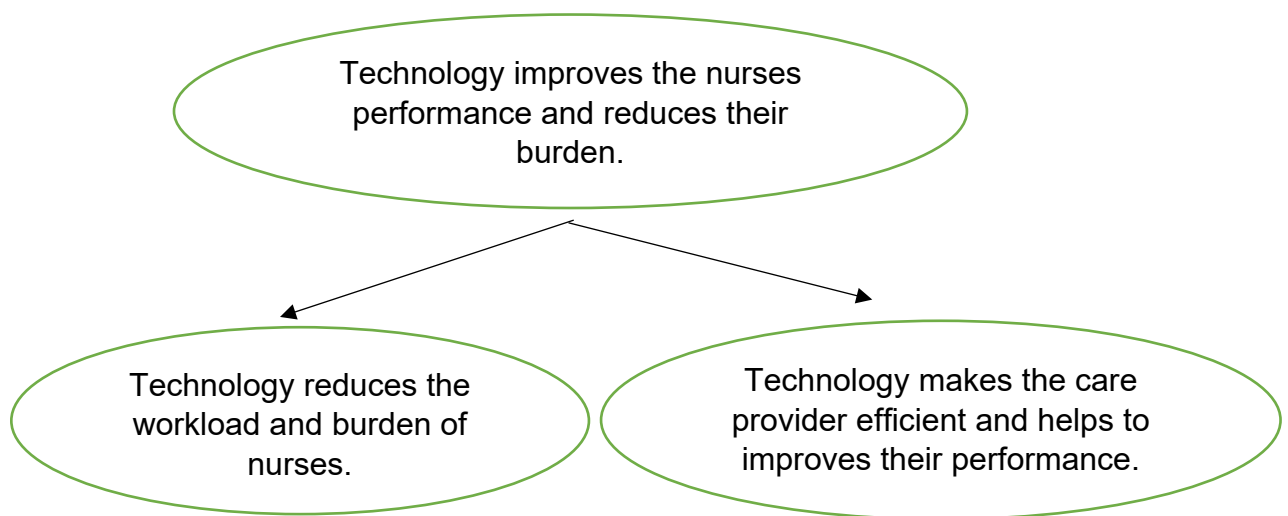
Figure 9 Technology improves the nurses performance and reduces their burden.

Residents in the nursing home get the effective and fast services with the help of AAL technologies. AAL technology also helps residents in their daily life so nurses do not need to assist them personally all the time. Therefore, AAL made the work of nurses effective and efficient. (Aloulou et al. 2013.)

Pressure sensory mat placed on the bed and chair played significant role in the reduction of workload of nurses as per authors. They stated that nurses could focus on documentation and other important works and they could easily get informed with alarm if residents try to get up from bed or fall from chair. Also, in Netherlands research, residents rooms were equipped with communication module which has listen-speech functionality so nurses could easily answer staying at office. (Vandenberg et el, 2017.)

With the advancement of call light system, nurses knew the pick time when residents are going to call them so authors explained that nurses could focus on the other works like reporting, documenting and care plan on the free hour. So, technology helps nurses to perform another important task, making the work easier and efficient. (Haneen & Huiyang, 2020.)

Technologies helps to evaluate and assess the care needed.

With two different sub-categories this generic category came up. They are illustrated below in the figure 10.
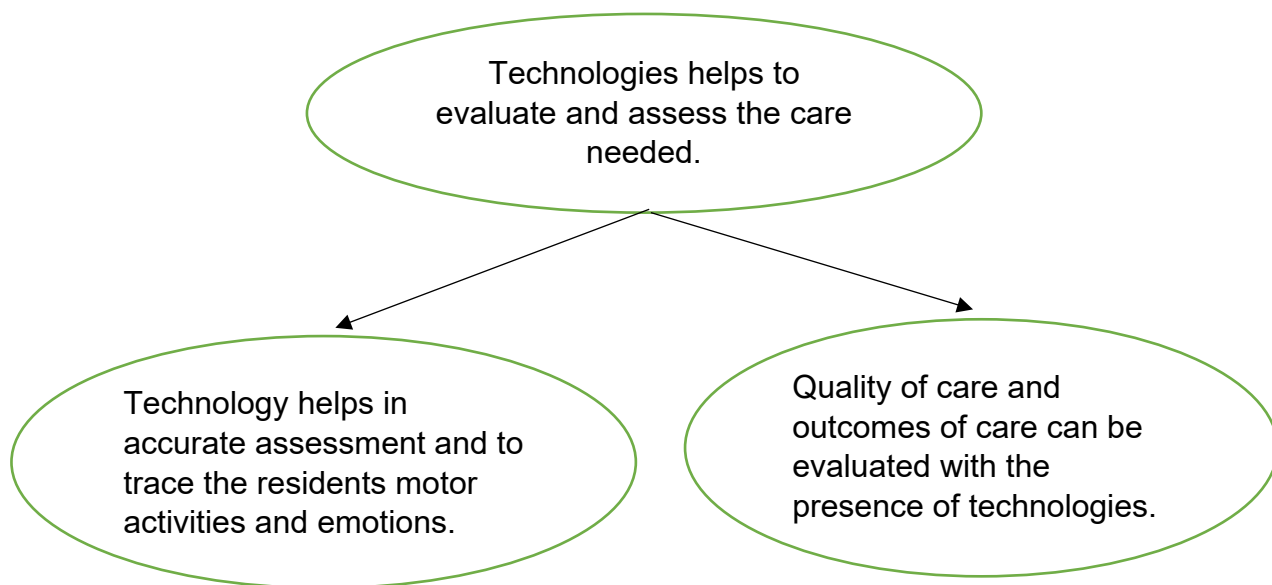

Figure 10- Technologies helps to evaluate and assess the care needed.

Video recordings placed on different places of residents home like living room, dining room, hallway, public areas played the significant role in the assessment of residents in nursing home. Residents could be easily monitored and evaluate their functional capacity

for example, the ability to perform activities of daily living such as feeding and transfer. It also helped to assess the psychological and behavioral symptoms such as resistiveness to care and agitation, and communication. This recording also used to observe the patterns in the behavior of residents in certain situation. Likewise, this technology also measures the health outcomes of people with dementia, outcomes that are exhibited as responses to the behaviors of nursing home staff. The concepts measured by videorecording for staff included care behaviors such as person-centered care, assistance with activities of daily living, and verbal and nonverbal communication. Hence, video recording technology helped nurses to assess the care needed and evaluate the quality of care provided and its outcomes. (Kim et al. 2019.)

Technology helps in medicine management, work coordination and effective communication.

This generic category came up with the link between three different sub-category and it is shown below in figure 11.
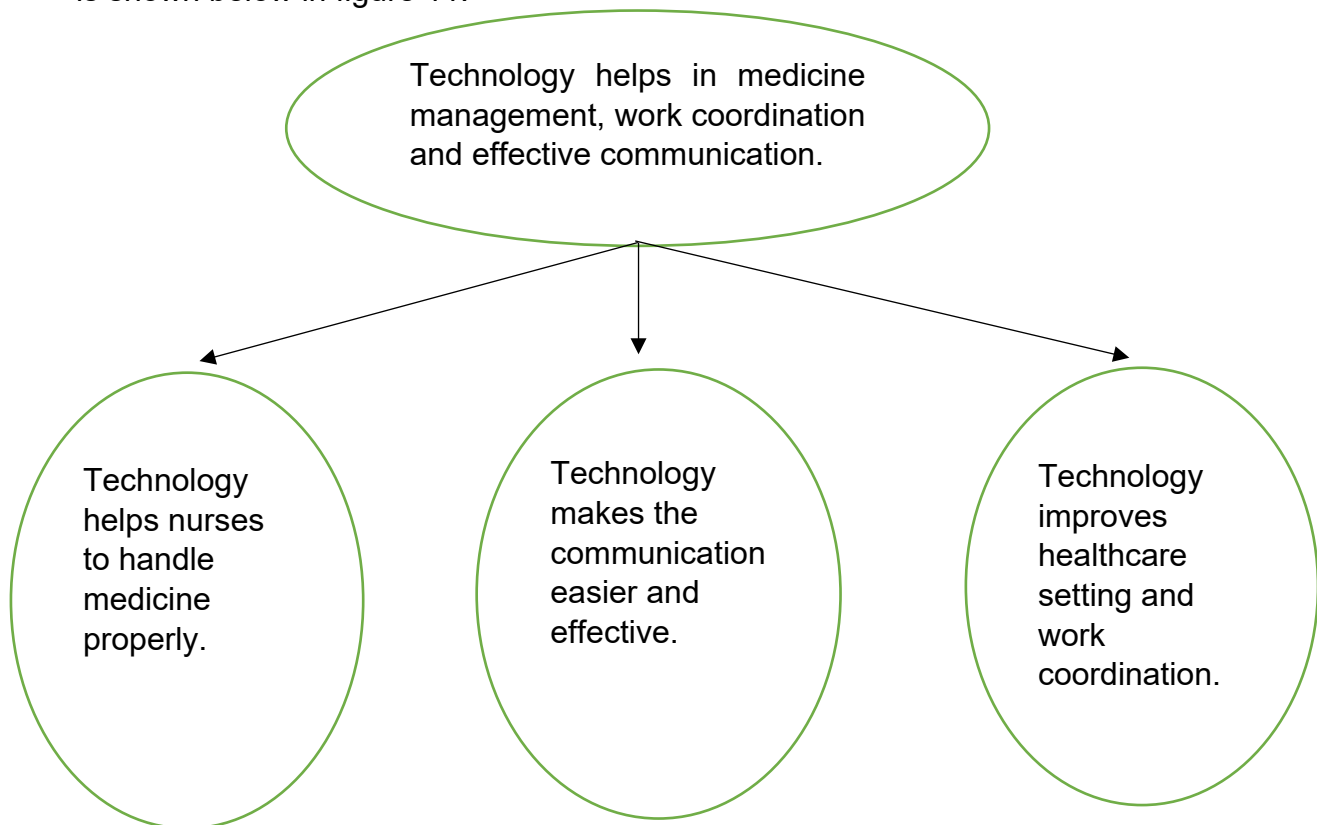
Figure 11- Technology helps in medicine management, work coordination and effective communication.

Digital documentation system was easy to retrieve, store and document the data and medications. Nurses found it easier to check if residents got the medication or not. Hence, it played significant role in the reduction of medication errors. (Munyisia, Yu & Hailey, 2010.)

The IST Vivago watch was used to observe the sleeping time, sleeping circle, circadian rhythm, and movements during night. This watch was placed on the wrist of the residents who were mainly having dementia and could not explain about their sleep. This watch helped nurses to identify the sleeping problems that dementia patients were having in nursing home. Hence, doctor prescribed sleeping tablets to the residents who were having sleepless night and minor sleeping problems. Furthermore, this technology also helped in changing the medication if the previous medication did not work well to the resident. (Nijhof et el. 2012.)

Authors from Call Light technology article explained clearly about the role of technology in term of communication. Mainly focusing on call light technology in nursing home, author explained technology as very important part in care process. Call light technology connects the residents and nurses easily and quickly. Residents could stay inside their room and easily contact them with the help of technology. Nurses could hear the alarm after the residents had called them, so they just go and solve the problem that elderly people are having. Hence, technology made the communication effective and efficient. (Haneen & Huiyang, 2020.)

Digital documentation in nursing home provided clear, legal, and complete information to the nurses. Information was permanently saved and easy to retrieve through digital documentation which helped nurses to communicate with residents and their family members. Nurses could give clear and latest information about the residents to their family member. (Munyisia, Yu & Hailey, 2010.)

After the research done by Nijhof et el. 2012, they found out that work of nurses can be arranged and organized in better manner in the presence of technology. Taking the example of watch, the watch monitored the resident whole night and they reflected sleeping patterns and total sleeping hours. Therefore, if patient has not slept well in previous night then nurses can simply let those residents sleep more. In this case, nurses can start the morning hygiene routine with those residents who have slept well. So, authors stated technology helps in work coordination. (Nijhof et el. 2012.)

With the help of digital documentation, care provided, and care outcomes can be easily documented. All the information of residents can be found on same place which helps to identify the further care needed. Likewise, nursing manager can easily check if care provider is professional through their work and documentation skills. Management of care is made easier by technology. (Munyisia, Yu & Hailey, 2010.)

Technology works as evidence and it can also be used for educational purpose.

This generic category came up together after the link between two different sub-categories (Figure 12).
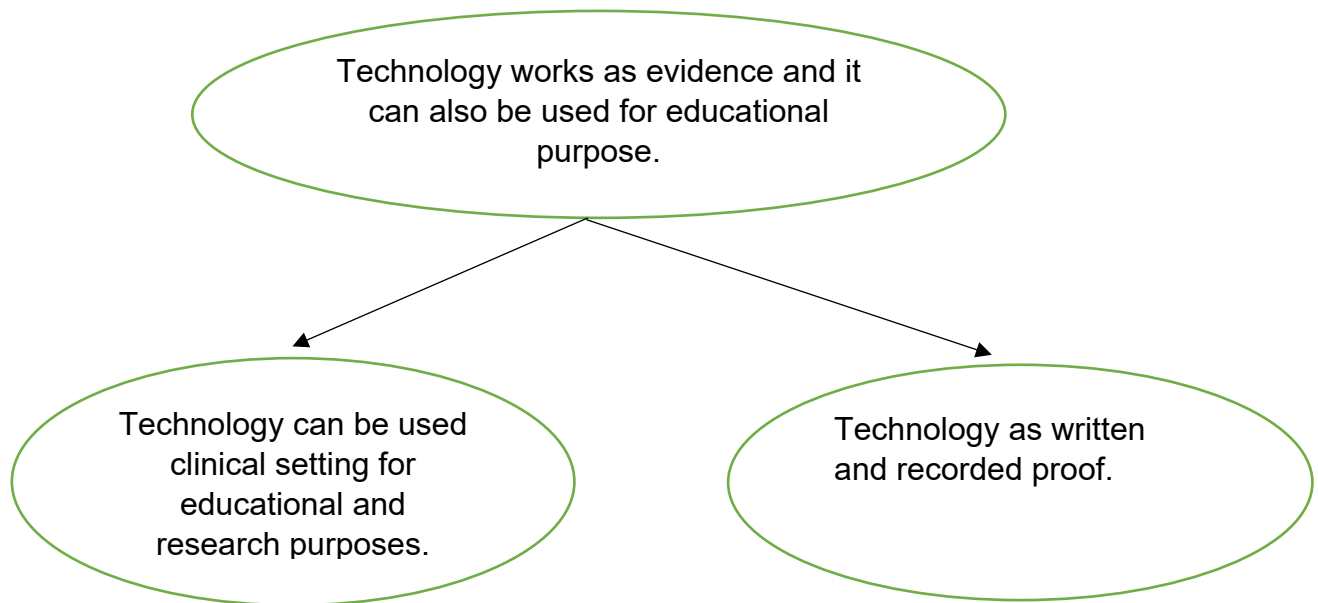

Figure 12- Technology works as evidence and it can also be used for educational purpose.

Munyisia, Yu & Hailey, 2010 explained about the importance of digital documentation technology in terms of its recording, safety, and validity. After their research questionnaire, positive answers were received. Nurses and caregivers mentioned the digital documentation system as legal, more accurate, easier, and faster than paper-based documentation. They also mentioned that it helped in the reduction of multiple entry of data. Hence, all the data can be easily retrieved easily at any time with the single click in any needed time. (Munyisia, Yu & Hailey, 2010.)

7. DISCUSSION

7.1 Discussion of main findings

The purpose of this thesis was to identify the benefits that nurses, and residents get from technology in nursing homes. Hence, this literature review illustrated all the possible benefits that can be taken from technology. Most of the residents in nursing home had dementia so the main benefits that they got from technology was the safety and reduction of fall which also helped them to have quality of life. (Aloulou et al. 2013.) Likewise, technology played significant role in the management of sleep, which increased their physical activities and decreased the daytime sleep (Nijhof et el. 2012). Author also explained that use of technology is cost and time effective. He also concluded that technology has reduced the anxiety of elderly population. (Dozet et el. 2016.) Due to technology, residents could get the service quickly which saved the time. According to author, some basic examination could be done in nursing home, so residents did not have the stress of transferring to hospital. It makes complete sense in our life too.

Haneen & Huiyang, 2020., explained that technologies have allowed nurses to focus on other important tasks like reporting, documenting and care plan during their shift because residents were given call light system so that they can call nurses for help when needed. It saved the time, makes the work easier and faster for nurses (Haneen & Huiyang, 2020). Also, pressure sensory mats and other different monitoring devices made the work of nurses easier. Any irregular moment of residents was detected by these sensory mat and nurses could easy detect their activities. Hence, nurses could do their other task and in case of emergency technologies alerted them. (Vandenberg et el, 2017.) Digital documentation system was easy to retrieve, store and document the data and medications. Nurses found it easier to check if residents got the medication or not. Hence, it played significant role in the reduction of medication errors. (Munyisia, Yu & Hailey, 2010.) Also, technology helped the nurses to trace the activities, monitor sleeping patterns, change medication, and work coordination.

7.2 Independent Learning process

Selection of topic started in last year spring (2020), and idea paper got selected in the end of August. Since, then the actual thesis has been started. In the December 2020, thesis planning got accepted. After that I worked on the data analysis part which was accepted in February this year. Data analysis was quite tough task as per my opinion during the thesis process. After the analysis, I headed forward to write the findings, discussion and abstract. Data analysis part helped a lot to write the findings because all the information needed was already there. Hence, analysis part was backbone of the findings in my thesis. Because of COVID-19 situation, contact support lesson was not possible but through AC classes I got adequate help and assistance from supervising teacher. Correction process went quite slowly because a lot of courses and training was going on at the same time. But finally, we made it.

8. ETHICALNESS, RELIABILITY AND VALIDITY OF THE THESIS

Ethics generally deals with the moral principles which teaches the right way of everything. Every single nurse should ensure that their practice has up-to-date evidence, truthfulness, safety, and accountability. These ethics are necessary to uphold and protect the human right as a professional from different kind of unnecessary harms and it also safeguards our dignity and value. Having all ethical knowledge and considering ethicalness in our work is imperative because we are living and working in the world which is fast moving and evolving almost daily. (Buka, 2020.)

Unlike in primary research, literature review does not collect deeply personal, sensitive or any kind of confidential information form the participants. Instead, literature review collects the information form the books, journals, articles, etc. giving the credits to the original writers. Furthermore, in the last decades literature review has evolved to become more inclusive methodologically and plays significant role in influencing policy, practice, further research, and public perception. Therefore, ethical consideration of how interests of different stakeholders are represented in research review have become more critical. (Suri, 2019.)

Likewise, to make sure that there will be no biasness after submitting and publishing the thesis, referencing part in both text and bibliography has been given high priority and taken into due consideration. It is also most important to write the thesis on my own words so I have taken this into account so that plagiarism can be reduced. Therefore, writing with own words and giving credits to the main authors is very important ethical consideration. Finally, suggestions from the supervisor have been noted sincerely and followed throughout the thesis process.

Validity means the appropriateness of tools, processes, and data. Validity measures if the research question is valid for required outcomes, choice of methodology is appropriate for answering the research question, sampling and data analysis are reliable, and finally the result and conclusion are appropriate for the context. Generally, validity measures how well the result correspond to established theories and other measures of same concept. (Leung, 2015) Hence, for the validity of thesis, appropriate and legal data were

collected through the sources that reliable and search engines of lapin AMK. Furthermore, research questions have been answered with the descriptive literature review method. Only the related articles had been selected for the thesis. Likewise, unwanted information was neglected from selected articles after guidance of supervising teacher. Latest published books and articles were selected as they are reliable and valid. So, published year of the journal or article was major point during thesis process. Also, analyzing how well the data matches the content was evaluated before collecting the information. Finally, template of lapin UAS has been used.

9. CONCLUSION

This study shows that technologies are now getting more value in the health care settings mainly in the nursing home. It shows that the nursing homes are welcoming more technologies to assist their staffs and residents in their daily routine. Technology has almost eliminated the paper form of work. Nowadays nurses could not perform their work effectively without assistance of technologies. Any work of nurses will be incomplete if there will be no technology. After the research I found out that benefits for residents include safety and security, sleep management and satisfaction, time and cost effective, improvement in quality of life and rehabilitation. Likewise, benefits for nurses include improvement in nursing performance, reduction of burden, assessment in care needed, management of medicine, effective communication, and educational purpose. Technology saved time of both nurses and residents. Therefore, we can conclude that technology goes side by side with nursing homes and healthcare is moving towards the digital healthcare.

It is important to recognize that technologies come with certain challenges that staff face during their work which makes their work more difficult and challenging so teaching and training session for nurses is the recommendation from this research to make the world of technology better and smoother. Due to all benefits mentioned on findings part, the technologies will get more priority in the future and technologies really matters in the daily life of residents and nurses. Hence, technologies should always be promoted and upgraded.

For the further research about the technology in nursing home, it would be better to do the qualitative research where they could select few nursing homes and residents. I think, interviewing residents and nurses about the benefits that they are getting on daily basis will be clear in nature.

BIBLIOGRAPHY

Aloulou, H., Mokhtari, M., Tubergen, T., Biswas, J., Phua, C., Lin, J & Yap, P. 2013. Deployment of assistive living technology in nursing home environment: methods and lesson learned. BMC Medical Informatics and Decision Making. Vol. 13.

https://search-proquest-com.ez.lapinamk.fi/docview/1372370845

Buka, P., 2020. Essential law Ethics in Nursing: Patients' Rights and Decision-Making.

https://books.google.fi/books?hl=en&lr=&id=KC3tDwAAQBAJ&oi=fnd&pg=PT10&dq=%22ethics+in+nursing%22&ots=hw0UywwufJ&sig=ZHi5Y0IQDWucJ80caJ8zNJB9Ap8&redir_esc=y#v=onepage&q=%22ethics%20in%20nursing%22&f=false

Coffta, M. 2010. Literature review. Bloomsburg University of Pennsylvania. Harvey A. Andruss Library.

https://guides.library.bloomu.edu/litreview

Deborah, G. 2013. Inductive and deductive approaches to research.

https://deborahgabriel.com/2013/03/17/inductive-and-deductive-approaches-to-research/

Dewsbury, G.,2019. Use of Information and Communication Technology in Nursing Services. British Journal of Community Nursing. Vol. 24, Issue. 12 PP. 604-607

http://web.b.ebscohost.com.ez.lapinamk.fi/ehost/detail/detail?vid=1&sid=eda2e246-576b-472a-b62d-888d7cceed35%40pdc-v-sessmgr01&bdata=JnNpdGU9ZWhvc3QtbGl2ZSZzY29wZT1zaXRl#AN=140084330&db=c8h

Doucette, E., Sanzone, L., Albahouth, A., Luca, W.D., Santella, G.& Wamg, K. 2019. The role of technology in enhancing a family-centred approach to care: Navigating nurse-family communication in ICU. Canadian Journal of Critical Care Nursing. Vol. 30, 29-34.

http://web.a.ebscohost.com.ez.lapinamk.fi/ehost/pdfviewer/pdfviewer?vid=6&sid=7a7f6b
ca-06b2-4fac-8aba-fcf199112eae%40sdc-v-sessmgr02

Dozet, A., Ivarrson, B., Eklund, K., Klefsgard, R. & Geijar, M. 2016. Radiography on wheels arrives to nursing homes - an economic assessment of a
new health care technology in southern Sweden. Journal of Evaluation in Clinical Practice.

http://web.b.ebscohost.com.ez.lapinamk.fi/ehost/pdfviewer/pdfviewer?vid=5&sid=6c021
188-3f49-4866-bbc8-30e0b79701d3%40pdc-v-sessmgr02

Erlandson, C., Brysiewicz, P. 2017. A hands-on guide to doing content analysis. African Journal of Emergency Medicine. Vol. 7, Iss.3, 93-99)

https://www.sciencedirect.com/science/article/pii/S2211419X17300423#b0005

Golash-Bola, T. 2015. Writing a literature Review: Six Steps to Get You from Start to Finish.

Haneen, A., Huiyang, L. 2020. Use of Notification and Communication Technology (Call Light Systems) in Nursing Homes: Observational Study. Journal of Medical Internet Research.

http://web.a.ebscohost.com.ez.lapinamk.fi/ehost/detail/detail?vid=3&sid=809a8547-
55d3-4211-ade8-
9c6b93abe542%40sessionmgr4007&bdata=JmxvZ2luLmFzcCZzaXRlPWVob3N0LWxp
dmUmc2NvcGU9c2l0ZQ%3d%3d#AN=142471159&db=c8h

Kanta 2019. What are the Kanta services?
https://www.kanta.fi/en/what-are-kanta-services

Krishnaswami, O.R. & Satyaprasad, B.G. 2010. Business Research method. The Himalayan Publishing House. Issue-1. Page- 160

https://ebookcentral-proquest-com.ez.lapinamk.fi/lib/ramklibrary-
ebooks/reader.action?docID=588025&query=defination+of+data+analysis

Kim, D.E., Sagong, H., Kim. E., Jang, A.R. & Yoon, J.R. 2019: Dec;30(4):400-413. Korea. A Systematic Review of Studies Using Videorecording to Capture Interactions between Staff and Persons with Dementia in Long term care facilities.

https://pc.jkachn.org/DOIx.php?id=10.12799/jkachn.2019.30.4.400

Leung, L., 2015. Validity, reliability, and generalizability in qualitative research. Journal of Family Medicine and Primary Care.

https://www.researchgate.net/publication/281172234_Validity_reliability_and_generaliza bility_in_qualitative_research

Munyisia, E., Yu, P. & Hailey, D. 2010, Vol.80 (2), p.116-126. The changes in caregivers' perceptions about the quality of information about benefits of nursing documentation associated with the introduction of an electronic documentation system in a nursing home.

https://www-sciencedirect-
com.ez.lapinamk.fi/science/article/pii/S1386505610001826?via%3Dihub

Nijhof, N., Gemert-Pijnen, V., De Jung, G.E.N., Ankone, J.W. & Seydel, E.R. 2012. How assistive technology can support dementia care: A study about the effects of the IST Vivago watch on patients sleeping behavior and the care delivery process in a nursing home.

http://web.a.ebscohost.com.ez.lapinamk.fi/ehost/pdfviewer/pdfviewer?vid=18&sid=5419 01a6-c0f0-4472-88a0-4c65a9e056c2%40sessionmgr4007

Vandenberg, A.E., Beijnum, B.J., Overdevest, V.P., Capezute, E. & Johnson, T.M. USA. 2017. US and Dutch nurse experiences with fall prevention technology within nursing home environment and workflow: A qualitative study. Geriatric Nursing. Vol 38 Iss 4.

https://www-sciencedirect-com.ez.lapinamk.fi/science/article/pii/S0197457216302397

Wesley, P., 2019. Nursing Home care. https://caregiver.com/articles/nursing-home-care/

While, A. & Dewsbury, G. 2011. Nursing and Information and Communication Technology (ICT): A discussion of trends and future directions. International Journal of Nursing Studies. Vol. 18. Issue 10, 1302-1310.

https://www-sciencedirect-com.ez.lapinamk.fi/science/article/pii/S0020748911000873

Stemler, S.E., 2015. Content Analysis- Methods of Research.
https://onlinelibrary.wiley.com/doi/abs/10.1002/9781118900772.etrds0053

Suri, H., 2019. Ethical Consideration of Conducting Systematic Review in Educational Research. PP-41-54
https://link.springer.com/chapter/10.1007/978-3-658-27602-7_3

Yousef, S., 2009. The Nine Elements of Technology. Published in technology and education.
https://www.slideshare.net/Yousef93/the-nine-elements-of-technology-presentation

8. APPENDICES

Figure 1- Article selection criteria for the thesis.

Figure 2- Data analysis phases

Figure 3- Benefits of technology for residents in nursing home.

Figure 4- Benefits of technology for nurses in nursing home.

Figure 5-Technology enhances safety and security for people with dementia.

Figure 6. Technology enhances sleep management, and satisfaction.

Figure 7. Technology is time and cost effective.

Figure 8. Technology enhances quality of life, care, and rehabilitation.

Figure 9 Technology improves the nurses performance and reduces their burden.

Figure 10- Technologies helps to evaluate and assess the care needed.

Figure 11- Technology helps in medicine management, work coordination and effective communication.

Figure 12- Technology works as evidence and it can also be used for educational purpose.

Table 1- Data search path

Table 2- Selected article details

Table 3- Data anlysis

Table-1

Database	Searched words and limits	Total Results	Articles taken by the title	Articles taken by the abstract	Articles taken by the whole text
CINAHL EBSCO host	Technology in healthcare **AND** Nursing home or long-term care facility, **AND** Technology in nursing home) Published 2010-2020, English, Academic journals,	14	2	1	1
	Technology **AND** Long-term care facilities **AND** Staffs and Residents. Published 2010-2020, English, Academic journals.	13	1	1	-
	Communication AND Technology AND Nursing Home or Long-Term Facilities Published 2010-2020, English, Academic journals Full text	29	1	-	1
Science Direct	Technology and Nursing Home. Published 2017-2020, English, Researched Articles Geriatric Nursing.	78	1	-	1

International e-search	Roles of technology in Nursing Homes. Published 2013-2020, English, Full Text, E-articles	20	1	-	1
	Benefits of technologies in Nursing Homes. Published 2010-2020, English, Full Text, E-articles	96,996	1	-	1

Table-2

No.	Authors, Published date, Country, and title.	Purpose and aim	Research Method used	Literature and summary	Findings of research
1.	Kim, D.E., Sagong, H., Kim. E., Jang, A.R. & Yoon, J.R. 2019. Korea A Systematic Review of Studies Using Videorecording to Capture Interactions between Staff and Persons with Dementia in Long term care facilities.	The purpose of this article was to investigate and synthesize the interaction between staffs and resident with dementia in long-term care facilities showing the advantage of video recording.	Quantitative Research using Medline, Embase and CINHAL databases which was in English language.	Among 5,605 searched papers, a total of 20 studies were selected for this review.. Concepts measured by videorecording were classified into two groups: 1) Staff 2) residents Communication by resident, activities of daily life function of resident, behavioral and	This research proves that video recordings can be used To evaluate the gap between quality of care provided and health outcomes in aged people. It also supports the future research using the video recording technologies to evaluate the interaction and relationships between residents and staffs.

				psychological symptoms of patient with dementia were included.	
2.	Munyisia, E., Yu, P. & Hailey, D. 2010. Ireland. The changes caregivers' perceptions about the quality of information about benefits of nursing documentation associated with the introduction of an electronic documentation system in a nursing home.	The aim of this research was to investigate the perception of caregivers in documentation before and after the introduction of electronic documentation system in nursing home settings.	Questionnaire survey was done three months before, 6, 18 and 31 months after the introduction electronic system.	Scores for questionnaire responses showed that the benefits of the electronic documentation system were perceived by the caregivers as provision of more accurate, legible, and complete information, and reduction of repetition in data entry, with consequential managerial benefits	This result found out that the perception of nurses and caregivers were positive towards the introduction of electronic documentation system and it proved that it has more benefits than paper-based system.
3.	Aloulou, H., Mokhtari, M., Tiberghein, T., Biswas, J., Phua, C., Lin, J & Yap, P. 2013. Singapore. Deployment of assistive living technology in nursing home environment: methods and lesson learned.	It aimed to deploy and develop the ambient assistive livings for elderly people and to evaluate its performance and useability.	The research was conducted with the close contact between dementia patient and caregivers. It was conducted in the nursing home settings.	It was conducted within three months in the two-room of nursing home with the participation of eight patient with dementia and two caregivers. A technical ambient assistive device, consisting a set of sensors and device controlled by	It gave the clear answer to the researchers that a lot of problems need to be fixed and those problems came out from the deployment of ambient assistive devices. It also shows that those assistive devices help to know the early detection of resident's health degradation.

				software was used.	
4.	Dozet, A., Ivarrson, B., Eklund, K., Klefsgard, R. & Geijar, M. 2016. Sweden. Radiography on wheels arrives to nursing homes – An economic assessment of a new health care technology in southern Sweden.	To see and evaluate if the examination done in nursing home settings is cost effective or not with the examination done in hospital settings with the use of mobile radiography.	The prospective study was performed in two different places of Sweden including two different groups. Study was then evaluated based on elderly home settings and hospital settings.	312 residents were examined based on mobile radiography in the elderly care settings and 71 patients were then examined with hospital-based radiography.	Results shows that mobile radiography have significantly low cost than hospital-based radiography. Cost per examination is very high with radiograph taken in hospital.
5.	Vandenberg, A.E., Beijnum, B.J., Overdevest, V.P., Capezute, E. & Johnson, T.M. USA. US and Dutch nurse experiences with fall prevention technology within nursing home environment and workflow: A qualitative study.	It has investigated how the fall prevention technologies was experienced in nursing home environment and workflow.	Interview and observational data were collected. Two case reports were made, and they were compared with the magnitude of fall, safety cultures, and effectiveness.	Multiple cases study approach was used. Nurses experience of technology in fall prevention with two distinct and bounded system was examined.	Technologies are used to monitor the moves of residents which is connected with the alarm system. This research says that those technologies actually, notify the caregivers about the fall about it actually does not prevent the fall.

6.	Haneen, A., Huiyang, L. 2020. United States. Use of Notification and Communication Technology (Call Light Systems) in Nursing Homes: Observational Study	It focuses on the experiences of nurses about the usage of call light systema including challenges and issues associated with it.	150 hours of hypothetico-deductive task analysis and 90 hours of direct task analysis done on 4 different nursing homes.	The collected information form 4 nursing homes reveals that the residents are more likely to call before and after the meal. Staffs exceeded the expectation of administration to the use of call light technology.	It has shown that call light technology is the crucial aspect in the health care settings. It is perceived as the factor that can satisfy the needs of residents and makes the work of staffs easier.
7.	Nijhof, N., Gemert-Pijnen, V., De Jung, G.E.N., Ankone, J.W. & Seydel, E.R. 2012. The Netherlands. How assistive technology can support dementia care: A study about the effects of the IST Vivago watch on patients sleeping behavior and the care delivery process in a nursing home.	The inner motive of this academic journal was to gain insights into the effects of watch on sleep or awake routine and care delivery process to patient with dementia.	Observation and in-depth interview were the root of this article. Data were collected from the interview and sleeping rhythm were viewed more accurately.	The questions for the research was focused on the use of watch and effects of watch on the sleeping behavior of patient. This research answers the way to improve care process for dementia patient.	The watch has great potential to affect the care delivery process and quality of life. It also said that more infrastructure and communication is crucial along with the watch.

Table.3

Original expression	Reduced expression	Reduced expression with same content arranged together	Sub-Category	Reduced same content sub-category	Generic category	Main Category

						Benefits of technology for residents.
The use of Ambient Assistive Living (AAL) technologies aims to empower people with dementia and relieve the burden of their caregivers. 1	AAL technologies empowers people with dementia (1) Technology relieves burden of the caregiver (1).	AAL technologies empowers people with dementia (1) Technology improves the quality of life of people with dementia (6). Mobile radiography helps to reduce anxiety in elderly people (2).	Technology reduces anxiety and improves quality of life of people with dementia.	Technology helps in detection and prevention of fall. Technologies reduces the risks and supports the safety of people with dementia.	Technology enhances safety and security for people with dementia.	
Today, these technologies are used in diverse healthcare applications and are expected to increase efficacy and efficiency of healthcare providers. They improve the organization of healthcare providers, improve therapy and rehabilitation, and enhance prevention and care. (1)	Technologies increases the healthcare providers efficacy (1) Technology improves the healthcare providers organization (1). Technology improves the therapy and rehabilitation (1). Technology improves the care (1). Technology enhances prevention (1)	Technology enhances prevention (1). Monitoring technology helps in fall prevention (1). Fall detection technologies notify staffs about fall so that they can prevent fall or further injuries after fall. (7)	Technology helps in detection and prevention of fall.	Technology supports in management of sleeping patterns. Satisfaction and requesting right to the patient through technology.	Technologies enhances sleep management and increases satisfaction.	
Other remote monitoring systems are used for mobility measurement to estimate disturbances in motor activity of the patients to prevent risk of accidents. Some systems use video and audio recording for patient tracking in order to analyze their activities. (1).	Monitoring technologies measure the motor activities of residents (1). Monitoring technology helps in fall prevention (1). Technology helps to trace the activities of residents (1).	Technology enhances the safety of patient with dementia (6) Call light system promotes safety of patients (3). Mobile radiography reduces risks associated with transfer (2). Documentation helps to check if care provided is safe (5)	Technologies reduces the risk associated with transfers and supports the safety of people with dementia.	Technology is time effective. Technology saves cost.	Technology is time and cost effective.	
				Technology improves care, therapy, and rehabilitation. Technology reduces anxiety and improves quality of life of people with dementia.	Technology enhances quality of life, care, and rehabilitation.	
It can be concluded that technology can significantly improve the quality of life and safety of patients with dementia (such as less falling down). (6)	Technology improves the quality of life of people with dementia (6). Technology enhances the safety of patient with dementia (6)	Technology relieves burden of the caregiver (1). Technologies enabled nurses to	Technology reduces the workload and	Technology reduces the workload and burden of nurses. Technology makes the care	Technology improves the nurses performance and reduce their burden.	

		work in calm and peaceful way. (7) Call light system satisfy the staffs (3).	burden of nurses.	provider efficient and helps to improves their performance.	
		Technologies increases the healthcare providers efficacy (1) Technology improves the staff's performance (3).	Technology makes the care provider efficient and helps to improves their performance.	Technology helps in accurate assessment and to trace the residents motor activities and emotions. Quality of care and outcomes of care can be evaluated with the presence of technologies.	Technologies helps to evaluate and assess the care needed.
The coordination of care can be divided up into various categories. First of all, there is the coordination of sleep, coordinating the sleep medication, and coordination of work activities for the caregivers. (6)	Technology helps to manage sleeping patterns of residents **(6).** Technology helps to manage medications **(6).** Work for caregivers can be coordinated with technologies **(6).**	Monitoring technologies measure the motor activities of residents (1). Technology helps to trace the activities of residents (1). Videorecording enables accurate observation of duration (4). Videorecording supports observation of patterns of behaviors (4). Technology helps to capture emotional expressions (4). Technology increases the accuracy of assessment (4)	Technology helps in accurate assessment and to trace the residents motor activities and emotions.	Technology makes the communication easier and effective. Technology helps nurses to handle medicine properly	Technology helps in medicine management and effective communication
The call light system is one of the major communication technologies that link nursing home staff to the needs of residents. (3)	Call light technologies connects nurses to the needs of residents. **(3)**			Technology as written and recorded proof. Technology can be used clinical setting for educational and research purposes.	Technology as proof and can be used for educational purpose.
By providing residents the ability to request assistance, the system becomes an indispensable resource for patient-focused health care. (3).	Technology promotes patient-focused health care by giving right to request for assistance. (3)	Call light technologies connects nurses to the needs of residents. (3) Technology connects residents and staffs (3)	Technology makes the communication easier and effective.		Benefits of technology for nurses
it has been observed that the call light system is perceived to be an important factor affecting the outcomes of the care	Call light system affects the outcomes of care **(3)**.				

process and satisfaction of both residents and staff as well as the staff's performance. (3).	Call light system satisfy the residents (3). Call light system satisfy the staffs **(3).** Technology improves the staff's performance **(3).**	Electronic records improve communication (5).				
call light systems also help to ensure the safety of patients. Also described it as a *lifeline* for patients because it is linked with patients' needs and alerts the staff to the situations in which patients may ask for help. (3).	Call light system promotes safety of patients **(3).** Technology connects residents and staffs (3)	Technology helps to manage sleeping patterns of residents (6).	Technology supports in management of sleeping patterns.		.	
Many of these potential fall prevention technologies are deemed "fall detection devices" because they typically notify staff of falls with too short notice for staff to arrive to prevent a fall. (7)	Fall detection technologies notify staffs about fall so that they can prevent fall or further injuries after fall. **(7)**	Technology helps to manage medications (6). Documentation reduces medical errors (5).	Technology helps nurses to handle medicine properly.			
NL staff described technology as enabling them to do their work in caring for residents in a calm and peaceful way. (7)	Technologies enabled nurses to work in calm and peaceful way. **(7)**					
Video technologies are actively used to evaluate the relationship between quality of care and health outcomes of the elderly with dementia in many international nursing studies. (4)	Quality of care provided, and health outcomes of residents can be evaluated with video technologies. **(4)**	Documented record works as legal evidence (5). Documentation makes nursing activities visible (5)	Technology works as written and recorded proof.			
Videorecording is a measurement method that enables accurate observation of the duration, intensity, and pattern of a behavior. videorecording enables researchers to immediately capture emotional expressions or behaviors and directly measure them. (4)	Videorecording enables accurate observation of duration of behavior (4**).** Videorecording supports observation of patterns of behaviors **(4).** Technology helps to capture emotional expressions **(4).**	Records helps in research activities (5). Records helps in nursing education and clinical practice (5).	Technology can be used in clinical setting for research purposes.			
video observation allows data to be repeatedly reproduced and rated by multiple observers, ultimately increasing the objectivity and accuracy of assessment (4)	Technology increases the accuracy of assessment **(4)**	Residents records can be assessed with finger click with electronic documentation (5).	Technology is time effective.			
Using the Web-based electronic documentation system, a manager with proper	Residents records can be assessed with finger click with	Documentation saves time (5).				

access rights could access a resident's record at a finger click. This had significantly improved management's understanding about an aged resident's care needs.	electronic documentation **(5).** Technology improves the managements understanding about care needs **(5).**	Information can be given at any time with the help of electronic records (5)			
Documented evidence enables nursing managers to assess whether care provided by individual caregivers was professional, safe, and competent. It also increases the visibility of nursing care activities	Documentation helps to check if provided care is safe **(5)** Documentation helps to verify if care provider is professional (5). Documentation makes nursing activities visible **(5).**	Call light system affects the outcomes of care (3). Quality of care provided, and health outcomes of residents can be evaluated with video technologies. (4)	Quality of care and outcomes of care can be evaluated with the presence of technologies.		
Nursing records can serve as legal evidence in the event of a lawsuit. They also facilitate research activities and standards setting in nursing education and clinical practice	Documented record works as legal evidence **(5)**. Nursing records helps in research activities **(5).** Records helps in nursing education and clinical practice **(5).**	Technology improves the therapy and rehabilitation (1). Technology improves the care (1).	Technology improves care, therapy, and rehabilitation.		
Digital documentation practice is less time consuming. Records are o legible, which reduces medical errors.	Digital documentation saves time **(5).** Records are legal **(5).** Digital documentation reduces medical errors **(5).**	Work for caregivers can be coordinated with technologies **(6).** They improve the healthcare providers organization (1). Technology improves the managements understanding about care needs (5).	Technology improves healthcare setting and work coordination.		
Electronic record easiness in developing care plans; offering resident information at any time; easiness in editing/revising care plans and improving communication between care workers.	Electronic documentation eases in developing care plans (5). Information can be given at any time with the help of electronic records **(5).** Electronic records improve communication **(5).**				
Mobile radiography can be used to examine patients in nursing homes at a lower cost than hospital-based radiography. (2)	Mobile radiography is cost effective (2)	Mobile radiography is cost effective (2)	Technology saves cost (2)		
The societal benefit to the elderly patient is high, reducing the anxiety and possible risks associated with transfer from the nursing home to hospital for radiography. (2)	Mobile radiography helps to reduce anxiety in elderly people **(2).** Mobile radiography reduces risks associated with transfer **(2).**	Technology promotes patient-focused health care by giving right to request for assistance. (3) Call light system satisfy the residents (3).	Satisfaction and requesting right to the patient through technology.		