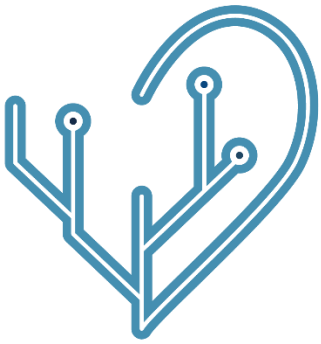
Funded by
the European Union

21.3.2023

Erasmus+ TECH2MATCH WP2

JOINT SUMMARY REPORT

Austria, Denmark, Finland and Spain



TECH2MATCH

HEALTHCARE INSPIRED BY TECHNOLOGY

Funded by
the European Union

CONTENT

Funded by
the European Union

1 INTRODUCTION

The primary objective of this Erasmus + project TECH2MATCH is to develop a 5 ECTS course to strengthen and increase the share of advanced digital skills and technological competencies among future healthcare professionals within nursing, physiotherapy and midwifery by 30% in all partner organizations. Through development, piloting, and implementation of the interdisciplinary TECH2MATCH course health and Quality of Life (QoL) for PwP will improve. The secondary objective is to strengthen and increase the share of advanced digital pedagogical competencies by 40%, providing lecturers with a training course to enable them to oversee and lead the TECH2MATCH course.

In this work package two (WP2) we have analyzed and summarized the needed technological skills and competences that future healthcare professionals will need. In this joint summary we describe all the WP2 results from the consortium. More detailed information about the project results is found from all partners National summaries.

2 DESK RESEARCH ABOUT NATIONAL POLICY PAPERS AND RESEARCH ARTICLES

2.1 Search strategy for desk research

The desk research was split into two parts: search for scientific literature was set up as a standardized literature review process resulting in a potential publication; and a search for grey literature. Inclusion criteria for scientific literature were:

- published conference paper or journal article
- publications from 1.1.2018 to 1.1.2023.

Exclusion criteria were: language is not Finnish, Danish, Spanish, German, or English, document does not refer to health care scenarios including patients with pain (PwP), document does not provide any useful data for extracting information about needs of PwP, document does not provide any useful data for extracting information about needed Health care professional (HCP) technological competencies or results do not relate to Virtual/Augmented Reality, Tele Medicine/Health, monitoring technologies or mobile apps. The consortium used Covidence software to manage desk research and evaluate literature systematically. The project partners searched the following databases, and the work was split as follows: Healthcare databases: FHV: Medline via Pubmed, UCLM: Cinahl via EBSCO host, SeAMK: Cochrane library, UCN: Psychinfo, UCN: EMBASE. Education databases: UCLM: ERIC via EBSCO host and Education Source via EBSCO host.

Other search engines and databases were considered but discarded due to the general limited time available for work package 2.1 and the lacking suitability.

Google Scholar for example lists a lot of scientific papers already covered in the scientific paper section and only a few grey literatures. During the screening process the grey literature was excluded. One reason to discard grey literature was the variety of search terms and lack of Mesh terms or similar. Additionally, the search was often in different languages and types (policies, white papers, etc.) and therefore no comparability was given.

Searches focusing on the use of monitoring technologies found no articles which met the inclusion criteria.

The selection process of the articles in Covidence is shown in Table 1.

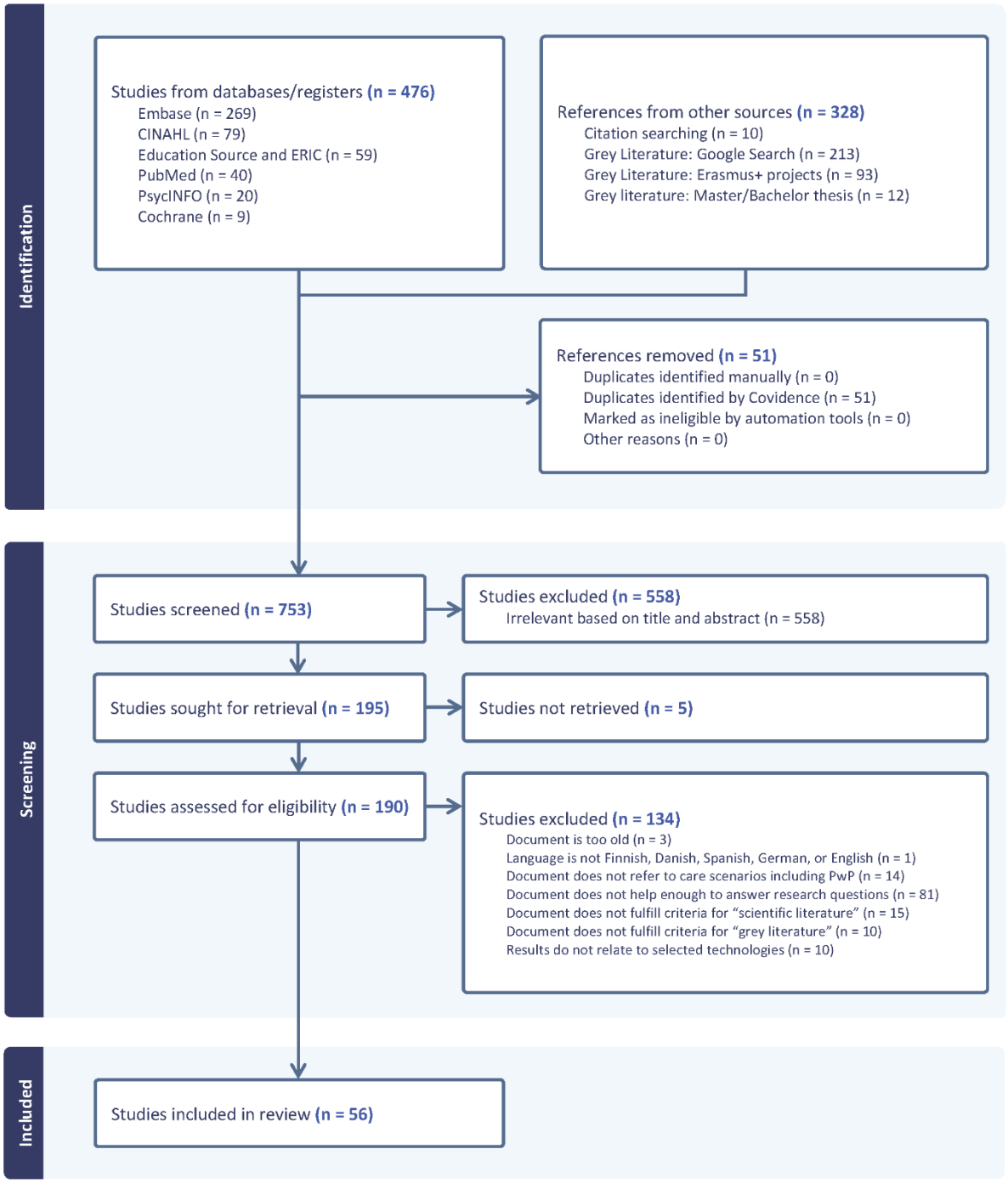


Table 1. Selection of the articles in Covidence

2.2 Joint summary of literature search – technological skills and competences needed for future health care system

In the literature the terms telemedicine and telehealth are both used to describe how virtual, electronic equipment/communication can be used in the health sector. In **telemedicine**, for example diagnostics, clinical consultations, monitoring, treatment, and also clinical decisions are provided based on information accessed by medical practioners electronically, for example via smartphone or video link. The difference between telemedicine and telehealth is that telehealth refers to a broader scope of remote healthcare services than telemedicine. WHO defines telehealth as a delivery of health care services, where healthcare providers and patients are separated by distance. Telehealth can also refer to remote non-clinical services, such as continuing medical education and training, in addition to clinical services. [56,57,58]

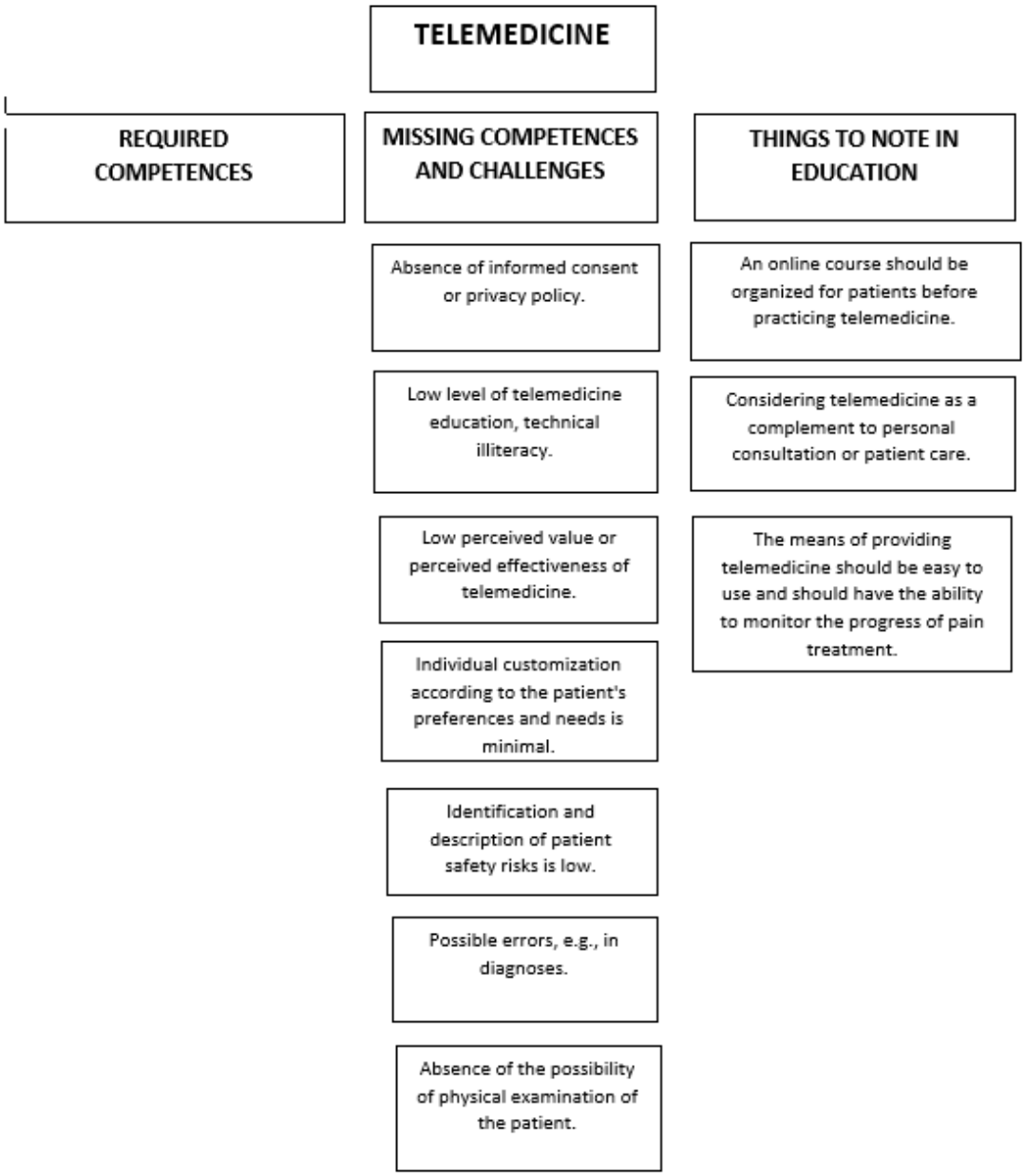
Since the term "telemedicine" was used as the search term for the final search string (WP 2, task 2.1.), that term was used in the Joint Summary from now on.

PwP's felt that using telemedicine they received the same quality treatment for their pain as through conventional treatment. The role of **telemedicine** from the perspective of improving PwP's quality of life appeared as the patients experienced that when they used telemedicine they received the same quality of treatment for their pain as through conventional treatment. The experience of easier access to treatment also improved the quality of life experienced by PwP. Needs of the educations were the consideration of the role of telemedicine as part of pain management, i.e., its role as a supplement to the patient's pain treatment or personal consultation. Patient education before using telemedicine in the treatment of the patient's pain was also recommended [27,48,49].

Challenges in the use of telemedicine were seen as the lack of the patient's informed consent or privacy policy. The missing competencies were seen as a low level of expertise in telemedicine and lack of technological literacy. Other challenges were the low perceived value of telemedicine or its low perceived effectiveness, the identification of patient safety risks,

possible errors in diagnoses, and the absence of the possibility of physical examination of the patient. Even in the use of telemedicine, there was little individual customization and compliance with the patients' needs [31,32,47,48,49]. Missing competencies, challenges and things to note in education related to telemedicine are presented in Figure 2.

Figure 2. Missing competencies, challenges and things to note in education related to telemedicine

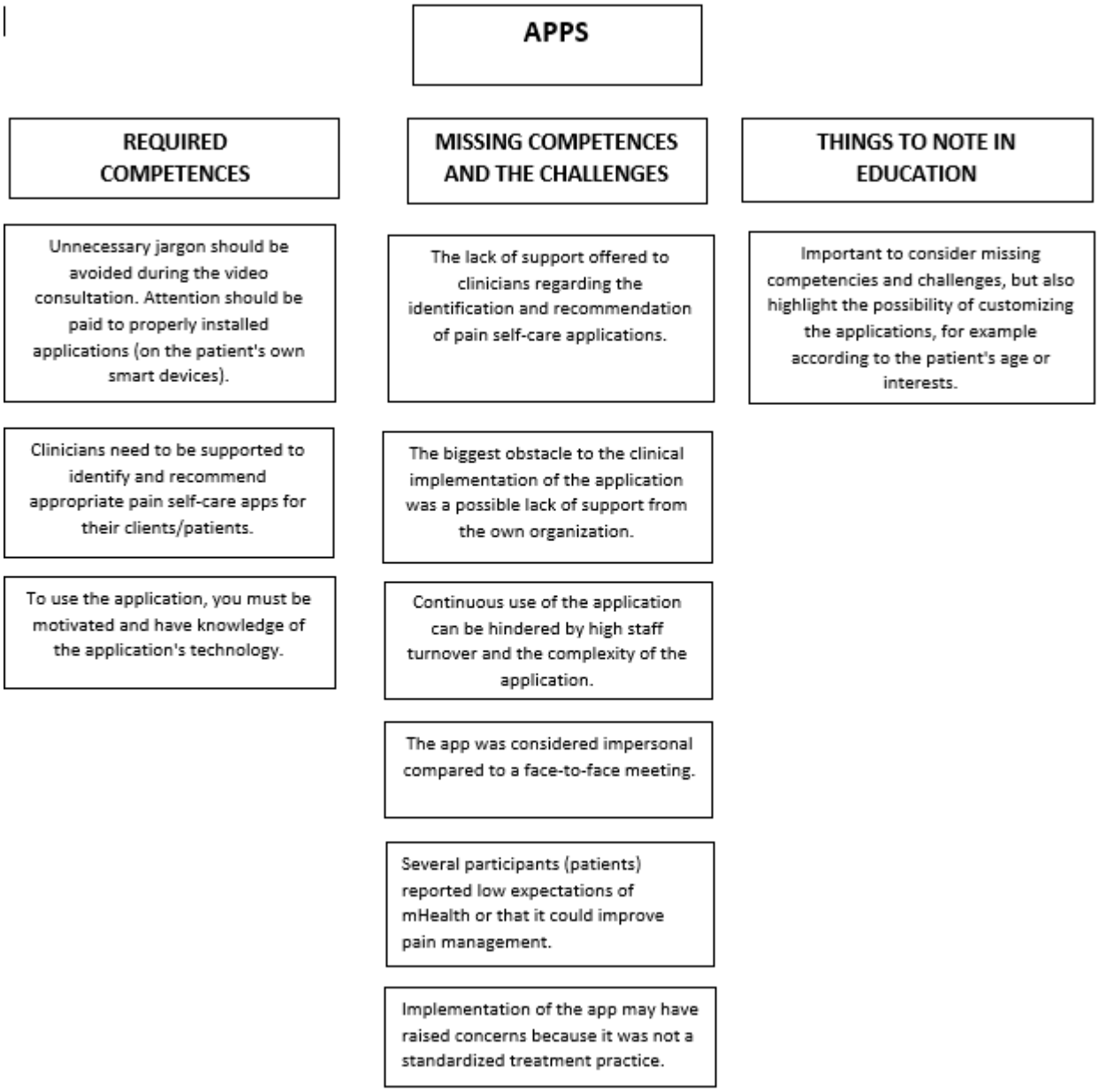

TELEMEDICINE
REQUIRED COMPETENCES
MISSING COMPETENCES AND CHALLENGES
THINGS TO NOTE IN EDUCATION
Absence of informed consent or privacy policy.
An online course should be organized for patients before practicing telemedicine.
Low level of telemedicine education, technical illiteracy.
Considering telemedicine as a complement to personal consultation or patient care.
Low perceived value or perceived effectiveness of telemedicine.
The means of providing telemedicine should be easy to use and should have the ability to monitor the progress of pain treatment.
Individual customization according to the patient's preferences and needs is minimal.
Identification and description of patient safety risks is low.
Possible errors, e.g., in diagnoses.
Absence of the possibility of physical examination of the patient.

The use of mobile **applications** removed PwP's worries about their own health condition. By using the applications, it was also possible to save the patient's unnecessary visits to clinics. When using applications for pain treatment, it was important to highlight the benefits of using applications in relation to pain treatment. The role of clear communication from the healthcare personnel was essential and important, the communication emphasized clarity and teaching about how to use the application [51,54].

The required competencies related to the use of applications were the ability to communicate clearly, knowledge of application technology, and healthcare professionals' motivation to use applications . When using the applications, healthcare personnel had to avoid unnecessary jargon. Lack of management support was seen as missing competencies and challenges and was the biggest barrier to clinical adoption of apps. Management support for doctors, for example, was seen as important so that they could recommend suitable pain self-care applications for PwP [49,52,54].

The continuous use of the applications was weakened by the high turnover of personnel and the complexity of the applications. The apps were considered impersonal, compared to a regular treatment visit. Several patients had low expectations of how apps could improve pain treatment and management. In education, it is good to consider the above-mentioned areas of missing competencies and challenges, but also highlight the possibility of customizing the applications, for example according to the patient's age or interests. [52,55]. Required competencies, missing competencies, challenges, and things to note in education related to apps are presented in Figure 3.

Figure 3. Required competencies, missing competencies, challenges and things to note in education related to apps



When using **Virtual Reality** (VR) in pain treatment, highlighting the patients benefits was seen as important from the point of view of improving the patient's quality of life. For those

PwP for whom the use of VR was suitable, it helped the patient to relax and reduced the experience of pain and fear during the treatment event. Consideration of individuality in pain treatment, but also consideration of possible adverse effects of using VR in pain treatment was seen as important [5,7,10,17,21.]

Competencies required of the healthcare personnel in relation to the use of VR were the ability to guide the patient during the treatment, managing the total time of the treatment event, choosing the right VR applications for e.g., pediatric patients, knowing how to use VR applications, i.e., starting and changing applications [1,3,5,7,12]. Explaining the need and content of the applications to the patient with a positive attitude was seen as an important factor for strengthening for instance the nurse-patient relationship [4, 5, 7,11,12,17,22].

The challenges related to VR seemed to be the possible side effects, when using VR to the patient during the treatment event, for example nausea and claustrophobia. The unsuitability of VR for delirium patients was also seen as a challenge [5,10].

Needs related to education regarding the use of VR were the user-friendliness of the applications, the importance of personnel training, awareness of the adverse effects of using VR, availability of VR glasses and technical infrastructure. VR could also be used for patient education or assessment of the need for treatment. In education, it is good to consider as a point of view that technological joint learning can strengthen the treatment relationship between the healthcare personnel and the patient. [3,4,5,7,11,12,17,22]. Required competencies, missing competencies, challenges, and things to note in education related to virtual reality are presented in Figure 4.

Figure 4. Required competencies, missing competencies, challenges, and things to note in education related to virtual reality

VIRTUAL REALITY

REQUIRED COMPETENCES	MISSING COMPETENCES AND CHALLENGES	THINGS TO NOTE IN EDUCATION
Consideration and limitation of the time spent on the treatment event (time is also spent on patient guidance, this must be considered in the total time)	Possible harms due to the use of VR (e.g., nausea, claustrophobia).	Applications should be user-friendly.
VR applications should be chosen according to the needs of the pediatric patient and the respective procedure.	Unsuitability of VR for patients with delirium.	Personnel education, availability of VR glasses, technical infrastructure, workflow, change management strategy, management support and instructions are important, even mandatory.
Guidance competence of healthcare professionals during a VR treatment event for a patient (for example, keeping the patient's attention in a virtual environment during a treatment procedure).		VR could be used for patient education or to assess the need for care before offering it for pain relief.
Explaining VR applications (starting applications, switching, etc.) to patients and a positive attitude are important to strengthen trust in the nurse-patient relationship.		Learning technology together can strengthen the patient relationship between healthcare professionals and the patient.
Health care professionals should know about the spread of infections and disinfection when using VR devices.		Information about possible health problems caused using VR, such as nausea, claustrophobia.

2.3 Joint summary of the policy documents – technological skills and competences needed for future health care systems.

The German Network for Quality Development in care (DNQP), highlights the competences required in the future of healthcare personnel in relation to non-pharmacological methods (technologies) for pain treatment. The required competencies are the ability to systematically assess pain and distinguish between acute and chronic pain, the ability to plan and coordinate pain management in connection with acute and/or chronic pain, and the ability to inform, train and advise on pain and pain-related problems. It is important to know how to apply target group-specific drug-free measures for pain prevention and relief.[6].

The expertise of healthcare personnel is essential to be able to evaluate the most suitable non-medicinal methods for pain treatment for each patient, which can be, for example, applications, the use of virtual reality or telemedicine. Knowing how to evaluate when choosing a drug-free form of treatment, in cooperation with different professional groups, and the realization of individuality in pain management is important. Health care personnel must have the skills to assess the progress of the situation, the achievement of individual goals and the effectiveness of treatment measures [6].

The Finnish social, health and education trade association Tehy stated in its report that in the future, the most important competence needs of Finnish social and health professionals are welfare technological competence, interaction competence, basic and expanding competence, lifelong learning competence, ethical and working life competence, multicultural competence, and management competence [37].

The most important requirement for clinical competence was the knowledge of medical treatment. Digital competence and digital or remote consultation competence was seen as the most important competence areas of well-being technological competence. The most

important areas of interaction competence were language skills, the ability to meet customers and competence in interaction skills [37].

The importance of reporting, recording, giving feedback and various work community and teamwork skills was also emphasized. Competence in lifelong learning required continuous competence development and the ability to change and learn. In the requirements for ethical and working life skills, the emphasis was on knowledge of working life skills, flexibility, and ability to withstand pressure. When planning and implementing the content of social and health education in Finland, the above-mentioned necessary future competence needs must be considered [37].

The Danish Institution for Evaluation states that many of the educational institutions focus on technology throughout their educations, but the interpretation of which technologies are relevant vary among the educations. A strict and formal transdiciplinary strategy is needed, as it will enable a common technology focus [24].

The education of nurses, physiotherapists, occupational therapists and midwives is complement to professional practice. In teaching, it is important to be aware of the extent to which learning technologies is sufficient to prepare students for the use of technologies related to the profession in clinical practice. Therefore, dialogue and cooperation between professional practice and education is needed [24]. A sharing of knowledge and experiences between education, clinical practice, and professional organizations will be essential in the development of a common technology conceptualization and common teaching methods, but also access to the relevant technology is needed. [24]

In Spain, there is no national legislation, strategy, or policy for the use of telemedicine, as it is considered a regional domain where autonomous communities are responsible for telemedicine services. However, the Ministry of Health, Consumer Affairs and Social Affairs has

published detailed instructions on the planning, evaluation, and implementation of telemedicine services [47].

2.4 Conclusion

According to the results of literature searches, the technological skills and competencies required of healthcare personnel in the future are technical expertise and knowledge of technologies. Important skills and competences were also social skills, ability to critically evaluate the technologies used in pain management, the ability to guide, to enable and support patient engagement, and the ability to manage pain.

Technological solutions should be developed in cooperation with end users, so that the solutions individually support the needs of PwP. Other important technological skills and competencies were knowing how to combine traditional treatment practices and technological solutions, knowing how to choose the right technological solution in accordance with the individual needs of the patients and knowing how to use drug-free pain treatment methods, in addition to other pain treatment.

According to the national policy documents, the technological skills and competences required of healthcare personnel in the future are related to the ability to assess the type of pain, individual planning of pain management skills, coordination, information, education, and counseling skills related to pain and pain treatment. From the requirements of clinical competence, the competence of drug treatment and the competence of non-pharmacological procedures, in cooperation with other healthcare professionals, is important.

The most important aspects of interaction competence were the ability to meet the customer, competence in interaction skills, language skills, competence in various work community and team skills, flexibility, and ability to withstand pressure. The most important areas of expertise

related to wellness technology were the digital competence of healthcare personnel, digital consultation, and remote consultation competence.

According to national policy documents, in education, it is important to consider the sharing of information and experiences between education, clinical practice and professional organizations to be able to form common concepts and teaching methods in the development of the use of technology. Teaching must be aware of the extent to which learning about different technologies is sufficient to prepare students for using technology in their profession. This is why cooperation and dialogue between education and clinical practice is needed.

3 FOCUS GROUP INTERVIEW

Each partner interviewed a national stakeholder group to gather information from them. Below information about the focus group interviews in each country is described. More information about the interviews and participants is presented in the national summary reports. Austria, Finland, and Spain got Ethics committee approval to proceed in interview. In Denmark there was no need to Ethics committee approval.

3.1 Results of the focus group interview

Austria

The participants expressed that new technologies, VR or applications, can affect pain management in a positive way.

Results regarding the necessary skills and competence of healthcare professionals to utilize technology were adequate knowledge of pain, related therapies, and transparent communication with the patient. Competencies related to the estimation of pain are the correct diagnose of pain and the support of patients to communicate about their pain and to seek help as early as possible and necessary. Health care professionals need systematic and profound training in the context of pain management, especially while introducing new technologies in this context. The training should be repeated on a regular basis, consist of different therapeutic approaches and the techniques learned should be implemented in practice as well. Otherwise, the gap between theory and practice might be too big and can cause frustration on both sides. Especially, qualified nurses are often not aware of their specific skills in supporting patients in their pain. This specific relationship, their ability to guide and accompany patients through different therapies should be emphasized regularly.

For example, when using virtual reality (VR), health care professionals should not focus too much on pain alone – as can happen with the use of technologies – because too much focus on pain may make chronic pain even worse. Pain management must be individual, and professionals must be aware of technologies used and those additional value but as well of their misuse. Especially in VR staff should ethically reflect about the placebo effect and be aware of the additional value of the cases, where new devices are used, and multiprotection case reflections are preferred. The relationship between the patient and the nurse still plays an important role independent of the type of pain therapy.

Healthcare teachers emphasized that if VR is used in pain management, it must be accompanied and guided by a professional and not leaving patients alone. Students stated that even if it feels not" normal" having patients who use more technologies than the professional themself, staff must be open and not afraid (of technologies). Communication about the technical devices must be present. PwP stated that the technical devices must be safe, good handling, and staff must be competent in using these technical devices. PwP emphasizes communication, which is important, because it is the way to find out what the patient really needs. Technical devices can be supportive, but not automatically – this must be reflected.

Denmark

In general, focus group interview participants had no experience with VR/AR technology related to pain/pain management (or VR/AR in general). They had little experience with Telehealth technology in pain/pain management (or telehealth in general). Only one participant had experience in telehealth technology from a previous job as a paramedic. Technologies with which participants had the most (yet relatively little) experience with pain patients were mobile apps and monitoring.

Students were more open to incorporating technology into healthcare for citizens/PwP than the educated participants. The students pointed out that they want to gain concrete technical skills during the theoretical training so that they can use technology more confidently.

Ethical concerns related to the incorporation of technology into healthcare work focus on the risk of focusing on the technology rather than the patient. It is important to note that all but one of the participants worked with labor and pain associated with or after childbirth. The participants themselves had little experience with the four selected technologies (VR/AR, Mobile Apps. Monitoring, Telehealth) related to their own work with patients/PwP.

However, participants had knowledge of other healthcare professionals using these technologies in other areas than pain, such as attention deficit and overview issues, planning challenges, anxiety, social challenges, etc. A point of attention is the missing citizen/patient perspective in this analysis – no patients participated in this focus group interview due to unforeseen circumstances.

Spain

The results focused on the different participants' perception of the use of new technologies in pain management and the abilities and skills that healthcare professionals should have in their use, especially in telehealth, robotics, monitoring and virtual and augmented reality applications.

The most important results regarding the necessary skills and competence of healthcare professionals to utilize technology were as follows: Healthcare professionals must be able to explain what the technology is for and how the technology is applied to the needs of different patients. Furthermore, the healthcare professionals must have the ability to use technology fluently, justify its clinical use. They need to be able to adapt technology to the patient's preferences and needs, know how to apply technology to the patient's life, and especially to

those patients who live in a rural environment. Healthcare professionals must have sufficient IT skills for configuration and the ability to solve technological problems.

At the same time, health care professionals must have a deep knowledge of pain (cognitive, emotional, and sensory components), knowledge of the clinical picture to apply the technology and know contraindications for the use of the technology for PwP. The ability to communicate and feel empathy was also seen as an important quality by the professionals.

The students revealed the need for pain technology information. Patients and relatives provided an essential perspective on health professionals' needs for information, advice, and guidance, as well as social skills.

Finland

Health care professionals had relatively little experience with technological aids related to pain treatment. The physiotherapist brought up the need for an application that would be suitable for creating and preparing exercise programs for clients. There is also a need for apps and virtual games related to pain management, especially in the treatment of pain in the legs. For example, exercises for PwP using VR glasses are needed. There are already some virtual games for practicing your hands. The nurse mentioned magnetic impulse therapy for the treatment of pain, for example for people with chronic pain. Internet portals were also mentioned. On their first visit to the pain clinic, healthcare professionals intend to guide PwP to use these internet portals to search for help and information about pain management. A few portals were mentioned: www.suomenkipu.fi (drug-free pain management methods), www.terveyskyla.fi (pain management center coordinated by HUS) and www.nivel.fi (Take a control for the pain / doctor's guide). Healthcare professionals also stated that there would be an increasing need for telehealth processes to give guidance for PwP, but those are not yet available.

The health care teachers did not bring up their own experiences with technological aids in pain management, but instead they talked about what kind of alternatives technological aids offer, for example, technological aids are used in home care and pain syringe pumps are used in intensive care.

Health care students had almost no experience with technological aids related to pain management. The physiotherapy student talked about a study, where the results showed that the use of technological aids reduced the feeling of experienced pain.

PwP had the most experiences with various Apps and applications related to pain self-care, for example using a mobile phone. PwP's self-direction played a significant role in the search for technological apps. The patient had not received guidance to use these Apps from the healthcare professionals. The apps used were mainly found through peer support, for example in Facebook discussion groups. Among the Apps used for pain treatment, the English-language Heimlog and Simply Pain Scale were mentioned.

The relatives of PwP pointed out that the pain patients themselves were active in terms of pain treatment, and the search for technological aids. The role of PwP's relatives had remained minimal.

Healthcare professionals wished for more education in the use of health technology devices. It was also addressed that pain care needs to be very individual and use various methods in different stages of pain, even in the same patient. If necessary, pain can also be treated other than evidence-based pain management methods, depending on the individual's needs. The attitudes of PwP's relatives may be negative towards some pain management methods, which can affect the success of pain care.

Health care teachers emphasized having an open mind when confronting PwP with individual aspects. On the other hand, they talked about the difficulty of putting themselves into PwP's

position. The teachers also brought up themes related to education, and challenges related to the introduction of new technology and directing the utilization of technology. Health care teachers raised issues related to education.

Health care students highlighted the knowledge and skills that are needed to take care of PwP, to be considered in education and practice. These include, for example, patient-orientation, the ability to face a human as a human, and the knowledge of the patient's pain experience. The importance of practicing individual patient guidance was also highlighted.

PwP wished for more information about pain treatment from healthcare professionals. More technology-related teaching is needed in the education of professionals. However, the health care personnel's greatest skills are to be open-minded when meeting and caring for PwP. They should have a comprehensive consideration of the patient's ability to function and face the human as a human. It was addressed that PwP's relatives and healthcare professionals understanding of the often-invisible pain is important from PwP's point of view. The teaching content needs more information about drug-free pain management methods. It is also proposed to use experts, like pain patients, in the lessons.

3.2 Summary of the focus group interview

In **Denmark** focus group participants had no experience with VR/AR technology related to pain/pain management (or VR/AR in general). They had little experience with Telehealth technology in pain/pain management (or telehealth in general). The students pointed out that they want to gain concrete technical skills during the theoretical training so that they can use technology more confidently.

In **Spain**, the most important results regarding the necessary skills and competence of healthcare professionals was to utilize technology, were effective communication skills, social

abilities, software and hardware dominion, knowledge of pain, technological therapy experience and logical-intellectual skills.

In **Finland**, focus group participants had relatively little experience with technological aids related to pain/pain management with technology. Health care students had almost no experience with technological aids related to pain management. From the point of view of PwP, self-directedness emerged in the search for technological aids. The most important results regarding the necessary skills and competence of healthcare professionals to utilize technology were emphasizing the individuality of pain management and the adequate treatment of pain in different stages. Pain should be treated based on the needs of the individual with various pain management methods.

The health care teachers emphasized also confronting PwP individually and the understanding attitude towards their pain. These should be the key issues in pain education. There should be separate entities on health care technology and pain management in the curriculum. Financial resources are needed for health technology acquisitions in both educational organizations and healthcare organizations. Health care students wished for instructions for individual guidance of a pain patient, as well as equipment training to both health care students and health care professionals. In the opinion of PwP, more technology-related teaching is needed for the education of healthcare professionals.

In Austria, results regarding the necessary skills and competence of healthcare professionals to utilize technology were adequate knowledge of pain, related therapies, and a transparent communication towards the patient. Competencies related to the estimation of pain are: the correct diagnosis of pain, and the support for patients to communicate about their pain so that they seek for help as soon as necessary and early as possible. Health care professionals need systematic and profound training in the context of pain management, especially while introducing new technologies in this context. The training should be repeated on a regular

basis, consist of different therapeutic approaches and the techniques learnt should be implemented in practice as well.

Healthcare professionals currently have little information about technologies related to the treatment of pain patients, so more knowledge about technology related to pain and pain management would be needed for healthcare professionals, in healthcare education and for healthcare students, as well as for healthcare teachers. There is also a need for cheaper technology that could be recommended to pain patients. Also, more research is needed on the effects of technology related to pain and in pain management.

Demographic change, the shortage of health care personnel among other relevant factors influences the pain management process. It's suggested that new technical devices can solve some of these problems.

3.3 Conclusion

The focus group interviews conducted in Austria, Denmark, Spain, and Finland shed light on the perceptions and experiences of healthcare professionals, students, and PwP regarding the use of selected technologies in pain management. Participants recognized the potential of technologies such as virtual reality (VR), augmented reality (AR), telehealth, and mobile apps to positively impact in pain management. However, they emphasized the importance of healthcare professionals should have the necessary skills and competencies to effectively utilize these technologies and acquire the necessary skills and knowledge while maintaining a patient-centered approach.

The participants emphasized the importance of increased education and training for healthcare professionals, students, and teachers regarding the use of health technology devices. Open-mindedness, understanding, and individualized approaches to pain care were considered essential. Additionally, affordable technology options and further

integration of technology into healthcare systems were suggested to address challenges in pain management, particularly in the context of demographic changes and the shortage of healthcare personnel.

Patients had limited experience of technologies. patients have limited experience with many technologies, most (all) focus group participants recognised the potential to use technology to support PWP. Communication between healthcare professionals, healthcare students and teachers, practice settings and patients were seen crucial.

Continued research and educational efforts are vital to further leverage the benefits of technology and enhance pain care outcomes.

4 ANALYSIS OF CURRICULUMS

The framework was developed by UCN so that all partners could systematically assess the content of their various curricula. The framework consisted of materials included in the framework, results from the framework and description of curriculum analysis, which contained curriculums challenges and gaps.

4.1 Materials included in the framework

Austria (FHV) analysed a curriculum of nursing degree programme, Bachelor of Science in Health Care Studies. Curriculum mapping is based on the new curriculum which will be introduced in September 2023.

Denmark (UCN) analysed a curriculum of nursing education, physiotherapeutic education, occupational therapeutic education, and midwifery education in UCN. In all the above, all seven semesters were analysed.

Finland (SeAMK) analysed a curriculum of nursing and physiotherapy education. From both education, both seven semesters were analysed.

Spain (UCLM) analysed a curriculum of Physiotherapy Degree in UCLM.

4.2 Results from framework

The framework-section contained questions regarding the curriculum.

Questions were:

1)Is VR/AR mentioned in the curriculum?

2)Is mobile apps mentioned in the curriculum?

3) Is telehealth mentioned in the curriculum?

4) Is any technologies mentioned in the curriculum?

5) Is any technology associated to PwP and clinical practice, mentioned in the curriculum?

6) Are communication skills and competences part of the curriculum?

7) Are curriculum introducing students to knowledge of "must know" information when using technology in clinical practice?

8)Are clinincal reasoning skills and competences part of the curriculum?

9)Are critical reflection on the influence and use of technology part of the curriculum?

10)Are curriculum introducing students to knowledge of benefits associated with the use of technology?

11)Are curriculum providing students with skills acquisitioning possibilities?

12)Are curriculum providing students with opportunities to develop clinical-practice based competencies including technology?

13) Are patient-centered healthcare skills and competences part of the curriculum?

14)Are curriculum introducing students to knowledge of fascilitators and barriers associated with the use of technology?

15) Are curriculum introducing students to knowlegde regarding ethics in clinical-practice?

16) Are multidisciplinary skills and competencies part of the curriculum?

Austria (FHV)

In the nursing degree program framework, 9/16 questions have been scored with “fulfilled”. For example, clinical reasoning (question 8) is an important subject part of the course accompanying the students' internships. Although it is not specifically focused on the use of technologies, it could be expected that with competence in clinical reasoning should also come the possibilities to utilise appropriate technologies.

Denmark (UCN)

In the nursing educational framework, 1/16 questions have been scored “fulfilled” (F), but in question 4 it is mentioned, that Telehealth solutions, telemedicine and information and communication technology are mentioned and related to question 5 it is stated, that telehealth solutions, telemedicine and information and communication technology are mentioned as support tools in communication and collaboration with patients (currently suffering from circulatory problems, respiratory problems, fever, immobile).

For the physiotherapeutic educational framework, none of the questions were fulfilled. In relation to question 4 “Are any technologies mentioned in the curriculum?”, information technology (not specified), health-, tracking- and welfare technology are mentioned in curriculum. The answer to question 5, “Is any technology associated to PwP and clinical practice mentioned in the curriculum?” is using technology to support

movement and support. Hence, the curriculum of the physiotherapeutic department has several gaps related to using technologies.

In the therapeutic educational framework, there were 2/16 questions, which were “fulfilled” (F). For question 4 “Is any technologies mentioned in the curriculum?”, iWelfare technology, Assistive technology, in-formation technology, communication technology, profession's relevant technologies, and health technology is highlighted.

For the midwifery education, none of the questions were fulfilled and several were missing. Related to question 4 “Is any technologies mentioned in the curriculum?”, technological devices, information- and communication technologies (not specified) is mentioned.

Finland (SeAMK)

In the results from nursing education framework, there were 11/16 questions, which were “fulfilled” (F). In physiotherapy education framework, there were 12/16 questions, which were “fulfilled”.

Spain (UCLM)

In the results from Physiotherapy Degree program framework, there were 4/16 questions, which were “fulfilled” (F). Most of the items contained restrictions because they do not appear in the curriculum but do appear in the teaching guide.

4.3 Description of curriculum analysis

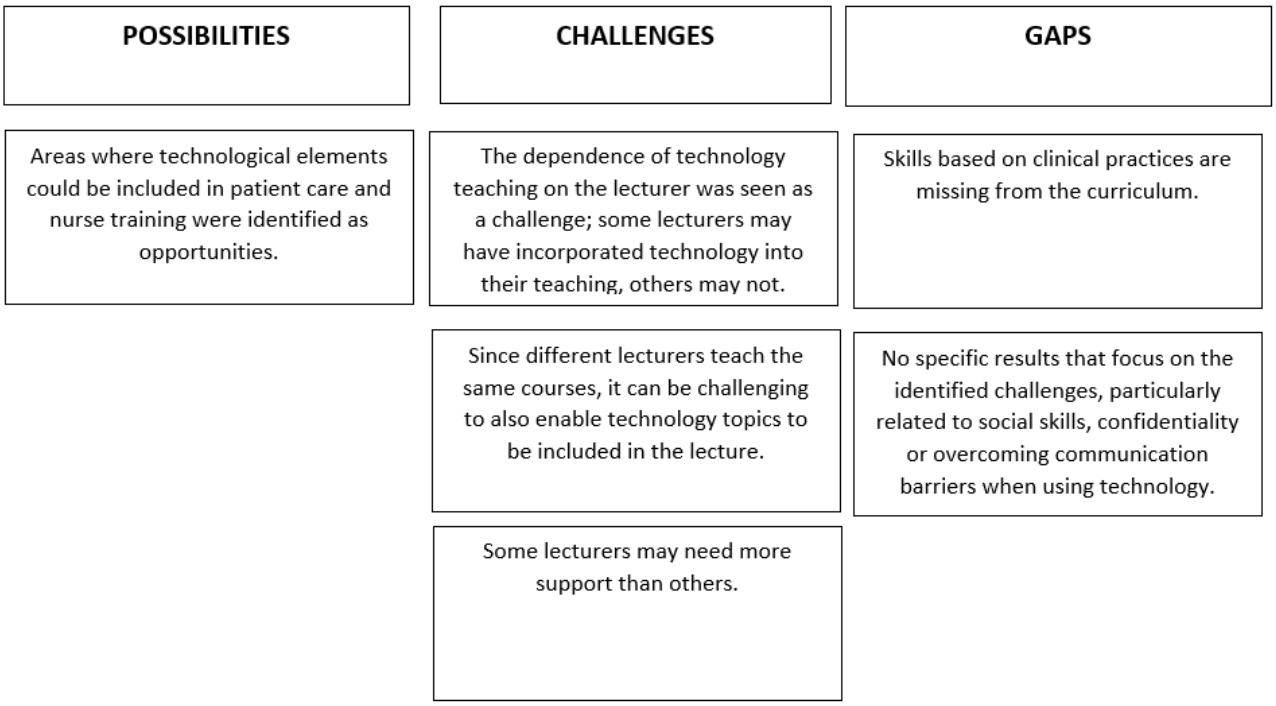
Description of curriculum analysis is divided from each country into several paragraphs: possibilities, challenges and gaps.

Austria (FHV)

During the Curriculum Mapping process, areas where technological elements could be included in patient care and nurse training were identified as *possibilities*. The dependence of technology teaching on the lecturer was seen as a *challenge*; some lecturers may have incorporated technology into their teaching, others may not, and it is currently not possible to assess content and learning outcomes related to PWP and technology use. And since different lecturers teach the same courses, it can be challenging to also enable technology topics to be included in the lecture. Depending on their background and work experience, some lecturers may need more support than others.

Communication skills are included as a module in the 1st semester and are part of many modules. However, there are no specific results that focus on the identified challenges, particularly related to social skills, confidentiality or overcoming communication barriers when using technology. Skills based on clinical practices are missing from the curriculum. This *gap* is decreasing as the technology developed by FHV research centers is integrated into teaching and more and more researchers teach in different modules, bringing their knowledge of VR/AR and robotics to the educational environment. The connection to clinical practice is less clear to develop without the investment (time and funding) of clinical settings. Curriculum analysis possibilities, challenges, and gaps in FHV (Austria), are presented in Figure 5.

Figure 5. Curriculum analysis possibilities, challenges and gaps FHV (Austria).



Denmark (UCN)

Nursing education curriculum

In the analysis of nursing educational curriculum, aspects where technology already is or might be included, or where it can be integrated in the current curriculum were seen as *possibilities.* In some parts of the curriculum there are specific terms of technology, which specifies that students are introduced to, for example online health platforms. Further use of technology is linked to some patient groups, potential PwP, leaving opportunities to include relevant clinical scenarios in these specific areas. The curriculum also specifies that

the students must have knowledge of technology development and assessment related to patient processes. In curriculum, there is a strong focus on communication, clinical reasoning skills, patient-centered healthcare and interdisciplinary collaboration, but it is not possible to evaluate to what extent these subjects are related to technology. A focus on more technologically specific topics and scenarios could relative easily be included, e.g., when teaching communication. The current curriculum signals an awareness of the impact of technology in nursing since they have earmarked ECTS specifically for technology teaching.

In the nursing educational curriculum technology is described in very broad terms which challenges the assessment of which and to what extent technology is included in the present curriculum. The knowledge of the specific competencies and skills gained through the program is limited. Another challenge is that it will be up to the individual lecturer to assess what technology is relevant to include in teaching. It's possible that lecturer's knowledge and competencies of technology in relation to the profession may differ from student to student, and there can also be differences from department to department that may also be geographically dependent.

The curriculum of the nursing program UCN has several *gaps* related to using technologies when working with PwP. None of the technologies, virtual/augmented reality, mobile apps are mentioned in the curriculum. Therefore, it is unclear if the students are introduced to any of these technologies. Technology is linked to larger patient groups e.g., diabetes mellitus, but the use of technology is not specified, and the content might be dependent on the teacher's knowledge and preferences in both theoretical and clinical teaching.

The curriculum has gaps in regard to introducing the students to the "must know" information when using technology in clinical practice and to the knowledge of benefits associated with using technology. Curriculum analysis of nursing program possibilities, challenges, and gaps in UCN (Denmark), are presented in Figure 6.

Figure 6. Curriculum analysis of nursing program possibilities, challenges and gaps UCN (Denmark).

POSSIBILITIES	CHALLENGES	GAPS
Aspects where technology already is or might be included, or where can be integrated in the current curriculum were seen as possibilities.	Technology is described in very broad terms which challenges the assessment of which and to what extent technology is included in the present curriculum.	None of the technologies, virtual / augmented reality, mobile apps are mentioned in the curriculum.
Further use of technology is linked to some patient groups, potential patient with pain, leaving opportunities to include relevant clinical scenarios in these specific areas.	It will be up to the individual lecturer to assess what technology is relevant to include in nursing studies.	Technology is linked to the larger patient groups e.g., diabetes mellitus, but the use of technology is not specified.
A focus on more technology specific topics and scenarios could relative easily be included e.g. when teaching communication.	Lecturer's knowledge and competencies of technology in relation to the profession may differ from student to student.	The content in education of technology might be dependent on the teacher's knowledge and preferences in theoretical and clinical teaching.
The current curriculum signals an awareness of the impact of technology on nursing since they have earmarked ECTS specifically for technology.	Knowledge and competencies of technology may differ department to department and that may also be geographically dependent.	

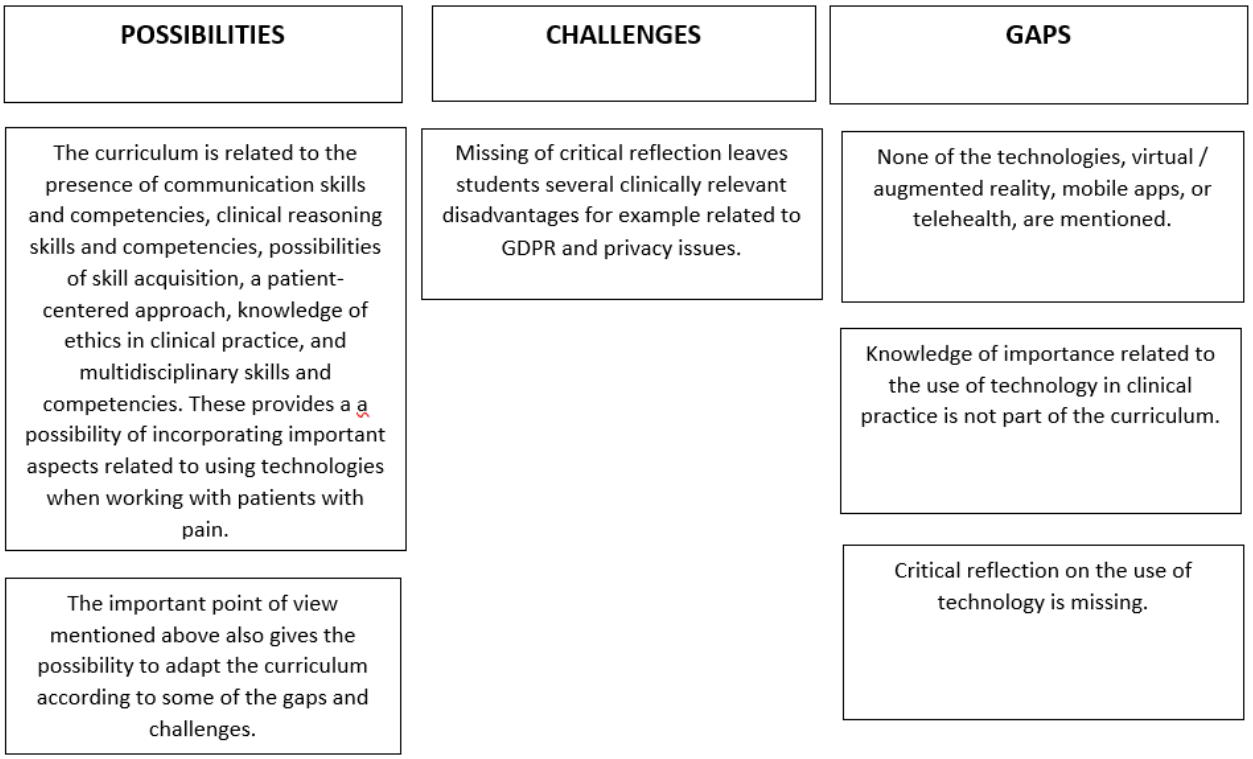
Curriculum for physiotherapy education

In the analysis of physiotherapeutic education, possibilities also exist. The curriculum is explicitly related to the presence of communication skills and competencies, clinical reasoning skills and competencies, possibilities of skill acquisition, a patient-centered approach, knowledge of ethics in clinical practice, and multidisciplinary skills and competencies. The presence of these important areas provides a possibility of incorporating important aspects related to using technologies when working with PwP. This gives an

opportunity also to adjust the curriculum according to some of the gaps and challenges described below.

None of the technologies, virtual/augmented reality, mobile apps, or telehealth, are mentioned in the physiotherapeutic education curriculum. Technology is mentioned as information technology, which is not further specified, and health-tracking and welfare technology. It is unclear if the students are introduced to any technologies. Knowledge of importance related to the use of technology in clinical practice is not part of the curriculum. Also, critical reflection on the use of technology is missing in the physiotherapeutic education curriculum. This leaves students with several clinically relevant disadvantages, for example related to GDPR and privacy issues. Curriculum analysis of physiotherapeutic education possibilities, challenges, and gaps in UCN (Denmark), are presented in Figure 7

Figure 7. Curriculum analysis of physiotherapeutic education possibilities, challenges and gaps UCN (Denmark).



Curriculum for occupational therapeutic

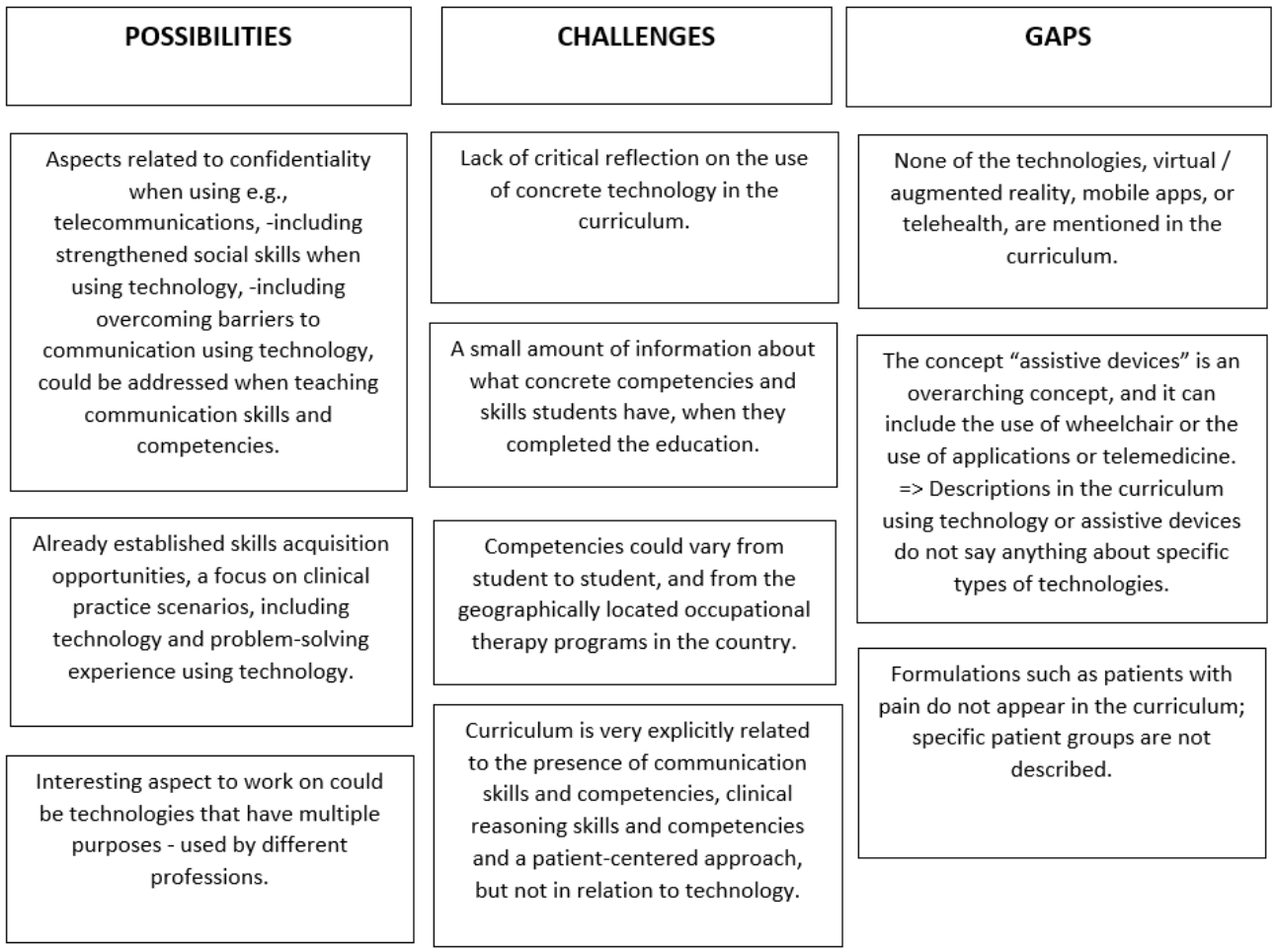
In the analysis of occupational therapeutic education, aspects related to confidentiality when using e.g., telecommunications, -including strengthened social skills when using technology, -including overcoming barriers to communication using technology, could be addressed when teaching communication skills and competencies. Aspects related to use and not use technology, including adapting the choice and use of technology to the patient, could be incorporated into the teaching of clinical reasoning skills. Also already established skills acquisition opportunities, a focus on clinical practice scenarios, including technology and problem-solving experience using technology, could be also relevant. Another interesting aspect to work on could be technologies that have multiple purposes -

used by different professions; training in being able to use technologies across professional groups with multiple functions and purposes. The things mentioned above were seen as *possibilities* in the development of occupational therapeutic education.

Challenges are a lack of critical reflection on the use of concrete technology in the curriculum and a small amount of information about what concrete competencies and skills students have, when they graduate. The challenge is also that competencies could also vary from student to student, and from the geographically located occupational therapy programs in the country. The curriculum is very explicitly related to for example the presence of communication skills and competencies, clinical reasoning skills and competencies and a patient-centered approach, but not in relation to technology.

The curriculum of the occupational therapeutic educational program has several gaps related to using technologies when working with PwP. None of the technologies, virtual/augmented reality, mobile apps, or telehealth, are mentioned in the curriculum. Within the field of occupational therapy, the concept “assistive devices” is very central - it is an overarching concept, and it can include the use of wheelchair or the use of applications or telemedicine. So, descriptions in the curriculum using technology or assistive devices do not say anything about specific types of technologies. In the curriculum, technology is often mentioned as: assistive devices – or as welfare technology, which is not further specified. Formulations such as patients with pain do not appear in the curriculum; specific patient groups are not described. Curriculum analysis of occupational therapeutic education possibilities, challenges, and gaps in UCN (Denmark), are presented in Figure 8.

Figure 8. Curriculum analysis of occupational therapeutic education possibilities, challenges and gaps UCN (Denmark).



Midwifery curriculum

In the analysis of midwifery education curriculum, there were many *possibilities* where technology can be included and where it might already be integrated in the specific teaching content. Also, a focus on more technology or technologically specific topics and scenarios could be included e.g., when teaching communication.

The analysis of the curriculum of midwifery education revealed *challenges*. Technology is only included in the curriculum in general terms and described in very broad terms. This challenges the assessment of which and to what extent technology is included in the present curriculum. It will be up to the individual lecturer to assess what is relevant to include in teaching.

None of the technologies, virtual reality/argumented reality, mobile apps and telehealth are mentioned and technology is not specified in the curriculum. The curriculum does not address a critical reflection on the influence and use of technology, nor does it introduce the students to the benefits associated with the use of technology. Curriculum analysis of midwifery education possibilities, challenges, and gaps in UCN (Denmark), are presented in Figure 9.

Figure 9. Curriculum analysis of midwifery education possibilities, challenges and gaps UCN (Denmark).

POSSIBILITIES	CHALLENGES	GAPS
Technology can be included, and it might already be integrated in the specific teaching content.	Technology only included in the curriculum general terms and technology is in the curriculum described in very broad terms.	None of the technologies VR/AR, mobile apps and telehealth are mentioned and technology is not specified in the curriculum.
Focus on more technology specific topics and scenarios could be included e.g., when teaching communication.	It will be up to the individual lecturer to assess what is relevant to include in teaching.	The curriculum does not address a critical reflection on the influence and use of technology, nor does it introduce the students of the benefits associated with the use of technology.

Finland (SeAMK)

Nursing education curriculum

In analysis of nursing education, possibilities, challenges, and gaps were identified. Many developing processes are going on about themes such as eHealth, and digitalization. For example, there is a SeiHow room with many technological equipment's-like robots and Rehab wall which can be used in education. Every student group of social and health care students must visit Sei-How classroom and get to know the technology. In nursing education there is already a study module about eHealth and digitalization.

As a challenge, technology in the curriculum is described in quite broad terms as eHealth and digitalization. The knowledge of the specific competencies and skills in technology in nursing for patients with pain is limited.

Virtual and augmented reality, mobile apps are not mentioned in the curriculum, although these technologies may be available in SeiHow room study visit, which is obligatory for all nursing students in SeAMK. These technologies are not necessarily linked to nursing and patients with pain. There are gaps in critical reflection on the influence and use of technology and curriculum is not providing knowledge of benefits associated with the use of the technology. Curriculum analysis of nursing education possibilities, challenges, and gaps in SeAMK (Finland), are presented in Figure 10.

Figure 10. Curriculum analysis of nursing education possibilities, challenges and gaps SeAMK (Finland).

POSSIBILITIES	CHALLENGES	GAPS
Many developing processes is going on about themes of eHealth, and digitalization. (for example Sei-How room)	Technology in the curriculum is described in quite broad terms as eHealth and digitalization.	Virtual and augmented reality, mobile apps are not mentioned in the curriculum.
There is already study module about eHealth and digitalization for every nursing student. => Possible to add this kind of themes into curriculum.	The knowledge of the specific competencies and skills in technology of nursing in patient with pain is limited.	Critical reflection on the influence and use of technology and curriculum is not providing knowledge of benefits associated with the use of the technology.
Technological themes are developing strongly in nursing curriculums.		
In Tech2Match -project it's possible to pilot a new study module of technology solutions of nursing in patient with pain.		

Curriculum for physiotherapy education

In analysis of physiotherapy education, PwP are one of the most important topics in education and training periods. Robotics and welfare technology are included for example in neurological patients' physiotherapy studies. Students are also practicing in well-being labs and using many kinds of technology applications there. Physiotherapy education has

already welfare themes, and in the future, it is possible to add this kind of themes into curriculum.

A challenge, that technology is in the curriculum described in quite broad terms like welfare technology. The knowledge of the specific competencies and skills, related to technology and treatment of pain patients is limited. Technologies, as VR/AR, mobile apps, telehealth are not mentioned in the curriculum. Curriculum analysis of physiotherapy education possibilities, challenges, and gaps in SeAMK (Finland), are presented in Figure 11.

Figure 11. Curriculum analysis of physiotherapy education possibilities, challenges and gaps SeAMK (Finland).

POSSIBILITIES	CHALLENGES	GAPS
In physiotherapy education, patients with pain are one of the most important topics in education and training periods.	Technology is in the curriculum is described in quite broad terms like welfare technology.	Technologies, as VR/AR, mobile apps, telehealth are not mentioned in the curriculum.
Robotics and welfare technology are included for example in neurological patients' physio-therapy studies.	The knowledge of the specific competencies and skills, related to technology and treatment of pain patients is limited.	
Physiotherapy education has welfare themes, and in the future, it is possible to add this kind of themes into curriculum.		
Tech2Match -project is the possibility to pilot a new study module of technology solutions physiotherapy of patients with pain.		
SeAMK has gotten the principal lecturer in welfare technology.		

Spain (UCLM)

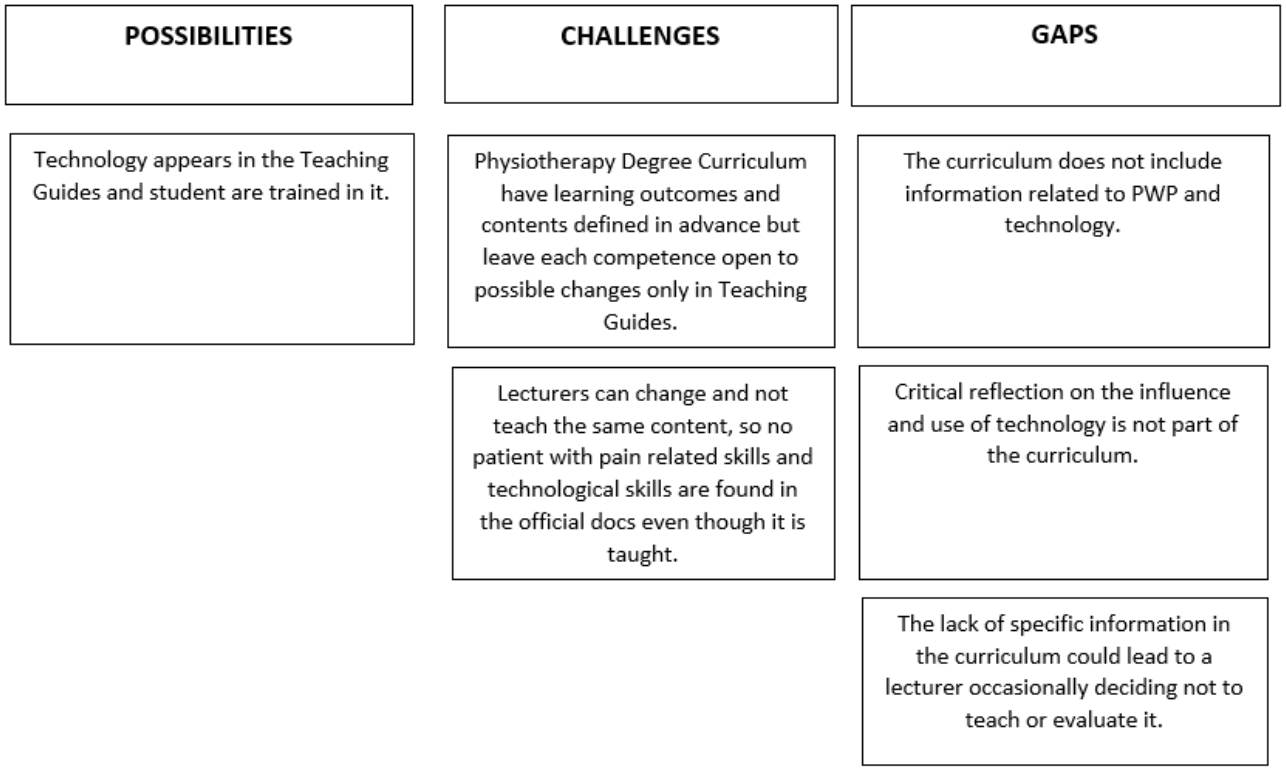
In the analysis of Physiotherapy Degree education, technology appears in the Teaching Guides and students are trained in it.

As a challenge, subjects contained in the Physiotherapy Degree Curriculum have learning outcomes and contents defined in advance but leave each competence open to possible changes only in Teaching Guides. Lecturers can also change and not teach the same

content, so no patients with pain related skills are found in the official documents even though it is taught. The same goes for technological skills.

Communication-focused competencies and patient-focused care skills have not been found in the Physiotherapy Degree Curriculum. The curriculum does not include information related to PWP and technology. Critical reflection on the influence and use of technology is not part of the curriculum. The lack of specific information in the curriculum could lead to a lecturer occasionally deciding not to teach or evaluate it. Curriculum analysis of Physiotherapy Degree possibilities, challenges, and gaps in UCLM (Spain), are presented in Figure 12.

Figure 12. Curriculum analysis of physiotherapy education possibilities, challenges and gaps UCLM (Spain).



4.4 Summary of curriculums

The current situation of the curriculum about the use of technologies for PwP in Austria, Denmark, Finland and Spain appeared to be similar.

For example, in Finland, technology is included in the curriculum´s common level, but also partly in PwP in nursing and physiotherapy education. In Finland, nursing education has an obligatory study module about Health and digitalization in Health care and social services and technology themes are developing strongly. In other countries, technology is mentioned more generally in the curricula, but not with a focus on PwP.

- “Modules which focus on digital health are not focused on PwP.“ (Austria, of nursing degree programme)

- “Technology appears in Teaching Guides and students are trained in it.” (Spain, Physiotherapy Degree)

It is still uncertain how much technology-related teaching takes place. This is influenced, among other things, by the individual teacher's knowledge, skills and competencies related to technology. In the analysis of the curricula, as common factors between different countries (Austria, Denmark and Spain), the importance of individual teachers' knowledge and competencies was emphasized on how much technology-related teaching was given to students in each country.

- “It is up to the individual (the specific teacher) to choose and include specific technologies”. (Denmark, Occupational therapeutics education)

The common factors in the curricula of different countries were the fact that technology had not been defined or individualized either at all or very precisely and clearly.

- “The use of technology is not generally included as a requirement across the curriculum.” (Austria, of nursing degree programme)

When technology is not precisely defined or identified in the curricula of the different countries in relation to the content of the teaching, it can contribute to the fact that technology-related teaching and its delivery are more dependent on the judgement, knowledge, and competencies of the individual teacher.

The common factor that emerged in the mapping in all participating countries was that none of the countries received a full score for questions related to the Framework. It can be stated that there were gaps in each country's curriculums.

- “Several gaps are present in the curriculum when analyzed according to the framework.” (Denmark, Physiotherapeutic education)

In Finland, technology themes are already partly included in nursing and physiotherapy curricula, and technology-related themes are constantly being developed in connection with studies.

In Spain, the Physiotherapy Degree Curriculum does not include technology in the care of patients with pain (PWP), although the technology appears in the Teaching Guides and in the training of students.

5 CONCLUSIONS OF JOINT SUMMARY

In the results of the literature searches and national policy papers, as well as the results of the focus group interviews, the importance of interaction skills and social skills was highlighted as the personal competence requirements of healthcare professionals.

Competencies required by health care professionals are knowledge about individual pain management, the ability to guide the patient, and the ability to use technologies in the management of pain. The same competencies were highlighted in the Focus Group interviews with healthcare professionals.

The importance of guidance skills was also emphasized in the results of the literature searches and national policy papers and focus group interviews.

In the analysis of curriculum, it was emphasized that technology is defined in broad terms in curricula, which means that currently a clear definition of technology and its contents is missing. The teaching of technology depends a lot on the competences and knowledge of the individual teacher regarding technology.

According to the results of literature searches, the technological skills and competencies required of healthcare personnel in the future are technological expertise, knowledge of technology and technical know-how. The results of the focus group interviews also highlighted the fact that health care professionals should have sufficient competencies and skills to use technology for the benefit of pain management.

In the planning and development of curricula, it is good to consider both the results of literature searches and national policy papers, the need for expertise in drug-free pain management methods, which can act as a supplement or part of conventional pain management,

which also was highlighted in emerged in the focus group interview of healthcare teachers and pain patients.

In education, it is important to consider the sharing of information and experiences between education, practice, schools, and professional organizations to be able to form common concepts and teaching methods in the development of access to technology. Teachers must be aware of the extent to which learning different technologies is sufficient to prepare students for the use of technology in their profession. Cooperation and dialogue between education and practice is needed.

Continued research and educational efforts are vital to further leverage the benefits of technology and enhance pain care outcomes. Technologies already in use should be strengthened in organizations and universities across Europe. Raising awareness regarding technologies is also important in both healthcare organizations and universities.

6 REFERENCES

1. Bruno, R. R., Bruining, N., Jung, C., Kelm, M., Wolff, G., Wernly, B., & the VR-ICU Study group. (2022). Virtual reality in intensive care. Intensive Care Medicine, 48(9), 1227–1229. https://doi.org/10.1007/s00134-022-06792-0

2. Bruno, R. R., Wolff, G., Wernly, B., Masyuk, M., Piayda, K., Leaver, S., Erkens, R., Oehler, D., Afzal, S., Heidari, H., Kelm, M., & Jung, C. (2022). Virtual and augmented reality in critical care medicine: The patient's, clinician's, and researcher's perspective. Critical Care (London, England), 26(1), 326. https://doi.org/10.1186/s13054-022-04202-x

3. Burns-Nader, S. (2019). Technological Tools for Supporting Pediatric Patients through Procedures. In Integrating Technology into Modern Therapies. Routledge.

4. Chen, Y.-J., Cheng, S.-F., Lee, P.-C., Lai, C.-H., Hou, I.-C., & Chen, C.-W. (2020). Distraction using virtual reality for children during intravenous injections in an emergency department: A randomised trial. Journal of Clinical Nursing, 29(3–4), 503–510. https://doi.org/10.1111/jocn.15088

5. Deo, N., Khan, K. S., Mak, J., Allotey, J., Gonzalez Carreras, F. J., Fusari, G., & Benn, J. (2021). Virtual reality for acute pain in outpatient hysteroscopy: A randomised controlled trial. BJOG: An International Journal of Obstetrics and Gynaecology, 128(1), 87–95. https://doi.org/10.1111/1471-0528.16377

6. Deutsches Netzwerk für Qualitätsentwicklung in der Pflege. (2020). Expertenstandard Schmerzmanagement in der Pflege. Aktualisierung 2020, einschl. Kommentierung und Literaturstudie. Hochschule Osnabrück.

7. Furness, P. J., Phelan, I., Babiker, N. T., Fehily, O., Lindley, S. A., & Thompson, A. R. (2019). Reducing Pain During Wound Dressings in Burn Care Using Virtual Reality: A Study of Perceived Impact and Usability With Patients and Nurses. Journal of Burn Care & Research: Official Publication of the American Burn Association, 40(6), 878–885. https://doi.org/10.1093/jbcr/irz106

8. Hascalovici, J., Kohan, L., Spektor, B., Sobey, C., Meroney, M., Anitescu, M., Barad, M., Steinmann, A., Vydyanathan, A., & Wahezi, S. (2021). The Pain Medicine Fellowship Telehealth Education Collaborative. Pain Medicine, 22(12), 2779–2805. https://doi.org/10.1093/pm/pnab251

9. Hoag, J. A., Karst, J., Bingen, K., Palou-Torres, A., & Yan, K. (2022). Distracting Through Procedural Pain and Distress Using Virtual Reality and Guided Imagery in Pediatric, Adolescent, and Young Adult Patients: Randomized Controlled Trial. Journal of Medical Internet Research, 24(4), e30260. https://doi.org/10.2196/30260

10. Jawed, Y. T., Golovyan, D., Lopez, D., Khan, S. H., Wang, S., Freund, C., Imran, S., Hameed, U. B., Smith, J. P., Kok, L., & Khan, B. A. (2021). Feasibility of a virtual reality intervention in the intensive care unit. Heart & Lung: The Journal of Critical Care, 50(6), 748–753. https://doi.org/10.1016/j.hrtlng.2021.05.007

11. Le May, S., Hupin, M., Khadra, C., Ballard, A., Paquin, D., Beaudin, M., Bouchard, S., Cotes-Turpin, C., Noel, M., Guingo, E., Hoffman, H. G., Déry, J., Hung, N., & Perreault, I. (2021). Decreasing Pain and Fear in Medical Procedures with a Pediatric Population (DREAM): A Pilot Randomized Within-Subject Trial. Pain Management Nursing: Official Journal of the American Society of Pain Management Nurses, 22(2), 191–197. https://doi.org/10.1016/j.pmn.2020.10.002

12. Lie, S. S., Helle, N., Sletteland, N. V., Vikman, M. D., & Bonsaksen, T. (2023). Implementation of Virtual Reality in Health Professions Education: Scoping Review. JMIR Medical Education, 9, e41589. https://doi.org/10.2196/41589

13. Logan, D. E., Simons, L. E., Caruso, T. J., Gold, J. I., Greenleaf, W., Griffin, A., King, C. D., Menendez, M., Olbrecht, V. A., Rodriguez, S., Silvia, M., Stinson, J. N., Wang, E., Williams, S. E., & Wilson, L. (2021). Leveraging Virtual Reality and Augmented Reality to Combat Chronic Pain in Youth: Position Paper From the Interdisciplinary Network on Virtual and Augmented Technologies for Pain Management. Journal of Medical Internet Research, 23(4), e25916. https://doi.org/10.2196/25916

14. Martínez de la Cal, J., Fernández-Sánchez, M., Matarán-Peñarrocha, G. A., Hurley, D. A., Castro-Sánchez, A. M., & Lara-Palomo, I. C. (2021). Physical Therapists' Opinion of E-Health Treatment of Chronic Low Back Pain. International Journal of Environmental Research and Public Health, 18(4), 1889. https://doi.org/10.3390/ijerph18041889

15. Matthias, M. S., Evans, E., Porter, B., McCalley, S., & Kroenke, K. (2020). Patients' Experiences with Telecare for Chronic Pain and Mood Symptoms: A Qualitative Study. Pain Medicine (Malden, Mass.), 21(10), 2137–2145. https://doi.org/10.1093/pm/pnz345

16. Safari, R., Jackson, J., & Sheffield, D. (2020). Digital Self-Management Interventions for People With Osteoarthritis: Systematic Review With Meta-Analysis. Journal of Medical Internet Research, 22(7), e15365. https://doi.org/10.2196/15365

17. Sarkar, U., Lee, J. E., Nguyen, K. H., Lisker, S., & Lyles, C. R. (2021). Barriers and Facilitators to the Implementation of Virtual Reality as a Pain Management Modality in Academic, Community, and Safety-Net Settings: Qualitative Analysis. Journal of Medical Internet Research, 23(9), e26623. https://doi.org/10.2196/26623

18. Schlett, C., Röttele, N., van der Keylen, P., Schöpf-Lazzarino, A. C., Klimmek, M., Körner, M., Schnitzius, K., Voigt-Radloff, S., Maun, A., Sofroniou, M., & Farin-Glattacker, E. (2022). The Acceptance, Usability, and Utility of a Web Portal for Back Pain as Recommended by Primary Care Physicians: Qualitative Interview Study With Patients. JMIR Formative Research, 6(12), e38748. https://doi.org/10.2196/38748

19. Skelly, J. R., & O'Connor, T. (2021). Guidelines for the use of the Attend Anywhere Platform for Telecommunications within the Pain Service. Irish Medical Journal, 114(7), 403.

20. Stoppok, P., Teufel, M., Jahre, L., Rometsch, C., Müßgens, D., Bingel, U., Skoda, E.-M., & Bäuerle, A. (2022). Determining the Influencing Factors on Acceptance of eHealth Pain Management Interventions Among Patients With Chronic Pain Using the Unified Theory of Acceptance and Use of Technology: Cross-sectional Study. JMIR Formative Research, 6(8), e37682. https://doi.org/10.2196/37682

21. Toledo Del Castillo, B., Pérez Torres, J. A., Morente Sánchez, L., Escobar Castellanos, M., Escobar Fernández, L., González Sánchez, M. I., & Rodríguez Fernández, R. (2019). Reducing the pain in invasive procedures during paediatric hospital admissions: Fiction, reality or virtual reality? Anales De Pediatria, 91(2), 80–87. https://doi.org/10.1016/j.anpedi.2018.10.019

22. Vincent, C., Eberts, M., Naik, T., Gulick, V., & O'Hayer, C. V. (2021). Provider experiences of virtual reality in clinical treatment. PloS One, 16(10), e0259364. https://doi.org/10.1371/journal.pone.0259364

23.Docking, R. E., Lane, M., & Schofield, P. A. (2018). Usability testing of the iPhone app to improve pain assessment for older adults with cognitive impairment (Prehospital Setting): A qualitative study. Pain Medicine (United States), 19(6), 1121–1131. https://doi.org/10.1093/pm/pnx028

24. EVA (The Danish Institution for Evaluation) (2018). The technology focus of the Danish health educations, an evaluation A background report for the project ‘Technology within health-professions and -practice’.

25. Matthias, M. S., Evans, E., Porter, B., McCalley, S., & Kroenke, K. (2020). Patients’ Experiences with Telecare for Chronic Pain and Mood Symptoms: A Qualitative Study. Pain Medicine (United States), 21(10), 2137–2145. https://doi.org/10.1093/PM/PNZ345

26. Mithani, M., Benhamroun-Zbili, J., Bloomfield, A., Sitapara, K., Paul, A., Nair, S., Mohan, S., Vydyanathan, A., Zar, S., & Shaparin, N. (2022). Cross-Sectional Study Evaluating Clinical & Psychological Impact of Limited Access to Healthcare in Chronic Pain Patients During the COVID-19 Pandemic. Health Services Research, 427–439. www.painphysicianjournal.com

27. Morcillo-Muñoz, Y., Sánchez-Guarnido, A. J., Calzón-Fernández, S., & Baena-Parejo, I. (2022). Multimodal Chronic Pain Therapy for Adults via Smartphone: Randomized Controlled Clinical Trial. Journal of Medical Internet Research, 24(5). https://doi.org/10.2196/36114

28. Schlett, C. (2022). The Acceptance, Usability, and Utility of a Web Portal for BackPain as Recommended by Primary Care Physicians:QualitativeInterview Study With Patients. JMIR, 6(12). https://doi.org/10.1186/s12875-019-0925-8

29. Shanthanna, H., Strand, N. H., Provenzano, D. A., Lobo, C. A., Eldabe, S., Bhatia, A., Wegener, J., Curtis, K., Cohen, S. P., & Narouze, S. (2020). Caring for patients with pain during the COVID-19 pandemic: consensus recommendations from an international expert panel. In Anaesthesia (Vol. 75, Issue 7, pp. 935–944). Blackwell Publishing Ltd. https://doi.org/10.1111/anae.15076

30. Simon, J. D. H. P., Schepers, S. A., Grootenhuis, M. A., Mensink, M., Huitema, A. D., Tissing, W. J. E., & Michiels, E. M. C. (2021). Reducing pain in children with cancer at home: a feasibility study of the KLIK pain monitor app. Supportive Care in Cancer, 29(12), 7617–7626. https://doi.org/10.1007/s00520-021-06357-9

31. Skelly, J. R., & O'connor, T. (2021). Guidelines for the use of the Attend Anywhere Platform for Telecommunications within the Pain Service. Ir Med J, 114(7), 403.

32. Svendsen, M. J., Nicholl, B. I., Mair, F. S., Wood, K., Rasmussen, C. D. N., & Stochkendahl, M. J. (2022). One size does not fit all: Participants' experiences of the selfBACK app to support self-management of low back pain—a qualitative interview study. Chiropractic and Manual Therapies, 30(1). https://doi.org/10.1186/s12998-022-00452-2

33. Alaringi, N.T. (2021) Musculoskeletal physiotherapy strategies in post COVID-19 infection: A narrative review". Journal of Clinical and Diagnostic Research, 15(4), YE06-YE09.

34. Ball, S., Wilson, B., Ober, S., Mchaourab, A. (2018) SCAN-ECHO for pain managment: Implementing a regional telementoring training for primary care providers. Pain Medicine 19.

35. Barton, C.J., Ezzat, A. M., Merolli, M., Williams, C.M., Haines, T., Mehta, N., Malliaras, P. (2022) "It's second best": A mixed-methods evaluation of the experiences and attitudes of people with musculoskeletal pain towards physiotherapist delivered telehealth during the COVID-19 pandemic. Musculosketal Science and Practice 58.

36. Chen. M., Wu, T., Lv, M., Chen, C., Fang, Z., Zeng, Z., Qian, J., Jiang, S., Chen, W., Zhang, J. (2021) Efficacy of Mobile Health in Patients With Low Back Pain: Systematic Review and Meta-analysis of Randomized Controlled Trials. JMIR Mhealth Uhealth 9(6), 1-12.

37. Coco, K. & Kurtti, J. (2018) Tehy Competence needs in the social and health sector - Tehy peo-ple's views on the skills needed in the work-place. Tehy Publication series B:4/18. Tehy ry.

38. El-Tallawy, S.N., Nalamasu, R., Pergolizzi, J.V., Gharibo, C. (2020) Pain Management During the COVID-19 Pandemic. Pain Ther 9, 453-466.

39. Flynn, D., Doorenbos, A.Z. Steffen, A., McQuinn, H., Langford, D.J. (2019) Pain Management Telementoring, Long-term Opioid Prescribing, and Patient-Reported Outcomes. Pain Medicine 21(2), 266-273.

40. Jalilian, L., Wu, I., Ing, J., Dong, X., Sadik, J., Pan, G., Hitson, H., Thomas, E., Grogan, T., Simkovic, M., Kamdar, N. (2022) Evaluation of Telemedicine Use for Anesthesiology Pain Division: Retrospective, Observational Case Series Study. JMIR Perioperative Medicine, 5 (1), 1-11.

41. Jones, S.E., Campbell, P.K., Kimp, A.J., Bennell, K., Foster, N.E., Russell, T., Hinman, R.S. (2021) Evaluation of a novel e-Learning program for physiotherapists to manage knee osteoarthritis via telehealth: Qualitative study nested in the PEAK (physiotherapy exercise and physical activity for knee osteoarthritis) randomized controlled trial. Journal of Medical Internet Research, 20 (4), 1-13.

42. Kristoffersen, E.S., Sandset, E. C., Winsvold, B.S., Faiz, K.W., Storstein, A.M. (2020) Experiences of telemedicine in neurological out-patient clinics during the COVID-19 pandemic. Annals of Clinical and Translational Neurology, 8(2), 440-447.

43. Lu, Y., Xie, D., Zhang, X., Dong, S., Zhang, H., Yu, B., Wang, G., Wang, J.J., Li, L. (2020) Management of Intractable Pain in Patients With Implanted Spinal Cord Stimulation

Devices During the COVID-19 Pandemic Using a Remote and Wireless Programming System. Frontiers in Neuroscience 14; 594696.

44. Sharawat, I.K., Panda, P.K. (2020) Caregiver satisfaction and effectiveness of teleconsultation in children and adolescents with migraine during the ongoing COVID-19 pandemic. Journal of Child Neurology, 36 (4), 296-303.

45. Webster L.R., Cashon, S., Gudi, J, Argoff, C. (2022) “Mobile Health Technology & Pain Management” PAINWeek abstract book 2022, Postgraduate Medicine, 134: sup2, 1-93

46. Llorens Vernet, P. (2021). Aplicacions mòbils en salut: criteris per al desenvolupament i avaluació de la qualitat (Doctoral dissertation, Universitat Rovira i Virgili).

47. Hashiguchi, T. C. O. (2020). Bringing health care to the patient: An overview of the use of in OECD countries.

48. De Marchi, F., Sarnelli, M. F., Serioli, M., De Marchi, I., Zani, E., Bottone, N., ... & Massara, M. (2021). Telehealth approach for amyotrophic lateral sclerosis patients: the experience during COVID-19 pandemic. Acta Neurologica Scandinavica, 143(5), 489-496.

49. Ghai, B., Malhotra, N., & Bajwa, S. J. S. (2020). Telemedicine for chronic pain management during COVID-19 pandemic. Indian Journal of Anaesthesia, 64(6), 456.

50. LeBaron, V., Alam, R., Bennett, R., Blackhall, L., Gordon, K., Hayes, J., ... & Lach, J. (2022). Deploying the behavioral and environmental sensing and intervention for cancer smart health system to support patients and family caregivers in managing pain: feasibility and acceptability study. JMIR cancer, 8(3), e36879.

51. Ahluwalia P, Gupta B. (2022). Can we dream of an integrated pain management app for cancer patients? Indian Journal of Cancer Jan-Mar;59(1):132-135.

52. Ball, E.; Newton, S.; Rohricht, F.; Steed, L.; Birch, J.; Dodds, J.; Cantalapiedra Calvete, C.; Taylor, S.; Rivas, C. (2020). MHealth: providing a mindfulness app for women with chronic pelvic pain in gynaecology outpatient clinics: qualitative data analysis of user experience and lessons learnt. BMJ Open 2020;10(3):

53. Bhattarai, Priyanka; Newton-John, Toby; Phillips, Jane L. (2020). Apps for older people's pain self-management: Perspectives of primary care and allied health clinicians. Pain Medicine 2020;21(4):686-694.

54. Hogan, Timothy P; Etingen, Bella; McMahon, Nicholas; Bixler, Felicia R; Am, Linda; Wacks, Rachel E; Shimada, Stephanie L; Reilly, Erin D; Frisbee, Kathleen L; Smith, Bridget M. Understanding Adoption and Preliminary Effectiveness of a Mobile App for Chronic Pain Management Among US Military Veterans: Pre-ost Mixed Methods Evaluation. JMIR Formative Research 2022-1-20 2022;6(1):e33716

55. Richardson, J.E.; Lee, J.I.; Nirenberg, A.; Reid, M.C. The potential role for smartphones among older adults with chronic noncancer pain: A qualitative study. Pain Medicine (United States) 2018;19(6):1132-1139

56. Valvira (2022) Telemedicine services. National Supervisory Authority for Welfare and Health. https://www.valvira.fi/web/en/healthcare/private-health-care-licences/telemedicine-services

57. ONC (2019) How telemedicine different from telehealth. Official Website of The Office of the National Coordinator for Health Information Technology. https://www.healthit.gov/faq/what-telehealth-how-telehealth-different-telemedicine

58. WHO (2022) WHO-ITU global standard for accessibility of telehealth services. https://www.who.int/publications/i/item/9789240050464