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PRODUCTION OF A VIDEO TUTORIAL ON A MULTIPURPOSE MEDICAL CAMERA FOR BASIC EXAMINATIONS

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ABSTRACT

Over 72% of population in Finland lives in urban area which covers 5% of the land surface, while nearly 30% of population is distributing in the rest of 95% areas all over Finland. An evaluation on the social and health services in Finland shows that, the inadequate equal access to medical care is hindered by the traveling and waiting time. It had also been approved that distance to access health care has negative impact on health outcome. How to improve the equal access to all populations becomes a big challenge for each municipal health services providers.

Telemedicine, sometimes described as telehealth, eHealth, designed to overcome the obstacles of time and space to deliver medical care, had been highlighted and adopted deeper into practical use by health services providers. Registered nurses being the most front-line healthcare providers with physical contacts in the community, play a critical role in telehealth services.

In the above mentioned situation, portability and mobility are especially important in the set up of telemedicine when the aim is to provide patient-based medical services. Based on various consideration, a Multipurpose Medical Camera, a portable hand-piece which performs different type of basic examination digitally, was selected as an exploratory product by the RoboSote project managed by Centria University of Applied Sciences HealthLab. This portable medical camera would allow the operators to capture images or videos during medical examination and transfer to medical providers who work remotely on the background for diagnosis and draw up treatment plans. It could be a tool to improve healthcare access for patients living in remote areas or with decreased mobility.

The purpose of this thesis is to produce a video tutorial on the use of this Multipurpose Medical Camera. This video is aimed to be as a training material for nursing students studying in Centria University of Applied Sciences, as well as registered nurses who will be working related to the use of this camera. This video was presented in English, with subtitles in English, Finnish and Chinese.

CONTENTS

1 INTRODUCTION

According to the investigation of SYKE (Finnish Environment Institute,) in 2018, over 72% of population in Finland lives in urban area which covers 5% of the land surface, while nearly 30% of population is distributing in the rest of 95% areas all over Finland. An evaluation on the social and health services in Finland shows the inadequate equal access to medical care. The report pointed out that traveling time or waiting time is one of the factor that hindered the access to care. The access is also affecting the elderly group in urban area due to mobility decrease. It had also been approved that distance to access health care has negative impact on health outcome. How to improve the equal access to all populations becomes a big challenge for each municipal health services providers.

As an alternative to traditional office-based consultation, telemedicine, sometimes described as remote consultation, was designed to overcome the obstacles of time and space to deliver medical care. It helps to enhance the equality of access, service efficiency and overall quality in medical services. Registered nurses being the most front-line healthcare providers in the healthcare system and community, play a critical role in telehealth services, they are expected to be major contributors and informants in telehealth.

In the above mentioned geographical situation in Finland, for telemedicine implementation, portability and mobility are especially important when the aim is to provide patient-based health care service to solve the access challenges caused by distance. Based on various considerations, a Multipurpose Medical Camera, a portable hand-piece with multiple HD cameras which performs different type of basic examination digitally, was selected as an exploratory product by RoboSote project, which is financed by European Regional Development Fund and managed by the HealthLab of Centria University of Applied Sciences. It could be used as a tool in the view of linking up patients or customers located in remote areas or customers with decreased mobility to medical care, bridged by register nurses who works in the most front-line and physical contacts with patients or customers.

The application of this Multipurpose Medical Camera in clinical practice could aim to be handled in healthcare sites in remote areas where lacking direct access to medical care or physicians are not available at all times. Examination results can be obtained and documented by trained registered nurses by using such a device, and forward them to seek medical opinions in a basic and less-urgent manner. Home care units or nursing homes dealing with clients of chronic conditions and decrease of

mobility, such as elderly or disabled groups, no matter in urban or rural area, may also consider to use this device for telehealth on basic and non-urgent health conditions. It had been reported that a similar device had been successfully used for telehealth service in a small town in Iceland where physicians are not based in the area. In house nurses working in a small clinic had been using a digital medical camera and digital stethoscope to record examination results of patients and forward them to the duty physician for review and provide follow up instructions.

Nursing care and nursing education had been lacking telehealth content. Nursing graduates are not prepared with the necessary skills in telehealth service delivery, which had hindered their professional stand and their role optimization being register nurses. Nurses are not ultimately ready to provide care through telehealth technologies. Without proper training, customer satisfaction, service effectiveness and efficiency, service delivery security in the telehealth would be highly impacted.

The purpose of this thesis is to produce a video tutorial on the practical application of the Multipurpose Medical Camera. A video tutorial on how to use this Multipurpose Medical Camera can be used as a training material to prepare nursing students in optimizing their nursing roll, and to help registered nurses master the usage of this device and carry out telehealth service delivery efficiently and smoothly.

In this video, the structure to the manipulation of the camera are introduced; evidence based instructions and demonstrations on how to correctly complete basic inspections related to the basic functions of this camera are also included. A brief introduction on disinfection and maintenance after use, as well as problem solving are mentioned. This video is done in cooperation with the RoboSote project. It is presented in English. Additionally, English, Finnish and Chinese subtitles are available to be chosen.

The key audience of this thesis is primarily for nursing degree students in Centria University Applied Sciences. Secondly registered nurses in the working environment who would be involved in the use of this device, such as nurses in home care services units or nursing homes, who are dealing with patients with decreased mobilization capabilities; and registered nurses working in remote areas where there are no physician available at all times.

2 EQUAL ACCESS TO HEALTH SERVICES IN FINLAND HINDERED BY DISTANCE

In year 2018, THL (Finnish institute for health and welfare, Terveyden ja hyvinvoinnin laitos) had done an evaluation on social and health care services in Finland which indicated that equal access to medical care remains inadequate though social and health care services had overall been improved. The report had pointed out that traveling time or waiting time is one of the factor that hindered the access to care. The access is also affecting the elderly group in urban area due to mobility decrease. (Rissanen, 2018)

People had also tried to understand if long distance or travel time would affect health outcomes in the general population, and the answer was positive. A systematic review in recent years had found nearly 80% of the results suggested that people living far from health facilities have worse treatment outcomes in multiple north countries globally in the adult population. These including lower survival rate, more hospitalization time and lower follow-up attendance. (Kelly, Hulme, Farragher, & Clarke, 2016)

According to the investigation of SYKE (Finnish Environment Institute, Suomen Ympäristökeskus) in 2018, over 72% of population in Finland is living in urban area which occupying only 5% of the land surface. (Picture 1, 2)
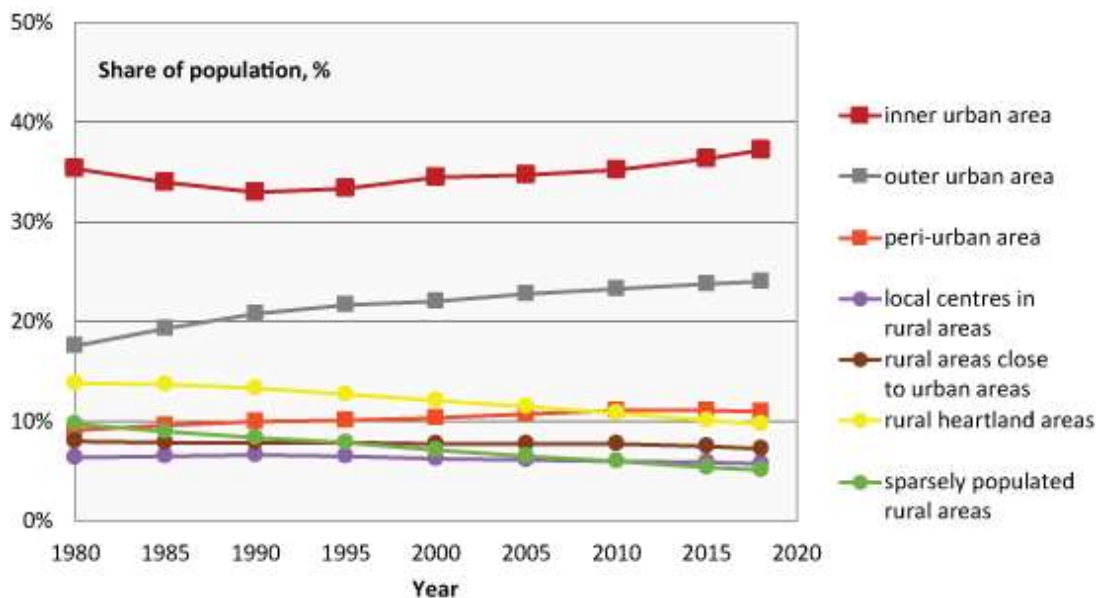
PICTURE 1: Population distribution according to the urban-rural classification (2018) (Finnish Environment Institute. 2020)
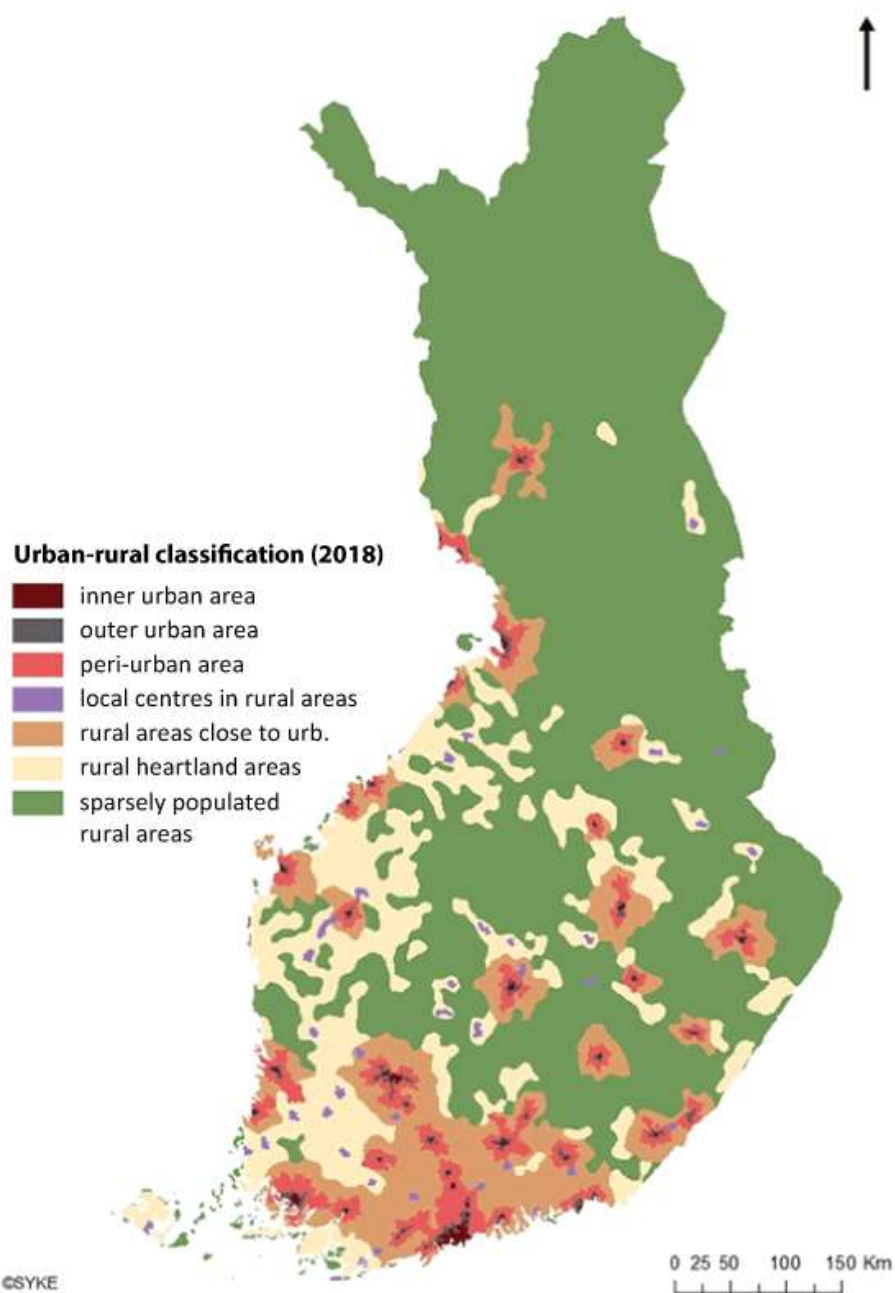
PICTURE 2: Urban-rural Classification (2018) (Finnish Environment Institute. 2020)

With the fact that specialized health care services are mostly only available in central hospitals located in the city, how to improve the access and convenience of specialized medical care, even for some of the primary service, for the nearly 30% population wildly located in the rest of 95% land surface area all over the country, became a huge challenge for each municipal health service providers.

2.1 Geographical access to primary health services

In the primary care area, the level of access differs from region to region. The municipal health service provider's decision and how they structure their services, affects greatly on the outcome. In general, the Finnish population are considered to have good access to health care services, however, the distinct inadequate access to health care services exists in rural area in particular. (Kotavaaraa, Nivalab, Lankilaa, Huotaria, Delmellec & Antikainena, 2021) In certain population groups, such as the ageing and disabled populations, the accessibility level to health care are affected when mobility decreases. Majority of the population can access to primary health care within 10 minutes travel, and maximum travel to be 35 minutes in the far north corner. (Rissanen, 2018)

2.2 Geographical access to specialized health services

Specialized health care has significant variations between regions in terms of productivity, its productivity could have been improved without adding additional resources. The accessible level of specialized health care is much worse in compare with the primary health care due to the spacial distance.Only the population living in inner urban would have access to specialized health service with in 15 minutes, and the maximum travel time is up to over three hours covers a vast area of northern Finland. (Rissanen, 2018)

3 SHORTENING THE GAP OF HEALTHCARE ACCESS BY USING TELEMEDICINE

Telemedicine was designed to overcome the obstacles of time and space to have medical information exchange or deliver medical care. Telemedicine is not a sub-speciality of medicine, but a mean of delivery medical care through telecommunication technology which is to be used by various specialties in medicine. (Craig & Petterson, 2005) It helps to enhance the access, service efficiency and overall quality in medical services. As an alternative to traditional office-based consultation, it no only improves the convenience for patients to receive medical care, but also saved a lot other costs, such as traveling, absence from work. (Freed, Lowe, Flodgren, Binks, Doughty & Kolsi, 2018)

Adopting telemedicine into different areas of health care services delivery had become more and more of a choice to health care providers to shorten the distance challenge for the access to high quality of care. Nearly 15% primary doctors are using telemedicine in their practice in the United States of America, and telemedicine is being covered by half of the private health insurances in the last decade. Telemedicine is indicated to be moving toward the mainstream by the National Health Service Long Term Plan in United Kingdom. The trend of telemedicine is shifting from hospital - clinic to hospital - patient home. (Dorsey & Topol. 2020) Registered nurses, who are usually the most consistent and first contact in healthcare service, play a critical role in telehealth continuum and had a great impact in patient care. They play their full scope to support telehealth in all aspects. (Fathi, Modin & Scott, 2017)

Sometimes people might also use terms as eHealth, telehealth, online health to refer to medical service delivery via distance. However, The American Academy of Family Physicians had made it clear that telemedicine and telehealth are not equal to each other. It gives the two of them more strict concept that telemedicine is seriously practicing medicine, which involving remote clinical services presented as patient on one site and physician on the other site on a remote consultation. While telehealth covers a more wider range of health related services through distance, it can be remote non-clinical services including training, health education or non-clinical meetings, it can also be sharing of digital information to facilitate assessment, diagnosis, consultation, or treatment plan. (The American Academy of Family Physicians, 2021)

There are basically three different types of telemedicine, which are real-time, non-real-time and remote monitoring. Real-time telemedicine allows immediate image transmission and discussion between medical professional and patient, it could be with or without the assistance of digital examination

devices. Medical assistants or nurses are usually involved when digital examination devices are involved. Non-real-time telemedicine also known as "store and forward", medical information such as images or medical reports are collected and send to medical professional for drawing diagnosis and treatment plan. Remote monitoring refers to the consistent monitoring of patient clinical condition over distance under the help of mobile applications or wearable devices. (Mechanic, Persaud & Kimball, 2022)

The Multipurpose Medical Camera being displayed in the video, falls into the category of real-time and non-real-time telemedicine group. It is possible to achieve both functions by its product features, however the "store and forward" mode would be in dominant use in the situations mentioned.

4 INTRODUCTION OF THE MULTIPURPOSE MEDICALCAMERA

The Multipurpose Medical Camera, consists with a Riester camera system (RCS-100) handset module with three optics lenses and accessories. The camera is a portable and multifunctional electronic imaging diagnostic system with three replaceable optical modules: an otoscope, a dermatoscope, and general lens. It can achieve real time or non-real time images transfer. This camera system is designed to be operated by any adult or medical professionals to capture images and video in specified operating environment. (Product User Manual, Attachment 1)

4.1 Features of the Multipurpose Medical Camera

The Multipurpose Medical Camera, a portable hand-piece with multiple HD cameras which performs different type of basic examination digitally, has the capability to transfer live images and examination process through Wi-fi or USB connection, to generate a real-time remote consultations. It is also capable in taking still images or record videos of examinations, and transfer the record for further review or just for documentation. It can be performed flexibly either in Telemedicine or Telehealth scenarios. (Product User Manual, Appendix 1) It can achieve the goal of linking up patient in remote areas with physicians or specialized medical care, while additionally be used in primary care on the groups of patients with decreased mobility when appropriate. It had been reported that a similar device had been successfully used for telehealth service in a small town in Iceland where physicians are not based in the area. In house nurses working in a small clinic had been using a digital medical camera and digital stethoscope to record examination results of patients and forward them to the duty physician for review, hence provide follow up instructions. (Nordic Welfare Centre, 2019)

The application of this Multipurpose Digital Camera could aim to be handled in basic health care settings, health-care sites in remote areas where lacking direct access to medical care, to document examination results by trained registered nurses and seek medical opinions in a basic and less-urgent manner. Advanced conditions, however, would still be recommended to have an office-based consultation, or using more advanced examination method. Home care units or nursing homes dealing with clients of chronic conditions and decrease of mobility, such as elderly or disabled groups, no matter in urban or rural area, may also consider to use this device for remote consultation on basic and non-urgent health conditions.

4.2 Functions of the three optical lenses

To understand the setting goals and functions of each lens module, and the correct operating procedures, will allow us to master the application of this instrument proficiently. Otoscope (OT) is intended to capture images and videos of eardrum of the ear. Dermatoscope (DE) is intended to capture images and videos of skin. General Lens (GE) is intended to capture digital images and video of mouth/throat. (Product User Manual, Attachment 1)

4.2.1 Otoscope

Otoscope is using mostly in an out-patient settings to examine and obtain information on outer ear canal, tympanic membrane and the situation of the middle ear through the ear drum, by using an otoscope with light source and disposable ear specula. (Oxford Medical Education, 2022)

By starting the otoscopy examination, always start with the healthy ear to get a normal reference from patient's own anatomy. Choose the right size of specula according to the size of patient ear canal, usually the biggest possible. Hold the otoscope like holding a pen, check the right ear with your right hand and left ear with your left hand. Extend your little finger to patient cheek to ensure you maintain a good distance so to prevent breaking through the ear drum by the tip of otoscope. Before entering the external auditory canal (EAC), have a quick glance of the pinna and back of the ear for any possible damage, when putting the otoscope in, also make sure to observe the conditions of EAC. Once the tympanic membrane is reached, check the integrity and color, any retraction or bulging, if transparent and if any signs of middle ear fluid. Finally try to went through all the area of the ear drum. When straighten the EAC, pull the pinna in the direction of upward and backward, while dealing with child, just pull backwards. (Oxford Medical Education, 2022)

When a registered nurse is performing otoscopy for patients, there are many situations one may need to discontinue the examination of otoscopy. First of all, when the examining ear has increasing discomfort or pain, obvious discharge or foreign body from the ear canal was seen, or the outer ear skin layer was swollen, broken and inflamed, procedure must be stopped and patient should seek an office-based review with a primary physician. Other situation like if the outer ear was found to have

deformity that ear canal could not be found. In the situation that patient was not able to sit still or maintain the head in steady position, even with assistance of family member or other caregivers, no matter due to physical condition or psychological reason, stop the examination and discuss with primary physician for other possible options. (Queensland health, 2020)

4.2.2 Dermatoscope

Dermatoscope, also known as dermoscope, is a hand-carried medical camera with illumination lights and magnifying optics. It is becoming an important diagnostic aid to identify malignant skin carcinoma. Dermatoscope uses two different types of light sources to illustrate skin, which are light with polarizing filter, and light without polarizing filter. (The American Academy of Family Physicians. 2013)

Dermatoscope without polarizing filter requires direct contact to the skin by using a liquid interface in between the skin and optical lens as a media. The liquid interface could be ultrasound gel or alcohol, when it is put on top of the examine area of the skin, the scope should be place on top of it and gently press to get away all the bubbles, examination can be then started. While dermatoscope with polarizing filter does not require skin contact with the optical lens. (The American Academy of Family Physicians. 2013)

There are three types of techniques being used nowadays, first of all the scope without polarizing filter using liquid interface, secondly the scope with polarizing filter without using liquid interface and thirdly the scope with polarizing filter using liquid interface. Though scope with polarizing filter can be used either with liquid interface or without, the combination of polarizing filter and liquid interface had been able to superior image clarity. Superficial skin layer has a better visualization under non-polarizing filter, however epidermis and papillary dermis which is in the deeper layer of our skin, shows better under the polarizing filter scope. (The American Academy of Family Physicians. 2013)

Talking about advantages of dermoscopy, it allows physicians to have more confident diagnosis and could be more accurately differentiate different skin conditions, such as Melanoma, Basel-cell carcinoma, Seborrheic keratosis, etc. It helps to access the pathological border of certain malignant skin tumor. Further more it helps to relax patients and physicians from worrying, to avoid cut out some unnecessary biopsies. On the other hand, the physician's capability to determine the images is

affecting the accuracy of diagnosis, which could be one of the limitations of dermoscopy. It also has yet develop any dermoscopic criteria to diagnose early melanoma, and the accurate rate in diagnosis is low if clinical information is not shared. (The American Academy of Family Physicians. 2013)

4.2.3 General lens

This general lens is intended to obtain pictures or videos of mouth and throat. The exam of the mouth and throat including examination and palpation to patient who may be in a high risk group of having head and neck cancers. Patient who wears a denture will need to remove it before the examination of mucosa underneath. The targets to be examined are lip, mucosa and gums, hard and soft palate, tongue and pharynx. (Product User Manual, Appendix 1)

By doing examination on mouth and throat, ask the patient to open his or her mouth wide and say 'ahh', with a good light source check on color and surface integrity of each parts, look for any lump or nodules, or any ulcer, shape and symmetry. When patient was saying 'ahh', the soft palate should raise and the full pharynx should be fully displayed. If this does not happen, depress the tongue with a tongue blade. In this inspection, check on the tonsillar pillars, tonsils, uvula and pharynx if well shown, assess the color, symmetry, secretion or any enlargement. (Access pharmacy, 2022)

4.3 Basic installations

In accordance with the User Manual, here to go through the basic installation of the Multipurpose Medical Camera. Firstly, to do lens exchange, hold the hand set and lens tightly on both hands, align the handset marks with lens marks and rotate clock wise to set the lens in place. Rotate counterclockwise when doing removal. Secondly, for RCS-100 dedicated single-use ear specula replacement, hold the hand set and the specula tightly on both hands, put the specula on the tip of the otoscope, gently push the specula in till it locks, and pull it directly out to remove. Though it had been suggested to only use the ear specula provider by the manufacturer, using an universal single-use ear specula is still possible, put the specula on the tip of the otoscope and gently rotate clock wise till it does not go any further, and turn it counterclockwise to remove. Thirdly, to replace battery, pull out the battery cover and connect the battery to the battery cable, then fit everything into the battery cage, put the cover back in place.

4.4 Manipulation of the system

Under the guidance of the User Manual, here to go through the basic manipulation on the system of the camera. As a start, install the battery and start the camera. At the first time using the machine, you need to fit the battery to the camera. The camera is turned on or off by pressing the power button for three seconds. Once it is on, the start-up process takes up to 25 seconds to complete and the system recognizes the lens automatically to display the corresponding homepage.

On the upper corner of the left hand side, locates the indication light. It can show in white or yellow color with constant or flashing modes under each color. When the white light is on constantly, it means the camera is charging, when the white light is flashing, it means the camera is under low-battery. When the green light is on constantly, it means the battery is fully charged, and when the green light is flashing, it means the camera is under sleeping mode.

To manage the Settings of the camera, enter the setting page by clicking the '⚙' button and follow the instructions on the screen panel. Patient data can be key in and patient name with exam date will be show on the screen of images or video. It can be removed as well, then no patient data will be shown on the images. Lens settings has preserved default or record keeping mode. Pictures can be set to have preview time once taken. Demotoscope has a software ruler that can be set under 'mm' or 'inch', and there is a 'set focus' button to help focus automatically.

You are able to use the Record manager to review or delete records in the storage. You may use USB mode or use UVC mode to transfer records to PC running under Microsoft Windows. TOSHIBA FlashAir Wifi-SD card can be used as an option to expand internal storage.

4.5 Precautions of using the Multipurpose Medical Camera

According to the user manual, there are several precautions before using this Multipurpose Medical Camera. It is important to understand the precautions so to prevent damage to the camera and make sure it is in the best condition of use. Firstly, about the camera's reaction to water and humidity. The

camera is non dust resistant and non waterproof. Keep the camera away from dust or moisture. If the camera gets wet, do not dry the camera with heater, autoclave or UV light. Avoid sudden change of temperature or humidity to prevent condensation of the lenses and camera, it may lead to damage of the camera. If this did happen, turn off the camera and set it for two hours in steady temperature before reuse.

Secondly, about the camera's reaction to heat and electromagnets. The camera can become warm after long time use. Do not leave the camera and battery in car or car trunk in summer, high temperature can damage the battery. Keep the camera from electromagnetic environment. Do not leave the camera close to microwave, TV, video-games, radio or high-voltage lines.

Thirdly, about battery and others. Battery will get warm when charging and remain warm for sometime afterwards. Only use the type of battery provided by the manufacturer. If the camera is unlikely to be used for over two weeks, remove the battery from the camera. Disposal battery or other medical waste according to routine guidelines. The user manual says only use the disposable specula provided by the manufacturer, however, using an universal disposable ear specula is possible with this camera. Do not make any structure change to the product.

4.6 Disinfection and maintenance

The User Manual had given clear instruction on the camera's cleaning and disinfection. Proper treatment of the camera would highly prevent cross transmission of microorganisms and pathogens, and promote its service life. When doing cleaning, turn off the camera first, use soft cloth with 70% alcohol solution to wipe the camera for disinfection. Only connect the charger or USB when the camera is totally dry. Lenses are recommended to be cleaned by optical cleaning cloth or tissue. Dermatoscope that was in contact with patient skin, is disinfected with 70% alcohol first and then optical cleaning as mentioned before. The device is not intended to be sterilized. For maintenance, ambient storage temperature is from 0 ℃ to 45 ℃. Relative humidity from 15% to 95% without condensing. Recommended to remove battery if storage over 2 weeks.

4.7 Problem solving

Minor problem solving had been mentioned in the User Manual. Such as failed lens recognition. If the software does not recognize the lens correct, remove the lens and check if there is any connection pin and surface problem. Make sure the connect pins and surface are ok then place the lens again. Another example is if illumination does not work, change lens to see if the illumination control are normal otherwise. Furthermore, if you cannot turn on the handset or there is short battery operation time, check if battery is charged if battery is in good condition. Contact the manufacturer if necessary.

5 PURPOSE AND OBJECTIVES

The purpose of this thesis is to produce a video tutorial on how to use the Multipurpose Medical Camera and scope system. This thesis introduces the practical application of such a device when examining ear, skin or throat of a patient. The video can be used as an educational material to nursing degree students studying in Centria University of Applied Sciences in the primary place. This could furthermore be used as a training material for registered nurses or any other medical professionals who could possibly work with this device if it is being applied in clinical use.

5.1 Why the video tutorial is made

A summarized training video on how to use this Multipurpose Medical Camera can be used to help registered nurses and nursing students to master the usage of the device and carry out the remote consultation efficiently and smoothly. With the simplified training video, registered nurses and nursing students can study according to their personal schedule, which would make their study flexible. It is going to save time and shorten the training process, hence improve working proficiency.

The videos tutorial is made also in consideration of improving accessibility of learning. People are different kinds of learners and people prefer to receive information in the way they feel convenient to them. Reading text is suitable for some people, however, for others the visual presentation works better, and some perhaps learning easier by listening. Many people find it easier to absorb things from videos than by reading text. For example, people with reading and learning difficulties benefit from videos. Videos, and image-supported communications in general, improve the accessibility of content. (Saavutettavuus, 2022) With the video introduction, people learn from other ways rather than reading from user manual. It had been approved that audio-visual materials are the best aid for effective learning in university level (Rasula, Bukhshb, & Batoolc, 2011).

Subtitles will also be included in the video tutorial in accordance with the WCAG 2.1 Guidelines, in order to benefit people with hearing and visual impairments, or for somebody not so familiar with the language. Moreover, in noisy environment or in places that requires to be absolutely quiet, audio might not work very well or not suitable to be on. Adding subtitles would ensure the message reach the

audience successfully in different ways. (Saavutettavuus, 2022) In this project, English, Finnish and Chinese subtitles will be added on to the video tutorial.

5.2 Objective of the video tutorial

In this thesis, we aim to have an overall practical introduction of the Multipurpose Medical Camera. We will firstly introduce the structure and manipulation of the camera. This included the introduction of parts, installation of three different cameras, the manipulation of the touch screen and data storage. Evidence based information on how to correctly complete basic inspections related to the basic functions of this camera is included; and simulations on the use of different lenses on volunteer patients is also included in the video. A brief introduction on the disinfection and maintenance after use are attached, as well as use precautions and problem solving. A video script and a PowerPoint outline as connecting pages to bind up the whole video are generated before the video was produced. This video tutorial is presented in English following tightly to the scripts. (Appendix 2/1, 2/2). The scripts was further translated into Chinese, additionally English, Finnish and Chinese subtitles are drawn base on the scripts and video.

5.3 Key audience of the video tutorial

The key audience of this video tutorial are primarily nursing degree students in Centria University of Applied Sciences, as well as other universities or universities of applied sciences. Furthermore, it is suitable for registered nurses who would be using this piece of device in their clinical practice if this device would be applied in clinical use. They could be registered nurses working in primary care clinics in remote areas where physicians are not available at all times; registered nurses in home care services units or nursing homes who are dealing with patients with decreased mobilization capabilities.

6 PROJECT IMPLEMENTATION

A project is a unique and temporary task intent to deliver a product or service that was not produced before. Different from operations which is continuous and repetitious, a project has a start and an expected close time to have the distinctive task completed. (Watt, 2014) The task of producing a video tutorial to introduce the application of the Multipurpose Camera is an unique product that has not been done before, it would be ended when this task is accomplished, this task is a project that should follow the steps of a project implementation. In this section the key elements of this project implementation are reviewed, which are operational environment, project phases and project organization.

6.1 Operational environment, stakeholders and expectations

The Multipurpose Medical Camera is an advanced technology product that Centria University of Applied Sciences HealthLab had acquired as an exploratory product under the RoboSote project, which was financed by European Regional Development Fund. The video tutorial will be used as a training material for nursing bachelor degree students of Centria University of Applied Sciences. Additionally to registered nurses or any other medical professions who might be using this device in clinical practice.

6.1.1 Centria University of Applied Sciences

Centria University of Applied Sciences, with its main stakeholder as the City of Kokkola, operates three campers in Kokkola, Ylivieska and Pietarsaari respectively in Finland. Centria offers English-speaking bachelor degree programs for international students in the fields of Business management, Environmental chemistry and technology, Information and technology and Nursing. Outside the country, Centria had partnered with more than one hundred institutions allover the world for study exchange programs. Every year, around a hundred students are exchanged in and out of Centria. Centria is an international multidisciplinary higher education institution which crated a dynamic environment for its students and staff with innovation, care and multicultural. (Centria, 2022)

6.1.2 Centria HealthLab and RoboSote project

'Centria HealthLab is a hub for innovation, demonstration, development and training in health technology products. It connects and serves healthcare providers, technology companies and research and development organizations in the Central Ostrobothnia, Finland.' (Tuttunet, 2021) RoboSote project is operated under the Centria HealthLab, which is financed by the European Regional Development Fund - an association of Central Ostrobothnia. RoboSote project is managed by Centria University of Applied Sciences administratively with Ms. Heidi Hintsala as its project manager. (Centria, 2022)

RoboSote project is aiming to provide technological solutions in the health industry, by promoting the development and utilization of technological products in the industry. The HealthLab is the implementation party that coordinates the participants playing in the RoboSote project. These participants are social and health care units, technology developer companies, as well as research, development and educational organizations. It played a multifunctional roll in product co-development, promotion and piloting, commercialization and training. The high technology products are targeting to be in use in the areas of home care and assisted living, ehealth and rehabilitation. (Centria, 2022; Tuttunet, 2021)

6.2 Project phases

Project phases is also known as project life cycle, a standard project contains typically four phases: initiating, planning and drafting, implementing and closing. (Watt, 2014) Practically, in this project implementation, the initiating and planning phases were proceeded in a staggered way and overlapping in time. The following paragraph is going to describe the various phases of this project.

6.2.1 Initiation phase

The author had joined the summer workshop arranged by Centria University of applied sciences in 2020. A project team with three students from different study majors was formed to work with the Centria HealthLab. From there the team started to know about health technology products in the current market and how these new inventions would help to fill the gaps of shortages in medical

service delivery. The author had since been attracted into this area, and had been willing to be involved in one of the product development.

This topic was suggested from Centria HealthLab and approved by the tutor of the author from the course of Basics of Research and Development Work. A rough project objectives was studied and summarized by the author base on the understanding of the subject and further modified under the suggestion of the tutor, the feasibility of the project is verified. In this first verification, the focus of the primary training target was shifted from medical professionals in primary health settings to nursing students and the registered nurses in primary health care units. Meanwhile, a drafted filming script was generated based on the written user manual of the device obtained, and furthermore the evidence based theoretical framework, as well as some guided practical experiences.

In the initiating phase, a timeline and budget was made. The aim of ending this project was to be before the new year holiday, and should be nearly none or very little cost that could be ignored. It is critical to understand the exact expectations and objectives of the task from all stakeholders. Remote discussions mainly through emails among all stake holders had been done many rounds to identify the objectives, set project timeline and discuss any possible cost, as well as to clarify the exact requirements.

The tutor of the author had suggest the author to have a partner for this project development, considering that the workload can be distributed more reasonably, meanwhile, some coordination on handling within the project might be required. Since the author did not plan to have a thesis partner before, no partner was then available in the same group. The author had tried to find a partner from other groups, or even cross major, but was not successful. Since the author was eager to have the project developed and completed at an early date, accepting that the workload might be larger to complete the project alone, the decision was made on 30 April after a brief discussion with the tutor, that the author would be the project manager and the only project runner.

It was a big relief that RoboSote project had provided resources on video shooting and translation of Finnish subtitles. Two of the biggest hurdles for the author were well addressed. Two volunteer patients was also coordinate through RoboSote project. The author had dragged her own resources for whatever other requirement might be needed during the project development, such as all stage properties.

6.2.2 Planning phase

Making a plan in this project is a bit challenging. First of all the author has the willingness to finalize the project shortly, however, there are approval procedures in place, and the key resources are not in direct control of the author. Anyhow, a project plan was drawn with marked segmented tasks, timeline to follow. In the plan, it is easier to identify possible threads to the project and be prepared to deal with any risk factors in advance.

The project were planned with four key steps. Firstly, to verify the project requirements and expectations in order to finalized the filming script. This requires communication and coordination with all the stakeholders. Once the project objectives were confirmed, details in the filming script was then determined. Secondly, to schedule appointment with the photographer for film shooting through the RoboSote project manager and prepare all necessary supplies and equipment. Thirdly, to carry out the film shooting, follow with post-editing, such as video clipping, post-dubbing and subtitles. Fourthly, to review the whole work and get feedback, modify when appropriate. Submit the final product and close the project.

After getting this topic, the author had started to search for theoretical support. Besides understood the basic functions of this Multipurpose Medical Camera, the author had tried to understand the current challenges of health care services related to distance in Finland and to understand the significance and rationality of this instrument being put into clinical application. The author also tried to study the different types of telemedicine and understand the basis of its operation.

Another part of the theoretical preparation for this video, is the evidence based examination techniques related to the functions of the Multipurpose Medical Camera. Since those examination techniques were not included in the standard training of nursing bachelor program, extra studies got to be done for a well and accurate demonstration on the use of this device. The author had also consulted an ENT Specialist who is working in Central Ostrobothnia Central Hospital for some professional opinion on the use of this digital otoscope and had done a clinical practice on the specialist's assistant nurse under the specialist's supervision. More trial practices were done using the author's family members and a client in home care service, where the author is working as a full-time substitute nurse. The author had also sourced all the necessary stage properties and set up the shooting scene.

After knowing how the device is operated, as well as mastered the examination steps and techniques, a filming scripts was drawn up for further discussion and polishing. A draft script of the video was written in English initially, clarification of exact expectations and requirements were done and the draft script was finalized and ready for filming implementation. The scripts were translated into Chinese using the final version.

In this video, the author had intended also to display the camera under the real use in telemedicine with both ends presenting, so the audience could have a full picture of how this device is working in the real-time transfer mode. It means another photographer and a presenter on the other end would be needed at the same time when reviewing the live video provided from this device. This had been very challenging on resources. The idea was abandoned when realized the resources shortage.

6.2.3 Implementation phase

A good discipline to apply in project management is an important means of making sure that the project is progressing on the right track and in the correct pace. The project manager should monitor the project progress closely and follow the timeline strictly, make sure all participant in the project are functioning accordingly. Nevertheless, stay open and flexible to make timely adjustment from the original plan due to the requirement of quality control.(Watt, 2014)

Since the author is the project manager and the only dedicate person working to run this project, effective coordination and communication with all stakeholders are important to pull all possible resources and make them work for the project efficiently. The filming is the core part of this project. It is based on the well analyze of the device and careful planning on the sections. The primary idea is to complete the video in four sections. Firstly to introduce the structure and instalment of different parts of the camera; secondly, to introduce the manipulation of the camera with the touch screen; thirdly to demonstrate the practical application of each inspection lenses in a simulated environment; finally to include miscellanea items, such as precautions, disinfection and maintenance, and problem shooting.

The author was aiming to finish this project by the end of April 2022, or at lease finish the initial filming part by then. The actual delay of this video had been somehow the coordination and availability of resources, in addition because the author's focus switch after started a full-time job as a

registered nurse substitute started from the beginning of May. The initial filming part end up to be completed by the end of October.

After the theoretical preparations and the coordination of all necessary resources, the video shooting was done on 26 October, 2022 within four hours time as scheduled. The stage shooting time was around 3 hours and the studio shooting time a little bit less than 1 hour. After the actual filming was done, the photographer had made the first edition of the video on 28 October 2022 and it was reviewed by all stakeholders. The second edition of the video was done on 1 November 2022 with modification under the suggestion of the thesis supervisor and instructor, and all stake holders' logos were added. Furthermore, minor correction on the typing error and logos were again done to create the third edition on 22 November 2022. After the final review of the supervisor, a forth edition was done on 7 December 2022 to cut away a few over-talk in the video. Finally the whole video length stayed to nine minutes and thirty-two seconds.

6.2.4 Closing phase

During the closing phase of a project, the key is to deliver the final product to the customer and review if the product had met the settings and targets as planned, as well as to reflect what had went well and what to learn in the future. These experience and summary would be able to pass on and help for the project management in the future. (Watt, 2014)

After the video was done and revised after review, the core part of the project is completed and the video is ready to be delivered to the customer. According to Heidi Hintsala, the project manager of RoboSote project, the Finnish subtitle translation, synchronization of all subtitles to the video and video publish are arranged by RoboSote project. This video will be published on YouTube and can be used in Centria HealthLab's communications, such as social media, events, or web page. The data storage is on MVP server.

All related stakeholders are communicated about the closure of the project. The author had complete the maturity test on 2 December 2022, and a project review will be conducted on 20 December, 2022 with the thesis supervisor. The written thesis is to be reviewed and published in Theseus.

6.3 Project organization

A project organization is a managing structure that coordinate and implement all activities of the project. The reason of creating this structure is to form an environment that all the team members can interact effectively, and minimize all possible disturbance, overlapping and conflicts. This is very important for the success of running a project, as it takes most of the effort in implementation and application. Each project has its own character, the design of the project organization should put organization environment, the character of the project and the authority level of the project manager into consideration. (Project Management for Development Organizations, 2016)

This project adapts to the project based project organizations structure. The project based project organizations structure means the project manager has the full authority (Project Management for Development Organizations, 2016). The author is taking the roll of project manager, the driving engine of this project.

Due to the difficulties in finding a partner aiming at the same working pace and timeline, the author decided to be the only dedicated person running this project, after knowing that there are some possible resources can be used from the organization environment. Resources on script translation and filming had been offered by RoboSote project of Centria University of Applied Sciences. The support from the project organization environment makes this single person managing structure possible, and it can be much flexible in terms of operation implementation.

The project manager was the screenwriter of the script, director of the video as well as the presenter in the video. The project manager is responsible to draw up a plan of action and initiate the plan, coordinate all the resources and ensure the project to run smoothly and meeting the project timeline. Additionally, trouble shooting in the whole process of this project. The author were responsible to the video content, and had done the English and Chinese subtitle arrangement in the video post-editing.

Ms. Hanna-Mari Pesonen, the senior tutor of Centria University of Applied Sciences Department of Nursing is the thesis supervisor, who had reviewed the video script and this thesis and had given suggestions on the theoretical part. Hanna-Mari had also arranged the filming location through Centria University of Applied Sciences Nursing division.

Ms Heidi Hintsala, the project manager of RoboSote project managed under Centria HealthLab, is the thesis working life supervisor, she was the key support and contact of coordinating most of the resources needed for this project, such as the availability of the Multipurpose Medical Camera, photographer availability and volunteer patients.

Mr. Markus Kunelius was engaged after the script was done, carried out the filming phase and carried on to the end stage of the project by conducting the video post-editing. Markus had also arranged the studio location and shooting. The date of filming was negotiated with the photographer according to his availability, as well as the volunteer patients.

Two volunteer patients was finally recruited by the project manager of RoboSote project, Mr. Joonas Pesiö and Ms. Mitha Jose. Mr. Joonas Pesiö had also been the technical assistant. Ms. Heidi Kaartinen had worked for the project communication and subtitles synchronization to the video, as well as video upload to the official channel.

7 ETHICAL ISSUES AND RELIABILITY

As a student of University of Applied Sciences, it is important to understand and committed to the guidelines of Responsible Conduct of Research (RCR) and procedures for handling allegations of misconduct in Finland during the thesis process. RCR provided a model of responsible conduct of research to all personnel participate in research, aiming to promote responsible conduct of research and prevent scientific deceit by organizations, universities or individual performing research. It is applied in all research areas in Finland. The violation of RCR can be also breaking the laws. (ARENE, 2019)

The ethical principles related to research in human science are to respect self-determination, to avoid harm and to protect privacy and personal data of the research participant (ARENE, 2019). In this study, we do not involve any research of humanities and without any handling of personal information. Hence a research permit is not necessary. There is not consent needed to be obtained from any individual and to go through any Board of Ethical Review, And no personal data would be related to any materials, results or publications of this work.

The thesis introducing the Multipurpose Medical Camera, is a piece of digital examination device being selected by RoboSote project. This thesis introducing the practical application of such a device is acting as an educational material for the nursing degree students. The author removed the product brand and model names from the title of the thesis and video to avoid any implication of product promotion. The author do not have any financial interest or funding in the product featured in this thesis.

An Agreement on Confidentiality and Transfer of Rights was signed in between the author and Centria University of Applied Sciences Ltd. on 21.4.2022. The author undertakes to keep the confidentiality of any information received secret and undertakes not to disclose it to a third party. This condition is valid three (3) years after the termination of the work placement relationship. By this agreement, the author shall assign the unrestricted and exclusive rights as defined in this agreement to Centria without any separate compensation for the Results of the project, including the rights to modify and redistribute. The Student undertakes to use only Centria's material intended for the project in question or publicly available material. If the author wants to use the material he/she owns or material owned by a third party in the project, it must be agreed with Centria in advance.

This thesis was reviewed by Joonas Råman, teacher from Centria University of Applied Sciences for language evaluation. The thesis had gone through an identification system of plagiarism before it is sent for evaluation and publication. All the quotations and references were clearly marked and valid linkages were provided to identify the sources.

The publication of this video tutorial and the generation of subtitles followed strictly the law and WCAG 2.1 Guidelines. (Saavutettavuus, 2022) The publication was handled through RoboSote project running by the HealthLab of Centroa University of Applied Sciences. It was published on YouTube and can be used in Centria HealthLab's communications, such as social media, events, or web page. The data storage is on MVP server. Written consent was obtained from the two volunteer patients on the use of their images in the video on 29 November 2022 and the documents are kept in RoboSote project achieve. The ENT specialist's name was removed form the thesis written part and the video thank you list while unable to obtain a consent before closing the project.

In order to create this video tutorial, the author had done a thorough study of the product User Manual. Further than that, searched for theoretical supports with reliable resources on the theoretical framework, such as to understand the significance and rationality of this Multipurpose Medical Camera being put into clinical application, be aware of different types of telemedicine and understand the basis of its operation, as well as the examination techniques by using evidences based guidance. The author had even consulted an ENT Specialist on the use of the digital otoscope and had practiced under the specialist's supervision, with extended practice on her own family members. The film script was drafted base on a number of studies and practices, and the video had been done tightly following the theoretical framework and scripts. This video tutorial is considered to be reliable.

8 RESULTS

This video tutorial had been done tightly following the theoretical framework and the scripts created on top of it. It had included all the key information the author intended to deliver. It was well structured and the flow of the video goes natural and smooth. The scenes and background were proper and the narrations were in general fluent. The presenter had some hesitation and slip of tone in the narration, but they did not lead to any misinterpretation and were well recovered by the subtitles. A few clips in the video were out of focus when shooting the camera's screen, but they did not miss any key information intended to reveal and were completely compensated by narration and subtitles. The video tutorial had met the expectation of the author and was acceptable to the project supervisor Ms. Hanna-Mari Pesonen and the working life supervisor Ms. Heidi Hintsala. Overall, this project had been completed with high quality under excellent team contribution.

9 REFLECTION

This project had been prolonged for nearly nine months, from received the topic as a piece of idea in March 2022 to totally complete it in December 2022. It could have been proceed much faster if the author would have stayed focused on it. However, the author had been distracted to something apparently more important and urgent in her life and career development. The author was accepted to a new job as a home-care nurse working full-time in the beginning of May 2022, so had been focused on Finnish language improvement so as to be able to work as a registered nurse in the Finnish healthcare system and concentrated on adapting to the new role. The author had finally pick up the project again after being settled in the new position.

The author had a few reflections from this project . Firstly, have solid theoretical preparation and a detailed scripts are the key of success. The video shooting can do well only if this part is clear and in good order. Writing a script also requires thorough study of the object and good structure of the video. Secondly, efficient coordination and cooperation are very important in project implementation, effective communication is the main tool to make the the project rolling forward. Thirdly, being a director and presenter in a video work is challenging. The director gives instructions and all participants rely heavily on the director's guidance. So the director needs to have a clear mind and a good overview of the work, as well as good task allocation and quality control. A presenter need to understand the scripts and read the lines so well to keep them in mind. A lot of preparation need to be done in order to present smoothly. Overcoming the anxiety in front of the camera is also one big challenge. Good preparation hence being confident is one measure to minimize the anxiety. Taking small breaks and taking deep breaths also helps.

The author had nearly zero experience on formal video production before this project. Making a video tutorial with theoretical support had been a completely new experience and somehow challenging. In the process of writing this thesis, some background study had been done on telemedicine, and some current situations in healthcare that related to telemedicine or telehealth, from which a deeper understanding on the meaning of telemedicine and the important role register nurses are playing in this field were gained. In addition, about the basic operations of otoscopy, dematoscopy, skin and throat inspection, both theoretical knowledge and operation skills as well as proficiency on basis examinations had been reinforced and improved.

The experience of coordinating a video production have given the author greater confidence in facing similar tasks in the future. The practice of using the Multipurpose Medical Camera had improved the author's competencies in handling a digital diagnostic device and managing telehealth service delivery. The role as a registered nurse had been somehow optimized.

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APPENDIX 1.

Multipurpose Camera & Scope System User Manual.

Multipurpose
Camera & Scope

APPENDIX 2/1

A Video Tutorial on a Multipurpose Medical Camera - Scripts

A Video Tutorial
of a Multipurpos

A Video Tutorial on a Multipurpose Medical Camera - Still images source

A Video Tutorial
on a Multipurpos