



Management of Quality of Care in Telehealth Services offered by European Hospitals

Anna Marie Baumgartner

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Professor Dr. Henrique Martins

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Abstract

Title: Management of Quality of Care in Telehealth Services offered by European Hospitals

Author: Anna Marie Baumgartner

Telehealth services are now part of modern healthcare systems. Their adoption, accelerated by the COVID-19 pandemic and the increasing need for accessible and flexible care models, revealed gaps in systematic approaches to quality management in telehealth. This study explores the perspectives of quality managers and telehealth leads in European hospitals, focusing on telehealth adoption, integration, quality assessment, and the utility of structured tools like the WHO Europe Telehealth Quality of Care Tool (TQoCT; 2024). This study employed semi-structured interviews with healthcare professionals from European hospitals to assess the management of telehealth quality and evaluate the applicability of the WHO TQoCT. Thematic analysis was used to identify key barriers, perceptions, and implementation challenges.

Institutional disparities in telehealth adoption reveal fragmented practices, with teleradiology leading integration. Barriers to telehealth adoption and quality assurance include financial constraints, interoperability issues, and regulatory misalignment, underscoring the need for scalable quality management. The TQoCT (2024) offers guidance highlighting telehealth quality indicators but is criticized as a management tool for its resource intensity and inflexibility for diverse needs.

This study emphasizes the need to address financial, technical, regulatory, and organizational barriers while advancing systematic quality assessment, hybrid systems, and technical device therapy. It endorses the WHO (2024) quality dimensions - patient-centeredness, clinical effectiveness, and safety - and promotes scalable, high-quality telehealth integration across diverse European institutions.

Keywords: *Telehealth, Quality Management, WHO TQoCT, Healthcare Integration, Systematic Quality Assessment*

Sumário

Título: Gestão da qualidade dos cuidados de saúde nos serviços de tele saúde prestados por hospitais europeus

Autora: Anna Marie Baumgartner

Os serviços de tele saúde são parte integrante dos sistemas de saúde modernos. A sua adoção, acelerada pela pandemia de COVID-19 e pela necessidade crescente de modelos de cuidados acessíveis e flexíveis, revelou lacunas nas abordagens sistemáticas à gestão da qualidade em tele saúde. Este estudo tem por objetivo explorar as perspetivas dos gestores da qualidade e dos responsáveis de tele saúde de hospitais europeus, centrando-se na adoção, integração e avaliação da qualidade da tele saúde e na utilidade de ferramentas estruturadas como seja a Telehealth Quality of Care Tool (TQoCT) criada pela OMS Europa.

Entrevistas semi-estruturadas com profissionais de hospitais europeus foram utilizadas como método para avaliar a gestão da qualidade da tele saúde e a aplicabilidade da ferramenta TQoCT. Através de análise temática identificaram-se barreiras, perceções e desafios de implementação.

As disparidades institucionais na adoção da tele saúde revelam práticas fragmentadas, com a teleradiologia liderando a integração. As barreiras incluem restrições financeiras, interoperabilidade e desalinhamento legal e regulamentar, salientando a necessidade de uma gestão de qualidade sustentável. A TQoCT (2024) oferece indicadores úteis, mas é criticada por ser inflexível e ser recurso-intensiva.

O estudo enfatiza a necessidade de abordar barreiras financeiras, técnicas e organizacionais, promovendo sistemas híbridos e avaliação sistemática da qualidade. Apoia as dimensões da TQoCT - centralização no doente, eficácia clínica e segurança - e promove uma tele saúde sustentável e de qualidade na Europa.

Palavres-chave: *Tele-saúde, Gestão da Qualidade, TQoCT da OMS, Integração dos Cuidados de Saúde, Avaliação Sistemática da Qualidade*

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List of Abbreviations

AHRQ	Agency for Healthcare Research and Quality
AMA	American Medical Association
CMM	Capability Maturity Model
HER	Electronic Health Record
EMR	Electronic Medical Records
ERIC	Enhanced Recovery after Intensive Care
FHIR	Fast Healthcare Interoperability Resources
ICU	Intensive Care Units
IOM	Institute of Medicine
IoMT	Internet of Medical Things
NQF	National Quality Forum
PDA	Personal Digital Assistant
QoC	Quality of Care
SOP	Standard Operating Procedure
TPS	Total Performance Score
TQoCT	Telehealth Quality of Care Tool
WHO	World Health Organization

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1 Introduction

The rapid expansion of telehealth in Europe, mainly due to COVID-19 pandemic-enforced social distance, has been transforming care delivery and helping to overcome physical restrictions (Aristodemou et al., 2021; Statista, 2023a). However, European hospitals still lag behind those in regions like the U.S., where 76% of hospitals integrate telehealth (American Hospital Association, 2019), or the rapidly growing Chinese healthcare market, which is said to be transitioning to home-based care (Statista, 2023b). This disparity stems from fragmented infrastructure, inconsistent regulations, and funding inequalities, leading to wide variations in adoption and limiting the development and standardization of high-quality telehealth services (Gullslett et al., 2024; Eze, 2020). While existing telehealth research often focuses on benefits, barriers or clinical application (Gajarawala & Pelkowski, 2021; Haleem et al., 2021; Edirippulige & Armfield, 2016), little attention is given to providing structured hospital-specific quality frameworks for telehealth services. Much of the COVID-19-era research prioritized crisis management over sustainable quality improvement (Doraiswamy et al., 2020; Silva et al., 2021), while pilot studies with a specialty focus (Spies et al., 2023) and future-oriented perspectives with a focus on a certain healthcare system (Secer & von Bandemer, 2019) have yet to address a comprehensive quality assurance guide and monitoring tool for telehealth quality of care management in hospitals. As hybrid care models combining virtual and in-person services become more prevalent, there is a growing need to adapt quality metrics in telehealth services to include factors like technological infrastructure, interoperability, digital literacy, and patient safety (WHO, 2024; Demaerschalk et al., 2023) alongside clinical effectiveness or people-centricity.

To address these gaps, the WHO's Telehealth Quality of Care (QoC) Tool offers a framework focusing on people-centered care, clinical effectiveness, and safety (WHO, 2024). While an interesting theoretical proposal, its relevance and applicability to European hospitals with diverse healthcare contexts remains unexplored. This study aims to examine hospital-specific telehealth quality management issues while also evaluating the usability and perception of the WHO QoC Tool. By identifying implementation barriers and exploring its adaptability, this research provides actionable insights for improving telehealth quality and advancing standardized metrics across European healthcare systems.

The following research questions have been outlined for this dissertation:

- RQ 1** *What are hospitals perspectives and practices regarding the management of quality of care in telehealth services?*
- RQ 2** *What are the perceptions of hospital representatives on the usefulness and relevance of the WHO Telehealth Quality of Care (QoC) Tool?*
- RQ 3** *What challenges, potential barriers and improvements do hospitals anticipate when implementing the WHO QoC Tool in assessing telehealth quality?*

2 Background

2.1 Telehealth

According to the WHO (2023), telehealth refers to providing healthcare services where distance separates patients from healthcare providers. It leverages information and communication technologies (ICT) to exchange clinical information, diagnosis, treatment, and health education. Telehealth encompasses various services, including remote patient monitoring, telepsychiatry, teleradiology, teledermatology, and telepathology, facilitating information sharing and clinical consultations (WHO, 2023). Importantly, it plays a critical role in improving healthcare access and advancing universal health coverage goals (WHO, 2023; Kobeissi & Hickey, 2023). There are multiple modalities and typologies for telehealth services: for example, services can be synchronous, involving real-time communication such as video calls for immediate care, or asynchronous, relying on "store-and-forward" technologies that allow information to be shared for later review. These approaches also support remote consultations between healthcare professionals, enabling improved coordination of care (AMA, 2022). The delivery of telehealth services today primarily relies on internet connectivity, frequently leveraging mobile devices. This approach is referred to as the Internet of Medical Things, which integrates technologies and devices into healthcare workflows (Omboni, 2019).

2.2 Telehealth Adoption in European Hospitals

2.2.1 Service Adoption

The adoption of telehealth systems across healthcare organizations can be conceptualized through the Capability Maturity Model (CMM; Figure 2), which provides a structured framework for process improvement. Developed initially to evaluate software development processes, the CMM identifies five progressive levels of maturity that reflect increasing control, standardization, and continuous improvement (Paulk et al., 1993). This structured evolution ensures organizations progress from fragmented processes to integrated, measurable, and sustainable systems. The CMM framework directly applies to understanding telehealth adoption, where organizations are progressing through similar stages of service maturity. Early

adoption mirrors chaotic and inconsistent processes, while higher maturity reflects standardized policies, performance metrics, and ongoing improvements.

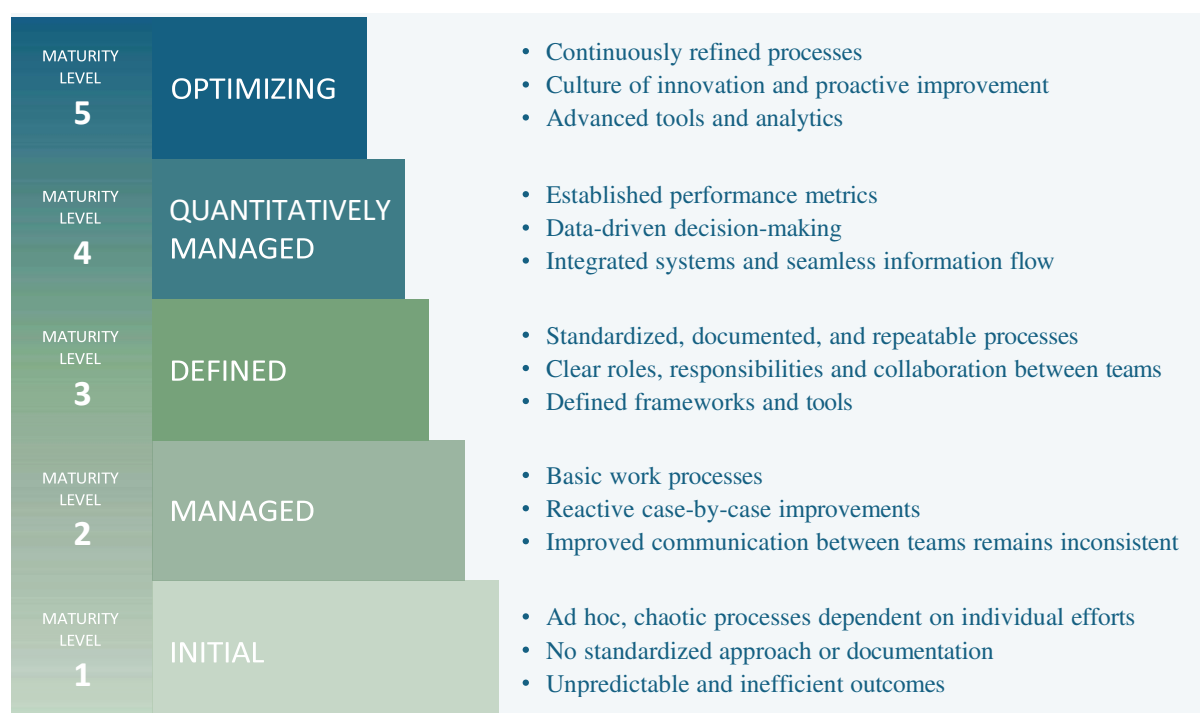


Figure 1: Capability Maturity Model (CMM) for process improvement (Paulk et al., 1993)

2.2.2 National-Level Telehealth Adoption Trends

Telehealth adoption in European hospitals has progressed at varying rates, with significant acceleration during the COVID-19 pandemic. Teleradiology is the most advanced telehealth service, established in 53% of countries and piloted in 31%, followed by telepsychiatry, operational in 42%, and telehealth for chronic disease management, established in 35% but still in pilot stages in 42%. In contrast, telepathology remains less developed, with only 25% of countries having established services and 18.6% in pilot phases (Gullslett et al., 2024). WHO Europe analyzed data from over 20,000 studies across 53 countries involving more than 20,000 patients in collaboration with the University of Oberta de Catalunya (WHO, 2022). The study revealed that 23 member states had conducted evaluations of telehealth, with most studies originating from the United Kingdom (52%), Italy (45%), Denmark (39%), the Netherlands (39%), Germany (24%), and Norway (24%) (Saigí-Rubio et al., 2022). Policy support has played a critical role in telehealth adoption, with 78% of European countries incorporating telehealth into national health strategies and 59% implementing telehealth-specific policies during the pandemic (WHO, 2023). These advancements align with WHO's Global Strategy

(2021) on "*Digital Health 2020–2025*", emphasizing telehealth as a key component of healthcare innovation. While telepsychiatry and teledermatology (established in 42.2% and 28.2% of countries) are gaining traction, teleradiology remains the leading telehealth service. These trends reflect a growing commitment across European countries to integrate telehealth into healthcare systems, enhancing accessibility and continuity of care while addressing the disparities in adoption.

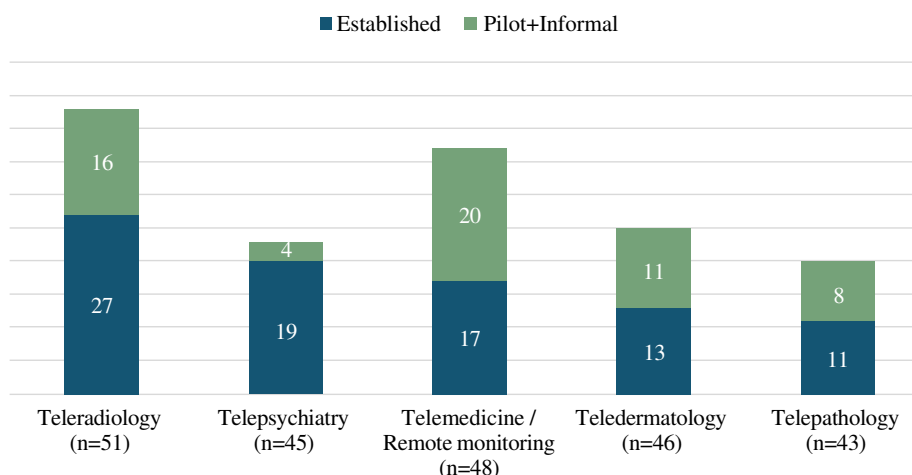


Figure 2: Maturity of telehealth services offered by Member States of the WHO European Region (Gullsløtt et al., 2024)

2.2.3 Variations Across European Countries in Telehealth Application

Telehealth adoption and quality improvement in European hospitals vary widely, shaped by healthcare infrastructure, regulatory frameworks, and funding, with success dependent on robust infrastructure, quality assurance, strategic implementation, sector-specific financing, and improved data interoperability (Totten et al., 2020; NQF, 2017; Secer & von Bandemer, 2019). Next to Estonia, which is leading in digital health integration, Denmark, Spain, the Netherlands, Portugal, and Sweden have embedded telehealth in healthcare policy and standard care, reflecting a high level of integration supported by national digital health strategies (Thiele et al., 2018). For example, Denmark's national telemonitoring system for COPD patients exemplifies coordinated telehealth implementation (Digital Health Strategy, 2018–2022). Video consultations are standard in Denmark, Israel, and the Netherlands, showcasing their commitment to accessible digital care. Conversely, Germany and France display fragmented adoption of telehealth (Thiele et al., 2018). Germany's Digital Healthcare Act has yet to drive consistent telehealth use, though ICU initiatives like ERIC and TELnet@NRW have improved

quality (Spies et al., 2023; Dohmen et al., 2021). France has mandated health data hosting for telehealth and expanded reimbursement policies, yet adoption remains inconsistent across regions (Ministère des Solidarités et de la Santé, 2021). Eastern Europe lags further, with countries like Poland missing the infrastructure and national strategies needed for broad telehealth deployment, ranking lowest in the international comparison. This disparity highlights the divide between Western leaders in telehealth integration and Eastern European countries building foundational frameworks for telehealth (Thiele et al., 2018).

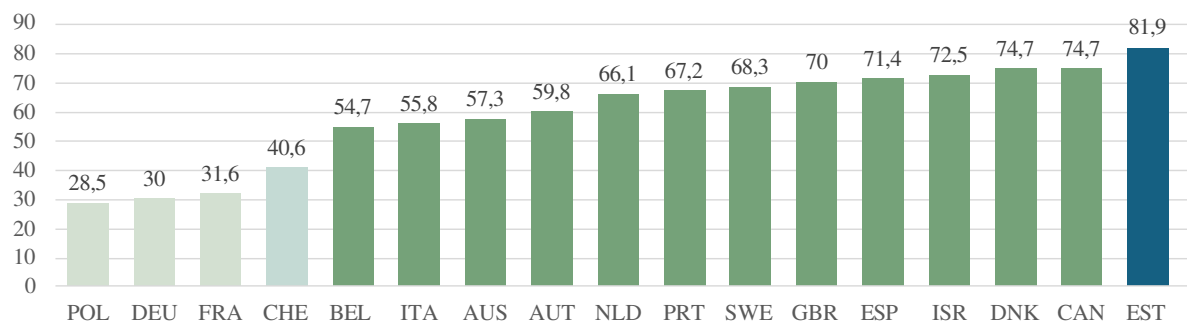


Figure 3: Indices of all countries according to the Smart Health Study (Thiele et al., 2018)

2.3 Quality of Care

Quality of healthcare is defined as the extent to which health services improve desired health outcomes in line with professional standards and knowledge (Donabedian, 2005). This definition emphasizes both clinical effectiveness and adherence to evidence-based practices, a perspective widely accepted and foundational in healthcare evaluation frameworks (Berwick, 2008). However, quality remains complex and context-dependent, shaped by patient expectations, system constraints, and evolving medical advancements (Campbell et al., 2000). The OECD (2019) highlights assessing healthcare quality by identifying gaps, prioritizing improvements, and addressing barriers like the lack of reliable data for policymakers. Healthcare quality strategies should focus on four key functions: primary prevention, acute care, chronic care, and palliative care. Similarly, these strategies emphasize setting standards, monitoring, and assuring improvements while targeting health professionals, technologies, provider organizations, patients, and payers to ensure comprehensive and effective implementation. The Donabedian Triad (2005) evaluates healthcare quality by examining the structure, which encompasses resources and settings, the delivery process and patient health outcomes. The STEEEP model (IOM, 2001) defines healthcare quality through six key dimensions: safety, clinical effectiveness, patient-centeredness, timeliness, efficiency, and

equity. In contrast, the OECD (2019) and WHO (2024) focus on a more streamlined framework, emphasizing safety, clinical effectiveness, and patient-centeredness as the core dimensions of quality (Figure 4).



Figure 4: Domains of Healthcare Quality (IOM, 2001 & OECD, 2019)

2.4 Quality of Care and Telehealth

Virtual approaches should be acknowledged as an extension of care delivery rather than a fundamentally different form of care (Demaerschalk et al., 2023). However, ensuring quality in telehealth requires addressing specific indicators such as psychological safety, technological infrastructure, and patient engagement (WHO, 2024) and balancing digital and physical visibility (Pilosof et al., 2021). Quality measurement systems should be tailored to meet the organization's needs, adhere to national standards, and ensure relevance to the specific medical specialty and telehealth service provided (Demearschalk et al., 2023). Quality assessment in telehealth is crucial, as telehealth services must demonstrate outcomes comparable to or exceeding those of in-person care to be considered effective and valuable (Haveland & Islam, 2022). For example, a German study on ICU telehealth used quality indicators based on national standards such as, for instance, sedation management, ventilation, and infection prevention established by the German Interdisciplinary Society of Intensive Care Medicine. The study found that the telehealth program significantly improved adherence to seven out of eight indicators, demonstrating its potential to enhance process quality in intensive care (Spies et al., 2023).

To best integrate virtual healthcare, future quality assessment must focus on hybrid care models rather than overemphasizing modality comparisons (Pilosof et al., 2021). However, there is still a lack of research on quality in telehealth and well-defined metrics for evaluating it comprehensively (Demaerschalk et al., 2022). While some guidelines exist, such as those from the NCQA, there is no consensus on telehealth-specific standards (NQF, 2017). The NCQA (2020) advises applying existing in-person quality metrics to telehealth settings rather than developing new, telehealth-only standards to avoid placing an additional compliance burden on telehealth programs. Synchronous virtual visits like virtual consultations might fit into existing frameworks with minor changes. A framework such as that put forth by the NQF (2021) leads quality improvement efforts while being mindful of the context and kind of virtual care delivery. Quality assessment in asynchronous telehealth focuses on ensuring data integrity, accuracy, and patient safety across diverse use cases, such as visual-based practices, patient-generated health data, digital care plans, and e-consults, while addressing the unique challenges of non-real-time interactions that require the exchange of medical information between patients and providers (Demaerschalk et al., 2023). Questionnaire tools like the Telehealth Usability Questionnaire (TUQ) and Telemedicine Satisfaction Questionnaire (TSQ), which emphasize satisfaction, usability, and implementation, further support evaluation efforts (Hajesmaeel-Gohari & Bahaadinbeigy, 2021). Demaerschalk et al. (2023; Table 1) illustrate how virtual care quality can be integrated using the Donabedian model aligned with STEEEP domains, ensuring robust oversight.

<i>Concept</i>	<i>Indicator (TQoC)</i>
Structure	Local patients experience teams
	Committees overseeing virtual care quality
Process	Identifying and addressing virtual care risks
	Reporting trends by local teams
	System-wide committees analyzing and addressing trends
Outcome	Patient experiences, such as Net Promoter Score
	Comparing virtual care outcomes with in-person care outcomes

Table 1: Donabedian Model for Assessing Quality of Virtual Care (Demaerschalk et al., 2023)

2.4.1 Telehealth Capabilities

The COVID-19 pandemic emphasized challenges in accessing healthcare due to infection fears, distance, or limited mobility. Telemedicine addresses these barriers by improving access, efficiency, and outcomes, particularly for an aging population with chronic conditions amid healthcare staff shortages (Omboni et al., 2020). Studies show that 85% of physicians report improved care timeliness, with 75% recognizing its high-quality care potential (AMA, 2022). Telehealth reduces costs, minimizes travel, and meets the growing demand for accessible care, positioning it as a sustainable model (Demaerschalk et al., 2023; Kobeissi & Hickey, 2023). It extends care to underserved populations, optimizes chronic disease management, and improves adherence to clinical standards (Secer & von Bandemer, 2019).

Telehealth's capabilities are discussed along the three dimensions of healthcare quality: patient-centeredness, clinical effectiveness, and safety, as defined by the OECD (2019). By prioritizing accessibility and convenience, telehealth enhances patient experience, particularly for rural populations (Ahmad et al., 2021). Satisfaction remains high, with 78% of UK patients reporting telehealth addressing their concerns during COVID-19 (Walley et al., 2024), and 87% of oncology patients prefer remote consultations (Mahtta et al., 2021). However, unreliable internet and limited platform usability negatively affect satisfaction, especially for less tech-savvy users (Hospodková et al., 2021). The lack of physical exams often necessitates hybrid care models that blend virtual and in-person strengths. Telehealth improves clinical effectiveness by enhancing adherence to evidence-based practices and patient outcomes. Chronic disease management benefits significantly, with remote monitoring improving glycemic control and reducing hospital readmissions for heart failure by 25% (Mahtta et al., 2021). Telehealth also enhances safety by minimizing exposure to hospital-acquired infections and enabling continuous critical care monitoring. During COVID-19, TeleICU programs reduced ICU mortality rates by 20%, showcasing the value of remote specialist oversight (Saigí-Rubió et al., 2022). However, reliance on technology introduces risks such as system failures and diagnostic errors. Furthermore, telehealth disproportionately benefits tech-savvy populations, leaving underserved groups at a disadvantage. Addressing these challenges requires investments in infrastructure, user-friendly platforms, and digital literacy programs to ensure equitable access and safe outcomes for all patients (Eze et al., 2020).

2.4.2 Quality of Care Management in Telehealth

The telehealth ecosystem comprises diverse stakeholders, including healthcare providers, insurers, technology firms, regulatory bodies, logistics providers, investors, and governments. Each is important in enabling telehealth services' growth and effective operation. At its center, healthcare providers such as hospitals and clinics integrate virtual care platforms to ensure continuity of care, particularly for non-emergency services (Poonsuph, 2022). Sustained improvement in telehealth requires strong leadership and system-wide collaboration, yet many countries rely on fragmented approaches focused on regulation rather than fostering continuous quality improvement (Gullslett et al., 2024; Eze, 2020). Telehealth often operates within existing institutional frameworks, requiring complex cooperative structures and sector-specific funding, which limits broader adoption. For instance, Tele-Stroke Units succeed within single sectors due to streamlined collaboration despite the high effort required for network development (Secer & von Bandemer, 2019). Healthcare quality can be addressed at two levels: the system-wide level and the provider level, encompassing preventive, acute, chronic, and palliative care services (WHO, 2023). Significant barriers to telehealth adoption exist at both levels, necessitating tailored strategies. This study focuses on hospitals as key providers of telehealth services, emphasizing the critical need to address these barriers for broader adoption and integration (Table 2).

- **Healthcare Systems:** Strategic investments in digital health technologies, including telehealth, can reduce healthcare costs by up to 15% when effectively aligned with system-level and patient-specific outcomes (Chukwu et al., 2023). This finding underscores the importance of accelerating the adoption of telehealth to optimize resource utilization, improve care delivery, and achieve measurable improvements in health system performance. Busse et al. (2019) outline four essential elements of effective healthcare governance: increasing political commitment, promoting the sharing of knowledge and best practices, establishing standardized quality guidelines, and strengthening monitoring for accountability. Integrating telehealth into healthcare systems from a long-term perspective also requires robust policies, national digital health strategies, and reimbursement frameworks (Gullslett et al., 2024). These strategies provide standards and guidance for healthcare providers, patients, and payers, enabling collaboration across health and social sectors (OECD, 2019). Monitoring telehealth implementation is crucial for service design, policy development, and

assessing progress toward universal health coverage. The COVID-19 pandemic highlighted the urgency of evaluating telehealth quality, particularly in comparison to traditional in-person care, which has helped establish best practices and improve overall care quality (Hatef et al., 2024; Schoenfeld et al., 2016; Uscher-Pines et al., 2015). However, standardized quality assessment remains a challenge in telehealth. Frameworks like the NQF (2021) offer some guidance, but the rapid expansion of telehealth means there is still limited evaluation data on its impact on care quality (Halpern-Ruder et al., 2019). The 2022 WHO Europe Digital Health survey showed that only 16% of participating countries conducted evaluations of telehealth services implemented during the pandemic, indicating a lack of regular self-assessment and benchmarking. These tools are relevant for continuous quality improvement in telehealth, ensuring a reliable component for healthcare systems (Gullslett et al., 2024; Chuo et al., 2020).

- **Healthcare Providers:** Quality management within healthcare organizations has grown increasingly complex with the integration of digital health technologies like telehealth, which fundamentally reshape patient-provider interactions and challenge traditional care models (Haleem et al., 2021). Incorporating telehealth into routine workflows is often disruptive, necessitating a focus on core quality dimensions such as safety, effectiveness, and patient-centeredness to ensure meaningful patient benefits (OECD, 2019). Telehealth's cost-effectiveness is pivotal for sustainable adoption, requiring robust financial and operational strategies (Eze et al., 2020). To maximize telehealth's potential, education and continuous digital upskilling of healthcare providers are essential. Structured training programs help maintain high standards of care within this evolving digital landscape (Edirippulige & Armfield, 2016). However, telehealth implementation faces barriers that quality managers must address. Significant obstacles include interoperability issues, digital literacy gaps, and inadequate training (Hospodková et al., 2021). Structural barriers, such as limited reimbursement models and usability challenges, further restrict telehealth's seamless integration into healthcare systems (Eze et al., 2020). Secer & von Bandemer (2019) highlight that telehealth services often require establishing resource-intensive cooperative structures, as existing funding models are usually sector-specific. Specialized telehealth centers have emerged to address these challenges, establishing clear organizational and certification standards. Unlike the "Quantified Self" movement, which focuses on individual data tracking, these centers emphasize professional, medically supervised data collection and analysis.

They also provide tailored coaching and training for patients, often in collaboration with local healthcare providers, ensuring responsibility for patient care remains with treating physicians. Despite initial skepticism, experience has shown that these centers can effectively enhance telehealth service delivery. Nonetheless, technological barriers hinder workflow integration and data standardization due to limited interoperability between devices and systems. Automated data evaluation, for example, identifies critical thresholds and facilitates timely interventions, although integrating patient devices into existing systems remains a bottleneck. Addressing these challenges will require efforts from quality managers to align telehealth capabilities with operational, technological, and financial frameworks while prioritizing care quality and patient outcomes.

Barriers	Macro-level: Healthcare Systems	Micro-level: Healthcare Providers
Technical	Technology (ICT infrastructure)	Technology (hardware and software)
Behavioral	Society	Learning (healthcare workers)
Economical	Policy (reimbursement models)	Core (budget)
Organizational	Policy (planning and promotion of telehealth)	Core (process integration and prioritization)

Table 2: Telehealth Barriers for Healthcare Systems and Healthcare Providers (Tanriverdi & Iacono, 1998 and Khoja et al., 2007)

2.5 Telehealth QoC Management Guidelines in Hospitals

Telehealth demonstrates significant potential to enhance healthcare delivery, but its successful implementation requires structured guidance, robust infrastructure, and rigorous quality assurance to address organizational challenges and ensure equitable adoption (Kobeissi & Hickey, 2023). Zhao et al. (2020) highlight that starting with one or two telehealth services can yield immediate improvements in Total Performance Scores (TPS), enabling hospitals to reduce costs and enhance efficiency when scaling to additional services. Effective strategies should align telehealth capabilities with specific objectives, such as post-discharge monitoring to reduce readmissions and patient engagement tools to improve satisfaction. Policymakers play a crucial role in addressing reimbursement barriers and ensuring the sustainability of telehealth initiatives, particularly for underfunded hospitals, while also leveraging telehealth's ability to alleviate traditional healthcare system burdens during crises like COVID-19.

This work integrates the Organizational Telehealth Program Model, Kotter's Eight Steps of Change, and the standardized Telehealth Quality of Care Tool and proposes a model for promoting TQoC in European hospitals based on the background.

2.5.1 Organizational Telehealth Program Model

The Organizational Telehealth Program Model (Kobeissi & Hickey, 2023; Figure 5) supports building or improving telehealth programs by allowing adaptation to an institution's specific culture and goals. It uses systems theory to address safety, equity, and quality challenges. The model focuses on establishing processes to deliver reliable telehealth services, includes a feedback loop to evaluate and refine practices, and ensures metrics align with both national standards and local needs.

It applies the Donabedian triad (2005) for quality evaluation, categorizing telehealth quality into structure, process, and outcome components. This model's structure is divided into four interconnected levels: Policy and Authority, Organization, Provider, and Patient, each contributing to a robust telehealth infrastructure aimed at safe and equitable access to care (Kobeissi & Hickey, 2023). The Policy and Authority level includes federal and state regulations, professional guidelines, and compliance requirements, setting standards for licensing, reimbursement, and data security. The organization focuses on internal policies, telehealth governance, and information technology compliance, underscoring the need for accredited systems and clear guidelines for safe and equitable telehealth delivery. The model focuses on provider education, credentialing, and participation in telehealth committees at the provider level to ensure consistent, high-quality remote care (Demaerschalk et al., 2023). Finally, the patient level addresses digital accessibility, literacy, and usability to ensure that all patients, particularly vulnerable populations, can effectively engage with telehealth services. The process component translates these structural elements into actionable practices, such as standardized provider training, patient triage protocols, and adherence to safety guidelines. These processes are intended to operationalize high standards of care and facilitate effective remote interactions. The outcome section encompasses continuous monitoring and evaluation, with quality metrics suited to each model level. This feedback mechanism allows for regular adjustments based on outcome data, promoting an iterative process of improvement that aligns with national standards and local needs (Kobeissi & Hickey, 2023).

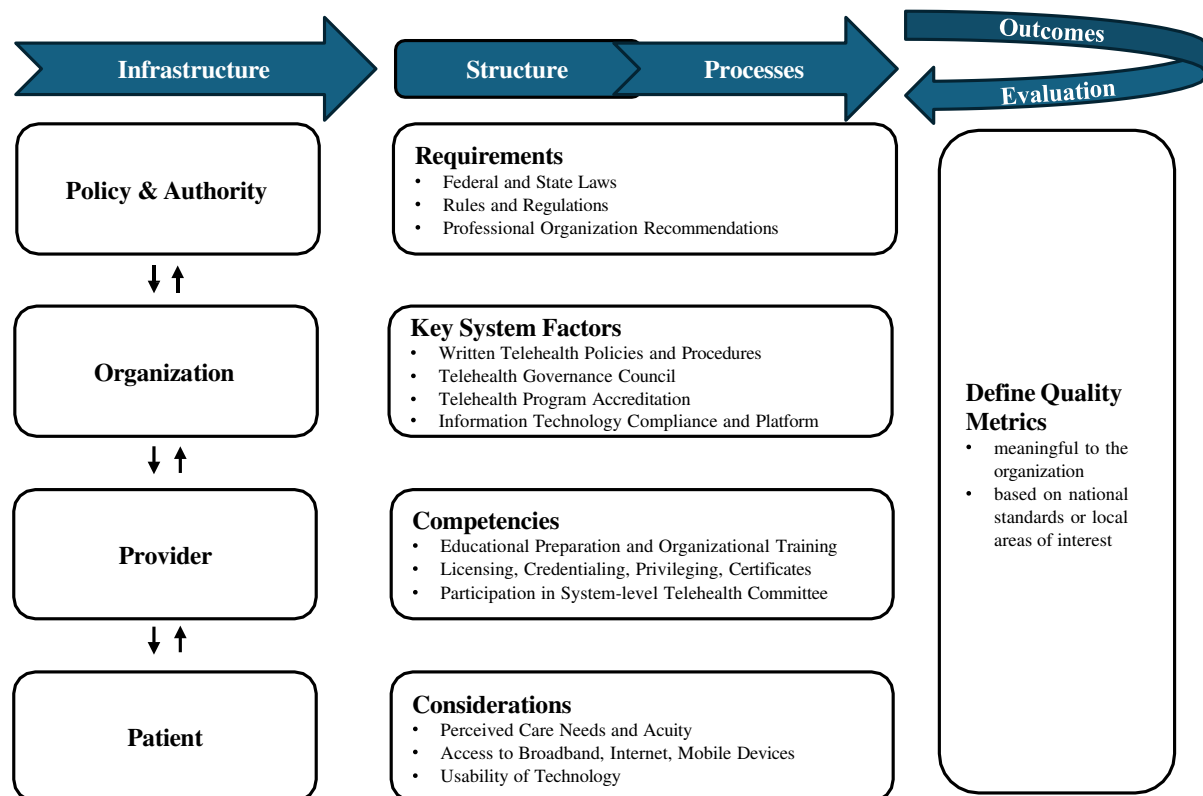


Figure 5: Organizational Telehealth Program Model (Kobeissi & Hickey, 2023)

2.5.2 Kotter's Eight Steps of Change

Effective change management is crucial for implementing telehealth and other digital healthcare innovations. Hospodková et al. (2021) analyzed the application of change management strategies in hospitals across five European countries, including Germany, Czech Republic, Austria, Slovakia, and Hungary, to understand how digital healthcare innovations are adopted. The findings suggest that only 58% of healthcare managers employed formal change management tools, with Kotter's (1996) eight-step model being the most used framework. However, notable variations in awareness, application, and outcomes were observed across countries, primarily due to staff resistance and reliance on intuitive rather than structured approaches. Many hospitals lack systemic approaches, with only 59% of managers reporting strategies to address resistance to change. Hospodková et al. (2021) highlight the growing emphasis on IT and digital innovation, cited by 88% of respondents as the most common change initiative. Leadership also plays a key role, with respondents identifying top management as the primary authority overseeing change management processes. This fact calls for strong and clear leadership to drive innovation and address barriers, such as staff resistance and workflow disruptions, ensuring successful implementation. According to Kotter (1996), the model allows

for early identification of potential errors, poorly designed processes, and subjects not ready for change. This proactive approach ensures minimized risks and enhanced likelihood of success. Small et al. (2016) also emphasize the framework's solid structure and ease of understanding for employees, which fosters alignment and engagement. Incorporating employee feedback enhances the system's functionality and stakeholder acceptance.

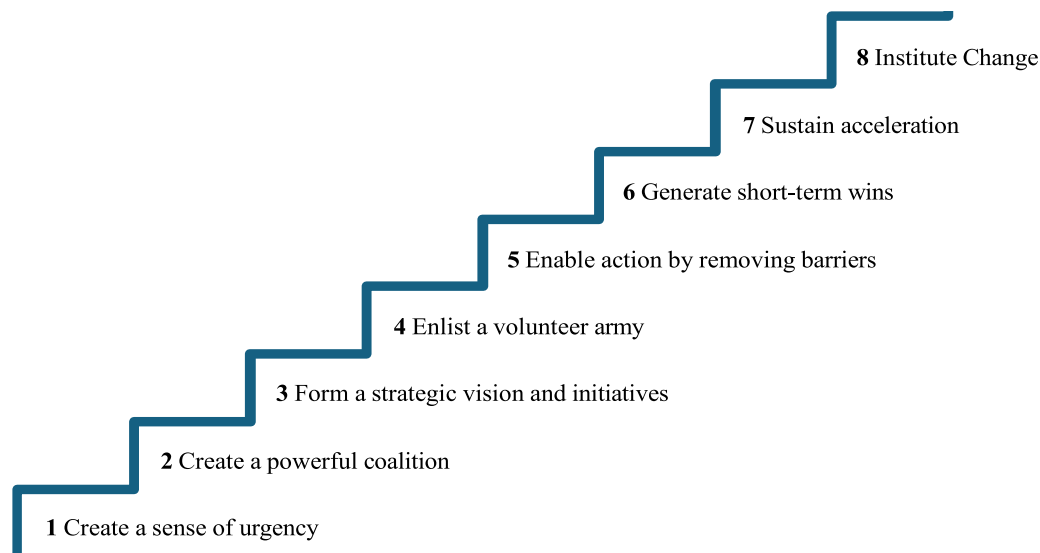


Figure 6: Kotter's Eight Steps of Change (Kotter, 1996)

2.5.3 WHO Telehealth Quality of Care Tool

The WHO Europe developed the Telehealth Quality of Care Tool (TQoCT; 2024) as a key advancement in standardizing quality assessment and guiding telehealth services. This framework is intended to evaluate and enhance telehealth quality at national and organizational levels, emphasizing three primary dimensions: people-centricity, clinical effectiveness, and safety. The TQoCT focuses on assessing quality aspects while recognizing the need for complementary tools to cover financial impact or business continuity. However, it is notable that the TQoCT, first published in 2024, is still in its early stages and is expected to undergo updates every two years as it evolves.

The TQoCT is structured as a self-assessment tool designed for national policymakers and healthcare organizations. It includes 16 questions with versions modified for national or organizational assessment, rated on a 5-point maturity scale. This setup enables healthcare entities to monitor their progress in telehealth quality over time and facilitates benchmarking against similar organizations or national objectives. The questions span various subdomains

under each primary dimension, providing a comprehensive approach to evaluating telehealth services. To show the assessment criteria that the WHO deems relevant, Figure 7 provides an overview of the tool's structure and additionally proposes a mapping with the established Donabedian model (2005):

- The people-centricity dimension includes that telehealth should assess patient satisfaction integrated into existing quality measurement tools or via feedback tools like pop-up surveys (Kidholm et al., 2017). High-quality, accessible information tailored to varying digital literacy levels, including paper formats, is vital (Kidholm et al., 2017). Applications must follow the user-centered design, provide training, and meet ISO 13131:2021 standards for equitable access and usability (Perry et al., 2021). Infrastructure ought to ensure interoperability, security, and alignment with use cases like teleradiology while addressing low digital literacy through education, as only half of the European countries have policies for this (Perry et al., 2021). Strong communication, platform reliability, and adherence to ethical principles are critical for transparent, patient-centered care (NQF, 2017).
- The clinical effectiveness dimension concerns whether telehealth achieves comparable outcomes to conventional care. It includes workforce preparedness, diagnostic accuracy, and impact on mortality, morbidity, and patient quality of life (Kidholm et al., 2017). These metrics ensure that telehealth is clinically reliable and that healthcare providers are adequately trained to deliver effective remote care. Additionally, it reviews healthcare resource utilization to prevent overuse or underuse of telehealth services (NQF, 2017).
- In the safety dimension, the TQoCT examines data privacy, system reliability, and emotional safety for both patients and providers. Key areas include cybersecurity measures to protect patient data, operational reliability, and governance to oversee telehealth systems (NCQA, 2020; Perry et al., 2021). Psychological and emotional safety are also prioritized, ensuring a supportive and comfortable environment for telehealth interactions.

For effective implementation, the WHO recommends creating a response team to discuss answers based on obtained data and documents collectively. This approach promotes socialized knowledge and mutual understanding among stakeholders (WHO, 2024), enhancing the tool's effectiveness in real-world settings. This collaborative approach allows healthcare providers to identify improvement areas across dimensions and subdomains, supporting ongoing quality enhancement. To ensure effective implementation, the TQoCT requires mandatory and optional contributors (see p. 8-9; WHO, 2024). At the organizational level, the tool is a structured approach to evaluate telehealth practices, helping to identify gaps and guide quality

improvement efforts. It offers a visualization along a five-point grid for all dimensions to support organizations in tracking progress, encouraging continuous improvement in telehealth services.

<i>Dimensions</i>	<i>Domains</i>	<i>Subdomains</i>	<i>Donabedian Model</i>
People – centrality	Patient's perspective	Satisfaction/experience and acceptance	Outcome
		Understanding of information and trust	Process
		Capacity to use the application/accessibility	Process
	Access	Appropriate technological infrastructure	Structure
		Digital literacy	Structure
	Communication	Communication	Process
	Access to care	Access for patient, family, and/or caregiver	Process
	Experience	Care team member experience	Outcome
	Financial impact/cost	Financial impact on health system or payer	Outcome
Clinical effectiveness	Ethical principles	Promotion and marketing	Process
	Care management and population health	Workforce preparedness	Structure
	Diagnostic accuracy	Diagnostic accuracy	Outcome
	Clinical effectiveness – effects on patients' health	Effects on mortality, morbidity, health-related quality of life, and habits and behaviors	Outcome
Safety	Use of healthcare service	Use of healthcare service	Outcome
	Operational and infrastructure integrity	Privacy and security	Structure
	Psychological and emotional safety	Psychological and emotional safety	Process
	Governance and financial issues	Governance	Process
		Business continuity	Process

Figure 7: Structure of the Telehealth Quality of Care Tool (WHO, 2024) and Identification according to the Donabedian Triad (2005)

2.6 Model for Promoting Telehealth Quality of Care in European Hospitals

Building on the insights from the background, the author proposes a model for promoting TQoC in European hospitals. This model focuses on key dimensions such as adaptive frameworks, technological infrastructure, and patient-centered care. It excludes financial and reimbursement aspects and prioritizes actionable strategies directly relevant to hospital practices and quality management. The model is summarized in Figure 8.

- **Adaptive Quality Frameworks:** Structured evaluation frameworks, such as the TQoCT, provide a robust method for assessing telehealth services across key quality dimensions: people-centricity, clinical effectiveness, and safety (WHO, 2024). Benchmarking quality metrics allows hospitals to identify gaps, promote accountability, and align with international standards like ISO 13131:2021 (Kidholm et al., 2017). Additionally, by integrating feedback loops and benchmarking practices, hospitals can refine workflows, enhance service quality, and adapt telehealth solutions to meet evolving patient and operational needs (Demaerschalk et al., 2023).
- **Technological Infrastructure and Interoperability:** Technological barriers, including system failures and poor interoperability, hinder telehealth adoption and clinician efficiency (Hospodková et al., 2021). Addressing these issues through secure and compliant platforms improves operational reliability and documentation accuracy (AMA, 2022). Enhancing real-time troubleshooting mechanisms and ensuring GDPR compliance further strengthens hospital telehealth systems. Scaling telehealth systems also optimizes resource allocation, achieving significant cost savings, such as €2.5 million annually in documented case studies (Kidholm et al., 2017).
- **Standardized Quality Metrics:** Benchmarking enables hospitals to compare their performance and adapt accordingly (Demaerschalk et al., 2023). To ensure comprehensive quality monitoring, hospitals should implement metrics for structures, processes and outcomes (Donabedian, 2005).
- **Hybrid and Patient-Centered Models:** Hybrid care models, combining in-person and virtual care, improve chronic disease management outcomes and treatment adherence (McKinsey & Company, 2020). Hospitals incorporating patient-centered features, such as multilingual interfaces, pre-visit instructions, and patient feedback mechanisms, report improved satisfaction and trust in telehealth services. Hospitals addressing language barriers, supporting individuals with disabilities, and reducing digital

inequalities achieve higher telehealth adoption rates, especially in underserved populations (WHO, 2024).

- **Digital Literacy and Tailored Training:** Ongoing training for clinicians and patients significantly improves telehealth proficiency. Clinician training has increased proficiency by 22% (Edirippulige & Armfield, 2016), while structured patient education reduces drop-off rates and supports engagement (NQF, 2017). Tailored training programs addressing communication, troubleshooting, and data security compliance enhance workflow efficiency (Eze et al., 2020).
- **Systematic Change Management:** Strategic leadership and visible mentorship programs increase telehealth adoption by fostering clear communication and alignment across stakeholders (NQF, 2017). Hospitals implementing change management strategies reduce resistance and delays, promoting a smooth integration of telehealth into daily workflows (Kotter, 1996). A culture of continuous improvement ensures telehealth's success (Kobeissi & Hickey, 2023).

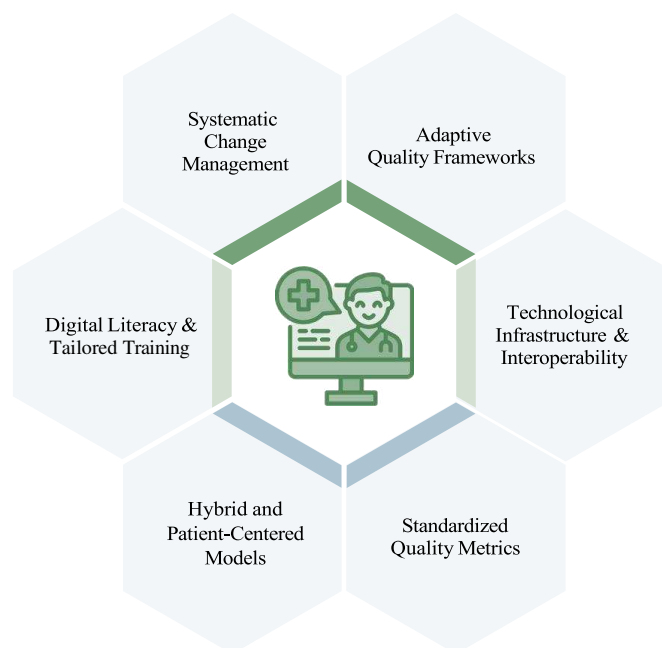


Figure 8: Model for Promoting TQoC in European Hospitals

3 Research Methodology

The qualitative methodology used in this research emphasizes exploring meaning over statistical generalization, offering an in-depth understanding of emerging phenomena (Bryman, 2012; Denzin & Lincoln, 2005). This approach is particularly suited to studying complex, poorly understood issues, as it captures behaviors, opinions, and social contexts through methods like interviews (Creswell, 2007; Strauss & Corbin, 1998). Qualitative research generates new insights by focusing on subjective interpretations, enabling flexible inquiry and innovative solutions grounded in participants' realities (Punch, 2013; Patton, 2002). Hospitals were chosen as the focus because of their key role in the current uptake of telehealth (Poonsuph, 2022).

3.1 Qualitative Data Collection

Representatives from European hospitals offering telehealth services were invited to focus groups to test and provide feedback on an adaptive telehealth quality framework, specifically the 2024 WHO TQoCT. Due to the limited availability of senior staff, particularly for sessions requiring both implementation and feedback, the approach shifted to semi-structured interviews (n=11), which lasted one hour and were conducted by a single interviewer (AMB). Recruitment involved targeted outreach via the WHO network, direct email invitations to European healthcare providers, and collaboration with digital health innovation centers. Semi-structured interviews were chosen for their flexibility and ability to address complex research topics requiring expert insights (Barriball & While, 1994). This approach enriched the data's depth by enabling participants to focus on what they deemed most relevant (Braun & Clarke, 2006). The interview guide (Appendix 1) was developed based on the proposed model rooted in the elaborated background (see 2.6).

Key discussion topics included:

- Maturity of telehealth services & current approaches to TQoC management in European hospitals
- Guidelines for TQoC management in Hospitals: quality indicators, best practices, and common pitfalls
- Perceptions of adaptive quality frameworks, particularly the WHO TQoCT (2024)

Participants (n=11; Table 3) were selected for their research expertise in telehealth service design, quality management in European hospitals, or their professional experience implementing telehealth solutions.

ID	Profession	Category	Country
CD1	Director of Endocrinology and Telehealth Advocate	Clinical Director	Portugal
CD2	Deputy Clinical Director at a top 10 globally ranked hospital	Clinical Director	Germany
CD3	Assistant Clinical Director in Teleradiology	Clinical Director	Austria
CD4	Director of Outpatient Services at a nationally leading hospital	Clinical Director	Latvia
MI1	Professor of Medical Informatics	Medical Informatics Expert	Austria
MI2	Data and Analytics Coordinator	Medical Informatics Expert	Belgium
TE1	Associate Professor of Medical Informatics	Telehealth Expert	Italy
TE2	Healthcare Transformation Researcher at a top 10 globally ranked hospital	Telehealth Expert	Israel
TE3	Telemedicine Cardiologist and Founder of a national Telemedical Institute	Telehealth Expert	Italy
TE4	Cardiologist and Founder of a Telemedical Center at a top 30 globally ranked hospital	Telehealth Expert	Germany
TE5	Chief Medical Innovation Officer at a top national hospital	Telehealth Expert	Estonia

Table 3: Overview of Interview Participants

3.2 Data Analysis

The focus of the thematic analysis was to evaluate the interviews based on the six pillars of the authors' proposed model for promoting TQoC management in hospitals: *Adaptive Quality Frameworks, Technological Infrastructure and Interoperability, Digital Literacy and Tailored Training, Hybrid and Patient-Centered Models, Standardized Quality Metrics, and Systematic Change Management*. *ATLAS.ti* was used to assign code groups and specific codes (Figure 9) to systematically analyze the data, enabling a structured understanding of topics. This approach also allowed for exploring diverse quality indicators and their relevance across expert

perspectives. Given the interviewees' varying experience and expertise in telehealth services, it was essential to analyze their interactions with telehealth systems. Specifically, the maturity of telehealth services, current TQoC management approaches, and hospital guidelines were examined. Additionally, feedback on the relevance and practical applicability of the *TQoCT* was analyzed to identify strengths and areas requiring further refinement.

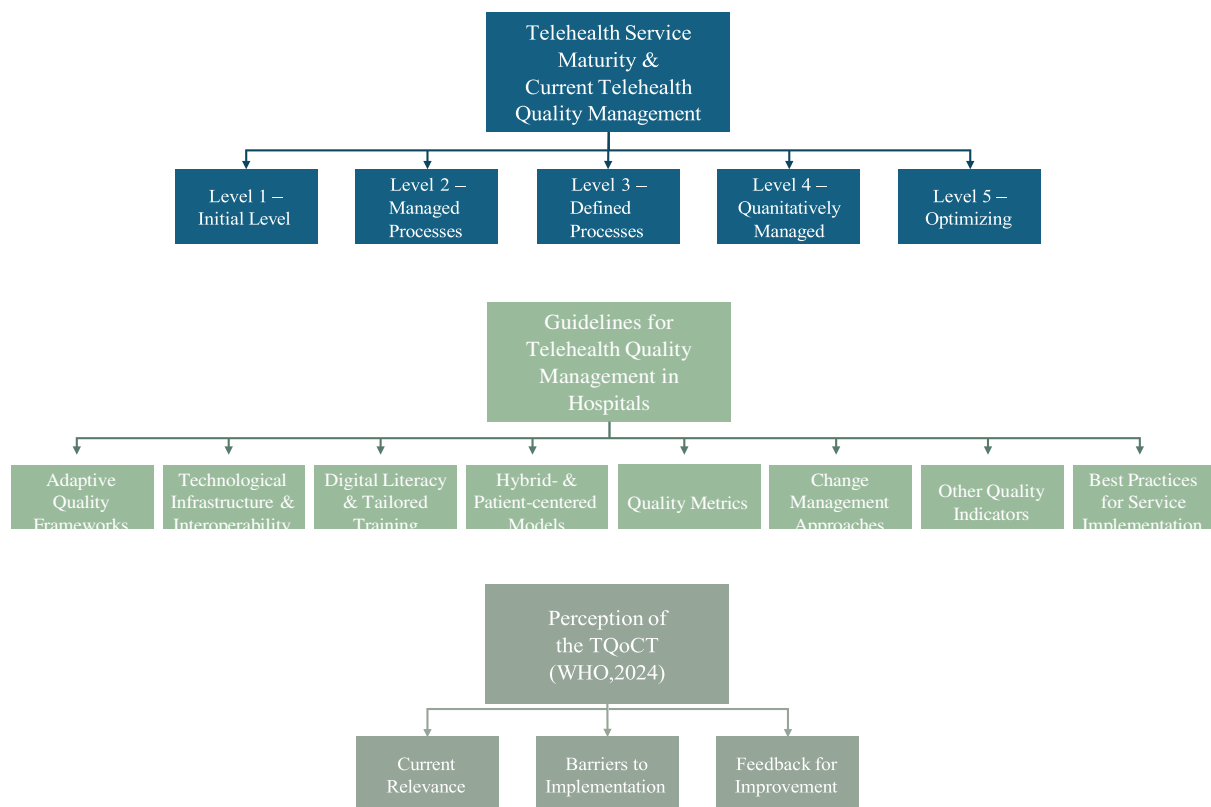


Figure 9: Code Structure for Data Analysis

4 Results

4.1 Telehealth Services

The interviews highlight a broad range of telehealth services, showcasing diverse clinical applications, technologies, and patient specialties. Several pilot projects and telehealth networks stand out for their innovative approaches and potential for scalability.

<i>Interviewee Code</i>	<i>Telehealth Services Discussed</i>
TE3, TE4, CD1	Cardiac Telemonitoring: Continuous monitoring for heart failure using external sensors (ECGs, blood pressure monitors, weight scales)
TE1, TE4, TE5	Teleoncology: Managing chemotherapy side effects via remote monitoring, video consultations, and online platforms
CD3	Teleradiology: Remote radiological image analysis for diagnostics
CD1, CD3, CD4	Teledermatology: Remote diagnosis of skin conditions using high-resolution imaging and tele-screening tools
CD4, TE2	Telerehabilitation: Post-operative and remote rehabilitation using camera-based systems for guided recovery
TE2, TE5	Telepsychology: Mental health consultations using video platforms
TE2, TE4	Virtual Wards and Home Hospitalization: Monitoring chronic diseases and conditions like heart failure through wearable devices

Table 4: Telehealth Services Discussed in the Interviews

Telehealth technologies mentioned included remote consultations via telephone or video calls (CD1, CD2, TE3, TE4, TE5), wearable devices for monitoring vital signs like ECG and blood pressure (TE1, TE4), telemedical robots for remote bedside exams (CD2), and remote ultrasound tools for pregnant women (TE2). Secure telehealth apps protect patient data and enable remote consultations (TE3), while web-based platforms support chronic disease management and professional collaboration (TE3). Immersive technologies enhance remote interactions among healthcare providers (CD2). Networks such as Tele-ICU provide second opinions for intensive care internationally (CD2), multidisciplinary case discussions improve complex care (CD2), and virtual wards enable home-based monitoring through cross-hospital collaboration (TE2). Radiotherapy networks facilitate treatment planning (CD1), while telehealth networks ensure secure, collaborative care delivery (TE3, CD2).

4.2 Telehealth Adoption

Telehealth service adoption in European hospitals shows great variation between institutions and even between clinical specialties. This finding is described to be rooted in dependencies on national policies, motivated staff and user acceptance (TE5). These challenges are mainly practical implementation barriers rather than a lack of research or technical development (TE5). Tailoring telehealth solutions to the organization's needs results in uneven adoption and slower progress across institutions (TE5). At the policy level, the goal is to make healthcare affordable and sustainable (MI1), but progress is slowed by variability in resources, priorities, and funding systems across European healthcare systems (TE5). Differences in healthcare structures, patient care access, and payment models make universal solutions impractical (TE5). While some healthcare systems deprioritize telehealth, others pursue independent approaches, hindering consensus. Improving the QoC is primarily an aim of healthcare providers whose practices are significantly impacted by the healthcare system in which they function (MI1).

- Telehealth success in hospitals is said to rely on national regulatory prioritization (CD1, CD2, CD4, MI2, TE1, TE2, TE3, TE4). For example, initial telehealth regulations were designed for doctor-to-doctor consultations, not for direct patient-doctor interactions, limiting their applicability in modern healthcare settings (CD1). In some institutions, the absence of specific legislation creates uncertainty and potential legal risks. As one Clinical Director from Latvia highlighted:

"In our country at the moment, we do not have any legislation about telehealth. If the patient is a good lawyer and there happens to be a misunderstanding, we would not know if we did it correctly or not" (CD4).

Where regulations exist, they can impose rigid structures that hinder practical implementation. For instance, in a German institution, clinicians are required by law to use electronic patient messaging services instead of simpler alternatives like emails or PDFs (TE4). These mandates, while ensuring data protection, can slow down adoption by increasing complexity (TE4). Austrian efforts are underway to revise telehealth regulations, with the health ministry specifying digital health maturity indicators. However, challenges arise when certain requested metrics are difficult or impossible to measure (MI2). Israel is described as a notable example of regulatory prioritization to support telehealth scalability. Faced with shortages of patient beds, healthcare resources,

and human resources, the Ministry of Health adopted regulations to enable flexible telehealth solutions. This proactive approach positions Israel five to ten years ahead of Europe in addressing these systemic challenges (TE2).

- Governance structures (CD2, CD3, MI1, MI2, TE1) are essential for telemedicine's successful integration, ensuring compliance, coordination, and adoption across institutions (TE1). Effective governance combines top-down leadership with bottom-up engagement, aligning oversight with practical implementation (CD2). Governance frameworks ensure regulatory compliance, such as adherence to GDPR, while addressing challenges like resource allocation and stakeholder coordination (MI1, CD2). However, governance often struggles to keep pace with innovation (MI2). While large organizations benefit from advisory boards and structured processes, smaller institutions face difficulties implementing comprehensive governance systems (CD3). Even advanced telemedicine programs risk underutilization without adequate oversight, as highlighted: *"There is no point in establishing a costly telemedicine program if no one uses it"* (CD2). Addressing this gap ensures telemedicine's long-term success and integration (TE1).
- Reimbursement frameworks and financial incentives (CD2, MI1, MI2, TE2, TE3, TE4) are relevant for telehealth integration into standard care. As one Clinical Director explained:

"Financial impact is often where telehealth services fail in the end. It costs money and does not generate any money in return" (CD2).

Doctors require systems to bill telehealth services equivalently to in-person care. Temporary adjustments during COVID-19 allowed video consultations to be reimbursed, but permanent solutions are needed to maintain telehealth's viability (MI1). The disparities in reimbursement rates remain a challenge. In some systems, teleconsultations are reimbursed at half the rate of in-person visits (MI2). Additionally, hospitals lack incentives to prioritize preventive care, as their revenue relies on admissions (MI2). For telemonitoring, financial sustainability is critical but slow to achieve. A telehealth expert noted that implementing heart failure monitoring took over a decade to secure reimbursement (TE4). Similarly, national telemonitoring initiatives in Italy face persistent funding gaps (TE3). To broadly implement telehealth services, reimbursement is highlighted as a critical factor:

"We have 1,000 patients online and employ four nurses solely on telemonitoring. Their salaries must be financed. If there is no financial support, you can, of course, be as "crazy" as we are and fund it via third-party money, but for standard care, reimbursement is essential" (TE4).

4.3 Telehealth Service Maturity & Current Telehealth Quality Management

Telehealth service management across European hospitals demonstrates significant variability, following the progression outlined by the Capability Maturity Model (CMM). A continuum of maturity levels was found, from unstructured implementation to advanced systems focusing on continuous improvement and innovation.

- At the Initial Stage (CD1, CD3, CD4), telehealth in hospitals remains fragmented, reactive, and informal, with no structured processes, governance, or quality assurance. Infrastructure gaps and outdated regulations further limit adoption. In this context, telehealth is very limited in scope (CD1), with progress hindered by the absence of mature regulatory frameworks (CD4). Evaluations of telehealth services are largely anecdotal, relying on direct conversations with patients rather than structured assessment processes (CD1). This lack of institutional oversight prevents strategic growth and systematic improvements.
- At the Managed Stage (MI2, TE3, CD4), telehealth adoption occurs at the project or departmental level, driven more by individual initiatives than institutional strategies. Services and Medical Device Quality Assurance often lack integration into broader hospital systems and as described, *"teleconsultations happen under the radar"* (MI2). Progress is hindered by technical issues, usability challenges, and limited resources, with ongoing difficulties slowing implementation (TE3). Financial barriers, such as inadequate reimbursement models, also restrict growth, where teleconsultations are reimbursed at only half the rate of in-person visits (MI2).
- At the Defined Stage (CD2, MI1, TE4), telehealth processes become standardized and institutionalized, supported by clear governance frameworks and quality controls. Long-term telemonitoring programs emphasize the importance of interdisciplinary coordination and structured evaluation: *"Quality assurance was central, especially during the pilot phase"* (MI1). Standardized frameworks, such as FHIR, are adopted to enhance interoperability and ensure efficient data-sharing for primary health data (MI2). Additionally, Standard Operating Procedures (SOPs) are implemented to regulate key

clinical processes and ensure consistent service delivery. Ethical standards, for example, dictate that life-ending diagnoses must be delivered face-to-face rather than through telemedicine (CD2). Financial sustainability also becomes a priority, with governance structures focused on securing adequate funding and ensuring stability within the system (CD2).

- At the Quantitatively Managed Stage (CD2, CD3, TE3, TE4), telehealth systems implement structured, data-driven processes to ensure consistent quality. ICU telemonitoring tracks multiple indicators daily during ward rounds (CD2). The reliance on data accuracy is central, as noted: *"If there is no data, you are just measuring approximations"* (CD2). In teleradiology, workflows are optimized with secure systems and rapid reporting using automatic speech recognition (CD3). Quality care depends on case managers and nurses for smooth operations (TE3), while peer reviews and external evaluations enhance accountability and guide improvements (CD2).
- At the Optimizing Stage (TE4, TE3, TE2), telehealth systems advance through data-driven processes, integrating wearables for real-time monitoring and leveraging virtual hospitals as organization-wide initiatives. Hybrid care models, developed over more than two years, demonstrate scalability from pilots to systematic operations (TE2). Adaptability and analytics drive refinement, though financial sustainability remains a key challenge (TE4).

4.4 Guidelines for Telehealth Quality Management in Hospitals

Telehealth evaluations traditionally rely on scientific study designs focused on clinical endpoints and measurable outcomes (CD2). While effective in ensuring precision, these approaches often overlook broader real-world benefits, such as improved patient experience and resource efficiency (TE5). Current evaluations, like those in cardiac telemonitoring, emphasize metrics such as hospitalization and transmission rates (CD2, TE4). However, a shift toward value-based and application-focused assessments is needed to realize telehealth's potential fully. As noted, *"Telehealth is evaluated in clinical studies, but telehealth brings other benefits, like saving patients time and resources"* (TE5). Earlier evaluations centered on technology and clinical effectiveness, but recent approaches increasingly emphasize usability, accessibility, and psychological safety (T1, CD2, TE5). Trust in technology, data security, and clinician competence remains imperative for adoption by patients and providers (TE2). Evaluating telehealth as part of a socio-technical system is important for integrating technology

into workflows, decision-making processes, and care delivery pathways (MI1). Tools like logic models provide insights into interdependencies and capture the optimal conditions under which telehealth is most impactful (MI1).

Best practices for effective telehealth implementation include conducting initial consultations in person to build trust, ensuring accurate diagnoses, and reserving telehealth for follow-ups (CD4, TE3). Telehealth tools should remain simple and practical to maximize time-saving benefits (CD1). Evaluations are required to balance quantitative metrics, like hospitalization rates, with qualitative insights, such as user feedback and real-world challenges (TE5, MI1). Collaborative telehealth networks demonstrate how structured coordination and motivated teams can drive sustained improvements across facilities (CD2, MI1). While scientific precision remains crucial (CD2), value-based assessments align better with telehealth's potential to enhance care quality, efficiency, and patient satisfaction.

4.4.1 Adaptive Quality Frameworks

The WHO TQoCT (2024), an adaptive quality framework, was recognized by interviewees as a guide for identifying critical telehealth quality dimensions (CD1, CD2, CD4, MI1, MI2, TE1, TE2, TE5). Experts valued its ability to ensure that "*relevant quality indicators are not overlooked*" (TE5). However, adoption readiness varies, with institutions finding the tool too advanced for their current telehealth maturity (CD1, CD4). Smaller organizations face significant challenges, including resource and personnel limitations, which hinder effective implementation (CD4).

Hospital representatives emphasized the need for specific guidelines for specialties or conditions to improve clinical relevance, as requirements differ across patient groups, such as elderly patients in internal medicine versus pregnant women monitored at home (CD1, MI2, TE2). Others appreciated the generic framework, noting that many issues are similar across settings (CD2). Some changes to the response team were noted as external representatives, such as industry partners, were deemed unnecessary, as their input is already incorporated into purchased telehealth products (TE4). Experts also highlighted that board involvement should be streamlined, focusing on initial approval and results, while implementation is managed by those directly involved in the telehealth program (CD2, TE5). The tool's structured approach was praised for enabling progress visualization (CD2, CD3, TE1) but criticized for over-reliance on quantitative self-assessment (MI1). Qualitative insights, particularly free-text feedback, are relevant to capture a more comprehensive picture of telehealth quality (MI1).

Improvements should focus on aligning terminology with clinical standards for clarity (TE4) and aligning the tool with national frameworks to support broader scalability and consistency (MI2). Ultimately, the TQoCT has the potential to serve as an endorsement tool, helping providers demonstrate the quality of their telemedicine services once refined and validated (TE1).

4.4.2 Technological Infrastructure and Interoperability

Adequate technological infrastructure is essential for telehealth as it assures usability, integration, and secure data exchange (CD2, MI1, TE3). Hospital platforms must support robust telehealth systems, but infrastructure gaps remain, especially in smaller facilities (CD2). While radiology benefits from secure tools like VPNs (CD3), patient-facing telehealth struggles with usability issues such as complex authentication processes reducing accessibility (MI1). Widely used platforms like Zoom and Teams fail to evolve for clinical purposes, highlighting the necessity of systems that align with real-world constraints, as "*telemedicine systems must not assume perfect networks or infinite resources*" (TE1). Data exchange is deemed substantial, with Electronic Medical Records (EMRs) enhancing clinical workflows through structured information flows, though interoperability challenges persist (MI2). Hospitals require tools capable of real-time and structured data transmission (TE3). Affordable and usable systems must be adapted to clinical demands to support adoption (TE3, TE4). Data protection is another cornerstone of telehealth, requiring compliance with regulations like GDPR and strong cybersecurity measures to safeguard patient data (CD3, CD4, MI1, MI2, TE1, TE3, TE4). Secure infrastructures, such as VPNs and password protocols, are necessary but insufficient when non-compliant tools like WhatsApp are used (MI1). Secure telehealth environments meet cybersecurity risks and should be integrated with electronic patient records to avoid fragmented data management (MI2, TE4). Regulatory frameworks must define and meet compliance standards to maintain patient and provider trust (CD4, TE1, TE3).

Interoperability assures seamless data exchange and improves care efficiency (CD3, MI2, TE3, TE4). Standards like FHIR facilitate structured data sharing for primary care and research (MI2). However, fragmented implementation highlights barriers such as inefficient systems and poor user design, undermining progress (TE3, TE4). For success, telehealth systems must balance compliance, usability, and technical integration to create connected, efficient workflows (CD2, TE3).

4.4.3 Standardized Quality Metrics

The adoption of standardized quality metrics in telehealth is considered uneven, with limited implementation in early-stage programs and varying relevance across specialties (CD2, CD4, MI1, TE3, TE4). In the initial stages, quality monitoring is often seen as a secondary priority, with one representative suggesting that *"quality monitoring might become a topic in two years, once doctors have more experience"* (CD4). The lack of precise requirements is viewed as a source of ambiguity, as hospitals rely on existing processes rather than implementing standards for telehealth (CD2). In more advanced settings, process indicators and practical measurement tools are recognized as central to quality evaluations, for example, using eight process indicators for ICUs for structured ward rounds (CD2). Targeted reporting of hospitalization rates, adverse events, and quality of life improvements for cardiac patient monitoring offers measurable benefits for insurers and healthcare systems (TE4). These metrics are perceived as valuable for demonstrating cost savings and improving outcomes, driving interest in their broader application (TE4).

Challenges such as documentation burdens are described as *"bottlenecks"* that add to doctors' workloads (CD4). Furthermore, digital maturity assessments are criticized for including indicators viewed as difficult to measure (MI2).

4.4.4 Hybrid and Patient-Centered Model

Usability and patient acceptance are recognized as essential for telehealth adoption (TE3, MI1). Simplified and well-designed tools are needed to engage patients and providers (TE3). Additionally, focusing on socio-technical systems is seen as necessary for evaluating how telehealth integrates into workflows rather than focusing solely on technology (MI1). One expert states that *"the focus on data safety often excludes concerns about the safety and usability of the tools themselves"* (TE3). Complex interfaces and multi-step authentication processes present significant barriers, particularly for older adults or individuals with limited digital literacy (MI1). Trust is foundational, as *"patients need to feel confident that the doctor understands them and that the system itself is safe"* (MI1). Addressing these challenges requires tools that are intuitive, easy to use, and supported by ongoing patient education and technical assistance (CD4, MI2). It is highlighted that *"Trust can save resources and reduce inefficiencies, such as repeated emergency room visits"* (TE2). Hybrid care models, which integrate in-person and virtual care, are described as practical solutions for managing diverse patient needs,

particularly in chronic disease care. These models reduce travel burdens, enable frequent follow-ups, and provide flexibility for patients and providers (TE2, TE4). Virtual consultations are also valued for their ability to uncover insights into patient behavior and family dynamics, particularly in mental health care, where home settings can reveal patterns that may remain hidden during clinic visits (TE2, MI2). Feeling safe and comfortable at home is a key factor that boosts patient satisfaction and engagement (MI2). Home care programs are gaining traction globally, with an institution from Israel demonstrating their success through cost savings and maintained quality of care supported by trained telenurses (MI1, TE2). Decisions regarding home care require more than just clinical considerations, as factors such as the patient's ability to manage technology, the suitability of their home environment, and the presence of family support impact effective implementation (TE2). Emotional benefits, including reduced stress and improved recovery in familiar surroundings, are frequently highlighted as advantages of home care models (MI1, TE2). Telehealth systems must align with clinical priorities, balancing convenience and flexibility with the medical necessity to deliver meaningful improvements in patient outcomes (TE3, MI2).

4.4.5 Digital Literacy & Tailored Training

Quality of care in telemedicine hinges on upskilling and tailored training (TE3, CD1, CD2, MI2) of doctors and teams to change workflows. Structured training and written guidelines are helping smooth adoption (CD4, CD2). The relevance of new skills in virtual care becomes apparent as *"delivering telehealth care is very different from in-person care, requiring a shift in mindset and new skills"* (TE3). New skills emerge due to the change in the patient-provider relationship, and they contain technical support for patients, device therapy, and home hospitalizations. Empowering nurses as intermediaries between patients and physicians to manage telemonitoring and basic consultations independently establishes effective care delivery while reducing the workload for doctors (TE2, MI1).

Comprehensive on-site training for telemedicine devices was emphasized to assure staff competence (CD2). Training must be contractually secured in a network service between hospitals to guarantee consistency (CD2). Specialized telehealth providers must combine clinical expertise with technical proficiency: *"This cardiologist must not only be a specialist but also hold the specialized training in device therapy"* (TE4). Changing workflows also demand proactive support, as IT-trained staff are needed to manage technical issues like connection problems during virtual care delivery (MI2).

Staff motivation heightens the success of telehealth training programs, as engaged teams are more likely to adopt and implement new practices (CD1, CD2). Successful programs often rely on individuals who take the initiative to self-train and actively participate. Digital literacy is highlighted as an important factor for both staff and patients. While younger clinicians are generally seen as competent, IT support is crucial for helping patients facing challenges with virtual tools (MI2). Barriers such as age, limited health literacy, and difficulties with human-computer interaction are identified as obstacles to wider telehealth adoption (MI1).

4.4.6 Systematic Change Management

Implementing telehealth frameworks requires structured leadership, targeted strategies, and effective system integration (CD2, TE4, TE2). Strong leadership sustains networks and maintains program continuity. Standardized processes are considered necessary to reduce variability and ensure consistent delivery across different settings (CD2). Clear frameworks help institutionalize telehealth programs and provide the foundation for scalability (TE4). Local champions often play a significant role in advancing initiatives, though reliance on individual efforts is noted as a limitation for achieving consistent and sustainable implementation (CD1, TE4). Structured strategies and institutional backing are recommended to address these limitations and ensure broader adoption (TE4, CD2). Focusing telehealth initiatives on specific patient groups, such as those with chronic illnesses, is highlighted as an effective approach to demonstrate clear benefits and improve resource efficiency (TE1, TE3, TE2). Integration with existing systems is viewed as important for reducing provider workload, avoiding duplicative workflows, and ensuring that telehealth aligns with broader clinical practices (MI1). Collecting patient and provider feedback allows for real-world adjustments that align telehealth delivery with clinical goals and user expectations for long-term success (CD2, TE3).

5 Discussion

This chapter contextualizes the interview findings within the broader literature on telehealth adoption and quality management. By analyzing insights from experts across multiple European countries with varying levels of telehealth maturity, this section highlights key themes, areas of consensus, and contradictions to derive meaningful implications for hospital-specific telehealth quality management.

5.1 Main Findings

RQ 1 *What are hospitals' perspectives and practices regarding the management of quality of care in telehealth services?*

Hospitals' approaches to managing telehealth quality reveal significant variation between institutions and specialties, shaped by service maturity and resource availability (Paulk et al., 1993). The level of maturity depends on national policies, motivated staff, governance structures, reimbursement frameworks, and user acceptance. These aspects show that the challenges are mainly practical rather than due to a lack of research or technical development. Early-stage programs often lack structured frameworks and rely on individual efforts. Evaluations are based on informal patient conversations, and quality monitoring is currently irrelevant. This aligns with broader literature indicating that fragmented implementation hinders scalability (Gullslett et al., 2024; Eze, 2020). More advanced organizations incorporate structured frameworks integrating quality indicators into daily workflows. Process indicators ensure consistent ward rounds and adherence to evidence-based practices. This approach reflects findings where structured processes improve care quality and clinical outcomes (Demaerschalk et al., 2023; Spies et al., 2023). Hybrid care models were emphasized as the desirable but mostly unmatched modality for hospital digital services. These models play a role in reducing patient travel burdens while maintaining continuity of care. These findings resonate with Thiele et al. (2018), who identify hybrid approaches as essential for balancing virtual and in-person care.

RQ 2 *What are the perceptions of hospital representatives on the usefulness and relevance of the WHO Telehealth Quality of Care (QoC) Tool?*

Hospital representatives view the WHO TQoCT as an adaptive framework with the potential to enhance telehealth quality management, particularly in benchmarking and guiding evaluations. The telehealth quality indicators can serve as a checklist even for experienced teams. However, smaller institutions consider the tool excessively resource-intensive and overly complex, making it unsuitable for organizations in the early stages of telehealth implementation. Feedback emphasized the importance of adapting the tool to the specific needs of different care contexts. Metrics for teleradiology involving asynchronous workflows differ significantly from those required for patient-facing synchronous care, suggesting the need for clear differentiation. This observation aligns with Demaerschalk et al. (2023), who highlight the distinct requirements in synchronous versus asynchronous care quality. The NCQA (2017) advises using in-person quality frameworks for synchronous virtual evaluations to reduce compliance burdens, raising doubts about the necessity and justification for developing a dedicated TQoCT (WHO, 2024). Structuring indicators based on the Donabedian model (2005) could leverage an established quality framework, promoting familiarity and easing integration into existing quality management practices. Reimbursement and financial aspects were identified as significant omissions. While the WHO (2024) excluded these considerations from the tool, stating they are addressed by other guidelines, hospital representatives argue that without incorporating financial sustainability, the tool risks limited adoption and practical applicability. Moreover, Saigí-Rubio et al. (2022) emphasize the importance of financial metrics in driving telehealth implementation and ensuring its long-term viability. Concerns were raised about the reliance on subjective quantitative metrics, such as the one-to-five maturity scale, as qualitative feedback is perceived to provide more meaningful and actionable insights.

RQ 3 *What challenges, potential barriers and improvements do hospitals anticipate when implementing the WHO QoC Tool in assessing telehealth quality?*

The barriers to implementing an adaptive quality framework, such as the TQoCT, mirror the challenges of telehealth adoption, as quality management often becomes relevant only after telehealth services or networks are well-established and providers have gained sufficient experience. A recurring recommendation is simplifying the tool's implementation process, making it more accessible and adaptable for diverse institutional contexts. Integrating the

TQoCT into existing workflows is particularly complex, as simplified, context-specific response teams are needed to facilitate its implementation. This insight aligns with the background, highlighting the importance of streamlined planning and prioritization in telehealth processes (Khoja et al., 2007). Continuous iteration is viewed as essential to ensure the tool evolves alongside telehealth practices and institutional needs. Despite these challenges, the TQoCT holds significant potential to drive continuous improvement if refined to include specialty-specific metrics, differentiation between care modalities, and alignment with national frameworks. This result aligns with the WHO's (2024) perspective that the tool should remain iterative, undergoing regular development to meet the demands of a rapidly evolving telehealth landscape. Further recommendations are addressed to the WHO in the following section (see 5.2.4).

5.2 Implications and Recommendations

5.2.1 Hospitals Using Telehealth

To improve the hospital's telehealth operations, interdisciplinary coordination and transparent governance structures must be prioritized. Hospitals should adopt a top-down leadership approach, paired with bottom-up engagement, to ensure alignment and foster collaboration across teams. SOPs are critical for regulating clinical workflows, while ethical standards and sustainable funding form the foundation for continuous improvements. Additionally, hospitals should adopt structured quality frameworks, such as the Donabedian model (2005), to ensure systematic and comparable evaluations. Hospitals must leverage data-driven processes and external evaluations, such as peer reviews, to identify areas for enhancement. Integrating hybrid care models, including virtual hospitals, should be actively explored to improve flexibility and accessibility in patient care. These innovations require hospitals to implement robust process indicators, measurement tools, and targeted reporting mechanisms to monitor performance and outcomes effectively. Telehealth systems within hospitals must align with the standards of in-person care, ensuring compliance with clinical protocols and avoiding non-compliant tools. To maximize the benefits of telehealth in hospitals, a shift toward value-based and application-focused assessments is essential. Embedding quality control into routine care processes can help hospitals scale telemedicine services and deliver consistent, high-quality outcomes. Evaluations should emphasize usability, accessibility, and psychological safety alongside

traditional metrics such as hospitalization rates. Hospitals can use tools like logic models to identify and address interdependencies within telehealth as a socio-technical system, ensuring evaluations reflect real-world benefits such as patient satisfaction and resource efficiency. Collaborative networks between hospitals should be developed to share best practices and reduce variability in telehealth quality management. These networks can foster consistency across facilities, enabling hospitals to improve telehealth implementation and outcomes collectively.

Patient trust and acceptance are critical for telehealth success in hospital settings. Hospitals must invest in patient education and technical assistance to support telehealth adoption, particularly for home hospitalization programs. Special attention should be given to assessing the suitability of home environments and the availability of social support systems to ensure patients receive adequate care. Moreover, it is necessary to invest in the upskilling of hospital staff. On-site, contractually secured training programs should focus on building technical expertise and device management skills as well as empowering nurses to take on enhanced roles. These measures will equip hospital staff to navigate new technologies and workflows effectively.

Hospitals must adopt structured leadership and targeted strategies for change management. Local adaptations within individual hospital settings are necessary to integrate telehealth systems seamlessly. Hospital policymakers and managers should focus on specific patient groups, such as those with chronic illnesses, to maximize the impact of telehealth initiatives. Patient feedback should be actively collected to refine telehealth processes and ensure alignment with patient needs.

5.2.2 Telehealth Technology Providers

As a result of these findings, telehealth technology providers should prioritize standardized frameworks, such as FHIR, to improve interoperability and data sharing. Solutions must also be designed to function under real-world network constraints, ensuring reliability in diverse settings. Ensuring secure data transfer through EMR integration and strict GDPR compliance will build trust and uphold legal standards. Additionally, intuitive, user-friendly interfaces with simple authentication processes are essential to drive adoption and usability.

Providers must deliver systems that integrate seamlessly into existing healthcare infrastructures to maximize impact, minimize disruption and enable efficient telehealth deployment.

5.2.3 National Health Policymakers and Regulators

National health policymakers and regulators must establish clear telehealth legislation to reduce legal risks and uncertainties, fostering broader adoption. Policies should incorporate modern use cases like doctor-to-patient consultations to align with current healthcare demands. Regulations should balance data protection with flexibility, enabling innovation without unnecessary rigidity. Practical metrics must be implemented to measure digital maturity and guide telehealth adoption effectively. Reimbursement models should ensure coverage for services, including nurses, caregivers, and devices, promoting equitable access. Additionally, regulatory frameworks must define data security and infrastructure compliance standards to ensure consistency and safety. These actions will create a supportive environment for telehealth, improving healthcare delivery and driving system-wide innovation.

5.2.4 WHO

The WHO should refine and expand the Telehealth Quality of Care Tool (TQoCT) to address its current limitations and enhance its utility. Differentiating quality indicators for synchronous and asynchronous care, such as telemonitoring, is recommended for accurate assessments. Additionally, tailoring guidelines to specific specialties and conditions will improve the tool's clinical relevance and applicability across diverse patient populations. Streamlining administrative processes supports efficient implementation. The WHO should revise its suggested response team composition by limiting senior-level involvement, emphasizing the role of telehealth core teams in quality assessments, and excluding external representatives to maintain focus and avoid unnecessary complexities. Qualitative feedback, such as free-text responses, is necessary to complement self-assessment metrics and provide a more nuanced evaluation of telehealth services. Aligning the tool with national telehealth frameworks and reimbursement models will ensure its sustainability and relevance across healthcare systems. Furthermore, a simplified version of the TQoCT should be developed to address resource constraints faced by smaller organizations. At the same time, modifications should be made to accommodate institutions at varying stages of telehealth maturity. Positioning the TQoCT as an endorsement framework will help demonstrate telehealth service quality to stakeholders and patients, increasing its impact. Finally, integrating principles from established frameworks, such as Donabedian (2005), will ensure systematic and consistent evaluations across healthcare settings (Figure 7).

5.3 Limitations and Future Work

The findings of this study should be interpreted considering specific limitations. While the interview sample included diverse stakeholders from European hospitals at various telehealth adoption stages, it does not represent all hospitals across the region. The reliance on qualitative interviews provided valuable insights but may be influenced by subjective biases. The semi-structured format allowed for flexibility but resulted in variability, with some themes emphasized based on participants' roles and institutional contexts. Additionally, the evolving nature of telehealth adoption means the findings often reflect ongoing or pilot-stage projects rather than mature systems. The translation of interviews from German into English posed challenges, potentially losing nuances or cultural specifics despite efforts to ensure accuracy. Future research should expand the sample size to include a broader range of stakeholders, such as policymakers, IT experts, and providers from underrepresented regions. Comparative studies across healthcare systems could identify factors like funding models, regulatory frameworks, and infrastructure readiness driving telehealth success. Further research should also investigate the long-term outcomes of integrating telehealth into regular care, focusing on clinical effectiveness, patient satisfaction, and cost-efficiency through quantitative studies. Specialty-specific applications, such as telemonitoring in cardiology or postpartum care, should be explored to uncover unique challenges and opportunities. Efforts should address barriers highlighted in this study, including financial sustainability, interoperability, and staff training. Evaluating the WHO Telehealth Quality of Care Tool in diverse hospital settings would provide insights into its adaptability and relevance. Promoting its adoption among hospitals and policymakers could enable benchmarking, and translating the tool into national languages would further enhance accessibility and standardization. By addressing these gaps, future studies can contribute to more scalable, sustainable, and standardized telehealth adoption across Europe.

6 Conclusions

This study explored telehealth quality management in European hospitals, focusing on the applicability of the WHO Telehealth Quality of Care (QoC) Tool. Semi-structured interviews with hospital representatives, telehealth experts, and medical informatics professionals provided insights into barriers, opportunities, and the maturity of telehealth systems. A thematic analysis revealed the following key findings:

- **Telehealth Service Maturity:** Hospitals are at varying stages of telehealth maturity, ranging from unstructured, early-stage programs to advanced systems integrating structured frameworks, process indicators, and continuous improvement strategies. Models like the Capability Maturity Model (Paulk et al., 1993) and Donabedian Triad (2005) can guide hospitals in transitioning from pilot projects to integrated, standardized care, emphasizing continuous improvement and evidence-based practices.
- **Implementation Barriers:** Technical challenges (e.g., interoperability and infrastructure gaps), behavioral resistance (e.g., digital literacy and training deficits), economic limitations (e.g., insufficient reimbursement models), and organizational issues (e.g., workflow integration) hinder telehealth adoption and quality management.
- **Hybrid Care Models:** Hybrid care models, which balance virtual and in-person care, emerged as a preferred approach. They enhance accessibility, improve chronic disease management, and address the limitations of entirely virtual or in-person care models.
- **Training and Leadership:** Tailored training programs and strong leadership are critical for successful telehealth integration. Programs focusing on communication, technical skills, and workflow adjustments are essential for overcoming resistance and ensuring high-quality care delivery.
- **Perceptions of the WHO Telehealth Quality of Care Tool:** The TQoCT offers structured quality assessments focusing on people-centricity, clinical effectiveness, and safety. However, it requires refinement for diverse hospital contexts, simplified implementation, and specialty-specific adjustments. While the tool offers a strong foundation for telehealth quality management, its resource intensity and lack of specialty-specific guidelines limit its practicality.
- **Iterative Tool Refinement:** The TQoCT requires iterative development to improve usability and relevance. Key improvements include differentiating between synchronous and asynchronous care and aligning with national frameworks.

The study underscores the importance of promoting telehealth quality in hospitals through tailored frameworks, standardized processes, and continuous refinement of tools like the WHO QoC Tool. Hospitals can advance telehealth adoption by addressing technical, organizational, and financial barriers and establish high-quality, patient-centered care across diverse healthcare contexts.

7 Bibliography

- Ahmad, F., Wysocki, R. W., Fernandez, J. J., Cohen, M. S., & Simcock, X. C. (2021). Patient perspectives on telemedicine during the COVID-19 pandemic. *Hand*, 18(3), 522–526. <https://doi.org/10.1177/15589447211030692>
- AMA. (2022). Telehealth implementation playbook. American Medical Association. Retrieved from <https://www.ama-assn.org>
- American Hospital Association. (2019). Fact Sheet: Telehealth. Retrieved from <https://www.aha.org/factsheet/telehealth>
- Aristodemou, K., Buchhass, L., & Claringbould, D. (2021). The COVID-19 crisis in the EU: The resilience of healthcare systems, government responses and their socio-economic effects. *Eurasian Economic Review*, 11, 251–281. <https://doi.org/10.1007/s40822-021-00166-1>
- Barriball, K. L., & While, A. (1994). Collecting data using a semi-structured interview: a discussion paper. *Journal of Advanced Nursing*, 19(2), 328–335.
- Berwick, D. (2008). Quality of care. *The Health Care Delivery System*, 50.
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101. <https://doi.org/10.1191/1478088706qp063oa>
- Bryman, A. (2012). *Social research methods* (4th ed.). Oxford University Press.
- Busse, R., Klazinga, N., Panteli, D., & Quentin, W. (2019). Improving healthcare quality in Europe: Characteristics, effectiveness and implementation of different strategies (Health Policy Series No. 53). European Observatory on Health Systems and Policies, OECD.
- Campbell, S. M., Roland, M. O., & Buetow, S. A. (2000). Defining quality of care. *Social Science & Medicine*, 51(11), 1611–1625. [https://doi.org/10.1016/S0277-9536\(00\)00057-5](https://doi.org/10.1016/S0277-9536(00)00057-5)
- Chukwu, E., Mechael, P., Edelman, J. K., & Layer, E. (2023). The state of digital health 2023. HealthEnabled and Global Development Incubator. Retrieved from <https://www.who.int/initiatives/global-initiative-on-digital-health>
- Chuo, J., Macy, M. L., & Lorch, S. A. (2020). Strategies for evaluating telehealth. *Pediatrics*, 146(5), e20201781. <https://doi.org/10.1542/peds.2020-1781>
- Creswell, J. W. (2007). *Qualitative inquiry and research design: Choosing among five approaches* (2nd ed.). Sage Publications.
- Demaerschalk, B. M., Hollander, J. E., Krupinski, E., Scott, J., Albert, D., Bobokalonova, Z., Bolster, M., Chan, A., Christopherson, L., Coffey, J. D., Edgman-Levitan, S., Goldwater, J., Hayden, E., Peoples, C., Rising, K. L., & Schwamm, L. H. (2023). Quality frameworks for virtual care: Expert panel recommendations. Mayo Clinic

- Proceedings: Innovations, Quality & Outcomes, 7(1), 31–44.
<https://doi.org/10.1016/j.mayocpiqo.2022.12.001>
- Denzin, N. K., & Lincoln, Y. S. (2005). *The SAGE handbook of qualitative research* (3rd ed.). Sage Publications.
- Dohmen, S., Benstoem, C., Wahl, A., Offermann, A., & Marx, G. (2021). Qualitätssteigerung in der Intensivmedizin durch Telemedizin: Beispiel TELnet@NRW [Quality improvement in intensive care through telemedicine: The TELnet@NRW example]. Thieme Connect. <https://doi.org/10.1055/a-1288-4587>
- Donabedian, A. (2005). Evaluating the Quality of Medical Care, *The Milbank Quarterly*, 83(4):691-729.
- Doraiswamy, S., Abraham, A., Mamtani, R., & Cheema, S. (2020). Use of telehealth during the COVID-19 pandemic: Scoping review. *Journal of Medical Internet Research*, 22(12), e24087. <https://doi.org/10.2196/24087>
- Edirippulige, S., & Armfield, N. R. (2016). Education and training to support the use of clinical telehealth: A review of the literature. *Journal of Telemedicine and Telecare*, 22(7), 347–353. <https://doi.org/10.1177/1357633X16632968>
- Eze N.D., Mateus C., Cravo Oliveira Hashiguchi T. (2020). Telemedicine in the OECD: An umbrella review of clinical and cost-effectiveness, patient experience and implementation. *PLoS ONE* 15(8): e0237585.
<https://doi.org/10.1371/journal.pone.0237585>
- Gajarawala, S. N., & Pelkowski, J. N. (2021). Telehealth benefits and barriers. *The Journal for Nurse Practitioners*, 17(2), 218–221. <https://doi.org/10.1016/j.nurpra.2020.09.013>
- Gullslett, M. K., Ronchi, E., Lundberg, L., Larbi, D., Lind, K. F., Tayefi, M., Ngo, P. D., Sy, T. R., Adib, K., & Hamilton, C. (2024). Telehealth development in the WHO European region: Results from a quantitative survey and insights from Norway. *International journal of medical informatics*, 191, 105558.
<https://doi.org/10.1016/j.ijmedinf.2024.105558>
- Haleem, A., Javaid, M., Singh, R. P., & Suman, R. (2021). Telemedicine for healthcare: Capabilities, features, barriers, and applications. *Sensors international*, 2, 100117.
<https://doi.org/10.1016/j.sintl.2021.100117>
- Halpern-Ruder, D., Chang, A. M., Hollander, J. E., & Shah, A. (2019). Quality assurance in telehealth: Adherence to evidence-based indicators. *Telemedicine and e-Health*, 25(7), 599–605. <https://doi.org/10.1089/tmj.2018.0149>
- Hatef, E., Wilson, R. F., Zhang, A., Hannum, S. M., Kharrazi, H., Davis, S. A., Foroughmand, I., Weiner, J. P., & Robinson, K. A. (2024). Effectiveness of telehealth versus in-person care during the COVID-19 pandemic: A systematic review. *npj Digital Medicine*, 7(1), Article 1152. <https://doi.org/10.1038/s41746-024-01152-2>

- Haveland, S., & Islam, S. (2022). Key considerations in ensuring a safe regional telehealth care model: A systematic review. *Telemedicine and e-Health*, 28(5), 602–612. <https://doi.org/10.1089/tmj.2020.0580>
- Hospodková, P., Berežná, J., Barták, M., Rogalewicz, V., Severová, L., & Svoboda, R. (2021). Change management and digital innovations in hospitals of five European countries. *Healthcare*, 9(11), 1508. <https://doi.org/10.3390/healthcare9111508>
- IOM. (2001). *Crossing the quality chasm: A new health system for the 21st century*. Washington, DC: National Academy Press.
- Khoja, S., Scott, R. E., Casebeer, A. L., Mohsin, M., Ishaq, A. F., & Gilani, S. (2007). e-Health readiness assessment tools for healthcare institutions in developing countries. *Telemedicine journal and e-health: the official journal of the American Telemedicine Association*, 13(4), 425–431. <https://doi.org/10.1089/tmj.2006.0064>
- Kidholm, K., Clemensen, J., Caffery, L. J., & Smith, A. C. (2017). The Model for Assessment of Telemedicine (MAST): A scoping review of empirical studies. *Journal of telemedicine and telecare*, 23(9), 803–813. <https://doi.org/10.1177/1357633X17721815>
- Kobeissi, M. M., & Hickey, J. V. (2023). An infrastructure to provide safer, higher-quality, and more equitable telehealth. *The Joint Commission Journal on Quality and Patient Safety*, 49(4), 213–222. <https://doi.org/10.1016/j.jcjq.2023.01.006>
- Kotter, J. P. (1996). *Leading change*. Harvard Business Review Press.
- Mahtta, D., Daher, M., Lee, M. T., Sayani, S., Shishehbor, M., & Virani, S. S. (2021). Promise and Perils of Telehealth in the Current Era. *Current cardiology reports*, 23(9), 115. <https://doi.org/10.1007/s11886-021-01544-w>
- McKinsey & Company. (2020). *Telehealth: A quarter-trillion-dollar post-COVID-19 reality?* McKinsey & Company. Retrieved from <https://www.mckinsey.com/industries/healthcare/our-insights/telehealth-a-quarter-trillion-dollar-post-covid-19-reality>
- Ministère des Solidarités et de la Santé. (2021). Dossier de presse - Stratégie d'accélération Santé numérique. Retrieved from <https://sante.gouv.fr/archives/archives-presse/archives-dossiers-de-presse/article/strategie-d-acceleration-sante-numerique>
- NCQA. (2020). Findings and recommendations: Patient safety and program integrity. Retrieved from <https://www.ncqa.org/programs/data-and-information-technology/telehealth/taskforce-on-telehealth-policy/taskforce-on-telehealth-policy-findings-and-recommendations/>
- NQF. (2017). *Creating a framework to support measure development for telehealth: Final report*. U.S. Department of Health and Human Services. <https://www.qualityforum.org/WorkArea/linkit.aspx?LinkIdentifier=id&ItemID=83618>

- NQF. (2021). Rural telehealth and healthcare system readiness measurement framework: Final report. Retrieved from <https://www.qualityforum.org/WorkArea/linkit.aspx?LinkIdentifier=id&ItemID=96378>
- OECD. (2019). Improving healthcare quality in Europe: Characteristics, effectiveness and implementation of different strategies. European Observatory on Health Systems and Policies (Health Policy Series, No. 53). Copenhagen, Denmark. Retrieved from <https://www.ncbi.nlm.nih.gov/books/NBK549276/>
- Omboni S. (2019). Connected Health in Hypertension Management. *Frontiers in cardiovascular medicine*, 6, 76. <https://doi.org/10.3389/fcvm.2019.00076>
- Omboni, S., McManus, R. J., Bosworth, H. B., Chappell, L. C., Green, B. B., Kario, K., Logan, A. G., Magid, D. J., McKinsty, B., Margolis, K. L., Parati, G., & Wakefield, B. J. (2020). Evidence and recommendations on the use of telemedicine for the management of arterial hypertension: An international expert position paper. *Hypertension*, 76(5), 1368-1383. <https://doi.org/10.1161/HYPERTENSIONAHA.120.15873>
- Patton, M. Q. (2002). *Qualitative research and evaluation methods* (3rd ed.). Sage Publications.
- Paulk, M. C., Curtis, B., Chrissis, M. B., & Weber, C. V. (1993). Capability maturity model, version 1.1. *IEEE Software*, 10(4), 18–27. <https://doi.org/10.1109/52.219617>
- Perry A. F., Federico F., Huebner J. (2021). Telemedicine: Ensuring Safe, Equitable, Person-Centered Virtual Care. IHI White Paper. Boston: Institute for Healthcare Improvement. Retrieved from <https://www.ihl.org/resources/white-papers/telemedicine-ensuring-safe-equitable-person-centered-virtual-care>
- Pilosof, N. P., Barrett, M., Oborn, E., Barkai, G., Pessach, I. M., & Zimlichman, E. (2021). Telemedicine implementation in COVID-19 ICU: Balancing physical and virtual forms of visibility. *Health Environments Research & Design Journal*, 14(3), 34–48. <https://doi.org/10.1177/19375867211009225>
- Poonsuph, R. (2022). Telehealth ecosystem: Challenge and opportunity. *World Academy of Science, Engineering and Technology, Open Science Index*, 182, *International Journal of Health and Medical Engineering*, 16(2), 9–15.
- Punch, K. F. (2013). *Introduction to social research: Quantitative and qualitative approaches* (3rd ed.). Sage Publications.
- Saigí-Rubió, F., do Nascimento, I. J. B., Robles, N., Ivanovska, K., Katz, C., Azzopardi-Muscat, N., & Ortiz, D. N. (2022). The current status of telemedicine technology use across the World Health Organization European Region: An overview of systematic reviews. *Journal of Medical Internet Research*, 24(10), e40877. <https://doi.org/10.2196/40877>

- Schoenfeld, A. J., Davies, J. M., Marafino, B. J., Dean, M., DeJong, C., Bardach, N. S., Kazi, D. S., Boscardin, W. J., Lin, G. A., Duseja, R., Mei, Y. J., Mehrotra, A., & Dudley, R. A. (2016). Variation in Quality of Urgent Health Care Provided During Commercial Virtual Visits. *JAMA internal medicine*, 176(5), 635–642.
<https://doi.org/10.1001/jamainternmed.2015.8248>
- Secer, S., & von Bandemer, S. (2019). Potenziale und Perspektiven der Telemedizin. *Forschung Aktuell* (No. 03/2019). Institut Arbeit und Technik (IAT). Retrieved from <https://hdl.handle.net/10419/193767>
- Silva, C. R. D. V., Lopes, R. H., Júnior, O. G. B., Fuentealba-Torres, M., Arcêncio, R. A., & da Costa Uchôa, S. A. (2021). Telemedicine in primary healthcare for the quality of care in times of COVID-19: a scoping review protocol. *BMJ open*, 11(7), e046227.
<https://doi.org/10.1136/bmjopen-2020-046227>
- Small, A., Gist, D., Souza, D., Dalton, J., Magny-Normilus, C., & David, D. (2016). Using Kotter's Change Model for Implementing Bedside Handoff: A Quality Improvement Project. *Journal of nursing care quality*, 31(4), 304–309.
<https://doi.org/10.1097/NCQ.0000000000000212>
- Spies, C. D., Paul, N., Adrion, C., Berger, E., Busse, R., Kraufmann, B., Marschall, U., Rosseau, S., Denke, C., Krampe, H., Dähnert, E., Mansmann, U., & Weiss, B. (2023). Effectiveness of an intensive care telehealth programme to improve process quality (ERIC): A multicentre stepped wedge cluster randomised controlled trial. *Intensive Care Medicine*, 49(191–204). <https://doi.org/10.1007/s00134-022-06949-x>
- Statista. (2023a). Digital health report 2023: Telemedicine market worldwide. Retrieved from <https://www.statista.com/study/116507/digital-health-report-2023/>
- Statista. (2023b). Share of clinicians who believed that in ten years' time the majority of healthcare will be provided in a patient's home instead of a healthcare setting as of December 2021, by region. Retrieved from <https://www.statista.com/statistics/1299193/clinicians-views-that-healthcare-will-take-place-at-home-in-future-by-region/>
- Strauss, A., & Corbin, J. (1998). Basics of qualitative research: Techniques and procedures for developing grounded theory (2nd ed.). Sage Publications.
- Tanriverdi, H., & Iacono, C. S. (1999). Diffusion of telemedicine: a knowledge barrier perspective. *Telemedicine journal: the official journal of the American Telemedicine Association*, 5(3), 223–244. <https://doi.org/10.1089/107830299311989>.
- Thiel, R., Deimel, L., Schmidtman, D., Piesche, K., Hüsing, T., Rennoch, J., Stroetmann, V., & Stroetmann, K. (2018). #SmartHealthSystems: Digitalisierungsstrategien im internationalen Vergleich. Bertelsmann Stiftung. <https://www.bertelsmann-stiftung.de>
- Totten, A. M., McDonagh, M. S., & Wagner, J. H. (2020). The Evidence Base for Telehealth: Reassurance in the Face of Rapid Expansion During the COVID-19 Pandemic. Agency for Healthcare Research and Quality (US).

- Turner, D. W. (2010). Qualitative Interview Design: A Practical Guide for Novice Investigators. *The Qualitative Report*, 15(3), 754-760. <https://doi.org/10.46743/2160-3715/2010.1178>
- Uscher-Pines, L., Mulcahy, A., Cowling, D., Hunter, G., Burns, R., & Mehrotra, A. (2016). Access and Quality of Care in Direct-to-Consumer Telemedicine. *Telemedicine journal and e-health : the official journal of the American Telemedicine Association*, 22(4), 282–287. <https://doi.org/10.1089/tmj.2015.0079>
- Walley, D., McCombe, G., Broughan, J., O'Shea, C., Crowley, D., Quinlan, D., Wann, C., Crowley, T., & Cullen, W. (2024). Use of telemedicine in general practice in Europe since the COVID-19 pandemic: A scoping review of patient and practitioner perspectives. *PLOS Digital Health*, 3(2), e0000427. <https://doi.org/10.1371/journal.pdig.0000427>
- WHO. (2021). Global strategy on digital health 2020–2025. World Health Organization. Retrieved from <https://www.who.int/publications/i/item/9789240020924>
- WHO. (2022). Telemedicine has clear benefits for patients in European countries, new study shows. World Health Organization. Retrieved from <https://www.who.int/europe/news/item/31-10-2022-telemedicine-has-clear-benefits-for-patients-in-european-countries--new-study-shows>
- WHO. Regional Office for Europe. (2023). Digital health in the WHO European region: The ongoing journey to commitment and transformation. World Health Organization. Retrieved from <https://www.who.int/europe/publications/m/item/digital-health-in-the-who-european-region-the-ongoing-journey-to-commitment-and-transformation>
- WHO. Regional Office for Europe. (2024). Telehealth quality of care tool. World Health Organization. Retrieved from <https://www.who.int/europe/publications/i/item/WHO-EURO-2024-9475-49247-73556>
- Zhao, M., Hamadi, H., Xu, J., Haley, D. R., Park, S., & White-Williams, C. (2020). Telehealth and hospital performance: Does it matter? *Journal of Telemedicine and Telecare*. <https://doi.org/10.1177/1357633X20932440>

8 Appendices

8.1 Appendix 1: Interview Guide

<i>Research Question</i>	<i>Interview Question</i>
Introduction	Could you please introduce yourself, the institution you are working in and your position.
	Could you give me a small introduction and characterization of the existing telehealth services in your institution, your specialty?
RQ1: <i>What are hospitals' perspectives and practices regarding telehealth adoption and quality management?</i>	Could you describe the current maturity level of telehealth services in your hospital?
	What types of telehealth services does your institution currently offer, and how have they evolved over time?
	How do you currently manage quality of care in telehealth services in your institution?
	How do you envision telehealth services being integrated into routine workflows in the future?
	How relevant do you believe systematic quality management is for telehealth services?
	What are barriers in quality management for telehealth services in your hospital? How do you address them?
	What are key system factors in your organization to consider in telehealth quality management?
	How do you define high-quality telehealth from both the provider and patient perspectives?
	What technological challenges have you faced in implementing telehealth services, and how have these been addressed?
	How does your hospital ensure adequate digital literacy and training for both staff and patients to effectively use telehealth?
	How does your hospital incorporate hybrid care models to enhance patient-centered telecare ?
	What standardized quality metrics does your hospital use to evaluate telehealth services, and how often are they assessed?
	What change management strategies have been most effective in advancing telehealth adoption in your hospital?
	What best practices has your hospital identified for successful telehealth service implementation?

RQ2: <i>What are the perceptions of hospital representatives on the usefulness and relevance of the WHO Telehealth Quality of Care (QoC) Tool?</i>	Do you find these dimensions and their subdomains useful for assessing telehealth quality?
	Are there additional quality indicators you believe are missing?
	Are there quality indicators you want to highlight?
	Do you believe the TQoCT can be relevant in your institution?
RQ3: <i>What challenges and potential barriers do hospitals anticipate when implementing the WHO QoC Tool in assessing telehealth quality?</i>	What challenges and barriers do you anticipate when adopting the TQoCT?
	How do you see the TQoCT tool evolving to better address hospital-specific needs in the future?
Additional Thoughts	Is there anything you'd like to add about managing telehealth quality or on the TQoCT or change management tool?

8.2 Appendix 2: Interview Transcripts

8.2.1 Transcript CD1

Occupation: Clinical Director of Endocrinology and Telehealth Advocate

Institution: Portuguese Hospital

Interview Question	Response
Could you please introduce yourself, the institution you are working in, and your position?	The respondent is a senior endocrinologist at a specialized oncology hospital, responsible for promoting telehealth services.
Could you give me a small introduction and characterization of the existing telehealth services in your institution, your specialty?	Telehealth services include video consultations in endocrinology and radiotherapy, and dermatology tele-screening based on national standards. However, services are still in their early stages.

Could you describe the current maturity level of telehealth services in your hospital?	Telehealth services are at the beginning stage, with minimal infrastructure and technical maturity. Most activities are driven by individual motivation.
What types of telehealth services does your institution currently offer, and how have they evolved over time?	Endocrinology and radiotherapy video consultations and dermatology tele-screening. Infrastructure improvements are slowly increasing capacity.
How do you currently manage quality of care in telehealth services in your institution?	Quality management is informal, primarily through patient feedback. Dermatology services follow national standards. No structured evaluation exists.
How do you envision telehealth services being integrated into routine workflows in the future?	Telehealth has potential for routine integration, particularly in specialties like endocrinology and radiotherapy, but regulatory and technical barriers must be addressed.
How relevant do you believe systematic quality management is for telehealth services?	Systematic quality management is essential but underdeveloped due to the lack of institutional frameworks and formal evaluation methods.
What are barriers in quality management for telehealth services in your hospital? How do you address them?	Barriers include outdated regulations, insufficient infrastructure, technical problems, and resistance to overly complex requirements compared to in-person care.
What are key system factors in your organization to consider in telehealth quality management?	The absence of mature regulations and the complexity of current requirements deter adoption. Simplified processes are needed.
How do you define high-quality telehealth from both the provider and patient perspectives?	From the provider's perspective, motivation and digital literacy are critical. From the patient's perspective, convenience and avoiding travel are highly valued.
What technological challenges have you faced in implementing telehealth services, and how have these been addressed?	Challenges include poor infrastructure and unreliable patient-side Wi-Fi. Recent improvements allow 90% of scheduled consultations to proceed as planned.
How does your hospital ensure adequate digital literacy and training for both staff and patients to effectively use telehealth?	Digital literacy is not a major issue for younger doctors, but training is self-initiated. Older patients may face challenges with technology.
How does your hospital incorporate hybrid care models to enhance patient-centered telecare?	Hybrid models are used for follow-up consultations, particularly in endocrinology, saving time and travel for patients. First consultations remain in-person.
What standardized quality metrics does your hospital use to evaluate telehealth services, and how often are they assessed?	No formal metrics are used; evaluations are informal and based on patient feedback. Dermatology follows national requirements.
What change management strategies have been most effective in advancing telehealth adoption in your hospital?	Telehealth adoption relies on motivated individuals. Formal strategies and updated guidelines are needed to reduce resistance.

What best practices has your hospital identified for successful telehealth service implementation?	Convenience for patients and motivated staff are key success factors. Simplified, practical tools are necessary for sustainability.
Do you find these dimensions and their subdomains useful for assessing telehealth quality?	The dimensions are useful conceptually, but the tool is too subjective and not suited for formal assessment.
Are there additional quality indicators you believe are missing?	More objective and specialty-specific indicators are required. Current indicators are too general and difficult to apply.
Are there quality indicators you want to highlight?	Convenience for patients and provider motivation are critical factors for telehealth quality.
Do you believe the TQoCT can be relevant in your institution?	Not currently. The tool might serve as a guideline in the future as services mature, but it is too complex for current use.
What challenges and barriers do you anticipate when adopting the TQoCT?	The tool's complexity, subjectivity, and additional workload discourage its adoption in its current form.
How do you see the TQoCT tool evolving to better address hospital-specific needs in the future?	The tool needs clearer instructions, tailored metrics for different specialties, and simplified usability to enhance relevance.
Is there anything you'd like to add about managing telehealth quality or on the TQoCT or change management tool?	National guidelines must be updated to reflect modern telehealth requirements. Technical barriers remain a major obstacle to scalability.

8.2.2 Transcript CD2

Occupation: Deputy Clinical Director at a top 10 globally ranked hospital

Institution: German Hospital

<i>Interview Question</i>	<i>Response</i>
Could you please introduce yourself, the institution you are working in, and your position?	The respondent is a Deputy Clinic Director at a renowned teaching hospital in Berlin, specializing in ICU telehealth and second-opinion consultations.
Could you give me a small introduction and characterization of the existing telehealth services in your institution, your specialty?	The telehealth program supports ICU workflows regionally and internationally. Services include immersive telehealth robots and adherence to ICU-specific quality indicators.
Could you describe the current maturity level of telehealth services in your hospital?	The telehealth service is advanced, incorporating robotics and structured daily ward rounds based on quality indicators. However, legal and IT interoperability remain challenges.

What types of telehealth services does your institution currently offer, and how have they evolved over time?	Daily telemedicine ICU rounds, remote second opinions, and international collaborations in underserved regions are offered. Innovations such as immersive telehealth robots drive improvements.
How do you currently manage quality of care in telehealth services in your institution?	Quality management includes structured daily evaluation of eight ICU-specific quality indicators using an online tool integrated with electronic health records.
How do you envision telehealth services being integrated into routine workflows in the future?	Telehealth will complement bedside care with immersive systems. Broader adoption requires robust governance, IT systems, and standardized training.
How relevant do you believe systematic quality management is for telehealth services?	It is essential, with ICU quality indicators providing a framework to standardize processes and improve care outcomes.
What are barriers in quality management for telehealth services in your hospital? How do you address them?	Barriers include IT infrastructure, medico-legal challenges, and resistance among clinicians. Governance and interoperability improvements are key solutions.
What are key system factors in your organization to consider in telehealth quality management?	Data protection, governance, interoperability, and structured training are critical for effective quality management in telehealth.
How do you define high-quality telehealth from both the provider and patient perspectives?	Providers value technical functionality and training, while patients prioritize accessibility, convenience, and clear communication.
What technological challenges have you faced in implementing telehealth services, and how have these been addressed?	Technical barriers like system downtime and connectivity issues are managed through proactive monitoring and robust IT infrastructure.
How does your hospital ensure adequate digital literacy and training for both staff and patients to effectively use telehealth?	Training programs are contractually secured with partner hospitals, ensuring standardized education for on-site teams.
How does your hospital incorporate hybrid care models to enhance patient-centered telecare?	Hybrid models integrate telehealth with in-person care, supporting underserved regions and providing continuity of care.
What standardized quality metrics does your hospital use to evaluate telehealth services, and how often are they assessed?	ICU-specific indicators, developed by a national association, are evaluated daily to ensure adherence to best practices.
What change management strategies have been most effective in advancing telehealth adoption in your hospital?	Local champions drive adoption, supported by clear governance and incentives. Collaborative leadership ensures program sustainability.
What best practices has your hospital identified for successful telehealth service implementation?	Strong governance, clear documentation, immersive technology, and robust training are identified as critical success factors.

Do you find these dimensions and their subdomains useful for assessing telehealth quality?	The dimensions are valuable, but the tool needs clearer, actionable metrics tailored to telehealth services.
Are there additional quality indicators you believe are missing?	Indicators for patient education, team collaboration, and infrastructure readiness should be included for a more comprehensive assessment.
Are there quality indicators you want to highlight?	ICU-specific indicators and adherence to data protection standards are critical for high-quality telehealth services.
Do you believe the TQoCT can be relevant in your institution?	The tool is conceptually valuable but needs refinement to align with practical requirements and clinical workflows.
What challenges and barriers do you anticipate when adopting the TQoCT?	Overcomplexity, lack of customization, and additional workload may hinder its adoption.
How do you see the TQoCT tool evolving to better address hospital-specific needs in the future?	The tool should offer customizable metrics, practical examples, and incentives like certifications to increase adoption and usability.
Is there anything you'd like to add about managing telehealth quality or on the TQoCT or change management tool?	National guidelines and funding mechanisms are essential for scaling telehealth programs. Governance must ensure buy-in from all stakeholders.

8.2.3 Transcript CD3

Occupation: Clinical Director

Institution: Austrian Hospital

<i>Interview Question</i>	<i>Response</i>
Could you please introduce yourself, the institution you are working in, and your position?	The respondent is a radiologist in a specialized hospital in Burgenland, Austria. He oversees a regional teleradiology network supporting smaller hospitals.
Could you give me a small introduction and characterization of the existing telehealth services in your institution, your specialty?	The teleradiology program involves secure, encrypted data transfer of imaging from smaller hospitals to a central hub, with diagnoses returned within 10–20 minutes.
Could you describe the current maturity level of telehealth services in your hospital?	Teleradiology is fully integrated and routine. However, other telehealth services, like teledermatology, are not yet developed in the region.
What types of telehealth services does your institution currently offer, and how have they evolved over time?	Primarily teleradiology, which has become routine in the region over 15 years. Other specialties like dermatology or psychiatry are not yet implemented.
How do you currently manage quality of care in telehealth services in your institution?	Quality management occurs at three levels: image creation, transmission, and reporting. These processes are secure and

	efficient, leveraging VPN connections and automatic speech recognition.
How do you envision telehealth services being integrated into routine workflows in the future?	Teleradiology will expand due to personnel shortages and rising diagnostic needs. Integration into other specialties will require policy adjustments and personnel training.
How relevant do you believe systematic quality management is for telehealth services?	Crucial for maintaining high standards in transmission, diagnostic accuracy, and adherence to protocols.
What are barriers in quality management for telehealth services in your hospital? How do you address them?	Barriers include limited technical staff, occasional data transmission issues, and resistance from professionals. Complex password systems are also a challenge.
What are key system factors in your organization to consider in telehealth quality management?	Data security, transmission reliability, and diagnostic accuracy are critical. The hospital's IT department oversees technical infrastructure.
How do you define high-quality telehealth from both the provider and patient perspectives?	Providers focus on technical accuracy and efficiency, while patients value fast and accurate diagnoses with minimal direct interaction.
What technological challenges have you faced in implementing telehealth services, and how have these been addressed?	Occasional system failures and secure access protocols are managed through robust IT systems and continuous evaluation.
How does your hospital ensure adequate digital literacy and training for both staff and patients to effectively use telehealth?	Radiologists are trained on telehealth tools. Technologists receive instructions for imaging and data transfer. Patients are not directly involved in the system.
How does your hospital incorporate hybrid care models to enhance patient-centered telecare?	Teleradiology does not directly interact with hybrid models but highlights potential for fields like dermatology and psychiatry.
What standardized quality metrics does your hospital use to evaluate telehealth services, and how often are they assessed?	Metrics include image transmission speed, diagnostic accuracy, and protocol adherence. Feedback loops with clinicians ensure quality improvement.
What change management strategies have been most effective in advancing telehealth adoption in your hospital?	Routine processes and technical reliability have normalized teleradiology adoption. Structured governance could support other telehealth fields.
What best practices has your hospital identified for successful telehealth service implementation?	Secure data transmission, standardized protocols, and routine evaluations are critical for success in teleradiology.
Do you find these dimensions and their subdomains useful for assessing telehealth quality?	The dimensions provide clarity for progress assessment but need specialization for teleradiology.
Are there additional quality indicators you believe are missing?	Indicators specific to teleradiology, like image quality and transmission speed, should be prioritized.

Are there quality indicators you want to highlight?	Technical quality, diagnostic accuracy, and clinical effectiveness are key priorities for teleradiology.
Do you believe the TQoCT can be relevant in your institution?	Conceptually useful but requires specialty-focused indicators and less bureaucratic overhead for practical implementation.
What challenges and barriers do you anticipate when adopting the TQoCT?	Complexity and lack of teleradiology-specific metrics could limit usability. Additional documentation requirements may deter staff participation.
How do you see the TQoCT tool evolving to better address hospital-specific needs in the future?	The tool should minimize administrative burden and include practical, specialty-specific metrics to improve adoption.
Is there anything you'd like to add about managing telehealth quality or on the TQoCT or change management tool?	Addressing personnel shortages and integrating stepwise training for assistants and nurses could help expand telehealth into other fields.

8.2.4 Transcript CD4

Occupation: Director of Outpatient Services at the largest clinic in the Baltic States

Institution: Latvian Hospital

<i>Interview Question</i>	<i>Response</i>
Could you please introduce yourself, the institution you are working in, and your position?	The respondent is responsible for all outpatient services one of the largest clinics in the Baltic States, managing both operational efficiency and telehealth implementation.
Could you give me a small introduction and characterization of the existing telehealth services in your institution, your specialty?	Telehealth primarily involves phone consultations (15% of all consultations) and pilot programs for online rehabilitation. The clinic lacks national telehealth legislation, so internal policies are being developed.
Could you describe the current maturity level of telehealth services in your hospital?	Telehealth adoption is growing, with basic services integrated. Quality management and formal policies are in early development stages.
What types of telehealth services does your institution currently offer, and how have they evolved over time?	The services include follow-up phone consultations and experimental online rehabilitation. Initial consultations remain face-to-face due to safety concerns.
How do you currently manage quality of care in telehealth services in your institution?	Current quality management focuses on operational efficiency, like consultation volume. Patient outcomes and satisfaction are not systematically monitored yet.

How do you envision telehealth services being integrated into routine workflows in the future?	The strategy involves phased integration, maintaining face-to-face initial consultations and using telehealth for follow-ups, focusing on GDPR compliance and secure communication.
How relevant do you believe systematic quality management is for telehealth services?	It is essential but underdeveloped. The clinic is beginning to explore quality assurance processes and aims to refine metrics as telehealth services expand.
What are barriers in quality management for telehealth services in your hospital? How do you address them?	Barriers include lack of legislation, increased documentation workload, and resistance from staff. Secure IT systems are also needed.
What are key system factors in your organization to consider in telehealth quality management?	Data protection, efficiency, and trust are critical. Establishing patient verification systems and minimizing documentation redundancies are priorities.
How do you define high-quality telehealth from both the provider and patient perspectives?	Providers focus on efficiency and operational ease, while patients value reduced travel, convenience, and trust in secure consultations.
What technological challenges have you faced in implementing telehealth services, and how have these been addressed?	Challenges include using personal phones for consultations and ensuring secure data transfer. Planned solutions include centralized hospital phones and smart ID verification.
How does your hospital ensure adequate digital literacy and training for both staff and patients to effectively use telehealth?	Training is not yet systematic. Staff rely on their own digital proficiency, while patients benefit indirectly through clearer guidelines and secure tools.
How does your hospital incorporate hybrid care models to enhance patient-centered telecare?	Hybrid models are in early phases, with initial face-to-face consultations followed by telehealth for follow-ups. Plans for expansion into other specialties are being discussed.
What standardized quality metrics does your hospital use to evaluate telehealth services, and how often are they assessed?	Metrics are limited to consultation volume and efficiency. Quality metrics like patient satisfaction are under consideration but not yet implemented.
What change management strategies have been most effective in advancing telehealth adoption in your hospital?	Engaging doctors and departments in the development process has been key to reaching current adoption goals. Further progress requires addressing quality concerns.
What best practices has your hospital identified for successful telehealth service implementation?	Gradual adoption, secure communication systems, and clear guidelines are critical. Pilot programs for specialties like rehabilitation provide learning opportunities.
Do you find these dimensions and their subdomains useful for assessing telehealth quality?	The dimensions are useful but need practical tools for implementation, such as specialty-specific guidelines and training.
Are there additional quality indicators you believe are missing?	Indicators for documentation efficiency, secure patient identification, and workflow integration should be included.

Are there quality indicators you want to highlight?	Patient safety, accessibility, and operational efficiency are priorities in the clinic's telehealth services.
Do you believe the TQoCT can be relevant in your institution?	The tool could provide structure but needs customization to align with practical workflows and specialty-specific needs.
What challenges and barriers do you anticipate when adopting the TQoCT?	Increased documentation workload and resistance to additional administrative tasks may hinder adoption. The lack of alignment with existing workflows is a concern.
How do you see the TQoCT tool evolving to better address hospital-specific needs in the future?	Customizable guidelines and streamlined processes would make the tool more applicable and user-friendly. Specialized training for staff would also support adoption.
Is there anything you'd like to add about managing telehealth quality or on the TQoCT or change management tool?	Developing internal policies to compensate for legislative gaps is crucial. The clinic prioritizes balancing efficiency with patient trust and safety.

8.2.5 Transcript MII

Occupation: Data and Analytics Coordinator

Institution: Austrian Hospital

<i>Interview Question</i>	<i>Response</i>
Could you please introduce yourself, the institution you are working in, and your position?	The respondent is a medical informatics researcher with experience in telehealth projects, including a telemonitoring program for heart failure patients in Tyrol, Austria.
Could you give me a small introduction and characterization of the existing telehealth services in your institution, your specialty?	The focus has been on evaluating large-scale telehealth projects to improve care quality and cost efficiency. The project involves interdisciplinary collaboration and patient monitoring.
Could you describe the current maturity level of telehealth services in your hospital?	Telehealth services are evolving. The program demonstrates high maturity in terms of structured evaluations and interdisciplinary coordination.
What types of telehealth services does your institution currently offer, and how have they evolved over time?	Services focus on telemonitoring and follow-up care. For example, the program ensured continuous patient support post-discharge, integrating hospital and outpatient care.
How do you currently manage quality of care in telehealth services in your institution?	Quality is managed through structured evaluations, interdisciplinary quality circles, and standardized care guidelines to monitor performance and refine processes.
How do you envision telehealth services being integrated into routine workflows in the future?	Telehealth will shift care delivery from hospitals to home settings, emphasizing hybrid models where initial consultations are in person, followed by telehealth for ongoing care.

How relevant do you believe systematic quality management is for telehealth services?	Essential, as it defines clear goals and evaluates process changes. Logic models are used to map cause-effect relationships and identify areas for improvement.
What are barriers in quality management for telehealth services in your hospital? How do you address them?	Barriers include trust in technology, usability issues, and resistance from clinicians. Quality circles and structured training address these challenges.
What are key system factors in your organization to consider in telehealth quality management?	Socio-technical factors such as usability, workflow integration, and trust in data security are critical for telehealth adoption and success.
How do you define high-quality telehealth from both the provider and patient perspectives?	Providers value usability and efficiency, while patients prioritize trust, data security, and the quality of communication with healthcare professionals.
What technological challenges have you faced in implementing telehealth services, and how have these been addressed?	Challenges include data security, usability of authentication systems, and interoperability. Addressing these requires investment in secure, user-friendly technologies.
How does your hospital ensure adequate digital literacy and training for both staff and patients to effectively use telehealth?	Digital literacy efforts are essential but underfunded. In projects interdisciplinary training and patient education were emphasized to ensure effective use of telehealth systems.
How does your hospital incorporate hybrid care models to enhance patient-centered telecare?	Hybrid models combine in-person consultations for initial visits with telehealth for follow-ups. This approach leverages patient familiarity with their doctor to enhance remote care effectiveness.
What standardized quality metrics does your hospital use to evaluate telehealth services, and how often are they assessed?	Metrics include care quality, cost savings, and adherence to treatment standards. Interdisciplinary quality circles assess these metrics quarterly.
What change management strategies have been most effective in advancing telehealth adoption in your hospital?	Volunteer-driven initiatives with clear financial incentives for participants have proven effective. Structured governance ensures consistency across networks.
What best practices has your hospital identified for successful telehealth service implementation?	Structured guidelines, interdisciplinary collaboration, and secure data management systems are key to success.
Do you find these dimensions and their subdomains useful for assessing telehealth quality?	Yes, but the framework must adapt to include socio-technical factors and process evaluations to capture the complexities of telehealth.
Are there additional quality indicators you believe are missing?	Indicators for usability, patient trust, and integration into clinical workflows should be included in telehealth assessments.
Are there quality indicators you want to highlight?	Usability and patient trust are critical, alongside cost efficiency and care quality improvements.

Do you believe the TQoCT can be relevant in your institution?	The tool could be relevant but needs adaptation to include flexible and practical guidelines that address local needs and challenges.
What challenges and barriers do you anticipate when adopting the TQoCT?	Resistance to additional documentation, lack of specialty-specific metrics, and the tool's complexity may hinder adoption.
How do you see the TQoCT tool evolving to better address hospital-specific needs in the future?	The tool should prioritize simplicity, practical metrics, and integration into existing workflows to encourage adoption and usability.
Is there anything you'd like to add about managing telehealth quality or on the TQoCT or change management tool?	Networks and interdisciplinary collaboration are essential for scaling telehealth. Financial incentives and trust-building are critical for long-term adoption.

8.2.6 Transcript MI2

Occupation: Data and Analytics Coordinator

Institution: Belgian Hospital

<i>Interview Question</i>	<i>Response</i>
Could you please introduce yourself, the institution you are working in, and your position?	The respondent works in the Medical Information Department of a major Belgian university hospital, overseeing the implementation of electronic medical records (EMRs) and telehealth systems.
Could you give me a small introduction and characterization of the existing telehealth services in your institution, your specialty?	Telehealth services are nascent, driven by individual doctors' initiatives. Early-stage teleconsultations are focused on chronic care and follow-ups.
Could you describe the current maturity level of telehealth services in your hospital?	Telehealth is still developing, with informal teleconsultations and plans to integrate a secure, validated workflow into the EMR system.
What types of telehealth services does your institution currently offer, and how have they evolved over time?	Teleconsultations are primarily patient-driven, focused on chronic disease management and follow-ups. Acute cases are seen in person.
How do you currently manage quality of care in telehealth services in your institution?	Quality management is not yet systematic. EMR integration aims to improve quality by enabling structured workflows, secure communication, and better data use.
How do you envision telehealth services being integrated into routine workflows in the future?	Telehealth will complement in-person care, with secure channels for chronic care follow-ups and initial visits conducted face-to-face.

How relevant do you believe systematic quality management is for telehealth services?	It is essential but currently lacking. Systematic quality management is tied to broader goals of EMR integration and leveraging structured medical data.
What are barriers in quality management for telehealth services in your hospital? How do you address them?	Barriers include lack of reimbursement incentives, outdated governance processes, and technical constraints like secure data transmission and encryption.
What are key system factors in your organization to consider in telehealth quality management?	Data security, interoperability, and alignment with national regulations (e.g., BMUC) are critical for ensuring effective telehealth quality management.
How do you define high-quality telehealth from both the provider and patient perspectives?	Providers value efficiency and secure systems, while patients prioritize convenience, cost savings, and the ability to access care without travel.
What technological challenges have you faced in implementing telehealth services, and how have these been addressed?	Challenges include integrating telehealth tools with existing EMRs, ensuring GDPR compliance, and overcoming resistance to new workflows.
How does your hospital ensure adequate digital literacy and training for both staff and patients to effectively use telehealth?	Training focuses on integrating telehealth workflows into EMRs. For staff, digital proficiency is assumed, while patient education is minimal but evolving.
How does your hospital incorporate hybrid care models to enhance patient-centered telecare?	Hybrid models are used for chronic conditions, alternating between physical and virtual visits to maintain continuity and patient-provider relationships.
What standardized quality metrics does your hospital use to evaluate telehealth services, and how often are they assessed?	Metrics are not yet standardized. Planned metrics include patient satisfaction, data security, and efficiency of virtual workflows.
What change management strategies have been most effective in advancing telehealth adoption in your hospital?	Pilot programs led by individual departments, supported by EMR integration and governance processes, have driven gradual adoption.
What best practices has your hospital identified for successful telehealth service implementation?	Secure data transfer, reimbursement alignment, and patient-driven adoption are key practices. Chronic care and follow-ups are prioritized for telehealth.
Do you find these dimensions and their subdomains useful for assessing telehealth quality?	The dimensions are useful conceptually, but the framework must include measurable, practical guidelines to be implemented effectively.
Are there additional quality indicators you believe are missing?	Indicators for chronic vs. acute care, patient engagement, and data utilization should be included in telehealth quality assessments.
Are there quality indicators you want to highlight?	Data security, patient outcomes, and operational efficiency are critical quality indicators for telehealth.
Do you believe the TQoCT can be relevant in your institution?	The tool has potential but requires alignment with national regulations and practical metrics to facilitate adoption.

What challenges and barriers do you anticipate when adopting the TQoCT?	The tool's lack of actionable metrics, complexity, and alignment with national standards are significant barriers to adoption.
How do you see the TQoCT tool evolving to better address hospital-specific needs in the future?	Customizable metrics and streamlined workflows are needed to integrate the tool into hospital systems effectively.
Is there anything you'd like to add about managing telehealth quality or on the TQoCT or change management tool?	National regulations and financial incentives are necessary to drive telehealth adoption. Governance must evolve to match technological advancements.

8.2.7 Transcript TE1

Occupation: Associate Professor of Medical Informatics with expertise in European telemedicine projects

Institution: Italian Telehealth Researcher

<i>Interview Question</i>	<i>Response</i>
Could you please introduce yourself, the institution you are working in, and your position?	The respondent is a social professor of medical informatics at a University, with over 35 years of experience in medical informatics research.
Could you give me a small introduction and characterization of the existing telehealth services in your institution, your specialty?	Telemedicine services focus on transitioning from small experimental projects to a fully integrated telemedicine environment. Collaborations with regional healthcare authorities aim to improve implementation.
Could you describe the current maturity level of telehealth services in your hospital?	Telehealth is transitioning from experimental to real-world delivery. Services are being designed to address practical realities, including underserved populations and connectivity challenges.
What types of telehealth services does your institution currently offer, and how have they evolved over time?	Services include oncology patient monitoring and chronic disease management. Historical projects like EPIC have influenced current implementations by integrating care across primary and hospital settings.
How do you currently manage quality of care in telehealth services in your institution?	Quality management emphasizes technical reliability and clinical quality. Guidelines address practical issues like sensor positioning, data security, and patient education.
How do you envision telehealth services being integrated into routine workflows in the future?	Telehealth will prioritize hybrid models that balance technical quality with clinical reliability, using real-time monitoring for critical patients and expanding care to underserved populations.

How relevant do you believe systematic quality management is for telehealth services?	Quality management is essential for transitioning telemedicine from experimental projects to routine care, ensuring systems are designed for real-world conditions.
What are barriers in quality management for telehealth services in your hospital? How do you address them?	Barriers include patient trust in telemedicine tools, low technical literacy, and connectivity issues in rural areas. Skilled technicians and tailored education help address these challenges.
What are key system factors in your organization to consider in telehealth quality management?	Systems must prioritize interoperability, real-time monitoring, and actionable insights tailored to specific patient conditions. Focus is on precision medicine and chronic care management.
How do you define high-quality telehealth from both the provider and patient perspectives?	Providers prioritize accuracy, reliability, and meaningful data, while patients value ease of use, trust in the system, and effective communication.
What technological challenges have you faced in implementing telehealth services, and how have these been addressed?	Connectivity issues, data security, and usability are key challenges. Solutions include network improvements, secure smartphones for telemonitoring, and patient education on device usage.
How does your hospital ensure adequate digital literacy and training for both staff and patients to effectively use telehealth?	Training programs focus on interdisciplinary collaboration and patient education. Initiatives emphasize addressing technical literacy and resolving practical issues early.
How does your hospital incorporate hybrid care models to enhance patient-centered telecare?	Hybrid care models combine in-person consultations for initial visits with telemedicine follow-ups, reducing hospital visits while ensuring continuity of care.
What standardized quality metrics does your hospital use to evaluate telehealth services, and how often are they assessed?	Metrics include technical reliability, patient engagement, and clinical outcomes. Assessments are frequent during early project phases, transitioning to annual evaluations as systems mature.
What change management strategies have been most effective in advancing telehealth adoption in your hospital?	Collaborative approaches with healthcare authorities and interdisciplinary teams drive adoption. Early patient education and clear guidelines enhance confidence and trust.
What best practices has your hospital identified for successful telehealth service implementation?	Secure communication systems, actionable data collection, and structured guidelines tailored to specific patient groups are critical for success.
Do you find these dimensions and their subdomains useful for assessing telehealth quality?	The dimensions are valuable but need adaptation to practical, specialty-specific metrics and inclusion of socio-technical factors like patient education.
Are there additional quality indicators you believe are missing?	Indicators for addressing patient trust, usability, and socio-technical integration should be added.

Are there quality indicators you want to highlight?	Practical metrics like data accuracy, ease of use, and the impact of telemedicine on patient anxiety and care continuity are emphasized.
Do you believe the TQoCT can be relevant in your institution?	The tool shows potential but requires refinement and practical testing. Early adoption could be driven by collaborative projects with regional authorities.
What challenges and barriers do you anticipate when adopting the TQoCT?	Barriers include the tool's perceived complexity and a lack of alignment with real-world workflows. Stakeholder engagement is crucial for success.
How do you see the TQoCT tool evolving to better address hospital-specific needs in the future?	Customizable guidelines and clear visualization tools for metrics can enhance usability and adoption. Regular refinement based on user feedback is needed.
Is there anything you'd like to add about managing telehealth quality or on the TQoCT or change management tool?	Quality control must transition from academic projects to real-world applications, emphasizing collaborative assessments and scalable implementation.

8.2.8 Transcript TE2

Occupation: Healthcare Transformation Researcher

Institution: Top 10 globally ranked Israeli hospital

<i>Interview Question</i>	<i>Response</i>
Could you please introduce yourself, the institution you are working in, and your position?	The respondent is an experienced professional specializing in healthcare design and digital health. They work with a leading healthcare institution on telehealth and hybrid care projects.
Could you give me a small introduction and characterization of the existing telehealth services in your institution, your specialty?	Their focus is on hybrid care models combining hospital and home-based care, including projects such as virtual hospitals for critical patients and telehealth innovation.
Could you describe the current maturity level of telehealth services in your hospital?	Telehealth services are innovative and aim to address complex patient needs by blending physical and virtual care for seamless delivery.
What types of telehealth services does your institution currently offer, and how have they evolved over time?	Current services include virtual hospitals for rehabilitation and home hospitalization, emphasizing integration between technology, space, and service design.
How do you currently manage quality of care in telehealth services in your institution?	Quality management involves a comprehensive approach addressing human, technological, and spatial aspects to ensure high-quality care.

How do you envision telehealth services being integrated into routine workflows in the future?	The integration strategy emphasizes continuity of care, ensuring seamless transitions between home and hospital through user-friendly systems.
How relevant do you believe systematic quality management is for telehealth services?	Systematic quality management is essential to support hybrid care models, focusing on interdisciplinary collaboration and holistic service design.
What are barriers in quality management for telehealth services in your hospital? How do you address them?	Barriers include resistance to change, infrastructure challenges, and patient trust issues. Addressing these requires collaboration, training, and innovation.
What are key system factors in your organization to consider in telehealth quality management?	Systems need to prioritize patient empowerment, interoperability, and seamless integration with clinical workflows to deliver consistent care.
How do you define high-quality telehealth from both the provider and patient perspectives?	Providers focus on clinical reliability and adaptability, while patients value convenience, trust, and personalized communication.
What technological challenges have you faced in implementing telehealth services, and how have these been addressed?	Challenges include ensuring data security, patient verification, and maintaining trust. Robust systems and transparent communication address these concerns.
How does your hospital ensure adequate digital literacy and training for both staff and patients to effectively use telehealth?	Training programs emphasize technical proficiency, communication skills, and adaptability for digital healthcare environments.
How does your hospital incorporate hybrid care models to enhance patient-centered telecare?	Hybrid care models balance in-person care with telemedicine follow-ups, enabling continuity of care and reducing hospital visits.
What standardized quality metrics does your hospital use to evaluate telehealth services, and how often are they assessed?	Metrics include patient satisfaction, accessibility, and outcomes, assessed iteratively to adapt to evolving patient needs.
What change management strategies have been most effective in advancing telehealth adoption in your hospital?	Strategies include interdisciplinary collaboration, stakeholder engagement, and early focus on demonstrating telehealth's benefits to build trust.
What best practices has your hospital identified for successful telehealth service implementation?	Best practices include designing systems that integrate with patient needs and creating supportive environments that foster trust and usability.
Do you find these dimensions and their subdomains useful for assessing telehealth quality?	The dimensions are valuable but require expansion to include spatial and organizational factors to address hybrid care complexities.
Are there additional quality indicators you believe are missing?	Indicators related to patient empowerment, environmental design, and perceived usability should be added to ensure comprehensive evaluations.

Are there quality indicators you want to highlight?	Emphasis on metrics like perceived privacy, ease of use, and the psychological safety of patients is crucial for fostering telehealth trust and adoption.
Do you believe the TQoCT can be relevant in your institution?	The tool has potential but needs customization for hybrid care models and practical validation in real-world settings.
What challenges and barriers do you anticipate when adopting the TQoCT?	Barriers include lack of specialty-specific metrics and administrative complexity, which may hinder adoption without proper adaptation.
How do you see the TQoCT tool evolving to better address hospital-specific needs in the future?	Future iterations should focus on specialty-specific adaptations, integration of environmental factors, and user-friendly metrics to enhance usability.
Is there anything you'd like to add about managing telehealth quality or on the TQoCT or change management tool?	Advancing telehealth quality requires collaboration, shared learning, and tools tailored to real-world hybrid care needs.

8.2.9 Transcript TE3

Occupation: Telemedicine Cardiologist and Founder of an national Telemedical Institute

Institution: Italian Hospital

<i>Interview Question</i>	<i>Response</i>
Could you please introduce yourself, the institution you are working in, and your position?	The respondent is a cardiologist with over 25 years of experience in telemedicine, focusing on blood pressure monitoring and regulatory affairs. They founded a telemedicine company and an institute specializing in telehealth services.
Could you give me a small introduction and characterization of the existing telehealth services in your institution, your specialty?	The respondent's organization provides telemonitoring, tele-reporting, and chronic disease management, with services integrated into pharmacies and home-based systems.
Could you describe the current maturity level of telehealth services in your hospital?	Telehealth services are growing, with advancements like home telemonitoring and national efforts to build interoperable platforms. Challenges remain in usability and integration.
What types of telehealth services does your institution currently offer, and how have they evolved over time?	Services include telemonitoring for cardiology and pneumology, home care for chronic conditions, and GPS monitoring. These have expanded significantly since the COVID-19 pandemic.
How do you currently manage quality of care in telehealth services in your institution?	Quality is managed through certified medical devices, usability for patients, affordability, and professional support by healthcare staff such as nurses and case managers.

How do you envision telehealth services being integrated into routine workflows in the future?	Telemedicine is seen as complementary to in-person care, focusing on high-risk patients and leveraging telemonitoring as the primary tool for follow-ups.
How relevant do you believe systematic quality management is for telehealth services?	It is essential for ensuring safety, usability, and interoperability. Quality management systems must integrate technological and clinical aspects seamlessly.
What are barriers in quality management for telehealth services in your hospital? How do you address them?	Barriers include cultural resistance among healthcare professionals, insufficient interoperability, and tools that prioritize cybersecurity over usability. Education and structured workflows help address these issues.
What are key system factors in your organization to consider in telehealth quality management?	Systems need to prioritize data exchange, support regulatory compliance, and ensure tools are practical for real-world clinical use.
How do you define high-quality telehealth from both the provider and patient perspectives?	Providers value tool reliability and data accuracy, while patients prioritize ease of use, affordability, and trust in the system.
What technological challenges have you faced in implementing telehealth services, and how have these been addressed?	Interoperability, data security, and usability are significant challenges. Addressing these requires certified devices, seamless integration, and user-focused design.
How does your hospital ensure adequate digital literacy and training for both staff and patients to effectively use telehealth?	Training focuses on the practical use of telehealth tools and understanding the regulatory and technical requirements for effective telemedicine practices.
How does your hospital incorporate hybrid care models to enhance patient-centered telecare?	Hybrid models combine in-person consultations for initial visits with telemonitoring and televisits for follow-ups, prioritizing patient convenience and safety.
What standardized quality metrics does your hospital use to evaluate telehealth services, and how often are they assessed?	Metrics include device certification, usability, cost-effectiveness, and clinical outcomes, assessed regularly to ensure compliance and efficiency.
What change management strategies have been most effective in advancing telehealth adoption in your hospital?	Strategies include aligning technological and clinical workflows, educating staff on new models of care, and demonstrating the benefits of telehealth to stakeholders.
What best practices has your hospital identified for successful telehealth service implementation?	Best practices include focusing on high-risk patients, ensuring interoperability, and maintaining a balance between safety, usability, and cybersecurity.
Do you find these dimensions and their subdomains useful for assessing telehealth quality?	The dimensions are helpful but need to include practical metrics for usability, scalability, and regulatory compliance.
Are there additional quality indicators you believe are missing?	Indicators like patient trust, cultural adaptability, and integration into existing workflows are critical for evaluating telehealth quality.

Are there quality indicators you want to highlight?	Emphasis should be placed on interoperability, ease of use, and scalability, which are often overlooked in favor of privacy and cybersecurity.
Do you believe the TQoCT can be relevant in your institution?	The tool has potential but requires specialty-specific metrics and adaptations to align with real-world clinical and technical needs.
What challenges and barriers do you anticipate when adopting the TQoCT?	Barriers include administrative complexity, lack of cultural readiness, and insufficient alignment with clinical workflows.
How do you see the TQoCT tool evolving to better address hospital-specific needs in the future?	The tool should include specialty-specific guidelines, focus on practical usability, and incorporate features to support interoperability and scalability.
Is there anything you'd like to add about managing telehealth quality or on the TQoCT or change management tool?	Success in telehealth depends on aligning cultural, technological, and clinical aspects, ensuring tools meet real-world needs, and focusing on patient-centered care.

8.2.10 Transcript TE4

Occupation: Cardiologist and Founder of a Telemedical Center

Institution: Top 30 globally ranked German Hospital

<i>Interview Question</i>	<i>Response</i>
Could you please introduce yourself, the institution you are working in, and your position?	The respondent is a cardiologist specializing in telecardiology, managing telemonitoring systems and device therapy while contributing to the integration of telehealth solutions in clinical workflows.
Could you give me a small introduction and characterization of the existing telehealth services in your institution, your specialty?	Services include cardiac telemonitoring, teleconsultation for rural hospitals, and home-based monitoring for chronic conditions like heart failure. The respondent also leads innovative projects like integrating smartwatches for diagnostics.
Could you describe the current maturity level of telehealth services in your hospital?	Telehealth is advanced, with certified systems in place for cardiac monitoring and ongoing integration of interoperable platforms and telemonitoring solutions for new specialties like nephrology and gynecology.
What types of telehealth services does your institution currently offer, and how have they evolved over time?	Services include home-based monitoring for heart failure patients, wearable technology for COVID-19 positive individuals, and interdisciplinary applications for postpartum hypertension monitoring.

How do you currently manage quality of care in telehealth services in your institution?	Quality is managed through certified devices, adherence to clinical guidelines, structured SOPs, and regular evaluations of patient outcomes and service efficiency.
How do you envision telehealth services being integrated into routine workflows in the future?	Telemedicine will complement in-person care, focusing on proactive monitoring and reducing unnecessary hospital visits, allowing faster responses to complications.
How relevant do you believe systematic quality management is for telehealth services?	Quality management is crucial to ensure safety, effectiveness, and interoperability, particularly with the increasing adoption of wearable technology and remote monitoring.
What are barriers in quality management for telehealth services in your hospital? How do you address them?	Barriers include cultural resistance, lack of interoperability, and challenges with reimbursement. Solutions include education, collaboration, and advocating for systemic support.
What are key system factors in your organization to consider in telehealth quality management?	Interoperability, certified medical devices, and seamless integration with electronic patient records are key for ensuring efficient and high-quality telehealth services.
How do you define high-quality telehealth from both the provider and patient perspectives?	Providers focus on diagnostic accuracy and system efficiency, while patients value convenience, reliability, and the ability to avoid unnecessary hospital visits.
What technological challenges have you faced in implementing telehealth services, and how have these been addressed?	Challenges include ensuring interoperability and system integration. These are addressed by collaborating with industry partners and adopting certified devices like smartwatches that provide raw data.
How does your hospital ensure adequate digital literacy and training for both staff and patients to effectively use telehealth?	Training programs emphasize the use of certified devices, regulatory compliance, and interdisciplinary collaboration to address practical and clinical needs.
How does your hospital incorporate hybrid care models to enhance patient-centered telecare?	Hybrid models blend in-person care with remote monitoring, allowing early detection of complications and reducing hospital visits for chronic conditions.
What standardized quality metrics does your hospital use to evaluate telehealth services, and how often are they assessed?	Metrics include diagnostic accuracy, transmission rates, and patient outcomes, assessed annually and reported to regulatory bodies like the German Cardiology Society.
What change management strategies have been most effective in advancing telehealth adoption in your hospital?	Strategies include interdisciplinary collaboration, structured SOPs, and demonstrating the cost-effectiveness and clinical benefits of telehealth services.
What best practices has your hospital identified for successful telehealth service implementation?	Best practices include ensuring data interoperability, using certified medical devices, and creating systems that prioritize patient safety and provider usability.

Do you find these dimensions and their subdomains useful for assessing telehealth quality?	The dimensions are helpful but require customization for specific telehealth applications, including alignment with established clinical guidelines.
Are there additional quality indicators you believe are missing?	Indicators addressing interdisciplinary collaboration and real-time data integration should be added for a comprehensive quality assessment.
Are there quality indicators you want to highlight?	Interoperability, certified device use, and scalability are critical for maintaining telehealth efficiency and reliability.
Do you believe the TQoCT can be relevant in your institution?	The tool is relevant but requires adaptation to align with specialty-specific needs and existing clinical workflows.
What challenges and barriers do you anticipate when adopting the TQoCT?	Barriers include complexity in application, lack of alignment with real-world workflows, and insufficient financial and structural support.
How do you see the TQoCT tool evolving to better address hospital-specific needs in the future?	Future iterations should focus on specialty-specific guidelines, seamless integration with electronic systems, and practical usability enhancements.
Is there anything you'd like to add about managing telehealth quality or on the TQoCT or change management tool?	Telemedicine must focus on scalable, interdisciplinary solutions while emphasizing interoperability and certified device use to maintain quality and efficiency.

8.2.11 Transcript TE5

Occupation: Chief Medical Innovation Officer

Institution: Top National Estonian Hospital

<i>Interview Question</i>	<i>Response</i>
Could you please introduce yourself, the institution you are working in, and your position?	The respondent is an Innovation and International Relations Officer at a major medical center with a background in digital health since 2011. They have experience implementing telehealth solutions across various settings.
Could you give me a small introduction and characterization of the existing telehealth services in your institution, your specialty?	Telehealth services include oncology platforms for symptom reporting, secure video consultations for psychiatry, and telemonitoring tools for chronic diseases like diabetes and hypertension.
Could you describe the current maturity level of telehealth services in your hospital?	Telehealth adoption varies by specialty, with psychiatry and primary care leading, while other fields like surgery and cardiology are less engaged. There is a focus on integration and usability.

What types of telehealth services does your institution currently offer, and how have they evolved over time?	Services include secure video platforms for psychiatric consultations, AI-assisted oncology symptom management tools, and telemonitoring for chronic conditions. Evolution focuses on user-centric design and integrating new specialties.
How do you currently manage quality of care in telehealth services in your institution?	Quality is managed through simplicity, accessibility, and alignment with clinical workflows. Tools must demonstrate clear benefits to users to gain acceptance.
How do you envision telehealth services being integrated into routine workflows in the future?	Telehealth will become an integral part of routine care, with seamless integration into electronic health records and an emphasis on reducing workload for healthcare professionals.
How relevant do you believe systematic quality management is for telehealth services?	Systematic quality management is critical, acting as a checklist to prevent oversights and ensure comprehensive integration across clinical, IT, and administrative domains.
What are barriers in quality management for telehealth services in your hospital? How do you address them?	Barriers include resistance to adoption, lack of seamless integration, and specialty-specific challenges. Addressing them involves training, proven results, and tools that reduce workload.
What are key system factors in your organization to consider in telehealth quality management?	Systems must integrate with electronic health records, flag only relevant data, and avoid adding to the workload of healthcare professionals.
How do you define high-quality telehealth from both the provider and patient perspectives?	Providers value efficiency and usability, while patients prioritize simplicity, accessibility, and a sense of safety and control over their care.
What technological challenges have you faced in implementing telehealth services, and how have these been addressed?	Challenges include interoperability, patient identification, and usability. These are addressed through secure platforms, integration with existing systems, and user-centered design.
How does your hospital ensure adequate digital literacy and training for both staff and patients to effectively use telehealth?	Training focuses on demonstrating the benefits of tools and building trust through pilot projects and results-driven approaches. Motivated individuals often lead adoption efforts.
How does your hospital incorporate hybrid care models to enhance patient-centered telecare?	Hybrid models combine in-person consultations for critical assessments with telehealth follow-ups, offering flexibility and convenience to patients.
What standardized quality metrics does your hospital use to evaluate telehealth services, and how often are they assessed?	Metrics include user satisfaction, integration efficiency, and clinical outcomes. Evaluations are iterative and adjusted based on specialty-specific needs.

What change management strategies have been most effective in advancing telehealth adoption in your hospital?	Strategies include engaging specialty-specific stakeholders, aligning telehealth discussions with broader medical events, and demonstrating tangible benefits through case studies.
What best practices has your hospital identified for successful telehealth service implementation?	Best practices focus on secure, user-friendly systems, specialty-specific training, and involving stakeholders in broader medical discussions rather than standalone telehealth events.
Do you find these dimensions and their subdomains useful for assessing telehealth quality?	The dimensions are valuable as a flexible framework but need to adapt to specific specialties and practical implementation scenarios.
Are there additional quality indicators you believe are missing?	Indicators for usability, time savings, and patient engagement in care should be emphasized to reflect the full benefits of telehealth.
Are there quality indicators you want to highlight?	Focus should be on metrics like ease of use, integration with clinical workflows, and the ability to reduce workloads for healthcare providers.
Do you believe the TQoCT can be relevant in your institution?	The tool has potential but needs to be flexible and adaptable to different specialties and settings to maximize its relevance.
What challenges and barriers do you anticipate when adopting the TQoCT?	Barriers include the tool's complexity and the need for alignment with real-world clinical workflows and specialty-specific requirements.
How do you see the TQoCT tool evolving to better address hospital-specific needs in the future?	Future iterations should emphasize customization, seamless integration, and practical usability for diverse specialties and clinical contexts.
Is there anything you'd like to add about managing telehealth quality or on the TQoCT or change management tool?	Telehealth should be integrated into broader medical discussions within specialties to ensure adoption and alignment with real-world needs.