



# “DigiHealth” – Emerging digital Competences of Healthcare Staff

- Business Case –





## Abstract

**Background:** Demographic change and the increasing demand for care services are leading to a growing need for personnel in the healthcare sector, particularly in long-term care. At the same time, digitalization in the healthcare sector is advancing, which presents new demands for nursing assistants. Despite their central role in care provision, they have so far received little attention in research and in competence development.

**Aims:** The aim of this paper is to highlight the importance of digital competencies for nursing assistants in the context of the digital transformation of the healthcare system. Existing challenges, competence requirements, as well as educational and implementation strategies will be identified and analyzed.

**Methodology:** The study is conducted within the framework of the Erasmus+ project “DigiHealth – Emerging Digital Competences of Healthcare Staff” using a qualitative methodology. It is based on literature analyses and interviews with relevant stakeholders from the nursing and education sectors in Italy, Greece, Germany, Lithuania and Austria.

**Results:** The results show that nursing assistants are increasingly working with digital technologies such as mobile documentation tools, communication platforms, or sensor-based monitoring systems. However, there are often deficits in competence, a lack of technical and didactic prerequisites in educational institutions, and structural barriers such as low formal qualifications or unclear job profiles.

**Discussion and Assessment:** The digital transformation holds potential for improving the quality of care but requires targeted development of digital competencies also among less qualified care workers. This necessitates adapted curricula, practice-oriented learning environments, and systemic change in





vocational education. At the same time, technical, legal, and cultural obstacles such as data protection concerns and technology acceptance must be addressed.

**Conclusion:** Targeted promotion of digital competencies among nursing assistants is essential for future-proof, technology-supported care practice. Educational institutions play a key role in this. Only through coordinated action at the European level can existing digital inequalities be overcome and digital maturity in the care sector be increased.

**Keywords:** Digital competencies, nursing assistants, digitalization, long-term care, vocational education, digital transformation, Erasmus+, DigiHealth



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## Table of contents

<b>Abstract</b>	<b>II</b>
<b>List of Figures</b>	<b>VI</b>
<b>List of Tables</b>	<b>VII</b>
<b>1 Introduction - Initial Situation and Relevance</b>	<b>1</b>
<b>2 Method</b>	<b>7</b>
<b>3 Tasks and responsibilities of care assistants</b>	<b>9</b>
3.1 Legal Regulations for Care Assistants	9
3.2 Collaboration of Care Assistants with Other Healthcare Professions	13
3.3 Scope of practice of care assistants	17
3.4 Core tasks of care assistants	19
<b>4 Opportunities and Challenges</b>	<b>23</b>
4.1 Opportunities of Digital Competencies	23
4.1.1 Results of the German Interviews	27
4.1.2 Results of the Greek Interviews	30
4.1.3 Results of the Italian Interviews	31
4.1.4 Results of the Lithuanian Interviews	33
4.1.5 Results of the Austrian Interviews	35
4.1.6 Identified opportunities of digital competencies	37
4.2 Barriers of Digital Technologies	40
4.2.1 Results of the German Interviews	48
4.2.2 Results of the Greek Interviews	52
4.2.3 Results of the Italian Interviews	54
4.2.4 Results of the Lithuanian Interviews	56
4.2.5 Results of the Austrian Interviews	59





4.2.6 Cross-national Challenges of Digitalization in the Healthcare Sector	61
<b>5 Importance of Digital Competencies in Healthcare</b>	<b>64</b>
5.1 Definition of Digital Competencies	64
5.2 International Strategies and Educational Initiatives	66
5.3 Necessity of Digital Competencies	68
5.4 Named digital Competencies from the Interviews	73
5.4.1 Named digital Competencies from the German respondents	73
5.4.2 Named digital Competencies from the Greek respondents	78
5.4.3 Named digital Competencies from the Italian respondents	82
5.4.4 Named digital Competencies from the Lithuanian respondents	86
5.4.5 Named digital Competencies from the Austrian respondents	92
5.4.6 Transnationally Identified Digital Competencies	95
<b>6 Prerequisites for Successful Integration</b>	<b>98</b>
6.1 Influencing Factors for a Successful Implementation	98
6.1.1 Identified Solution Approaches of the German Respondents	100
6.1.2 Identified Solution Approaches of the Greek Respondents	103
6.1.3 Identified Solution Approaches of the Italian Respondents	104
6.1.4 Identified Solution Approaches of the Lithuanian Respondents	106
6.1.5 Identified Solution Approaches of the Austrian Respondents	108
6.1.6 General Recommendations for Action and Solution	110
<b>7 Conclusion</b>	<b>112</b>
<b>8 Limitation</b>	<b>114</b>
<b>9 Funding</b>	<b>115</b>
<b>Bibliography</b>	<b>116</b>



## List of Figures

<b>Figure 1:</b> PRISMA 2020 flow diagram – adapted (Page et al. 2021)	7
<b>Figure 2:</b> Benefits of digital competencies in Healthcare – Summary of the German interviews.	29
<b>Figure 3:</b> Benefits of digital Competencies in Healthcare – Summary of the Greek interviews	31
<b>Figure 4:</b> Benefits of digital Competencies in Healthcare – Summary of the Italian interviews	33
<b>Figure 5:</b> Benefits of digital Competencies in Healthcare – Summary of the Lithuanian interviews	35
<b>Figure 6:</b> Benefits of digital Competencies in Healthcare – Summary of the Austrian interviews	37
<b>Figure 7:</b> Challenge of Digitalization – Summary of the German Interviews	52
<b>Figure 8:</b> Challenge of Digitalization – Summary of the Greek Interviews	54
<b>Figure 9:</b> Challenge of Digitalization – Summary of the Italian Interviews	56
<b>Figure 10:</b> Challenge of Digitalization – Summary of the Lithuanian Interviews	58
<b>Figure 11:</b> Challenge of Digitalization – Summary of the Austrian Interviews	61
<b>Figure 12:</b> Areas of Digital Competence (Brande, L. V. d. et al., 2016)	66
<b>Figure 13:</b> Necessity of digital Competencies – Germany	78
<b>Figure 14:</b> Necessity of digital Competencies - Greece	82
<b>Figure 15:</b> Necessity of digital Competencies – Italy	86
<b>Figure 16:</b> Necessity of digital Competencies - Lithuania	92
<b>Figure 17:</b> Necessity of digital Competencies – Austria	95



## List of Tables

**Table 1:** Benefits for Nursing Professionals and Derived Benefits for Care Assistants 27

**Table 2:** Challenges for Nursing Professionals and Derived Challenges for Care Assistants 47



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# 1 Introduction - Initial Situation and Relevance

The healthcare system worldwide is facing the challenge of demographic change. It is assumed that the number of people over the age of 65 will more than double globally by 2050. (Barisch-Fritz et al. 2023) An aging population and, as a result, an increasing demand for care and health services are contrasted by a growing shortage of nursing staff. Additionally, the place of service provision is increasingly shifting to the home environment. This presents major challenges, particularly for staff in long-term care. (Groeneveld et al. 2023)

In many countries, a large part of basic care, especially in long-term care, is not provided by trained nursing professionals but by nursing assistants. This represents an occupational group with lower formal qualifications, shorter training, and often unclear or variable scopes of duties. (OECD, 2020)

In light of the aforementioned issue, the implementation of digital technologies is seen as a possible solution to bridge the growing gap between increasing care needs and the availability of suitable personnel. (Groeneveld et al. 2023; Barisch-Fritz et al. 2023) Therefore, visions of the technologization of elderly care are increasingly emerging in public and economic discussions. (Barisch-Fritz et al. 2023)

Healthcare is increasingly characterized by digital technologies, such as sensor-based monitoring or mobile communication tools. (Mannevaara et al. 2024) Digital health solutions such as telemedicine, sensor systems and wearables, medical apps, eHealth and mHealth applications, digital patient records, communication platforms, clinical decision support systems as well as personalized and predictive modeling tools have been increasingly integrated into care processes over the past ten years and are gaining increasing acceptance among patients and staff. The way healthcare is delivered is fundamentally changing as a result. (Mather and Cummings 2019; Kaihlanen et al. 2024; Jarva et al. 2022; Groeneveld et al. 2023)



The health sector is considered one of the most promising areas of application, in which digital technologies can not only improve individual care but also have a positive impact on the healthcare system as a whole. However, within the sector, new technologies and applications are often only introduced slowly. (Shiferaw et al. 2020)

The sector is undergoing a profound transformation due to the rapid advancement of digital technologies, which is leading to a transformation of professional roles within the nursing profession. (Mannevaara et al. 2024; Jarva et al. 2022; Isidori et al. 2022) These changes affect not only trained nursing professionals but also the respective nursing assistant professions.

In addition, new competency requirements are being placed on staff. (Mather and Cummings 2019; Kaihlanen et al. 2024; Jarva et al. 2022; Groeneveld et al. 2023) Nursing assistants are also frequently expected to use digital tools in their daily work. These include tasks such as entering basic health data, using digital mobile apps to document nursing activities, or initiating digital communication between residents and their relatives. New forms of digital communication and technological innovations, which are often described in the literature in connection with professional nurses, therefore very likely also increasingly require nursing assistants to adapt their skills to new professional demands. (Jarva et al. 2022)

These profound changes have increased interest in the teaching of digital health competencies and at the same time revealed existing gaps in curricular development, implementation, and evaluation. (Lawrence and Levine 2024; Borges do Nascimento et al. 2023)

In view of the increasing use of digital technologies in the health sector, digital basic skills are now expected of newcomers to the profession. (Raghunathan et al. 2023; Lawrence and Levine 2024) The literature also increasingly speaks of digital professional professionalism, which should be strengthened as part of the development of professional identity. It is considered a response to the necessity of professional behavior in dealing with digital media in the work context. (Mather and Cummings 2019) Digital competencies must therefore be increasingly



integrated into the training of care assistants, as they too must demonstrate professional conduct.

In order to prepare current and future staff for a technology-supported work environment, the teaching of digital competencies in the respective training programs is internationally recognized. (Tischendorf et al. 2024) Although the evidence for the importance of digitalization-related training content has increased significantly in recent years, progress in many countries remains slow. (Kaihlainen et al. 2024) Nevertheless, there is great interest in the widespread introduction of digital technologies in healthcare. This requires the development of appropriate strategies and guidelines to specifically manage the digital transformation. (Mannevaara et al. 2024)

Knowledge in health information technology is considered a key prerequisite for future-proof nursing practice. (Mannevaara et al. 2024) In order for acquired knowledge in this area to be applied in the work context, appropriate framework conditions are essential. Educational institutions and providers play a key role by providing technical resources and creating practice-oriented learning environments (Navarro-Martínez et al., 2023). While many studies focus on individual learning through training, organizational learning processes are often neglected (Jose et al., 2022). A systemic change in the education system is therefore required in order to sustainably anchor digital competencies. (Isidori et al., 2022)

Despite their central role in long-term care, nursing assistants in many countries have only low formal qualifications. About 70% have a medium level of education, 17% a low level of education. (OECD, 2020) This requires adapted teaching of digital technologies for this specific target group. The heterogeneity of responsibilities and qualification formats makes it significantly more difficult to develop target group-specific digital competencies. It is therefore necessary to address the digital competency needs of care assistants in order to optimally prepare them for their future digital work environment.

It is becoming increasingly evident that nursing staff have difficulty keeping up with the rapid development of digital technologies in healthcare (Mannevaara et al.



2024). The mismatch between the demands of everyday work and the existing qualifications can lead to insecurity and rejection of digital applications among nursing assistants. (Kulju et al. 2024) If the further development of digital competencies is neglected, there is a risk that needs-based and patient-centered care can no longer be fully ensured. (Jarva et al. 2022)

Several studies indicate that digital technologies can only realize their potential if users have the necessary competencies. (Raghunathan et al. 2023; Tischendorf et al. 2024) Jarva et al. (2022) note that a large part of the nursing staff does not make comprehensive use of digital opportunities in everyday work. In order to use digital technologies efficiently and effectively, a certain level of digital competence is therefore essential. (Shiferaw et al. 2020; Jarva et al. 2022) From a nursing perspective, it is therefore crucial that both professional and assistant staff have the necessary knowledge to meaningfully integrate digital applications into the care process. (Kulju et al. 2024; Tischendorf et al. 2024)

For the successful use of digital technologies, a suitable infrastructure alone is not enough; equally essential is qualified, appropriately trained staff with job-specific digital competencies. (Hariyati et al. 2024)

Although the international literature has so far mainly focused on trained nursing professionals, many of the described requirements, developments, and challenges can also be transferred to nursing assistants. It can therefore be assumed that this occupational group is also highly affected by the digital transformation and requires corresponding competencies in order to keep up with technological change.

Despite the previous research focus on professionals, the literature provides valuable insights that can be transferred to nursing assistants. A differentiated consideration of this previously underrepresented occupational group is necessary in order to specifically integrate their needs, challenges, and potential into the digital transformation of the healthcare system.



The Erasmus+ project "DigiHealth – Emerging Digital Competences of Healthcare Staff" recognizes the rapid technological change in elderly care and responds to the priorities of digital transformation as well as the necessary adaptation of vocational education and training to the changing demands of the labor market. The aim is, in particular, to strengthen the digital competencies of nursing assistants and low-skilled care workers and to bridge the digital divide within the care sector. In this way, low-skilled care workers are to gain access to the benefits of the digital transformation and be equipped with the necessary basic competencies to meet the new professional requirements. This strengthens the digital readiness of the staff. As mentioned at the beginning, educational institutions play a central role. The goal must therefore be to prepare these institutions for the digital transformation in the care sector.

The discussion about digital technologies often focuses on industries such as high-tech, industry, or IT research. The profound impacts of the digitization and technologization of healthcare, on the other hand, are largely neglected. This overlooks the fact that these processes affect all occupational groups and require adaptability from employees at all levels and in all areas.

It is therefore necessary, on the one hand, to specifically strengthen the digital competencies of nursing staff – especially of assistant staff – and, on the other hand, to overcome existing obstacles to the introduction of technologies. Aspects such as complexity, data protection, and usability pose major challenges, particularly for less qualified nursing staff. "DigiHealth" addresses these challenges in order to enable the safe and efficient use of digital technologies in long-term care. In doing so, not only are the digital competencies of nursing assistants strengthened, but the attractiveness of the nursing profession as a whole is also increased – a contribution to addressing the shortage of skilled workers in healthcare.

The project therefore focuses on two central priorities: digital transformation and the adaptation of vocational education and training to the requirements of the labor market. In particular, the digital maturity of educational institutions and the development of digital skills of nursing assistants are to be promoted.



The digital transformation in long-term care is a cross-border challenge of European relevance. The transnational approach of the project enables the exchange of best practices and supports the development of digital competencies. The involvement of leading nursing institutions and educational providers from various European countries brings in diverse perspectives and increases the effectiveness of the project at the EU level.

This paper therefore begins with a description of the underlying methodology. Chapter three presents the central tasks, legal foundations, and areas of deployment of nursing assistants based on the interviews. This is followed by a presentation of the opportunities and challenges of digital transformation in long-term care as identified through qualitative surveys and literature. Chapter five derives the relevance of digital competencies from the previously described opportunities and presents the resulting competency requirements. The following chapter outlines the prerequisites for successful integration of digital competencies into vocational education and their implementation in everyday work. The final chapter draws a conclusion and formulates recommendations for action.



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## 2 Method

As part of the project and in preparation for the interviews, which formed the basis for the data collected here, a systematic literature review was conducted. The search was carried out in the scientific database "PubMed" as well as in "Google Scholar." Additionally, a manual search was conducted, and relevant sources from project-related reports were included.

The search strategy focused on key terms related to digitalization, digital competencies, healthcare, and care assistants. Early in the literature review process, a noticeable gap emerged in studies specifically addressing care assistants and support roles in the context of digitalization.

For this work, only studies published between 2019 and 2025 were included in order to ensure the representation of current digitalization processes in healthcare. Sources published outside this period were only included if they served to define relevant frameworks or terms.

A total of 22 relevant studies were included in the analysis. The following Prisma Flow-Chart illustrates the origin of the selected sources.

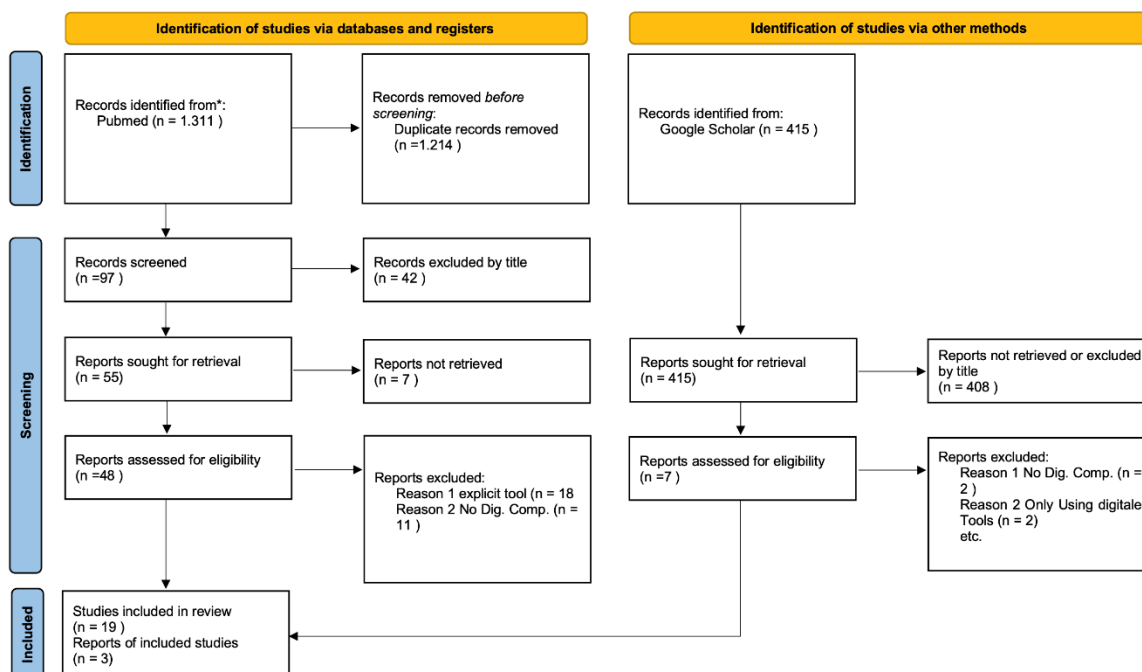


Figure 1: PRISMA 2020 flow diagram – adapted (Page et al. 2021)



Between February and April, guided interviews were conducted in the five member countries. Teachers and institutions from vocational schools and universities, professionals from healthcare facilities, as well as care assistants, nurses and operatori Socio-Sanitari, were interviewed. A total of 34 individuals participated in the interviews. Among them, 6 were from Greece, Italy, and Lithuania, and 10 were from Germany. One person from Austria participated in an interview but requested that it not be recorded, so this interview could not be included in the qualitative content analysis. Therefore, this study includes only 5 interviews from Austria.

In total, 12 nurses, 10 VET teachers, and 11 professionals (Care Assistants, Nurses and Social Worker) from healthcare facilities were included in the analysis.

The qualitative content analysis was conducted using MAXQDA, following Kuckartz's approach. Initially, the predefined codes from the interview guides were applied. During the coding process, additional inductively developed codes were integrated into the analysis.



### 3 Tasks and responsibilities of care assistants

In over 90% of the countries surveyed in the OECD Health Policy Studie, collaboration with healthcare professionals is a central aspect of care assistant's roles. While care assistants typically do not provide direct medical care, they are responsible for monitoring the health status of care recipients. This includes observing changes such as weight loss or loss of appetite, maintaining care documentation, recognizing urgent medical situations, and informing healthcare professionals. (OECD, 2020)

In nearly 40% of countries, they also coordinate communication between family members and healthcare providers. The most frequently performed tasks focus on supporting activities of daily living and instrumental activities of daily living. These include positioning, lifting, and moving older people (using wheelchairs or care beds), assisting with personal hygiene, dressing, and feeding. Additional responsibilities involve cleaning the environment, changing bed linens, preparing meals in accordance with special diets, and accompanying individuals for errands. Tasks such as preparing for medical examinations or treatments are carried out less frequently, and in some countries care assistants are not permitted to administer medications. (OECD, 2020)

Care assistants play a vital role in the care of older adults, which can be categorized into four main functions: (1) support with activities of daily living such as dressing or eating, (2) assistance with instrumental activities of daily living such as cooking or shopping, (3) communication with care recipients and their families, and (4) monitoring of the care recipient's health status. (OECD, 2020)

#### 3.1 Legal Regulations for Care Assistants

The legal framework for care assistants in Germany is highly differentiated and subject to various influences, particularly regarding the federal state, type of institution, and individual qualification level of the assistants. There is no nationwide uniform regulation, especially in the area of outpatient care. In some federal states, such as Lower Saxony, care assistants are allowed to perform significantly more



tasks than in inpatient settings, which many perceive as contradictory. These differences are partly due to varying training requirements in the states – currently, there are 16 different training situations, leading to a very heterogeneous qualification picture.

In principle, care assistants are responsible for basic care and support with daily activities. They are generally not permitted to perform treatment care unless certain conditions are met. This is governed by the so-called delegation principle: treatment care tasks – such as blood sugar measurement, insulin administration, or applying compression stockings – may only be carried out if explicitly delegated by a nursing professional. A prerequisite is that the health condition of the person being cared for is stable, and the nursing professional has previously verified that the care assistant has the necessary competence. In practice, this may be ensured through supervision or regular checks.

Some care assistants have extended qualifications, such as a "treatment care certificate." This additional qualification allows them to perform certain treatment care tasks independently after appropriate training. However, even for these professionals, delegation by a nursing professional is still necessary, with the exception of certain legally defined tasks. Tasks such as wound care, suctioning of secretions, or handling narcotics are generally excluded and may only be performed by professionals.

Institutions increasingly address this complex situation with organizational measures. For example, many care facilities have job descriptions that regulate the tasks of care assistants. Additionally, in line with the new staffing regulation under § 113c SGB XI, delegation concepts are being developed, where task allocation is systematically organized based on the assistants' qualifications. Many institutions are currently in the process of concept development or testing model concepts within networks. The goal is to make the distribution of care tasks more transparent, legally secure, and qualification-appropriate. Overall, it is evident that the legal framework for care assistants depends on many variables, with both legal provisions and internal regulations playing a role. However, the implementation of



these regulations in practice is often shaped by verbal agreements, the trust of professionals, and the specific organizational culture. Accordingly, there is a high need for more uniform and clearly communicated regulations on task distribution in nursing.

In Greece to work as a Care Assistant, it is necessary to have a diploma or certificate in vocational education and training, according to Article 4 of Presidential Decree 210/2001. The title of "Care Assistant" is granted to holders of secondary school diplomas (D.E.) who have completed their training at specific, recognized educational institutions. These include vocational training institutions (IEK) in the field of care, public vocational education institutions (DIEK), and nursing schools of public hospitals. Graduates of former technical vocational secondary schools (T.E.L.) in the field of care, vocational schools (EPAL), as well as the EPAS OAED training in General Care Assistants are also eligible to carry this title. Other recognized educational institutions include technical vocational schools (T.E.E.) of the A and B cycles of Care Assistants as well as secondary technical vocational nursing schools (M.TENS). Finally, foreign schools are also recognized if they are equivalent to the above-mentioned institutions.

The individuals surveyed in Italy clearly express the existing regulations for Care Assistants (or social healthcare professionals, such as OSS – Operatori Socio-Sanitari). It is emphasized that there are clear rules that define what is allowed and what is not. These rules define the responsibilities and limits of the role. For example, medication may not be administered unless under the direct supervision of a nursing professional who explicitly requests and is present. The tasks of Care Assistants, on the other hand, involve supporting activities such as meal preparation, assistance with mobility, and helping with feeding. Employers and cooperatives explicitly insist that these guidelines are followed, and there are written documents in which prohibited activities are listed.

The areas of responsibility are thus clearly defined even though those in need of care often demand more. Additionally, reference is made to state-regional regulations, particularly the 2001 agreement between the state and regions, which sets the required competencies for OSS in the areas of health, social care, and

administration. However, the actual tasks may vary depending on the work area – such as in home care – and can be weighted differently.

The tasks and responsibilities of Care Assistants in Lithuania are clearly regulated by law, although less comprehensively than those of fully trained nursing professionals. In Lithuania, for example, their work is defined by laws such as the Social Services Act and the Licensing Act for Social Institutions. These legal frameworks ensure that social and medical services are provided in a structured and quality-assured manner.

The work of Care Assistants is guided by national standards, precise work instructions, and a so-called "medical norm catalog," which defines areas of responsibility and qualification requirements. Care Assistants must perform their duties strictly according to these instructions – deviations can lead to legal and financial consequences. Therefore, the requirements for documentation and care in performing tasks are very high.

In addition, professional certification is a prerequisite for practicing the profession. This is granted after training, including a practical component lasting about five months. There is also a clear differentiation between medical care assistants and social care assistants, with the latter primarily undertaking household and supportive tasks.

Care Assistants in Austria are also subject to clearly regulated legal frameworks, which define exactly which tasks they are allowed to perform and which they are not. These regulations are very strict, and exceeding the allowed competencies results in liability risks for the individual.

Legal provisions concern, among other things, the administration of medications, which is only allowed in certain cases and usually after a doctor's order – regulated, among others, by the Medicines Act. In certain areas – depending on the specific hospital or department – care assistants or specialized care assistants can also work independently, provided that this falls within their competence.



For example, in some hospitals, specialized care assistants are allowed to take blood, while in others, they are not. Thus, there is flexibility in implementation, but in general, a very strict legal framework exists that clearly differentiates between responsibilities and permissions. There are also restrictions in the profession of the trained nurse – for example, treatments or interventions may only occur with medical approval.

### **3.2 Collaboration of Care Assistants with Other Healthcare Professions**

The collaboration of Care Assistants with other healthcare professions in Germany varies depending on the institution, structure, and team culture, but follows certain patterns. The cooperation with nursing professionals is particularly close. In this case, there is typically a collegial collaboration on equal terms, with no strongly emphasized hierarchies. While Care Assistants usually take on basic care tasks, nursing professionals are primarily responsible for treatment care, communication with doctors, and the coordination of the care process.

However, it is emphasized that "working hand in hand" is essential—especially in situations where staff members suddenly drop out, and schedules need to be adjusted spontaneously. Direct contact between Care Assistants and doctors is rare in inpatient settings. Medical communication generally takes place through qualified nurses. In exceptional cases, such as emergencies or when no qualified nurse is available, Care Assistants sometimes take over handovers to emergency services or make phone contact with medical services, such as the palliative care team (SAPV). But it is also often emphasized that Care Assistants have limited formal competence in these situations and often feel that they lack the necessary knowledge to provide comprehensive information.

In contrast, contact with therapists—especially physiotherapists, occupational therapists, and speech therapists—is more pronounced. Care Assistants are often involved in mobilization measures or physical exercises and are in direct exchange



with therapeutic professionals. Organizational tasks such as registering residents for therapy, providing prescriptions, or accompanying them to appointments often fall within the scope of the Care Assistants' responsibilities. Therapists frequently provide brief feedback on treatment, which is then integrated into the daily care practice.

The task areas between Care Assistants and nursing professionals are increasingly structured, such as through the introduction of specific schedules for different qualification levels. However, flexibility in daily work remains essential, as daily routines in nursing are often unpredictable. Particularly in cases of sudden absences, smooth collaboration between professional groups is crucial.

Communication primarily occurs through handovers, which serve as central interfaces. Digital solutions such as Outlook or internal platforms are used additionally, but often only to a limited extent. In some institutions, Care Assistants do not have systematic access to digital infrastructure, which complicates the exchange of relevant information. Informal communication channels such as WhatsApp groups are sometimes used but are voluntary and subject to data protection restrictions.

Whether and how interdisciplinary collaboration succeeds strongly depends on the respective setting. While interdisciplinary teams are more common in hospitals, the contact between Care Assistants and other healthcare professions is often limited in nursing homes. In home care, it is difficult to generalize, but there tends to be a stronger focus on the collaboration of qualified nurses with doctors and therapists. Overall, it is evident that Care Assistants are often closer to the residents than qualified staff and can thus contribute valuable information to daily care. At the same time, their role in interdisciplinary communication and digital documentation is often underrepresented.

The collaboration of Care Assistants with other healthcare professions in Greece plays a central role in their daily work. One key aspect is the continuous and

effective communication with the healthcare team, especially with the responsible nurses and doctors.

Care Assistants regularly report on the patients' conditions, such as symptoms, complaints, or behavioral changes, contributing to the quality and safety of the care provided. In emergency and crisis situations, such as mass disasters, they work closely with other healthcare members as well as with involved institutions to manage health issues quickly and in a coordinated manner.

In Italy Care Assistants occasionally collaborate with other healthcare professions such as nurses or doctors, but this does not happen regularly. Collaboration with nurses takes place, for example, under their supervision during medication administration. The nurse must be present and explicitly instruct the action, as Care Assistants are not allowed to administer medications independently.

In general, respondents express a positive attitude towards teamwork and emphasize that they enjoy working with other professional groups as long as there is a harmonious working environment. Additionally, there are occasional collaborations with other professionals, such as psychologists, social workers, and educators, particularly in the context of activities for mental stimulation and daily living of the individuals being cared for. However, these professionals are rarely present at the same time but are usually on-site alternately.

In special cases, such as the care of bedridden individuals with pressure ulcers, closer collaboration with nurses takes place, where the Care Assistant also takes over specific care instructions. Communication with medical professionals often occurs indirectly, such as through written documentation or telephone consultations. Overall, there is some, usually situation-dependent, collaboration with other healthcare professions, but it does not occur consistently.

The collaboration of Care Assistants with other healthcare professions in Lithuania is characterized by high coordination and clear structures. They work closely with nurses and doctors, with tasks delegated in a structured system and instructions from medical staff passed on.

In settings such as hospitals, nursing homes, or home care, this close collaboration is particularly important. Care Assistants are integrated into interdisciplinary teams, which are usually led by nurses. They act as a link between patients and higher-qualified staff, promptly passing on important observations or anomalies to nurses or doctors. Regular team meetings facilitate the exchange of information and the joint adjustment of care plans.

There is a clear hierarchy: when problems arise, Care Assistants first contact the responsible nurse, who decides whether the case needs to be referred to a doctor. Communication within the team is continuous and structured, both in person and by phone.

The collaboration of Care Assistants with other healthcare professions is a central component of modern healthcare but still presents some challenges in Austria. A frequently mentioned difficulty is the still prevalent silo mentality, where each professional group works largely independently and is only marginally networked.

Interdisciplinary collaboration often only takes place in pilot projects or protected educational environments, such as universities, where different professional groups—such as those from nursing, therapy, pharmacy, and medicine—work together on projects, particularly in the field of digitalization. These approaches show that collaboration works and is perceived as beneficial by all involved.

In regular practice, however, many structural barriers still exist. Legal regulations clearly define which tasks nursing staff may perform, such as the fact that certain medical procedures can only be carried out following a doctor's order. Nevertheless, there are frequent overlaps in task areas in daily practice—whether in inpatient care or in new care models such as Primary Care Units. In such facilities, general practitioners, nurses, physiotherapists, and other professional groups work under one roof, promoting interdisciplinary communication.



Digital solutions are also increasingly gaining importance, as they serve as interfaces between professional groups and facilitate the exchange of information. Ultimately, collaboration always depends on functioning teamwork—regardless of the professional field or the specific facility. Particularly in departments with high professional diversity, it becomes clear how important coordinated collaboration is for holistic patient care.

### **3.3 Scope of practice of care assistants**

Care assistants in Germany are active in various care sectors. They work in senior centers as well as in outpatient care, especially in the area of basic care. In addition, they are heavily involved in inpatient long-term care and take on supportive tasks.

They are also deployed in hospitals, particularly in acute inpatient settings, for example on internal medicine wards. There, they are often responsible for basic care tasks, such as distributing and collecting meals, ensuring adequate fluid intake, or other supportive measures within the framework of a comprehensive care setting.

Nursing assistants work both in inpatient and outpatient settings and are also active in semi-inpatient facilities as well as in day care centers. In outpatient care, they sometimes independently carry out patient rounds, especially when it involves services that can be performed within the framework of basic care. Overall, nursing assistants are theoretically represented in all forms of care, with the focus of their deployment lying in the area of inpatient long-term care.

Care assistants in Greece are also active in a wide range of health and social institutions. Their main areas of deployment include public and private hospitals and clinics, primary health centers, rehabilitation centers, and social care institutions, such as programs like “Home Help.” They also work in elderly and nursing homes, facilities for the treatment of chronic illnesses, psychiatric institutions, and maternity clinics.

Deployment in public and private schools as well as in holiday camps is also possible. In addition to these institutional areas, care assistants are also active in

home care, where they care for patients directly in their living environment, as well as in respite homes, which provide temporary care and support. Thanks to their comprehensive training, they are flexibly deployable and take on a variety of tasks in medical, social, and caregiving contexts.

Care assistants in Italy, particularly OSS (Operatori Socio-Sanitari), work in various areas of the health and social care sector. The respondents mention day centers as a specific place of deployment, for example centers which specializes in the care of people with dementia.

In addition, OSS work in nursing homes (RSAs), in home care as part of integrated home care (ADI), and in regional hospitals. The training of OSS is designed in such a way that it allows deployments in different contexts—social, socio-health, and purely health-related sectors. Their field of activity includes both the home setting and institutions and hospitals.

In Lithuania Care assistants are active in diverse areas of deployment, depending on the needs of the patients and the institutional framework. They work in hospitals, nursing homes, outpatient care, and home care. In doing so, they take on tasks in inpatient care as well as in day and long-term care in facilities. A particular focus is often placed on home care, where the goal is to enable people to lead a self-determined life in their own homes for as long as possible before a move to an inpatient facility becomes necessary.

In some institutions, the focus is also on outpatient services and palliative care. There, care assistants conduct home visits—depending on the specific focus of tasks and work schedule. In specialized institutions such as integrated care units with a focus on palliative care, they also make an important contribution to the care of seriously ill people.

Care assistants in Austria predominantly work in inpatient settings, especially in hospitals. Another central area of activity is mobile care, which plays a key role particularly in rural regions and without which care there would hardly be possible. In this context, digitally supported care concepts are gaining increasing



importance—for example, in projects where less qualified personnel are active on-site and are guided by centrally located, digitally networked specialist units.

In addition, there is the area of 24-hour care in the home environment, the legal and professional status of which is often perceived as lower. Overall, the tasks and competencies of care assistants vary greatly depending on the place of deployment—be it in hospitals, nursing homes, mobile care services, or private households. This diversity makes the development of uniform legal or organizational regulations difficult.

In addition, care assistants are also frequently active in rehabilitative and therapeutic areas, with the aim of maintaining and stabilizing the health status of patients.

### **3.4 Core tasks of care assistants**

Nursing assistants perform a variety of tasks in the area of basic nursing care in Germany. These include washing, showering, bathing, as well as dressing and undressing the residents. They assist with general personal hygiene, accompany residents to the toilet, and make beds. Applying lotion, preparing and serving food and drinks, and ensuring sufficient fluid intake are also part of their daily tasks.

In day care, they also support food intake, accompany residents during their midday rest, and help them go to bed, which also contributes to supporting their sleep rhythm. Nursing assistants also carry out household-related tasks such as taking out the trash, starting the washing machine, or preparing simple meals.

In outpatient care, they conduct so-called “helper rounds” in which they independently visit clients with stable medical conditions and provide basic care.

With appropriate training and delegation by a registered nurse, they may also perform simple treatment care tasks, such as putting on and taking off compression stockings, measuring blood pressure and blood sugar, and in some cases, administering insulin.

Nursing assistants observe the condition of the residents, report changes to professional staff, and document relevant information—sometimes also by photographing wounds, provided this is done within the scope of their training and with regard to data protection. In many institutions, they are therefore a central part of everyday nursing care. Although they usually do not manage the care process themselves, they perform many delegated tasks.

In Greece, care assistants perform a variety of supportive tasks in everyday care, which include bodily care actions as well as organizational and communicative duties. A central task area is supporting patients with personal hygiene. This includes washing, bathing, styling hair, nail care, changing Incontinence material, and accompanying them to the toilet. Preparing and making beds is also part of their responsibilities. Especially for bedridden patients, they carry out important care actions to maintain hygiene and prevent complications such as pressure ulcers.

In the area of nutrition, care assistants help nourish patients and support the administration of fluids via the gastrointestinal tract if necessary and under supervision. They also perform simple medical-nursing tasks, such as measuring vital signs—blood pressure, temperature, pulse, respiratory rate, and blood sugar. Performing oximetry and, in some cases, electrocardiograms (ECGs) are also part of their tasks.

Furthermore, they collect samples such as urine, stool, or sputum, and assist in monitoring medication intake. Care assistants regularly document their tasks and observations regarding medication or care needs.

Communication with the care team is also very important, especially the timely reporting of relevant information about the patient's condition (such as complaints, symptoms, or behavioral changes) to the responsible nurses. They also assist with the use and monitoring of simple technical aids—such as smartwatches or blood pressure monitors—and report any malfunctions to the nursing staff.

They also support with mobilization, help with getting up, transferring, and moving patients, accompany them during walking, and assist with dressing and undressing.

Everyday practical assistance—especially in home settings—such as small errands or structuring the daily routine is also part of their duties.

In special situations, such as the care of chronically ill or dying individuals, care assistants take on supportive and accompanying tasks, including the care of deceased persons with dignity. In emergencies, they collaborate with other professions to manage health issues. Overall, Greek nursing assistants work closely with nursing professionals and perform numerous supportive tasks under instruction or supervision, contributing to comprehensive nursing care.

Care assistants in Italy perform a variety of support tasks that differ depending on the area of deployment and the care needs of the persons being supported. They take care of the holistic care of elderly people, admit them, help them undress, and support them if they cannot move or go to the toilet independently. They prepare meals such as breakfast or snacks, assist with eating, and also provide social support through conversation. Their tasks also include assistance with personal hygiene, such as washing, cutting nails, or styling hair.

In inpatient facilities, they also ensure tidiness in the personal areas of those in need of care, for example by tidying bedside tables or sorting clothing. In home care, they often take on cleaning tasks in the bedroom, bathroom, and kitchen, as well as general housekeeping. They assist people who can no longer perform all daily tasks independently due to illness or limited mobility with hygiene and household tasks. For those who are still partially independent, they provide more of a supervisory presence than full care. The tasks are not strictly defined but are oriented toward the individual needs of the care recipients and the social context.

Nursing assistants in Lithuania also perform a broad range of tasks that include both nursing and household duties, as well as medically supportive activities. They support nursing professionals and also act independently within clearly defined areas of responsibility. Their core tasks include basic care, such as assisting with personal hygiene, dressing and undressing, eating, as well as positioning and lifting

patients. They monitor vital signs, administer food, assist with medication administration, and operate medical equipment such as lifters.

In addition, they take on household tasks, such as preparing meals, cleaning patient rooms, and making beds. In home care, they conduct home visits. Nursing assistants work closely with other members of the care team, carefully document their actions, and pay close attention to changes in the health condition of the persons entrusted to them. Their tasks are always guided by the individual needs of the patients and the organizational requirements of the institution.

Austrian Nursing assistants perform a variety of supportive tasks in direct patient contact, especially in basic care. Persons with lower qualifications, such as nursing assistants, are more focused on practical tasks compared to higher-qualified nursing staff and work less with digital systems—especially in acute care. Their competencies are legally regulated and limited, for example, in the area of blood sampling, which is only permitted under certain conditions and in some facilities (e.g., for specialized nursing assistants).

In addition, documenting all measures taken is part of their fixed responsibilities, which is described as legally mandatory and well-organized. These support tasks vary depending on the facility, area of deployment, and qualification level.



## 4 Opportunities and Challenges

### 4.1 Opportunities of Digital Competencies

This chapter addresses the opportunities and advantages of digitalization and the digital competencies of care assistants identified in the literature. Although the existing literature predominantly focuses on certified nursing staff, many of the identified opportunities can be transferred to care assistants. Due to their involvement in care processes and the use of basic digital technologies, care assistants also benefit significantly from digital competencies.

At the time of writing, no specific studies could be found in the literature review that explicitly address the digital competencies of nursing aides and care assistants or the opportunities of digitalization for this occupational group. Therefore, the aim of this chapter is to derive key aspects for care assistants from the existing body of research on the digital opportunities for healthcare professions in general, as well as for professional nursing staff.

The literature shows that digital technologies can improve the adherence to clinical standards, interprofessional communication, skills and personal competencies, as well as the mental health of healthcare personnel. Furthermore, an optimization of work performance has been observed, for example through improved communication skills, reliable and fast access to relevant care data, the development of professional expertise, as well as increased productivity, efficiency, and accuracy. Care quality also increases, the time required for individual tasks is reduced, and knowledge acquisition is expanded. The improvement of psychological, social, and financial factors suggests that digital health technologies may be superior to traditional methods. (Borges do Nascimento et al. 2023)

These positive effects are also of great importance for care assistants. Especially in the often stressful care routine with limited time and personnel resources, technologies offer significant opportunities. The described improvements, such as strengthened personal competencies, more efficient team communication, improved mental health, and increased work productivity, also impact their daily work. Through the regular use of digital documentation systems, communication

platforms, and organizational workflows, they benefit directly from the advantages of digital technologies.

Tischendorf et al. show that health personnel in particular benefit from digital technologies in areas such as the organization of care processes, the improvement of treatment plans, and access to health information. (Tischendorf et al. 2024) In this regard, the primary benefit for care assistants should not be viewed in isolation. The efficient organization of care processes and treatment plans also has secondary effects on the care steps carried out by care assistants.

The literature describes that digital health services can particularly strengthen the healthcare system by improving the efficiency of care, offering support for care practice, and promoting patient-centered care. (Jarva et al. 2022) Digital tools such as mobile documentation tools or automated reminder functions can also increase efficiency and quality in basic care, where care assistants play a key role. The digitalization of the healthcare system thus improves patient care through more precise and individualized nursing and simultaneously leads to a relief for nursing staff. (Tischendorf et al. 2024) The potential for relief described in the literature is likely to be particularly effective for assistants, as repetitive tasks or organizational effort can be simplified through digital aids.

Groeneveld et al. show that digital technologies also influence the interpersonal relationship between staff and patients. (Groeneveld et al. 2023) For care assistants, who are active in direct care and relationship building with patients, digital technologies also offer the opportunity to make these interactions more efficient, for example through digital support for communication.

Digital information and communication technologies enable access to health services across spatial distances. Overcoming these geographical barriers allows for medical care and follow-up without physical proximity. This not only improves care for immobile persons but also increases overall comfort and accessibility for all users. (Mannevaara et al. 2024; Borges do Nascimento et al. 2023) Telemedicine is also described as advantageous for interprofessional collaboration. It ensures precise, secure, and efficient communication and data exchange. An interoperable

system between care sectors increases quality and efficiency and thus reduces care costs. (Poitras et al. 2024) It is evident that the introduction of information and communication technologies in the healthcare sector has led to moderate improvements in clinical outcomes and a reduction in costs. (Barisch-Fritz et al. 2023, Mannevaara et al. 2024) Due to the limited use of telemedicine services, it is not yet possible to accurately assess what role care assistants may potentially play in initiating telemedical consultations in home care in the future.

Moreover, access to professional knowledge for healthcare personnel is significantly simplified by digital systems, which in turn can improve the quality of patient care. (Borges do Nascimento et al. 2023) The simplified access to digital knowledge resources also enables assistants to continuously educate themselves on care-relevant topics. This can strengthen their confidence in everyday practice and positively influence the quality of basic care.

The use of new digital technologies leads to professional, comfortable, and comprehensive care for all users. (Lawrence and Levine 2024) It has been shown that patients generally have a positive attitude toward digital health applications and technologies. These have proven useful in various aspects of care, such as adherence to medication plans or health-promoting behaviors. (Jarva et al. 2022)

The improvements described in the literature for professional nursing staff through digital systems, such as more efficient documentation or access to health information, can be transferred to assistant staff by acquiring digital competencies for direct application in daily care practice. Since care assistants are closely involved in organizational and supportive workflows, they benefit in a comparable way from digital applications that facilitate these processes, such as digital documentation, internal communication, and digitally supported training. The present opportunities of digital competencies thus do not apply exclusively to academically trained nursing staff but also apply, in an adapted form, to care assistants. Digitalization can specifically support, relieve, and professionalize their work.

Despite different educational levels, care assistants are closely involved in nursing and organizational workflows and accordingly benefit from digital applications that structure, facilitate, and professionalize their work. For example, the use of digital technologies supports adherence to clinical standards by providing nursing aides with clear orientation in daily care through checklists, reminder functions, or standardized documentation systems.

Also in interprofessional communication, for example during shift handovers or feedback to nursing professionals, digital communication platforms enable structured, transparent, and time-saving coordination.

Furthermore, digital tools promote skills and personal competencies, such as self-organization, basic technical skills, and independent work. These competencies can be specifically developed through practice-oriented digital training formats.

Mental health can also be positively influenced by digitalization. Less manual documentation work, clearer processes, and faster access to information relieve the daily workload, reduce stress, and promote well-being.

In addition, digital systems lead to increased productivity, efficiency, and accuracy in basic care. For example, automated reminder functions, digital performance records, or simple documentation tools can help save time and avoid errors. This directly affects the quality of care.

A confident use of digital systems strengthens self-esteem, improves teamwork, and can promote long-term professional development opportunities.

The qualitative interviews conducted as part of the project support the aspects identified in the literature regarding the digital competencies of care assistants. In the following, the interviews of the individual project partners are presented by country and subsequently summarized.

**Table 1:** Benefits for Nursing Professionals and Derived Benefits for Care Assistants

Source	Benefits for Nursing Professionals	Derived Benefits for Care Assistants
Borges do Nascimento et al. (2023)	Improvement of clinical standards, communication, competencies, mental health, work performance, care quality, knowledge acquisition	Relief through better organization, strengthened personal skills, more efficient work, reduced stress, easier access to knowledge
Tischendorf et al. (2024)	Optimization of care processes and treatment plans, improved access to health information, enhanced patient care through digitization	Improved processes support care delivery, digital tools ease routine tasks, indirect increase in care quality
Jarva et al. (2022)	Support of nursing practice, more efficient care, promotion of patient-centered care, positive patient perception of digital tools	Higher quality and efficiency in basic care, positive feedback motivates care assistants
Groeneveld et al. (2023)	Improved relationship-building with patients through digital communication support	Enhanced patient communication in direct care, more efficient interactions
Mannevaara et al. 2024	Overcoming geographic barriers through telemedicine, improved follow-up care, better access to professional knowledge	Flexible use in home care settings, access to training resources, better preparedness for daily tasks
Poitras et al. 2024	Interprofessional collaboration, efficient data exchange, improved quality and efficiency, cost reduction	More efficient team communication, structured workflows, workload relief
Barisch-Fritz et al. 2023	Moderate improvements in clinical outcomes, cost reduction through information and communication technologies	Use of digital tools simplifies daily routines, enables structured work
Lawrence und Levine 2024	Comfortable, professional care delivery, high patient acceptance of digital technologies	Motivation through positive feedback, improved service quality through use of technology

#### 4.1.1 Results of the German Interviews

As part of the interviews with the German participants, various levels were identified on which digital technologies, from the perspective of the respondents, have positive effects on the nursing activities of care assistants. A central topic emphasized by the interviewees is corporate communication. In their assessment, digital tools facilitate communication across locations and reduce, particularly at management levels, the need for travel. This leads to a reduction in time and financial effort. According to the respondents, applications such as video conferences enable regular exchange between facilities on a nationwide level. Another significant advancement is seen in the digital exchange of care-relevant data. The interviewees assume that this can optimize care structures and processes. For care assistants, this means faster coordination with nursing professionals and the management level, which can reduce the time spent on queries and strengthen independence in everyday work. It is also partially assumed that digital technologies could lead to a stronger integration of care assistants into interprofessional teams.

Another point highlighted by the German interviewees concerns the documentation processes. They report that digital programs as well as AI-supported voice software significantly reduce the time required for documentation, especially for nursing assistants with language challenges, for example due to a migration background. According to the respondents, voice-based systems enable conversations with residents to be transferred directly into care documentation. Moreover, mobile devices would improve the quality of documentation by enabling fast and tamper-proof data collection. This is seen as a contribution to more efficiency and reliability.

In the area of physically demanding tasks, the interviewees also see advantages through digital technologies. Exoskeletons are specifically mentioned, which in their perception significantly reduce the physical effort required in basic care. This could contribute to the prevention of occupational musculoskeletal disorders, increase job satisfaction, and thus counteract the shortage of skilled workers in the long term, as care assistants could remain healthier and longer in the profession.

Digital technologies are also perceived by the respondents as an enrichment for the social care of residents. Devices such as Amazon Alexa or social robots offer, in their view, entertainment and access to information, especially for physically limited individuals. This could create time relief for the staff, which in turn could be used for higher-quality interactions with the residents.

The interviewees particularly emphasized the improved quality of care from their point of view. In their opinion, digital applications improve communication between professional groups, leading to better information levels, early interventions, and overall better care. Automated monitoring systems such as radar-controlled robots or smart incontinence products are capable of recognizing emergencies more quickly and using resources more efficiently. Digital simulations in the training of care assistants were also highlighted by the respondents as supportive in the development of professional competencies and preventive action. They also emphasized an increase in patient satisfaction due to the elimination of unnecessary control measures, which at the same time conserves material and human resources.



Furthermore, the easier flow of information between relatives and residents through digital technologies was also addressed. The interviewees described that telemedical processes could involve relatives more in medical decision-making and at the same time reduce the effort for informational discussions with nursing staff. Video call systems and digital portals would also enable more regular contact and thus contribute to a more intensive relationship between relatives and residents. According to the respondents, care assistants play a central role here, as they often have more time to initiate and accompany such digital contacts.

In conclusion, the interviewees expressed the assumption that the successful implementation and application of digital technologies could strengthen the sense of action competence among care assistants. From their perspective, this would have a positive effect on the self-confidence and personal development of nursing aides.

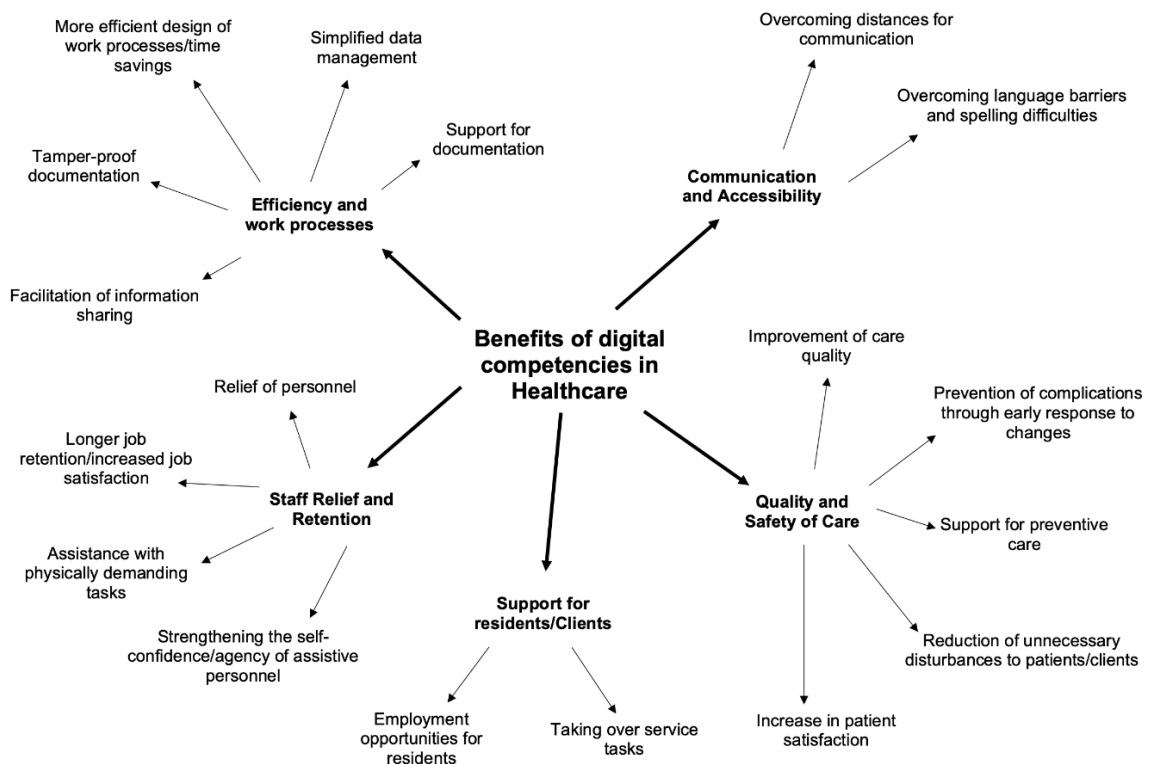


Figure 2: Benefits of digital competencies in Healthcare – Summary of the German interviews.

### 4.1.2 Results of the Greek Interviews

The interviews with the Greek participants highlight various perceived advantages of digital competencies and applications in nursing practice. A central benefit emphasized by the respondents lies in the fast and structured access to medical data, particularly through electronic health records. From the perspective of the interviewees, this can improve the quality of care and the efficiency of service delivery in basic care. Digital tools would thus contribute to increasing the accuracy and safety of nursing procedures and reducing errors. It is also assumed that care assistants could be specifically supported in their areas of responsibility through functions such as automatic documentation or reminder systems.

Another aspect highlighted by the respondents is the improvement of communication and collaboration between the various healthcare professions through digital technologies. From their point of view, this enables faster responses in emergencies and contributes to continuous, transparent care. Furthermore, more efficient interdisciplinary collaboration is facilitated, as well as a more structured task distribution, which is seen as particularly relevant in the context of the existing shortage of skilled workers. According to the interviewees, care assistants could be more strongly integrated into these interprofessional processes.

Individual and preventive care is also strengthened by digital solutions, according to the participants. They state that especially digital early warning systems could represent important support for care assistants to detect abnormalities in vital signs more quickly. Additionally, it is reported that access to medical services is made easier for vulnerable groups without necessarily requiring a physical doctor's visit. According to the respondents, this could also relieve basic nursing routines, as care assistants would no longer have to prepare their clients for doctor appointments under high time pressure.

Overall, the interviewees emphasize that digital technologies could not only bring considerable relief in everyday nursing care but also contribute to enhancing the professional role of nursing assistants. They see this as an opportunity to facilitate work processes, support evidence-based decisions, and promote better

collaboration with other healthcare professions. Ultimately, this could lead to more efficient therapy processes and improved risk management.

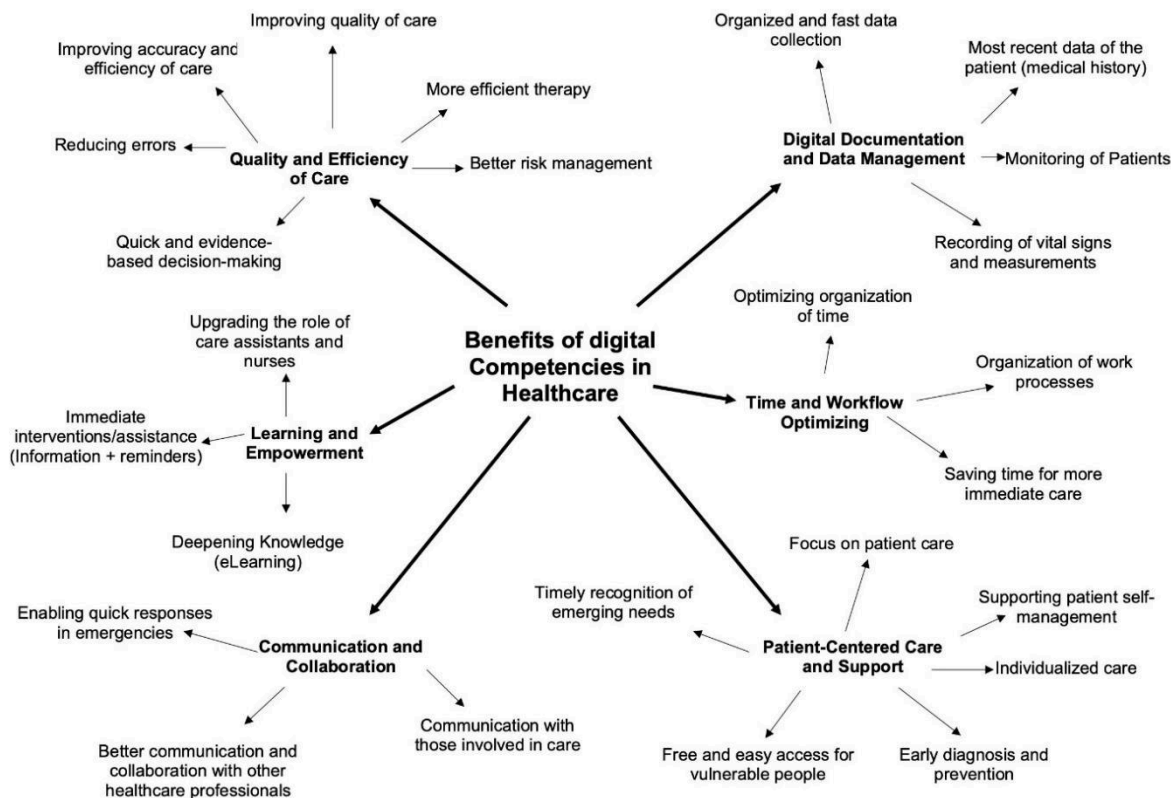


Figure 3: Benefits of digital Competencies in Healthcare – Summary of the Greek interviews

### 4.1.3 Results of the Italian Interviews

The Italian interview participants see numerous opportunities in the digitalization of the healthcare system for improved quality and efficiency of care. According to their statements, digital tools enable a more precise and faster way of working, which, especially in routine tasks, leads to time savings. This relief is perceived by the respondents as significant for better organization of work processes.

A central aspect emphasized by the interviewees is the improved interprofessional collaboration. The use of digital systems can simplify and accelerate communication between healthcare professions. Shared access to patient data is considered helpful for developing a better understanding of the treatment process and reducing potential errors.

According to the respondents, the quality of care is also positively influenced by digitalization. Digital documentation systems, in their view, allow for seamless and traceable data recording. In combination with telemedical applications, they report, care assistants could receive timely feedback in the case of irregularities, which is seen as an advantage for the safety of patients and staff, particularly in home care.

For care support professions such as the OSS (Operatore Socio-Sanitario), the interviewees also recognize individual benefits. They report that digital competencies can contribute to more efficient and safer work. Digital access to care plans and patient data is perceived by the respondents as helpful support for better orientation in everyday work. The ability to digitally document activities in a traceable way is also regarded as protection in legally unclear situations.

Especially in the area of home care, the interviewees point to new potentials. The use of smart home technologies, such as fall detection sensors, gas detectors, or automatic window controls, is considered an important support in the care of people with cognitive and physical impairments. At the same time, this can noticeably relieve relatives.

At the systemic level, the respondents emphasize that digitalization allows for more efficient use of resources and improved regional care planning. The digital networking between health services, municipalities, and other actors is described as a basis for more coordinated management of the care system, which could contribute to a healthier population in the long term. Ecological advantages are also mentioned by the interviewees in this context.

Overall, the interviews show that the targeted use of digital technologies, from the perspective of the respondents, can not only contribute to improving working conditions for nursing and care staff but also offer a societal benefit in terms of a qualitative enhancement of healthcare.



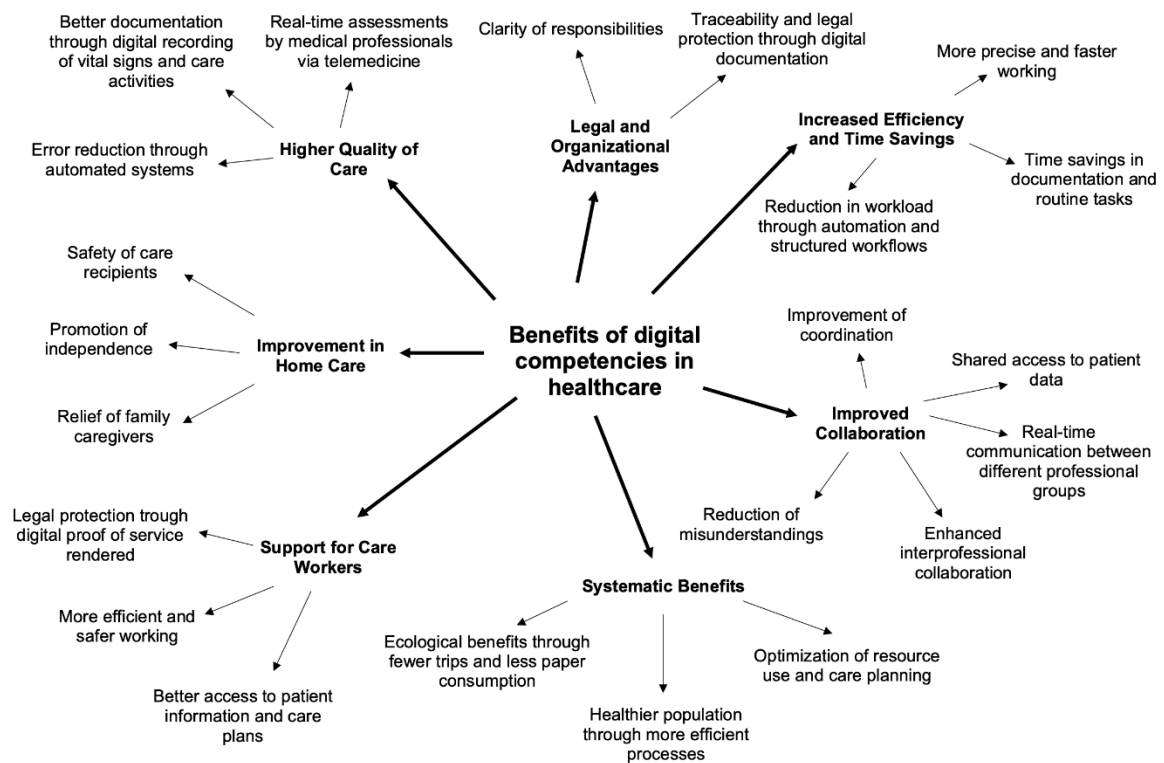


Figure 4: Benefits of digital Competencies in Healthcare – Summary of the Italian interviews

### 4.1.4 Results of the Lithuanian Interviews

From the perspective of the interviewed persons, digital technologies and competencies in the care sector offer a multitude of advantages, which, in their assessment, can significantly improve both the quality of care and working conditions. A central benefit, according to the interviewees, lies in the increase in efficiency as well as the improvement of care quality. They emphasize that digital systems can simplify work processes, reduce potential sources of error, and support caregivers in managing their daily tasks. In particular, the use of electronic documentation is assessed as beneficial by the respondents, as it enables faster and more accurate communication between professional groups. This, in turn, promotes, in their opinion, timely decision-making and better coordination of care processes. Moreover, they assume that the use of digital solutions eliminates paper-based processes, which represents a noticeable relief in everyday care.

Care safety, according to the interviewees, is also strengthened by digital technologies. They referred to the use of tele-assistance systems and digital tools for accident prevention, which could reduce the risk for patients and increase the protection of employees. Location tracking during home visits is mentioned as one example that provides additional safety, while digital early warning systems would enable timely intervention in emergency situations. Furthermore, according to the respondents' assessment, technical aids – for example, for lifting heavy patients – could reduce the physical strain on care staff.

Another advantage highlighted by the interviewees concerns communication. They assumed that digital platforms such as email, WhatsApp, or video conferences enable rapid and targeted information exchange within care teams as well as with patients and their relatives. From their point of view, this not only promotes the involvement of families in the care process but also strengthens the transparency and traceability of decision-making and care processes.

Moreover, it was emphasized in the interviews that digital competencies play an essential role in professional development. The respondents see them as a fundamental prerequisite for operating modern systems, such as the Lithuanian “esveikata.” In the view of the interviewees, these competencies increase the employability of care personnel and strengthen their adaptability to technological innovations in the healthcare sector. Also in the medical field, according to the assessment, digital technologies offer new possibilities in therapy planning, in the management of electronic prescriptions, as well as in health monitoring. Automatic reminder functions could, for example, support the timely administration of medication and thus contribute to patient safety.

Overall, the interviewees hold the view that digital competencies and technologies in care enable a more efficient, safer, and higher-quality care process and therefore better meet both the needs of patients and the requirements of a modern care practice.

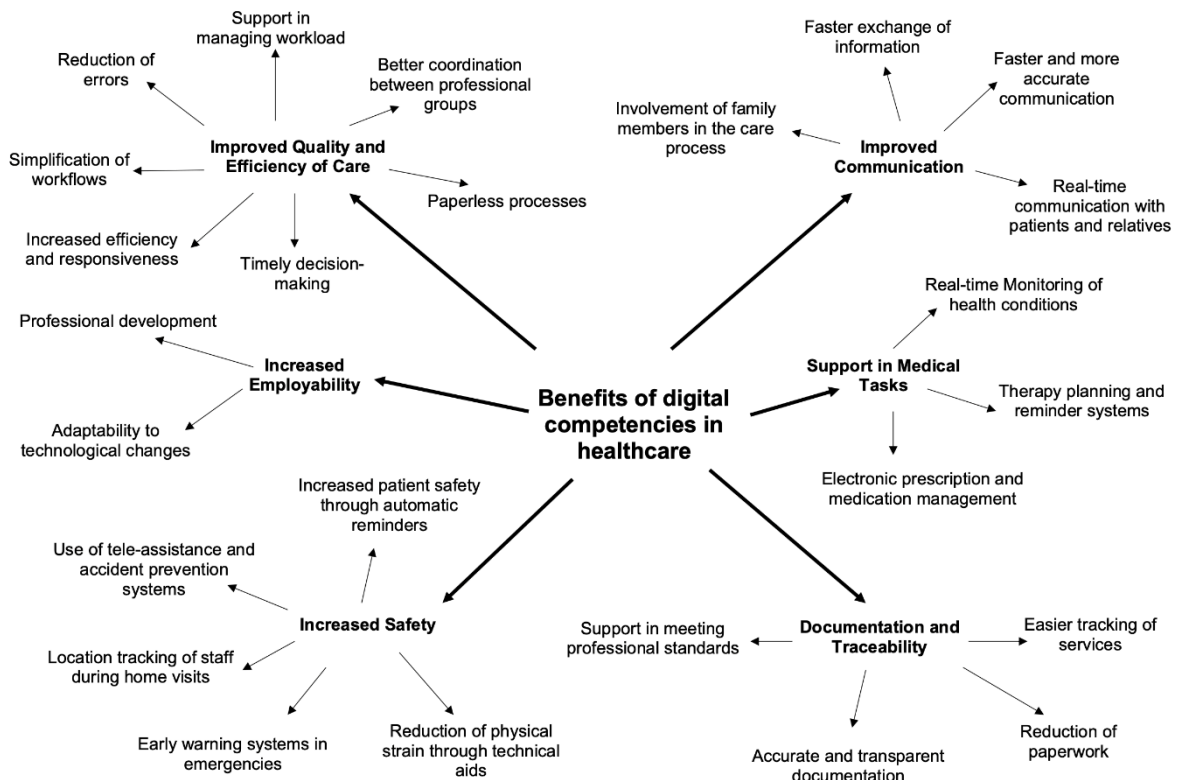


Figure 5: Benefits of digital Competencies in Healthcare – Summary of the Lithuanian interviews

### 4.1.5 Results of the Austrian Interviews

According to the respondents, the integration of digital technologies into the Austrian healthcare system brings numerous advantages, particularly with regard to increased efficiency, time savings, and quality improvements in care. The interviewees emphasize that a central goal of using digital systems lies in the optimization of documentation processes, especially in mobile care. In their view, care assistants could be relieved by digital solutions, thereby gaining more time for direct patient care. Digital documentation is perceived as more structured, legible, and less prone to error than handwritten records, which, according to the respondents, contributes to a higher quality of care.

Another significant advantage of digital systems, in the opinion of the respondents, is the standardization of procedures. This, from their perspective, enables better comparability, the identification of training needs, and more targeted resource allocation. The interviewees assume that the analysis of measurable data could

identify weaknesses in the system and specifically strengthen the competencies of care staff, which in the long term would contribute to improving the quality of care. Additionally, the respondents see the planned European Health Data Space as an important opportunity to make patient-related data securely accessible across borders. They believe this could not only simplify care but also increase efficiency and safety in the healthcare system. Decentralized data spaces, according to the participants, would offer additional protection against data misuse and strengthen patients' control over their health data.

The rapid availability of relevant data is also seen by the interviewees as beneficial. They emphasize that this enables individualized and timely decision-making and facilitates both treatment and coordination among various healthcare actors. According to the respondents, digital health applications are opening new pathways for care, especially in the field of mental health. For instance, waiting times for therapy slots could be reduced, helping to counteract the shortage of skilled professionals.

The interviews also highlight the particular potential of telemedicine and telemonitoring. The respondents see these as a means to improve access to medical care, especially for people in rural areas or with limited mobility. In their view, such solutions contribute to equality in the healthcare system by enabling location-independent care. At the same time, according to the respondents, telemonitoring allows for close post-hospital follow-up care, which could help detect relapses early and prevent readmissions. This would relieve both the healthcare system and care staff, while also strengthening patient safety.

Digital alert systems—for example, for potential drug interactions or abnormal vital signs—are also regarded by the respondents as another key advantage of digital technologies. These systems, in their opinion, can enable rapid responses to critical changes in health status, thereby contributing to prevention and the avoidance of hospital admissions.

Overall, the interviewees are convinced that digital technologies not only simplify administrative processes but also make a lasting contribution to improving quality, safety, and accessibility in care.

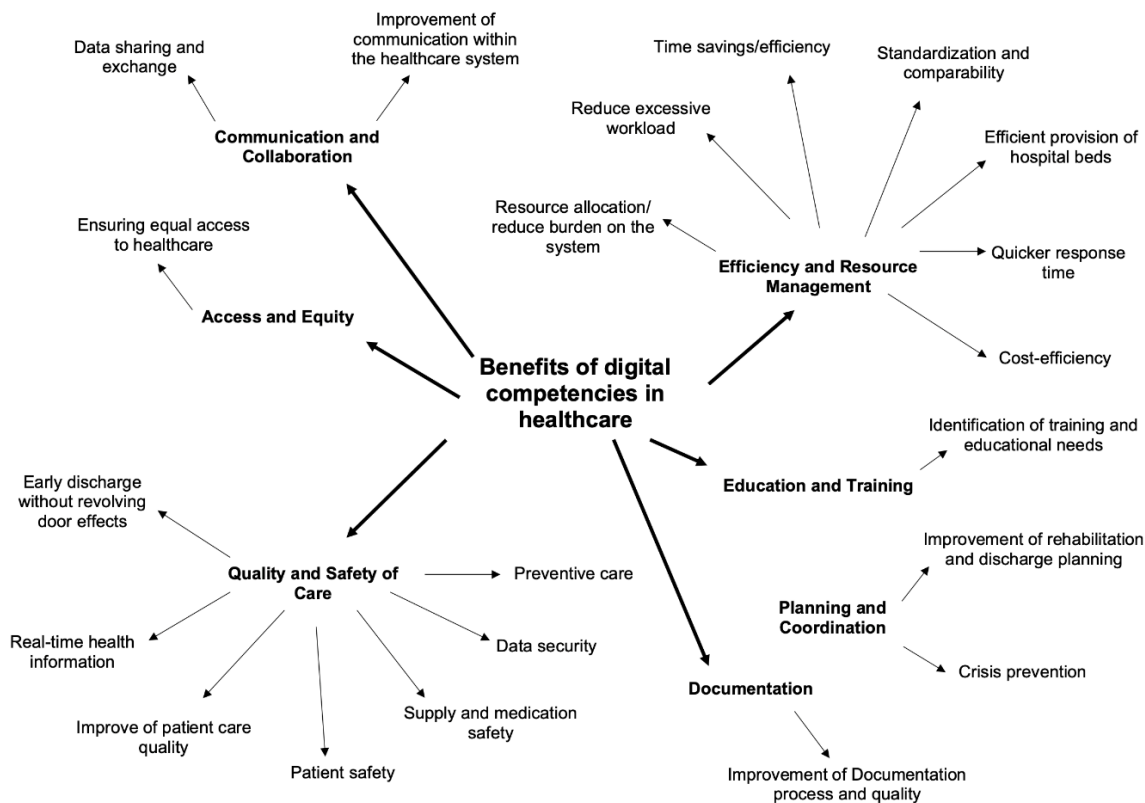


Figure 6: Benefits of digital Competencies in Healthcare – Summary of the Austrian interviews

## 4.1.6 Identified opportunities of digital competencies

### Efficiency Increase and Relief in Everyday Work

According to the interviewees, the relief of nursing staff and the optimization of work processes represent a key opportunity of digital applications in the field of care. They assume that electronic documentation systems, AI-supported speech software, and mobile devices could contribute to faster and more error-free data collection. This would particularly reduce the documentation workload for care assistants with language challenges while simultaneously improving data quality. According to the respondents, digital tools significantly simplify routine tasks such as measuring vital signs or managing medications. Especially in mobile care, they see the potential to create more time for direct patient care through structured,

digitized documentation. In their view, digital systems replace paper-based processes and offer better orientation in everyday work, for example through digital access to care plans.

### **Improvement of Care Quality**

The interviewees assume that digital patient records, telemedicine, and automated monitoring systems could support continuous and high-quality care. They emphasize that critical changes could be identified early and that faster nursing and medical feedback could be enabled. This could help prevent emergency situations and ensure seamless tracking of care processes. From the respondents' point of view, legal protection for nursing staff is also improved by digital documentation. The standardization of procedures is likewise seen as a significant advantage. It could enable targeted training and more effective resource distribution. The collection of measurable data is seen as an opportunity to further develop competencies in a targeted manner, thus increasing the quality of care in the long term.

### **Interprofessional Communication and Coordination**

Digital tools such as video conferences, email, or specialized platforms are described by the respondents as helpful means for cross-location and interdisciplinary communication. They see this as a reduction in travel efforts and an improvement in the shared level of information. Even in emergencies, faster coordination between nursing staff, doctors, and other professional groups would be possible through digital communication channels. According to the interviewees, telemedicine applications would also involve family members more closely in the care process, as they could gain insight into medical decisions. Collaboration among professionals would thus become more efficient and transparent.

### **Safety and Prevention**

The interviewees emphasize the contribution of digital technologies to patient safety. Early warning systems and radar-controlled robots could help detect

emergencies at an early stage. Location tracking during home visits and the use of automatic reminder functions are also seen as safety gains for both nursing staff and patients. Furthermore, the respondents consider technical aids such as exoskeletons or lifting assistants as important support for physically demanding tasks. They assume that these could contribute to the prevention of work-related musculoskeletal disorders and increase job satisfaction. This, in turn, could positively influence the duration of professional practice and counteract the shortage of skilled workers.

### **Personalized and Preventive Care**

From the interviewees' perspective, digitalization facilitates access to medical services, particularly for vulnerable groups and people in rural areas. Wearable devices for monitoring vital signs, mHealth apps, or telemonitoring could enable continuous care and support individualized care. This is seen as a significant contribution to strengthening preventive measures and reducing health inequalities. According to the interviewees, care assistants especially benefit from digital training offers and simulations, as these convey knowledge in a practical and low-threshold manner. In a digitally evolving care environment, it is essential that care assistants are specifically trained and supported in using new technologies. These enable practice-oriented learning formats and promote preventive action in future care situations.

### **Digital Participation of Residents and Relatives**

The interviewees also see digital technologies as a means to increase the quality of life of nursing home residents. Devices such as Amazon Alexa or social robots would provide added entertainment and access to information, especially for residents with physical limitations. They emphasize that these technologies should not replace human contact but rather create space for more intensive personal interactions. Communication between residents and relatives could also be intensified through digital portals and video calling systems, according to the respondents. Care assistants would play a central role here, as they often have the necessary time to initiate and accompany digital contact.

## **Systemic and Ecological Advantages**

The interviewees assume that digitalization on a systemic level can enable more coordinated care and better regional planning. They see the digital networking of health services, municipalities, and other actors as key to more efficient resource use. The European Health Data Space is rated by the respondents as an important future perspective to create secure, cross-border access to health data while strengthening patients' control over their data. The interviewees also point out ecological advantages. Reduced travel and lower paper consumption could thus contribute to sustainability in the healthcare system.

Overall, the respondents indicated that digital technologies offer far more than just efficiency gains. They promote safety, quality, and transparency in care practice, improve working conditions for healthcare staff, and enhance the participation of patients and their families. However, they stressed that the successful integration of these technologies into daily practice depends on the targeted development of digital competencies. Through this, digitalization can contribute to modern, patient-centered care, which the respondents see as an essential goal for the future.

It becomes apparent, however, that the interviewees often expressed a broad perspective. The identified advantages do not solely reflect the benefits of digitalization for care assistants, but often encompass the entire care process and the advantages of digitalization for it as a whole.

## **4.2 Barriers of Digital Technologies**

The findings presented in the scientific literature on digital challenges and competence deficits refer almost exclusively to qualified nursing staff. The analyzed studies and publications primarily focus on academically trained nursing personnel, who have extended responsibilities in direct patient care as well as in interprofessional collaboration. Interventions, educational offerings, and competency frameworks have thus been developed and described primarily for this

target group. (Kulju et al. 2024) Nevertheless, transferring the identified problems and recommendations for action to the occupational group of nursing assistants is possible and, in many cases, also necessary.

This chapter therefore presents the challenges identified in the existing scientific literature in connection with the acquisition of digital competencies. At the same time, an attempt is made to transfer the problems described for qualified nursing staff to the professional conditions and requirements of nursing assistants.

Digital inequality is identified in the literature as a significant problem of digitalization. Many actors in the healthcare system point to considerable deficiencies. There are mostly differences in access to and use of digital technologies. This concerns both the provision of electronic devices and the technical requirements for an adequate internet connection. Especially for people with low digital competence, these factors have an additional significantly inhibiting effect on interprofessional collaboration. Some institutions have devices and services of low quality, which has negative effects on collaboration in the telemedical context. (Poitras et al. 2024)

Nursing assistants and qualified nurses operate within the same care system and are often dependent on the use of identical digital technologies in their professional everyday life. However, it should be noted that nursing assistants, due to their different qualifications, have different responsibilities in nursing care compared to qualified nurses. The individual digital applications and thus the required competencies must take these different responsibilities into account. In addition, structural barriers such as insufficient technical equipment, unstable internet connections, or lack of training opportunities, as described in the literature, also affect nursing assistants.

It could also be shown that students and trainees often do not have sufficient access to digital technologies. This leads to a limited ability to acquire these competencies. (Mannevaara et al. 2024; Raghunathan et al. 2023) These factors increase the likelihood of digital exclusion, which may manifest as uncertainty in dealing with technology, feeling overwhelmed, or fear of making mistakes.

Health policy and respective vocational school and institutional managements are identified as key actors in combating these barriers. (Poitras et al. 2024; Jose et al. 2022) Further insights are needed into educational interventions for the acquisition of digital competencies by nursing assistants. What is particularly necessary are programs that are not only aimed at academic nursing staff, but explicitly tailored to nursing assistants and that take into account their specific requirements and conditions.

Raghunathan et al. point out that despite the growing recognition of the importance of digital competencies, deficits in basic knowledge in this area continue to be identified. They argue that students and trainees are inadequately prepared for the care context and the use of digital technologies in patient care. They define the rapid progress of technological development, which curriculum adjustments in nursing education cannot keep up with, as the cause of the problem. (Raghunathan et al. 2023) Even though nursing assistants do not have an academic qualification level, they are increasingly taking on responsible tasks in direct care and nursing documentation. The ability to operate basic IT applications and to comply with data protection regulations is therefore also essential in this occupational group.

The lack of appropriate human resources in terms of teaching staff is also named as a possible cause. (Raghunathan et al. 2023) The curriculum design of health professions in response to emerging competency requirements due to digitalization is often also insufficient to keep up with the rapidly advancing change processes. (Kaihlanen et al. 2024) Missing national strategies and educational programs, insufficient investment in training and continuing education, as well as uncertainties about alternative training approaches, often hinder the integration of informatics competencies into curricula. This gap does not only affect trainees and students in nursing professions, but also nursing educators. They themselves often do not have sufficient competencies in the field of health technologies. (Mannevaara et al. 2024) Tischendorf et al. note that targeted and effective development of digital competencies in nursing education can only be ensured if the teaching staff also possesses comprehensive digital competencies. (Tischendorf et al. 2024)

It could be shown that the organization of education and continuing vocational training is highly fragmented within and between countries. This entails the risk of unequal quality of healthcare across different countries. (Kaihlainen et al. 2024; Isidori et al. 2022) The literature refers to a digital divide in the skills of healthcare professionals that needs to be bridged; however, no specific information is usually given about the existing gap in digital competencies. (Shiferaw et al. 2020) Consequently, there is a lack of consensus regarding informatics nursing competencies that can guide the use of digital technologies in the professional context. (Mather and Cummings 2019) The central challenge in teaching digital health competencies thus lies in the lack of consensus about what these competencies actually comprise and how they should be taught. Frequently, only general recommendations are made on areas of competence such as patient safety or medical knowledge, without naming specific competencies. Overall, there is a lack of systematized approaches for defining, implementing, and evaluating curricula for digital health—both in the education of students and trainees and in the continuing education of teachers and practitioners. (Lawrence and Levine 2024)

Frequently discussed were deficits in communication (verbal interaction, written documentation and reporting), ethics, education, information and knowledge management, change management, basic IT, data protection, data security, documentation, digital competencies, as well as process management. (Mannevaara et al. 2024) Among healthcare professionals, there are particularly deficits in the areas of problem-solving, safety, and communication when dealing with digital technologies. This suggests that training should explicitly focus on routine problem-solving, digital communication skills, and security awareness. (Shiferaw et al. 2020) It can be seen that there are significant gaps in knowledge regarding data protection, ethical principles, and the concrete application of digital tools in everyday care. (Hariyati et al. 2024) Nursing assistants often have a shorter or less specialized education, which suggests that existing competency gaps in the digital field among nursing assistants are at least equally pronounced, if not even more severe.

Kulju et al. point out that changes in work processes and patient interaction as well as new competency requirements brought about by the implementation of digital

technologies are perceived as threatening and hinder the integration of these technologies. (Kulju et al. 2024) The use of digital technologies can affect work processes and workload and contribute to the development or reduction of burnout. (Groeneveld et al. 2023)

Trust in digital technologies among nursing staff actively using them is also found to be low. (Raghunathan et al. 2023) A common concern is that the balance between human contact and the use of technology may not be maintained, leading to a depersonalization of care. (Groeneveld et al. 2023) Healthcare personnel worry that operating the technologies could take up valuable time needed for direct patient care and that system malfunctions could lead to additional stress. (Jarva et al. 2022) The acceptance of technical systems, according to Barisch-Fritz et al., depends on various factors, such as age, cognitive abilities, level of education, previous experience with technology, and aspects like design, trustworthiness, or security of the system. (Barisch-Fritz et al. 2023) Nurses consider it important that technology contributes to the quality of care. Technologies should improve individualized and personalized care. The goal stated by nursing staff of achieving better individual care represents a qualitative rather than a productivity-related improvement. From a management perspective, technology might be introduced to increase efficiency; however, if this does not lead to improved personalized care, it may lead to rejection by nursing staff. (Groeneveld et al. 2023) Nursing assistants do not have formal training in nursing care and generally have a lower level of education. They often have less digital experience, which can further influence their acceptance of technology. The barriers mentioned above therefore directly affect nursing assistants as well.

A major obstacle to the introduction of new technologies is the lack of specific knowledge and competency profiles among healthcare personnel for dealing with these technologies. (Kaihlainen et al. 2024) The actual use and acceptance of technical solutions in elderly care are often restricted by access barriers or lack of knowledge. (Barisch-Fritz et al. 2023) Barriers to the use of digital technologies include contextual conditions and resources, attitudes and perspectives of decision-makers, care staff, and care recipients. (Barisch-Fritz et al. 2023)

The use of digital technologies in healthcare also has implications at the management, clinical, and political levels, which are shaped by the implementation of new products and processes. (Mannevaara et al. 2024) The introduction of digital technologies in healthcare also affects traditional financial flows, organizational structures, and the political system. (Groeneveld et al. 2023) It is well known that the implementation of information and communication technologies in healthcare generally takes longer than in other sectors due to security concerns. (Barisch-Fritz et al. 2023)

Similar to our qualitative survey, the data from Jarva et al. (2022) also show that barriers such as poor design of systems and applications, careless implementation processes, and lack of access to devices are obstacles to the use of digital technologies. (Jarva et al. 2022) The willingness to adopt digital technologies depends on the respective country, healthcare system, disease burden, infrastructure, and political conditions. (Jose et al. 2022) The implementation of technologies is in many aspects influenced by the initiative of nursing management. The leadership level is therefore crucial for planning and implementing digital transformation. It must possess digital competencies to steer, monitor, and further develop services. (Hariyati et al. 2024)

Barisch-Fritz et al. show that perceptions of different digital technologies vary between employees in operational roles and those in management positions. Furthermore, the tasks that are to be carried out using digital solutions differ significantly within these areas. This suggests that nursing management must be addressed differently than other employees when it comes to the implementation of technologies. (Barisch-Fritz et al. 2023)

Navarro-Martínez et al. show that the motivation to learn digital skills is not solely dependent on the education received, but is also influenced by factors such as the work environment and institutional support. (Navarro-Martínez et al. 2023)

Mather and Cummings speak of a digital technology paradox, in which healthcare professionals are not enabled to use digital technologies in the workplace, while at the same time the potential of these technologies to improve patient outcomes is increasingly acknowledged. They note that successful digital transformation can

only take place if governance structures at the system and organizational levels enable access to digital technologies. The lack of corresponding guidelines means that digital professionalism cannot be exemplified. This also continues across professional generations, as they are socialized through the social and cultural norms of their profession and work environment. Thus, both organizations and individuals are needed to support the integration of elements of informatics competencies into workflows. (Mather and Cummings 2019; Tischendorf et al. 2024) It also requires the development of models that support and evaluate organizational readiness and the development of competencies in digital professionalism. (Mather and Cummings 2019)

Kaihlainen et al. examine the implementation of continuing education in digital competencies for healthcare professionals in various EU countries. Three main themes regarding implementation were defined: political/strategic incentives and initiatives, organization of training, and funding. At the political/strategic level, two perspectives can be identified among EU countries: on the one hand, the governance of continuing education through national strategy and authorities, and on the other hand, a lack of national coordination and systematic approach. About half of the EU countries lack comprehensive national regulation for coordinating digital training. While there are national strategies in some cases to promote digital competencies among the general population and the public sector, these do not specifically address the needs of healthcare professionals. (Kaihlainen et al. 2024) These framework conditions can also be applied to nursing assistants in order to efficiently convey digital competencies to them.

Significant predictors for the digital competence of healthcare professionals were identified as gender, level of education, occupation, monthly income, and professional experience. Surprisingly, higher income and longer professional experience were associated with lower digital competence. This is explained by the assumption that younger professionals are better able to adapt to digital changes. (Shiferaw et al. 2020; Hariyati et al. 2024; Barisch-Fritz et al. 2023) Hariyati et al. explain this with less exposure to outdated, analog working methods. (Hariyati et al. 2024; Barisch-Fritz et al. 2023) Barisch-Fritz et al. also demonstrate a negative correlation between age and computer self-efficacy, as well as age and computer

use. (Barisch-Fritz et al. 2023) It is evident that the availability of a private computer facilitates familiarity with digital applications in the professional context. (Hariyati et al. 2024) Male healthcare professionals were more likely to have better digital competencies than women. This trend may be culturally driven or related to the distribution of technology-related roles within organizations. (Shiferaw et al. 2020; Hariyati et al. 2024; Barisch-Fritz et al. 2023) Barisch-Fritz et al. also show that the affinity and interaction with technology as well as the associated self-assessed competence are higher in men than in women. (Barisch-Fritz et al. 2023) A higher level of education is associated with better digital skills. (Shiferaw et al. 2020; Hariyati et al. 2024) Positive experiences in the use of digital technologies were linked to the digital competencies of the healthcare professional and the belief in the added value of digital technologies for the quality of care. (Jarva et al. 2022) It can be assumed that these factors are also applicable to nursing assistants and should therefore be taken into account when developing possible training programs. The factors mentioned here are often not specific to a particular profession. Therefore, it can be assumed that they should also be considered in the education of nursing assistants.

**Table 2:** Challenges for Nursing Professionals and Derived Challenges for Care Assistants



## 5 Importance of Digital Competencies in Healthcare

Source	Challenges for Registered Nurses	Derived Benefits for Care Assistants
Poitras et al. (2024)	Digital Inequality: Unequal access to devices, internet, and technical resources hinders collaboration and usage.	Nursing assistants also experience poor equipment, weak connections, and limited access to digital tools.
Mannevaara et al. (2024), Raghunathan et al. (2023)	Lack of access to digital technologies during training	Low availability of technology in nursing assistant schools hinders early competence development.
Raghunathan et al. (2023)	Fear of technology, insecurity, feeling overwhelmed	Potentially more pronounced with low education and technical experience.
Poitras et al. (2024), Jose et al. (2022)	Insufficient digital education offerings	Educational measures are mostly aimed at academic nursing; nursing assistants are systematically neglected.
Raghunathan et al. (2023)	Deficits in basic IT knowledge	Lower formal education increases the risk of serious IT competency deficits.
Raghunathan et al. (2023), Tischendorf et al. (2024)	Lack of qualified teaching staff for digital content	
Kaihlani et al. (2024), Lawrence & Levine (2024)	Lack of national education strategies & curricula for digital nursing	Nursing assistants are completely missing in national digital strategies; curricula are often outdated.
Kaihlani et al. (2024), Isidori et al. (2022)	Fragmentation of education and training across countries	Nursing assistants are particularly affected due to lower training standards and lack of harmonization.
Mather & Cummings (2019)	Unclear definition of digital nursing competence	Missing standards hinder the development of nursing-specific competencies for assistant professions.

Hariyati et al. (2024)	Competency gaps in data protection, ethics, documentation	Especially relevant as nursing assistants increasingly take on documentation tasks.
Mannevaara et al. (2024), Shiferaw et al. (2020)	Deficits in communication, basic IT knowledge, process management	Nursing assistants need simple, practice-oriented training on these topics.
Raghunathan et al. (2023), Groeneveld et al. (2023)	Lack of trust in technology, fear of depersonalization	Low technology acceptance can reinforce rejection, as human closeness is a central guiding principle.
Jarva et al. (2022)	Additional stress, time loss due to technology	The burden on nursing assistants is especially high with inadequate training and support.
Barisch-Fritz et al. (2023)	Influencing factors on technology acceptance: age, experience, education	Nursing assistants often have lower levels of education, less experience, and greater skepticism.
Kulju et al. (2024)	Unclear roles and competency requirements	Changing tasks also affect nursing assistants – without appropriate qualifications, uncertainty arises.
Jarva et al. (2022), Barisch-Fritz et al. (2023)	Systemic barriers: lack of resources, poor system design	Nursing assistants experience barriers directly in everyday work, e.g., no devices or login access.
Jose et al. (2022), Groeneveld et al. (2023)	Influence of management and political governance	Management decides on training, equipment, and use. Nursing assistants have hardly any opportunities for participation.

In summary, key challenges can be identified that are also relevant for nursing assistants, including a lack of digital competencies, inadequate technical equipment, lack of training opportunities, and limited strategic anchoring of digital competency development in initial, continuing, and further education. In addition, institutional and structural barriers exist, such as hierarchical access to digital applications, lack of interoperability, and uncertainties in dealing with data protection

and documentation requirements. These problems affect not only qualified nursing staff but also, and especially, assistant staff, as they are often excluded from digital training offers or lack sufficient technical and personnel support. Based on these findings, it appears scientifically plausible and professionally necessary to systematically transfer the existing literature-based findings on the promotion of digital competencies to nursing assistants. However, it must be taken into account that this occupational group has specific needs and framework conditions that must be adequately addressed in the development and implementation of appropriate educational measures. Nursing assistants generally bear less responsibility for the care of patients and are dependent on delegation from qualified nurses. It remains questionable which digital competencies they must possess within the scope of their reduced responsibilities.

The qualitative interviews conducted as part of the project support the aspects identified in the literature. The following section presents the interviews of the individual project members by country in alphabetical order and concludes with a summary.

#### **4.2.1 Results of the German Interviews**

In the German healthcare system, digitization brings numerous personal challenges from the perspective of the interviewed participants. The age-related access to digital technologies was mentioned particularly frequently. Many respondents reported that especially members of older generations have difficulties transferring existing analog work processes into digital structures. This was attributed, among other things, to different digital socializations. While younger employees have grown up with digital media and intuitively find their way around smartphones and digital research, older employees, according to the interviewees, often require intensive guidance and support.

According to the interview statements, significant differences are also evident within teams. Younger employees often perceive the digital transformation as a relief, whereas older colleagues tend to be more skeptical of innovations. This skepticism

is often associated with fears, such as the fear of losing data through operating errors or crashing systems. Several respondents expressed a fundamental uncertainty about the reliability of digital systems. Some reported that paper-based documentation is still preferred due to concerns that digital information could be lost in the event of technical failures.

Furthermore, many interviewees described widespread insecurity in dealing with digital applications. The fear of being perceived as incompetent or of embarrassing oneself due to ignorance often leads to rejecting attitudes towards new technologies. This is particularly evident in everyday nursing work, according to the respondents, in the reluctance to use social robotics, which is often associated with a potential loss of humanity. Such technological developments are frequently viewed with concern, as they deeply interfere with existing routines and the self-image of nursing work.

Another frequently mentioned obstacle is the educational background of many nursing assistants. Especially among people with a migration background, several respondents described language barriers as well as difficulties in understanding and writing digital content as problematic. This complicates the implementation of digital systems. The digital competencies of this target group are generally perceived as limited, which is attributed, among other things, to inadequate schooling or lack of prior experience. Practitioners reported that many trainees must first acquire basic social and cognitive skills during their training before they can engage with digital topics. Some interviewees even stated that certain nursing assistants are excluded from using digital technologies because they lack the necessary cognitive prerequisites. Even among qualified nursing staff, digital competencies are often considered basic. Many expressed the desire for targeted training to expand their digital skills beyond private use.

In addition to personal factors, process-related challenges were also mentioned. The respondents reported that digitization is accompanied by a densification of work structures. Digital processes are perceived as faster but also as more information-intensive and potentially overwhelming. Constant notifications and digital documentation obligations, according to the interviewees, generate additional

stress. Some saw digitization as a driving force behind a general acceleration of the working world, which could lead to a high additional burden.

Several interviewees pointed out that digitization not only requires new technology but also necessitates a restructuring of work organization. It is not enough to merely provide digital devices—rather, responsibilities, role distributions, and processes must be rethought. According to several voices, the introduction of digital systems must take place in close dialogue with employees to avoid overload and promote acceptance.

Many interviewees saw a central structural obstacle in the inadequate and short-term-oriented financing. Although there are funding programs, they usually only cover the purchase costs of hardware and software, but not ongoing expenses such as maintenance, training, or the necessary support for the transformation process. However, from the perspective of the respondents, these ongoing costs are central to sustainable digitization success.

The fragmented financing landscape was also critically assessed. Responsibilities vary depending on the provider, federal state, or care sector, leading to a lack of coherence in financial resources. According to several interviewees, this uncertainty negatively affects the willingness to invest in digital infrastructure. Particularly in the area of inpatient elderly care, it was lamented that investments are often not refinanced. At the same time, there is a risk that the costs will be passed on to care recipients or relatives. Due to the high prices of external training providers, institutions are sometimes forced to entrust inadequately trained internal staff with implementation—leading to corresponding inefficiencies. Without long-term financial planning, many interviewees saw no realistic prospect of introducing or maintaining digital systems sustainably. In addition, there is a lack of political and regulatory frameworks to ensure such sustainable financing. So far, digitization has rather been promoted as a technological innovation—less as a permanent structural change that must be continuously financed and supported.

Another frequently mentioned obstacle was bureaucracy and data protection. The interviewees described compliance with data protection regulations as extremely

time-consuming. They perceived the bureaucratic structures as overwhelming and called for a simplification of regulations. In everyday care, the comprehensive documentation obligation leads to a loss of care time.

The interviewees also described the training structures as problematic. The training for nursing assistants and auxiliary professions is regulated at the federal state level and is highly heterogeneous. Curricula are often outdated, and digital topics are rarely taught systematically. The teaching of digital competencies depends heavily on the commitment of individual teachers. Additionally, several respondents reported that trainees often have only limited access to digital documentation systems, which limits their practical experience. The aspect of lifelong learning is also hardly promoted in this form of training. Additional hurdles arise from bureaucratic difficulties in integrating external subject lecturers.

Another topic repeatedly mentioned by the respondents was the hierarchical divide in the German healthcare system. Nursing assistants often see themselves as the lowest level in the system—little respected and socially devalued. This impairs professional self-esteem and hinders collaboration. Tasks in the area of documentation or communication are often not trusted to nursing assistants.

Lastly, the inadequate digital infrastructure was also frequently addressed. According to the interviewees, many institutions lack stable Wi-Fi or sufficient digital devices. Paper-based documentation still predominates, particularly in nursing homes, while hospitals are already more digitally equipped. Outdated computers and incompatible software further complicate everyday operations. The lack of interoperability of new systems with existing applications was also described as a central obstacle.

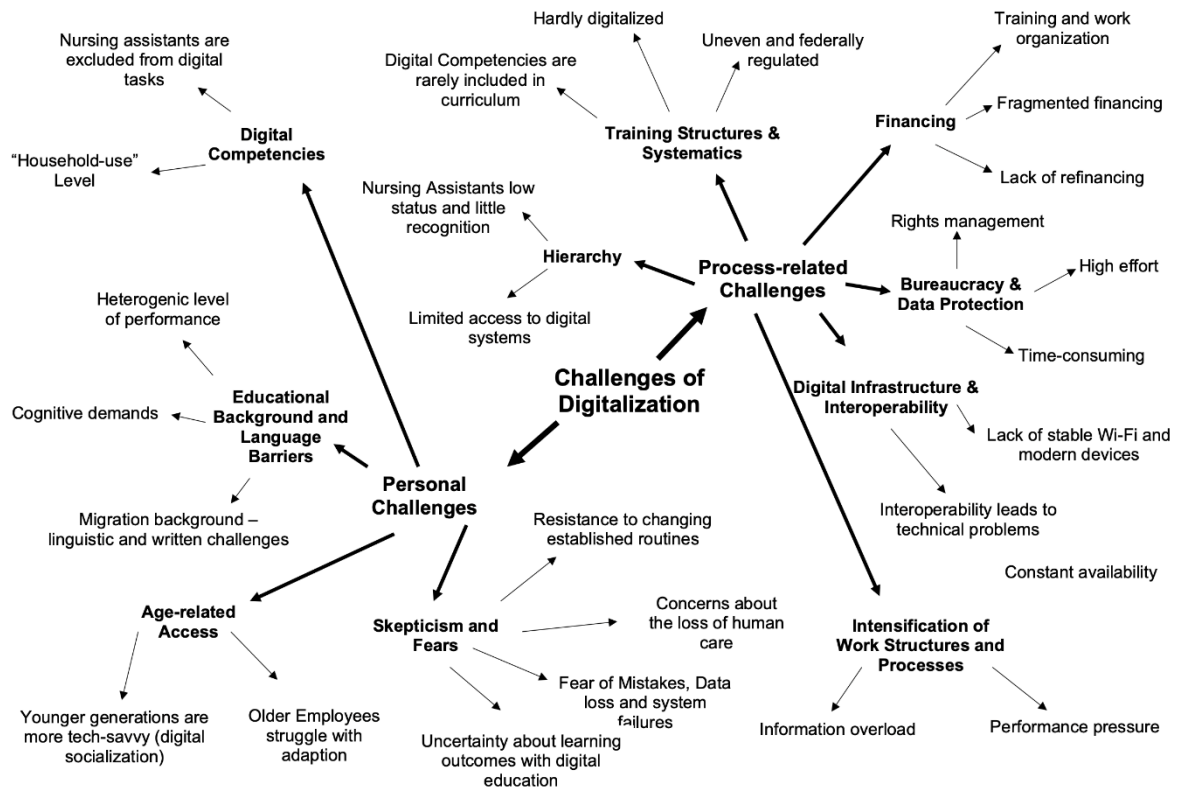


Figure 7: Challenge of Digitalization – Summary of the German Interviews

### 4.2.2 Results of the Greek Interviews

A central obstacle to the digital transformation in nursing in Greece, according to several interview participants, is the lack of access to modern technical equipment. In many facilities and households, computers, tablets, or stable internet connections are either completely absent or outdated and functionally limited. According to some respondents, the purchase of new devices often fails due to high costs, which neither families nor organizations can afford.

Several interviewees also reported insufficient training. Many employees had never learned how to use digital technologies, and there were hardly any regular, practical training opportunities. Even after completing their formal education, there was often a lack of continuing education in the use of digital applications, according to the respondents, which led to insecurities and hesitation in dealing with technology.

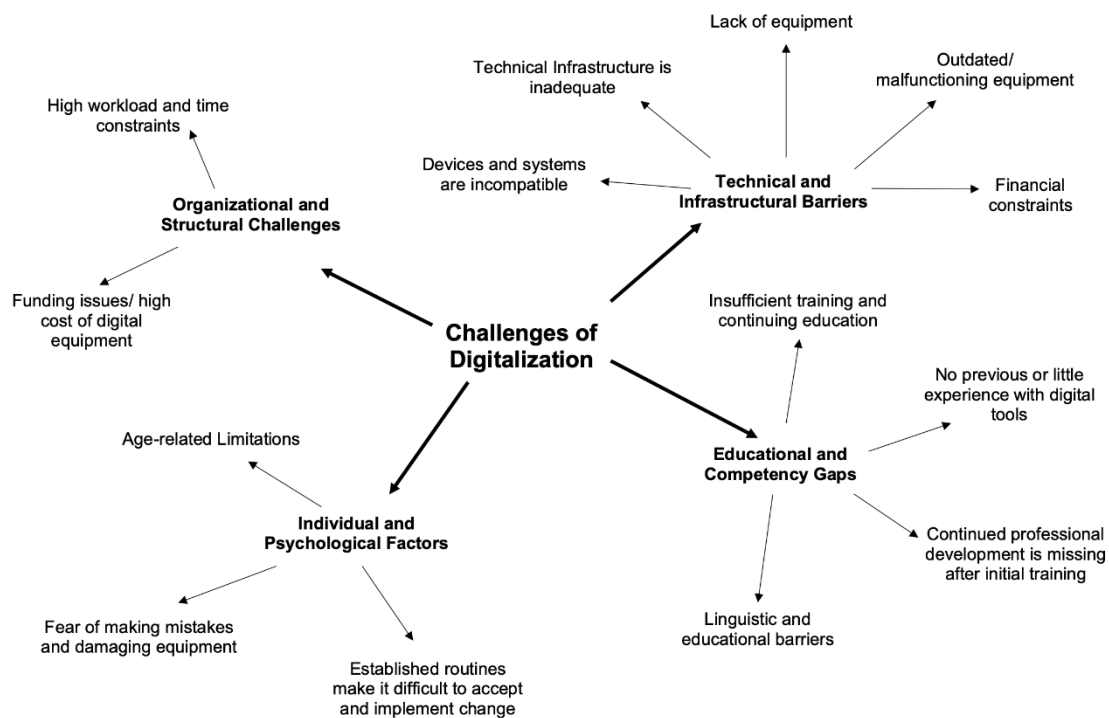
The technical complexity and low user-friendliness of the systems used were also described as additional challenges in the interviews. Devices and programs were not always intuitively operable, which was particularly problematic for individuals without prior IT knowledge. Furthermore, the interviewees reported issues with the technical infrastructure and interoperability. In many care contexts, a reliable WLAN was missing, and the technologies used were not always compatible with existing workflows.

According to the respondents, these difficulties led to skepticism and fears regarding digital solutions. Care staff often worried about doing something wrong or damaging devices. Older employees in particular felt overwhelmed or had the feeling of being “too old to learn.” In several interviews, it was emphasized that routines practiced over many years were being questioned by digital innovations, which could trigger rejection. Doubts about the reliability and trustworthiness of digital tools were also expressed multiple times.

In addition, some interview participants reported linguistic and educational barriers. Employees with low levels of education or insufficient language skills, in their opinion, required special, simplified access to learning content. Even simple user interfaces could be confusing, according to the statements, if basic language or reading skills were lacking.

Age-related limitations such as vision or hearing problems also made the use of digital devices more difficult, according to the respondents. Many older care recipients or their relatives were not familiar with digital technologies and showed little willingness to engage with new systems.

Finally, the interviews frequently pointed to the high workload and the associated lack of time. Nursing assistants were under significant time pressure and had hardly any opportunity to deal with new technologies during or after work. According to many respondents, the attempt to integrate digital tools into a tightly scheduled daily routine often failed due to a lack of time and energy.



**Figure 8:** Challenge of Digitalization – Summary of the Greek Interviews

### 4.2.3 Results of the Italian Interviews

In Italy, especially in rural and structurally weak regions, many of the interviewed participants see significant challenges in the area of digitization of the health and social care sectors. A frequently mentioned problem is the lack of digital resources and technical devices. According to their statements, nursing assistants are often forced to use their own computers or private devices, since the facilities themselves lack both appropriate infrastructure and digital tools.

Moreover, several interviews described a clear deficit in the training and qualification of staff. Many employees had neither basic knowledge in the use of digital applications nor access to targeted continuing education in this field. The interviewed persons criticized that training was often too theoretical and missed practical relevance, which meant that digital competencies were hardly conveyed. According to several statements, the people being cared for, especially elderly

patients, also lacked basic technical education, which further complicated the use of digital health solutions. The introduction of staff to technical aids usually took place only once and superficially, which subsequently led to application problems.

Furthermore, the respondents described problems with the technical infrastructure, particularly unstable or absent internet connections in remote villages, which significantly hampered the implementation of telemedicine and digital care services. Bureaucratic obstacles and data protection regulations were also experienced as hindering factors. While the private sector, according to some interviewees, could react more flexibly, public institutions were bound by lengthy tendering and procurement processes.

Another frequently mentioned obstacle was the lack of interoperability between the various actors in the healthcare system. According to the statements of the interviewees, hospitals, municipalities, and outpatient services often worked with incompatible IT systems, which made the exchange and joint use of data difficult. Additionally, many expressed a general skepticism towards digital innovations, both among staff and older users, who often felt overwhelmed when dealing with digital technology.

Demographic developments were also addressed several times. The shrinking working-age population alongside a rising demand for health and care services due to an aging society was seen by the respondents as a significant challenge. Added to this was the lack of sufficient funding. Especially in regions subject to austerity measures, such as within the framework of the re-entry plan, only the basic services of healthcare could often be covered, according to the interviewees. As a result, investments in digitization remained limited, which significantly hampered the implementation of sustainable digital care structures.

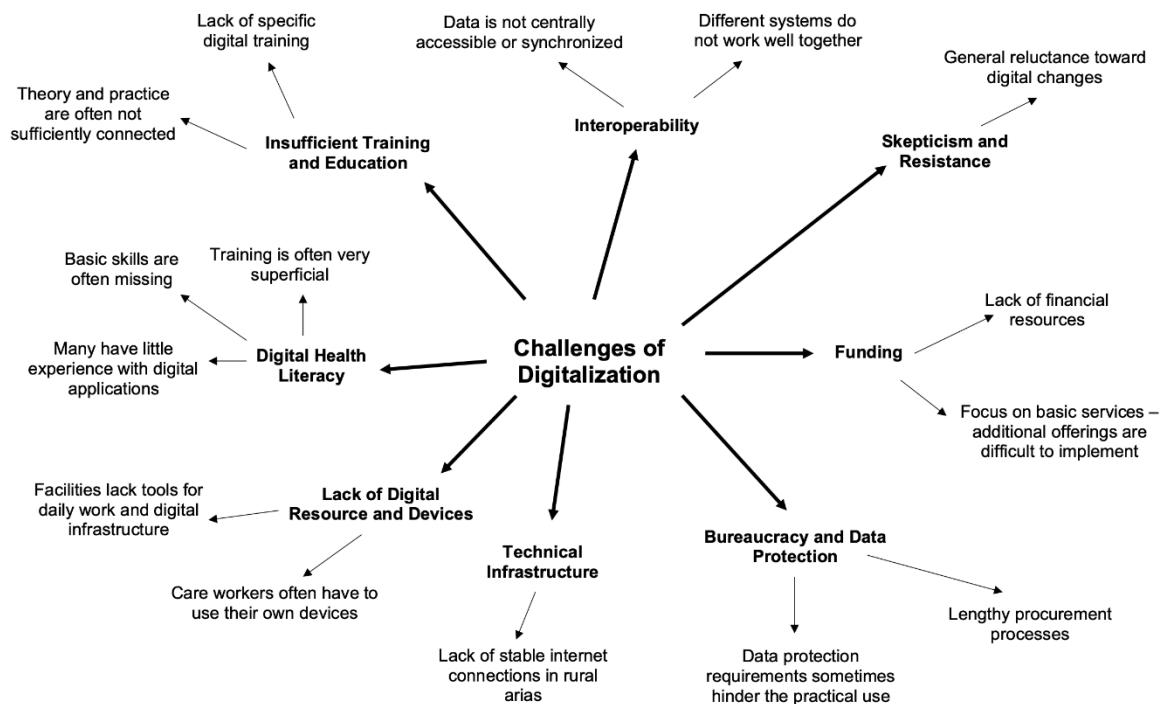


Figure 9: Challenge of Digitalization – Summary of the Italian Interviews

#### 4.2.4 Results of the Lithuanian Interviews

A central obstacle to the digital transformation of care in Lithuania, according to many of the interviewed participants, is the inadequate technical equipment. It was repeatedly reported that many facilities do not have a comprehensive digital infrastructure and that there is often a lack of suitable devices. The use of mobile devices, especially smartphones with small keyboards, was described by many as cumbersome and inefficient. Several nursing assistants stated that they had to resort to private devices that were not optimized for professional requirements, which in their opinion made the security of data entry more difficult.

Another key aspect highlighted by the respondents is the pronounced lack of time in everyday care work. Many described working under significant time pressure, which made the use of digital systems additionally difficult. Data entry was experienced as time-consuming, especially when devices worked slowly or were difficult to operate.

Many facilities also lacked clear organizational structures, such as the availability and return of devices or a clear distribution of tasks for documentation.

A frequently mentioned problem was also the insufficient training in the use of digital applications. Numerous interviewees reported that they had received no or only very limited further training. Often, the learning of new systems occurred on their own initiative. Although new programs were partially introduced, their application was not consistently supported or accompanied in the long term, so that they hardly made it into everyday work.

Closely connected to this was the low level of digital health literacy among many employees. According to the interviewees, older employees and assistants with lower qualifications in particular often had difficulties dealing with digital technologies. The existing systems were perceived by many as unintuitive, complex, and overwhelming. In addition to lacking IT knowledge, low motivation also contributed to the reluctance to use digital applications.

Some interviewees also pointed to the pronounced hierarchy in care practice. In cases of uncertainty in dealing with digital applications, care assistants would usually consult the registered nurse, who might then confer with physicians. While this structured approach could facilitate communication, it sometimes led to a slowing down of decision-making processes.

Technical aspects of the systems in use were also repeatedly described as problematic. Mentioned were, among other things, a lack of interoperability, system crashes, long loading times, and the complexity of the applications. In addition, some respondents reported difficulties when switching between different working environments, such as between working from home and clinical settings, which led to inconsistent user experiences.

Data protection and bureaucratic requirements were also mentioned by several interviewees as obstacles. Although there were standardized procedures such as password allocation, electronic signatures, and data anonymization, there were still uncertainties regarding the complete security of digital systems. In their opinion, the protection of sensitive data caused additional organizational effort.

In several interviews, a certain skepticism towards digital applications also became apparent. Many employees expressed fears about handling personal data and concerns about making mistakes or causing data protection violations. The additional responsibility associated with the use of digital systems was perceived by many as burdensome. Especially the detailed data entry was experienced as overwhelming, particularly by older or less digitally proficient employees.

Finally, some respondents made it clear that factors such as educational background, language barriers, and the age of employees also influenced access to digitization. In their assessment, younger and more tech-savvy employees could adapt more quickly, while older or less qualified individuals found digital systems difficult to access.

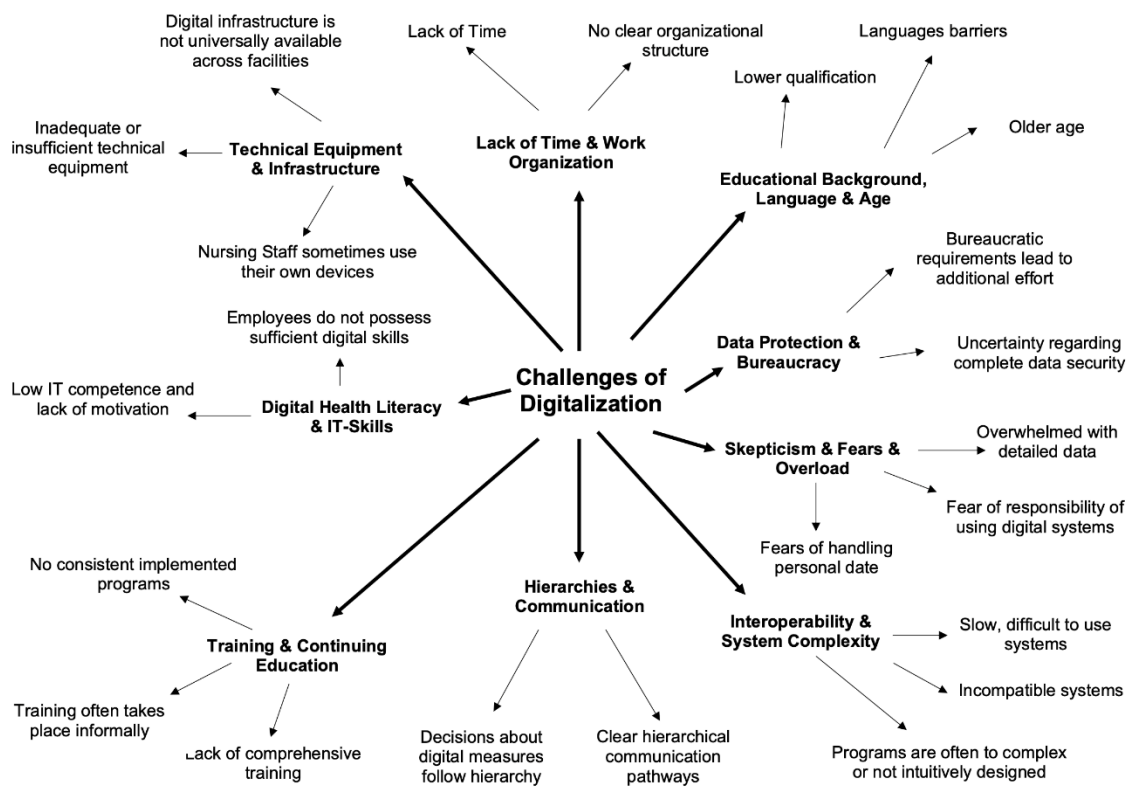


Figure 10: Challenge of Digitalization – Summary of the Lithuanian Interviews

### 4.2.5 Results of the Austrian Interviews

According to the interviewees, the digital transformation of the Austrian healthcare system is hindered by a variety of structural, technical, and cultural challenges. A central barrier is the low level of digital health literacy among many employees. In particular, nursing assistants often do not possess basic computer skills, which makes the use of new technologies more difficult. According to some respondents, this is not merely a question of age— younger employees do not necessarily have sufficient basic digital skills either. The use of programs like Microsoft Word or navigating operating systems such as Windows is widely assumed to be a given, but this is by no means consistently the case.

Another frequently mentioned problem area concerns the hierarchical structures in the Austrian healthcare system. Several interviewees reported that access to digital tools strongly depends on the respective professional role. For instance, doctors may have access to different applications than nursing staff. The use of certain technologies is also tied to the proof of specific training. According to the respondents, these access restrictions slow down the introduction of new systems and make broad usage more difficult. The unequal distribution of technical resources also contributes to fragmentation and reinforces existing hierarchies.

The technical challenges in the area of interoperability were also clearly criticized. It was reported that different hospital operators or federal states used incompatible systems that could not communicate with each other. This leads to media discontinuities, duplicate documentation, and a significantly increased time expenditure in everyday nursing work. Some interviewees pointed out that this fragmentation applies not only to software but also to the data formats used. Document types often have to be converted manually to be usable across systems, an effort that ties up resources and impairs the acceptance of digital processes.

Regulatory framework conditions were also perceived by the respondents as obstructive. The requirements for documentation, data transmission, and legally compliant archiving are high. Especially new technologies, such as applications with artificial intelligence, are subject to elaborate testing procedures like Health

Technology Assessment or CE certification. The European AI Act was repeatedly mentioned in this context: Since many systems in the healthcare sector are classified as high-risk technologies, additional testing and certification processes are required. According to several voices from the field, this is seen as inhibiting innovation, as potential users are discouraged by the associated effort.

Several interviewees also expressed criticism of the high bureaucratic burden associated with documentation obligations, regardless of whether in analog or digital form. Documentation is often perceived as time-consuming and impractical. In addition, there is widespread uncertainty in handling data protection and data security. Although legal regulations such as the GDPR are known, there is often a lack of knowledge about their concrete implementation in everyday professional life. Data protection is perceived by many not as protection but as an additional burden.

The lack of training and support in the introduction of digital applications was also repeatedly mentioned as a problem. According to the interviewees, new tools are often introduced without sufficient explanation or training. The existing offers are often not tailored to the respective target group. This leads to uncertainty and misunderstandings. At the same time, there is a lack of low-threshold information formats that could clearly convey the benefits of digital solutions.

This lack of inclusion and insufficient communication leads to a pronounced skepticism towards digital innovations. In many cases, digital tools are not perceived as a relief but as an additional burden. According to several respondents, the negative attitude towards digital applications is not only due to a lack of knowledge but also to the feeling of not being sufficiently involved in the development and introduction of new systems. Digital transformation is often imposed “from above,” without adequately considering the perspective of actual users.

Overall, the statements of the interviewees paint a multifaceted picture of the challenges in the course of the digitalization of the Austrian healthcare system. It becomes clear that the difficulties range from a lack of basic competencies to technical incompatibilities and cultural and structural resistance. Therefore, a

successful digital transformation requires not only technological investments but above all comprehensive continuing education measures, participatory development processes, and a clear political strategy that actively involves all professional groups in the healthcare system.

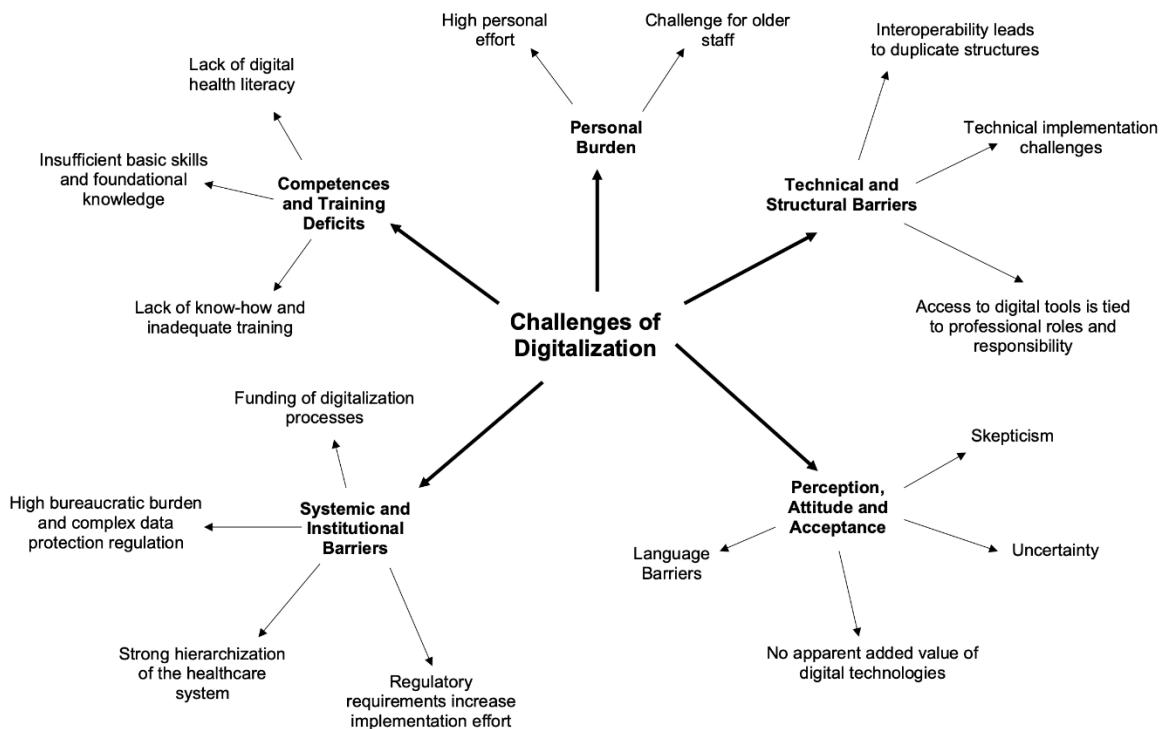


Figure 11: Challenge of Digitalization – Summary of the Austrian Interviews

#### 4.2.6 Cross-national Challenges of Digitalization in the Healthcare Sector

The interview partners emphasized that the digital transformation in the health and care sector is associated with a multitude of challenges that manifest on different levels. On the individual level, several respondents pointed to age-related differences in digital socialization. Younger employees, who have grown up with digital technologies, generally show a higher digital affinity. Older employees, on the other hand, according to the statements of some interviewees, more frequently deal

with insecurities, skepticism, and a certain degree of fear of making mistakes. These fears are not solely due to a lack of competencies but also to the concern of being exposed in everyday work or feeling overwhelmed by technological demands. The potential loss of humanity, for example in the use of technologies such as social robotics, was critically discussed in several interviews.

In addition, some respondents pointed to individual factors such as educational background or language barriers, particularly among nursing assistants with a migration background. It was reported that a lack of basic digital knowledge and limited media competence could lead to digital tools not being accepted or even being rejected. In some cases, access to digital technologies was made more difficult for certain groups due to cognitive or linguistic reasons, which could result in exclusion from transformation processes.

At the process level, the interview partners also described considerable challenges. It was repeatedly pointed out that digitalization is accompanied by a densification of work and an acceleration of processes. Nursing assistants reported a possible increase in communication frequency, a growing number of notifications, and increased documentation requirements. This could lead to additional stress and overload in the already demanding care routine. The introduction of new technologies also requires a fundamental reorganization of work processes as well as a redefinition of roles and responsibilities. Some interviewees emphasized that the active involvement of staff in planning and implementation processes is crucial to ensure acceptance and sustainability of digital changes.

On the structural level, many interview partners criticized the insufficient and unsustainable financing of digitalization. Although there are time-limited funding programs, these often only cover investments, but not ongoing costs for maintenance, training, or technical support. In addition, fragmentation of responsibilities between different providers, sectors, and political levels makes a coordinated implementation of digital measures more difficult. Bureaucratic requirements and data protection regulations were also described by several respondents as obstructive, particularly because they are associated with an



additional documentation burden that is perceived in everyday work as time-consuming.

The education system was also described by various interview partners as an inhibiting factor. It is often not aligned with the requirements of digital transformation, and binding standards for the teaching of digital competencies are lacking. Some interviewees stated that trainees and nursing assistants often had no or only limited access to digital documentation systems, leading to unequal levels of knowledge within teams. The existing hierarchical structures were also addressed. According to some respondents, nursing assistants often felt little appreciated, had hardly any opportunities for participation, and rarely received targeted training offers, despite their central role in direct care.

Technical and infrastructural deficiencies were also frequently mentioned. In many institutions, according to the respondents, the necessary devices were missing, or there was a lack of a stable internet connection, particularly in rural areas. In addition, the existing software systems were often not intuitive to use, which is why employees partly resorted to private smartphones or tablets. This posed an additional hurdle, especially for older or less tech-savvy individuals.

The lack of interoperability between different applications was identified by several interviewees as a central problem, as it could lead to information loss and inefficient workflows. Individual limitations such as visual or hearing impairments as well as insufficient language or reading skills also made the use of digital technologies more difficult, according to some respondents. Finally, many interview partners pointed out that in everyday nursing practice, there is simply no time to become familiar with new digital applications or to participate in training courses.



# 5 Importance of Digital Competencies in Healthcare

## 5.1 Definition of Digital Competencies

The European Commission's Digital Competence Framework identifies five central components of digital competence. These are information and data literacy, content creation, communication and collaboration, problem-solving, and safety. (Shiferaw et al., 2020)

Digital competence forms the foundation for healthcare-related informatics competence, which is essential for technology-supported care. (Hariyati et al., 2024)

In the first competence area, "Information and Data Literacy," the focus is initially on recognizing information needs and purposefully searching for data, information, and digital content. Users should be able to analyze the reliability of individual sources, interpret content, and critically question it. Additionally, the aim is to organize and store content in a structured manner and to be able to retrieve it afterward. This is intended to ensure an effective and secure handling of digital content. (Brandt, L. V. d. et al. 2016) Especially for care assistants, who play an important role in collecting daily vital signs and care-relevant data, it is essential that they learn how to structure data for documentation purposes. As mentioned at the beginning, care assistants must also be able to access the digital system in emergency situations and retrieve relevant data within a short period of time.

The competence area "Communication and Collaboration" encompasses the ability to use different digital technologies appropriately for communication depending on the situation. This also includes sharing data, information, and digital content through appropriate digital applications. The competence area further includes active societal participation through digital services. Another important aspect is "netiquette." Users should be aware of behavioral norms in digital spaces. They should adapt their communication to different target groups and consider cultural as well as generational differences. The competence also includes managing digital identities, including protecting one's own and professional reputation and dealing

consciously with one's own digital “footprints.” (Brandt, L. V. d. et al., 2016) This study finds that a large part of communication with residents and relatives is initiated by care assistants. They should be able to initiate digital contact and adapt their communication in digital contexts to meet work related requirements.

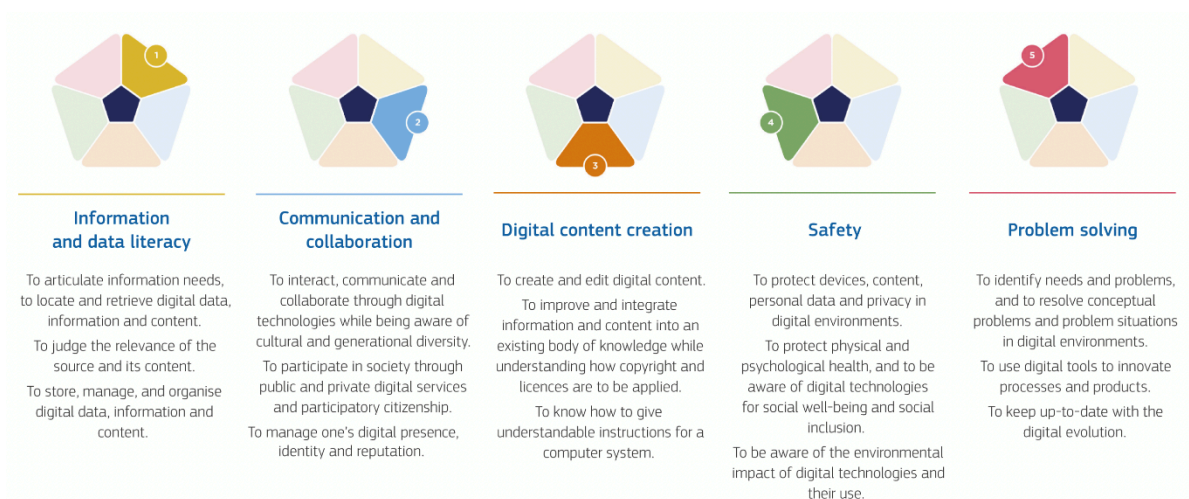
In the competence area "Digital Content Creation," users should be enabled to create and edit digital content in various formats. Furthermore, they should be able to create their own original content. This requires an understanding of copyright and licensing in dealing with digital data. Finally, this competence area also includes the ability to develop computer-based solutions for specific tasks and problems. (Brandt, L. V. d. et al., 2016) The respondents indicate that documentation also constitutes an important part of the work of care assistants. Digital documentation should therefore be learned in such a way that computer-based solutions for existing software problems can be effectively managed.

The competence area "Safety" enables users to protect devices and digital content against digital risks and threats. For this, they should know and be able to apply appropriate protection and security measures. Protecting personal data and privacy, as well as understanding the handling of personally identifiable information and privacy policies, must also be learned. This also includes risks and dangers to health in digital spaces, such as cyberbullying. Furthermore, users should be aware of the environmental impact of using digital technologies. (Brandt, L. V. d. et al., 2016) Especially regarding the digital initiation of contact with care recipients by care assistants, it is important that they maintain a secure approach when using digital communication platforms. Internal facility-related and personal data should also be handled appropriately by care assistants.

The final competence area "Problem-Solving" is intended to enable users to recognize and resolve technical problems when using devices and digital applications. The goal is for users to assess their own digital needs and to adapt them using technological solutions. Creative use of digital environments for knowledge generation and problem-solving should also be learned within this

competence area. Ultimately, it is about identifying gaps in digital competence, engaging in continuous learning, and supporting others in their competence development. (Brande, L. V. d. et al., 2016)

It is noted that digital competencies should by no means be understood as a permanently achieved state, but rather as a temporary, context-dependent concept. (Shiferaw et al., 2020)



**Figure 12:** Areas of Digital Competence (Brande, L. V. d. et al., 2016)

## 5.2 International Strategies and Educational Initiatives

Internationally, several educational frameworks have been developed to meet the increasing demands for digital competencies. (Mannevaara et al., 2024) For example, the International Medical Informatics Association (IMIA) develops core competencies for healthcare personnel in the field of digitalization and divides them into six categories. These include basic knowledge and skills such as data management, understanding the impact of digitalization on clinical processes, the ability to use new technologies, and the evaluation of clinical safety and ethics in the context of digitalization.

However, there is a lack of implementation of these core competencies and their integration into education and training. The design of educational content is generally influenced by universities and professional associations based on

regulatory minimum requirements. IMIA has also developed an accreditation model for training programs, which is based on the recommended competencies. Integration of such models would contribute to a competitive advantage, international quality comparison, and the further development of corresponding educational offerings. (Kaihlainen et al., 2024)

The Technology Informatics Guiding Education Reform (TIGER) initiative was also developed. It is intended to support the integration of technology and informatics into nursing practice, education, and research. (Mannevaara et al., 2024) TIGER defines that healthcare personnel should possess core competencies in social, emotional, and cognitive areas. These should particularly exist in fields such as IT fundamentals, management, ethical and legal issues, and medical technologies. (Mannevaara et al., 2024)

In Australia, the National Digital Health Strategy exists. Under Priority 6, the strategic goal is defined to enable the workforce to confidently use digital technologies to deliver health and care. (Mather and Cummings, 2019) The Health Workforce Roadmap and the accreditation standards in Australia mandate the development of digital competencies. However, it is reported that the absence of national competency guidelines makes the standardization of curricula more difficult. (Raghunathan et al., 2023)

In 2021, the WHO published the Global Strategy on Digital Health 2020–2025, which outlines the goals to be achieved for the realization of Health for All. (Kulju et al., 2024)

The national coordination of the development of digital competencies varies between countries and is guided by specific strategies, governmental bodies, and collaboration among different stakeholders. Many countries show a commitment to promoting digital competencies through national strategies. These include specialized training, interdisciplinary workforce development, and financial incentives. (Kaihlainen et al., 2024) Despite existing educational initiatives, there are still significant gaps in the field of health technologies within education and training. (Kulju et al., 2024)

The literature review underlying this work shows that, at present, there is no existing strategy or framework for the education of digital competencies for care assistants.

### 5.3 Necessity of Digital Competencies

The acquisition of competencies in direct patient care, basic IT knowledge, IT-related management, as well as teaching and education plays a central role in the implementation of the digitalization of healthcare. (Mannevaara et al. 2024) Since care assistants undertake the core activities of care and are among the main users of digital technologies, digital competencies are internationally regarded as central competencies for care practice. (Mannevaara et al. 2024) Increasingly high demands on patient safety and the quality of care services require up-to-date knowledge of developments in science and technology. Healthcare services increasingly require competencies and skills in handling advanced digital technologies. (Hariyati et al. 2024)

The COVID-19 pandemic further strengthened the use of digital technologies in healthcare. (Kulju et al. 2024; Poitras et al. 2024; Lawrence and Levine 2024) It highlighted the necessity of strengthening the digital competencies of healthcare personnel. (Shiferaw et al. 2020; Poitras et al. 2024; Lawrence and Levine 2024) The transformation of healthcare towards virtual services and digital technologies, combined with the growing field of "Big Data" and generative artificial intelligence, has revived interest in the digital transformation of healthcare. (Lawrence and Levine 2024)

Thus, insufficient digital competencies among healthcare staff can endanger patient safety and increase the error rate in the care process. (Navarro-Martínez et al. 2023; Mather and Cummings 2019) There is also evidence that the frequency of digital technology use by healthcare personnel strongly depends on their technological skills. (Navarro-Martínez et al. 2023) The lack of these skills can also lead to feelings of incompetence and reluctance to use the technologies among healthcare personnel. (Mannevaara et al. 2024) It has also been shown that productivity and quality gains depend on investment in implementation and staff training. (Barisch-Fritz et al. 2023)

Interprofessional collaboration is among the frequently cited key competencies. It increases care quality, patient safety, and satisfaction with treatment. Additionally, it leads to higher job satisfaction and motivation among professionals. It is therefore a relevant influencing factor for the outcome of clinical practice and the optimization of care. In the context of changing working conditions towards increasing digital communication, necessary competencies for interprofessional collaboration in the digital working environment must be captured. Among the six competency domains of the National Interprofessional Competency Framework of the Canadian Interprofessional Health Collaboration, communication competency was most frequently mentioned. (Poitras et al. 2024) Poitras et al. identify competence in interprofessional conflict resolution as essential. Work absences and high turnover within organizations are partly attributed to the lack of conflict resolution skills. In contrast to in-person situations, digital contexts often offer fewer opportunities for conflict resolution or require handling conflicts differently due to the setting. (Poitras et al. 2024)

Care Assistants increasingly are and will be the link for communication and coordination between different healthcare professions. There is therefore a necessity to develop new communication, adaptation, and problem-solving competencies to adjust the use of future digital technologies to the competence level of patients. (Isidori et al. 2022)

Studies also show that healthcare personnel often do not feel sufficiently competent in dealing with digital tools. (Poitras et al. 2024; Kaihlanen et al. 2024) Therefore, it is urgently necessary to adequately train the staff. The more familiar professionals are with the equipment and forms of cooperation, the more successful the collaboration will be. (Poitras et al. 2024)

At the same time, awareness is growing regarding the risks to equity associated with digital health technologies, especially since differences in access and digital competence can exacerbate existing inequalities in the healthcare system. This reality underscores the need to educate healthcare personnel who are both technically and culturally competent and who understand health equity as an integral part of care. (Lawrence and Levine 2024; Jarva et al. 2022)

Besides technical competencies in dealing with digital systems, healthcare personnel must also be able to critically evaluate these systems regarding the provision of ethical patient care. They must also understand how digital solutions can best be used in practice. (Jarva et al. 2022)

Negative experiences with the use of digital applications mostly arose from insufficient competencies that threatened the clinical competence of healthcare personnel and were associated with concerns about the quality of patient care. (Jarva et al. 2022) Studies show that there is predominantly a positive attitude towards robotics in nursing. However, this varies depending on the area of application. Reservations mainly exist regarding robotics in relation to social and emotional aspects. (Barisch-Fritz et al. 2023) The goal of a successful technical solution should therefore be to consider the needs of patients and residents, the specific conditions, and the requirements of nursing staff. (Barisch-Fritz et al. 2023)

An analysis by Brice and Almond revealed that four main themes must be considered for the implementation of person-centered digital healthcare: change management, user-centered applications, digital information and communication competence, and innovation competence. (Brice und Almond 2020)

Change management encompasses competencies that staff needs to actively shape and implement changes in healthcare. This includes the ability not only to accept change processes but also to actively initiate, manage, and design them collaboratively with others. This requires a deep understanding of organizational structures and processes as well as the impacts of technological innovations on daily care practice. (Brice and Almond 2020)

Digital information and communication competence describes the skills required to handle information safely, reflectively, and responsibly in digital contexts. Healthcare personnel must be able to search for, evaluate, process, disseminate, and apply digital information in the care context. A special focus is placed on the ability for interprofessional and cross-sectoral communication in the context of digital case discussions, teleconsultations, or interdisciplinary platforms. (Brice and Almond 2020)

User-centered application emphasizes the ability of staff to use digital technologies in a way that meets the needs, expectations, and living environments of patients. This includes both functional and ethical aspects. Healthcare personnel must not only be able to operate digital applications technically but also reflect on their impact on care. This includes knowledge about usability, accessibility, data protection, cultural sensitivity, and the maintenance of the therapeutic relationship in digital settings. In particular, virtual communication requires the further development of communication skills, for example, through verbal empathy, active listening, or the conscious use of digital media to build trust. (Brice and Almond 2020)

Innovation competence describes the ability not only to use new technologies but also to actively shape their development and integration. Healthcare staff should be able to recognize technological potentials, critically evaluate them, and integrate them into their own practice. This includes creative problem-solving, technology-related critical thinking, and a strong understanding of care needs and their digital solutions. (Brice and Almond 2020)

The four named key competencies show that it is not sufficient to merely master digital technologies technically but that ethically and reflectively founded action competence is required to design these technologies in the best interest of patients. (Brice and Almond 2020)

Jose et al. analyzed existing literature in a scoping review regarding the influence of different competencies according to Hecklau on the introduction of Healthcare 4.0 technologies. (Jose et al. 2022) Hecklau's categories are divided into technical, methodological, social, and personal competencies. (Hecklau et al. 2016) In the analyzed selection of literature, the technical competence category was considered the most significant. (Jose et al. 2022) It comprises six sub-competencies: current professional knowledge, technical skills, process understanding, handling intelligent devices, apps and media, data and information processing competence, and IT security understanding. Current professional knowledge includes professional knowledge, system knowledge, experience-based knowledge, decision-making, preoperative planning, and data protection. Technical skills include handling digital technologies, computer skills, device evaluation and maintenance, and evaluation abilities. (Jose et al. 2022)

The second most important competence category is methodological competencies with eight sub-competencies. Creativity promotes innovation and sustainability, entrepreneurial thinking, problem-solving and decision-making, analytical skills for data processing, research competence, and efficiency orientation. (Jose et al. 2022)

Social competencies include teamwork, willingness to compromise, communication, and knowledge sharing. Intercultural competencies are necessary to avoid misunderstandings due to cultural differences. Networking skills help to build and maintain relationships with public and private healthcare institutions. Leadership skills are essential for achieving common goals. Language skills were not explicitly addressed but could be closely related to intercultural and communicative competencies. (Jose et al. 2022)

Technological changes often lead to changed roles. Therefore, adaptability, motivation to learn, sustainable thinking, tolerance of ambiguity, resilience, and compliance with legal and ethical standards are crucial. (Jose et al. 2022)

The necessity and relevance of digital competencies is also clearly evident from the interviews. In the countries and institutions studied, a variety of digital applications are used. These include, in particular, eHealth systems for recording patient data. Telemedicine platforms are also used to enable remote consultations and treatments. In addition, electronic health records are used to digitize patient management in hospitals and care facilities.

Smartphones and tablets are also part of daily work, used to exchange information between care-relevant persons via communication apps such as WhatsApp or Viber. Calendar apps are used to organize appointments and medication administration. The use of specialized digital measuring devices is also widespread. In some cases, smart care beds are used, although their extended functions are usually only accessible to qualified nursing staff.

E-learning platforms are used for continuing education and knowledge deepening. Language AI applications such as Voice complement digital documentation. Innovative projects also rely on care and social robots – for example, the robot Ricky in Germany or radar-based night watch robots that monitor the well-being of

residents. In some facilities, special apps also exist to inform relatives directly about the condition of the patients.

Clear differences in the use of digital tools are evident depending on the qualification level. Healthcare staff, works intensively with more complex digital systems – these include electronic health records, telemedicine platforms, and medication management software. Nursing assistants, on the other hand, are more likely to use simpler technologies such as smartphones, digital measuring devices, and basic entries in digital documentation systems. This also highlights the relevance of imparting digital competencies to nursing support and assistant professions.

Depending on the country and region, the degree of digitalization also varies. Some facilities already document fully digitally via smartphones and tablets, while others continue to work mainly on a paper-based basis.

Overall, it is evident that digital technologies are increasingly becoming part of everyday care practice. However, there are clear differences in the type, scope, and competence of use, depending on qualification, age, regional development status, and organizational structures.

## **5.4 Named digital Competencies from the Interviews**

Within the interviews and as part of the qualitative content analysis, essential aspects could be captured, which can be transferred to possible curricular design for the teaching of digital competencies.

### **5.4.1 Named digital Competencies from the German respondents**

Teaching content on the topic of data protection and privacy should include the safe handling of digital media and the handling of digital, personal data within the professional context.



*"...And the safe handling of digital data and media, that is also very important to me..."  
(Stakeholder 3)*

*"But it is significantly more relevant to know: What am I allowed to do, what am I not allowed to do? How must I observe data protection? What does data protection even mean? Because in private life I only use my own data, normally, hopefully, and in the professional context, of course, I work with sensitive data from other people." (Stakeholder 1)*

It should particularly address the changed framework conditions, for example through speech documentation.

*"But if I work with speech documentation and can dictate something into it from anywhere, then it is indeed relevant to also look to the right and left and think about where I am speaking and what data it is. And that has a lot to do with sensitization. Because I would simply assume that everyone knows that you must handle data like this, but just had not yet paid attention to it before." (Stakeholder 1)*

With the increasing use of digital technologies in long-term care, the ethical context is also becoming increasingly important. A special focus should be placed on the assumption of activities by digital technologies.

*"Yes, I believe we simply have to always keep in mind that it is not a replacement for humans. And then we have already considered all the ethical aspects, because I really believe that it is floating around in many people's minds that the robot will eventually replace the human, and that you will then be washed by the robot and... I don't know... get a hug from the robot. That is, for me, completely, completely unrealistic. We are somehow miles away from that, and we also don't want to get there. I always think, if we simply draw the line and say, everything that supports me, that is fine. Everything that forms a tandem with me, that is fine. But everything that runs without me, I have to think about that. And I have to check: Is that okay for all sides?" (Stakeholder 1)*

Phenomena are named, such as staying at the desk, the withdrawal of human affection, and the loss of interpersonal relationships.

*"(...) Let's not kid ourselves. In nursing, the desk is desirable. Now actually somehow for everyone..., so that it is then taken as an opportunity to say, oh, let the robot do it, I don't want to go there anymore. So that in fact, human affection is withdrawn against one's will because one wants to stay at the desk." (Teacher 3)*

*"I could imagine that the interpersonal aspect might get a little lost, because we already have... everything is so fast-paced anyway. At the moment. And the more we digitalize, the faster everything becomes, of course. And in the end, it's just a quick look: Is everything alright? Yes, so it is very important to me that despite all the digitalization, and there are*

*many changes, we still don't forget to respond to the people and to look after them. And even if a robot was there or something and had already checked, that when we... that we always continue to listen to our gut feeling and if something seems strange to us, that we still go and have a look." (Nursing assistant 4)*

The autonomy and the will of the patient should also be addressed within the teaching unit.

*"I do think that you shouldn't do that with all residents. That definitely the resident should also, I would say... I don't know how it works, but that they might be asked if they even want it. And I don't know how it is with dementia patients or so, that then the consent of the relatives or the legal guardian is obtained." (Nursing assistant 2)*

The communicative skills within the care process can be divided into two categories: on the one hand, dealing with other healthcare professions, and on the other hand, dealing with the person in need of care and their relatives.

The ability to express oneself in spoken and written word is named as important, in order to ensure optimal information exchange in the interdisciplinary team.

*"So really sensitive handling of the data, the ability to express oneself well in words there. It must be understandable for everyone working in the process, everyone must know what is written there and what it means. Good, short, concise descriptions. Then in collaboration in the digital space. So not only in the digital space. It is also the case when I read something, abbreviated situations, yes." (Stakeholder 2)*

Interfaces of digital processes in relation to other healthcare professions should be conveyed in order to promote interprofessional collaboration.

*"I also know what the interfaces to other professions are. I also find it relevant to know how I can use that to perhaps stay in contact or to pass something on or simply to promote interprofessional collaboration." (Stakeholder 1)*

Similarly, filtering relevant information from the data density for handover purposes is mentioned.

*"Well, you would have to learn. For example, if you are handing over to paramedics, which is not uncommon when no qualified personnel are available, you have to learn to retrieve the relevant information from the computer in such a way that you can carry out a handover. And that doesn't work either. So they just tell them something and also hand them some printed material, and then... So misunderstandings, sources of error galore. Yes, so actually, when such a situation arises, they should be able to access the computer with a password and*

*interpret the residents' records in such a way that they can make sense of them and don't end up rambling on for five minutes about nonsense to the paramedics." (Instructor 3)*

Digital technologies are understood as a promising opportunity for residents to establish contact with their relatives. In this context, the ability to establish contact via video chat functions is also mentioned as a necessary skill.

*"They're kind of scratching the surface with it, but of course it's also nice that the contact between relatives and residents might intensify if we also have capable staff on site who can provide support and quickly start a video call or something similar via a platform that they are familiar with." (Stakeholder 1)*

In the context of quality assurance and care security, the limits of digital applications as well as possible risks and sources of error should be highlighted.

*"I know the benefits and I know the advantages. But I also know the dangers. I can also assess the risks when I use these tools or innovations. (...) What I also always find important is to know one's own limits. So, I know my competence, but I also know where it ends and when I need to seek help." (Stakeholder 1)*

*"But I think it's particularly important to point out the sources of error. Especially with lifters or digital blood pressure monitors, to stress that there are still relatively many sources of error, and that people should be sensitized to check whether the readings are actually correct and not just blindly trust the data displayed." (Nursing Assistant 4)*

According to the respondents, an important prerequisite for the successful use of digital technologies in health care is the teaching of application knowledge and the associated design competences. Conveying the handling of hardware as well as the basics of digital formatting and document creation is considered elementary.

*"But that should simply be taught like learning the ABCs. In Word, for example: this is a Word table, and this is how you have to do it, this is how you convert it into a PDF, and this is how you upload it." (Instructor 3)*

*"Well, page numbers, integrating images correctly somehow, so that it doesn't just look like a cobbled-together thing. And I can tell you: very few can do that. We always get documents without page numbers, and I would really wish for things like a proper cover page, for example." (Instructor 3)*

*"Well, literature says a lot about the fact that the first step must be to enable people to handle the hardware at all...And then, yes, digital competences in the sense of what I just explained — that they first develop competences with the devices, competences with the system." (Instructor 2)*

Users should know all possible functions of the system and their benefits for the care process.

*"Digital competence should not only mean knowing where the on and off switch of a system is, but truly being able to recognize the full scope of possibilities or tools of the system. I know the benefit — that's very important. I know the benefit and the advantages." (Stakeholder 1)*

*"That means we basically have to start at the very beginning and develop or promote competences in terms of how to use these things at all. For what purposes to use them. And then first create a basis so that everyone — and that's always the aim in teaching — so that everyone has as similar a starting point as possible, bringing everyone to the same level." (Instructor 2)*

According to the respondents, important teaching content includes conveying key digital applications within the care context. This includes, for example, the function of the electronic patient record, the electronic health card, and the process of the electronic certificate of incapacity for work.

*"So they should definitely know how a patient record works. They should be trained in handling the health card, both for outpatient and long-term care settings, so they can gain security in these areas." (Instructor 1)*

*"(...) For example, one could... yes, I would like to read an electronic patient record (ePA) with them in class. I would find that quite interesting. (...) Perhaps also discuss the topic of the electronic certificate of incapacity for work (eAU). That's also something that affects them personally and is currently causing a lot of confusion." (Instructor 3)*

Internal organizational processes, such as digital documentation, should be taught to the trainees in such a way that all relevant process participants and their tasks are known.

*"But the most important thing is really to go through the process organization completely and make sure everyone knows their task, because only then can we really maintain quality." (Stakeholder 1)*

A clear structuring of processes and work organization should be conveyed to the trainees as a resource for stress management.

*"This is a personal competence, actually a stress competence. Digital documentation and digitization cause stress among many nursing assistants because it overwhelms them.*

*Because they didn't explicitly need it before and also can't see the potential of these possibilities." (Stakeholder 3)*

Ultimately, the trainees should be able to navigate their digital applications independently.

*"Finding all these things, where food is documented, where drinking is documented, where showering is documented, where repositioning is documented — I had problems with that too." (Nursing Assistant 3)*

Problem-solving competence was named as another important element. Trainees should be enabled to develop approaches to solve problems when system difficulties occur and help themselves in such situations.

*"Well, how should I put it... problem-solving competence is probably an important topic. Like, 'Oh my God, I clicked on something, now the Internet is deleted.' — 'It's all good, that's not going to happen.' So this fear of doing something wrong is very common because they are afraid that the system will crash." (Stakeholder 3)*

*"Definitely practicing in a protected environment. So that there is really no fear: if I make a wrong entry, or click on something, or try something out, that the whole system will collapse in the worst-case scenario." (Stakeholder 2)*

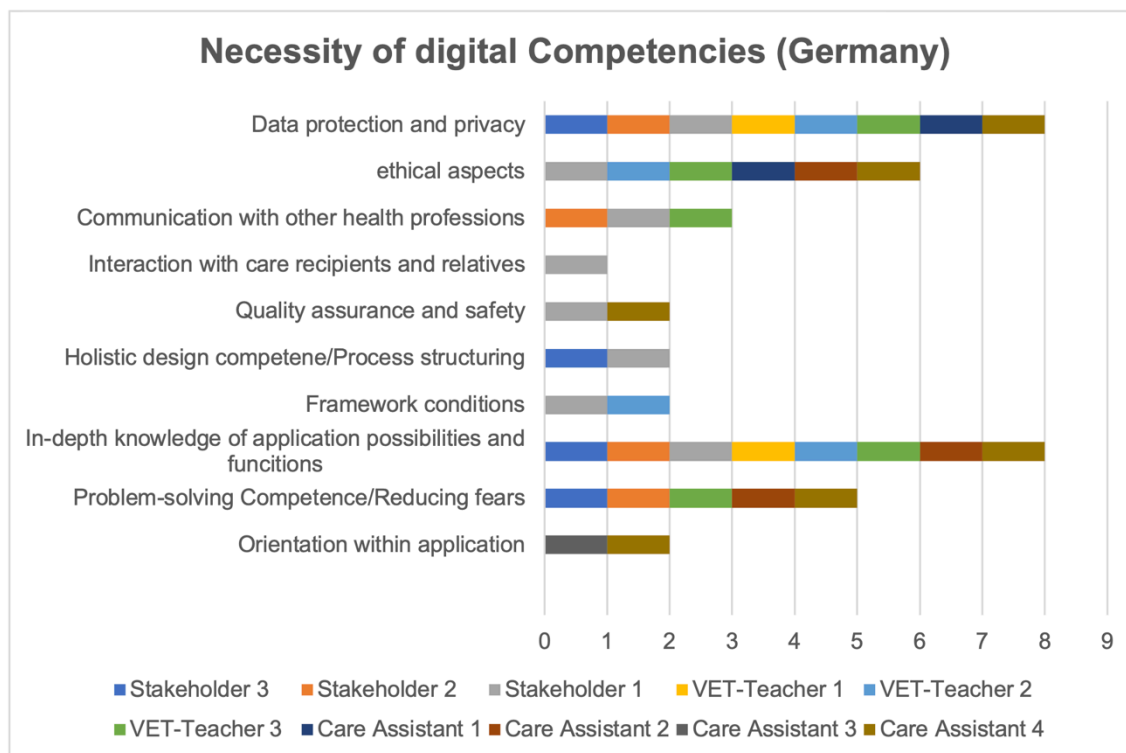


Figure 13: Necessity of digital Competencies – Germany

### 5.4.2 Named digital Competencies from the Greek respondents

In Greece, great importance is attached to a deep understanding of the application possibilities and functions of digital technologies regarding the digital competencies of care assistants. It is not sufficient to merely operate digital tools – rather, care workers should also understand how these tools function, for example in the area of therapy planning or emergency management. This also includes knowledge of how to start digital systems, enter and retrieve information, and communicate with other institutions or doctors. A basic technical understanding to independently resolve minor system malfunctions is equally relevant. Furthermore, it is emphasized that training should provide opportunities to become familiar with different digital devices and their functions in order to develop a deeper understanding of digital health systems.

*“I believe that, to ensure the quality of care in the long term, digital skills for recording and monitoring health, such as using applications to measure and store vital signs or medication, are particularly important. Also, the ability to communicate with other professionals through*

*digital means is essential, so that there is proper coordination. Understanding data security issues is crucial to protecting patient privacy. Finally, the ability to adapt to new technologies is vital, because care is constantly evolving and digital solutions will play an increasingly important role.” (VET-Teacher 2)*

*„Care assistants having the opportunity and the ability, not only to use, but also to understand functions like therapy planning customized in the format of an app, or responding to emergency assistance is very important for them and for the beneficiaries.“ (Stakeholder 2)*

*“How to use the equipment, how to enter and extract information, how to communicate with agencies and doctors. I would also say how to start and operate the system in a sustainable way, otherwise we might have to wait for a technician for primary level malfunctions.” (Care Assistant 1)*

*“Both. We need training and also the opportunity to get acquainted with more technical tools or equipment with different functions than the ones we use right now. This way we will be able to understand better and more deeply the role and function of digital health systems.” (Care Assistant 1)*

*“Familiarity with and training in using digital tools would be a good idea.” (Care Assistant 2)*

The interaction with people in need of care and their relatives represents another important aspect. Digital collaboration between caregivers, patients, and families is described as central, but also challenging. A prerequisite for this is that all parties involved possess a minimum level of digital competence. Therefore, realistic scenarios should be used in training to practice clear and empathetic information transfer as well as collaboration with medical staff and family members.

*„The collaboration between caregivers/patients/family members is crucial but also challenging. First of all, we need to be sure the caregivers have the necessary minimum skillset. Then, that the family members can perform by using the same tools and be able to support the process and also the patients, which depending their age/health issues/skills can vary: from very good user to a not abled user. That’s the reason the caregivers and family should be able to use the same tools and collaborate, to a minimum level, and that is what we try to pass during our trainings.“ (VET-Teacher 1)*

*„I also teach them, through realistic scenarios, how to convey information accurately and collaborate with doctors, nurses and families.“ (VET-Teacher 2)*

*“I emphasize the importance of data security and empathy in digital communication, so that they develop trust and professionalism in their relationships.” (VET-Teacher 2)*

Particular emphasis is placed on data security and appreciative digital communication in order to foster trust and professionalism in relationships. Communication with other healthcare professions should also be improved through digital competencies. The use of digital tools facilitates coordination with nursing staff and medical personnel, ensures up-to-date and accurate data, and thus strengthens clinical decision-making processes as well as interprofessional collaboration.

*„Developing digital skills of care assistants is important also given their great usefulness for outside hospitals care. Getting to know to handle digital software and tools will make their communication with nurses and medical staff much more efficient and on time. This way, all healthcare professionals have access to up-to-date and accurate data, which enhances sound clinical decision-making and improves overall team collaboration.“ (Stakeholder 1)*

Ethical issues play a major role in this context. These include, in particular, the protection of personal data, the safeguarding of privacy, and transparency in data collection and use. Informed consent from the persons in need of care or their relatives is considered essential, especially concerning sensitive data such as images, videos, or health information. Respect for the dignity and self-determination of the persons cared for is a central concern, especially for elderly or demented individuals. The use of digital technologies must always be carried out with regard to individual needs and ethical standards.

*„Key ethical aspects to consider include ensuring the protection of personal data and privacy, through strict protocols (e.g. in accordance with GDPR), as well as transparency in the collection and use of information, so that all patients and families are fully informed and give their consent.“ (Stakeholder 1)*

*„In my opinion, the most important ethical aspects to consider are first and foremost the protection of patients' privacy – that is, not leaking personal information or photos without permission. Equally important is respecting the dignity of the people being cared for, especially when using cameras, apps or files. Care assistants should also have informed consent from the patient or family when recording or sharing data.“ (VET-Trainer 2)*

*“The consolidation of the spirit of utilizing technology with absolute respect for the care of the care recipient and the professional empowerment of the care provider. From the one side we have the constant and pressing need of receiving more data and more specific data for managing someone's health, and from the other side we have to respect certain rules and to safeguard the integrity and privacy of patients.” (Stakeholder 2)*

*“The issue of acceptance of using them, and the issue of being informed and consenting on their use. Especially for older people being affected by dementia, it is crucial to use the equipment and interventions (not only the digital ones) with respect to the person and to his/her needs and preferences.” (Care Assistant 1)*

*“The ethical aspects of privacy and security. Also some people might not feel well getting observed by sensors or cameras all the time. Getting old doesn’t mean losing your self-determination of autonomy. Those are delicate issues that need the consent of the older person and of the family environment.” (Care Assistant 2)*

Finally, it becomes evident that although data protection and privacy are addressed in many training programs, this often happens only theoretically and without sufficient practical relevance. There is a clear need for improvement in practice-oriented training in which the handling of sensitive data is practiced concretely and realistically. Data protection should be closely linked to professional standards, particularly with regard to data security, the quality of data processing, and compliance with legal requirements such as the GDPR.

*“Yes, people have been trained about data protection and sensitive data privacy, especially in Europe, because of GDPR and many times because of the mandatory use of a specific platform that includes sensitive data. But in my opinion, there is a large gap that should be addressed!” (VET-Teacher 1)*

*“Yes, they are taught, but not always in the way and with the emphasis they need. In most care assistant training programs, there is reference to data protection and privacy, especially in relation to the use of digital media (such as photos, electronic files, messages). However, in practice, these topics are often covered superficially or theoretically, without enough practice in realistic scenarios.” (VET-Teacher 2)*

*“I would say that professional skills should be connected with professional standards related to security, data privacy, and quality of data elaboration.” (Care Assistant 2)*

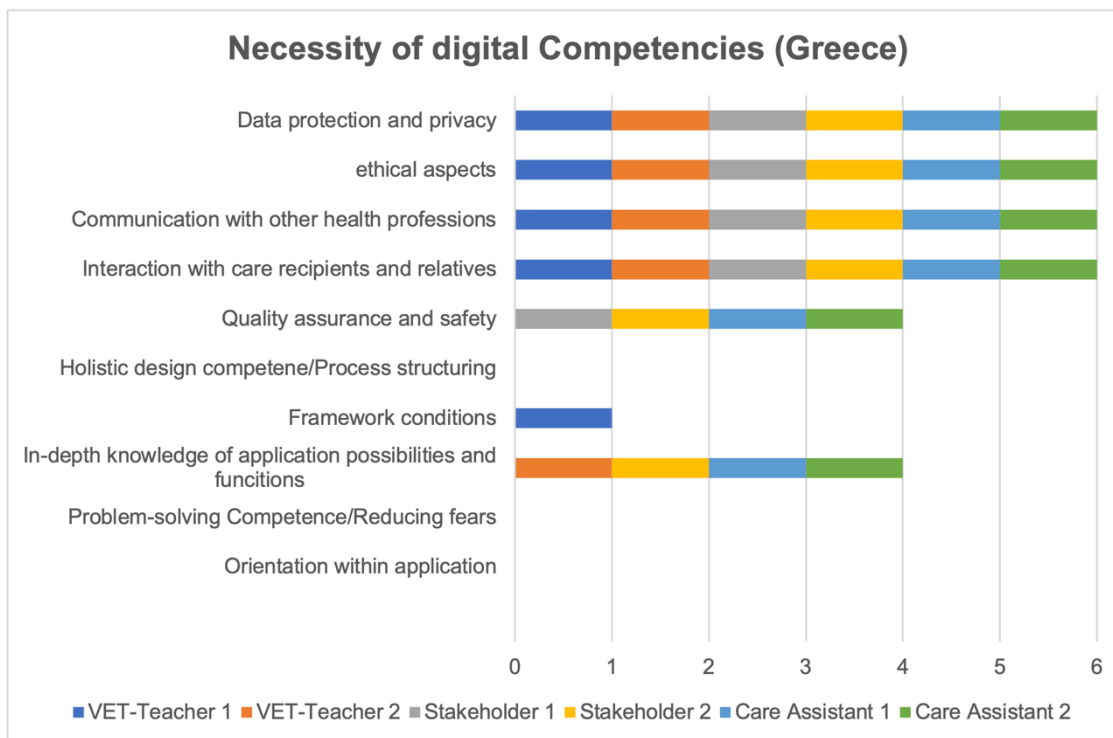


Figure 14: Necessity of digital Competencies - Greece

### 5.4.3 Named digital Competencies from the Italian respondents

The analysis of the statements shows that digital competencies in the Italian healthcare and care context require a broad range of skills. First of all, orientation in digital applications is central. Care workers must be able to use a wide variety of digital tools — such as tablets, probes, or telemedicine applications — safely and purposefully. The large number of specialized apps, often without a central platform, requires a high degree of flexibility and adaptability. At the same time, there is a certain skepticism or resistance towards digital technologies at all levels — from care workers to organizations — which additionally complicates access.

*For professional purposes, on the other hand, skills need to be more advanced and specialised. They may include understanding data security, using complex software, managing digital communication in a formal way or solving technical problems. (Stakeholder 1)*

*Other problem...with digital tools such as devices like the tablet, the probe, telemedicine in general that is already being used, and all the digital resources that are designed to support*

*these caregivers you have to know how to use it! And in my opinion there is a lot of resistance, on all levels.... (VET-Teacher 1)*

Closely linked to this is problem-solving competence. Digital competencies not only involve operating devices but also include the ability to independently solve technical problems and to overcome fears and insecurities in dealing with new technologies. An open attitude towards learning and the willingness to engage in continuous education are crucial here — regardless of age or previous experience. Moreover, the necessity of profound knowledge about the possible uses and functions of digital solutions becomes evident. This includes knowledge about data protection, digital communication, complex software, and its application in a professional context. However, the frequent criticism of the lack of standardization, which leads to an inefficient use of digital resources, is apparent.

*The social and health worker must know every single app to manage the various digital tools, often having 10-15 apps on their tablet or smartphone. There is still no universal app for these uses. Let's think, for example, of athletes: everyone has their own heart rate monitor and cycle computer with different apps, despite the fact that they control the same cardiovascular system. (Stakeholder 2)*

Another central area is the interaction with care recipients and their relatives. Digital competencies here also include pedagogical-didactic skills: care workers must be able to explain the benefits and usage of digital systems to patients and their families — often under challenging conditions, such as dementia or lack of prior technical experience. Clear and empathetic communication is required, as well as the sensitivity to reduce insecurities and build trust.

*For the patients it depends... You have to explain to them too. Eh, explain, yes. It also depends on their age, for older people it's not easy! It depends on what kind of patients they are, what kind of pathology they have, not everyone understands. We have a lady, here in the centre, who understands very well despite being the oldest of all, then there are the others, who are younger, who suffer from dementia and don't understand what they can do. You say something, but then he/she forget it. You have to try to explain what the benefits are, but for them I think it's difficult, it's difficult for us too, not just for them. But I take the initiative and say 'no, I'm going on', because I think you can't do without it ... I think we are not born learned, but we learn. There is something we say in Albania, that until we die, we will always learn, even if it seems we are no longer old enough. I say I need this and I need that, but sometimes I feel sorry at the end that I can't do it ... then you learn and you also enjoy doing something new! It's nice to always learn new things, to move forward. (Care Assistant 1)*

*I see that the difficulty is not so much in preparing the technology; the problem lies in preparing the patient (often a long-term patient) in the use of this technology, which is not a simple thing, because clearly there would be a need to guarantee these elderly people primary computer literacy. Obviously, this is not an easy task. (Stakeholder 2)*

*A Social and Health Worker (OSS) should possess the ability to manage remote devices, Internet connections and networks. It is important that the OSS also has dissemination skills, as they are often responsible for using and explaining the operation of digital machines to patients or people in rehabilitation. (Stakeholder 2)*

*In particular, when caring for the elderly, the OSS may be called upon to repeat the instructions given at the time of delivery of the device. Therefore, he must be able to understand the tools he uses well, be familiar with digital systems and the ability to convey this information clearly and effectively. (Stakeholder 2)*

*“The family member should be sensitized yes, but by an already trained operator! Because explaining how home automation works to an elderly person for example, is difficult...even more so if you are not prepared! One has to start from the very base! A nurse for example explains to the family member how to secure a patient at the bedside because the nurse does it every day and knows how to do it, so it should be like that for home automation as well...another critical issue is that it is not easy to “trust” the family member, because they are always a bit afraid of doing things wrong on their child, on their mother, so it has to be a convincing job as well, otherwise they will never do it, unless it is a young family member who is not afraid...”(VET-Teacher2)*

*Actually it is not difficult to raise awareness among family members... for example in home health care it is already done, I know family members who also put in catheters, so you can create a team but you have to be good at not burdening them with it and making them understand that something that can only do good and indeed if you don't do it it is worse; so even with digitization you have to be good at pushing this! (VET-Teacher 2)*

Digital competencies also play an increasing role in interprofessional communication. The use of shared digital platforms can significantly facilitate collaboration between different healthcare professions. Especially in the outpatient sector, digital networking enables continuous communication between nursing staff and doctors, thus contributing to better coordination and care.

*Absolutely, because it connects the OSS to the referring doctor with a continuous telematic flow that allows the management of activities. (Stakeholder 2)*

*Today, many general practitioners in Italy use apps to manage remote services. A Milanese*

*startup has developed one of the most popular apps in Europe. This service allows people to maintain constant contact with the doctor, enriching the digitized health record. For third-level patients, this system allows continuous monitoring and data updated in real time, which would otherwise be impossible to obtain. (Stakeholder 2)*

Last but not least, data protection and safeguarding privacy is a central topic. Care workers must be informed about the legal frameworks, particularly the European General Data Protection Regulation (GDPR), and be capable of handling sensitive patient data responsibly. At the same time, it becomes clear that digital systems — when used correctly — can enable a more secure handling of health data than traditional paper documentation.

*The use of PEC and the signing of digital deeds are now a consolidated practice. However, the Public Administration, with few staff and limited resources, must necessarily rely on digital systems to be competitive and offer an adequate service to citizens.*

*There is a need to balance individual interests related to personal data with the European GDPR regulation. Many US healthcare devices are struggling to implement in Europe due to the security standards imposed by the GDPR. Public health, guaranteed by Article 32 of the Constitution, provides for the protection of citizens, but in emergency situations, privacy can make it difficult to guarantee an adequate level of protection. An example is that of an individual who could only be operated on because he was conscious enough to give consent, highlighting the complexity of privacy legislation with respect to healthcare. (Stakeholder 2)*

*Here's the problem: these automated language tools rely on repositories and servers whose location we don't know. The European Union's Digital Act now requires servers to be within EU territory. With PNRR funds, a national database is being created to protect and store digital data. We use proprietary IT platforms, but we would have had to develop open source solutions to ensure the GDPR. We have not succeeded, and I believe that our privacy is now compromised. The scanning of personal information and health data is difficult to control. And I go back to the starting point: is it more important to guarantee everyone's health or the privacy of the individual? (Stakeholder 2)*

Overall, it is evident that digital competencies go far beyond technical skills. They require an interplay of expertise, communicative and didactic abilities, as well as a reflective attitude towards data protection and digital transformation.

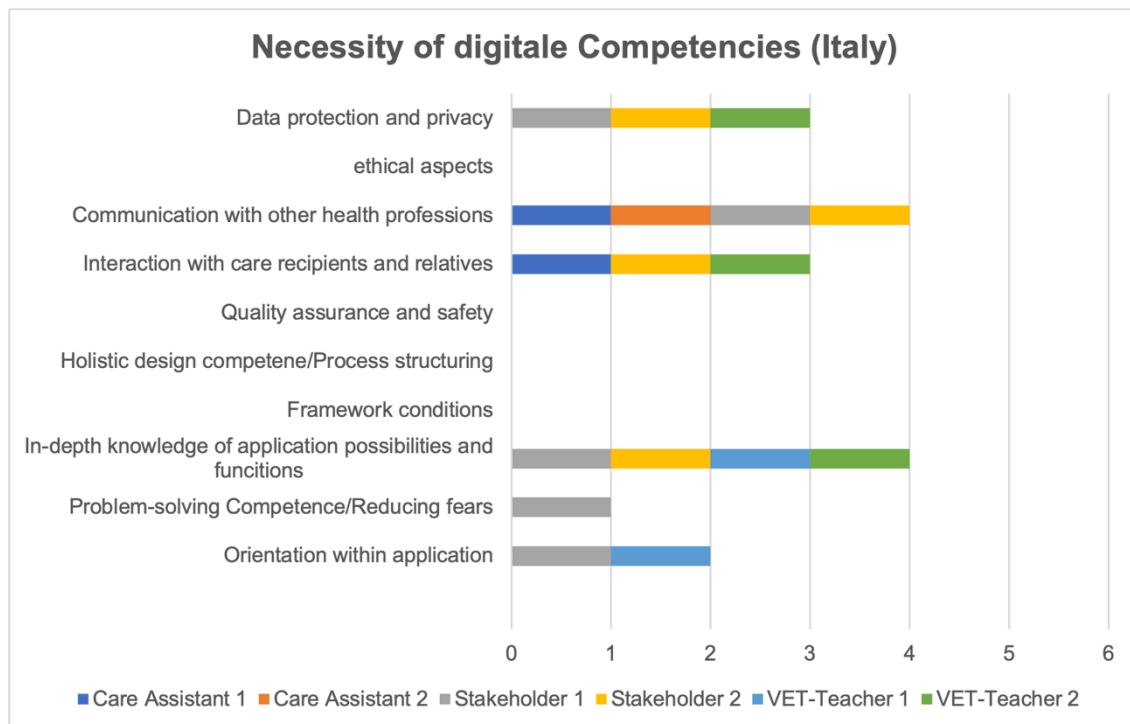


Figure 15: Necessity of digital Competencies – Italy

#### 5.4.4 Named digital Competencies from the Lithuanian respondents

The respondents' statements illustrate that digital competencies are fundamentally embedded in the care assistants education curriculum but usually remain limited to general basics. Significant deficits in the handling of digital technologies persist, particularly among older nursing assistants, which are further exacerbated by a lack of technical resources. The teaching of digital competencies currently often takes place at a very basic level, such as turning a computer on and off, accessing electronic government portals, or using email, leaving great potential for deepening and specialization untapped.

*„Our current programs don't fully keep up with digital advancements, and many care assistants—especially older ones—lack the necessary digital skills. Additionally, limited technical resources add to the challenge.“ (VET-Teacher 1)*

*„Digital skills are indeed included in the curriculum, but the focus is primarily on general competencies.“ (VET-Teacher 1)*

*„Yes, digital skills are part of the training curriculum. However, they tend to cover only the basics, and there’s significant potential to further enhance these competencies.“*

*(VET-Teacher 1)*

*„Yes, digital skills are included in our curriculum. We teach basics such as how to log into electronic government portals, turn on a computer, and open email—even though these are not the primary focus of the training.“ (VET-Teacher 2)*

*Our training organization can support this by incorporating digital tools into our curriculum. We could expand our training program or request that it be supplemented with modules on digital tools. If institutions invest in licenses for these applications, we can teach future care workers to use them effectively before they even start working. (VET-Teacher 2)*

*Collaboration is essential. As a teacher, I can foster better communication and cooperation—not only among care assistants, nurses, and doctors, but also between future employees and the clients or their families. By aligning our curriculum with the actual needs of digital care, we ensure that everyone knows what to expect and how to work together effectively. (VET-Teacher 2)*

*„Our training organization can support this by incorporating digital tools into our curriculum. We could expand our training program or request that it be supplemented with modules on digital tools. If institutions invest in licenses for these applications, we can teach future care workers to use them effectively before they even start working.“ (VET-Teacher 2)*

*„Digital skills are indeed included in the curriculum, but the focus is primarily on general competencies. There is a need for more targeted solutions—such as dedicated apps and interactive training modules—to address the specific barriers care assistants face.“ (VET-Teacher 1)*

Central to this is the necessity of specifically integrating digital applications into the education. This particularly includes training in the use of electronic health records, digital signature procedures, mobile devices, as well as institution-specific systems such as the esveikata platform. At the same time, the education should aim at the safe handling of digital information and technologies, including a basic understanding of new developments such as artificial intelligence. The ability to navigate the internet safely, to process data responsibly, and to communicate digitally is essential in this regard.

*„Digital skills are indeed included in the curriculum, but the focus is primarily on general competencies. There is a need for more targeted solutions—such as dedicated apps and interactive training modules—to address the specific barriers care assistants face.“(VET-Teacher 1)*

*“Care assistants need to be proficient in using the internet and various IT tools safely. This includes understanding emerging technologies—like artificial intelligence—to effectively access, process, and manage digital information.” (VET-Teacher 1)*

*„They need to be proficient in using electronic health record systems, digital signature procedures, and basic applications on tablets or smartphones. Familiarity with the specific systems used in our institution is essential.“ (Stakeholder 2)*

*„They need a baseline proficiency in using smartphones, computers, and the esveikata system. Basic digital literacy is key for handling everyday tasks and communication.“ (Stakeholder 1)*

*„Structured courses that explain these digital tools in detail, with opportunities to ask questions, would be highly beneficial.” (Care Assistant 1)*

*„Digital skills are indeed included in the curriculum, but the focus is primarily on general competencies. There is a need for more targeted solutions—such as dedicated apps and interactive training modules—to address the specific barriers care assistants face.“ (VET-Teacher 1)*

*“Care assistants need to be proficient in using the internet and various IT tools safely. This includes understanding emerging technologies—like artificial intelligence—to effectively access, process, and manage digital information.” (VET-Teacher 1)*

*„They need to be proficient in using electronic health record systems, digital signature procedures, and basic applications on tablets or smartphones. Familiarity with the specific systems used in our institution is essential.“ (Stakeholder 2)*

*„The most critical skills include effective use of communication tools, digital record keeping, and familiarity with any new digital applications that might streamline care delivery. Mastery of these skills supports a more efficient and safer care environment.“ (Stakeholder 1)*

*„I need basic proficiency in using the ehealth system and other essential digital tools. I’m also interested in learning new apps or software that could assist with reporting and data entry.“ (Care Assistant 1)*

*I believe more in-depth training sessions (Care Assistant 1)*

*Structured courses that explain these digital tools in detail, with opportunities to ask questions, would be highly beneficial. (Care Assistant 1)*

In addition to technical fundamentals, nursing assistants also need problem-solving competencies in dealing with digital tools in order to reduce barriers and uncertainties. Interactive training modules, structured courses, and open

opportunities to ask questions are described as particularly helpful. The competence for the safe application of digital tools is also crucial for quality assurance and patient safety: faster documentation and timely information exchange between professional groups significantly improve the efficiency of care.

*„Care assistants need to be proficient in using the internet and various IT tools safely. This includes understanding emerging technologies—like artificial intelligence—to effectively access, process, and manage digital information.“ (VET-Teacher 1)*

*“It’s essential that care assistants integrate digital skills with their care work, ensuring they use digital tools safely and efficiently. This not only enhances their effectiveness but also contributes to the long-term quality of patient care.” (VET-Teacher 1)*

*„Improved digital skills would lead to more efficient communication. For example, when I can quickly update patient records electronically, it helps nurses and doctors receive information promptly, which ultimately enhances patient care.“ (Care Assistant 1)*

*Yes, we use digital technologies like tele-assistance and accident prevention tools. For instance, we have systems in place that monitor work schedules and patient visits to ensure safety. (Care Assistant 1)*

*„Yes, these topics are strongly emphasized in our training programs. Students are made aware of the critical importance of data protection and patient privacy, given the sensitivity of healthcare information.“ (VET-Teacher 1)*

*„Yes, data protection and patient privacy are very important parts of our training. Given that our graduates handle highly confidential information, these topics are taught rigorously in every institution.“ (VET-Teacher 2)*

*“It is crucial that digital technologies are transparent and that both care assistants and clients understand their limits. For example, an app for electronic prescriptions should not automatically link to a client’s bank account or government portals. The client must be well informed about what the technology can and cannot do, ensuring that their rights and data security are always protected.” (VET-Teacher 2)*

*„It is crucial that digital tools do not lead to over-surveillance or unauthorized sharing of sensitive information. The systems must ensure that only authorized personnel can access patient data, and they must protect the dignity and privacy of patients at all times.“ (Stakeholder 2)*

*We ensure privacy by anonymizing patient data in our reports and strictly following data protection protocols. However, challenges remain in making sure that all systems are completely secure against data breaches. (Care Assistant 1)*

*It's vital that digital tools do not lead to over-surveillance or infringe on patient dignity. The focus should be on supporting care without creating an authoritarian environment—ensuring that patient privacy and the autonomy of both patients and care assistants are maintained.*  
(Care Assistant 1)

Another central aspect is communication – both interprofessionally and with patients and their relatives. Digital competencies not only enable access to telemedicine applications and electronic prescriptions but also promote stronger involvement of all parties in the care process. This supports the continuity of care and shared decision-making.

*„Although our current digital platforms are basic, improving digital competence is key to enhancing interdisciplinary collaboration and communication with patients and their families.”*  
(VET-Teacher 1)

*„Collaboration is essential. As a teacher, I can foster better communication and cooperation—not only among care assistants, nurses, and doctors, but also between future employees and the clients or their families. By aligning our curriculum with the actual needs of digital care, we ensure that everyone knows what to expect and how to work together effectively“* (VET-Teacher 2)

*In the long term, skills that enable smooth communication, efficient documentation, and the use of supportive medical devices are particularly important.* (Care Assistant 1)

*Better digital skills would allow us to use online platforms to communicate more effectively with patients and their families—whether through video calls, emails, or digital alerts—ensuring that everyone is well informed and connected.* (Care Assistant 1)

*It would provide a greater opportunity to inform the patient or family members.* (Care Assistant 2)

*„Although our current digital platforms are basic, improving digital competence is key to enhancing interdisciplinary collaboration and communication with patients and their families.“*  
(VET-Teacher 1)

*„Particularly important are skills that enable remote consultations—such as using video applications to connect with doctors—and managing electronic prescriptions. These skills can greatly simplify processes and enhance the overall quality of care.“* (VET-Teacher 2)

*„Collaboration is essential. As a teacher, I can foster better communication and cooperation—not only among care assistants, nurses, and doctors, but also between future employees and the clients or their families. By aligning our curriculum with the actual needs of digital care, we ensure that everyone knows what to expect and how to work together effectively.“* (VET-Teacher 2)

*„Skills that facilitate accurate documentation, timely data entry, and effective use of communication platforms (such as scheduling apps and telemedicine tools) are particularly important. These skills help maintain continuity of care and support ongoing patient monitoring.“ (Stakeholder 2)*

*„They need a baseline proficiency in using smartphones, computers, and the esveikata system. Basic digital literacy is key for handling everyday tasks and communication.“ (Stakeholder 1)*

*In the long term, skills that enable smooth communication, efficient documentation, and the use of supportive medical devices are particularly important. (Care Assistant 1)*

*Improved digital skills would lead to more efficient communication. For example, when I can quickly update patient records electronically, it helps nurses and doctors receive information promptly, which ultimately enhances patient care. (Care Assistant 1)*

*„Skills that facilitate accurate documentation, timely data entry, and effective use of communication platforms (such as scheduling apps and telemedicine tools) are particularly important. These skills help maintain continuity of care and support ongoing patient monitoring.“ (Stakeholder 2)*

Finally, the respondents emphasize the relevance of ethical aspects and the protection of privacy. Digital applications must neither lead to excessive surveillance nor impair the dignity of patients. Responsible handling of sensitive data, transparency regarding the function and scope of the technologies, as well as ensuring equal access are therefore of central importance.

*„Ethical implementation must ensure equality and non-discrimination, safeguard patient privacy, and manage sensitive data responsibly. Digitalization should be carried out transparently and securely, respecting the dignity and rights of everyone involved.“ (VET-Teacher 1)*

*„It is crucial that digital technologies are transparent and that both care assistants and clients understand their limits. For example, an app for electronic prescriptions should not automatically link to a client’s bank account or government portals. The client must be well informed about what the technology can and cannot do, ensuring that their rights and data security are always protected.“ (VET-Teacher 2)*

*„It’s essential that digital tools do not undermine patient dignity or lead to excessive surveillance of care assistants. The systems should support rather than control the work environment. Maintaining a balance between effective digital monitoring and respecting individual privacy and autonomy is crucial.“ (Stakeholder 1)*

*It’s vital that digital tools do not lead to over-surveillance or infringe on patient dignity. The focus should be on supporting care without creating an authoritarian environment—ensuring*

*that patient privacy and the autonomy of both patients and care assistants are maintained.  
(Care Assistant 1)*

Overall, it becomes clear that digital competencies in nursing require not only technical know-how but also ethical sensitivity, communication skills, and an understanding of systemic interconnections. A holistic curricular integration of these aspects is seen as key to a future-proof nursing education.

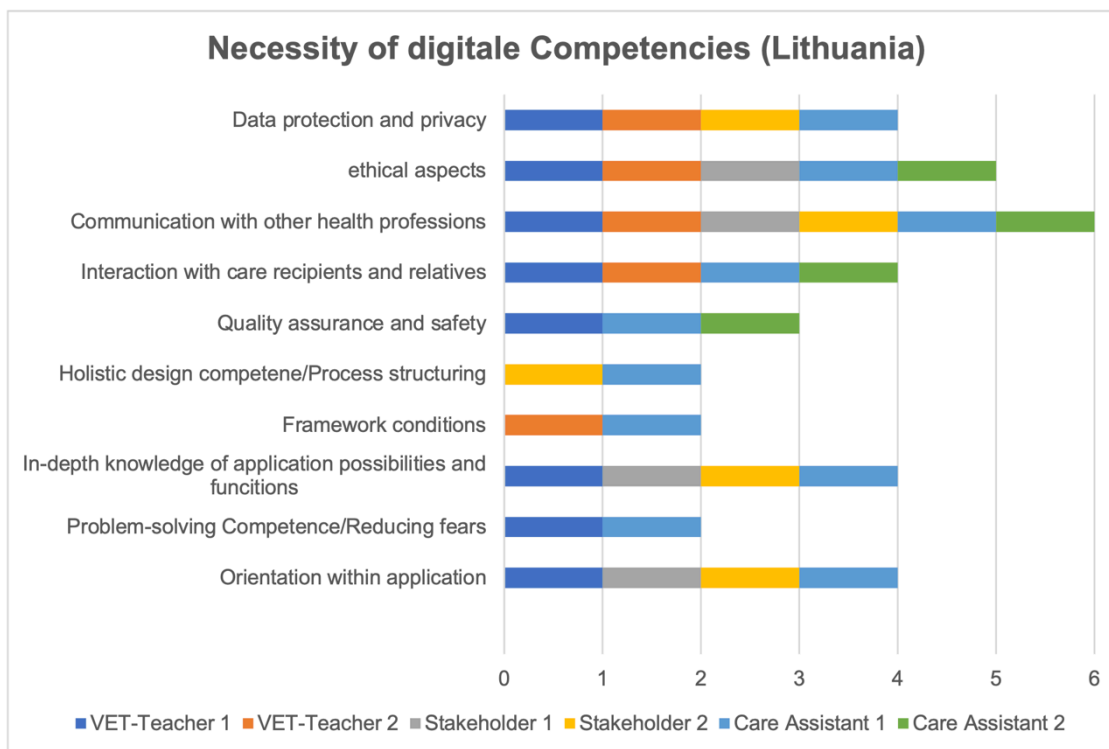


Figure 16: Necessity of digital Competencies - Lithuania

### 5.4.5 Named digital Competencies from the Austrian respondents

The integration of digital competencies into the education of care assistants is of central importance. Digital solutions should be incorporated into training programs at an early stage so that they are not perceived as an additional burden but rather as a part of everyday work life. If these digital contents are not taught during education, there is a risk that care assistants will neither have the time nor the motivation to engage with them later. Therefore, the early integration of digital tools promotes broad acceptance and competence in handling these technologies.

*"That brings us to another issue—training and curricula. It is essential that training programs for all healthcare professionals include digital solutions. Because if they don't learn about these things during their education, they won't bother to learn about them later... Because they don't have the time, they don't want to, they don't have the money—whatever the reason may be. That's why it is crucial to integrate digital solutions into all training programs. For nurses, medical training, and all other healthcare professions. Only then will you achieve widespread acceptance." (Stakeholder 1)*

Another important aspect is application knowledge. Care assistants must not only know how to operate digital applications but also understand how they work and what possibilities and limitations they have. Especially in areas where digital tools are used directly with patients, such as in therapy or diagnosis, it is crucial that care assistants know how the devices function and what to do in case of problems.

*"I think it's fundamentally important to develop a certain affinity and a certain level of competence. How do I use such devices correctly, for example? That's probably the most important thing in the first step. And I think you always have to differentiate between whether it's a digital tool or software or device or whatever that's there for documentation. Then it's a story. Or is it something that I actually use directly on the patient, that I use directly for therapy, for diagnosis or whatever. Especially when this digital support is provided directly with the patient, I think it is really, really important to know how it works? What am I actually doing? What are the consequences if it doesn't work? What can I do if it doesn't work? So simply learn how to use these products well, be good at it. So I think it is really, really important, when you introduce something like this, that you really get a feel for the people. So that they really know what these tools can do? How can I use them? What happens if it doesn't work?" (VET-Teacher 1)*

*"If I understand the question correctly, I would say that one key competency is understanding what a digital tool can and cannot do." (Stakeholder 1)*

*"This also applies to devices like VAC (Vacuum-Assisted Closure) therapy pumps, which are frequently used. These are still digital tools, and you need to know how to operate them." (Caregiver 2)*

*"Exactly, the real benefit behind it. I think one of the biggest obstacles is when we are only taught how to do something but not why it's done. After all, we are the ones performing these procedures. We need to recognize how they help us. And it's not just about making things easier—it's about understanding, Did I do this correctly? Did I perform the process correctly, or did I make a mistake? Did this have an actual effect on the patient, or did it not? Ultimately, is this test meaningful for further treatment and diagnostics, or is it not? And if it's*

*not, is it because the patient simply doesn't need it—or did I press the wrong button? That needs to be properly explained." (Caregiver 2)*

*"I think digital skills include the ability to handle technology and use digital tools effectively. It may sound basic, but in my opinion, that's the key. If someone doesn't know how to operate a computer, they won't be able to use any digital tools effectively." (Caregiver 2)*

In addition, it is of great importance that personnel understand the consequences of their actions and are able to identify and correct errors. A basic understanding of what a digital tool can and cannot do is crucial for its safe use. The fear of making mistakes, especially when entering data, can complicate the use of digital applications. Therefore, education should also aim to reduce these fears and develop problem-solving skills to enable independent handling of technical difficulties.

*"On the other hand, younger colleagues can also feel overwhelmed when dealing with a new system. I think a general level of respect for digital tools is always present because these tools directly impact patient health, and no one wants to make a mistake. For example, I once accidentally entered a blood pressure value incorrectly because I clicked too quickly. I was really worried about what I had done, but in reality, I just had to go back into the system and correct it. Once I realized that, I was relieved—but at first, I had unnecessary stress over it." (Caregiver 2)*

*"That's super important—if this fear isn't addressed, digitalization in healthcare won't succeed. From experience, I can say that every digital project, every policy initiative, must include training and digital literacy. No matter what it is, you must train all stakeholders." (Stakeholder 1)*

*"It should clearly explain how, what, when, and where to use the device. And most importantly, what to do if something goes wrong. If that part is missing, we can't expect other groups to use the device willingly. They won't. Instead, they'll think, Oh God, where is my old device? At least I knew how to use that one. The more uncertainty, the greater the resistance." (Caregiver 2)*

Another central topic is the handling of sensitive data and data protection. Care assistants must be informed about the correct procedures for handling personal and health-related data in order to guarantee the privacy and security of patients.

*"There was always this fear about data protection— 'They want to take our data!' You have to understand where this concern comes from and accept it. Personally, I also wouldn't want just anyone accessing my data. Especially health data, which is the most intimate thing a person has." (Stakeholder 1)*

In summary, education must convey digital competency on multiple levels: from the safe handling of digital tools, to the ability to find solutions in case of problems, to the understanding of ethical and data protection aspects of digital work. Only through comprehensive training can fears and insecurities be reduced and the digital transformation in healthcare be successfully implemented.

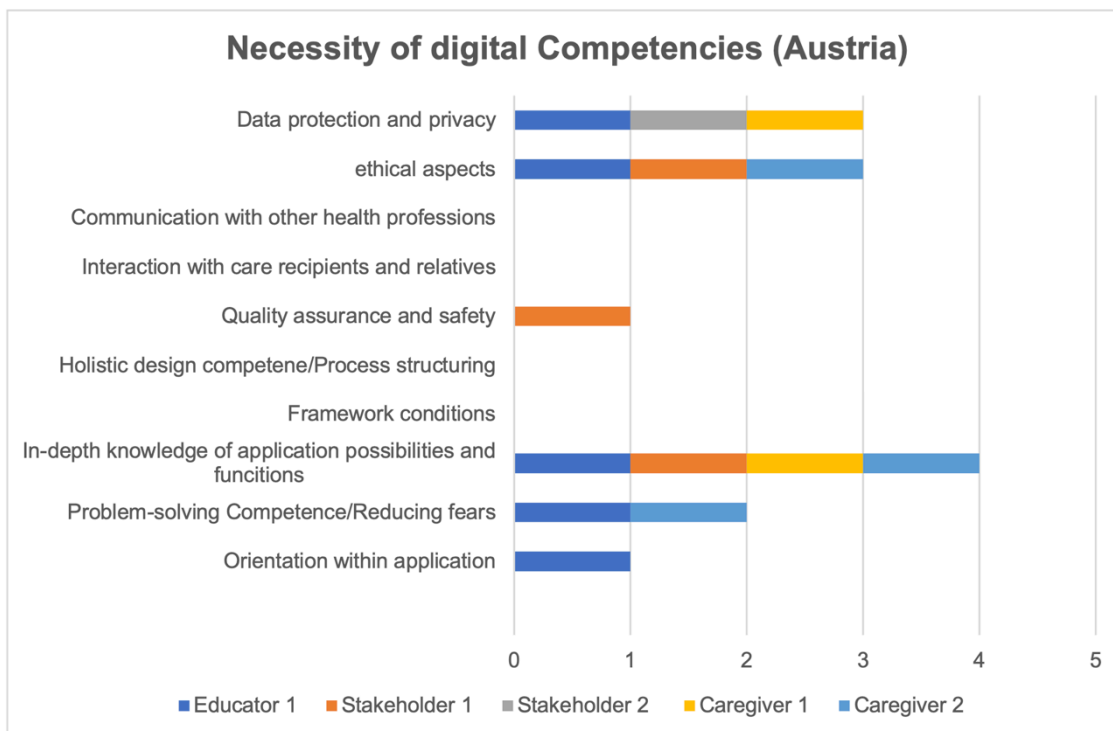


Figure 17: Necessity of digital Competencies – Austria

### 5.4.6 Transnationally Identified Digital Competencies

Digital competencies in the health and care sector encompass far more than the mere ability to operate technical devices. They include a broad spectrum of skills that relate both to the practical handling of digital applications and to ethical, communicative, and organizational aspects. The central foundation is application knowledge: care assistants should not only know how digital tools work, but also for what purpose they can be usefully applied. This includes knowledge of using software such as Word, creating PDFs, or working with electronic patient records and health cards. The necessity of structured process organization is particularly

emphasized here, so that all participants within an institution understand their tasks in the digital care process and can implement them efficiently.

An equally important area is data protection and privacy. The handling of sensitive personal and health-related data requires a high degree of responsibility. Care assistants must not only be familiar with the General Data Protection Regulation (GDPR), but also know how to obtain consent, store and share data securely, and prevent misuse. Ethics plays a central role in this: the dignity, autonomy, and self-determination of care-dependent persons must always be preserved—especially when dealing with particularly vulnerable groups such as dementia patients. Digitalization must not lead to surveillance or dehumanization but should be understood as a supportive tool.

Moreover, digital competencies are closely linked with communicative skills. Interprofessional collaboration requires clear, precise, and goal-oriented digital communication. Equally important is digital interaction with patients and their relatives. Here, empathy, understandable language, and the ability to meaningfully convey digital content via video calls or other platforms are required. At the same time, it is emphasized that all participants, including relatives, need a minimum level of digital competence in order to meaningfully participate in care.

Another important aspect is problem-solving competence. Many care assistants express uncertainty or fears when dealing with new digital tools—whether due to concerns about making mistakes or not being able to fix technical errors. Therefore, protected learning spaces are needed where mistakes are allowed, and practical learning is made possible. Care assistants should learn how to handle challenges, recognize and fix errors, and thus act more confidently in the digital everyday setting.

A central point is also the continuous willingness to learn and the ability to adapt. Digital technologies are evolving rapidly, and only those who are willing to continuously educate themselves can keep up with these changes. Digital competencies should therefore be integrated early into training—not as an add-on, but as a natural part of vocational education. This is especially important since

many professionals later have neither the time nor the motivation to independently familiarize themselves with new systems.

International perspectives show that the challenges are similar across Europe: there is often a lack of standardization, and especially older care workers or those with little technical experience find the digital environment difficult. At the same time, however, it is evident that significant progress is possible through targeted training, practical instruction, and systematic competency building. The value of interactive training modules, realistic scenarios, and clear action guidelines is particularly emphasized here.

Overall, it becomes clear: digital competence in care is a cross-cutting task. It unites technical know-how, ethical sensitivity, communication skills, and a deep understanding of systemic interrelations in the healthcare system. A holistic curricular integration of these aspects is the key to a future-oriented, digital care practice.

## 6 Prerequisites for Successful Integration

### 6.1 Influencing Factors for a Successful Implementation

The degree of digital competence of a healthcare professional has a significant influence on the introduction of digital applications in a company and its care processes. It can contribute significantly to the successful implementation of these technologies. (Shiferaw et al. 2020)

Analogously, it can be assumed that nursing assistants, as important actors in direct care, also benefit from an appropriate level of competence and can support the successful introduction of digital solutions. Since nursing assistants often interact closely with patients and use digital tools in their daily work, appropriate promotion of their digital skills is equally crucial for the overall acceptance and benefit of new technologies.

Kulju et al. state in their systematic review that a multimethod approach in the form of in-person or online teaching combined with supplementary materials for later repetition opportunities represents a suitable method for promoting digital competencies among healthcare professionals. What is particularly important here is the development of competence beyond mere factual knowledge. Training should be tailored to the competencies relevant to the specific professional role. (Kulju et al. 2024)

This finding can also be applied to nursing assistants: since their tasks and responsibilities differ from those of professionals, they require target group-specific training tailored to their role. A training offer that takes into account the practical applicability and specific area of activity of nursing assistants increases the acceptance and effectiveness of the qualification.

Organizational framework conditions should be designed in such a way that they enable individual promotion of digital competencies in order to support staff in the digital transformation within the company. Encouragement, empathy, and user-centered changes to the working environment are cited as beneficial. It is particularly important to allow sufficient time for training and to tailor it to the

professionally required competencies. (Kulju et al. 2024) This applies equally to nursing professionals and nursing assistants.

When implementing new technologies into existing care processes of a company, it is first necessary to assess the digital competencies of the users. Low productivity, inefficiency, and missed potential are relevant consequences of low digital competence among users. (Shiferaw et al. 2020) This applies to both nursing professionals and nursing assistants, with the latter assumed to have a particularly high need for targeted competence development due to usually lower formal IT training.

It has been shown that the number of training hours has a significant impact on the transfer of the learned knowledge into practical work. Nevertheless, it appears that training participants often chose the offer with the lowest number of hours. The workload perceived by professionals, which affects their capacity for further training, is seen as a significant inhibiting factor for the success of training programs. (Navarro Martínez et al. 2022) This burden also affects nursing assistants to a great extent and must be taken into account when planning training courses to ensure actual participation and effectiveness.

In order to increase acceptance of the implementation of digital technologies, comprehensive information should be provided and training should take place directly in the work context. It must be possible to integrate nursing-specific knowledge into the applications. (Jose et al. 2022) For nursing assistants, this means that training should be designed to be practical and address their specific activities to facilitate the transfer to everyday work.

Four main actors were identified for the organization of training and continuing education programs. These include educational institutions, employers, government agencies, and third parties such as trade unions and professional associations. About half of the countries reported the role of universities, universities of applied sciences, and postgraduate institutions. Less than half of the countries mentioned employers as educational providers. Implementation is often not guaranteed across the board. Government or regional authorities were

only occasionally mentioned as training providers. In some countries, the responsibility for acquiring competencies lies with the professionals themselves. (Kaihlainen et al. 2024) For nursing assistants, who often have less access to formal training, it is particularly important that employers and regional institutions provide appropriate, low-threshold offers to reach this target group as well.

Financing models for training in the context of digital competencies are documented in only a few countries. Financing takes place in different ways, for example through employers, public funds, sponsorship, or personal contributions by professionals. In some countries, shared financial responsibility could be identified. This points to a cooperative nature of the support for digital competencies. In countries where financing is provided exclusively by employers, continuity is endangered in light of increasing cost pressure in the healthcare system. (Kaihlainen et al. 2024) Especially nursing assistants, who often work in lower income groups, benefit from supported or free offers in order to minimize financial barriers.

Participatory and co-creative approaches are therefore particularly relevant for the implementation of digital technologies in nursing care. (Brice S 2020)

Groeneveld et al. found that nursing staff would like to have a direct colleague to support them in dealing with technology. The desire for a contact person with the same professional background can be explained by the ingroup/outgroup theory. Social interactions within one's own group are considered more predictable and understandable. In practice, IT staff are available to help with technical problems, but nurses do not find this sufficient, as they lack an understanding of nursing practice. (Groeneveld et al. 2023) It can be assumed that nursing assistants have similar preferences.

### **6.1.1 Identified Solution Approaches of the German Respondents**

A central aspect repeatedly emphasized by respondents in the context of digital transformation in healthcare is the role of the social economy as an important economic sector. From their perspective, the social economy must be more

strongly understood as a resource and actively involved in political design processes. It was emphasized that care and the social economy should not be treated as subordinate topics, but rather as an integral part of economic considerations.

The respondents also expressed criticism of political decisions in the areas of care and education, which are often made without sufficient involvement of practical actors. Teachers and nursing staff reported that they were not adequately considered in the design of curricula or in fundamental structural changes. For example, the change of the nursing assistant training to one and a half years without adequate content adjustment was assessed as problematic, as this could lead to foreseeable shortages in new trainees. The interviewees demanded that political decision-makers should not only talk about care in theoretical terms, but also gain practical experience in order to realistically assess the challenges of the profession.

In addition, respondents partially perceived the introduction of digital technologies in care facilities as an additional burden—especially when it occurred without structural relief. In their view, sustainable promotion of digital competencies requires conveying them already in the school context, ideally starting from lower secondary education (Sekundarstufe I).

Many respondents described the complex technical language of IT systems as particularly challenging. Here, they saw a great need for applications that are characterized by simple, understandable language and intuitive usability.

Another central point frequently mentioned by the interviewees concerns the lack of user orientation in the development of digital systems. The respondents demanded that users, especially nursing staff, must be systematically involved in the development process. Only in this way can digital tools be adapted to actual needs and acceptance be improved.

Regarding training concepts, the respondents emphasized that they should be low-threshold and practice-oriented. Introductory weeks, so-called “fresh-ups,” as well as learning in tandems were mentioned as helpful measures to strengthen

digital competencies and at the same time reduce fears. These trainings should be offered to both trainees and existing employees, particularly older nursing staff.

The generalist nursing education was described by the respondents as a forward-looking approach, as it enables close exchange between vocational schools and institutions. This could promote digitalization in practice. A structured understanding of digital process organization, meaning who is responsible for which steps, was seen as the basis for successful implementation.

A central wish of the interviewees was the establishment of protected practice rooms. In these, nursing staff could try out digital applications without fear of making mistakes. These protected learning environments were considered essential by the respondents in order to reduce inhibitions and gain confidence in dealing with digital tools.

The development of digital competencies could also be supported by training multipliers, who act as contact persons and training leads within the institutions.

Another problem mentioned by the respondents is the heterogeneity of the end devices used in the institutions, which makes standardized training difficult. In addition, many schools lack qualified IT officers who could take over the teaching of digital competencies.

The respondents suggested designing training offers in a multiprofessional way—both separated by professional groups and in joint exchange. In this way, not only technical skills but also interprofessional collaboration could be strengthened.

Finally, the interview partners emphasized that the financing of the digital transformation must be reorganized, particularly taking into account training absences and personnel expenses. Only if appropriate resources are provided—both for technological equipment and for personnel development—can digitalization actually contribute to relieving the workload in everyday care.

### 6.1.2 Identified Solution Approaches of the Greek Respondents

The Greek respondents repeatedly emphasized the central importance of simplicity and user-friendliness of digital technologies in their statements. From their point of view, both nursing staff and older users particularly benefit from systems that are intuitively operable. In their experience, complex or difficult-to-understand applications quickly lead to frustration, fear of making mistakes, and a decreasing willingness to use them. Digital systems – according to the unanimous opinion of the respondents – should make everyday work more efficient and in no case cause additional burdens.

In addition, the interviewees expressed the necessity of suitable framework conditions and political measures to sustainably promote digital transformation in the care sector. Frequently mentioned prerequisites included access to modern technical equipment, reliable technical infrastructure, as well as administrative support in integrating digital tools into existing work processes. EU projects, national initiatives, and exchange with countries that are already more advanced in this area were highlighted by the respondents as important impulses.

Another thematic focus was on training and education. The respondents advocated for low-threshold, practice-oriented, and target group-appropriate educational offerings. Content should be presented clearly – through the use of videos, images, and simple language. From the interviewees' point of view, instruction must be oriented to real work situations, take place in small learning units, and provide sufficient space for repetition and individual support. The role of multipliers was emphasized several times: they could pass on the acquired knowledge to colleagues and thus act as a link between theory and practice. Cooperations with educational institutions and the establishment of regular further training formats were named by several respondents as necessary measures.

In connection with training measures, many of the respondents mentioned the topic of "confidence in dealing with digital tools" as significant. Numerous employees brought uncertainties or negative experiences with digital technologies. Therefore, it is important to create a supportive, positive learning environment. Permanent support offerings such as helpdesks or technical contact persons

within the facilities were also described as necessary in order to be able to help quickly in case of problems and to ensure the sustainable application of digital solutions.

The respondents assigned particular importance to continuous training that should be adapted to the actual workload. Training should not be understood as a one-time measure but must take place regularly – ideally during phases of lower work intensity. Seminars and practice-oriented workshops on specific digital applications, such as in the area of electronic health records or telemedicine platforms, were repeatedly mentioned as particularly helpful.

Finally, the respondents made it clear that it is not just about technical training. Equally important is the promotion of acceptance and motivation. Information offerings, awareness campaigns, and concretely demonstrating benefits in everyday care were named as suitable ways to promote understanding of digital developments and to increase the willingness to use them – both among nursing staff and among older people and their relatives.

### **6.1.3 Identified Solution Approaches of the Italian Respondents**

The Italian respondents emphasized a clear need for the teaching of digital basics for nursing staff, especially for employees in operational social and health services (OSS). According to the assessment of many participants, numerous employees possess only limited technical prior knowledge. Therefore, they expressed the desire for simple, practice-oriented training courses that convey, among other things, how to use computers, tablets, and basic programs such as Word and Excel. The practical use of medical devices such as ECGs or monitors was also named by the respondents as an important training topic. It was repeatedly emphasized that digital skills are not only required for documentation and communication but should also enable a fundamental understanding of the ongoing digitalization in the healthcare sector.

A central concern of the interviewees was to first inform nursing staff about the existence and variety of digital tools. In their opinion, there is a widespread lack of

awareness about the available applications and their benefits. The respondents therefore called for information and training offers that clearly communicate the practical added value of digital technologies. At the same time, cultural and structural hurdles were mentioned: some respondents reported that training sessions were perceived by certain employees more as free time than as an opportunity for further development. From the respondents' point of view, this illustrates the need to develop strategies to promote motivation and interest in digital topics.

The framework conditions for successful further training measures were also addressed several times. According to the respondents, cooperatives and consortia in particular should take an active role by acting strategically and in a future-oriented manner. Free training offers with ideally paid participation were demanded – even when no active service is being provided. Positive examples from practice, according to the interviewees, showed that such models are already being successfully implemented. Furthermore, the essential importance of a stable internet connection was pointed out, especially in the context of remote monitoring of patients who cannot operate digital technology independently.

In the field of software solutions, some respondents proposed the development of booking systems that are closely linked to general practitioners and thus aim to enable more efficient care – particularly in the outpatient sector, which, in the opinion of the interviewees, needs significant relief.

The necessity of clearly communicating the practical benefit of digital technologies was emphasized by many as a key factor for their acceptance. Digital tools would only be perceived as relevant by nursing staff when concrete advantages for care quality, work organization, or communication are recognizable. Therefore, in addition to technical training, targeted awareness-raising measures are also required. Training of multipliers was mentioned by several respondents as a promising approach to sustainably integrate digital topics into everyday professional life.

With regard to financing, the interviewees pointed out that although there are legal requirements for further training, their implementation depends heavily on the commitment of individual providers. Many institutions shy away from the costs of digital further education. The respondents see a possible solution in regional or national funding programs that could facilitate access to technical equipment and training offers. In this context, the strong regional health service in Veneto was mentioned as an example: it shows that investments in primary care can not only strengthen prevention but also reduce hospital stays – provided that sufficient financial resources are available without strict repayment obligations.

Overall, the statements of the Italian respondents make clear: in order to sustainably strengthen digital skills in the care sector, low-threshold and practice-oriented training formats, targeted information offers, political and financial support, and a clear commitment by institutions to the continuous training of their employees are needed.

#### **6.1.4 Identified Solution Approaches of the Lithuanian Respondents**

The Lithuanian respondents repeatedly emphasized the importance of user-friendly digital technologies for everyday nursing work. In their view, devices should be intuitively operable, ergonomically designed, and adapted to the practical requirements in care. Wearable technologies, larger keyboards, and automated systems that provide physical relief – for example, through lifting functions when mobilizing patients – were particularly emphasized. From the respondents' perspective, the technical equipment represents a key factor for the acceptance of digital applications.

The topic of training and further education was also highlighted by many participants as particularly important. There was broad consensus that practice-oriented and structured training formats are necessary, which allow sufficient space for follow-up questions. Flexibility in time planning was seen as crucial in order to enable participation for employees working in shifts. According to the respondents, the development of digital skills should already begin during

training – especially through targeted training of multipliers such as teachers in nursing education. At the same time, low willingness to participate in existing offerings was pointed out, particularly among people with little interest in technology.

The interviewees also emphasized the importance of favorable organizational conditions. They stressed that clear internal guidelines, transparent responsibilities, and the provision of necessary resources by the institutions are central prerequisites for the successful use of digital technologies. Without this structural support, many digital initiatives remain ineffective, according to the assessment of several respondents.

Another central topic was technical support in everyday life. In addition to easy-to-understand, user-friendly interfaces, the respondents called for continuous technical support. Access to technical support – for example, through dedicated contact persons or helpdesks – was regarded by them as essential for the sustainable use of digital applications.

Regarding the digital basic skills of employees, the respondents described a heterogeneous picture. Particularly older employees or people with lower formal education, according to the statements of the interviewees, are dependent on basic introductions to digital systems. In this context, the complexity of some programs and general feelings of being overwhelmed are often perceived as barriers.

With regard to the technologies used, the respondents expressed the desire for targeted, practice-oriented software solutions. Mentioned in particular were central apps for appointment management as well as digital checklists, which are intended to enable structured and low-error documentation. Existing systems, on the other hand, were often criticized as not very innovative or insufficiently adapted to the specific needs in nursing care.

An important concern for many respondents was also the involvement of users – that is, caregivers, patients, and relatives – in the digital transformation. They advocated for communication formats such as joint chats, regular meetings, or

transparent information offerings in order to promote acceptance and create a sense of participation. Digital communication, in the opinion of the respondents, should include all parties involved.

It was also repeatedly emphasized that the concrete benefits of digital technologies for daily work must be clearly visible. Digital tools are only perceived as helpful when they provide tangible relief or improve the quality of care. At the same time, the respondents expressed the need for education about the limits of digital solutions in order to prevent unrealistic expectations.

The structuring of work processes was also considered significant. The respondents advocated for clear task distribution – for example, by appointing those responsible for digital documentation – as well as for standardized procedures. Only when digital tools are supported by reliable organizational processes can they, in the respondents' view, be meaningfully used.

Finally, the role of politics and the education system was also discussed. The respondents called for a systematic integration of digital skills into nursing training programs as well as stronger cooperation with authorities and service providers. Although existing political measures such as free IT courses were acknowledged, the participants so far rated their effectiveness as limited.

Overall, the statements of the Lithuanian respondents make clear that a successful digital transformation in nursing depends on a combination of user-friendly technology, structural and technical support, practice-oriented qualification, as well as political and institutional commitment.

### **6.1.5 Identified Solution Approaches of the Austrian Respondents**

The Austrian respondents emphasized that intensive training and the active involvement of users in decision-making processes are essential for the successful introduction of digital applications in healthcare. It was repeatedly noted critically that top-down decisions made without consultation with staff often meet with resistance. From the respondents' point of view, it is therefore crucial that nurses,

nursing assistants, and other employees understand how digital tools can meaningfully support their daily work without calling their roles into question. Acceptance can only emerge if the concrete benefits of the technologies are comprehensible and the employees are actively involved in their development.

A frequently mentioned concern was the necessity for transparency in dealing with digital innovations. Some respondents stated that reservations about digital technologies often stem from a lack of understanding of their added value or from uncertainties in handling sensitive data. Clear and open communication about the advantages as well as about data protection aspects was therefore regarded as central. According to the interviewees, it must be made clear that digital solutions are meant to provide support and by no means to replace staff.

The user-friendliness of digital applications was also a frequent topic. The respondents agreed that systems that are not intuitive and easy to use find little acceptance, even if their benefits have been proven. Digital tools should therefore be designed in such a way that they can be used without difficulty, regardless of the users' technical prior knowledge.

Another central topic was the timing and quality of training. According to the respondents, the introduction of digital applications should be well planned and occur in a timely manner so that there is sufficient time for preparation. Training must take place before the technologies are deployed, be well structured, and contain practical elements. Only in this way can it be ensured that the benefits and functions of the digital systems are understood and applied safely in everyday work.

Several respondents also advocated for the use of mentoring programs and continuous support. Peer support, regular workshops, and the practical use of technologies in a protected setting were described as helpful measures to overcome fears and insecurities. In addition, it was emphasized that employees should be trained to solve problems independently and to correct errors. A sense of security in dealing with digital tools was mentioned by many as a key factor for long-term acceptance.

Overall, the Austrian respondents made it clear that the successful use of digital applications does not depend solely on the technology used but above all on the way in which change processes are shaped. The targeted involvement of employees, the consideration of their concerns, as well as accompanying training and support offerings were regarded as decisive for a successful digital transformation in healthcare.

### **6.1.6 General Recommendations for Action and Solution**

The respondents from Austria, Greece, Italy, and Lithuania named a variety of proposals to promote digital competencies and to support the digital transformation in the health and social sector. Despite country-specific differences in the implementation of individual measures, the statements of the interviewees reflect overarching thematic commonalities that point to comparable challenges and similar developmental needs.

A central concern of all respondents was the expansion of training and further education opportunities. In all four countries, it was emphasized that digital competencies should be systematically integrated into existing educational structures. In doing so, the interviewees placed particular importance on practice-oriented, job-related training courses that are aligned with the concrete requirements of everyday work. In Lithuania and Greece, the respondents particularly advocated for mandatory further training measures and the introduction of nationally coordinated competency frameworks. In Austria, on the other hand, the integration of digital content already in basic training was mentioned as a top priority. The Italian respondents additionally emphasized the importance of low-threshold learning opportunities that specifically target caregivers in peripheral or structurally weak regions.

Across all countries, the interviewees stressed that in addition to formal qualification, motivation, awareness-raising, and individual support are also crucial. The digital transformation was described by many not only as a technological but also as a cultural challenge that requires a rethinking and a

changed professional self-understanding. The respondents therefore advocated for targeted support measures such as peer learning, supervision, mentoring, or interdisciplinary tandems. In Greece and Italy, particular emphasis was placed on the role of so-called digital “champions” or peer networks, while in Austria, multiprofessional teams consisting of nursing and IT, as well as coaching offers, were more in focus. The Lithuanian interviewees, on the other hand, especially emphasized the institutional anchoring of regular interdisciplinary exchange formats.

With regard to the technical and organizational framework conditions, the respondents in all four countries formulated similar requirements. The expansion of digital infrastructure, the improvement of system compatibility, and stable internet connections were repeatedly mentioned as fundamental prerequisites. In addition, the interviewees called for the reduction of bureaucratic hurdles and a legal clarification of central issues such as data protection and responsibilities. In Austria, particular emphasis was placed on the necessity of professional change management and structured interdisciplinary coordination. In Greece and Italy, on the other hand, the respondents frequently criticized the inadequate basic equipment and the lack of technical support in everyday professional life. In Lithuania, the need for uniform digital platforms for cross-sector communication and data use was particularly emphasized.

Another central topic in the statements of the respondents was user centering in the development and introduction of digital technologies. Across all countries, it was emphasized that the acceptance of digital solutions depends crucially on whether the perspectives of care and support staff are included in the development processes from the very beginning. In Austria and Italy, the respondents reported on concrete participatory formats such as living labs, pilot projects, or test phases under real conditions. In Lithuania and Greece, on the other hand, more general demands were made for institutional feedback mechanisms and continuous evaluation processes.

Overall, the statements of the interviewees from all four countries show that comparable challenges exist in the digital transformation of the health and social

sector – and that similar strategies are being proposed to address these challenges. At the same time, differences emerge in the prioritization, institutional implementation, and concrete design of the measures. This diversity can serve as a valuable basis for mutual learning and targeted knowledge transfer in the context of transnational cooperation projects.

## 7 Conclusion

The present work shows that digitalization in the healthcare sector does not merely represent a technological change, but requires a profound structural and pedagogical transformation process. In view of demographic change, the growing need for care, and the increasing shortage of skilled workers, the digital transformation represents a central opportunity to sustainably improve the quality and efficiency of care. It becomes clear that nursing assistants, as a key occupational group in basic care, have so far been insufficiently the focus of the digitalization debate, even though they are significantly involved in care processes.

The analysis of the international framework conditions in Chapter 3 highlights the great heterogeneity of qualifications, legal responsibilities, and areas of activity of nursing assistants within and between the individual countries. Nevertheless, a common trend can be identified across national borders. Nursing assistants are increasingly taking on more responsibility in everyday care, are a link in the interdisciplinary team, and contribute significantly to the quality of care through their close proximity to patients. At the same time, their formal education often remains minimal, which significantly limits their digital participation.

Chapter 4 emphasizes that digital technologies have the potential to ease work processes, increase the quality of care, improve communication, and reduce

administrative hurdles. The results of the interviews conducted in Germany, Greece, Italy, Lithuania, and Austria make clear that nursing assistants perceive digital tools as relieving and quality-enhancing. At the same time, however, it is emphasized that meaningful and safe use is hardly possible without targeted promotion of digital competencies.

Nursing assistants therefore need not only basic skills in IT use, but also a fundamental understanding of data protection, ethical issues of digital communication, and the operation of digital care documentation systems. In addition, they must be able to classify and apply digital technologies sensibly in everyday care – for example, when using mobile devices to monitor vital signs or when communicating with relatives via video calls. The imparting of these competencies requires adapted, low-threshold, and practice-oriented educational formats.

The barriers identified in the course of the work are multifaceted: insufficient technical infrastructure, lack of didactic concepts for digital further education, unclear legal regulations, and a digital divide within the care team. Particularly problematic is the fact that many curricula and further education offers are tailored to academically qualified nursing staff and do not sufficiently take into account the specific needs of assistant staff. This results in an increased risk of digital exclusion, which ultimately not only endangers the employees' confidence in action but can also impair the quality and continuity of care provision.

In summary, it can be stated that digital competencies must become an integral part of nursing assistants' professional self-understanding. Their promotion is not only an educational policy, but also a health policy necessity. Targeted national and European strategies are needed to harmonize legal framework conditions, improve digital infrastructure, and develop pedagogical concepts for the continuing education of this occupational group. Educational institutions have the responsibility to firmly integrate digital competencies into training, while healthcare institutions must create structural prerequisites to be able to apply these digital processes in practice as well.

Only through coordinated interaction between politics, education, practice, and technological development can nursing assistants be qualified for the digital future of care. In doing so, not only will their professional capacity to act be strengthened, but also a decisive contribution will be made to ensuring person-centered and future-resilient care.

## 8 Limitation

Due to the limited research period, it is possible that not all relevant studies were identified and included in the analysis. Moreover, conducting only 34 interviews with participants from different countries and federal states does not allow for conclusions about whether these statements are representative of the general population.

The still limited state of research regarding the digital development of the healthcare system makes it difficult to accurately depict the current situation through a literature review. At present, there are no known studies specifically addressing digital competencies for care assistants. The interviews also reveal that within individual countries, there are varying areas of responsibility and task profiles. This further complicates comparability.

Additionally, many respondents often resorted to general statements and did not explicitly relate their answers regarding digital competencies to care assistants. In the future, further quantitative and qualitative studies will be necessary in this research field to best represent the reality of healthcare provision and to adapt future educational structures accordingly.

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