Telemedicine

Minor Beyond borders
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Table of content

Introduction

Rotterdam University of Applied Science offers a 30 credits minor program entitled: Beyond Borders. four students are participating in the ERASMUS program of Greece. Miltos Sakellariou is the supervisor of this project. The project is about telemedicine in Greece, focused on the healthcare in the remoted islands and small villages in Greece. Telemedicine is the use of audio or video communication between a referral center and an individual clinic or health center on an island. For issues that cannot be managed on its own due to lack of staff, knowledge or experience, telemedicine can be the solution. (Miltos Sakellariou, personal communication, 10 September 2019). Research found, students of the University of Crete get minimum information and education about telemedicine. Graduated medical students are facing telemedicine, most of the time, first when they are already working.

In this project, the 5 phases of designed thinking were planned. With help of the design thinking method, the design challenge became clear. In the first phase, different tools were used to fill in the design challenge. Steep, stakeholder mapping, online survey/ needs finding, interviews, observations online survey, explorative research methods and opportunity framing were used. **The design challenge is: How might we educate the medical students about the telemedicine system and prepare them for the future of working with telemedicine, so they can provide better telemedicine healthcare for patients.The aim is that every graduate student can provide care using telemedicine.**
Telemedicine is a well-known program in Greece and a lot of doctors use it. The health providers of our survey worked in average of 18 years with telemedicine and has been involved with Vodafone Telemedicine for an average of 5 years. 80% of the health providers are general practitioners. 77% spent around 0-20% of their working hours on telemedicine while prevention is used mostly. It is important medical students receive education of telemedicine, before they are going to work with it. Medical students agree with this, they want to receive more information about the telemedicine system during medical school.

In the second phase, ideas were made to come up with a possible solution for the design challenge. The most important tool in phase 2 was ideating methods, it helped to get an overview of all the possible solutions. This tool, in combination with the information of the medical students, what was received during street interviews and discussing with the lady of the Erasmus program of the University of Crete leads to making an E-Learning. Miltos Sakellariou, in combination with Altera Vita and Vodafone, helped to make a design for the E-Learning.

The third phase was used to make a first version of the E-Learning. Wireframing, click dummies and expert opinions were used to arrange the first version.

In the fourth phase the E-Learning is made, based on the feedback of the click dummie. With applying design standards, we were able to fill in the E-Learning.

The last phase helped us with evaluating the E-Learning, change management (REVIEW) and user interviews were used. A part of phase 5 is not filled in in this end report, because it is an evaluation of the E-Learning which can be filled in when students succeed the E-Learning.

Literature review

The term ''telemedicine'' was first coined by Thomas Bird in the 1970ts, literally translated to ''healing at a distance'' (E.M. Strehle& N. Shabde, 2006). New terms were introduced (eHealth, mHealth, Digital Health and TeleHealth), the World Health Organisation (WHO) defined E-health as: "*The use of information and communication technologies for health", clearly places mHealth and telemedicine as subsets of eHealth*'' (Y. Nikolaidis, G. Efthymiadis& P. Angelidis., 2019). Telemedicine is being used for interaction between the client/patient and a doctor and transmitting medical information to another (specialized) doctor (Craig, J., & Patterson, V., 2005).

Years have passed and part of Telemedicine in Greece is controlled by Vodaphone, the Vodaphone Telemedicine Program (VTP) is used to give healthcare on remoted places in Greece. Several researches show the satisfaction of VTP, for example Y. Nikolaidis, G. Efthymiadis& P. Angelidis, (2019): '' *Overall, participants admitted that Vodafone Telemedicine Program results in more efficient primary healthcare services and improves the patients' quality of life. The degree of satisfaction of both the involved doctors and patients is very high and everyone wishes the continuation or, even better, the extension of the program through the inclusion of additional tests-examinations and its application to more remote areas of Greece*'' and S. Voutsidou, E. Moraitis, A. Sissouras, E. Jelastopulu& G. Charalampous (2019): '' *The promotion of e-Health renders possible the provision of better care to more patients, releasing the institutional resources (of hospitals, clinics, Health Centers, regional surgeries) and limiting healthcare expenses. The new technologies provide various possibilities, readjusting the provided healthcare forms, depending on the individualized needs and expectations of every patient. Geographical distances are nullified, and the provision range of health services is expanded, granting equal access even to residents of remote from the urban centers areas. There is a simultaneous upgrading of healthcare quality, offering fast and reliable results.*''.

In Philadelphia, United States, medical students get education about telemedicine during their years in university. Research shows that the students think education about telemedicine and facing telemedicine during university contributes to the development of core competencies in patient care, medical knowledge, and practice-based learning. And it is the truth, these benefits are stronger when students are facing telemedicine during undergraduate medical education as compared with during graduate medical education. ''*The integration of telemedicine-based lessons, ethics case-studies, clinical rotations, and even teleassessments are being found to offer great value for medical schools and their students*''. It is important that medical students are getting trained in working with telemedicine. *''As telemedicine becomes more ubiquitous in our nation's health care delivery system, it is imperative that modern physicians are trained to leverage such technology effectively. In this regard, undergraduate medical education represents an invaluable window of opportunity for building these capacities in future physicians.''* (Waseh, S., & Dicker, A. P. 2019).

In 2016, research in Boston, United States into telemedicine education is done and shows positive results. ''*Current medical students are among the first generation of "digital natives" who are well versed in the incorporation of technology into social interaction. These students are well positioned to apply advances in communications to patient care. Even so, providers require training to effectively leverage these opportunities. Therefore, we recommend introducing telemedicine training into medical school curricula and propose a model for incorporation*.'' (Pathipati, A. S., Azad, T. D., &Jethwani, K., 2016).

A study about telemedicine education in Zürich, Germany in 2018 shows that by teaching the medical students an E-learning unit in a 3-hour course in five modules about telemedicine, the competency development showed a significant increase for the subcomponent's "knowledge" and "skills". The neutral attitude towards telemedicine at the beginning of the module changed to a positive opinion after the session (Kuhn, S., & Jungmann, F., 2018).

Studies about education in telemedicine at the Greek Medical University cannot be found.

According to an online research in Greek university websites and an international literature review on electronic learning in the field of health informatics, there are a lot of e-learning programs offered by universities in Greece. However, none of them is related to health informatics domain. It also said that future actions are necessary for the enrichment of e-learning studies in health informatics education. E-learnings are received positive in universities. ''*E-learning projects have given a unique dimension to education and a new way of teaching are explored*.'' (Zogas, Lialiou, Gallos& Mantas, 2013).

In appendix 4 the search strategy of this literature review can be found.

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Phase 1 understand

In the first phase, a lot of tools were used to fill in the design challenge and get to know more about the context of telemedicine. A steep analysis was made in The Netherlands. Stakeholder mapping, online survey/ needs finding, interviews, observations online survey, explorative research methods and opportunity framing were used during the first phase in Greece.

STEEP analysis

Process

STEEP Analysis is a tool to explore and determine the impact of macro-environmental trends in the context of the project topic (design challenge) as you should not limit your thinking just to the people you are designing for(Tshiteem, D. K., 2017). This tool was used in the first week to prepare for the period abroad.

Results

The most imported information we discovered was:
- 42,7% of the Greek population is between 25 and 54 years old. (IndexMundi, 2017).
- Unemployment has been declining from 20.9% in December 2017 to 18.6% in October 2018. (European Commission Directorate- General for Economic and Financial Affairs, 2019).
- Greece has only basic legislation that deals specifically with Telemedicine. There is no legislation that is considered an obstacle to the implementation of telemedicine services. More legislation is required to promote the further implementation of telemedicine services in Greece. (Momentum, 2012).

The result of the STEEP analysis is an overview of social and demographic, technology and economy aspects in Greece. This helped us to prepare our project in Greece and take the circumstances into account. These aspects did not contribute to formulate the design challenge.

Stakeholder map

Process

A stakeholder map is a mindmap that shows all the people or organisations that are involved in the design challenge. This tool was used because it was crucial to find important stakeholders and contact them. Starting this project, a stakeholder map was made and discussed with Miltos.

Later in the process, new input was needed to succeed formulating our design challenge, so the stakeholder map tool was used again but this time it was focused on health care in Crete.

Results

Brainstorming about the telemedicine stakeholder map together with Miltos led to contacting Vivi Katsouli, a woman working for Vodafone. She had a big role in spreading out the survey. The most important stakeholders of the first stakeholder map were

- Miltos Sakellariou: He is our supervisor and our key stakeholder to unlock the doors to the other stakeholders.
- Greek health care professionals: The survey to investigate the user need of telemedicine was send to them.
- Vodafone (Vivi Katsouli): To send the survey to the Greek health care professionals, also she gave us more information about the Vodafone telemedicine training.

The following stakeholders (Greek health care professionals and Vodafone) did not contribute to formulate the design challenge, because there were no needs that we were able to improve.

The second stakeholder map was more focused on stakeholders that could actually be contacted by us. This resulted in contacting students of the university, department of medicine. The most important stakeholders of the second stakeholder map were

- Escape room girl: She studies medicine at the University of Crete, when we told her about our project, she did not know what telemedicine was. We saw an opportunity to contact the medical students of the university.
- University of Crete: By using the tool exploration research method, we discovered that medical students are not being educated about the telemedicine system in Greece. Also, we had a conversation with Evi (professor and ERASMUS coordinator). She confirmed that there was no education provided to the medical students about telemedicine.This confirmed that this was indeed the case.
- Our own acquaintances/ family: This led to a conversation with an acquaintance of one of the group members. She told us the required health care professionals was not available and telemedicine was not used. This helped us to get a better picture of the Greek health care system, but did not contribute to formulate the design challenge.
- Hospital/ telemedicine centre: Miltos Sakellariou arranged an appointment at the telemedicine centre. The doctors in this centre told us a lot about the Vodafone telemedicine program and showed us how the equipment works. This did not contribute to formulate the design challenge, but it helped us understand how telemedicine works.

Survey/ needs finding

Process

The initial plan was to use interviews and observations to find customer needs.

During the project it became clear that was hard to arrange because of the language barrier and the status of doctors. Therefore, a survey about Telemedicine was developed using literature and brainstorm sessions. Miltos Sakellariou translated the survey in Greek so it was more accessible for doctors. The survey was sent to 81 Health care professionals all over Greece.

An analysis (appendix 30) and a prepositionforfurther research about the results of the survey (appendix 31) is written.

Results

The main result of the survey is that health providers are positive about telemedicine, mostly a score of 4 out of 5 is given about parts of telemedicine. This is a high score, what tells us that health care professionals are very positive about telemedicine.

The results of this survey came too late to use when formulating the design challenge. An analysis (appendix 30) and a preposition are made (appendix 31) to process the recommendations of the participants. In appendix 28a summary of the results can be found and in appendix 29 the detailed graphs and results are given.

In appendix 5 you can find the survey in English and in appendix 6 the Greek version. We also wrote an explanation of the survey with relevant literature for the accountability of the questions, which can be found in the appendix 7 for the English version and in appendix 8 the Greek version.

Other important results are:
- Immediate diagnosis by a specialist in remote places is an important advantage of telemedicine.
- Monitoring and prevention are frequently used parts of telemedicine.
- Telemedicine is very useful in remoted places.

Recommendations for improvement:
- A better internet connection.
- Faster responses of specialists.
- More equipment.
- More support from the specialist.
- More use in remoted places.
- Training for health care professionals.

Preposition further research based on the results of the survey:

Process

After we received the results of the survey, we already had found another design challenge due to time management. The results of the survey are analyzed, present in appendix 30. A preposition for further researchbased on the results of the survey (appendix 31), so the results can be further investigated.

Results

The result is a preposition for further research based on the results of the survey. In this preposition, therecommendations which are mentioned by the participants, are listed.

Interview and observation

Process

In the beginning of the project, interviews were seen as an important tool to find the needs of the 'customers'. During the project it became clear that interviews with healthcare/telemedicine professionals were hard to arrange because of the language barrier and the status of doctors. Therefore, a survey about Telemedicine was developed, which is a substitution for interviews.

Besides, two interviews were held. One with a general practitioner in Crete(appendix 9,10, 11 and 14) and one with Dutch experience experts(appendix 12, 13 and 15)of the healthcare on the Greek island Kos (Mrs. A).

In addition, a conversation with a third-year medical student and with the lady of the ERASMUS program of the University of Crete took place. Also, we spoke with the lady of the Vodafone telemedicine training in Greece.

Results

The outcomes of these interviews helped us understand the Greek healthcare system more. In the end, the results of theinterviews with the general practitioner and the Dutch experience expert were not used in formulating the design challenge. The problems expressed in the interviews were merely due to financial affairs in the Greek government and this would not be a realistic subject for the design challenge.

The most important aspects of the conversation with the third-year medical student, the lady of the ERASMUS program of the University of Crete and the lady of the Vodafone telemedicine training are summed up below.

Results interview medical student

She had read a telesurgery article and had to do an exam about it. This was all she knew about telemedicine. She told us she was interested in more information about telemedicine.

A lot of students who study in Crete are from another island (mostly smaller islands), sometimes they need to go back to their families because of family issues. The University of Crete does not offer such thing as an online program with all the lessons they get. So, if students miss a couple of days, they cannot get access to the lessons they missed. She told us this is a problem in Crete.

When we told her, we were planning on making an E-Learning or something like that she was predominantly positive, but told us the university did not offer such thing as online lessons. In this way, you always have access to the information of telemedicine. She thought it would be very helpful for the medical students, if they receive more information about telemedicine.

Results interview Erasmus program coordinator Crete (Evi)

She told us telemedicine education is not in the curriculum of the medical department of the University of Crete.

We told her about the ideas we have about education in telemedicine. She thought it was a good idea and wanted to help us. She contacted professors of the medical department, unfortunately we did not success to pursue this plan.

Results interview lady Vodafone telemedicine training

Doctors get a request to participate in the Vodafone telemedicine training, when they accept the request an appointment is made to have a teleconference. In this teleconference doctors are teached about the telemedicine equipment. It takes approximately 1 or 2 hours, to complete the Vodafone telemedicine training. The training is mainly focused on doctors who have medical degree and who have worked as a doctor for a long time.

The information of these 3 conversations is important to define the design challenge, because in these conversations' topics came up where we saw an opportunity. Also, topics were discussed that we had to consider later when developing the design challenge.

Explorative research methods

Process

Exploratory research is a is used to investigate a problem which is not clearly defined. It carries out when the topic needs more definition and is not intended to provide conclusive evidence but helps us to understand the problem better.

We spoke to a medical student in an escape room, she told us she had never heard about telemedicine. She became a new stakeholder in our stakeholder map. A couple days later, we took a better look at our stakeholder map and thought about doing some literature reviews. We found out, medical students in other countries receive education about telemedicine. We decided to ask the medical students of the University of Crete about their experience with telemedicine education.

We used a field research to see if the students at the medical university are educated about the telemedicine system and if so, is the education they are getting enough to work with the system after they graduate. We asked medical students of the university of all years the following questions:

- Do you study medicine?

Only If the answer is "yes" continue to the next question.

- which study year are you in?
- Do you know what the telemedicine system is?

Only if the answer is "yes" continue to the next question.

- how do you know about?
- What do you know about it?

Results

We spoke to 31 students and only two of them knew the telemedicine system from their own research. None of them was being educated about the system, however, the students were eager to learn more about the system after we explained what it was. This result led us to defining our new design challenge, we needed to do more research to get to the core question.

The graphs of this field research can be found in appendix 17.

Opportunity framing (analysis phase 1)

Process

At the end of the first phase we choose the tool opportunity framing to process and summarize all information. The tools help us to see opportunities whom we did not see at the beginning of the project (Tshiteem, D. K., 2017). The templates of opportunity framing have many benefits for us to use. By filling the templates, there is certainly that no information has been missed, the project team has a summary of the first phase that the can use whenever they need.

Results

The real issue that we are dealing with is that health care professionals in Greece have to deal with telemedicine while not knowing a thing about it in medical school. Hereby, it is important to educate the under graduated students about telemedicine. Graduated medical students can help patients better and not lose any time because of the training afterwards. Students can also have the opportunity to delve into telemedicine and contribute to the development of it. The aim is that every graduate student can provide care using telemedicine. The design challenge is: How might we educate the medical students about the telemedicine system and prepare them for the future of working with telemedicine, so they can provide better telemedicine healthcare for patients.

The tool opportunity framing gave us a summary of Phase 1 where we can go to the next phase with. The details of the tool are in the appendix 16.

Scopes

Scopes	Definition
Situation/ problem	Medical students in Greece are not being educated about telemedicine
Constraints	• Language barrier • The university will not accept our ideas or solutions • Our knowledge about telemedicine is insufficient (system/ equipment)
Objectives and outcomes	Students are educated about telemedicine during their medical study. So, patients are being treated more effectively with the help of telemedicine, especially on remoted places.
People	The patients in remoted places and health care professionals
Estimates	• Telemedicine center (knowledge about equipment) • Literature • Health care professionals
Scope	Yes, we got multiple stakeholders to find a possible solution for the design challenge
Design challenge	How might we educate the medical students about the telemedicine system and prepare them for the future of working with telemedicine, so they can provide better telemedicine healthcare for patients.

Validation of the design challenge

A survey is set up, the results showed us that the current telemedicine users do not experience any problems in particular. So, a different perspective of telemedicine was highlighted using the stakeholder map. Medical students were another stakeholder and we decided to investigate their connection with telemedicine.By using explorative research methods, we discovered that there was no education about telemedicine at the university. Students of all years were asked and no one had ever heard of the word ''telemedicine''. A conversation with a professor of the university confirmed that there was no education about telemedicine at the University of Crete. Literature research showed positive effects of telemedicine education in other countries. Doctors can participate in the Vodafone telemedicine training, but this training is only available for graduated doctors. So, the first months or years after students graduate, there is no knowledge about telemedicine. This led to our design challenge:***How might we educate the medical students about the telemedicine system and prepare them for the future of working with telemedicine, so they can provide better telemedicine healthcare for patients***.

Feedback supervisor

The initial plan was to design a product to improve the telemedicine system. Miltos indicated that it was more realistic to write a preposition for this. It was not achievable to implement a new idea in the system, because of time management and bureaucracy.

Miltos gave us the tip to send the survey trough Vodafone to the Health professionals instead of our own mail. He indicated that this would give us better results. Miltos was satisfied with our chosen target group and results of the first phase. He thought it was a good opportunity to find the design challenge for the students of the university.

In consultation with Miltos we decided that we could spread the survey using Vodafone's network. Miltos as our intermediary send the survey to Vodafone and they send it to the potential participants. Because he agreed with the students as a target group, we proceeded it in our project. Because of Miltos' indication we planned on making a preposition for the implementation of the telemedicine curriculum.

Connection phase 1 and 2

We worked a long time in phase 1, because when we arrived in Greece in became clear that no one knew if there really was a problem with telemedicine. Due to official rules and the ministry of Healthcare it took a long time to get to the design challenge. However, by applying different tools we have found our design challenge. In phase 2 we are continuing our project with the design challenge, found in phase 1, and going to make ideas to resolve the design challenge.

Phase 2 Ideate

After phase one, the design challenge was formulated, the next step was to come up with ideas that may help to solve the design challenge. By using ideation methods, a lot of ideas were generated and written down by every member of the project group. Three tools were used in ideation methods:

- Brainwriting
- Affinity diagram
- Kill your darlings.

Ideating methods
Brainwriting

Process

''Brainwriting is a method used to generate ideas with a number of participants in a group setting. It allows those included to improve and build upon each other's' ideas.'' (Reventlow&Thesen, 2017). Every member of the group had a white piece of paper, the timer was set on 2 minutes and all the ideas about the design challenge were written down. After 2 minutes, the papers were passed on to the next person. In this way, new ideas can arise from ideas of other group members.

Results

After 4 rounds, 33 ideas were generated which can be used for solving the design challenge. We discussed every idea and categorized them in the affinity diagram.A lot of ideas came out of this tool and it really helped to think about how to solve the design challenge in different ways.These ideas can be found in appendix 18.

Affinity diagram
Process

The affinity diagram helped us to categorize all the ideas, which were made with brainwriting. By putting the ideas in a matrix (the affinity diagram) they were categorized in: creative, not creative, realistic and not realistic. We talked about every idea and decided together were the idea should be placed in the matrix. After that, all the ideas which were marked as creative and realistic (these were marked as 'A-ideas'), were discussed. Another step-in the ideation method is to merge multiple ideas to one.

Results

By filling in the affinity diagram, we were able to categorize the ideas which were made during the brainwriting session. 6 ideas were marked as creative and realistic, we decided to combine these ideas:

E-learning
- Making educational video's
- Making a podcast with stories about their experience with the telemedicine system
- Writing or looking for articles to use in the E-Learning
- Inviting an expert to give a lecture about his experience with the telemedicine system
- Making an assignment were the students teach each other about telemedicine
- At the end of the E-Learning course we can ask the students if they are interested on an excursion to a remoted island to have an insight about the system.

In this way, we were able to choose more ideas as a possible solution for the design challenge. These ideas can be found in appendix 19.

Kill your darlings

Process
'Kill your darlings' means burning off your own ideas. It was applied after the affinity matrix was filled in, only to the 'A-ideas'. We talked about the negative points of these ideas.

Results
As a result of this tool, we decided together that making an E-Learning with some additional ideas would be a possible solution for the design challenge.In appendix 20 you can find the description of kill your darlings.

- Reventlow, von, C., &Thesen, P. (2017). *Design Thinking Doing, Methods and Tools*. Geraadpleegd van https://docs.google.com/viewer?a=v&pid=sites&srcid=ZGVmYXVsdGRvbWFpbnxtaW5vcmJle W9uZGJvcmRlcnMyMDE4MjAxOXxneDo3ZTQxMDJjMTkyMDUzMWEz

Why did we choose for developing an E-Learning?

- The information is always available, because it is in an online platform. This responds to the conversation we had with a medical student. She told us that students of the University of Crete, sometimes miss out on the information when they leave the island due to family issues or something else.
- It was a realistic and creative idea.
- It is possible to add multiple ideas we came up with while ideating methods.
- We could execute on time.
- Literature shows educating with E-Learning is effective (Cook D, Levinson A, Garside S, Dupras D, Erwin P, Montori V., 2008).

Analysis phase 2 (elevator pitch)

Process

Phase 2 is completed and for analyzing these results we have used the format of the elevator pitch. The results we collected in phase 2 are summarized and analyzed in these templates.

Results

Problem definition
Ourtarget groupmedical students of the University of Crete
Has the problemthat they are insufficiently prepared during university for working with telemedicine.
Inresearch we found medical students in various countriesare educated about telemedicine. This was the reason to investigate the telemedicine education in Crete. Field research shows, there is no telemedicine education in Crete. This was an opportunity for us to work with because there is no knowledge that telemedicine can be used.
A good solution shouldachieve that medical students became informed about telemedicine during university.
And at the same time that this information is always available, so no students miss out.

Solution idea
Our solution to address this problem is developing an E-Learning to provide the medical students of telemedicine knowledge. In addition, a description for a curriculum that complements the E-Learning is proposed.
Unlike, the Vodafone training for graduate doctors.
Our solution is given during university, so students can work with telemedicine directly after graduation. Besides, our solution gives students the opportunity to delve into telemedicine and ultimately this can contribute to the development of telemedicine.

Feedback supervisor

Miltos was content we came up with a lot of different ideas in phase 2. The ideas he really liked was the quiz after every week and to give the course in the form of an E-learning. He thought it was difficult to realize the excursion to remote places, because it is difficult to plan something like that in the school year of a medical student.

Because Miltos was content with our ideas to make an E-Learning and insert questions after a session we proceeded this. The idea for an excursion was included in the preposition for the implementation for the E-Learning (appendix 26).

Connection phase 2 and 3

Ideation in phase 2 led to generating ideas for the prototype, next some tools were used to select the best ideas and finally one idea was picked. In phase 3 this idea is going to be created and assessed.

Phase 3 create

The creation phase is about defining and validating design concepts. In the second phase, ideas were made and in this phasewe are going to make a prototype with these ideas. First, wireframing was used to generate ideas of the appearance of the e-learning. Then, a click dummy of the E-Learning was made and this was assessed by an expert's opinion. Next, the prototype of the E-Learning was made and a first draft of the preposition for an additional program was made and also assessed by an expert's opinion.

Wireframing

Process

In phase 3 of design thinking wireframing is used. We chose to use this tool to make multiple designs and ideas for the layout of the E-Learning. We started sketching wireframes by hand onA2 paper.

Results

From every wireframe, the best idea for the E-Learning design was selected:

- Small box with the possibility to indicate if you are interested in a telemedicine excursion→ This is not used in the E-Learning, but it is put in the preposition for the implementation of the E-Learning (appendix 26, practical exposure).
- Test/ questions after every part of the E-Learning→ After section telemedicine equipment and telemedicine devices (4 and 5), 10 questions are added to test the knowledge of the students.
- Arranging the information per island in the E-Learning design→ This was not possible to add in the lay-out of the Moodle Cyclades E-Learning.
- Divide podcast in experiences of doctors, patients and/or families → This is not used in the E-Learning, but it is put in the preposition for the implementation of the E-Learning (appendix 26, expert opinions)

These results were taken in consideration to the next method; Click dummies.

In appendix 21 the description of wireframing is shown.

Prototyping methods

Prototyping methods helps to visualize the ideas and concepts. The concepts can be empathized to the terms of the users and with that we will minimize the risk of failure.

Click dummies

Process

Click dummies allow you to showcase the users interface during the concept phase. A click dummie is used in the third phase of design thinking to make a small prototype of the E-Learning. In this way, we were able to show how we were planning on making the whole E-Learning. Also, we could receive feedback from our supervisor.

Results

We made a 2-week course of the E-Learning about types of telemedicine and the telemedicine equipment as a click dummie. We chose to make it about these two subjects, because this is what telemedicine is about. Other subjects, like history, benefits and future were less important according to the project group. Photo's where being used in the courses to give the students an idea about how the equipment looked like. In the beginning of the next weeks course we have a couple of questions about last week's information. In response to this click dummie, we received feedback and with this feedback we made the E-Learning. While checking the click dummie as a group we discussed several parts of the click dummie. As a result, we agreed on where to put the ''check yourself'' and that feedback on the questions is given right away, instead of at the end.

The accountability of the click dummie and the schematic representation of the click dummie can be found in appendix 22, 23, 24 and 25.

Validation methods (feedback supervisor)

Expert review
Process

To receive an expert opinion about the click dummie of our E-Learning we contacted Miltos Sakellariou. He is an expert with making E-Learnings also, he is a teacher, so he knows how to teach students in an efficient and effective way. During a skype meeting he gave us feedback about the click dummie.

Results

The feedback we received was:

- I like the photos and the other content;
- The structure is like a web-page and not like an E-Learning, this is a good idea;
- It is a good idea to add questions like a quiz;
- To add a forum is a good idea;
- The videos are a good idea, this makes it more interactive but try to make it even more interactive;
- Add more questions, because I think questions are a good way to let the students learn about telemedicine;
- Make the questions more specific and about Greece;
- Add the feedback on the answers directly after they have answered the question, do not give them only scores but give feedback about the question and answer;
- Focus more on the Greek telemedicine system.

The feedback we received was positive, Miltos Sakellariou told us we had already done a great job. With this knowledge we were able to move forward in the same way had made the click dummie and complete the E-Learning.

Analysis phase 3

During the third phase, three tools were used that can help us to develop the final project. The first tool is wireframing. First, we thought to place a small box in the E-learning to ask the students if they are interested in telemedicine excursion. However, this idea is not used in the click dummies or the end project. We have to discuss it with the university first, this idea is processed in the preposition.The idea to put questions in it is processed in the E-Learning. Literature shows that it is helpful and so, the E-Learning stimulates the interactive learning. We came up with the idea of dividing the information per island,unfortunately, this idea is not included in the click dummies or the E-learning. The reason is because it does not fit into the layout of the E-learning and the information thereof is not very important for the student. Finally, we had the idea to post a podcast about different experiences of doctors, patients, and families of the patients. Just like with the previous idea, it is not included in the E-learning that has to do with the fact that doctors are difficult to reach to record their experience. It is recommended in the proposition to add it in the future.

Thanks to click dummies a first version of the E-Learning is made, we were able to receive feedback of an expert (expert opinion) to improve parts of the click dummie in the official E-Learning. Miltos Sakellariou 's (expert opinion) main feedback was to make the E-Learning more interactive. We add more videos, article's, photos and question in the E-Learning to make it more interactive. Miltos Sakellariou is an expert with E-Learnings and teachings, so his feedback leads to more efficient and effective way to teach the medical students.

Connection phase 3 and 4

In phase 3 the analyzed ideas of phase 2 are processed in the idea of the E-Learning. A click dummie is made in phase 3 to show the idea of the E-Learning we are planning to make in phase 4. When we finished the click dummie, an expert opinion is received and this helps us by making the complete E-Learning.

Phase 4 develop

In this phase the tool ''applying design standards'' is used to develop the E-Learning. In phase 3, we turned our ideas of phase 2 into a click dummie. With the expert opinion we received, we were able to improve the click dummie and turn it to a realistic prototype in phase 4. This leads to the first version of the E-Learning.

Access to the E-Learning

To see the E-Learning you can go to: https://moodle.alteravita-cyclades.gr/login/index.php
Username: teacherrotterdam
Password: Rotterdam1

Applying design standards

Process

Developing this E-learning, we had to agree on design standards. This was very easy as we had the technical support of KOINSEP of Cyclades(Social Cooperative Enterprise of Cyclades). This program provided a standardized format to add text, articles, images and videos to the E-learning.

This made it very easy for us to apply design standards. There were a few things we had to agree on, for example the subjects per section, the amount of sections, length of each section, the font and font size, the amount of visual additions and the 'check yourself'.

The challenge was to individualize and define the e-learning and to make it 'wow'.

This was done by making the e-learning interactive. A lot of video's, images and articles were added. Also, a banner for every topic was made to personalize the e-learning. The photo in the background shows the coastline of Syros and was shot by Maess.

Results

The result was the final version of the e-learning. It has a personalized touch because of the returning recognizable banner and it is interactive. Also, an accountability report was written on the content of the e-learning, supported with evidence.

The accountability report can be found in appendix 24.

Preposition implementation E-Learning

Process

In appendix 23 the preposition for the implementation of the E-Learning can be found. In this preposition we explained how blended learning is applied in the telemedicine education. We did literature research to support what is important to implement the telemedicine curriculum. The purpose for the telemedicine education course is that graduated students can provide care using telemedicine.

Results

It is recommended to use the E-learning to inform the students about telemedicine. Conversations with 30 random medicine students in Heraklion from different years showed that telemedicine is not yet a familiar concept for them. This is remarkable because telemedicine is important in Greece.

E-learning is an ideal tool to inform students. First, Sitzmann T, Kraiger K, Stewart D, Wisher R. (2006) are describing E-Learning has the same effects as classroom/ face to face instruction. Cook D, Levinson A, Garside S, Dupras D, Erwin P, Montori V. (2008)have done a comparable research a couple years later and found the same results. Second, it is easy and unlimitedly accessible. Third, it is free. Fourth, it is interactive.

When using the E-Learning in university for medical students, only the E-Learning will not provide a sufficient effect. Also, classroom education should be added in the telemedicine education. That is why we researched blended learning. Various articles back up that blended learning is effective.

According to '*De effectiviteit van e-learning en de implementatie in het medisch*onderwijs' (Dankbaar, 2009) there are various factors that affect the process of implementation. Control, involvement, accompaniment and communication are all important points when it comes to implementing the e-learning.

To obtain full telemedicine knowledge and skills competences, the e-learning should be followed up by experience opinions, problem bases learning tools and practical exposure. In this way, the aim of the telemedicine education (every graduate student can provide care using telemedicine) can be realised.

Of course, it is not possible to add immediately this to the curriculum of the medical university of Crete. The content of this preposition should be discussed by the professors. It could be integrated in existing classes because telemedicine is applicable in various medical situations.

The details of this can be found in appendix 23

Feedback supervisor

The feedback we received after completing phase 4 is not only to make theE-Learning for medical students, but also to expand it for other departments that may use telemedicine. For instance, speech therapist, occupational therapist or psychologist.

Further feedback we have received is to personalize the E-Learning even more. Miltos was generally very positive about what we developed and thought that we are doing very well and said he believe that we are going to hand over an excellent final project.

Information about telemedicine for psychiatrist is added in the E-Learning, because this is related to medicine. Other paramedical professions are not included in the E-Learning but are put into the preposition of the implantation of the E-Learning (appendix 23).

Analysis phase 4 and connection phase 5

In phase four the e-learning was further developed and individualized. The purpose of this was to make the e-learning interesting and attractive. Literature evidence supported that this can enhance the motivation of students. In order for the e-learning to be successful, it must appeal to the students. This is the reason interactive and personal elements were added.

If this is actually working is uncertain but this will show in phase 5, when the product is evaluated.

The accountability report supports the e-learning with evidence. This is also important for the next phase in design thinking, because if the university puts the e-learning into use, they will want to know why it is designed like it is and it will ensure that the e-learning is taken seriously.

In phase 4 the E-Learning is completed, phase 5 is to deliver the E-Learning to the clients and they can use it for teaching the students. After a couple of months, the clients can evaluate the E-Learning with the tools described in phase 5.

Phase 5 roll out

In phase 5 2 tools are used, change management (review) and user interviews. Phase 5 is used to make a plan to implement the E-Learning in the future and to evaluate the telemedicine E-Learning course.

Change management
REVIEW

Process

Using the change management tool we gained understanding about the information that should be included in the preposition. Based on this, we searched for literature about implementing an e-learning in medical education.

Results

The result is a preposition for the implementation of the E-Learning. In this preposition is the change of management included and also ways to combine the e-learning with classroom education to make sure the telemedicine education is effective. This corresponds to the principles of blended learning. This is all supported with evidence. Because of this, the chance of a successful implementation is enhanced.

The preposition for the implementation of the E-Learning can be found in appendix 23. The description of the REVIEW tool can be found in appendix 27.

User interviews:

Process

With this e-learning, the project is not yet finished. When the e-learning has been used for a while, it is important to evaluate it with the users. We wanted to give the participants the opportunity to give their opinion about the e-learning to make it better in the future.

Results

A short survey is attached to the e-learning in the last section. Participants have the possibility to fill in their opinion about the course. After one semester after the implementation, the evaluation is taken in consideration and accordingly the survey will be adjusted. This connects the circle of design thinking with phase 1.

Verwijzennaarbijlage

Analysis phase 5

By making the preposition of the implementation of the E-Learning, we gave the University guidelines to succeed the telemedicine education course. By recommending to insert the E-Learning and preposition in current courses of the University, we tried to make this course realizable. We are not qualified to implement our plans in the University, this role belongs to the curriculum supervisor. Unfortunately, we were not able to speak to this person.

We have developed a survey sothe E-learning can be evaluated in the future. With the results of the evaluation a new report can be made with the help of Design Thinking Method to further improve the E-Learning.
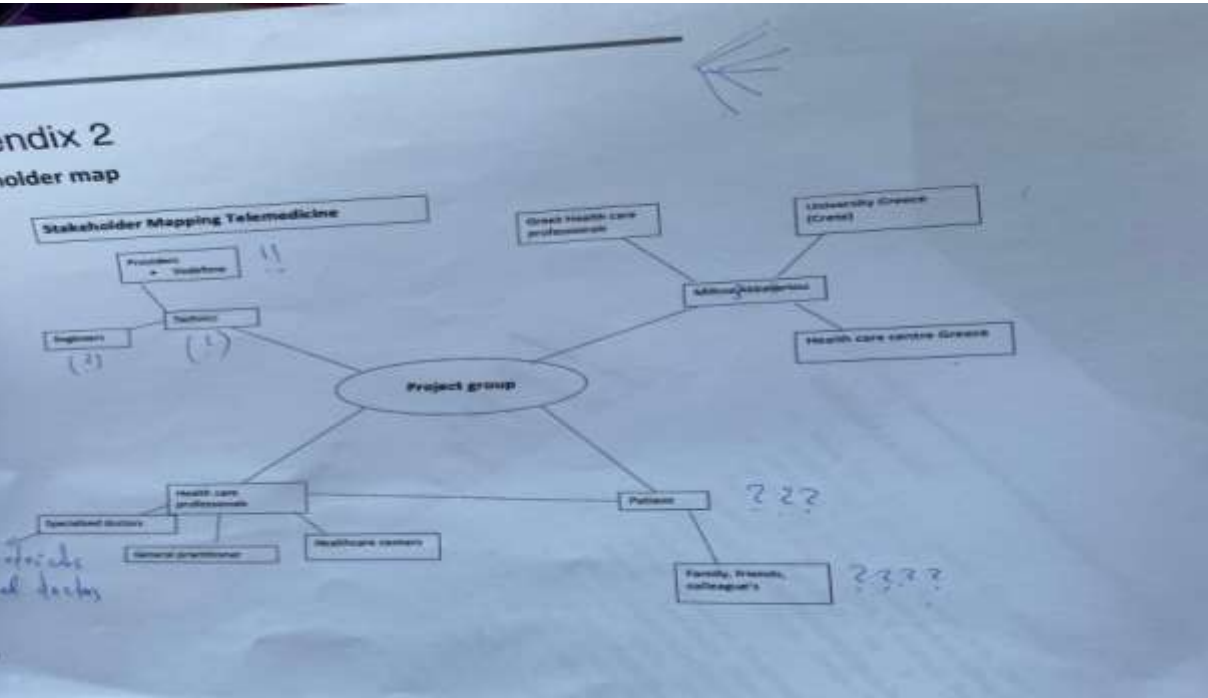
Feedback supervisor

Appendix

Appendix 1: STEEPanalyses

STEEP	

Social and Demographics	- [The population of Greece](#) is 10.773.253 (2016)
	   ○ **0-14 year:** 13,93%
	   ○ **15-24 year:** 9,68%
	   ○ **25-54 year:** 42,71%
	   ○ **55-64 year:** 13%
	   ○ **65 year and over:** 20,68%
	
	- In 2011 census found the population was comprised of Greek citizens (91%), Albanian citizens (4.5%), Bulgarian citizens (0.7%), Romanian citizens (0.4%), Pakistani citizens (0.3%) and Georgian citizens (0.25%).
	- 97,7% of the population of Greece over the ego of 15 can read and write (2015)
	- 25,1% of the population has obesity (2014)
	(IndexMundi, 2017)

Technology	[government appropriations for Research & Development](#) (R&D) in Greece rose to pre-crisis levels (GBARD index). An increase was noted in private investment in R&D in Greece, as recorded by the final R&D expenditure indicators for 2017. At the same time, 2017 saw a rise in the employment of R&D personnel. (National Documentation Centre, 2019) Greece has only basic legislation that deals specifically with [telemedicine.](#) There is no legislation that is considered an obstacle to the implementation of telemedicine services. More legislation is required to promote the further implementation of telemedicine services in Greece. (Momentum, 2012)
Economy	The [economy](#) of Greece is based mostly on the service and industry sector, with agriculture providing about 3% of the total gross domestic product of the country. Its industries include tourism, merchant shipping (being the largest merchant marine in the world in terms of total capacity), and a producer of agricultural products. In the primary sector, Greece is the largest producer of cotton and pistachios in the European Union. Other important agricultural products include rice, olives, tomatoes, watermelons, and tobacco. Organic farming has also increased considerably in the country. [Unemployment](#) has been declining from 20.9% in December 2017 to 18.6% in October 2018 (European Commission Directorate-General for Economic and Financial Affairs, 2019)

- Tshiteem, D. K. (2017). *Design Thinking the Guidebook*. Geraadpleegd van https://docs.google.com/viewer?a=v&pid=sites&srcid=ZGVmYXVsdGRvbWFpbnxtaW5vcmJleW9uZGJvcmRlcnMyMDE4MjAxOXxneDpmMzJjMzdhZWQzMDI2NjQ

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- IndexMundi. (2017). *Griekenland Profiel Demografie 2017*. Opgehaald van Indexmundi: https://www.indexmundi.com/nl/griekenland/demografie-profiel.html

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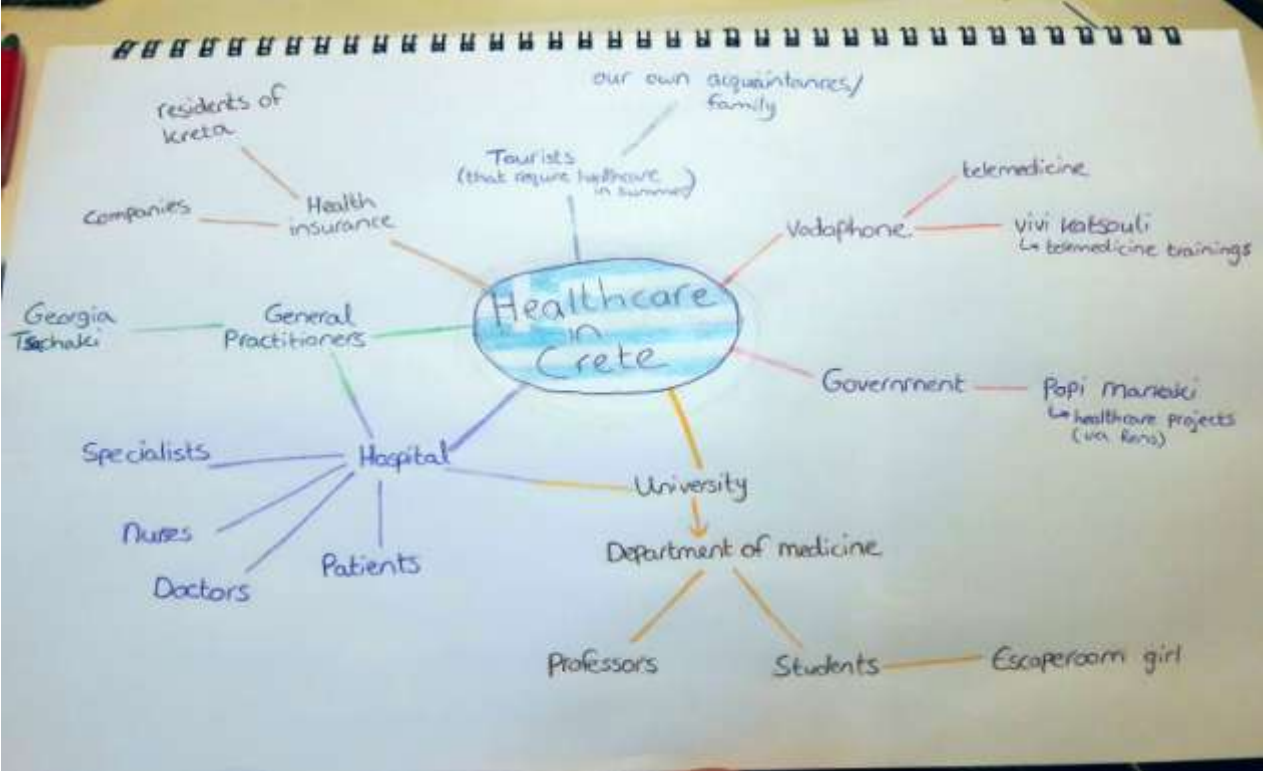
- Tshiteem, D. K. (2017). *Design Thinking the Guidebook*. Geraadpleegd van https://docs.google.com/viewer?a=v&pid=sites&srcid=ZGVmYXVsdGRvbWFpbnxtaW5vcmJle W9uZGJvcmRlcnMyMDE4MjAxOXxneDpmMzZjMzdhZWQzMDI2NjQ

- done

Appendix 2: first stakeholder map

Appendix 3: second stakeholder map

Appendix 4: literature search strategy

Database	Search	Hits	Comments
START	Telemedicine	44.741	2 articles used for definitions telemedicine and E-Health.
START	Telemedicine (only scientific articles)	45.580	A lot of useful articles
START	Telemedicine (only scientific articles and publication 2019)	2868	Useful articles, positive effects of telemedicine named in these articles. Also, a few articles who seemed used but we needed to pay for it.
START	Telemedicine Greece	16	No usable articles.
CINAHL-COMPLETE	Telemedicine	16.749	A lot of articles
CINAHL-COMPLETE	Telemedicine (only scientific articles and from 2005 till 2019)	11.162	Also, a lot of useful articles
CINAHL-COMPLETE	Telemedicine Greece (2015 till 2019)	1	Positive effects of telemedicine described
PUBMED	Telemedicine and education	6218	A lot of useful articles
PUBMED	Telemedicine in medical education (2014 till 2019)	647	1 useful article about telemedicine education in Germany.
PUBMED	Telemedicine and telecare (last 5 year)	554	We found a journal of telemedicine and telecare and used a lot of articles out of it. Mostly the articles out of 2019.
Journal of telemedicine and telecare	-	-	We found the international society for telemedicine and E-Health. It is a site of the World Health Organisation.
HUGO (Hogeschool Utrecht)	Telemedicine in Greece	333	Useful article for describing the telemedicine equipment
HUGO (Hogeschool Utrecht)	Telemedicine AND education	6963	A lot of articles from all over the world
HUGO (Hogeschool Utrecht)	Telemedicine AND education (last 5 year)	2331	Useful articles
HUGO (Hogeschool	Telemedicine	67	A lot of articles from

Utrecht)	education in Greece		2003
HUGO (Hogeschool Utrecht)	Telemedicine education in Greece (last 5 years)	19	No useful articles

In the bibliographic of the articles we used we founded other useful articles we used. These are not included in the search strategy, but we used them in our literature review.

Appendix 5: telemedicine survey (English version)

Dear participant,

This survey is about telemedicine and consists of 16 questions. The survey is sent to you by four Dutch students of the Rotterdam University of applied sciences. They are currently living in Crete for their project about telemedicine. Their goal is to research telemedicine and to find out the experiences and needs of telemedicine stakeholders.
Filling in this survey takes about 7-10 minutes and it will be of great help. The survey is anonymous, and the answers will only be used for the project of the students.
If you have any questions you can contact Laura van Weelde, lauravanweelde@gmail.com, +31637349288

1. What is your gender?
   - Man
   - Woman

2. What is your age?
   - open question

3. Do you work on an island?
   - Yes
   - No

4. In which city/village do you live (and/or work)?
   - Open question

5. Number of years you practice medicine:

6. Number of years you are involved in Vodafone Telemedicine Program:

7. What is your role in the telemedicine system?
If you are a specialized doctor or nurse, please fill in what your department is.
   - General practitioner
   - Specialized doctor (possibility to type)
   - Nurse (possibility to type)
   - Other (possibility to type)

8. What percentage of your working hours are spent on telemedicine?
   - 0%-20%
   - 20% - 40%
   - 40% - 60%
   - 60% - 80%
   - 80% - 100%

9. For what purpose do you use telemedicine mostly? Multiple answers are possible.
   o Prevention
   o Real-time
   o Store and forward
   o Remote monitoring
   o Specialist consultation
   o Other (possibility to type)

10. Rate the following aspects of telemedicine (0= extremely ineffective and 5= extremely effective) + irrelevant.
    o Your expertise on ICT
    o The initial education and training about Vodafone telemedicine provided
    o Training and support
    o Comfort with provider interaction
    o Reliability of technology
    o System speed
    o Information security
    o Data quality

11. Rate the following Vodafone telemedicine devices on a scale from 0-5 ((0= extremely ineffective and 5= extremely effective). If you do not use the device, please click 'irrelevant'.
    o Blood pressure monitor
    o Oximeter
    o Glucose monitoring device
    o Cholesterol and triglycerides meter
    o Electrocardiograph machine
    o Spirometer
    o Other (fill in)

12. Using telemedicine is clear and comprehensible for me.
    o Strongly disagree – disagree – neutral – agree – strongly agree

13. I know how to use telemedicine devices and how they work
    o Strongly disagree – disagree – neutral – agree – strongly agree

14. Telemedicine is easy to use.
    o Strongly disagree – disagree – neutral – agree – strongly agree

15. What are positive points about telemedicine?

_____
_____
_____

16. What is needed to make telemedicine even better?

_____

_____

_____

Thank you for taking the time to complete this survey. We truly value the information you have provided. Your responses will contribute to our analyses to help improve the Telemedicine system if needed. If you have any comments on the survey or the project, please leave a comment below.

Many thanks,

Laura, Katinka, Ali, Maess
Students of Rotterdam University of Applied Studies

Appendix 6: telemedicine survey (Greek version)

Αγαπητέ/η συμμετέχοντα,

Αυτή η έρευνα αφοράτηντηλεϊατρική και αποτελείται από 16 ερωτήσεις. Η έρευνα σας αποστέλλεται από τέσσεριςολλανδούς φοιτητέςτου Πανεπιστημίου εφαρμοσμένων επιστημώντουΡότερνταμ. Σήμερα ζουνστηνΚρήτηγια τοέργοτουςσχετικάμετηντηλεϊατρική. Σκοπός τουςείναι να ερευνήσουντηντηλεϊατρική και να βρουντιςεμπειρίες και τις ανάγκεςτωνενδιαφερομένων τηλεϊατρικής.

Η συμπλήρωση αυτήςτηςέρευνας διαρκεί περίπου 7-10 λεπτά και θα είναι πολύχρήσιμη. Η έρευνα είναι ανώνυμη και οι απαντήσεις θα χρησιμοποιηθούν μόνογια τοέργοτωνφοιτητών.

Εάνέχετε οποιεσδήποτε ερωτήσεις, μπορείτε να επικοινωνήσετεμετην Laura van Weelde, lauravanweelde@gmail.com, +31637349288.

1. Ποιοείναι τοφύλο σας;
○ Άντρας
○ Γυναίκα

2. Ποια είναι η ηλικία σας;
○ ανοιχτή ερώτηση

3. Εργάζεστεσεένα νησί;
○ Ναι
○ Όχι

4. Σε ποια πόλη / χωριόζείτε (ή / και εργάζεστε);
○ Ανοίξτετην ερώτηση

5. Αριθμόςετώνάσκησης ιατρικής:

6. Αριθμόςετών πουσυμμετέχετεστοΠρόγραμμα Τηλεϊατρικής

7. Ποιοςείναι ο ρόλος σας στοσύστημα τηλεϊατρικής;
Εάνείστεεξειδικευμένοςγιατρός ή νοσηλευτής/τρια, παρακαλούμεσυμπληρώστε τοτμήμα πουέχετε.
○ Γενικός ιατρός
○ Εξειδικευμένοςγιατρός (δυνατότηταγραφής)
○ Νοσηλευτής/τρια(δυνατότητα πληκτρολόγησης)
○ Άλλο (δυνατότητα πληκτρολόγησης)

8. Ποιο ποσοστότωνωρώνεργασίας σας, δαπανάταιγια τηντηλεϊατρική;

○ 0% -20%

○ 20% - 40%

○ 40% - 60%

○ 60% - 80%

○ 80% - 100%

9. Για ποιολόγοχρησιμοποιείτε κυρίωςτηντηλεϊατρική; Είναι δυνατές πολλές απαντήσεις.
   o   Πρόληψη
   o   Διάγνωσησε πραγματικό χρόνο
   o   Αποθήκευση και προώθησητηςεξέτασης
   o   Απομακρυσμένη παρακολούθηση
   o   ΕιδικήΔιαβούλευση.
   o   Άλλο(δυνατότητα πληκτρολόγησης)

10. Αξιολογήστετις ακόλουθες πτυχέςτηςτηλεϊατρικής (0 = εξαιρετικά αναποτελεσματική και 5 = εξαιρετικά αποτελεσματική) + N/A δενχρησιμοποιώ

○ Η εμπειρία σας στις ΤΠΕ

○ Η αρχικήεκπαίδευση και κατάρτισητηλεϊατρικής πουείχα

○ Κατάρτιση και υποστήριξη

○ Άνεσημετην αλληλεπίδραση παροχέων

○ Αξιοπιστία τηςτεχνολογίας

○ Ταχύτητα συστήματος

○ Ασφάλεια πληροφοριών

○ Ποιότητα δεδομένων

11. Αξιολογήστετις ακόλουθεςσυσκευέςτηλεϊατρικής σεκλίμακα από 0-5 ((0 = εξαιρετικά αναποτελεσματική και 5 = εξαιρετικά αποτελεσματική).

Εάνδενχρησιμοποιείτε τησυσκευή, κάντεκλικστο «άσχετο».

○ Έλεγχος πίεσης αίματος

○ Οξύμετρο

○ Συσκευή παρακολούθησηςτηςγλυκόζης

○ Μετρητήςχοληστερόλης και τριγλυκεριδίων

○ Μηχάνημα ηλεκτροκαρδιογραφήματος.

○ Σπιρόμετρο

○ Άλλο(συμπληρώστε)

12. Η χρήσητηςτηλεϊατρικής είναι σαφής και κατανοητήγια μένα.

○ Διαφωνώ έντονα - διαφωνώ - ουδέτερη - συμφωνώ - συμφωνώ απόλυτα

13. Ξέρω πώς να χρησιμοποιώ συσκευέςτηλεϊατρικής και πώςλειτουργούν

○ Διαφωνώ έντονα - διαφωνώ - ουδέτερη - συμφωνώ - συμφωνώ απόλυτα

14. Η τηλεϊατρική είναι εύκοληστηχρήση.

○ Διαφωνώ έντονα - διαφωνώ - ουδέτερη - συμφωνώ - συμφωνώ απόλυτα

15. Ποια είναι τα θετικάσημεία για τηντηλεϊατρική;

_____

_____

_____

16. Τιχρειάζεται για να γίνει ακόμα καλύτερη η τηλεϊατρική;

_____

_____

_____

Σας ευχαριστούμε που αφιερώσατε τοχρόνο σας για να ολοκληρώσετε αυτήντηνέρευνα. Θα αξιολογήσουμε πραγματικά τις πληροφορίες πουέχετε παράσχει.

Οι απαντήσεις σας θα συμβάλουν στις αναλύσεις μας για τη βελτίωσητουσυστήματος τηλεϊατρικής, αν χρειαστεί.

Ανέχετεσχόλια σχετικάμετηνέρευνα ή τοέργο, παρακαλώ αφήστεένα σχόλιο παρακάτω.

Σας ευχαριστούμε!

Laura, Katinka, Ali, Maess
Students of Rotterdam University of Applied Studies

Appendix 7: explanation survey (English version)

The first question is about the participants gender. To explore whether there may be a
certain Healthcare provider who experience the same obstacles can be catalysed in the same group
by certain properties. This question examines whether a gender experiences more, fewer or different
obstacles than the other gender

The next question is about age. This question examines whether age plays a role in experience
certain obstacles when using telemedicine
This question 'do you live on an island?' is asked to inspect if the health care provider lives in a place
where care is accessible or a remote place where few doctors are present.
Besides, we want to see if there are more, fewer or different obstacles for care providers on the
islands.
With the previous question, we do not have enough information to determine exactly whether the
place where the caregivers work is a remote place. That is why the participant is asked where he or
she lives. This question provides more clarification.

With the next question we want to know if care providers who practice medicine for a long period of
time experience different obstacles than care providers who have just started practice medicine.

The following question is about the number of years that the participant is involved in Vodafone
Telemedicine Program.Do caregivers who work with telemedicine for a longer time have more, fewer
or different obstacles while working with telemedicine?With question on the survey, we get a better
picture and an answer to the question above.

Thereafter, we ask about the participants role in the telemedicine system. Various health care
providers get in contact with telemedicine. By asking about the role of caregivers, we can distinguish
between the obstacles that each role encounters

By asking about the percentage of worked hours spent on telemedicine we get a better picture of the
importance of telemedicine for each care provider.

In 'Types of telemedicine' (Chiron health, n.d.) is spoken about different forms of telemedicine.
'Prevention' is about detecting diseases in an early stage within a risk group.
'Real time' means a live session between a doctor and a patient or another doctor. Store-and-
forward telemedicine is also called "asynchronous telemedicine." It is a method by which healthcare
providers share patient medical information like lab reports, imaging studies, videos, and other
records with a physician, radiologist, or specialist at another location. Remote monitoring is a
method that enables healthcare professionals to track a patient's vital signs and activities at a
distance. Remote monitoring is also useful for the treatment of chronic diseases. 'Specialist
consultation' means that one healthcare professional consults another healthcare professional for
advice (Chiron health, n.d.). This question is aimed at finding out if there is a specific type of
telemedicine that results in different answers to the survey.

The participants are asked to rate different aspects of telemedicine on a scale from 0 to 5. The different aspects of telemedicine are based on the Fishbone diagram shown in figure 1. The fishbone diagram is a visualization tool for identifying the root causes of quality problems. It summarizes potential causes for an effect or problem by sorting possible causes into categories (Chang, H, 2015). The group members made a selection of the aspects, the following eight were picked;

1. Expertise on ICT
2. Education and training
3. Training and support
4. Comfort with provider interaction
5. Reliability of technology
6. System speed
7. Information security
8. Data quality

It was not possible to ask feedback on all of the aspects, because the survey would take too much time and the target group is not involved in all of the aspects. These were the eight most relevant aspects for this project, according to the group members.
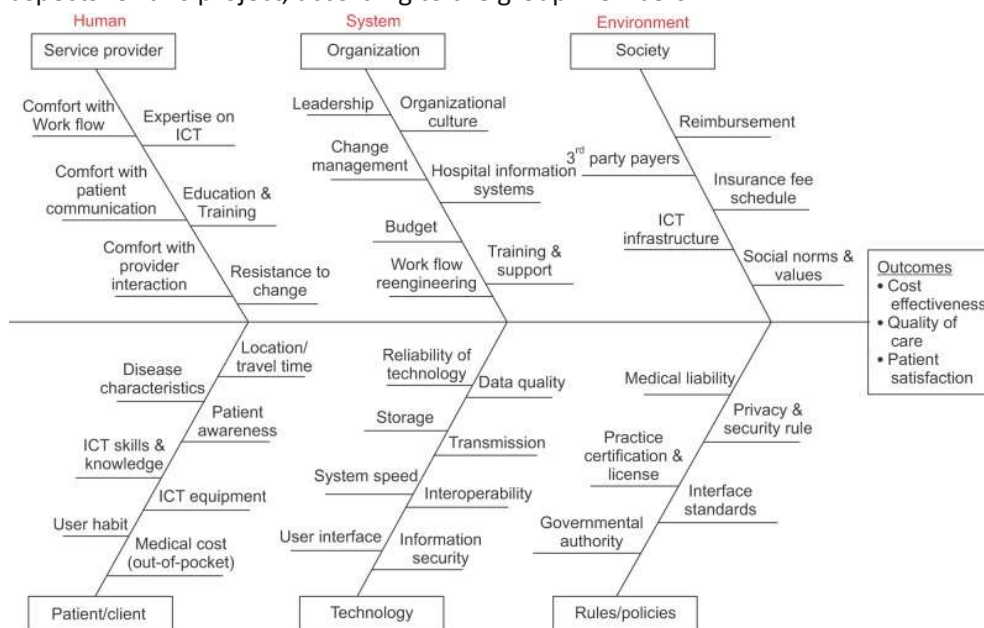

Figure 1

The participants are asked to rate on a scale from 0 to 5, whereby 0 = extremely ineffective and 5= extremely effective. There is also an 'irrelevant' option, in case the participant has never had to deal with this part. At first, we wanted to use a scale from 0-10 because this is the most used rating system in the Netherlands. However, this gave a confusing diagram in the online survey. The scale from 0-5 was more clearly and easier to fill in.

The next question reads: 'Rate the following Vodafone telemedicine devices on a scale from 0-5 (0= extremely ineffective and 5= extremely effective). If you do not use the device, please click 'irrelevant''. The answers are based on the information in 'Vodafone Telemedicine Program - Closer to Early Diagnosis, More Powerful!' (2018). The tests included in the Vodafone program are listed in this document. We compared this with the Questionnaire for the

Evaluation of Vodafone Telemedicine Program (Efthymiadis&NIkolaidis, 2015). The same tests were summed up in this questionnaire, that is why we chose to list these tests in our survey.

The next three questions are focusing on the overall experiences with telemedicine. The previous questions were zoomed in on smaller aspects, these three questions measure the impact of this on the overall experience. With these three questions we hope to get a complete view of the experiences and opinions about telemedicine. The questions are based on 'Telemedicine bijzorgprofessionals' (Nijhof, 2007).

The last two questions are open questions to give the participant the chance to write their own opinions. These opinions are very important for our research. The positive points are important to find out what should be maintained. The last question is meant to find out what things about telemedicine need improvement. We did not want to use 'negative points' because this implies that telemedicine is not good.

- Chang, H. (2015). Evaluation Framework for Telemedicine Using the Logical Framework Approach and a Fishbone Diagram. *Healthcare Informatics Research*, *21*(4), 230-238. https://doi.org/10.4258/hir.2015.21.4.230
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Appendix 8: explanation survey (Greek version)

ΕΠΕΞΗΓΗΣΕΙΣ ΓΙΑ ΤΗΝ ΕΡΕΥΝΑ

Το ερωτηματολόγιο τηςέρευνας μπορείτε να το βρείτεηλεκτρονικάστηνδιεύθυνση:

- Το πρώτοερώτημα αφοράτουςσυμμετέχοντεςως προςτοφύλο. Για να διερευνήσουμεεάν μπορεί να υπάρχουνορισμένοι πάροχοιπερίθαλψης που αντιμετωπίζουν τα ίδια εμπόδια και μπορούν να αναλυθούνστηνίδια ομάδα μεορισμένεςιδιότητες. Αυτή η ερώτησηεξετάζειεπίσηςεάνένα φύλο βιώνει περισσότερα, λιγότερα ή διαφορετικά εμπόδια από τοάλλοφύλοστηνχρήσητηςτηλεϊατρικής.

- Η επόμενηερώτηση αφοράτηνηλικία. Αυτή η ερώτησηεξετάζειεάν η ηλικία παίζεικάποιο ρόλοστηνεμπειρία ορισμένωνεμποδίων κατάτηχρήσητηςτηλεϊατρικής.

Αυτή η ερώτηση «ζείτεσεένα νησί;» καλείται να επιθεωρήσει αν ο/η πάροχοςφροντίδας υγείας ζεισεένα τόπο όπου η φροντίδα είναι προσβάσιμη ή σεένα απομακρυσμένο μέρος όπουεργάζονται λίγοιγιατροί και νοσηλευτές/τριες.

Εκτός αυτού, θέλουμε να δούμε αν υπάρχουν περισσότερα, λιγότερα ή διαφορετικά εμπόδια για τους παρόχους περίθαλψης στα νησιά.

Μετην προηγούμενηερώτηση, δενδιαθέτουμε επαρκείς πληροφορίεςγια να προσδιορίσουμεμε ακρίβεια αν ο χώρος όπουεργάζονται οιφροντιστέςείναι ένας απομακρυσμένος τόπος. Αυτός είναι ο λόγοςγια τον οποίο ο συμμετέχωνερωτάται πούζει. Αυτή η ερώτηση παρέχει περισσότερεςδιευκρινίσεις.

- Μετην επόμενηερώτησηθέλουμε να μάθουμεεάν οι πάροχοι υπηρεσιώνφροντίδας που ασκούν ιατρικήγια μεγάλοχρονικόδιάστημα αντιμετωπίζουν διαφορετικά εμπόδια από τους παρόχους περίθαλψης πουέχουνμόλις αρχίσει να ασκούν ιατρική.

  - Η ακόλουθηερώτηση αφοράτον αριθμό τωνετών που ο συμμετέχων συμμετέχειστο πρόγραμμα Τηλεϊατρικής. Οιφροντιστές πουεργάζονται μετηντηλεϊατρική για μεγαλύτερο χρονικόδιάστημα έχουν περισσότερα, λιγότερα ή διαφορετικά εμπόδια κατάτηνεργασία τουςμετηντηλεϊατρική ; Μετηνερώτησησχετικάμετηνέρευνα, έχουμεμια καλύτερηεικόνα και μια απάντηση στην παραπάνω ερώτηση.

  - Στησυνέχεια ,ρωτάμεγια τορόλοτωνσυμμετεχόντωνστοσύστημα τηλεϊατρικής. Διάφοροι πάροχοιυγειονομικής περίθαλψης έρχονται σε επαφήμετηντηλεϊατρική. Ρωτάμε σχετικάμετορόλοτωνφροντιστών, ώστε να μπορέσουμε να διακρίνουμε τα εμπόδια που ο καθένας συναντάει μέσα από τορόλοτου.

  - Ρωτάμεσχετικάμετο ποσοστότωνωρώνεργασίας που δαπανώνται για τηντηλεϊατρική, για να έχουμεμια καλύτερηεικόνα για τησημασία τηςτηλεϊατρικής για κάθεεργαζόμενο που παρέχει υπηρεσίες.

  - Στους « **τύπους τηλεϊατρικής** » (Chiron health , nd) γίνεται λόγοςγια διάφορεςμορφέςτηλεϊατρικής. Η **Πρόληψη**αφοράτην ανίχνευση ασθενειώνσε πρώιμοστάδιοσεμια πληθυσμιακή ομάδα κινδύνου.

Ως «**πραγματικός χρόνος**» νοείται μια ζωντανή συνεδρία μεταξύ ενόςγιατρού και ενός ασθενούς ή άλλουγιατρού.

 Η τηλεϊατρική **αποθήκευσης και προώθησης** καλείται επίσης "**ασύγχρονητηλεϊατρική"**. Πρόκειται για μια μέθοδομετην οποία οι πάροχοιυγειονομικής περίθαλψης μοιράζονται ιατρικές πληροφορίες ασθενών όπωςεργαστηριακές αναφορές, μελέτες απεικόνισης, βίντεο και άλλα αρχεία μεέναν γιατρό, ακτινολόγο ή ειδικόσεάλλητοποθεσία .

Η **απομακρυσμένη παρακολούθηση** είναι μια μέθοδος που επιτρέπει στους επαγγελματίες τουτομέα τησυγείας να παρακολουθούν από απόσταση τιςζωτικέςενδείξεις και δραστηριότητες του ασθενούς. Η απομακρυσμένη παρακολούθησηείναι επίσηςχρήσιμηγια τηθεραπεία χρόνιων παθήσεων .

Ως «**ειδικευμένηδιαβούλευση**» νοείται ότιένας επαγγελματίας υγείας συμβουλεύεται έναν άλλο επαγγελματία υγείας για συμβουλές (Chiron health, nd). Αυτή η ερώτηση αποσκοπεί στο να διαπιστώσει εάν υπάρχει αυτόςο συγκεκριμένοςτύπος τηλεϊατρικής και θα έχειως αποτέλεσμα διαφορετικές απαντήσειςστηνέρευνα.

- Οισυμμετέχοντες καλούνται να αξιολογήσουνδιαφορετικές πτυχέςτηςτηλεϊατρικής σεκλίμακα από το 0 έωςτο 5. Οιδιάφορες πτυχέςτηςτηλεϊατρικής βασίζονται στο**διάγραμμα Fishbone** που παρουσιάζεται στοσχήμα 1. Το**διάγραμμα Fishbone**είναι ένα εργαλείο απεικόνισηςγια τονεντοπισμό των βασικών αιτιώντων προβλημάτων ποιότητας . Συνοψίζει πιθανές αιτίεςγια την πρόκληση αποτελέσματος ή προβλήματος και μέσα από τη ανάλυση, πιθανές αιτίεςσε κατηγορίες (Chang, H, 2015).

  Τα μέλητηςομάδας έκαναν μια επιλογή από τις πτυχέςκαι επιλέχθηκανοιεξήςοκτώ:
  1. Εξειδίκευσηστις ΤΠΕ
  2. Εκπαίδευση και κατάρτιση
  3. Εκπαίδευση και υποστήριξη
  4. Άνεσημετην αλληλεπίδραση παρόχου
  5. Αξιοπιστία τηςτεχνολογίας
  6. Ταχύτητα συστήματος
  7. Ασφάλεια πληροφοριών
  8. Ποιότητα δεδομένων

Δεν ήταν δυνατόν να ζητήσουμε ανατροφοδότησηγια όλεςτιςπτυχές , διότι η έρευνα θα χρειαζόταν πολύχρόνο και η ομάδα στόχοςδενσυμμετέχεισεόλεςτις πτυχές. Αυτέςήταν οιοκτώ πιοσημαντικές πτυχές αυτούτουέργου, σύμφωνα με τα μέλητηςομάδας.

52
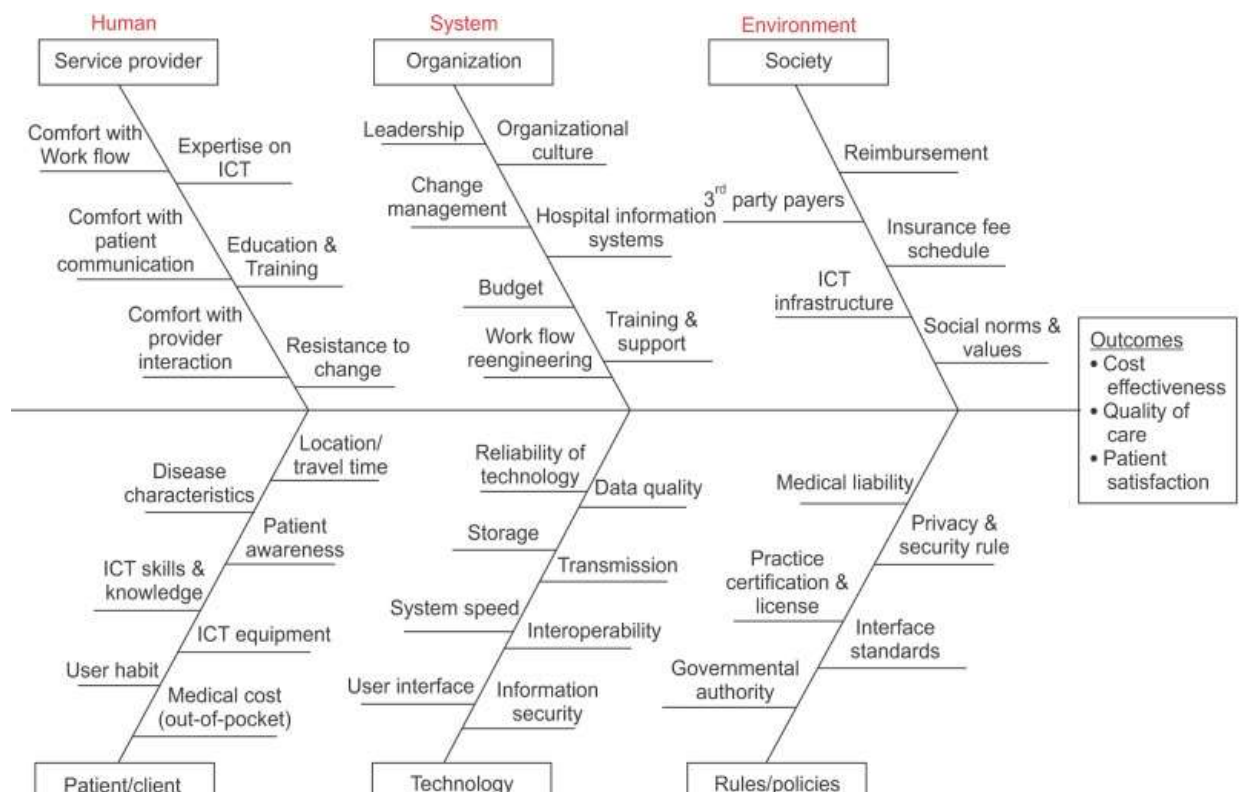
Σχήμα 1

- Οισυμμετέχοντες καλούνται να αξιολογήσουντηνκλίμακα από 0 έως 5, όπου 0 = εξαιρετικά αναποτελεσματική και 5 = εξαιρετικά αποτελεσματική. Υπάρχει επίσημια «N/A» επιλογή, σε περίπτωση που ο συμμετέχωνδενείχε ποτέ να αντιμετωπίσει αυτότο αντικείμενο. Αρχικά, θέλαμε να χρησιμοποιήσουμε μια κλίμακα από 0 έως 10, διότι αυτόείναι το πιοχρησιμοποιημένο σύστημα βαθμολόγησηςστιςΚάτωΧώρες. Ωστόσο, αυτόέδωσεένα σύγχρονο διάγραμμα στηνηλεκτρονικήέρευνα. Η κλίμακα από 0 έως 5 ήταν σαφέστερη και ευκολότερηγια να συμπληρωθεί.

- Η ερώτηση 11 έχειωςεξής: « Αξιολογήστετις ακόλουθεςσυσκευέςτηλεϊατρικής σεκλίμακα από 0-5 (0 = εξαιρετικά αναποτελεσματική και 5 = εξαιρετικά αποτελεσματική). Εάν δενχρησιμοποιείτε τησυσκευή, κάντεκλικστην επιλογή 'N/A' ' . Οιπληροφορίες βασίζονταιστοάρθρο : Vodafone Telemedicine Program - Closer to Early Diagnosis, More Powerful!' (2018).
  Οιδιαγνωστικές εξετάσεις που περιλαμβάνονται στο πρόγραμμα Vodafone παρατίθενται σε αυτότοέγγραφο. Συγκρίναμε αυτόμετο Ερωτηματολόγιο για τηνΑξιολόγησητου Προγράμματος Τηλεϊατρικής της Vodafone (Ευθυμιάδης & Νικολαϊδης , 2015) .
  Οιίδιεςδοκιμέςσυνοψίστηκαν σε αυτότοερωτηματολόγιο, γι αυτό επιλέξαμε να παραθέσουμε αυτέςτιςδοκιμασίες στηνέρευνα μας.

- Οι επόμενες τρεις ερωτήσεις επικεντρώνονται στιςσυνολικέςεμπειρίες τηςτηλεϊατρικής. Οι προηγούμενεςερωτήσεις προσεγγίστηκαν σεμικρότερες πτυχές, αυτέςοιτρειςερωτήσειςμετρούντον αντίκτυπο αυτήςτηςσυνολικήςεμπειρίας. Με αυτέςτιςτρειςερωτήσειςελπίζουμε να έχουμεμια πλήρηεικόνα τωνεμπειριών και των απόψεωνσχετικάμετηντηλεϊατρική. Τα ερωτήματα βασίζονται στο «Telemedicine bij zorgprofessionals » (Nijhof , 2007).

- Οιδύοτελευταίες ερωτήσειςείναι ανοιχτέςερωτήσεις πουδίνουνστονσυμμετέχοντα τηνευκαιρία να γράψειτις απόψειςτου. Αυτέςοι απόψειςείναι πολύσημαντικές για τηνέρευνά μας. Τα θετικάσημεία είναι σημαντικά για να μάθουμετι πρέπει να διατηρηθεί.
  Η τελευταία ερώτησηέχεισκοπό να αναδείξει ποια πράγματα χρειάζονται για τηντηλεϊατρική. Δεν θέλουμε ναχρησιμοποιήσετε «αρνητικές κρίσεις» , γιατί αυτό θα σημαίνει ότι η τηλεϊατρική δενείναι αναγκαία. Μέσα από τιςθετικές προτάσεις σας θα έχουμεμια καλύτερηεικόνα για τοτι πρέπει να γίνειγια την βελτίωσητηςΤηλεϊατρικής.

Σας ευχαριστούμε!!
Laura, Katinka, Ali, Maess
Students of Rotterdam University of Applied Studies

- Chang, H. (2015). Evaluation Framework for Telemedicine Using the Logical Framework Approach and a Fishbone Diagram. *Healthcare Informatics Research*, *21*(4), 230-238. https://doi.org/10.4258/hir.2015.21.4.230
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Appendix 9: key question list interview Georgia Tsachaki

1. How long have you been working with/using telemedicine?
2. What is your experience with telemedicine?
    1. What are positive points about telemedicine?
    2. What do you think are challenges when using telemedicine?
3. What is your opinion about telemedicine?

- What happens when a patient needs specialized healthcare?
- What happens when specialized healthcare is not available on the island?
- Does anyone have health insurance? Does it cover all healthcare?
- How is the communication with other doctors?
- What happens when there is an emergency?

- How is patient information kept?
- What does the practice look like, which tools are available?

Appendix 10: mind map telemedicine filled in by Georgia
Tsachaki
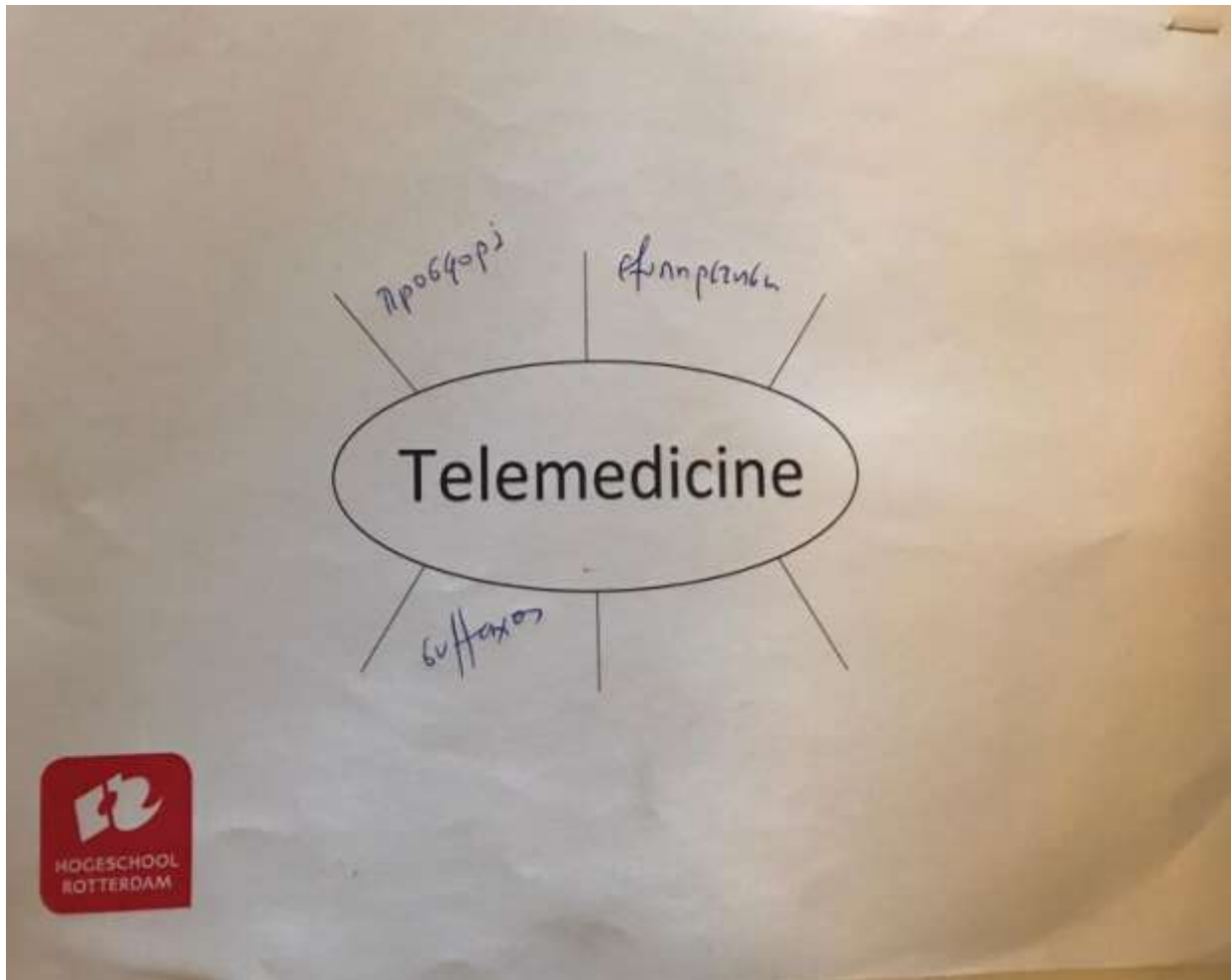
Appendix 11: interview and observation Georgia Tsachaki

Date of the interview: December 3th, 2019

This interview was not recorded, notes were taken during the interview. The description below is a summary of what was said. During the interview the questions asked different from the key question list, which can be because of spontaneous interaction.

First, we gave Georgia a mindmap with the word 'telemedicine' in the middle and asked her to write down three words that she thought of related to telemedicine. The words she wrote down were 'participation, service, special offer'.

How long have you been working with/using telemedicine?

Georgia Tsachaki is a general practitioner in Tylissos, Heraklion. She has been working the practice for 20 years. She has been using telemedicine for 3 years. She uses telemedicine mostly for the purpose of prevention and follow-up.

What are positive points about telemedicine?

Georgia told us that she had a memorable experience with telemedicine. She was with a patient with a heart disease and he/she needed immediate care. She called a number and she could talk to a cardiologist right away. She sends the cardiogram to him/her to hear the opinion of the cardiologist. This was very helpful, and this was a really positive experience she had with telemedicine. The direct contact with the specialist was really helpful and she would like to have this more often

What do you think are challenges when using telemedicine?

Georgia told us that she does not always have the right equipment. She would like to have more telemedicine devices. Also, she needs better equipment, so the measurements are be more precise.

What happens when a patient needs specialized healthcare?

This patient gets a referral to a specialist in the hospital. In the hospital of Heraklion are all the specializations

Does anyone have health insurance? Does it cover all healthcare?

Not everyone in Greece has a healthcare insurance. When someone does not have insurance, they can go to a public hospital.

There are also private hospitals, to go there the patient needs to pay approximately 15% of the costs.

How is the communication with other doctors?

Patients all have a file in the computer. When needed, this file is shared with other (specialized) doctors. This happens for example when a patient is referred to a hospital.

What does the practice look like, which tools are available?

Georgina gives us a tour of her practice. She has three rooms. One is the for consults. One room is for performing examinations, and minor surgery such as bandaging or suturing wounds. The other room is for gynaecology examinations.

There are several cabinets to store files and leftover medicines. The medicines are from patients that passed away. When we ask why the medicines are stored here, Georgia tells us that people need to pay for their medicines. Some people cannot afford this and that is why they don't take medicines. This is a problem. There are some social foundations that can help with this problem, for example the church.

Do you think that an e-learning about telemedicine would be helpful to learn more about telemedicine?

Georgia expresses that she thinks it might be helpful but for her it is sometimes hard to deal with digital tools because of her age. Also, the lack of time, because of the many patients, could keep her from taking an e-learning.

Appendix 12: topic list interview Mrs. A

- Explanation of the situation in Kos
- Healthcare facilities in Kos
- Communication with healthcare providers
- Communication between healthcare providers
- English skills of the healthcare providers
- Their situation in relation to telemedicine

Appendix 13: interview Mrs. A

Summary of the Interview with Mrs. A.

The interview with Mrs. A. was not recorded because it went via telephone. Therefore the description of the interview is a summarized transcription, divided in topics.

Mrs. A. (and her wife) were on a vacation on the Greek island Kos when their daughter got ill. They told us about their experience with the healthcare in Kos.

- **Explanation of the situation in Kos**

Mrs A. and her family was having a holiday on the Greek island Kos at the end of September. After a few days her daughter got ill, so they consulted the hotel doctor. The doctor did not exactly know what caused her illness. They also consulted a doctor from the Netherlands and told her what the symptoms were. This doctor told them she should get antibiotics. The clinical picture of their daughter was changing, thence it was hard to diagnose her properly.

In the night from Friday to Saturday, their daughter got high fever and needed to go to the hospital. They went to the hospital in a taxi, the hospital was about an hour driving away.

The paediatrician there was unavailable until Monday. The doctor that was available was unable to diagnose their daughter. They went back to the hotel and the next morning they went to a private clinic. This private clinic was about a half an hour drive away from the hotel and was located in the city. The doctor had his diagnosis almost immediately and prescript/adjusted medication for her. The costs were €150, this was later covered by insurance.

Mrs. A. and her wife talked to the local people of Kos when they were in the cab. They got the impression that the healthcare in Kos was of reasonable quality but there were long waiting times. Also, if people were willing to pay money, they would get help faster. Local people are not insured for private clinics and most of them cannot afford to go to such a clinic.

In addition, people were complaining about the distance to the hospital. In case of an emergency, there would simply be no time to drive for an hour to the hospital.

- **Healthcare facilities in Kos**

Their impression of the hospital was that it was very old and in decay. It felt like the hospital was located in a war zone. Their impression of the clinic was that it looked decent and clean.

- **Communication with healthcare providers**

The communication with the healthcare providers went well.

- **Communication between healthcare providers**

There was no communication between healthcare providers

- **English skills of the healthcare providers**

All healthcare providers spoke English well.

- **Their situation in relation to telemedicine**

Finally, we talked about telemedicine. I asked if it might have been of help if they could have consulted a paediatrician on another location in Greece, using telemedicine. Mrs. A and her wife indicated that this would perhaps had been of help.

According to the article '*National Telemedicine Network on the Aegean islands by the OTE Group'* (2016) Kos is covered by the telemedicine network. The question is why this facility was not used in this situation.

In conclusion the main problems with healthcare in Kos were
- The hospital was one-hour drive away
- The paediatrician in the hospital was unavailable until Monday
- The hospital building was old, in decay and remote
- Medication was unavailable in the pharmacies in small villages. It was only available in the city.
- Local people have to wait a long time to get medical care. If they want it faster, they probably have to give money to the healthcare providers to speed up the process.
- Most local people cannot afford to go to a private clinic
- It took a long time before the medication arrived at the hotel

The cause of these problems could be that there is little money available for the public hospital/healthcare.

- OTE group of companies. (2016, 11 april). *National Telemedicine Network on the Aegean islands by the OTE Group*. Retrieved 10 December 2019, from http://globalsustain.org/en/story/11074

Appendix 14: consent form filled in by Georgia Tsachaki

The goal of this interview for the students is gathering information about the telemedicine health care system. The students that perform the interview are from the Netherlands and they are in Greece for their Minor project. The project is aimed at investigating how telemedicine could be improved. The interviews need to be recorded in order to analyze the outcomes.
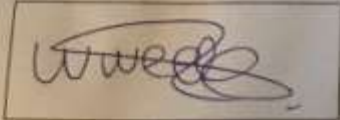
Name participant: Georgia Tsachaki
Name interviewer: Tanja van weelde
Date: 3/12/18

☑ I agree that the interview is recorded for transcription and analyses. The recording will not be used for any other purposes than the minor project. When the minor project is completed, the recording will be deleted.

Signature of the participant:

Signature of the interviewer:

HOGESCHOOL
ROTTERDAM

Appendix 15: consent form filled in by Mrs. A

Consent form

The goal of this interview for the students is gathering information about the telemedicine health care system. The students that perform the interview are from the Netherlands and they are in Greece for their Minor project. The project is aimed at investigating how Greek healthcare related to telemedicine could be improved.

Name/Initials *A.A Verlinden* participant:

Name interviewer: Katinka van Kasteel
Date: 09-12-2019

☑ I agree that the information collected during the interview is used in the telemedicine minor project. The information will not be used for any other purposes than the minor project.

Signature of the participant:

Signature of the interviewer:

Appendix 16: opportunity framing

<table>
<tr><td colspan="3">A.   Challenge or problem definition</td></tr>
<tr><td rowspan="3">Project sponsor</td><td>Organization name</td><td>Altera vita- social cooperative of the Cyclades</td></tr>
<tr><td>Address and contact</td><td>Agros P.R.E. 11, 84100 Syros</td></tr>
<tr><td>Contact person</td><td>Miltos Sakellariou</td></tr>
<tr><td>Project title</td><td colspan="2">Telemedicine in Greece</td></tr>
<tr><td>Design challenge</td><td colspan="2">How might we educate the medical students about the telemedicine system and prepare them for the future of working with telemedicine, so they can provide better telemedicine healthcare for patients.</td></tr>
<tr><td rowspan="2">Design challenge context and background information</td><td>What are the issues and opportunities that inspired this design challenge?</td><td>First, the aim was to improve the telemedicine system in Greece, but after research it became clear that was not needed. We did more research in telemedicine worldwide and found in other countries, medical students get education about telemedicine. This was the reason to investigate the telemedicine education in Crete. Field research shows, there is no telemedicine education in Crete. This was an opportunity for us to work with because there is no knowledge that telemedicine can be used.</td></tr>
<tr><td>Why does this challenge matter to the organization?</td><td>Altera vita is an organization that always busy improving the quality of health care. The medical student is the future doctor and so part of the health care. So, improving education will help the student in the future to use the system better. What will lead to a better quality of the health care</td></tr>
</table>

A. Challenge or problem definition

Project sponsor	Organization name	Altera vita- social cooperative of the Cyclades
	Address and contact	Agros P.R.E. 11, 84100 Syros
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Project title	Telemedicine in Greece	
Design challenge	How might we educate the medical students about the telemedicine system and prepare them for the future of working with telemedicine, so they can provide better telemedicine healthcare for patients.	
Design challenge context and background information	What are the issues and opportunities that inspired this design challenge?	First, the aim was to improve the telemedicine system in Greece, but after research it became clear that was not needed. We did more research in telemedicine worldwide and found in other countries, medical students get education about telemedicine. This was the reason to investigate the telemedicine education in Crete. Field research shows, there is no telemedicine education in Crete. This was an opportunity for us to work with because there is no knowledge that telemedicine can be used.
	Why does this challenge matter to the organization?	Altera vita is an organization that always busy improving the quality of health care. The medical student is the future doctor and so part of the health care. So, improving education will help the student in the future to use the system better. What will lead to a better quality of the health care

A. **Opportunity framing**	
Real issues behind this Design challenge	Health care professionals in Greece have to deal with telemedicine during their work as a doctor. In university there is no information provided about telemedicine. Thus, graduated doctors have to follow a training before they can adequately work with telemedicine. If they learn about this in university, they can help patients with telemedicine without losing time required for the training. Besides, providing information about telemedicine gives students the opportunity to delve into telemedicine and ultimately this can contribute to the development of telemedicine.
Inspirations from other solvings in this Design challenge	Our literature review shows, telemedicine education in the United Stated and in Germany has positive results.
Team contributions	The project team will make a report about the benefits of educating medical students about telemedicine and propose a prototype of the education system.
''HOW MIGHT WE'' Opportunity/ possibility statement	How might we educate the medical students about the telemedicine system and prepare them for the future of working with telemedicine, so they can provide better telemedicine healthcare for patients.

Appendix 17: explorative research method

31 students were being asked about the system. In the table shows which grade the students were.

Year	Number of students
First year	2
Second year	3
Third year	5
Fourth year	12
Fifth year	-
Sixth year	5
Master	1
Total	28

*2 students without a year

*1 was a researcher

- Do you study medicine?

Only If the answer is "yes" continue to the next question.

- which study year are you in?
- Do you know what the telemedicine system is?

Only if the answer is "yes" continue to the next question.

- how do you know about?
- What do you know about it?

Graphs of the explorative research method

Participant	1. Do you study medicine?	2. which study year are you in?	3. Do you know what the telemedicine system is?	4. how do you know about?	5. What do you know about it?
Student 1	yes	first year	No	-	-
Student 2	yes	first year	No	-	-
Student 3	yes	second year	No	-	-
Student 4	yes	second year	No	-	-
Student 5	yes	second year	No	-	-
Student 6	yes	third year	No	-	-
Student 7	yes	third year	No	-	-
Student 8	yes	third year	No	-	-
Student 9	yes	third year	No	-	-
Student 10	yes	third year	No	-	-
Student 11	yes	fourth year	yes	own research	mostly used in remoted places
Student 12	yes	fourth year	No	-	-
Student 13	yes	fourth year	No	-	-
Student 14	yes	fourth year	No	-	-
Student 15	yes	fourth year	No	-	-
Student 16	yes	fourth year	No	-	-
Student 17	yes	fourth year	No	-	-
Student 18	yes	fourth year	No	-	-
Student 19	yes	fourth year	No	-	-
Student 20	yes	fourth year	No	-	-
Student 21	yes	fourth year	No	-	-
Student 22	yes	fourth year	No	-	-
Student 23	yes	sixth year	No	-	-

Student 24	yes	sixth year	No	-	-
Student 25	yes	sixth year	No	-	-
Student 26	yes	sixth year	No	-	-
Student 27	yes	sixth year	No	-	-
Student 28	yes	master	No	-	-
Student 29	yes	-	No	-	-
Student 30	yes	-	No	-	-
Student 31	yes	reseacher	No	-	-
31,0	31		31	0	0

YEAR COMPERED WITH NUMBER OF STUDENTS

question compared with answers
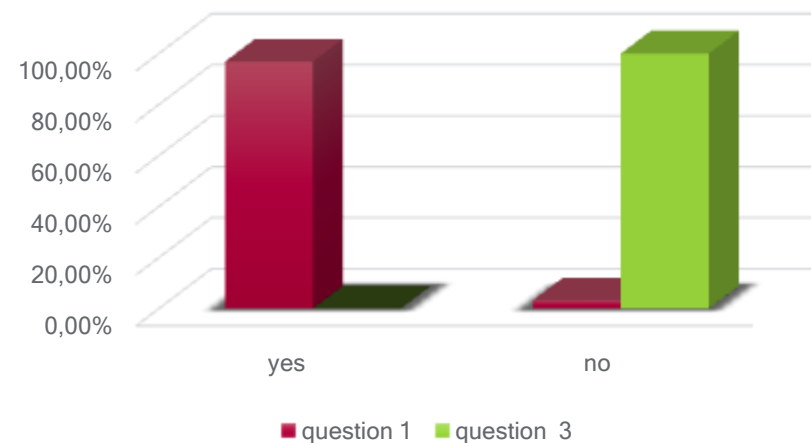
Appendix 18: ideating methods (brainwriting)

Round 1
Round 2
Round 3
Round 4

List 1:
- Interactive lessons about telemedicine
- Make an educational video → every week an educational video for the students
- Write a book
- Organize a symposium
- Vodafone Telemedicine Program (VTP) training on the University of Crete (given by Vodafone)
- Develop a telemedicine app or game → in this way, students are learning about telemedicine in a creative way.
- pMake an E-Learning (combine app/ game with the E-Learning)

List 2:
- Make an E-Book
- Give lesions about telemedicine
- Audiobook →podcast in which doctors and clients talk about their experiences with telemedicine
- One day introductory internship (training) → with a doctor who uses telemedicine regularly. Short internship for each student.
- E-Learning (app + E-Learning)
- Making an app for the students to stay up to date
- Students give each other lessons about telemedicine with information they found by doing research

List 3:
- Give lessons about telemedicine
- Write an article about telemedicine → let the students make an article about telemedicine with information they found by doing research → let the students make a presentation/ video/ assignment → E-Learning → make an E-Learning with can be followed by the medical students of the University of Crete
- Vodafone Telemedicine Program (VTP) training on the University of Crete (given by Vodafone)
- Invite doctors and clients to talk about their experience with telemedicine
- Furnish a classroom with telemedicine equipment, in this way students can practise and receive education about this equipment.

List 4:
- Give a presentation about telemedicine (by the students of Rotterdam University of applied science)
- Arrange an excursion to a telemedicine centre→ arrange a study trip to remote islands
- Vodafone Telemedicine Program (VTP) training on the University of Crete (given by Vodafone)
- Let students give a presentation to each other about telemedicine
- Professors and doctors give a presentation about telemedicine
- Make an E-Learning about Vodafone Telemedicine Program (VTP).
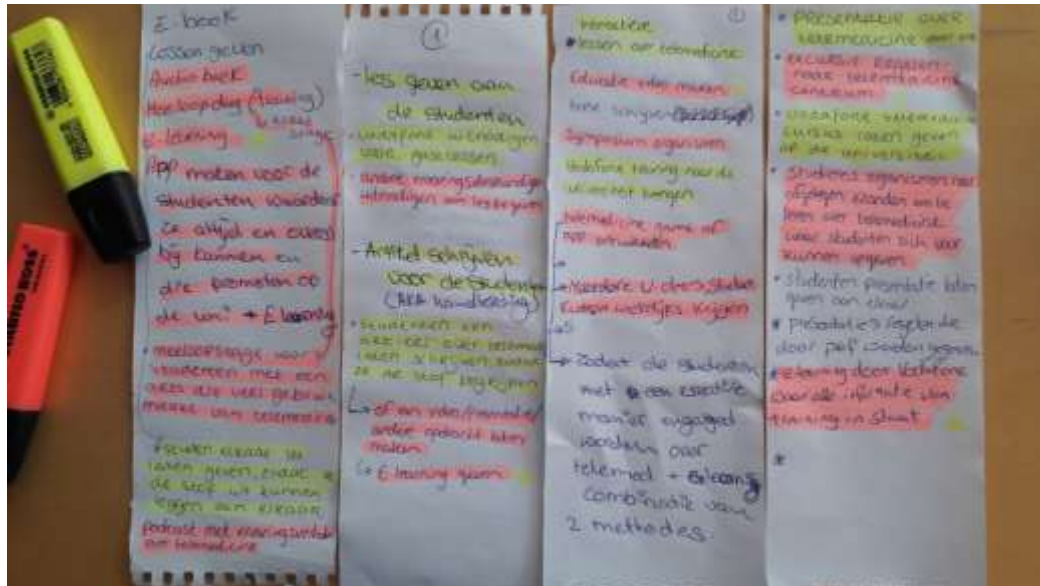
front side of the paper
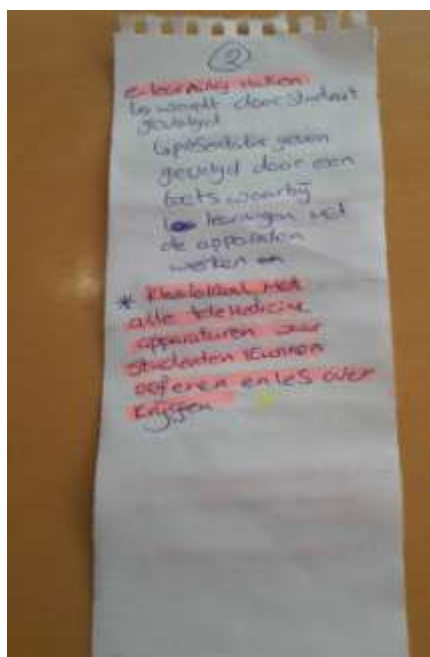
back side of the paper

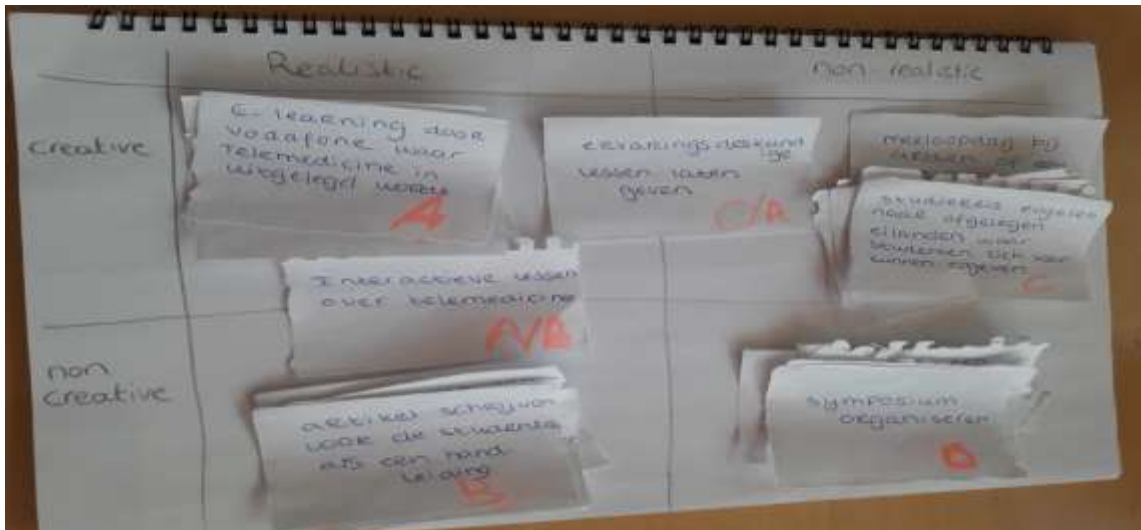# Appendix 19: ideating methods (affinity diagram)

<mark style="background-color:magenta">Creative</mark>
<mark style="background-color:yellow">Realistic</mark>
<mark style="background-color:magenta">Creative and realistic</mark><mark style="background-color:yellow">X</mark>

	Realistic	Non- realistic
Creative	A - Making an E-Learning where telemedicine would be explained - Making educational video's - Making a podcast with stories about their experience with the telemedicine system - An excursion to a telemedicine centrum for the students - Having interactive lessons about the telemedicine system - Inviting an expert to give a lecture about his experience with the telemedicine system	C - Making an e-book - Making an audiobook - Making a telemedicine game app - Making an app for the students to stay up to date about the telemedicine system - Making an excursion for the students to a remoted island - Inviting the students to a telemedicine centrum where they can experience a normal working day of an expert - Filling a classroom with telemedicine equipment where students get lectures of how to use them - Inviting an expert to give a lecture about his experience with the telemedicine system
Non-creative	B - Vodafone can give a course at the university - Writing an article for the students as a guidebook - HR students can give a lecture about the telemedicine system - The students write a article about the system and explain it to each other - A professor can give a lecture about the system - Having interactive lessons about the telemedicine system	D - Student give presentations to each other about the system - Students can teach each other about the system - Writing a book - Organizing a symposium for the students - Giving the students a test about the telemedicine system

Appendix 20: ideating methods (kill your darlings)

E-Learning about Vodafone Telemedicine Program (VTP)
- The University of Crete need to include the E-Learning in its regular University program or students need to do the E-Learning in their time off. We must to take into account that maybe it is not possible.
- We never made an E-Learning before, it will take a lot of time to make it and we do not have much time left.
- Students think an E-Learning is boring and will not make the E-Learning.

Education video about Telemedicine (one video or every week a video)
- We do not know how well the Greek medical students speak English and we do not speak Greek. In that case, we need to find a way to do the videos in Greek.
- The students think the videos are too long or too boring and never watch them.

Podcast in which doctors and patients talk about their experience with telemedicine
- We cannot find any doctor or patient who want to talk about their experience (privacy, no time).
- We do not know how to make a podcast, so first we need to find someone who can help us.

Arrange an excursion to a telemedicine centre
- There might be no time in the regular university program for an excursion.
- The transport from the university to the telemedicine centre cost too much.
- Doctors who work in telemedicine centres are too busy, they can not find any time to explain about the centre when the students are there.

Appendix 21: wireframing
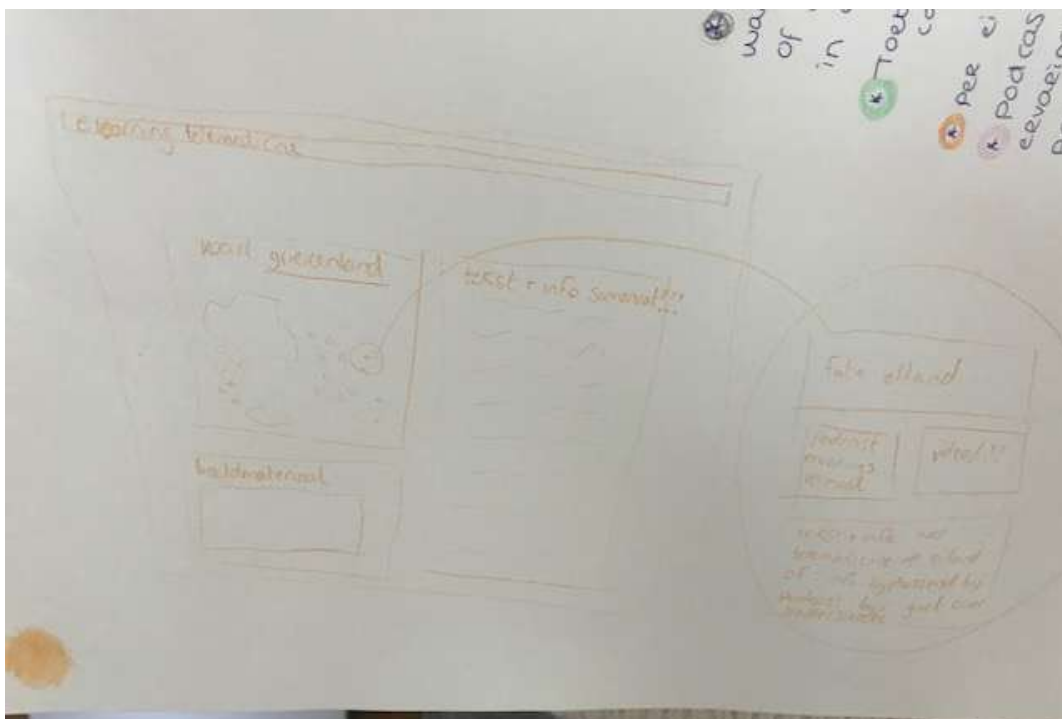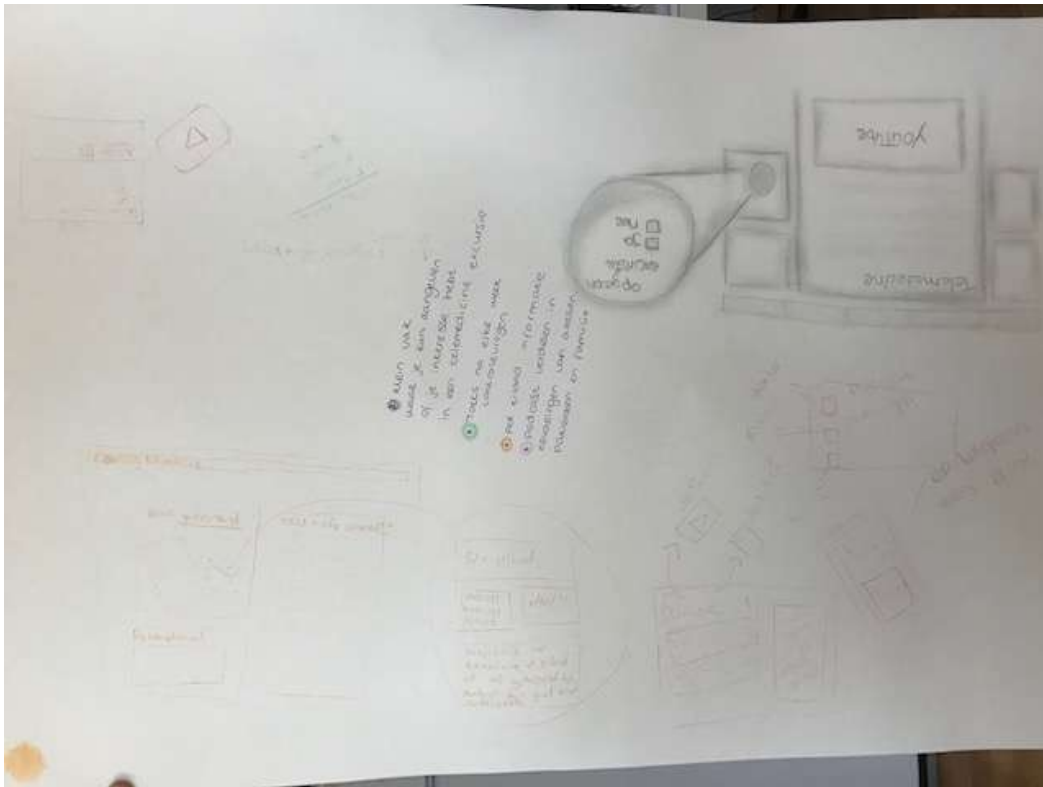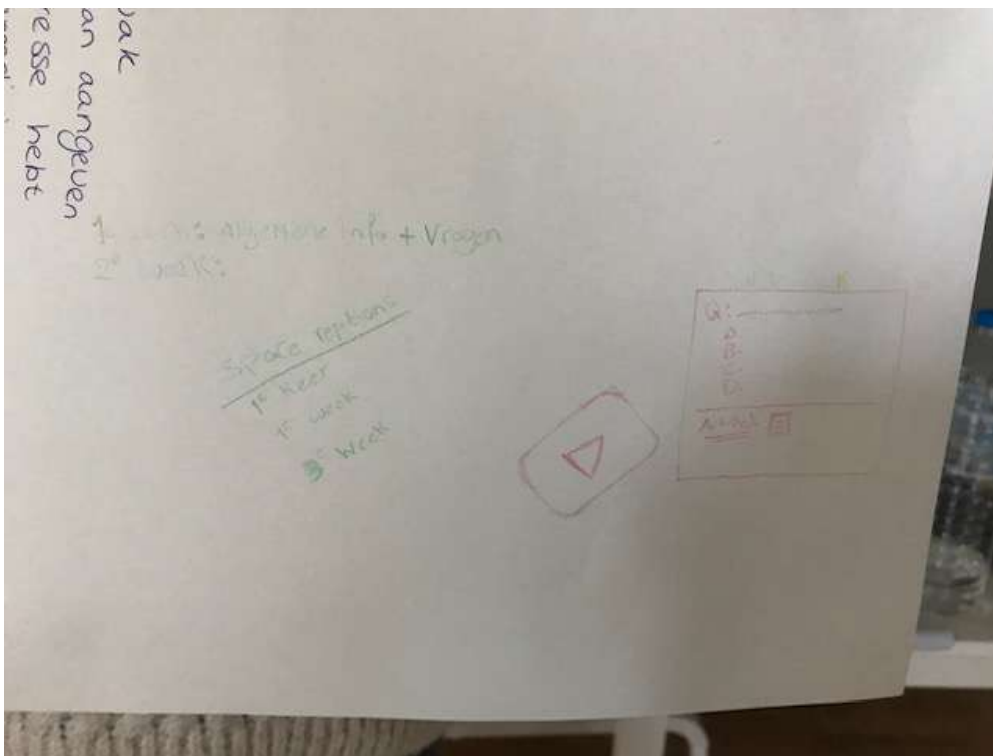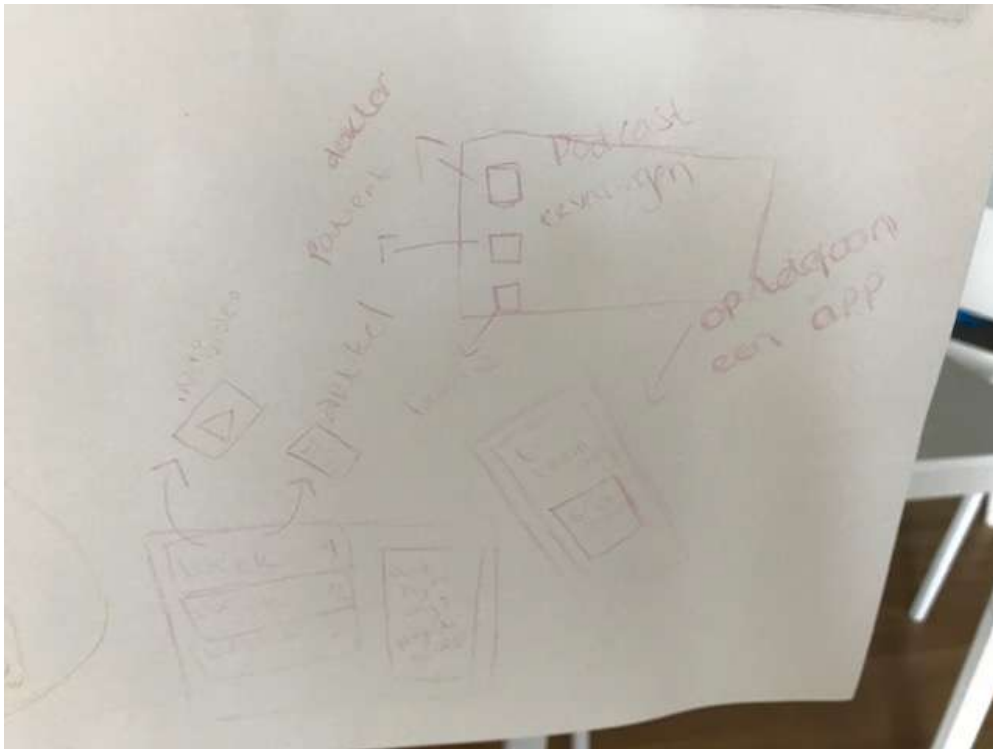
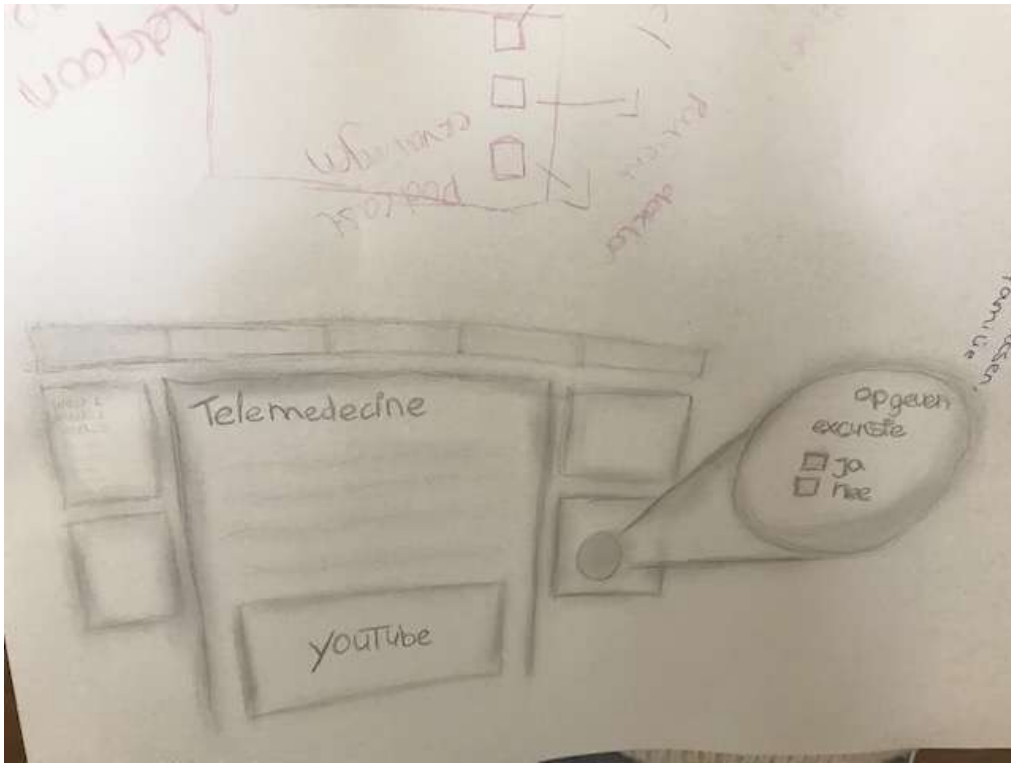# Appendix 22: click dummies (accountability)

Accountability report

Technological advances are changing and shaping our world. Nowadays most of the world population does have a cell phone and a laptop or a computer. Technology can be used in schools and universities. An ESCAR-study shows that Student of higher education use in a range of 6-10 hours a week doing online activities for school, work, and recreation. It also depends on the major they are actually doing at the university.(Caruso & Salaway, 2007)

According to an online research in Greek university websites and an international literature review on electronic learning in the field of health informatics, there are a lot of e-learning programs offered by universities in Greece. However, none of them is related to health informatics domain. It also said that future actions are necessary for the enrichment of e-learning studies in health informatics education. E-learnings are received positive in universities. ''*E-learning projects have given a unique dimension to education and a new way of teaching are explored*.'' (Zogas, Lialiou, Gallos& Mantas, 2013).

Another reason for choosing the E-learning is the lack of a learning platform in the university of Crete. Students cannot catch up on the lessons they miss at another time. An important benefit of the E-learning is that the student can organize their own time for learning the information About telemedicine.

Accountability of the content

The content of the E-learning consists of information about the types of telemedicine and equipment that are often used with their pictures. The lesson will be continued the following week with pop quiz and videos of the last weeks topic.

- Types of telemedicine: it is necessary for the users of telemedicine to know exactly which types of telemedicine there are. By knowing this information, they can use the right type of telemedicine in the right time.
- Equipment and their picture: Equipment are one of the most important components for the use of telemedicine. By giving future telemedicine users the right information about equipment will help them in the near future to understand the equipment more and can work with it more effectivity.
- Questions/pop quiz: During a study on effective learning, participants were divided into 4 groups. the first group studied the material once, the second group studied the material 4 times, the third group studied the material once and made a mind map about it and the last group studied the material once and then answered question about the material. The last group scored the best of the four groups at the verbatim as inference questions (Karpicke, J. D., & Blunt, J. R., 2011) This study shows that learning by answering questions is very effective, that is the reason that questions about the material have been added to the e-learning.
- Video's: The reason for choosing video in e-learning comes from that video is a very effective way of learning. In the article by Travis Bergwall, 2015 , 7 reasons are mentioned why videos are effective.

An example of this is that the part of your brain that visual information processes work much better than the textbooks and another reason is that video usually tells a story that is much more interesting than reading all of it.

Appendix 23: click dummie (content)

Types of telemedicine (E-Visit, 2018)

When a person thinks off telemedicine the first thought that will pop in their mind is a teleconference with doctor about acute health situations. So, there is no doubt that telemedicine is a great help in the acute cases but is actually more than that. Telemedicine can help in different ways. The types of telemedicine that we are going to discuss:

- o *Medications management*
- o *Triage*
- o *Prevention*
- o *Real time/ live telemedicine*
- o *Remote patient monitoring:*
- o *Store-and-forward*
- o *Specialist consulting*

Medication management

Patients with chronic diseases usually receive medication for a long time. when patients start taking new medication, it usually takes a while for the caregivers to find out whether the medication is effective and whether the patients have the correct dosage. the patients and caregivers have to address the side effect to determine if it is the right medication for the patients. The use of telemedicine by video and audio can ensure that the med checks can happen as much as necessary without placing a burden on both parties.

Triage

Patients with chronic illness can develop new symptoms. It is often difficult for the doctor to determine by telephone whether it is underline of a disease or a new disease that needs to be treated. Telemedicine can be used to quickly assess the new symptoms via video conversation. This way patients can be reassured or start a new treatment if the symptoms indicate new disease.

Prevention

Some patients can be a risk group for a certain chronic illness. To prevent them from developing chronic disease, patients usually need to change their lifestyle to ensure that patients are successful they need monitoring and support. It is often very difficult to book such an appointment, which is why telemedicine can play an effective role.

Real-time/live Telemedicine:

real-time/live telemedicine makes it for patients and doctors easy to have a visit anytime and anywhere they want. it is a two-way communication that let patient and health care providers communicate in real-time.

Remote patient monitoring:

This type of telemedicine allows health care providers to monitor patients from far. Using RPM (remote patient monitoring) can cut down on the time that the patient spends in the hospital. Especially for patients with chronic conditions is very effective to spend time home instead of the hospital. Nowadays technology is so evolved that patients do not monitor themselves, but rather vital health data will be shared with the doctor and other health care providers automatically. Thanks to this technology the doctor can provide much better care and take action immediately by any signs of trouble.

Store-and-forward:

Store and forward ensures that patient data and medication data are accessible across long distances. caregiver can collect, upload and leave the required information for the doctor to asses it later. The advantage of this type of telemedicine is that it is not necessary to assessed immediately by the receiving doctor. another big advantage is that there is no appointment required, therefore, this type of telemedicine is often used to assess minor medical issues. a lot of specialism uses this type of telemedicine to offer better care. Therefore, several systems ensure that all this information is integrated into a single record for each patient.

Specialist consulting:

Specialist consulting is deployed to improve the collaboration between the medical team and to offer patients the best care and save them the long journey. through a safe video conferencing with or without the patients in the communication room, the patient information can quickly and completely share with a specialist. this type of telemedicine has a big advantage in remote places, where the hospitals are far away. This type of telemedicine. In some hospitals and clinics, special examination cameras are available so that the specialized can get a better picture of the condition of the patient

Telemedicine equipment (E-Visit, 2018)

Most people have access to basic telecommunications technology, like telephones, internet, and computers. But many telemedicine solutions require more equipment than just those basics. Here's a review of the types of telemedicine equipment a healthcare provider may need

- **Telemedicine carts**

This equipment gives providers a mobile frame and a storage to carry the cameras, computers monitors, keyboards, computers, and the mobile medical devices. The carts look similar to standing work desks, with computer monitors attached at the top and wheels at the bottom for easy moving. These carts are usually used at the hospitals or other large health care systems.

- **Telemedicine kiosks**

The telemedicine kiosk looks like a photobooth and is usually stocked with all the equipment and commonly used mobile medical devices that are needed for a telemedicine visit.

- **Digital camera**

A webcam is needed in order to have a video conference. There are also high-end, high-resolution digital cameras for crystal-clear video capture. The high-tech camera allows the healthcare professional to take detailed medical images and share them with a specialist at another location. It is usually used for the **store-and-forward telemedicine** solutions between two healthcare providers.

- **Telemedicine kit**

Healthcare providers who are routinely providing frontline care in remoted areas need a portable telemedicine kit. The kits often look like a sturdy briefcase or a large medical kit. Inside the kids is a small computer with an integrated screen, a camera, and simple medical devices.

- **Telemedicine software**

A software system needs to be installed on the medical practice's computers. These software solutions may require additional equipment like data storage hardware or server

Appendix 24: click dummie (check yourself questions)
Questions about the types of telemedicine
Questions and feedback students receive

A little quiz to test your knowledge about the types of telemedicine.

"Sanne is in risk of getting a heart disease, she needs to change her lifestyle and a doctor need to monitor her heath".
What type of telemedicine do you think the doctor would be using?
- ☐ *Triage*
- ☐ ***Prevention***
- ☐ *Remote patient monitoring*
- ☐ *Real-time telemedicine*

Feedback: Prevention is used mainly for Patients how have a higher change of developing a chronic disease.

When is medication management used?
- ☐ To monitor patients with chronic diseases for the development of new symptoms
- ☐ Is used by minor medical issues, the caregiver can assess the data later and prescribe the correct medication
- ☐ **Is used to find out whether the medication is effective and whether the patients have the correct dosage.**
- ☐ It makes for patients and doctors easy to have a visit anytime and anywhere they want

Feedback: Medication management can replace the medication check doctor visit in a medication check via teleconference.

Which parties are involved in the use of specialist consulting?
- ☐ Patients
- ☐ General doctors
- ☐ Specialist
- ☐ General doctors and specialists
- ☐ **Patients, general doctors and specialists**
- ☐ None of the parties above

Feedback: Specialist consulting can be executed with or without the patient.

How quickly must the Store-and-forward cases be assessed?
- ☐ Those cases are life thread, they have to be assessed immediately
- ☐ **There is no rush, the care giver can assess it later**
- ☐ Time has been scheduled for reviewing these cases via video call
- ☐ These cases must be assessed immediately but are not life threatening

Feedback: It is important to ensure that all the required patient data and medication data is collected and upload it. This way the specialist can assessed the case the right way.

For which group of patients is remote patient monitoring used?

This question is in the last version of the E-Learning moved to the lesion about telemedicine equipment

- ☐ Patients with chronic diseases
- ☐ Patients whose medication must remain under control
- ☐ Risk group for a certain chronic illness
- ☐ **For patients who should stay in the hospital**

Feedback: Remote patient monitoring can cut down on the time that the patient spends in the hospital.

What is the difference between prevention and triage telemedicine?
- ☐ There are no differences, prevention and triage are two names for the same telemedicine type
- ☐ **Prevention for patients at risk of developing chronic disease. Triage is for the development of new symptoms in patients with a chronic disease**
- ☐ Triage for patients at risk of developing chronic disease. Prevention is for the development of new symptoms in patients with a chronic disease
- ☐ Triage makes it for patients and doctors easy to have a visit anytime and anywhere they want. Prevention is for preventing patients from becoming ill.

Feedback: Prevention can monitor patient to change their lifestyle to prevent them of developing a chronic disease. Triage can prevent chronic disease patient to worsen their condition or developing a new disease.

What do you think is the most important telemedicine type?
This question is removed in the last version of the E-Learning, due to practical issues
- ☐ Medication management
- ☐ Triage
- ☐ Prevention
- ☐ Real-time/live telemedicine
- ☐ Remote patient monitoring
- ☐ Store-and-forward
- ☐ Specialist consulting

Al the answers are right in the last question.

Questions about Telemedicine equipment

Questions and feedback students receive:

In which type of telemedicine is high-tech camera required?
- ☐ Prevention
- ☐ Medication management
- ☐ Triage
- ☐ **Store and forward**
- ☐ Specialist consulting

Feedback: It is important for the doctors to get high quality pictures to be able to make the correct diagnosis

Which of the things below is not in the telemedicine kit?
- ☐ Camera
- ☐ Stethoscope
- ☐ **Patient medical record**
- ☐ Small computer

Feedback: Patient medical record is important for making the correct diagnosis, but it is not standard with the telemedicine kit

What is a telemedicine kiosk?
- ☐ Room with all necessary telemedicine materials
- ☐ **Photobooth with all necessary telemedicine materials**
- ☐ Briefcase with all necessary telemedicine materials
- ☐ Software that is required to use telemedicine

Feedback: A telemedicine kiosk can be placed anywhere, like local shopping center. If a patient needs to "visit" a doctor, they simply go to a kiosk nearby.

Where is a telemedicine cart important? (multiple answers possible)
- ☐ **Hospital**
- ☐ **General practice**
- ☐ Telemedicine Kiosk
- ☐ **Telemedicine center**
- ☐ Patient home

Feedback: This equipment gives providers a mobile frame and a storage to carry the cameras, computers monitors, keyboards, computers, and the mobile medical devices. The wheels at the bottom make it easy to move around.

Why is a high-tech camera necessary?

- ☐ It is not necessary because it is only used with one type of telemedicine
- ☐ **It allows the health care provider to take detailed medical images**
- ☐ For an optimal image at a video conference

Feedback: High-tech camera is not necessary for a video conference, but it is very important to take detailed medical images.

What are the benefits of medication management?

- ☐ **Easily check whether the patients have the correct dosage of medication**
- ☐ Detect and treat symptoms of new disease in time
- ☐ Risk groups are easy to monitor
- ☐ The possibility to ask a specialist in another area for diagnosis

Feedback:

Detect and treat symptoms of new disease in time: Triage

Risk groups are easy to monitor: Prevention

The possibility to ask a specialist in another area for diagnosis: Specialist consulting

Appendix 25: click dummie (print screens)

+ Types of telemedicine

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Triage

Triage

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E-LEARNING Altera Vita- KOINSEP CYCLADES   English (en) ▾

👤 maess Al-Jawrani ▾

Specialist consulting:

Specialist consulting is deployed to improve the collaboration between the medical team and to offer patients the best care and save them the long journey. through a safe video conferencing with or without the patients in the communication room, the patient information can quickly and completely share with a specialist. this type of telemedicine has a big advantage in remote places, where the hospitals are far away. This type of telemedicine. In some hospitals and clinics, special examination cameras are available so that the specialized can get a better picture of the condition of the patient

✚ ✓ Test your knowledge about the types of telemedicine   Edit ▾ 👤

+ Add an activity or resource

+ Telemedicine equipment   Edit ▾

Most people have access to basic telecommunications technology, like telephones, internet, and computers. But many telemedicine solutions require more equipment than just those basics. Here's a review of the types of telemedicine equipment a healthcare provider may need.

Telemedicine carts

This equipment gives providers a mobile frame and a storage to carry the cameras, computers monitors, keyboards, computers, and the mobile medical devices. The carts look similar to standing work desks, with computer monitors attached at the top and wheels at the bottom for easy moving. These carts are usually used at the hospitals or other large health care systems.

E-LEARNING Altera Vita- KOINSEP CYCLADES   English (en) ▾

👤 maess Al-Jawrani ▾

Telemedicine kiosks

The telemedicine kiosk looks like a photobooth and is usually stocked with all the equipment and commonly used mobile medical devices that are needed for a telemedicine visit.

Digital camera

A webcam is needed in order to have a video conference. There are also high-end, high-resolution digital cameras for crystal-clear video capture. The high-tech camera allows the healthcare professional to take detailed medical images and share them with a specialist at another location. It is usually used for the **store-and-forward telemedicine** solutions between two healthcare providers.

Telemedicine kit

Healthcare providers who are routinely providing frontline care in remoted areas need a portable telemedicine kit. The kits often look like a sturdy briefcase or a large medical kit. Inside the kids is a small computer with an integrated screen, a camera, and simple medical devices.

Telemedicine software

A software system needs to be installed on the medical practice's computers. These software solutions may require additional equipment like data storage hardware or servers.

➕ ✅ Test your knowledge about the equipment of telemedicine   Edit ▾ 👤

➕ Add an activity or resource

➕ 4th Section   Edit ▾

Dashboard ▸ ERASMUS+ HIGHER EDUCATION ▸ TELEMEDICINE ▸ Types of telemedicine ▸ Test your knowledge about the types of telemedicine ▸ Edit quiz

ΚΟΙΝΣΕΠ ΚΥΚΛΑΔΩΝ

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NAVIGATION

ADMINISTRATION

▾ Quiz administration
 • Edit settings
 • Group overrides
 • User overrides
 ⚙ Edit quiz
 🔍 Preview
 ▸ Results
 • Locally assigned roles
 • Permissions
 • Check permissions
 • Filters

Editing quiz: Test your knowledge about the types of telemedicine

Questions: 7 | This quiz is open

Repaginate

Maximum grade: 10.00   **Save**

Total of marks: 10.00

Page 1   ☐ Shuffle

Add ▾

➕ 1 ☰ ⊙ **Medication management** _WHEN IS MEDICATION MANAGEMENT USED?_   🔍 ✕   1.48 ✎

➕ 2 ☰ ⊙ **type of telemedicine** "Sanne is in risk of getting a heart disease, she needs to change her lifestyle ...   🔍 ✕   1.42 ✎

➕ 3 ☰ ⊙ **specialist consulting** _WHICH PARTIES ARE INVOLVED IN THE USE OF SPECIALIST CONSULTING?_   🔍 ✕   1.42 ✎

➕ 4 ☰ ⊙ **Store-and-forward cases** _HOW QUICKLY MUST THE STORE-AND-FORWARD CASES BE ASSESSED?_   🔍 ✕   1.42 ✎

➕ 5 ☰ ⊙ **remote patient monitoring** _FOR WHICH GROUP OF PATIENTS IS REMOTE PATIENT MONITORING...   🔍 ✕   1.42 ✎

➕ 6 ☰ ⊙ **prevention and triage** _WHAT IS THE DIFFERENCE BETWEEN PREVENTION AND TRIAGE TELEMEDI...   🔍 ✕   1.42 ✎

➕ 7 ▭ ⊙ **your opinion** _WHAT DO YOU THINK IS THE MOST IMPORTANT TELEMEDICINE TYPE?_   🔍 ✕   1.42 ✎

Add ▾

E-LEARNING Altera Vita- KOINSEP CYCLADES   English (en) ▾   maess Al-Jawrani ▾

QUIZ NAVIGATION

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

Finish attempt...

Start a new preview

KOINΣEΠ ΚΥΚΛΑΔΩΝ

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NAVIGATION

ADMINISTRATION

- Quiz administration
  - Edit settings

Question 1
Not yet answered
Marked out of 1.00
Flag question
Edit question

When is medication management used?

Select one:

○ A
To monitor patients with chronic diseases for the development of new symptoms.

○ B.
Is used to find out whether the medication is effective and whether the patients have the correct dosage.

○ C.
It makes for patients and doctors easy to have a visit anytime and anywhere they want

○ D.
Is used by minor medical issues, the caregiver can assess the data later and prescribe the correct medication

Question 2
Not yet answered
Marked out of 1.00
Flag question
Edit question

"Sanne is in risk of getting a heart disease, she needs to change her lifestyle and a doctor need to monitor her health".
What type of telemedicine do you think the doctor would be using?

Select one:
○ A. Triage
○ B. Remote patient monitoring
○ C. Prevention
○ D. Real-time telemedicine

Question 3
Not yet answered

Which parties are involved in the use of specialist consulting?

E-LEARNING Altera Vita- KOINSEP CYCLADES   English (en) ▾   maess Al-Jawrani ▾

- Quiz administration
  - Edit settings
  - Group overrides
  - User overrides
  - Edit quiz
  - **Preview**
  - Results
  - Locally assigned roles
  - Permissions
  - Check permissions
  - Filters
  - Logs
  - Backup
  - Restore
  - Question bank
- Course administration
- Switch role to...

TERMS OF USE-PRIVACY POLICY

ΟΡΟΙ ΧΡΗΣΗΣ ΠΛΑΤΦΟΡΜΑΣ-
ΠΟΛΙΤΙΚΗ ΑΠΟΡΡΗΤΟΥ

ADD A BLOCK

Add...

Question 3
Not yet answered
Marked out of 1.00
Flag question
Edit question

Which parties are involved in the use of specialist consulting?

Select one:
○ A. Patients
○ B. None of the parties above
○ C. Patients, general doctors and specialists
○ D. General doctors
○ E. Specialist
○ F. General doctors and specialists

Question 4
Not yet answered
Marked out of 1.00
Flag question
Edit question

How quickly must the Store-and-forward cases be assessed?

Select one:
○ A. Those cases are life threat, they have to be assessed immediately
○ B.
Time has been scheduled for reviewing these cases via video call
○ C. There is no rush, the care giver can assess it later
○ D. These cases must be assessed immediately but are not life threatening

Question 5
Not yet answered
Marked out of 1.00
Flag question
Edit question

For which group of patients is remote patient monitoring used?

Select one:
○ A. Patients whose medication must remain under control
○ B. Patients with chronic diseases
○ C. Risk group for a certain chronic illness
○ D. For patients who should stay in the hospital

E-LEARNING Altera Vita- KOINSEP CYCLADES   English (en) ▾   maess Al-Jawrani ▾

○ ADD A BLOCK

Add... ▾

Question 5
Not yet answered
Marked out of 1.42
▼ Flag question
⚙ Edit question

For which group of patients is remote patient monitoring used?

Select one:
- ○ A. Patients whose medication must remain under control
- ○ B. Patients with chronic diseases
- ○ C. Risk group for a certain chronic illness
- ○ D. For patients who should stay in the hospital

Question 6
Not yet answered
Marked out of 1.42
▼ Flag question
⚙ Edit question

What is the difference between prevention and triage telemedicine?

Select one:
- ○ A. Prevention for patients at risk of developing chronic disease. Triage is for the development of new symptoms in patients with a chronic disease
- ○ B.
  Triage makes it for patients and doctors easy to have a visit anytime and anywhere they want. Prevention is for preventing patients from becoming ill.
- ○ C. Triage for patients at risk of developing chronic disease. Prevention is for the development of new symptoms in patients with a chronic disease
- ○ D. There are no differences, prevention and triage are two names for the same telemedicine type

Question 7
Not yet answered
Marked out of 1.42
▼ Flag question
⚙ Edit question

What do you think is the most important telemedicine type?

Answer: [   ]

E-LEARNING Altera Vita- KOINSEP CYCLADES   English (en) ▾   maess Al-Jawrani ▾

Dashboard ▸ ERASMUS+ HIGHER EDUCATION ▸ TELEMEDICINE ▸ Telemedicine equipment ▸ Test your knowledge about the equipment of telemed... ▸ Edit quiz

ΚΟΙΝΣΕΠ ΚΥΚΛΑΔΩΝ

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⚓ NAVIGATION

✿ ADMINISTRATION

- ▾ Quiz administration
  - ◦ Edit settings
  - ◦ Group overrides
  - ◦ User overrides
  - ⚙ **Edit quiz**
  - Q Preview
  - ▸ Results
  - ◦ Locally assigned roles
  - ◦ Permissions
  - ◦ Check permissions
  - ◦ Filters
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Editing quiz: Test your knowledge about the equipment of telemedicine

Questions: 6 | This quiz is open

Maximum grade: 10.00   **Save**

Repaginate

Total of marks: 10.00

☐ Shuffle

Page 1   Add ▾

✛ 1	⋮ ⚙ **High-tech camera** IN WHICH TYPE OF TELEMEDICINE IS HIGH-TECH CAMERA REQUIRED?	Q ✕	2.00 ✎
✛ 2	⋮ ⚙ **Telemedicine kit** WHICH OF THE OBJECTS BELOW IS NOT IN THE TELEMEDICINE KIT?	Q ✕	1.00 ✎
✛ 3	⋮ ⚙ **Telemedicine kiosk** WHAT IS A TELEMEDICINE KIOSK?	Q ✕	2.00 ✎
✛ 4	⋮ ⚙ **Telemedicine cart** IN WHICH OF THE PLACES BELOW IS A TELEMEDICINE CART IMPORTANT?	Q ✕	2.00 ✎
✛ 5	⋮ ⚙ **High-tech camera** WHY IS A HIGH-TECH CAMERA NECESSARY?	Q ✕	1.50 ✎
✛ 6	⋮ ⚙ **Medication management** WHAT ARE THE BENEFITS OF MEDICATION MANAGEMENT?	Q ✕	1.50 ✎

Add ▾

E-LEARNING Altera Vita- KOINSEP CYCLADES   English (en) ▾   maess Al-Jawrani ▾

QUIZ NAVIGATION

| 1 | 2 | 3 | 4 | 5 | 6 |

Finish attempt ...

Start a new preview

ΚΟΙΝΣΕΠ ΚΥΚΛΑΔΩΝ

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NAVIGATION

ADMINISTRATION

▾ Quiz administration
 • Edit settings
 • Group overrides
 • User overrides

Question 1
Not yet answered
Marked out of 2.00
⚑ Flag question
⚙ Edit question

In which type of telemedicine is high-tech camera required?

Select one:
- A. Store-and-forward
- B. Triage
- C. Specialist consulting
- D. Medication management
- E. prevention

Question 2
Not yet answered
Marked out of 1.00
⚑ Flag question
⚙ Edit question

Which of the objects below is not in the telemedicine kit?

Select one:
- A. Small computer
- B. Camera
- C. Patient medical record
- D. Soethoocope

Question 3
Not yet answered
Marked out of 2.00
⚑ Flag question
⚙ Edit question

What is a telemedicine kiosk?

Select one:
- A. Photobooth with all necessary telemedicine materials
- B. Briefcase with all necessary telemedicine materials
- C. Software that is required to use telemedicine
- D. Room with all necessary telemedicine materials

E-LEARNING Altera Vita- KOINSEP CYCLADES   English (en) ▾   maess Al-Jawrani ▾

⚙ Edit quiz
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 • Backup
 • Restore
 ▸ Question bank
▸ Course administration
▸ Switch role to...

TERMS OF USE-PRIVACY POLICY

ΟΡΟΙ ΧΡΗΣΗΣ ΠΛΑΤΦΟΡΜΑΣ-
ΠΟΛΙΤΙΚΗ ΑΠΟΡΡΗΤΟΥ

➕ **ADD A BLOCK**

Add... ▾

Question 4
Not yet answered
Marked out of 2.00
⚑ Flag question
⚙ Edit question

In which of the places below is a telemedicine cart important?

Select one or more:
- A. General practice
- B. Hospital
- C. Telemedicine center
- D. Telemedicine Kiosk
- E. Patient home

Question 5
Not yet answered
Marked out of 1.00
⚑ Flag question
⚙ Edit question

Why is a high-tech camera necessary?

Select one:
- A. It allows the health care provider to take detailed medical images
- B. For an optimal image at a video conference
- C. It is not necessary because it is only used with one type of telemedicine

Question 6
Not yet answered
Marked out of 1.00
⚑ Flag question
⚙ Edit question

What are the benefits of medication management?

Select one:
- A. The possibility to ask a specialist in another area for diagnosis
- B. Detect and treat symptoms of new disease in time
- C. Risk groups are easy to monitor
- D. Easily check whether the patients have the correct dosage of medication

Appendix 26: preposition implementation E-Learning

A survey is set out results shows that health providers worked in average of 18 years with telemedicine and has been involved with Vodafone Telemedicine for an average of 5 years. 80% of the health providers are general practitioners. 77% spent around 0-20% of their working hours on telemedicine while prevention is used mostly.

A project about telemedicine education is started by students of the Rotterdam University of Applied Science, literature review is done and shows the positive effects of telemedicine education. The literature review can be found in the appendix.

Research is done by the students of Rotterdam University of Applied Science and shows that medical students of the University of Crete do not receive education about telemedicine. There are also no researches found about telemedicine education in Greece. This was the motivation to develop an E-Learning about telemedicine.

It is recommended to use the E-learning to inform the students about telemedicine. Conversations with 30 random medicine students in Heraklion from different years showed that telemedicine is not yet a familiar concept for them. This is remarkable because telemedicine is important in Greece.

Greece has a peculiar geography that creates an increased need for medical staff. With telemedicine, it is possible to enable every patient to have immediate access to the specialities they need for their problem, this is why telemedicine is important in Greece (Miltos Sakkelariou, personal communication, 10 September 2019).

Knowledgeabout telemedicine may increase and therefore future doctors will be able to use telemedicine more efficiently. Besides, telemedicine might attract the attention of some students and they can decide to do more research on the topic.

E-learning is an ideal tool to inform students. First, Sitzmann T, Kraiger K, Stewart D, Wisher R. (2006) are describing E-Learning has the same effects as classroom/ face to face instruction. Cook D, Levinson A, Garside S, Dupras D, Erwin P, Montori V. (2008)have done a comparable research a couple years later and found the same results. Second, it is easy and unlimitedly accessible. During a conversation with a Medicine student it became clear that there is no possibility for the students to look up information again. The E-learning provides a solution for this.

Third, it is free. Fourth, it is interactive. Attached to the e-learning there is information, articles, video's, websites and 'check yourself' questions.

When using the E-Learning in university for medical students, only the E-Learning will not provide a sufficient effect. Also, classroom education should be added in the telemedicine education. That is why we researched blended learning. '' *Blended learning, defined as the combination of traditional face-to-face learning and asynchronous or synchronous e-learning*'' (Liu, Q., Peng, W., Zhang, F., Hu, R., Li, Y., & Yan, W., 2016). ''*Blended learning mixes various event-based activities, including face-to-face classrooms, live e-learning, and self-paced learning. This often is a mix of traditional instructor-led training, synchronous online conferencing or training, asynchronous self-paced study, and structured on-the-job training from an experienced worker or mentor.*'' Liu, Q., Peng, W., Zhang, F.,

Hu, R., Li, Y., & Yan, W., 2016, also write. '' *Blended learning appears to have a consistent positive effect in comparison with no intervention, and to be more effective than or at least as effective as nonblended instruction for knowledge acquisition in health professions*.'' (Singh, H., 2003). Suartama, I. K., Setyosari, P., Sulthoni, S., &Ulfa, S. (2019) wrote that blended learning teached in Moodle is effective. Our E-Learning is also developed in Moodle ''*Since Moodle was introduced as an open source learning software, blended learning has been developed as another method of teaching in addition to the traditional face-to-face learning. Researches have proven that the use of Moodle LMS can improve learning outside the classroom and provide a positive influence on students' thinking and innovation skills.*" Blended learning should be applied at the telemedicine education course.
Blended learning is applied in the telemedicine education, because the E-Learning is combined with the following preposition for classroom interventions based on evidence.

According to '*De effectiviteit van e-learning en de implementatie in het medisch*onderwijs' (Dankbaar, 2009) there are various factors that affect the process of implementation. Control, involvement, accompaniment and communication are all important points when it comes to implementing the e-learning. The implementation of the e-learning should be included in the administrative agenda. Managers must be aware of the possibilities and use of the e-learning. Besides, involvement of professors and students is important. They know best what the challenges are when using e-learning. Their opinions should be taken in consideration implementing the e-learning. This can be discussed during a meeting.

Also, guidance with technology is important. Users should be trained or informed about how to handle the e-learning, for example by showing them how it works ('teach as you preach')
Finally, communication is key. Let the users know what the benefits are of this e-learning and why it is implemented.

To obtain full telemedicine knowledge and skills competences, the e-learning should be followed up by experience opinions, problem bases learning tools and practical exposure.

Experience opinions:
Another part that can be used in education about telemedicine is experience opinions. By inviting doctors or patients to tell about their experience with telemedicine, students will become informed of the positive (or negative) sides of telemedicine. In this way, when the students are going to work with telemedicine in the future, they know how it can be experienced. Students can ask all their questions to these persons about how they experienced telemedicine and learn more about the system. The presence of an expert by experience means that things other than professional content will be discussed. Evaluation shows positive effects of education with an experience opinion:
- A different view of asking and discussing things with a patient
- Gain patient's perspective
- Gain awareness of the way you think about patients (Engels, J., &Platenkamp, C., 2009)

Problem based learning tools:

According to Demiris (2003) problem bases learning tools should be intergraded in the telemedicine education for medical students. Albanese & Mitchell (1993) are describing problem-based learning tools as: ''*an educational method characterized by the use of patient problems as a context for students to learn problem-solving skills and acquire knowledge*.'' Students can get (fictional) cases and discuss these cases with each other. In this way, students can discuss about the cases and learn from each other.

A possible way to organise the telemedicine practise is to contact the University of Chania and let students of both universities practise telemedicine in a realistic setting. The students can exchange cases and discuss it with students of the other university.

Practical exposure:

In the article of Demiris, 2003, It is recommended to let students visit a telemedicine centre. *'Site visits to clinical settings where telemedicine is being practiced can be of benefit to students who will be exposed to a practical implementation of the concepts they have been introduced to throughout the course* (Demiris, 2003). Students in Heraklion could visit the telemedicine centre of Heraklion. To experience telemedicine in a remote place, an excursion to the telemedicine centre in Gavdos could be organised.

The e-learning is accessible via this link: https://moodle.alteravita-cyclades.gr/login/index.php
Students have to create a new account before they can participate. The link to the e-learning can be sent by e-mail
It is recommended to send this to the students at the beginning of the semester, so they can complete one section every week.

Of course, it is not possible to add immediately this to the curriculum of the medical university of Crete. The content of this preposition should be discussed by the professors. It could be integrated in existing classes because telemedicine is applicable in various medical situations.

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- Suartama, I. K., Setyosari, P., Sulthoni, S., &Ulfa, S. (2019). Development of an Instructional Design Model for Mobile Blended Learning in Higher Education. International Journal of Emerging Technologies in Learning (iJET), 14(16), 4–22. https://doi.org/10.3991/ijet.v14i16.10633

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Appendix 27: accountability of the E-Learning

The E-learning consists of six weeks, the following subjects are included:

Week 1 – Introduction

Week 2 – Telemedicine history and current situation in Greece

Week 3 – Benefits and drawbacks of telemedicine

Week 4 – Types of telemedicine

Week 5 – Telemedicine equipments

Week 6 – The future of telemedicine

The introduction is to, as the word itself says, to introduce the subject 'telemedicine'. It also explains why the e-learning was made. According to the self determination theory of Deci and Ryan (2000), motivation of students can be enhanced by three factors: Competence, relatedness and autonomy. We applied the 'relatedness' factor by introducing ourselves and explaining why the E-learning is important for them. This is meant to enhance the motivation to use the e-learning.

The 'autonomy' factor was applied by inserting optional video's and articles to read. The most important information is written down, but if one is not satisfied with this there is an option to learn more. With this, students have the autonomy of choosing the amount of knowledge they obtain.

The history of telemedicine was included in the e-learning to help the participant better understand how and why telemedicine was originated and how it developed. The current situation in Greece is important to know because this is most likely the working field that Greek students end up in.

The benefits and drawbacks are explained in the third section. The benefits have been explained to motivate students for the importance of telemedicine. The drawbacks are have been explained to give a complete picture.

The types of telemedicine are necessary for the users of telemedicine to know exactly which types of telemedicine there are. By knowing this information, they can use the right type of telemedicine in the right time.

Equipment and their picture:

Equipment are one of the most important components for the use of telemedicine. By giving future telemedicine users the right information about equipment will help them in the near future to understand the equipment more and can work with it more effectivity.

Future of telemedicine

As last part of the telemedicine E-Learning we add a section about the future of telemedicine. These days, there are a lot research going on about telemedicine. Also, the development of technology never stops. So, the development of telemedicine is not stopping also. To inform the medical students about the possible future changes about telemedicine we add a part of telemedicine with communication apps (mostly WhatsApp). In the future, they might be helpful in telemedicine (Nikolic, A., Wickramasinghe, N., Claydon-Platt, D., Balakrishnan, V., & Smart, P., 2018)

Another part of telemedicine where a lot of research about is going on right now is telesurgery. 5G internet is needed to succeed telesurgery (Choi, Oskouian& Tubbs, 2018).

Videos are inserted in the e-learning. The reason for choosing video in e-learning comes from that video is a very effective way of learning. In the article by Travis Bergwall (2015), 7 reasons are mentioned why videos are effective. An example of this is that the part of your brain that visual information processes works much better than the textbooks and another reason is that video usually tells a story that is much more interesting than reading all of it.

The part about telepsychiatry is added because we wanted the students to know that other specialities also use caregiving from distance. Psychiatrics can use also telecare.

There are 'check yourself' questions added to week 3,4 and 5. A study on effective learning showed that learning by answering questions is very effective (Karpicke & Blunt, 2011) that is the reason that questions about the material have been added to the e-learning.

The remaining sections do not have these questions added to them because the information in these sections is not required to be immediately evoked.

- Bergwall, T. (2015). *7 Reasons Students Learn Better With Video*. Geraadpleegd op 6 januari 2020, van https://www.linkedin.com/pulse/7-reasons-students-learn-better-video-travis-bergwall
- Ryan, R.M., and Deci, E.L. (2000). Self-Determination Theory and the Facilitation of Intrinsic Motivation, Social Development and Well-Being. *American Psychologist,* 55 (1), 68-78.
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Appendix 28: summary results survey

The survey has a total population of 80 health providers whom work with telemedicine and are in contact with Vodafone. 35 health providers participated in the survey but only 26 completed the survey. The answers from the health providers who did not complete the survey will be processed in the analysis.

75% of the health providers were male whereas that 55% aged In between the 40 and 50 years. 63% of the health providers don't work on an island and Drama, Palaiokomi, and Eyvia were popular spots of where they live. The health providers worked in average of 18 years with telemedicine and has been involved with Vodafone Telemedicine for an average of 5 years. 80% of the health providers are general practitioners. 77% spent around 0-20% of their working hours on telemedicine while prevention is used mostly.

The question rate the following aspect of telemedicine health providers could give it 0= extremely ineffective to 5= extremely effective got an average of 4,3. Your expertise on ICT got a 4,2. The initial education and training about Vodafone telemedicine provided got a 4,5, Training and support got a 4,5, Comfort with provider interaction got a 4,4, Reliability of technology got a 4,3, System speed got a 3,9, Information security got a 4,5 and Data quality got a 4,3.

The question Rate the following Vodafone telemedicine devices on a scale from 0-5 got an average if 4,3. Blood pressure monitor got a 4,6, Oximeter got a 4,8, Glucose monitoring device got a 4,6, Cholesterol and triglycerides meter got a 4,3, Electrocardiograph machine got a 3,9 and the Spirometer got a 3,5.
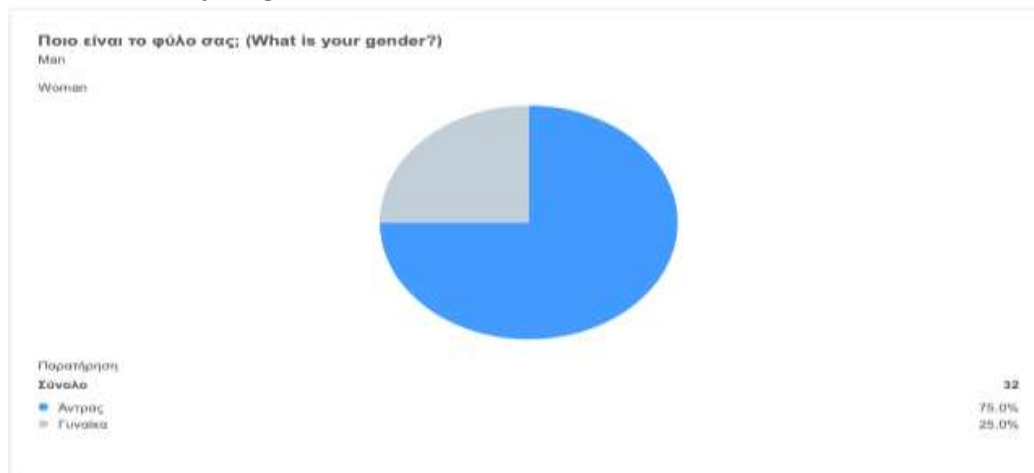
In the question which statement applies to you where three statement were giving to the health providers, they could answer it with strongly disagree – disagree – neutral – agree – strongly agree. In the statement "Using telemedicine is clear and comprehensible for me" 54% gave it a strongly agree, "I know how to use telemedicine devices and how they work" got for 54% a strongly agree and "Telemedicine is easy to use" got for 50% a strongly agree

Several participants indicated that immediate diagnosis by a specialist in remote places is an important advantage of telemedicine, other answers that have often occurred were prevention and monitoring of patients. Practically with all answers, the health professionals indicate that telemedicine is very useful in remote places. There are also points for improvement that health professionals would like to see, such as a better internet connection, faster answers from the specialist, more equipment and more support from the specialist. however, the most common point for improvement that health professionals have identified was a better internet connection, another point for improvement was the use of telemedicine in more remote places. training for health professionals and informing citizens about telemedicine was another point for improvement that was indicated.

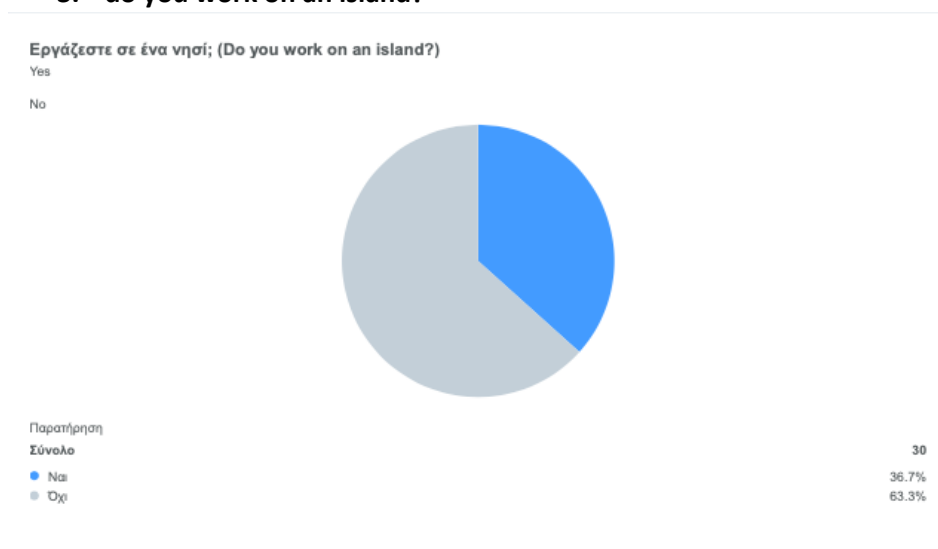# Appendix 29: detailed graphs and results of the survey

1. what is your gender?

Ποιο είναι το φύλο σας; (What is your gender?)
Man
Woman

Παρατήρηση
Σύνολο   32
● Άντρας   75.0%
● Γυναίκα   25.0%

2. what is your age?

1. 41	**15**. 47
2. 38	**16**. 59
3. 45	**17**. 62
4. 51	**18**. 41
5. k	**19**. 42
6. 54	**20**. 45
7. 41	**21**. 40
8. 26	**22**. 46
9. 46	**23**. 45
10. 47	**24**. 59
11. 50χρ	**25**. 40
12. 44	**26**. 43
13. 46	**27**. 58
14. 51	**28**. 58

3. do you work on an island?

Εργάζεστε σε ένα νησί; (Do you work on an island?)
Yes
No

Παρατήρηση
Σύνολο   30
● Ναι   36.7%
● Όχι   63.3%

4. In which city/village do you live (and/or work)?

1. Παλαιοκωμη - Palaiokomi

2. Δράμα - Drama

3. Elafonissos - Elafonissos

4. k

5. Αργαλαστή–Μαγνησία, ArgalastiMagnisia

6. Παλαιοκωμη- Palaiokomi

7. Τρίκερι ΝοτίουΠηλίου – Trikeri South Pelio- Magnisia

8. Εργαζομαι στα Πραμαντα Ιωαννινων – Pramanda- Ioannina

9. ΧΑΛΚΙΟΠΟΥΛΟ - Halkiopoulo

10. Αγγελόκαστρο - Λυσιμαχέια –Αγρίνιο ,Aggelokastro- Lysimaheia- Agrinio

11. ΚΑΤΕΡΙΝΗ - Katerini

12. Ευβοια - Eyvia

13. Άγιος Αθανάσιος Δραμας, Agios Athanasios- Drama

14. Πορταρια Πηλιου ΒΟΛΟΣ. PORTARIA Pelio, Volos

15. MYTIKAaitoloakarnanias, MytikaAitoloakarnania

16. ΑνώγειαΡεθύμνης, AnogiaKrete

17. Δράμα, Drama

18. ΧΑΝΙΑ, Hania

19. Ηράκλειο, Herakleio

20. Αμύνταιο, Amyndaio

21. Ευβοια, Eyvia

22. ΔΕΡΒΙΖΙΑΝΑ, Derviziana

23. ΛΗΞΟΥΡΙ, Leixouri

24. ΦΟΛΕΓΑΝΔΡΟΣ, Folegandros -Cyclades

25. Γκουρα, Goura

26. ΣΥΡΟΣ, Syros Cyclades

27. ΣΥΡΟΣ, Syros Cyclades

5. Number of years you practice medicine:

1. **13**
2. **16**
3. **20**
4. **k**
5. **25**
6. **12**
7. **1**
8. **16**
9. **15**
10. **20χρ**
11. **15**
12. **19**
13. **20 ετη**
14. **20**

15. **31**
16. **30**
17. **13**
18. **16**
19. **19**
20. **13**
21. **15**
22. **10**
23. **31**
24. **12**
25. **15**
26. **30**
27. **30**

6. Number of years you are involved in Vodafone Telemedicine Program:
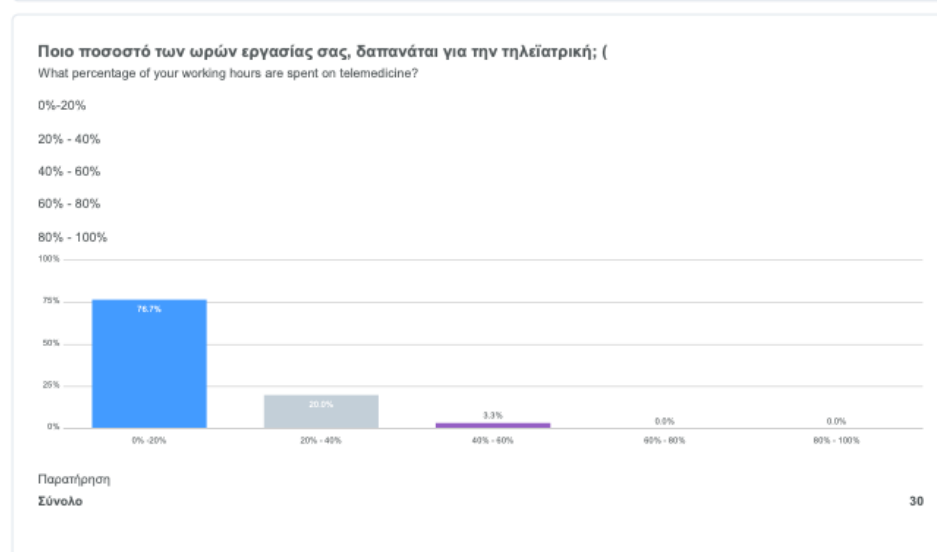
1. **6**
2. **1**
3. **6**
4. **k**
5. **4**
6. **6**
7. **1**
8. **5**
9. **4**
10. **4-5 ;**
11. **4**
12. **4**
13. **4**
14. **4**
15. **7**
16. **5**
17. **1**
18. **7**
19. **3**
20. **4**
21. **5**
22. **3**
23. **1**
24. **από τις 30/9/2019 περίπου 2 μήνες, almost 2 months**
25. **4**
26. **20**
27. **20**

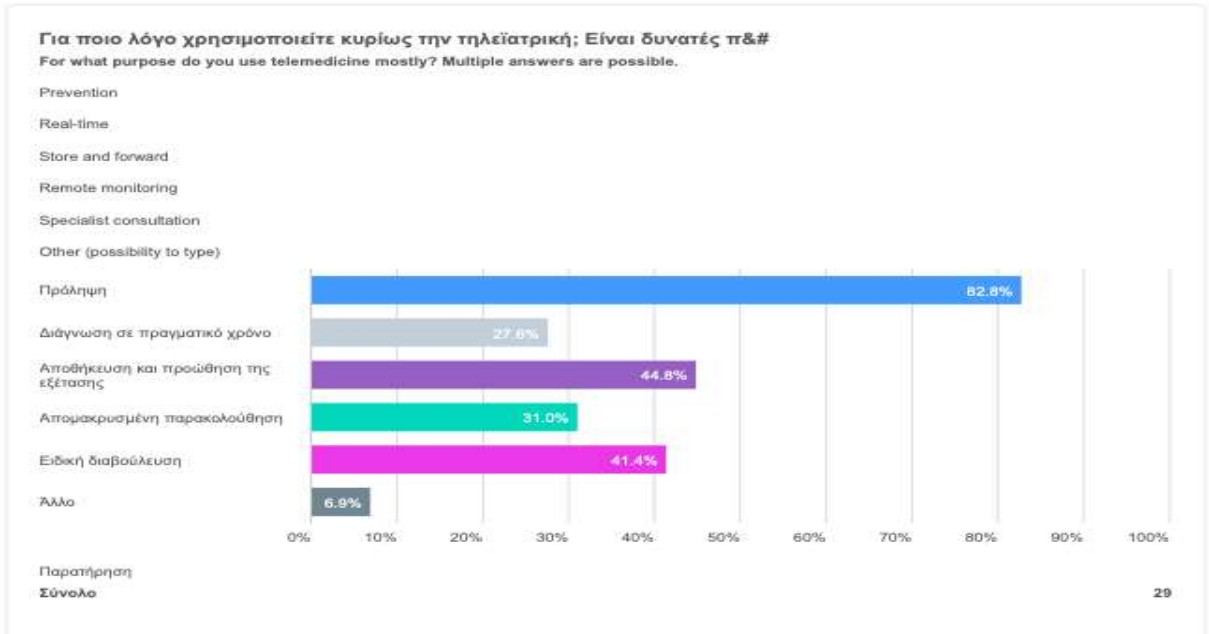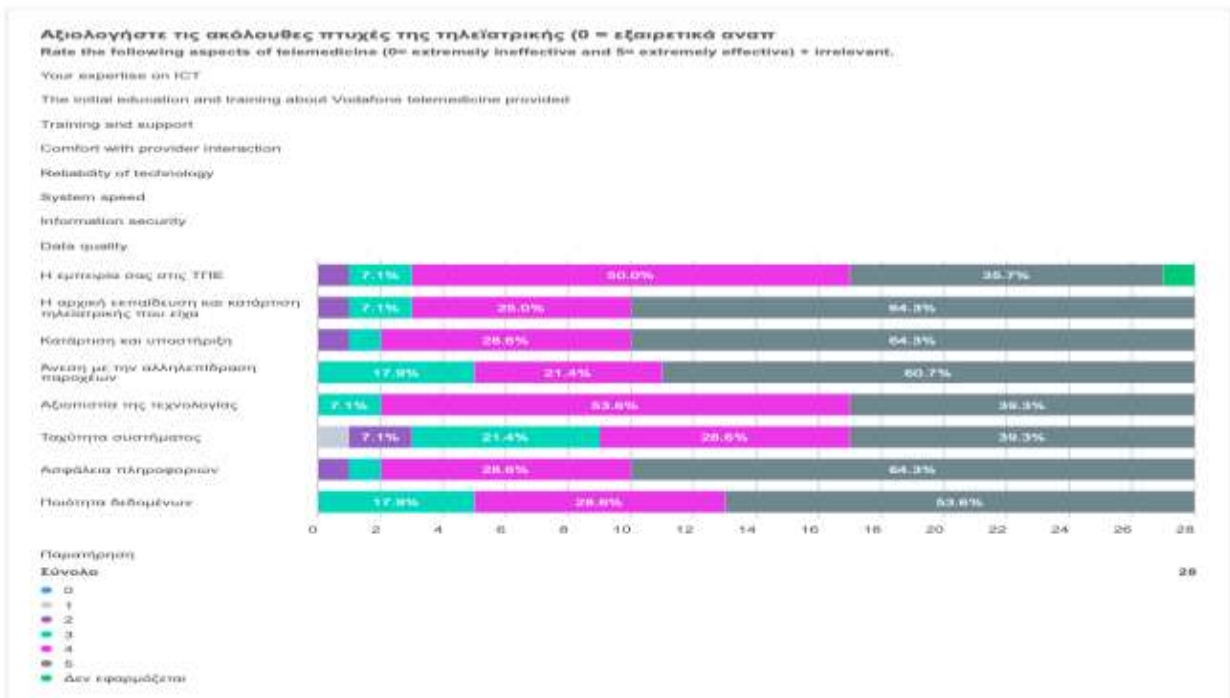**7.** a. **What is your role in the telemedicine system?**
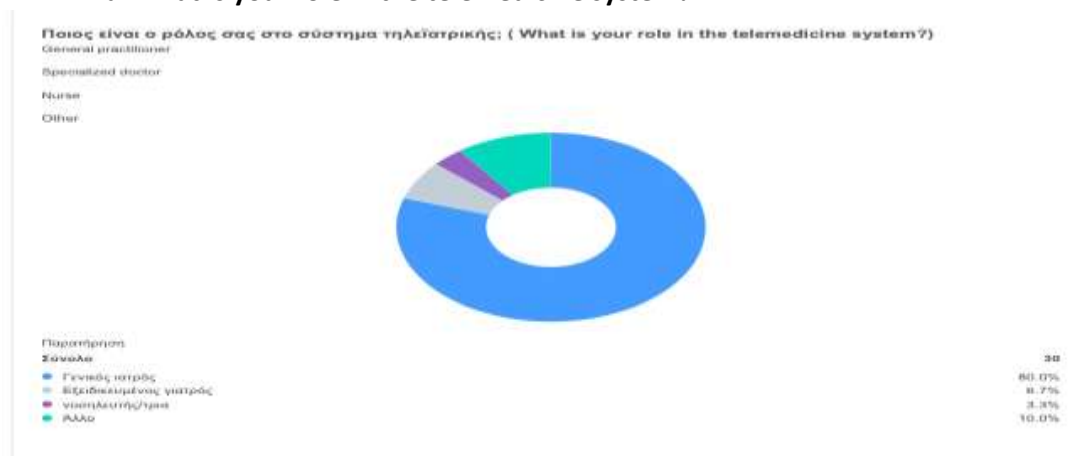
b. other

1. Π.ΙΠαλαιοκωμη – **peripheral dispensary of palaiokomi village**

2. Κ

3. Γενικός/ Οικογενειακός Ιατρός- GENERALDOCTOR

4. ΥΠΕΡΟΙΧΩΝ - Ultrasound Medical Center

5. Κy – HEALTH CENTER

6. ΓΕΝΙΚΟΣ ΙΑΤΡΟΣ ΜΕ ΕΞΕΙΔΙΚΕΥΣΗ ΣΤΟΝ ΥΠΕΡΗΧΟ ΚΟΙΛΙΑΣ ΚΑΙ ΜΕΤΕΚΠΑΙΔΕΥΣΗ ΣΤΗΝ ΕΠΕΙΓΟΥΣΑ ΙΑΤΡΙΚΗ- general doctor specialized in impossible ultrasound and emergency medical training

7. ΧΕΙΡΟΥΡΓΟΣ- Surgeon

8. Η ειδικότητα μου είναι Μαιευτήρας Γυναικολόγος όμως χρησιμοποιώ τόσο τις εργαστηριακές εξετάσεις όσο και τα ερωτηματολόγια και το ΗΚΓ γιατί τα θεωρώ ενδιαφέροντα για τους ασθενείς.- My specialty is Obstetrician Gynecologist, but I use both lab tests and questionnaires and Encephalography, because I find it interesting for patients.

9. Γενικος ιατρος Μετεκπαιδευθεις στο ΣΔ- General Practitioner Postgraduate Education

10. KOINSEP CYCLADES – Social Cooperative of the Cyclades- E-learning-telemedicine
    ΚΕΝΤΡΟ ΠΡΟΛΗΨΗΣ –OKANA. Prevention center of drug Addictions of Cyclades

8. What percentage of your working hours are spent on telemedicine?

9. For what purpose do you use telemedicine mostly? Multiple answers are possible.

Για ποιο λόγο χρησιμοποιείτε κυρίως την τηλεϊατρική; Είναι δυνατές π&#

For what purpose do you use telemedicine mostly? Multiple answers are possible.

Prevention

Real-time

Store and forward

Remote monitoring

Specialist consultation

Other (possibility to type)

Πρόληψη	82.8%
Διάγνωση σε πραγματικό χρόνο	27.6%
Αποθήκευση και προώθηση της εξέτασης	44.8%
Απομακρυσμένη παρακολούθηση	31.0%
Ειδική διαβούλευση	41.4%
Άλλο	6.9%

Παρατήρηση

Σύνολο 29

10. **Rate the following aspects of telemedicine (0= extremely ineffective and 5= extremely effective) + irrelevant.**

Αξιολογήστε τις ακόλουθες πτυχές της τηλεϊατρικής (0 = εξαιρετικά αναπ

Rate the following aspects of telemedicine (0= extremely ineffective and 5= extremely effective) + irrelevant.

Your expertise on ICT

The initial education and training about Vodafone telemedicine provided

Training and support

Comfort with provider interaction

Reliability of technology

System speed

Information security

Data quality

Η εμπειρία σας στις ΤΠΕ	7.1%	50.0%	35.7%
Η αρχική εκπαίδευση και κατάρτιση τηλεϊατρικής που έχα	7.1% 28.0%	64.3%	
Κατάρτιση και υποστήριξη	28.6%	64.3%	
Άνεση με την αλληλεπίδραση παροχέων	17.9% 21.4%	60.7%	
Αξιοπιστία της τεχνολογίας	7.1%	53.6%	39.3%
Ταχύτητα συστήματος	7.1% 21.4% 28.6%	39.3%	
Ασφάλεια πληροφοριών	28.6%	64.3%	
Ποιότητα δεδομένων	17.9% 28.6%	53.6%	

Παρατήρηση

Σύνολο 28

- 0
- 1
- 2
- 3
- 4
- 5
- Δεν εφαρμόζεται

11. **Rate the following Vodafone telemedicine devices on a scale from 0-5 ((0= extremely ineffective and 5= extremely effective). If you do not use the device, please click 'irrelevant'.**

The

Αξιολογήστε τις ακόλουθες συσκευές τηλεϊατρικής σε κλίμακα από 0-5 ((0 = εξ

Rate the following Vodafone telemedicine devices on a scale from 0-5 ((0= extremely ineffective and 5= extremely effective). If you do not use the device, please click 'irrelevant'.

Blood pressure monitor

Oximeter

Glucose monitoring device

Cholesterol and triglycerides meter

Electrocardiograph machine

Spirometer

Παρατήρηση
Σύνολο   27
- 0
- 1
- 2
- 3
- 4
- 5
- Δεν εφαρμόζεται

statements of question 12 to 14.

12. **Using telemedicine is clear and comprehensible for me.**

13. **I know how to use telemedicine devices and how they work**

14. **Telemedicine is easy to use.**

ποια δήλωση ισχύει για εσάς (○ Strongly disagree – disagree – neutral – agree – strongly agree)

Using telemedicine is clear and comprehensible for me.

I know how to use telemedicine devices and how they work

Telemedicine is easy to use.

Η χρήση της τηλεΐατρικής είναι σαφής και κατανοητή για μένα.	7.7%	38.5%	53.8%
Ξέρω πώς να χρησιμοποιώ συσκευές τηλεΐατρικής και πώς λειτουργούν	15.4%	30.8%	53.8%
Η τηλεΐατρική είναι εύκολη στη χρήση.	11.5%	38.5%	50.0%

0 2 4 6 8 10 12 14 16 18 20 22 24 26

Παρατήρηση
Σύνολο   26

- ● Διαφωνώ έντονα
- ○ διαφωνώ
- ● ουδέτερη
- ● συμφωνώ
- ● συμφωνώ απόλυτα

15. What are the positive point about telemedicine?

1. ΕΞΥΠΗΡΈΤΗΣΗ ΑΠΟΜΑΚΡΥΣΜΈΝΩΝ ΧΩΡΙΩΝ ΓΙΑ ΧΡΌΝΙΑ ΠΡΟΒΛΉΜΑΤΑ ΥΓΕΊΑΣ ΕΤΣΙ ΔΕΝ ΤΑΛΑΙΠΩΡΟΥΝΤΑΙΓΙΑ ΝΑ ΜΕΤΑΒΟΎΝ ΣΤΑ ΝΟΣΟΚΟΜΕΊΑ Ή ΣΕ ΙΔΙΏΤΕΣ ΙΑΤΡΟΥΣ. - ΈΧΕΙΣ ΜΙΑ 2Η ΓΝΩΜΗ ΕΞΕΤΑΖΟΝΤΑΣ ΤΟΝ ΑΣΘΕΝΗ ΣΟΥ. -ΠΑΡΈΧΟΥΝ ΕΞΟΠΛΙΣΜΟ ΠΟΥ ΣΕ ΔΙΑΦΟΡΕΤΙΚΉ ΠΕΡΊΠΤΩΣΗ ΘΑ ΉΤΑΝ ΔΎΣΚΟΛΟ ΝΑ ΥΠΆΡΧΕΙ ΣΕ ΕΝΑ ΠΕΡΙΦΕΡΙΚΟ ΙΑΤΡΕΊΟ.-. *service of removal villages for patients with chronic health problems, so there were no transferred to hospitals. - you have a second opinion examining your patient. -They (VODAFONE) provide equipment that would otherwise be difficult to exist in a regional clinic.*
2. Πρόληψη- *Prevention*
3. Πρόληψη και παρακολούθηση νοσημάτων για άτομα που δεν έχουν εύκολη πρόσβαση σε εξειδικευμένες δομές υγείας! - *Prevention and monitoring of diseases for people who do not have easy access to specialized health structures*
4. Πρόληψη και παρακολούθηση των περιστατικων με τη βοηθεια ειδικων – *Prevention and monitoring incidents with the help of specialists from distance.*
5. ΑΜΕΣΗ ΔΙΑΓΝΩΣΗ ΣΤΗΝ ΑΠΟΜΑΚΡΥΣΜΕΝΗ ΠΕΡΙΟΧΗ ΠΟΥ ΤΟΧΡΙΣΗΜΟΠΟΙΩ -- *immediate diagnosis in the remoted area I use*
6. Ευκολία και αμεσότητα - *Convenience and immediacy.*
7. ΠΡΟΛΗΠΤΙΚΗΙΑΤΡΙΚΗ - *Prevention Medicine*
8. Δυνατότητα εξιδεικευμενων εξετασεων με αξιολόγηση από ειδικο - *Possibility of specialized examinations with expert evaluation*
9. Η χρήση της απομακρυσμένης τεχνολογίας και η διάγνωση ειδικού - *The use of remote technology and expert diagnosis*
10. Αμεσα αποτελέσματα, ευκολια χρησης - *Immediate results, ease of use.*
11. Amesotita -*immediacy*
12. Ο Γενικός Γιατρός της επαρχίας έχει μια δεύτερη γνώμη για τον ασθενή του - *The GP has a second opinion on his patient*
13. Η Δυνατότητα μιας εξειδικευμένης απάντησης σε απομακρυσμένη περιοχή!!! - *The possibility of a specialized response in a remote area!!!*

14. Βοηθάει τον ασθενή σε απομακρυσμένες περιοχές - *Assists the patient in remote areas*
15. Η δυνατότητα να εχουμε μια δευτερη γνώμη - *The ability to have a second opinion.*
16. Ολα -*all*
17. Εύκολη χρήση των οργάνων - *Easy to use the telemedicine instruments.*
18. Πρόσβαση των ασθενών που μένουν σε απομακρυσμενες, αγονες και προβληματικες περιοχες σε εξειδικευμενες υπηρεσιες υγειας - *Access to remote, unexplored and problem areas in specialized health services*
19. ΕΞΕΙΔΙΚΕΥΜΕΝΗ ΔΙΑΒΟΥΛΕΥΣΗ ΑΠΟΜΑΚΡΙΣΜΕΝΗΒΟΗΘΕΙΑ - *special consultation -outside aid*
20. Καταγραφή των εξετάσεων σε ηλεκτρονική μορφή και αξιολόγησή τους και από εξειδικευμένη ομάδα από απόσταση - *Recording of the exams in electronic form and their evaluation by a specialized distance team.*
21. Απλοτητα ,συμβουλευτικη - *Simplicity, advisory*
22. αποτελεσματικότητα, αξιοποίηση επαγγελματιών που έχουν ειδίκευση και μπορούν να παρέχουν υπηρεσίες από απόσταση, κάλυψη πρωτοβάθμιας φροντίδας υγείας σε απομακρυσμένα μέρη - *effectiveness, utilization of professionals who can provide distance services, primary health care coverage in remote areas.*

16. What is needed to make telemedicine even better?

1. ΑΜΕΣΗ ΑΠΑΝΤΗΣΗ ΣΤΑ ΚΑΡΔΙΟΛΟΓΙΚΆ ΠΡΟΒΛΉΜΑΤΑ ΏΣΤΕ ΝΑ ΧΡΗΣΙΜΟΠΟΙΕΊΤΑΙΚΑΙ ΣΤΑ ΕΠΕΊΓΟΝΤΑ ΠΕΡΙΣΤΑΤΙΚΆ -ΔΕΝ ΥΠΆΡΧΟΥΝ ΑΡΚΕΤΟΊ ΙΑΤΡΟΊ ΏΣΤΕ ΝΑ ΥΠΟΣΤΗΡΊΞΟΥΝ ΤΟ ΠΡΌΓΡΑΜΜΑ ΚΑΙ ΟΙ ΥΠΆΡΧΟΝΤΕΣ ΠΟΛΛΈΣ ΦΟΡΈΣ ΧΡΕΙΆΖΕΤΑΙ ΝΑ ΚΑΛΥΨΟΥΝ ΠΟΛΛΑ ΧΩΡΙΆ ΝΑ ΠΑΝΕ ΣΕ ΝΗΣΙΆ ΝΑ ΠΑΝΕ ΣΤΟ ΝΟΣΟΚΟΜΕΊΟ ΝΑ ΚΆΝΟΥΝ ΠΟΛΛΈΣΕΦΗΜΕΡΊΕΣ - *direct response in heart problems o be used in emergency. No Several physicians to support the program and the existing physicians many times need to meet many patients to go on islands to go to hospital to make many all-day services (24 hours at the hospital)*
2. Επιπλέον εξετασεις - *Additional examinations*
3. Δεν έχω να προτείνω κάτι - *I have nothing to suggest*
4. Διαγνωση σε πραγματικο χρονο - *Real time diagnosis*
5. ΚΑΛΥΤΕΡΟ ΣΗΜΑ INTERNET Κ ΑΜΕΣΗ ΑΠΑΝΤΗΣΗ ΣΠΕΙΡΟΜΕΤΡΗΣΗΣ ΚΚΑΡ/ΤΟΣ - *Better internet connection and direct answer for Spiromerty and Cardiogram*
6. Πιο γρήγορη ανταπόκριση. διασύνδεση με άλλες συσκευές και προγράμματα - *Faster response. Interface with other devices and programs.*
7. ΛΕΙΤΟΥΡΓΙΚΟΤΕΡΕΣΣΥΣΚΕΥΕΣ - *most operating devices*
8. Δυνατότητα σχετικά άμεσης απόκρισηστου ειδικού. Προσθήκηεξέτασηςhba1c - *Possibility of relatively immediate response of the expert - add hba1c test*
9. Βελτίωση εξοπλισμου - *Improvement of equipment*
10. Περισσοτερα εργαλεια.και υποστηριξη απο περισσοτερες ειδικοτητες - *more tools and support from more specialties.*
11. Dieurinsi - *Investigation*
12. Βοήθεια στην αντιμετώπιση επειγόντων περιστατικών - *Assistance in dealing with emergencies*
13. Δυνατότητες απεικόνισης - *Possibilities for visualization*
14. Είναι ικανοποιητική - *is satisfactory*
15. χρόνος από την πλευρά του ιατρού ή του επαγγελματια υγείας - *Time on the part of the physician or the health professional.*
16. Μεγαλύτερη διασύνδεση. Στόχευμενη εφαρμογή της Εξειδικευσης - *greater interconnection. Targeted implementation of specialization*
17. Τιποτα - *Nothing*
18. Πρόσβαση σε περισσότερες περιοχες - *Access to more areas*

19. ΟΡΓΑΝΩΣΗ ΔΙΑΣΥΝΔΕΣΗ ΚΑΙ ΠΡΟΣΒΑΣΗ ΟΧΙ ΜΟΝΟ ΑΠΟ ΠΕΡΙΦΕΡΕΙΑ ΣΕ ΚΕΝΤΡΟ ΑΛΛΑ ΚΑΙ ΣΥΝΟΛΙΚΑ ΠΕΡΙΦΕΡΕΙΑΠΕΡΙΦΕΡΕΙΑ - *Organization interconnection and access not only from a region to another central, but the total area of a region*.

20. ΆμεσηδιάγνωσηκαιδυνατότηταοπτικήςεπαφήςμετονΙατρόπουγνωματεύειτηνεξέταση   - *Immediate diagnosis and possibility of eye contact with the examining physician.*

21. επικοινωνία/σύνδεση με ιατρικό φάκελλο ασθενή - *Communication / connection to a patient's medical record*

22. ΕΝΗΜΕΡΩΣΗ ΙΑΤΡΙΚΟΥΠΡΟΣΩΠΙΚΟΥ,ΠΟΛΙΤΩΝ - In*formation to the medical staff and citizens*

23. εκπαίδευση ειδικών ενημέρωση των πολιτών, θεσμικό πλαίσιο κατάλληλο, χρηματοδότηση από την πολιτεία - *Expert training, information to the public, appropriate institutional framework, state funding*

Appendix 30: analysis results survey

The survey is sent to 80 health care professionals, 26 participants responded on the survey. This is a respondent percentage of 20,8%. The health care professionals are based all over Greece, so we received a clear view about the opinion of telemedicine of whole Greece.

The health providers worked in average of 18 years with telemedicine and has been involved with Vodafone Telemedicine for an average of 5 years. So, these health care providers have experience with telemedicine and their answers on this survey can be considered reliable. 80% of the health providers are general practitioners. 77% spent around 0-20% of their working hours on telemedicine while prevention is used mostly. Prevention is the most used part of telemedicine, because this is a recurring appearance.

Participants had to rate several aspects of telemedicine, health providers could give it 0= extremely ineffective to 5= extremely effective (Expertise on ICT, initial education and training about Vodafone telemedicine provided, training and support, comfort with provider interaction, reliability of technology, system speed, information security and data quality). The average number is 4,3, which is a high rank. This tells us that these parts of telemedicine are experienced as positive and there is no need for improvement.

Participant had to rate the Vodafone telemedicine devices on a scale from 0-5 got an average of 4,3. This also shows us that the participants are satisfied with these parts of telemedicine and that there is no need for improvement.

3 statements were given to the participants: "Using telemedicine is clear and comprehensible for me", "I know how to use telemedicine devices and how they work" and "Telemedicine is easy to use". All 3 statements were ranked as ''I strongly agree'' by more than 50 % of the participants. This point of telemedicine can be improved, because the other half of the participant are telling us that they are not fully satisfied with these telemedicine parts.

A lot of participants filled in that telemedicine is very helpful in remoted places, but that it can be used more effective on these remoted places. More research is needed to indicate how to use it in its most effective way in these remoted places.

Other recommendations that participants give are A better internet connection. Faster responses of specialists, more equipment, more support from the specialist and training for health care professionals. The training for the health care professionals is partly covered by making the E-Learning for medical students. Other recommendations need to be further investigated to use effective.

Appendix 31: preposition further research based on the results of the survey

Students from the university of Rotterdam sent a survey out to 80 health providers all over Greece, around 35 participated in the survey but only 26 health providers completed the survey. health providers worked in average of 18 years with telemedicine and has been involved with Vodafone Telemedicine for an average of 5 years. 80% of the health providers are general practitioners. 77% spent around 0-20% of their working hours on telemedicine while prevention is used mostly.

The important findings from the survey were that telemedicine work like how it is supposed to be working. Some doctors came up with recommendation to improve it. The health providers work most of the time with prevention and that's why one of the recommendations was to have more equipment. More equipment can make telemedicine accessible for a larger group whom at first had to go the hospital. Another recommendation was that general doctors want to have faster answers from the specialist. A better internet connection is also one of the recommendations of the health providers to improve the telemedicine system. This are part of telemedicine that need improvement according to these health professionals. Research could be done for finding solutions for these problems.

The recommendation that did catch our eye was that telemedicine should be at more remote places, seeing that the main use of telemedicine is to make health care accessible for everyone everywhere. With our project we could not come up with a solution for this problem, but in the future, there can be improvement for this part of telemedicine.

From the survey, the project group has received more questions what need to be investigated. for example, it must be investigated which remote places do not have access to telemedicine and whether there is a reason why no telemedicine system has been installed in these places in the past. It is also important to know how much time a specialist takes to assess each type of telemedicine case and also to investigate, how much time the general doctor expects each case to be assessed.

If the questions above are answered, we recommend making agreements about how much time is required for each type. In this way it is clear to the general doctor in remote places how long he has to wait, and it is also clear to specialists how long they have to assess a telemedicine case. An important question that emerged from the "more equipment" recommendation is what other devices are needed to improve telemedicine. If this question is answered, it can be further investigated whether multiple care providers think it is necessary and then it is possible to explore if this equipment will be added to the telemedicine system in the future.

And finally, the internet connection appears to be a problem to make optimum use of the telemedicine system. therefore, it is recommended to invest more time and money in improving the internet service for the telemedicine system.

Appendix 32: change management (REVIEW)

To implement the new solution in the system it takes a change in the management. The necessary change of management was included in the preposition for implementation and it is supported with literature evidence.

To lead the change we use the REVIEW tool. This tool is also a brief overview of the implementation preposition.

R -Reasons for Change

Telemedicine is very important in healthcare in Greece. It is necessary to educate health care students about telemedicine so they can research telemedicine in university and when graduated, use telemedicine efficiently and immediately.

E -Engage staff on the change

In the preposition to implement telemedicine education in medicine university, the engagement of staff is included. '*Besides, involvement of professors and students is important. They know best what the challenges are when using e-learning. Their opinions should be taken in consideration implementing the e-learning. This can be discussed during a meeting'.* This recommendation is supported with evidence from literature in the preposition.

V -Visualize the vision for Change

To visualize our vision for change, the e-learning was created. The e-learning is a way to show our vision on telemedicine education. The e-learning can be found here: https://moodle.alteravita-cyclades.gr/login/index.php

I -Initiate the Implementation Plan

The implementation preposition is first handed to Miltos, our Greek project supervisor. If everything is approved by the Ministry of Education and the University of Heraklion, the E-learning and preposition are sent. There was not enough time to do this during our time in Crete because of the bureaucracy.

E -Empower people for the change

This is also done in the implementation preposition. In the following part of the preposition it is explained why this change is important:

'Knowledge about telemedicine may increase and therefore future doctors will be able to use telemedicine more efficiently. Besides, telemedicine might attract the attention of some students and they can decide to do more research on the topic.

W -Quick Wins to motivate people to change

The quick wins are, in this project, related to the e-learning. In the preposition it is explained why the e-learning is a convenient way to educate. This is done in a summary of the quick wins.

E-learning is an ideal tool to inform students. First, Sitzmann T, Kraiger K, Stewart D, Wisher R. (2006) are describing E-Learning has the same effects as classroom/ face to face instruction. Cook D, Levinson A, Garside S, Dupras D, Erwin P, Montori V. (2008) have done a comparable research a couple years later and found the same results. Second, it is easy and unlimitedly accessible. During a conversation with a Medicine student it became clear that there is no possibility for the students to look up information again. The E-learning provides a solution for this.

Third, it is free. Fourth, it is interactive. Attached to the e-learning there is information, articles, video's, websites and 'check yourself' questions.'

Also, the management is encouraged to empower their people: '*communication is key. Let the users know what the benefits are of this e-learning and why it is implemented.'*

Appendix 33 Final version of the E-learning

https://moodle.alteravita-cyclades.gr/course/view.php?id=26

Username:

Password:

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Why this E-learning?

Greece has a peculiar geography that creates an increased need for medical staff. Telemedicine is an important means to solve this problem. Field research showed that students in Heraklion, Crete, are not yet familiar with the term 'telemedicine'. This e-learning is intended to change this.

What is telemedicine?

The World Health Organization (WHO) has referred telemedicine as "healing from a distance." The telemedicine software is used to provide clinical services to the patients from any remote location.

Telemedicine would be considered as the most important technology as it makes it possible to treat patients effectively at a low cost. Today, it may seem to be a novel approach, but very soon, telemedicine software would be commonly used by healthcare professionals.

Nowadays in Greece, Vodafone has implemented a telemedicine program in 2006. It is located in 100 remote locations on the main land and on islands in Greece. The Vodafone network is used to send examination or test results to specialists in another location. Also it has the ability to create an electronic medical record. Vodafone also provides telemedicine training for health care professionals (Vodafone, 2018).

The e-learning consists of six sections. It is intended that one section per week is completed. The following topics are covered:

Lesson 1: Introduction

Πρόγραμμα Τηλεϊατρικής Vodafone

14 χρόνια

100 επαγγελματικά σημεία σε όλη την Ελλάδα

Πρόσβαση σε εξειδικευμένες υπηρεσίες υγείας για 500.000 κατοίκους

Από το 2013 έχουν εξεταστεί πάνω από 10.200 κάτοικοι απομακρυσμένων περιοχών

Από το 2008 έχουν πραγματοποιηθεί περισσότερες από 46.500 εξετάσεις
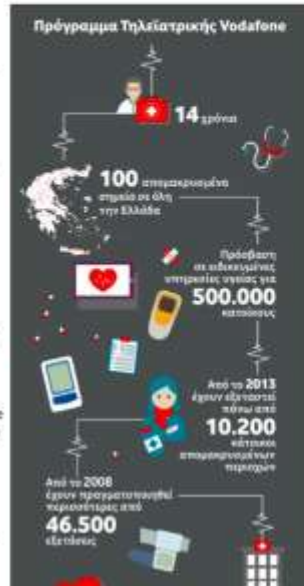
Lesson 1: Introduction

Lesson 2: Benefits and drawbacks of telemedicine

Lesson 3: Telemedicine history and current situation in Greece

Lesson 4: Types of telemedicine

Lesson 5: Telemedicine devices

Lesson 6: The future of telemedicine

Connecting for Good   Ίδρυμα Vodafone

Each week will offer a range of text information, video's and scientific articles. At the end of each section there are 'check yourself' questions to check if you understood the information correctly.

This video gives you an impression of how telemedicine is used.

Digital Europe - Say hello to Nikos

...and the nearest central hospital is 44 km away

We hope that this e-learning has added value to your medical career. If you have any questions or feedback you can contact Laura van Weelde; lauravanweelde@gmail.com. Thank you for participating.

We hope that this e-learning has added value to your medical career. If you have any questions or feedback you can contact Laura van Weelde; lauravanweelde@gmail.com. Thank you for participating.

Lesson 2

Telemedicine history and current situatie in Greece

The idea of talking to a doctor or a health care provider from a distance did not arise in the last century or the one before it, this idea has a long history and a lot of experience story that has designed different ideas and encouraged different people to develop a tool that can help to treat as many patients as possible.

In this first lesson, a small part of the history of telemedicine is introduced and we are also gone take a look at how Greece implemented telemedicine for the first time until now.

A brief History of Telemedicine

The modern history of telemedicine starts in the 19th century.

500 BCE — Telehealth in ancient Greece and Rome: patients receive medical advice from doctors using representatives.

19th century — The invention of the electric telegraph and telephone allow doctors and patients to communicate remotely.

1925 — Luxembourg born inventor Hugo Gernsback suggests Teledactyl and predicts that telemedicine could use video and robotic arms by 1975.

1948 — First teleradiology application: radiographs transmitted by telephone in Philadelphia.

1959 — University of Nebraska uses two-way interactive television to transmit neurological examinations to students.

1960s — NASA's contribution to telemedicine starts with transmitting animals' biometric data to scientists on Earth via a telemetric link.

1980s — Standards for the digital storage of medical images allow radiology images to be transmitted via a dedicated cable.

1993 — The American Telemedicine Association is established, aiming to promote access to medical care via telecommunications technology.

2010s — The extended use of the Internet allows telemedicine to evolve along with regulations and standards.

In 1860 the Telegraph was used for the first time in the war. William S. Morris and Albert James Mayer have developed a system to use the Telegraph to request medical supplies for the frontlines, specify delivery points and coordinate patient transport.

In 1874 in Australia was the first documented use of Telegraph for medical purposes. That happened when the Barrow Creek telegraph station was attacked. A police officer was seriously injured, a surviving policeman asked for help via the Telegraph. Dr. Charles Goose how was informed, gave instructions on how to treat the injured men through the Telegraph until an ambulance arrives.

Fig. 1.5 "Baudot telegraph machine", a military field-type telegraph during the Second World War (USSR, 1941-1945)

The next case where Telegraph was used was in west Australia where a twenty-nine-year-old farmer fell off his horse, his friend took him to the nearest town hall (75 km), but there was no hospital or doctor in that city. Via the Telegraph they could reach a doctor who made a diagnosis. However, because the man had to undergo surgery immediately and due to the lack of medical devices, the man died shortly thereafter. The next day the story was on the front pages of all newspaper.

This story inspired John Flynn to develop the world's first Medical Aviation Service in Australia. This organization was organized in 1928 under the name Aerial medical service (AMS), this organization makes it possible to reach patients quickly in case of an emergency.

The founder of AMS has indicated that a radio can reduces the work of AMS by 75%. However, the electricity was not optimal around this time. But Alfred Hermann invented the Pedal radio (a dynamo generator with pedal drive that was used for electricity supply) at the beginning Morse code were used and after 1930 was the sound massages used.

Fig 1.10 and Fig 1.11 Alfred Hermann Traeger (02.08.1895-31.08.1980) and his invention

In 1940, all AMS locations were provided with all the devices needed for telemedicine. With the further development of technology and the invention of television, the telemedicine system could further develop. In 1947, the TV was used for the first time to broadcast surgery to doctors in training. In 1951 the telemedicine system was further developed into a colored TV system. The system was also used for video conferencing this year. The cable television system connected in 1968 the university of Nebraska Medical Center and three hospitals for veterans (in Omaha, Lincoln, and Grand Island). Besides, the telemedicine system was further developed in this year with devices such as the electrocardiograph, stethoscope, microscopy, voice, and other capabilities. (Vladzymyrskyy, Jordanova, & Lievens, 2016)

Fig. 3.3. Medical black and white video conferences in Israel Zion Hospital (New York, USA), 1939

The twentieth century had an important role in the development of telemedicine, but the twenty-one century has also made enormous progress for telemedicine. Such as using a mobile phone to take medical care to a remote location, introducing the High-tech camera that makes teledermatology possible through clear photos of the skin and enabling teleradiology through radiographic images and making it possible to forward patient information easily and quickly to other healthcare providers far away.

Telemedicine and Greece

The Greek telemedicine program was started in 1989. the first impetus was between the Internal Medicine Department of the Sismanogleion Hospital and the first-line centers of Spata, the island of Paros, the Hospital of Karpenision and the Primary Care Department of West Fragista.

In 1990 the Greek health minister financed the installation of three terminals in primary health care, for which an agreement was signed with the Greek telecommunications provider (OTE). Two terminals were placed in Sismanogleion hospital one in the Medical Physics Laboratory of the National Kapodistrian University of Athens.

— Secondary care

— Primary Care

Isolated islands such as Limnos, Ikaria, Faros, Skopelos, Santorini, Astypalaia, Fourni and Kastelorizo were supported in 1992 with the telemedicine service. In April 1992 the connection of primary health care was complete. Afterward, 2000 cases were served.

Pneumatological: 27%

Cardiological: 17%

Orthopedics: 21%

Ourology: 5%

Surgery: 2%

Supporting and Diet: 12%

The same year the regular teleconsultation service for medical diagnosis was established via the Sismanogleion Hospital Telemedicine Unit on different islands.The last development of telemedicine in Greece was 1999 the country towards the design of an integrated national telemedicine action plan. This plan was implemented of the study in 1998 that was funded by the Greek ministry of health

Lesson 3

Benefits and drawbacks of telemedicine

Lesson 3

The video above shows the reason why telemedicine is important. Of course, like any technology, telemedicine does have its own benefits and drawbacks. Telemedicine has been around for a while now and a lot of problems with it have been fixed.

- *Telemedicine supports the general practitioners and rural practitioners. The GP's in rural area's can ask for support from specialists to help their patients better.*
- *The Vodafone telemedicine program promotes preventative medicine and therefore helps prevent diseases through their early diagnosis.*

- *It covers patients with chronic diseases, as it enables them to systematically monitor their health status at their place of residence, removing geographical or other restrictions.*
- *Telemedicine has the immediacy of the help that can be provided.*
- *It prevents the abandonation of remoted places.*
- *Telemedicine reduces health care costs.*
- *It even reduces the emission of atmospheric pollutants.*
- *A drawback for telemedicine is that the medical consultant loses a lot of the information he or she would get from direct contact with the patient, and it may not always be possible to help immediately.*

In a study of the benefits of telehealth divided the patients over two groups, one where the patients visit a geriatric service and the other is **Telegeriatric** where patients have a videoconference with a general practitioner. In **conclusion** the Telegeriatric reduced the wait-times, had a geographically broader reach and was able to reach more remoted areas compared with the geriatric service. For the results of the article click "*Improving geriatric care and reducing hospitalisations in regional and remote areas: The benefits of telehealth*".

Telemedicine significantly reduces the health care cost by saving money for the health care provider, the patients, and the insurance. It also reduces unnecessary non-urgent ER visits and eliminates transportation expenses for the regular checkups.

Another study shows that between January 2018 and June 2019 in total 9034 face-to-face visits were avoided in 2 hospitals. For an average journey of 25 minutes to the hospital and back a total of 11,754 L of petrol were saved whom would have cost 15,664 euros. Total reduction in pollutants is 29.384 tonnes of carbon dioxide and 36.61 kg of carbon monoxide. Therefore, Telemedicine reduces the environmental impact of atmospheric pollutants emitted by vehicles by reducing the number of journeys made for face-to-face visits to see a specialist. For the results of the article click "*Impact of a Telemedicine Program on the Reduction in the Emission of Atmospheric Pollutants and Journeys by Road*"

To sum all these benefits up, you can watch this American video about how telemedicine can improve care

📄 Impact of a Telemedicine Program on the Reduction in the Emission of Atmospheric Pollutants and Journeys by Road

📄 Improving geriatric care and reducing hospitalisations in regional and remote areas: The benefits of telehealth

Lesson 4

Types of telemedicine

When a person thinks off telemedicine the first thought that will pop in their mind is a teleconference with doctor about acute health situations. So, there is no doubt that telemedicine is a great help in the acute cases but is actually more than that. Telemedicine can help in different ways. The types of telemedicine that we are going to discuss:

- *Medications management*
- *Triage*
- *Prevention*
- *Real time/ live telemedicine*
- *Remote patient monitoring:*
- *Store-and-forward*
- *Specialist consulting*

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Medication management

Patients with chronic diseases usually receive medication for a long time. when patients start taking new medication, it usually takes a while for the caregivers to find out whether the medication is effective and whether the patients have the correct dosage. the patients and caregivers have to address the side effect to determine if it is the right medication for the patients.The use of telemedicine by video and audio can ensure that the med checks can happen as much as necessary without placing a burden on both parties.

Triage

Patients with chronic illness can develop new symptoms. It is often difficult for the doctor to determine by telephone whether it is underline of a disease or a new disease that needs to be treated. Telemedicine can be used to quickly assess the new symptoms via video conversation. This way patients can be reassured or start a new treatment if the symptoms indicate new disease.

Prevention

Some patients can be a risk group for a certain chronic illness. To prevent them from developing chronic disease. patients usually need to change their lifestyle to ensure that patients are successful they need monitoring and support. It is often very difficult to book such an appointment, which is why telemedicine can play an effective role.

Real-time/live Telemedicine

real-time/live telemedicine makes it for patients and doctors easy to have a visit anytime and anywhere they want. it is a two-way communication that let patient and health care providers communicate in real-time.

Remote patient monitoring

This type of telemedicine allows health care providers to monitor patients from far. Using RPM (remote patient monitoring) can cut down on the time that the patient spends in the hospital. Especially for patients with chronic conditions is very effective to spend time home instead of the hospital. Nowadays technology is so evolved that patients do not monitor themselves, but rather vital health data will be shared with the doctor and other health care providers automatically. Thanks to this technology the doctor can provide much better care and take action immediately by any signs of trouble.

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Store-and-forward

Store and forward ensures that patient data and medication data are accessible across long distances. caregiver can collect, upload and leave the required information for the doctor to asses it later. The advantage of this type of telemedicine is that it is not necessary to assessed immediately by the receiving doctor. another big advantage is that there is no appointment required, therefore, this type of telemedicine is often used to assess minor medical issues. a lot of specialism uses this type of telemedicine to offer better care. Therefore, several systems ensure that all this information is integrated into a single record for each patient.

Specialist consulting

Specialist consulting is deployed to improve the collaboration between the medical team and to offer patients the best care and save them the long journey. through a safe video conferencing with or without the patients in the communication room, the patient information can quickly and completely share with a specialist. this type of telemedicine has a big advantage in remote places, where the hospitals are far away. This type of telemedicine. in some hospitals and clinics, special examination cameras are available so that the specialized can get a better picture of the condition of the patient

The video below shows how some telemedicine devices are used

Telemedicine Helps Greek Elderly

✔ Test your knowledge about the types of telemedicine

Lesson 5

Telemedicine equipment

Most people have access to basic telecommunications technology, like telephones, Internet, and computers. But many telemedicine solutions require more equipment than just those basics. Here's a review of the types of telemedicine equipment a healthcare provider may need.

Telemedicine carts

This equipment gives providers a mobile frame and a storage to carry the cameras, computers monitors, keyboards, computers, and the mobile medical devices. The carts look similar to standing work desks, with computer monitors attached at the top and wheels at the bottom for easy moving. These carts are usually used at the hospitals or other large health care systems.

Telemedicine kiosks

The telemedicine kiosk looks like a photobooth and is usually stocked with all the equipment and commonly used mobile medical devices that are needed for a telemedicine visit.

Digital camera

A webcam is needed in order to have a video conference. There are also high-end, high-resolution digital cameras for crystal-clear video capture. The high-tech camera allows the healthcare professional to take detailed medical images and share them with a specialist at another location. It is usually used for the **store-and-forward telemedicine** solutions between two healthcare providers.

Telemedicine kit

Healthcare providers who are routinely providing frontline care in remoted areas need a portable telemedicine kit. The kits often look like a sturdy briefcase or a large medical kit. Inside the kits is a small computer with an integrated screen, a camera, and simple medical devices.

Telemedicine software

A software system needs to be installed on the medical practice's computers. These software solutions may require additional equipment like data storage hardware or servers

Patient medical record

Vidavo is the system that is used in Greece to process all the patient's medical data. There are also applications of this system. This makes work easier because doctors no longer need to carry a laptop or computer around, instead, all they need is a tablet or a phone.

When the patients visit the doctor, the doctors start to fill in the personal data of the patients in the application. Next, the medical history of the patients is fill in. After that, the reason for the visit will be entered. Then the doctor will test the necessary body functions that happen with a certain medical device. Think about Blood pressure meter, Spirometer, Electrocardiography (ECG), Oxygen saturation measurement or blood sugar meter, these medical devices are all connected to the application through Bluetooth, this results in equal results and then the doctor can send the visit

✔ Test your knowledge about the equipment of telemedicine

Lesson 6

Lesson 6

There's a lot to be optimistic about in the future of telemedicine. With rapid advances in technology, it's likely that telemedicine will only become easier and more widely accepted in the coming years. The rate that technology is progressing, telemedicine will of course need to overcome administrative barriers, such as restrictions placed on telemedicine practice by state legislation, state-specific licensing requirements by medical boards, and the reimbursement policies that affect whether doctors are reimbursed by payers and patients are not out-of-pocket. But with the projection that telemedicine will be a $36.3 billion industry by 2020, over 50 telehealth-related bills in the 113th Congress, and 75% of surveyed patients reporting interest in telemedicine, telemedicine's future is bright and demand is likely to overcome these barriers (E-visit, 2018)

In the future, telemedicine could be filled in by communication apps for your mobile phone, like WhatsApp. "*Clinicians have independently discovered that they can use their favourite instant messaging app to send text messages to colleagues to seek or give clinical advice, supplemented with images, video, or audio recordings made using their phone. This is counter to current conviction about how to implement scalable and sustainable telemedicine services. No needs or eHealth readiness assessment is undertaken, no business or change management plan formulated, no new software has to be installed, no training is required, and typically there is no budget.*" (Mars, M., Morris, C., & Scott, R. E., 2019). Literature found in this article showed that clinicians use communication apps because of its simplicity, timeliness and cost effectiveness. But is also shows that there are no generic guidelines available for the use of communication apps in healthcare.

In another article written in 2018 Nikolic, A., Wickramasinghe, N., Claydon-Platt, D., Balakrishnan, V., & Smart, P. are describing positive points about using communication apps in healthcare. Doctors who were participating in this trial were positive, but the privacy policy can not be insured by using these communication apps.
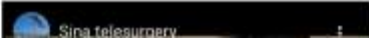
The use of communication apps could be very useful in the future for telemedicine. But there is more research needed to develop guidelines and solutions, due to the privacy issues.

In this E-Learning, a lot is written about the use of telemedicine for doctors, but for other professions telemedicine can be helpful as well. Physiotherapy, speech and language therapy, dietician and occupational therapist can use telemedicine as well.

Telesurgery

In 2001, the world's first telesurgery was conducted by a surgical team in New York, USA. Since then, using telesurgery technology is at a halt. '*further optimization of visual display, latency time, and haptic feedback technology, design and publication of further randomized controled trials, and minimization of the factors that limit its clinical translation, telesurgery's widespread implementation in clinical settings will become highly feasible*'(Choi, Oskouian & Tubbs, 2018).

This video gives you an impression of telesurgery with the Sina robot

There is already research going on about the use of 5G cellular technology. This technology is likely to improve the remote assistance in telemedicine and real time. If you are interested, the following article is about a pilot project that will use 5G cellular technology to enable remote assistance for surgical procedures in real time. You can find it by clicking on this link:

https://healthmanagement.org/c/healthmanagement/issuearticle/5g-opens-the-future-of-telesurgery

- 5G opens the future of telesurgery
- Telesurgery: Past, present, and Future
- The Ultimate Telemedicine Guide | What is Telemedicine?
- The Use of Communication Apps by Medical Staff in the Australian Health Care System: Survey Study on Prevalence and Use
- WhatsApp guidelines – what guidelines? A literature review

Lesson 7

Lesson 7

- TELEPSYCHIATRTY

Caregiving from distance can be used for other specialities, besides from doctors. Telepsychiatry is a well-known appearance in the Greek health care system.

Depression is well known appearance is the health care. Telemedicine can be useful for client who experience some kind of depression. A research about sending text messages to the psychiatrist is done in 2019. It shows that telemedicine can be useful when using real time, but there is more research needed for sending text messages to the psychiatrist. The research can be found below " Effectiveness of text messaging interventions for the management of depression: A systematic review and meta-analysis".

In the Greek health care centre telepsychiatry is used for psychiatry is remoted places. Below are two articles about telepsychiatry in Greece.

Presented by: Northeast Telehealth Resource Center Presenters: Don Hilty, MD, USC Keck School of Medicine and Kaweah Delta Medical Center Terry Rabinowitz, MD, DDS, University of Vermont College of Medicine and University of Vermont Medical Center Telepsychiatry is a well-established, evidence-based tool to increase access to quality mental health services. Two leaders in the field will explore effective telepsychiatry models, from traditional clinical settings to integration into rural primary care, nursing homes, and beyond. As reimbursement grows and regulations continue to evolve, join us to learn where to get started (or where to expand):

Exploring the potential of over the web Psychiatry

Tele-psychiatry: Socioeconomic Results and the Way Forward

Effectiveness of text messaging interventions for the management of depression: A systematic review and meta-analysi

Evaluation of the course

Exploring the potential of over the web Psychiatry

Tele-psychiatry: Socioeconomic Results and the Way Forward

Effectiveness of text messaging interventions for the management of depression: A systematic review and meta-analysi

Evaluation of the course

The purpose of this survey is to give us a better picture of your experience with E-learning. This feedback can help us to further improve e-learning. There are no 'right' or 'wrong' answers; we are interested only in your opinion. Please be assured that your responses will be treated with a high degree of confidentiality, and will not affect your assessment. Your carefully considered responses will help us improve the way this unit is presented online in the future. Thanks very much.

click the QR-Code to participate

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