

Quality in municipal call centre services - a multiple case study

Linda C Grøndal-Eeles, Janne Dugstad, Hilde Eide, Etty Nilsen

Submitted to: Journal of Medical Internet Research
on: April 15, 2025

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Linda C Grøndal-Eeles^{1*}; Janne Dugstad^{1*} PhD; Hilde Eide^{1*} PhD; Etty Nilsen^{1*} PhD

¹Centre for health and Technology Faculty of health and social science. University of South-Eastern Norway Borre NO

*these authors contributed equally

Corresponding Author:

Linda C Grøndal-Eeles
Centre for health and Technology
Faculty of health and social science.
University of South-Eastern Norway
Postboks 4
Borre
NO

Abstract

Background: Telecare has been partly integrated into the healthcare service in western countries over the last decade, aiming to assist the healthcare service battle with well-known challenges pertaining to demographic changes. Telecare is used to enhance the accessibility and efficiency of healthcare services. Focus on quality has had high priority within the healthcare service, and, recently, the emphasis on quality and telecare has become increasingly relevant, as more assistive technology is being implemented.

Objective: The study aims to evaluate quality in the telecare service provided by municipal call centres in Norway, according to the ARCHIE framework.

Methods: This study had a qualitative multiple case study design, investigating the quality of telecare provided through municipal call centres in Norway. Interviews and observations were performed, as well as document studies to understand the background of the call centres. Five municipal call centres were included in the study, covering approximately 60 municipalities across Norway. Eleven interviews with 15 informants, holding a variety of positions, were performed. The ARCHIE framework was used to analyse the data collected. The analysis was a combined deductive-inductive analysis identifying text segments according to the ARCHIE-framework, followed by qualitative content analysis of the text compiled according to each category in the framework.

Results: Findings from this study show that many stakeholders were involved in the shaping of quality in the telecare service. The stakeholders and the process of allocating telecare services were mapped along with quality in the delivered services, with the results showing that none of the ARCHIE framework categories were fully met.

Conclusions: The findings are not in line with the quality criteria for service defined by the ARCHIE framework. Several challenges were found at the system level, the professional level and the patient level within the telecare service, which reflected weaknesses with how the telecare service is organized. The voice of the patient is one key to resolve the challenges with quality in the telecare service. Patient-centred care should be at the core of decision-making. Clinical Trial: Registered and approved by the Norwegian Agency for Shared Services in Education and Research (SIKT). Ethics approval number: 426173.

(JMIR Preprints 15/04/2025:76054)

DOI: <https://doi.org/10.2196/preprints.76054>

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Original Paper

PhD Candidate Linda C Grøndal-Eeles, ORCID iD: 0009-0005-1136-3872

Centre for Health and Technology, Faculty of Health and Social Science, University of South-Eastern Norway, Drammen, Norway

Associate Professor Janne Dugstad, ORCID iD:

Centre for Health and Technology, Faculty of Health and Social Science, University of South-Eastern Norway, Drammen, Norway

Professor Emerita Hilde Eide, ORCID iD:

Centre for Health and Technology, Faculty of Health and Social Science, University of South-Eastern Norway, Drammen, Norway

Professor Etty Nilsen, ORCID iD:

Centre for Health and Technology, Faculty of Health and Social Science, University of South-Eastern Norway, Drammen, Norway

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The findings are not in line with the quality criteria for service defined by the ARCHIE framework. Several challenges were found at the system level, the professional level and the patient level within the telecare service, which reflected weaknesses with how the telecare service is organized. The voice of the patient is one key to resolve the challenges with quality in the telecare service. Patient-centred care should be at the core of decision-making.

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Keywords:

Quality, telecare, call centre, assistive technology, patient safety

Introduction

Telecare has been partly integrated into the healthcare services of western countries over the last decade [1], [2], [3], [4], [5], while at the same time being identified as at a “crossroads” [6], meaning the service is moving from telecare to telehealth. Telecare can be defined as: “the use of information, communication, and monitoring technologies which allows healthcare providers to remotely evaluate health status, give educational intervention, or deliver health and social care to patients in their homes” [7]. A call centre is a 24/7 service that operates telecare. A call centre employs operators, typically health care workers or technicians, to answer, document and assess calls and alarms from assistive technology [8]. Assistive technology is an umbrella term for assistive products and their related systems and services, which help maintain or improve an individual’s functioning related to cognition, communication, hearing, mobility, self-care, and vision [9]. These technologies are implemented in people's home and are the reason for call centres existence. Call centres organize their service in a variety of ways, including the core service – which is to answer, evaluate, document and take further action, if necessary [8] – and additional services, such as ambulant team, advisory department, or monitoring other technologies that are not health related. They may be private entities or part of the public service. In Norway, the call centres are largely organized as intermunicipal collaborations hosted by one municipality and regulated by the Local Government Act [10]. A recent article investigating the organization of municipal call centres in Norway, found that the centres were in an early development phase and had different organization models leading to a variation of delivered services [11]. As call centres are considered new and innovative within the health care service and provide the service in a new way, there is a need to investigate the quality of their services.

The World Health Organization (WHO) defines quality as "the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge" [12, p. 9]. To achieve high quality within healthcare services, several factors, such as patient safety, effectiveness, availability and patient-centred care, need to be evaluated [13], and many governments have strengthened their focus on quality within the health care system [14], [15], [16], [17]. International studies have shown a multitude of adverse events happening within the health care system in general each year, affecting quality [18], [19], [20], [21].

Focussing on quality in telecare has increasingly become a relevant topic, as more assistive technology is being implemented. The aim of implementing technology is to improve the access to the healthcare system and improve effectiveness [22]. The use of telecare can improve

communication between healthcare professionals as well as improving patient safety by reducing faults [23], [24]. Furthermore, digital healthcare can give the patients the opportunity to participate in their treatment and plans to a higher degree than before [22]. Challenges and barriers with the use of telecare include technical barriers, such as low internet access, poor digital competence amongst certain user groups, as well as concerns about privacy and data security [25]. In addition, Woolham et al [6] mention cost-effectiveness, assessment and deployment, ethical implications and user involvement as key challenges.

Greenhalgh et al's [26] research group developed the ARCHIE-framework for quality especially for telecare. Based on interviews and observations in various care contexts, they identified barriers and suggested in the framework several solutions to allow the provision of quality care with useful assistive technology. An important takeaway from Greenhalgh et al's [26] study is that technological advances should be underpinned by a user-centred approach to design and delivery. Furthermore, they suggested shifts in the service delivery to focus on and support technologies-in-use. The care contracts and technology should be personalized for each patient, from branded products to interoperable components. Furthermore, the technology should have the ability to be used flexibly across devices and platforms [26].

The benefits of telecare are still not well established [2], [27]. If the service lacks quality, this can lead to an increased burden of illness, increased economic costs, and medical errors such as inaccurate diagnoses, medication errors and inappropriate treatments [28], [29]. If clinical guidelines are not followed, this can result in ineffective care. By increasing quality within the telecare service, any benefits of the implemented technology might be easier to recognize.

Patient safety in primary care is a critical aspect of healthcare. According to the WHO, patient safety involves the prevention of errors and adverse effects associated with healthcare, aiming to "do no harm" to patients [30]. Research indicates that incidents in primary care, although often less severe than those in hospitals, significantly impact overall patient safety due to the high volume of patient interactions [19]. Furthermore, it is important to take into consideration that patients will increasingly receive complicated treatment of complex illnesses at home. As previous research has highlighted, the assessment of quality and safety culture is a fundamental step in understanding healthcare providers' safety-related perceptions [19], [31]. Therefore, fostering a robust safety culture and implementing targeted interventions for quality are paramount in primary care.

Telecare has the ability to enhance the accessibility and efficiency of healthcare services [32]. However, a systematic review identified multiple patient safety risks associated with telecare,

including issues related to the nature of homecare tasks, person-centred characteristics, technology and devices, organizational issues, and environmental factors [33]. These risks can arise from the complexity of integrating technology into homecare settings, where both the physical environment and the patient's capabilities play crucial roles. A qualitative study highlighted the importance of care workers' roles in ensuring patient safety through telecare. The study identified three essential work processes: aligning people and technologies, being alert and staying calm, and coordinating activities based on people and technology [34]. These processes underscore the need for effective training and support for care workers to manage the interface between technology and patient care effectively.

Few studies have investigated how quality is understood by telecare providers and how this is performed in call centre practice. This study aims to evaluate quality in the telecare service provided by municipal call centres in Norway, according to the ARCHIE framework.

Methods

Design - Multiple case study

This study has a qualitative multiple case study design. Eisenhardt [35], Eisenhardt & Graebner [36] and Yin [37], [38] all advocate for multiple case studies, as they claim that this format produces robust and parsimonious data. Interviews and observations have been performed, as well as document review to enhance understanding of the background of the call centres.

Data collection and participants

Data were collected in May and June of 2022 and were analysed iteratively with a focus on how quality in the service was maintained. Details of the recruitment procedure and sample selection for this study have been published previously [11].

Data was drawn from five municipal call centres in different parts of Norway. 11 interviews were performed with 15 professionals working in the call centres (CC1-CC5). Five informants from CC1 were interviewed, one from CC2, four from CC3, two from CC4, and three from CC5. In total, 12 women and 3 men were included. The informants had a variety of professional backgrounds and roles within the centres: six were managers; four were advisors, four were health care operators and one was an IT-technician.

The interviews followed a semi-structured interview guide. Observations were performed before conducting the face-to-face interviews in four of the call centres, observing the physical surroundings of the employees and how the service was provided. On arrival at the call centres, a guided tour was

conducted. The observations then included how the call centre operators worked, the response to alarms, the layout of the facilities, the workstation setup, and some of the technology included in the services (e.g., social alarms, GPS, medicine dispensers, door locks and sensors). These observations were important background knowledge for understanding the service and supporting the interviews.

Data Analysis

To understand the context of the telecare service and get a full picture of the ARCHIE framework, it was necessary to map the service, following how the patients' needs are mapped, who assigns services or technology, who installs, provides training, who does the follow-up and who evaluates the services the patients are receiving.

In this article, the ARCHIE framework [26] was used to analyse the data collected. The ARCHIE categories were designed to be adaptable and can guide the development and evaluation of telehealth and telecare services in various contexts. By focusing on user-centred design, realistic expectations, co-creation, human support, integration, and continuous evaluation, the framework provides a comprehensive approach to ensuring quality in assisted living technologies [26].

The framework aims to operationalize quality in telehealth and telecare to improve the proportion of patients receiving appropriate, acceptable, and workable technologies and services. It consists of six categories, each with an acronym.

1. Having a shared understanding of what matters to the user, which includes design and development of technology (Anchored).
2. Understanding the natural history of illness. The illness may progress, and the patients' needs change (Realistic).
3. Evolving and adapting solutions with patients. This should be continuous rather than standardized (Co-creative).
4. Supporting patients through interpersonal relationships and social networks where knowledge and information is key (Human).
5. Developing mutual awareness and sharing knowledge (Integrated).
6. Ensuring system learning from experiences built over years. Ongoing innovation to increase quality (Evaluated).

These six categories in the ARCHIE framework – Anchored, Realistic, Co-creative, Human, Integrated and Evaluated – make the acronym ARCHIE.

The data analysis performed was a combined deductive – inductive analysis first, deductively identifying text segments according to the ARCHIE framework, followed by an inductive qualitative content analysis of the text segments compiled according to each category.

Deductive analysis: in a joint meeting with the research team, it was decided that the first author (LGE) would initially read through the 11 interviews, identifying and coding text segments aligned with the six main ARCHIE categories as described above. It is noteworthy that some text segments agreed with the categories, whereas other segments agreed with the opposite value (see table 1 for examples). These “opposite statements” were coded under the specific category as, for example, “not anchored”. Consequently, all the coded text had a main code in line with ARCHIE, and a sub code as “not”.

Table 1. Examples of the opposite of the ARCHIE categories

Anchored	Not anchored	Realistic	Not realistic
A shared understanding of the needs of the patient.	<i>A patient is given the wrong technology</i>	Understanding the natural history of illness	<i>Change of pattern for the use of assistive technology, but the patient still has the technology</i>

As a second step, all authors read and coded three selected interviews to align the understanding of the ARCHIE framework categories and secure the initial coding in each category. Along with the coding process, the researchers kept an open mind for emerging issues, inspired by an inductive approach. The tentative coding by the first author in step one was discussed, adjusted and agreed on. Consequently, as a third step, LGE reread and secured the coding of all the interviews.

Inductive analysis: The qualitative content analysis of the text segments in the different ARCHIE framework categories followed the three-step analysis suggested by Elo & Kyngäs [39]. NVivo 5.0 was used in the coding processes.

Research ethics

The study was approved by the Norwegian Agency for Shared Services in Education and Research (SIKT), who assessed the data processing plan to be in accordance with data protection legislation (Ethics approval number: 426173). Furthermore, the main principles for research according to Research Ethics in the Social Sciences and the Humanities [40] were followed. All participants received written and oral information about the study and informed consent to participate was

obtained from each participant. Data was stored in a USN protected area. The data was anonymized in the quotes used throughout this article.

Results

Findings from this study show that many stakeholders were involved in shaping quality in the telecare service. The first section of the results will present the process of allocating a service, illustrating how the various stakeholders influence quality. The second part presents the results of the analysis based on the ARCHIE framework.

Stakeholders and the process of allocating telecare services

The telecare services consisted of several stakeholders within primary health care, each constituting a piece in the puzzle constituting the telecare service. The stakeholders included the home nursing unit, general practitioners (GP), and the service allocation office responsible for the referral and mapping of the patients and assigning the service, respectively. In addition, family members and even the patients themselves often detected the need for a service in the early phases.

When a patient was allocated a telecare service, the technical support team was notified by the service allocation office. Technical support was responsible for installing the technological devices in the patient's home and informing the patients. The call centres were then notified. Their responsibility was to respond to alarms and monitor the technology. The call centres and the home nursing staff interacted the most with the patients when compared to other stakeholders, and this interaction could last for several years. To evaluate or change the service, the call centres or home nursing staff reported back to the service allocation office and expressed concern. The service was perhaps no longer what the patient needed, prompting an evaluation and allocation of new services. See figure 2 for a visualization of the process with the relevant stakeholders.

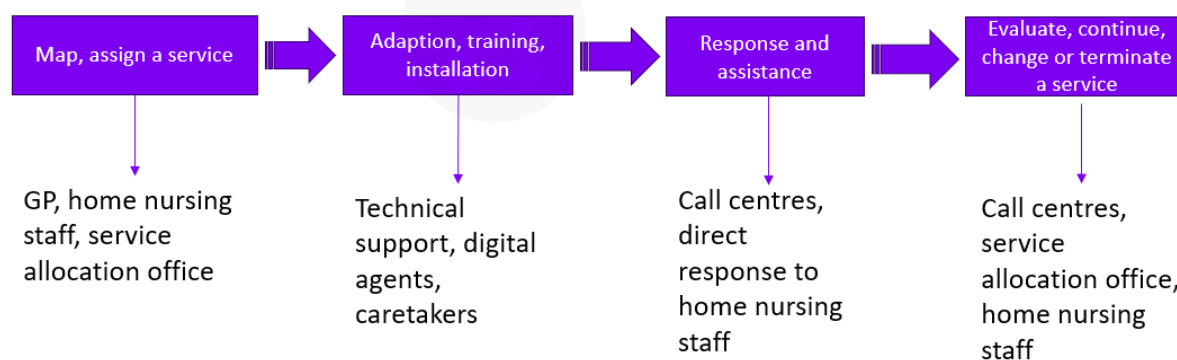


Fig. 2. Overview of the actions in service and stakeholders within primary health telecare

In figure 2, the actions are represented by the arrows. Table 2 presents a more specific overview of

which stakeholders are involved in the different phases of the process of assigning and providing a telecare service.

Table 2. Overview of which stakeholder is active in the different stages of the process

	Map and assign service	Adaption, installation, and training	Ensure response and assistance	Evaluate, continue, change or terminate a service
General practitioner (GP)	X			
Home nursing staff	X			
Service allocation office	X			X
Technical support		X		
Digital agents		X		
Caretakers		X		
Call centres, direct response to home nursing			X	X

Quality in the delivered services

Key dimensions of quality are presented according to the ARCHIE framework. One important discovery was that the categories in the ARCHIE framework are dependent on each other. One example is if the “Anchored” category is not fulfilled, the technology cannot be realistic. The results will be presented following the framework and the headings represent the main findings in each category.

The “Not-Anchored” services of call centres

The category “Anchored” reflected an understanding of the patient’s need that was shared between the patient and the care giving service and aimed to identify what was important and meaningful to the patient. This included both design and development of the technology. Many stakeholders collaborated to provide the home-based assistive technology service, such as service allocation offices, technicians, homecare nursing services, and call centres. However, the implementation of assistive technology did not appear to be anchored with all the stakeholders working with each patient. The telecare providers working in the call centres were not involved in the process of assessing the patients’ needs or prioritizing and selecting what service they should receive. They merely handled the alarms once the patient had already obtained the assistive technology. The task of

assessing what technology should be provided rested with the service allocation offices. Informant K said:

The assumption must be that both the home nursing staff, in collaboration with other decision-makers in the municipalities, should work much closer with the patient- to see if the technology can actually relieve the burden. It is felt that this is not being done.

The call centre operators had good knowledge about how the assistive technology worked but were unsure how much knowledge the service allocation offices had regarding the assistive technology and how it worked. A lack of cooperation between these stakeholders could in some instances lead to unsuitable assistive technology, indicating that the allocation of assistive technology was not anchored with those who were actually using it – the patients. Informant L said:

It turns out, that technology should never have been introduced to the patient, because it is not the right technology.

The analysis indicated a “we/them” attitude between the call centre providers versus the more administrative service allocation office, suggesting there is a lack of cooperation between the organizational units involved. Closer collaboration between the service allocation offices and call centres was called for by the call centres. Informant K said:

Because the administration makes decisions about medicine-support ... it is the municipality itself that chooses to use a medicine dispenser, or if they would like to do it the ordinary way, with home nursing giving medicines ... I don't know what to say about the administration, it is not that they are falling behind, but the cooperation, it has not worked so well”.

Another aspect was the cooperation between the call centres and the patients. The call centres explained that it was not easy to get the patients on board when deliberations of needs were mapped, which could affect the shared understanding of needs. Informant D said:

It is always in the back of our minds, to involve the users of the technology. And not just healthcare providers, because they also use the technology, but the patients. It can be difficult to include their representatives when we decide what technology is needed in the service.

This shows that there are two layers of users; the service providers are sometimes the end users for the technology and at other times the patients are the end users.

The challenge of having “Realistic” technology when the needs are constantly changing

The “Realistic” category meant that the technology needed to be representative and consider whether patient conditions are likely to progress and/or change, thereby changing the patient’s needs. However, if the technology was not anchored in the first place, it could never be realistic. The call centre providers addressed how patients received the technology too late, where the situation of the patients was rapidly changing, and technology was therefore not realistic. Informant K explained:

We feel like the introduction to health technology should happen at a much earlier stage than what is being done now. Today we see the need when it is an acute need, when the need is too urgent. To be up front and use technology before it has become urgent is something I believe in.

Another challenge was how some progressive illnesses left the patient in a state where they did not know, understand or remember the different assistive technologies, indicating that their health situation had changed so they were no longer capable of using the technology as intended. When the patient reached this stage, there was no benefit for either the patient or the health care service, because the assistive technology was a poor fit. As informant F stated:

When a patient has moderate Alzheimer, then it is too late. The patient will not understand why they have a pendant around their neck, or a bracelet. They will wonder what it is and maybe even take it off and not remember to use the alarm when needed.

The call centres could pick up on progression of the patient’s health conditions by monitoring patterns in their behaviour. For instance, a user functioned well at home with a social alarm, and then the call centre detected a change in the pattern of the use of the alarm, receiving more calls than necessary. The call centre reported these changes to the home nursing staff or service allocation office. Informant B said:

We can go to a specific zone, and when we look closer, all the patients come up. And then you will see we have two patients that trigger their alarms hundreds of times. Then we can say, this user has the wrong service.

However, the call centres found that in spite of their reports, the patients continued to have assistive technology that did not work for them. This indicated that the municipalities were unsuccessful in reevaluating whether a patient had the right technology at the right time, and also that the feedback from the call centre was not taken into consideration.

Challenges in co-creative and collaborative work

The category “Co-creative” meant that the technology should be continuously co-created with patients – making it tailor-made to a certain degree. Co-creation and interaction across disciplines and levels were raised as challenges by several informants. Lack of cooperation, information sharing and knowledge between call centres and other institutions was a challenge in general and specifically on a user-related level. Informant F said:

We see a need for cooperation, on a larger scale, with GPs and hospitals. But we also see a great need to interact better with the patients to be able to give them a better service. We already know, both hospitals and GPs have little knowledge of our health service. We had a meeting and became aware of how little they were familiar with us.

The focus of the call centre providers was to cooperate and interact with patients. The call centres tested all the technology, and some even created a test lab where patients, future patients and their next of kin could come and experience the technologies hands on. Informant K said:

We have emphasized it, the fact that we have a holistic focus. We see it as a core value, I would say. Because it is about bringing people with us the whole way, from development to implementation.

None of the telecare providers involved in this study actually developed health technology. They primarily managed calls/alarms from technology purchased by the municipalities. The technologies had been purchased based on the needs of the patients in each municipality. However, some of the call centres were involved in and provided recommendations to the municipalities about what technologies to procure. In some instances, they even procured technology on behalf of the municipalities. Informant K explained:

It is often us, or the municipalities can also suggest, but is often we who make recommendations, or take the initiative. But if something new comes along, it is not the technology which is our focus, it is what the need is. We must understand the needs to solve a problem, then we can go out and see, is there any technology that can work. Because we have run pilot projects with some fancy technology, but then we realized, we didn't have the need for it after all.

Telecare providers had a unique insight into how the home nursing staff coped with the technology, whether they managed the technology, and whether the patients could handle the technology. Informant B said:

We get the home nursing perspective, on what is difficult technology. Because it can be completely different for an engineer who has developed it and it makes sense to them, but not to an assistant in the home nursing.

They also work closely with the home nursing staff, who act as informants for the call centre providers. They can give feedback to the call centre providers about what technology works and what does not, and whether the patients are happy with the technology or not. The informants stated that this was valuable for the call centre providers. Informant L explains:

We have called some of the home nursing staff “digital agents”. They can give us information about what works, and if someone is unhappy with the service. But also, for the call centres to get information to patients.

The importance of knowledge for the nurses

The “Human” category comprised the interaction between patients and employees’ knowledge and key information. One call centre received 300 000 alarms in 2021, with 861 events in 24 hours and 36 per hour, which underlined how much interaction the call centre service had with their patients. The telecare providers frequently talked to the patients and got to know many of them. To have information and know some of their patients led to more calls being resolved by the call centre service. Hence, the alarm did not need to be transferred to the home nursing team for further action. Informant P stated:

Because in X [a private call centre], they just sent the phone through to home nursing, but here [municipal call centre] they answer, and ask questions, what can I help you with? I have lost something under the sofa ... yes, but we can see in your plan that someone is coming to you in two hours, and they will help you then. Finished. A call like this will not go out to the home care ...

As a result of the high numbers of alarms, an ethical dilemma appeared with frequent callers. The patients labelled as frequent callers could lead to employees in the call centre service feeling that they were getting tired of the patients and therefore needed to work to ensure they upheld their standards and communication was good. The telecare providers said they managed it because they knew that these patients’ needs were not met. Some reflected that the reason for the frequent calls might be the fact that the patient had the wrong technology. Informant D said:

I have experienced that I get tired of alarms, especially when the alarm is triggered for «nothing». But I am trying to think, they are ill, there is a reason they are triggering the alarm. It is about good communication from the call centre.

Findings highlighted a variety of health personnel working in the call centres. Some of the call centres had nurses, some had health care workers only, and some had technicians working together with nurses as operators in the call centre. Some call centres had a standard of at least one nurse as a minimum, whereas others who had nurses only were looking to hire health care workers. Informant P said:

We have made it a requirement, that a nurse must be present at work at all times.

Not only does the kind of health personnel the call centres have employed as operators vary, but their experience also seems to vary. One of the call centres was co-located with an emergency room. The nurses had high competence in handling telecare and solving acute matters over the phone. Informant A said:

The nurses working with us, as operators, have high competence, and that has a lot to do with the cooperation and co-location with the emergency room. We only have nurses with very high competence answering acute calls. Because that happens every week, and they need to be able to handle it.

Employees' experience seemed to be key. The interviews and observations revealed there were no national decision-making tools, procedures for the receiving of alarms, questionnaires, or standards. One nurse (informant C) working for a call centre co-located with an emergency room said:

We don't have any [decision-making tools] ... At the emergency room we do, we use triage systems [decision-making tools], but at the call centre we have nothing. There are no procedures as to what we should do.

Where there were no decision-making tools or procedures on how to receive and handle a call, it could elevate the risk of misunderstandings, as there was no "safety net" to make sure the operators had asked about everything relevant when handling an alarm. One informant explained an episode where the operator did not inquire well enough during an alarm that ended with a patient lying on the floor for a long time, whilst the operator thought the patient was lying in bed. Another call centre, which monitored a broad variety of technology-based services, including lift alarms, fire alarms, burglary alarms and an answering service for the municipality after work hours, needed other skills for non-health-related alarms. Informant K explained:

... We have two operators on duty, one with health background and one with technical background. This composition is because of the portfolio of services we have.

However, all alarms had the same ringtone in all the call centres. In the call centre with both nurses and technicians working alongside each other, they answered alarms without any system or pattern as to which one of them was answering which alarm. The lack of alarm identification meant that the technicians answered medical alarms and vice versa. They would assist each other if one, for example, answered a cardiac arrest. Informant C stated:

The technical alarms are blending in with the “operative” ... If a fire alarm has gone off in an apartment, we should act right away, but if an alarm box has low battery – we have 12 hours. But we can’t tell the difference between the two when the alarm goes (in the call centre). Therefore, it should be different sounds to the alarms, or something-but it is not.

The study found no evidence showing that there were more unwanted events in call centres with health care workers versus experienced nurses. This is because there was no indication of any system for registering unwanted events, or opportunities to look into whether call centres with different professional employee profiles had more unwanted events than others.

Challenges with partly integrated technology

The “Integrated” category meant that technology should be integrated with existing systems so that changes could be caught. Even though the call centres reported that it was demanding to cope with all the integrations, it seemed that this was a very high priority to all of them. They also emphasized the importance of the integrations. Informant A explained:

Because of the integrations, we can clarify many alarms that come in. About 50% of incoming alarms, we can resolve together with the patients, and there are no need alert other bodies.

As seen in the previous statement, integration played an important role. All call centres had patients’ medical records integrated. This meant that the telecare providers had access to information about the patients, such as what time the home nursing team had visits with the patients. Observations confirmed the statements. When operators answered alarms, a notification came up on the screens, as well as an alarm or ringtone in the call centre. The operator could see who was contacting them and their medical record came up on their screens. Furthermore, it seemed that the technology used by the patients was integrated into the platforms of the call centres. However, the call centres explained

how it could take time and be challenging to integrate new technology into the platforms. Informant A explained:

They [the vendor] have committed to assist with most things. This applies regardless of the technology, whether it is a bed sensor or social alarm. The information about the patients comes in our platform and is written back in the patients' medical record when the assignment is completed. Therefore, some of the integrations can take some time, but when it first comes, it is so much better than if we did not have an integration. But it does take more time than I thought, when we first started

Results showed it was complex with integrations. The call centres had many vendors to relate to, and many technologies that needed to be integrated into their systems. On top of that, new technologies were making their way into the service, which also required integration.

Better use of data for evaluation and learning

The “Evaluated” category indicated learning from experience and improving systems accordingly. It should involve an ongoing effort to increase quality. The call centres had a lot of data from their operations and the municipalities received reports from the call centres regarding this data on a regular basis. This data provided key information about the call centre service and the patients, and could be the basis for evaluation, learning and development of the service. However, the call centres were not sure whether the municipalities used the data for learning purposes, or if they used the data at all. The call centres monitored the number of alarms related to each of the collaborating municipalities and variations over the year and could provide data for individual patients, mapping whether the service was the right one for them. Informant B explained:

Creating value through better use of data is important for the municipalities ... how many “false alarms” did the home nursing have to take on before the call centre? When the alarm is being sent now, it is real. I don't have the exact numbers, but one municipality has calculated how much time they have saved, because they have seen a big difference. How much time did they spend on the social alarms before, and how much time do we use now

The call centres were reporting to the municipalities because they were trying to see the effects of their work, making sure they procured the right technology, and getting it documented. Informant K explained:

We are reporting, we do it because we want to see the effects of the measures we implement. What needs are vi mapping? Do we acquire on the basis of the needs, and what are the effects of that? A call centre is not a quick fix, but thorough work from top to bottom or bottom to top.

Furthermore, the call centres were evaluating what other services they could operate. Many options were considered at the idea stage, but digital home monitoring was a trend many of the call centres were looking at implementing as a service. Some call centres had already started. Informant L said:

Digital home monitoring and rehabilitation. We are investigating the possibilities. We could have digital rehabilitation, or digital training with patients ... So, they could have more treatment options. But this [digital rehabilitation/training] is just at the idea stage.

The results will be discussed in the following chapter.

Discussion

The study reveals that, despite efforts, the telecare service remains fragmented and therefore poses a potential threat to quality. The health care service faces significant challenges due to fragmentation, and this is also the case for the telecare part of the health care service. Call centres provide only a small part of telecare services, and their operations are complicated by a high number of stakeholders (e.g., the service allocation office, home nursing, and next of kin), even though they operate at the same level of care. This lack of coherence negatively impacts on the quality and safety of patient care because of miscommunication and a lack of coordinated care. In the following, the results will be discussed from system, professional and patient perspectives.

Quality in a fragmented telecare service from a system perspective

There are several challenges regarding the telecare service that need to be addressed on a system level: lack of coherence, effective utilization of data, and outdated national guidelines. From a system perspective, health care is seen as a complex set of management levels, along with the policies, resources, and actors involved in delivering care [41], referring to the entire network of organizations, people, and actions whose primary intent is to promote, restore, or maintain health [42]. The lack of coherence becomes visible when seen through the categories in the ARCHIE framework, and suggests it is a system feature where one category affects the other. For instance, if

anchoring, which is the service allocation office's responsibility, is not present, the following categories will not be right either. Another example is the category *realistic*, which presupposes that the call centres report to the service allocation office that a patient no longer benefits from using particular technology. The call centre's experience is that their report is not followed through, and the patient's situation remains the same, which will affect patients' health care quality. This shows how the telecare service is fragmented, and several silos are unsuccessful in working together to execute the service.

Dillon et al., [43] found that when the health care system is perceived as fragmented, the outcome could be loss of trust, and difficulties navigating between providers [43]. These results may be transferrable to the telecare service. Furthermore, fragmentation may substantiate the "we/them" feeling, causing an even greater division between the stakeholders, as the current study implies. Dillon et al., [43] suggest fundamental restructuring of the health care system, to coordinate patient-centred care to meet the needs of the patients and rebuild trust in the health care system. This is in line with the ARCHIE framework, which promotes patient centred care. Notwithstanding, results from this study show the opposite, suggesting that the lack of tailored approaches may be hindering quality in telecare and call centre services, despite efforts by municipal call centres to improve and professionalize their services.

The effective utilization of data in telecare services is crucial for enhancing patients' outcomes and service efficiency. When data is not coherently managed or utilized, it can lead to fragmented care, missed opportunities for service improvement, and reduced patient trust [44]. Inefficiencies such as repeated tests and procedures may also arise, increasing operational costs [45]. In the ARCHIE framework, data insufficiency and ineffective utilization of data falls under the category "evaluate" [26].

The call centres seem to lack national systems, updated guidelines, procedures, and best practices for handling alarms to guide the operators working in the call centre, which may negatively impact on the quality of the service. Hughes [46] suggests that most unwanted events result from faulty systems and processes rather than individual errors. This raises concerns about the impact of non-optimized systems in telecare services. Guise et al [33] called for increased standardization in reporting unwanted events to improve the evidence base, but current research indicates little progress since then. On the other hand, however, there are critical voices expressing concern about over-reliance on standardized guidelines and protocols. It is argued that these standardizations can lead to a lack of flexibility and creativity in addressing complex, real-world problems and, furthermore, that

these guidelines can sometimes stifle critical thinking and innovation, leading to a more bureaucratic and less effective healthcare system [47]. The importance of reflexivity and questioning established norms is stressed and it is argued that a one-size-fits-all approach to guidelines can overlook the unique contexts and needs of different health care settings and patients.

Although patient safety is not specifically mentioned in the ARCHIE framework, it is implicitly a threat if the assistive technology is not anchored, realistic, co-creative, human, integrated, or evaluated – as stated previously with the “human” category as an example. Knowledge regarding quality and patient safety seems inadequate – in line with Guise et al [33] who called for increased standardization in reporting unwanted events to improve the evidence base – but current research indicates little progress since then. The establishment of the municipal call centres was based on scarce knowledge and without a clear direction on how to systematically care for quality. This may have impacted on both quality and patients’ safety and made it challenging to establish quality standards within the telecare and call centre services. This mirrors other research highlighting concerns in telecare services [6], [33], [34], [48], [49].

One could ask questions about what responsibility the municipalities have in the matters of quality and standardization in the telecare service. Today, the call centres possess more knowledge and experience than when they first established the service, and many types of organizations have been tried out [11]. Telecare providers have the opportunity to develop industry standards themselves. However, it seems that this has not been successful yet. An industry standard could contribute to elevate quality; nevertheless, it is important to note that this does not exempt either health personnel or the municipalities from their responsibilities [50], [51].

The variety of professionals, skillset and alarm fatigue within telecare

This study has mapped a variety of health professions working in municipal call centres. It spans from highly experienced nurses working in both emergency rooms and call centres, to healthcare workers and technicians. Giving remote care is a different way of providing care, and needs specific skills [3], [52]. The call centres have to be prepared to handle acute alarms, and findings indicate that the staff’s experience level is key. Anker-Hansen & Johansen [53] found that the nurses are ensuring patient safety in complex remote decision-making in telecare. The complexity includes accurate decision making based on unclear patient descriptions and challenges with communication [53]. The telecare nurses emphasised the importance of clinical expertise and how challenging the decision-making processes and communication were. They asserted that to provide telecare, the staff working in call centres need to have proper training as well as experience. Furthermore, telecare

providers must also take into consideration whether they work towards that which are professionally defined, or towards “what matters” to the patients [54]. With regard to the ARCHIE framework and Greenhalgh et al’s [26] vision, the latter should be the goal.

Data from this study shows that miscommunication and unwanted events have occurred. In Fisk et al’s [3] study, the emphasis is on the need for a diverse range of skills and knowledge, which may include several healthcare professionals. Proper training and protocols can help mitigate these potential patient safety risks [33]. Regular audits and feedback mechanisms are also vital for continuous improvement [55]. Furthermore, Guise & Wiig [52] encourages training that includes patient-centred methodology to ensure good patient-professional relationships in remote care [52].

Another challenge telecare staff have raised is the ethical dilemma with patients who frequently use the alarm, resulting in alarm fatigue for telecare staff. Alarm fatigue is a well-documented phenomenon within healthcare in general [56]. Slow response time, identifying genuine alarms, well-being and job satisfaction can all be negatively impacted [57]. While these studies have not investigated the telecare service specifically, the current study shows that this problem has also arisen in the telecare service. One solution suggested for hospital alarms is effective alarm management to mitigate the challenge of alarm fatigue and improve work conditions [57]. For the telecare service, receiving alarms is the job. It is therefore important that the alarms occurring are relevant and false alarms are limited to a minimum, as per Dee et al’s [57] findings. To ensure that patients have the right technology – meaning that the service is anchored – is one possible way of limiting the false alarms. To reevaluate the service, ensuring that the technology is realistic could be another. Evidence within the telecare service suggests a variety of healthcare professionals, varied skillset, varied access to training and knowledge development is of importance for quality and for patient safety and should be updated regularly.

Quality for the patient in telecare

The findings in this study can be perceived as a contrast to the ARCHIE framework, developed by Greenhalgh et al [26] and what is indicated as high quality telecare. One example of such contrast is how ARCHIE promotes patient-centred care, whereas the current study suggests that the patient’s voice is barely heard. This permeates throughout the categories in the ARCHIE framework. When the patient’s voice is not heard, it can be traced to the assistive technology often not being anchored, not realistic, not co-created and presenting challenges in the human category, with examples discussed above (e.g., variety of healthcare personnel and skillset). Interestingly, the call centres say

it is difficult to engage the patients in co-creation. Fusco et al [58] identifies low health literacy, lack of understanding, time constraints and intimidation of the co-creation process as barriers to successful co-creation. Why call centres in the current study find it challenging to engage patients can only be speculated on, assuming that Fusco et al's [58] barriers also include telecare service patients.

As mentioned above, patient-centred care is suggested in order to meet the needs of the patients and rebuild trust in the health care system [43], [52]. Greenhalgh et al [26] also promote a user-centred approach, which the ARCHIE framework mirrors. A strong takeaway is therefore to move from standardized to personalized care within the telecare service. Nonetheless, there are some barriers. It is emphasized that the cost of developing and customizing these technologies to meet diverse patients' needs can be substantial, making it challenging to execute the framework without adequate funding and support [26], which consequently affects the quality of telecare services.

Strengths & Limitations

The ARCHIE framework is especially developed for defining quality in telecare and was therefore selected for this study. The framework has successfully assisted the research, uncovering quality and patient safety challenges within the telecare service. However, when analysing the data we found that the different categories in ARCHIE were difficult to differentiate from one another and could be intertwined, meaning data can fit several of the categories.

Data were collected from five call centres (multiple cases), located in different parts of the country and in municipalities of different sizes. This provides variation and rich data, which is a strength of a multiple case study [36]. A limitation of multiple case studies is the complexity that the amount of data gives. Breadth versus depth in data collection is a challenge that has been considered, where depth will possibly suffer in a multiple case study compared to a single case study [59].

The selection of the municipal call centres was a limitation to the study. At the time of data collection, modest information was available on existing call centres, and therefore the selection was random for practical purposes. This might have led to overrepresentation or underrepresentation, which may affect certain groups of call centres. The ease of access to informants might compromise the reliability and validity of the data [59]. A common limitation with qualitative studies is generalizability, and this also applies to this study. Another limitation to be aware of is that of the cross-sectional snapshot, since data was collected at one point in time in this study. This may not represent long-term behaviours or trends.

A strength of the research is the diverse background of the research team. This interdisciplinary background enabled the team to have an open and critical process, with the aim of reducing bias as much as possible.

Conclusions

The ARCHIE framework [26] has been used in this research on quality and patient safety within municipal call centres. The findings show that none of the categories in the framework are fully met, despite hard and dedicated work from the call centres. The challenges with quality and safety were found at a system level, a professional level, and a patient level within the telecare service. Furthermore, the results in this research reveal that this is largely due to how the health care service is organized, with many stakeholders providing small parts of the total health care service – such as the GP's, home nursing team, allocation offices, and call centres, to name a few. It seems that lack of communication, shared understanding of needs, evaluation, and cooperation between the various stakeholders hamper the quality and patient safety of the call centre service, meaning that it has not reached its full potential for a high-quality service.

The telecare service, as a whole, does not appear to optimize the available systems and assistive technology, despite the hard work municipal call centres put into elevating the service, professionalising it, creating best practice and learning from their experiences. This research suggests that the telecare service struggles to exploit possible gains, failing to create best practice and learning, thereby gaining knowledge. The utilization or evaluation of data may be the cause.

The voice of the patients is key to unlocking the lack of quality. A person-centred approach will elevate the understanding of the “anchored”, “realistic”, “co-creational” and “human” categories. Breaking down barriers is one suggestion for the telecare service to engage patients in participating in general, and especially in co-creation, because it greatly impacts quality and patient safety within the telecare service. Patient safety is not especially mentioned in the ARCHIE framework. One could, however, say patient safety is affected when patients have the wrong technology, or when the technology is not realistic, is partially integrated, has no co-creation, lacks in human factors, and has no evaluation.

Implications for practice:

The findings of this study imply that municipal call centres need to improve the telecare service, to reach the full potential of a service integrating high quality and patient safety. Improvements should be considered at system, professional and patient levels. At a system level, one way to advance is for

stakeholders in the telecare service to aim to improve communication across their services and improve the fragmentation in the system. Furthermore, they should ensure that the patients have the right technology at the right time, assuring quality and safety. The telecare service calls for national standardization to professionalise the service. As shown in this research, the ARCHIE framework of Greenhalgh et al [26] can be a useful tool for assessing quality in emerging services within the health care domain.

Issues for further research

The following issues for further research were identified in the current study:

1. Patient engagement: why it is difficult to engage patients in co-creation within telecare, and what is needed to break down barriers for co-creation?
2. Cooperation and communication between stakeholders: how do the municipalities consider patients' needs for assistive technology, and how is the mapping done? Furthermore, how are concerns of ill-fitted assistive technology handled?
3. Alarm fatigue: alarm fatigue is a well-known factor in the healthcare system, but it needs to be explored in the telecare service.
4. Competence development: what kind of training do telecare operators receive before they start as operators, and what plans are in place to maintain and increase knowledge?
5. Quality in services: what can the municipalities do to improve quality in the telecare service?

Acknowledgements

All authors made significant contribution to the manuscript. The article was prepared in close collaboration with the authors LGE, EN, JD and HE. The data was collected by LGE, but all authors contributed to the analysis and writing of the manuscript. Furthermore, all authors read and agreed to the final version of the manuscript. The article is funded by the University of South-East Norway.

The authors would like to thank all the informants participating in this study.

Conflicts of Interest

The first author (LGE) is employed in the private company, Tellu. The data collection and writing of this article was, however, done before the employment. EN, HE and JD has no conflicts of interest to

report.

Abbreviations

ARCHIE: Anchored, Realistic, Co-created, Human, Integrated, Evaluated

EN: Etty Nilsen

GP: General practitioners

HE: Hilde Eide

JD: Janne Dugstad

LGE: Linda Grøndal-Eeles

SIKT: Norwegian Agency for Shared Services in Education and Research

WHO: World health organisation

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