






Aspects of Pervasive Health and Technology Use in Care Organizations During the Pandemic: Report from a Municipality Covid-19 Study

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Abstract. The Covid-19 pandemic struck the world in spring 2019 and affected most people in the world. One group that suffered the most was older adults and others ‘weak’ citizens. In Sweden where the reported-on study was situated, especially people living in nursing homes and other care facilities suffered immensely, especially in the early stages of the pandemic. In this paper we report on perspectives and lessons learned from a survey compiled by 13 care managers in eleven Swedish municipalities followed by a workshop with ten of these municipality health managers. Our study showcase how technology has been a valuable tool for these organizations during the pandemic. While Internet-cameras in some instances has been used in private homes to facilitate ‘remote monitoring’, many of our findings points to aspects of managing care – a less studied aspect within the Pervasive health community.

Keywords: Municipality · Technology · Covid-19 · Lessons learned · Pandemic

1 Introduction

The ongoing Covid-19 pandemic has affected the whole world and challenged the care sector to the extreme. High mortality rates, especially among the older and institutionalized population were reported on in many countries at an early stage of the pandemic [1–3]. Sweden was one country that during the first year of the pandemic experienced high mortality numbers among care-receiving older adults, especially unmarried older adults [4]. In Sweden it is mostly the municipalities that have the responsibility to organize care-facilities, social care, and homecare. Consequently, many care- and organizational changes had to be made in the municipality care organizations as the pandemic spread and mortality increased, including the organization of elderly care facilities [5].

As part of an ongoing innovation project related to municipality care and social care a survey on the organizational effects of the pandemic was distributed to, and compiled by, care managers in 13 Swedish municipalities. The survey was followed-up by an online workshop. Our work did not have an outspoken technical agenda, but many of

the findings dealt with technology, or highlighted aspects of municipality care during a pandemic where technology can be part of a solution. The survey answers were analyzed and resulted in four broad themes, A) Information and information dissemination, B) Digital tools, C) Before and after a crisis, and D) Each crisis is different. These four themes were brought as input to the workshop and there further elaborated upon. The survey and workshop took place autumn 2020, what we then thought would be ‘at the end’ of the Covid-19 pandemic. While numerous large studies on the pandemic have been conducted [2, 6–8], the idea with our study was not to make a broad data-collection survey. Instead, the ambition was that the workshop would enable a discussion and collaborative reflection across the participants – using the survey data as a point of departure rather than the result. Combined, our survey data and workshop documentation provide insights into how the involved (small to midsize municipalities) experienced the pandemic and how they used (and not used) technology and pervasive healthcare technology as tools in managing the pandemic situation. Also, our data provides insights into challenges, for example organizational, where technology can be the solution, or part thereof.

2 Background and Case

Two representatives from a network of 13 Swedish municipalities and the authors of this paper collaboratively designed the study, in which all 13 municipalities agreed to participate. A study goal was for the municipalities to become better prepared for future pandemics and unforeseen crises situations based on shared experiences and lessons learned from working, and providing care, during Covid-19. The ambition was to have three workshops and using provocative design to stir reflection and discussion among the study participants. A motivation for the study was indeed not only to generate local data to complement national or large-scale studies but also to create a forum to discuss and reflect on the pandemic, its organizational and care-providing impact, and what lessons learned could be made to inform future crisis situations. Due to a new, second wave of Covid-19, the work was put on hold after the first workshop as the daily operation of managing the provision of care had to be prioritized.

3 Method

At the end, 13 people answered the survey, representing eleven out of the 13 municipalities. Eleven of the participants identified themselves as being Head of the social service office or having an equal position (titles and organizational structures may vary between municipalities, for example between a small and larger municipality). Additionally, one identified themselves as a dedicated Covid-19 pandemic coordinator and one as a Medical responsible nurse (i.e. a nurse with specific responsibilities in the Swedish municipal healthcare system). All municipality-participants in the herein reported-on study had through their work experienced the pandemic first-hand.

The survey was composed by three parts. The first part concerned background information about the respondent like what municipality they worked in and their formal role and position within the municipality. The second part was a set of Likert-scale questions

related to the effects of the pandemic within the care organization. For example how the different social care areas (i.e. Elderly Care, Subsidies and services to certain disabled persons, Individual and Family care, Community Psychiatry, and Financial Assistance) had been affected by the pandemic and to what degree the municipality had managed to adapt the above areas in respect to the pandemic. The third part was composed by 14 open-ended free-text questions. These questions covered aspects of the initial situation, for example if there was a crisis management organization ready and how the pandemic had changed care work in the municipality. The survey asked the participants to also give examples of implemented changes that had worked and not worked during the pandemic. There were also questions directly related to equipment and technology, including what technologies worked and didn't work as planned during the pandemic. Some questions also asked the respondents to reflect on what experiences from the pandemic they found valuable to bring with them into the future, including a question where the respondents should mention three lessons learned from the Covid-19 pandemic that they deem important to handle a crisis five years from now. Finally, the survey had some concluding questions, including what part of the municipality care work, aspect, or routine they found most important to work with and develop based on the Covid-19 experience. The survey was distributed and compiled online. To prepare for the workshop, the survey results were first analyzed by the two authors independently and then together. The purpose with this first analysis was to get an overview of the main results and to extract themes for the workshop based on the survey answers.

The workshop was held online with ten of the original 13 participants, using Zoom [9] and the web-based tool Mural [10]. The main part of the 3-h long workshop used Mural to conduct a so-called Future Workshop. The participants were divided into two groups with one facilitator (i.e. one of the authors) per group. Each group then had to select one of the above outlined themes (derived from analyzing the survey results). The task was then to first identify all problematic aspects related to the selected theme, group these and translate the 'problems' into their positive counterpart. These positive statements were then used to envision possible futures where the current challenges did no longer exist. The participants had to envision opportunities to move from 'today' to 'the future'. Each group then selected three such 'transformations' and presented these in plenum.

4 Related Work

Since the start of the Covid-19 pandemic, a range of existing technologies (e.g. Zoom video calls) have pervade and new technologies have been developed to answer to health-care challenges and needs raised by the pandemic and its effect on society. These studies include for example how to support individual's health [11], designing for mHealth support [12], and Covid-19 diagnostics using AI [13]. However, few studies have investigated needs and experiences of pervasive health technologies from the perspective of care providing organizations. A Google Scholar searching CSCW (Computer-Supported Collaborative Work) and Covid-19 also reveals publications that again cover other aspects of the pandemic, for example the use of Social Media [14, 15], remote working from home [16], distance learning [17], or organizational aspects from a SME perspective

[18], rather than a care organizations perspective on pervasive technology during the pandemic.

5 Empirical Data: Survey

The background survey was intended as a starting point for the envisioned three workshop. While limited in scope and number of answers, the survey by itself provides some interesting insights. The survey shows that among the main care areas of the municipalities, and from a pandemic perspective especially elderly care was rated as challenging (4,5/5 average) followed by subsidies and services to certain disabled persons (3,3/5 average). The survey also shows that these two areas are where the municipalities best have managed to adapt their work routines: Elderly care (4,7/5) and Subsidies and services to certain disabled persons (4,0/5). Across the care organization, the main challenges reported on relate to Leadership, Routines and organizations, Ways of working, and Manning. Least reported on challenges were related to Recruitment and competence support, Digital aids, Workspaces and its layouts, and Worries among clients.

According to the survey, most municipalities got ‘up to speed’ with handling the pandemic situation within a few weeks and about 50% of them could adapt existing emergency plans related to pandemics in general. The municipalities to a large degree used their existing communication channels, especially their Intranet in the early stage. One municipality mentions an early implementation of web-based courses and training for all relevant staff-members about hygiene, protective gears and clothes when caring for someone in a Covid-19 context.

An important observation made by the participants was that the crisis plans that were in place did not handle long-term and extensive crises as the one created by the pandemic. The crisis plans in the municipalities were created based on scenarios with a limited crisis, such as a large fire with harmful smoke development, or a train or car accident with many injured people to take care of. There were no plans to restructure the whole society, isolate certain groups due to risk of infection and still be able to provide the weakest and most vulnerable citizens with various necessities such as food, medicine, and nursing. Various authorities gave conflicting advice and guidelines, which created concerns and ambiguity at all levels within the municipal organization and its activities. The dissemination of information was rapid and sometimes inaccurate or based on rumours. The municipalities could sometimes feel that they were required to act in a certain way, but not because of instructions from the authorities but because of media and pressure from social media posts.

When asked about changes in the different organizations that worked well, 5 out of the 11 municipalities mentioned technology or technology-related aspects, like ‘digital visits in homecare’, information-flow and the use of Skype for meetings. That said, two municipalities also pointed to challenges with unclear flow of information and the ‘communications area’ in general. When directly asked about existing or new equipment and technology that worked very well during the pandemic, 12 out of 13 respondents mentioned different IT solutions (see Table 1). The one remaining respondent simply answered that there was nothing to mention.

While the municipalities have had overall positive experiences with implementing technology solutions, we can also see challenges. For example do the respondents answer

Table 1. Equipment and technology that worked well during the pandemic.

| | |
|----|---|
| 11 | Digital meetings (Skype, Zoom, Teams) |
| 3 | Digital ‘visits’ in homecare, cameras for remote monitoring |
| 2 | I-pads for older adults and care facilities |
| 1 | Digital activities like web-based courses for staff |
| 1 | Online shopping in homecare |

that they wanted more digital alternatives to visits in persons home (home care) and that they have experienced ‘technology incompatibilities’ that have slowed down the rollout of these solutions. A challenge is also when for example relatives (to a person referred with homecare) do not have sufficient technology skills while expected to operate these devices. Furthermore, while they have identified the Intranet as a communication channel and hub, they also report that much information ends up as email attachments. That in turn makes it difficult to sort and navigate the information. Working with technology, using for example Skype to talk with their clients’ relatives, have reportedly strengthen the municipality care workers and their overall technical competences. A reported-on and partly technology-related downside has been the difficulty at times to manage information flows, including cases of disinformation.

6 Empirical Data: Workshop

As described in the Method section, an online Future workshop was conducted using Mural based on a first analysis of the survey results. Based on the survey data, four themes were developed and brought into the workshop. The four themes were: 1) Information and the spread of information, 2) Digital tools, 3) Before and after a crisis, and 4) Each crisis is different.

The ten participants were divided into two groups and each group were appointed a facilitator (i.e. the authors) to guide the participants through the workshop. The two groups decided to work with the themes 1) Information and the spread of information and 3) Before and after a crisis. Based on the experiences from inside the municipalities during the pandemic, the workshop participants collaboratively generated 69 challenges or something that didn’t work well related to these two themes. Each of the 69 challenges was then rewritten so rather than representing a challenge, or negative aspect, it became its positive counterpart. The challenge “Regions and municipalities manage important issues like personal protective gear differently” was for example rewritten as “Regions and municipalities manage important issues like personal protective gear in the same way”. Each identified existing challenge thereby became an opportunity or goal to design for. Using Mural, these ‘opportunities’ were written down on digital post-its’ and then organized into clusters. The two groups developed the following seven clusters: Readymade plans, Coordination and collaboration, Roles and responsibilities, Competence and knowledge, Structure and planning, Collaboration, and Communication. These seven clusters, while in need of further analysis and a deeper understanding

of what they represent, were found at the workshop to cover important areas to consider for achieving an improved future pandemic- and crises response.

Working with the identified clusters, the two groups defined three summary statements each representing what they considered being the most important take-away messages: 1) **Clear division of responsibility and roles** is a condition for participation from politicians and the organization. 2) Create a more creative process regarding risk analysis together with **clearer roles** enables structures for new ways of working. 3) **Preventive information, clear definition of roles and responsibilities and good collaboration** leads to improved safety in an unsecure world. 4) A crisis can improve collaboration and development. We use **digital channels and tools** and contribute in creating a **more digital matureness-level** that in turn leads to new possibilities, the paradox of a crisis. 5) With established **communication-plans, clear messages and repetitions** will we create conditions to create calm and less stress for both co-workers and citizens. 6) The Pandemic plan is prepared and **contains clear division of responsibility**. The plan is **available digitally** and is implemented at a management level.

In the above six statements, some words are highlighted in bold font. These words are linked with opportunities for technology in aiding municipality care service delivery. These keywords highlight the importance of clear and defined roles, division of labor, and aspects of digitalization, including the need to use digital tools and increase an overall digital matureness-level. While being the result of a single, few-hours long online workshop, the clusters and the summary statements provide insights into current and potential future roles of technology in care management.

7 Discussion

The results of our study show that several technologies and services should be in place to better meet future crises. The municipality would benefit from a clear information strategy for a crisis that include both technology and services. Regular testing of the strategy (e.g. every second year) could help to both verify that important information reaches all staff, and to discover if new equipment has been added that is not managed by the crisis plan.

Technology, especially existing technology, have been an important tool for the municipalities in providing safe and qualitative care during the pandemic. They mention especially communication-software like Zoom and Skype, but also online cameras that can be used for ‘online visits’ and ‘night check-ups’. Another important technology is the e-commerce which has shown to be an important tool during the pandemic to provide necessities such as food, medicine and clothing to people who have been isolated. It is our understanding that these technologies also have been used prior to the pandemic, but that they have got an increased spread and use in the care organizations due to the pandemic. This is a development much like other parts of society where we for example have witnessed an increased use of Zoom during the pandemic for professional meetings, remote teaching, but also to stay in contact with families and friends. While it is too early to uncover long-term effects, it is not unlikely that for example Zoom or similar platforms will be used also after the pandemic.

Mainly, the use of these systems has not been in direct care-situations but in care planning and care preparation – for example to train staff in upgraded hygiene routines.

As a result, the change in technology use and the introduction of new technology have mainly empowered the care organizations and individual caregivers. Our work points to mainly organizational gains by using for example Zoom. That said, iPads and other tablets have been used to support communication between care receivers and their families.

Similar to the Related work, our study also points to the need and use of online teaching and learning. Zoom can be one option, but the participants also mentioned specific online and web-based courses to train staff in for example new hygiene routines. An advantage with web-based courses is that they do not require course participants to meet at a specific place at a specific time, they can study when and where it suits them. New modules and materials can also be uploaded as recommendations change over time. It would also be useful with dedicated education and training for all staff in handling new digital equipment for communication and information. Such a training program could include both computer skills and practice in finding trustworthy and official information.

The participants have also understood that they must be able to take control of the information-flow in a crisis: To ensure that the information is correct and reaches everyone. There should for example be some routine to handle contradictory information from different authorities as both the municipality organizations, their employees and clients received information from many sources and through different channels. During the Covid-19 pandemic, information also came from both official and unofficial sources, and it can be difficult to understand what information is correct. During our work, it was noted that all these information sources require the municipalities to find new ways of working with information and information technology. While no solution was found during our work, the challenge of controlling information and the need to verify correctness of information was identified.

What stands out is that much of the technology that has been implemented and used by the municipality care organizations during the pandemic, represents relatively stand-alone solutions (e.g. Zoom and online shopping platforms) that can be used in parallel with existing platforms, systems and routines. Integration takes time and resources, and municipalities – like many other larger organizations – already have numerous systems they use. There has not been any evident ‘integration work’, where new technology has been integrated into existing systems. There is no doubt that pervasive healthcare systems and technologies can support care in both normal and crisis situations, but these systems should be built with integration in mind.

It is not unlikely that if we would have done the same survey and workshop with some of the nurses and care assistants actually visiting people’s homes rather than responsible managers from the care providing organizations, we would have seen very different topics and results. Taking a top-down perspective we have however started to uncover organizational perspectives that influence how larger care organizations value and take up (for them) new care and care-related technology.

8 Conclusion

The reported-on work is based on limited data, namely a survey and one workshop. However, the participants all had key roles and responsibilities in their respective municipality to act on, and manage, the Covid-19 pandemic. The work differentiate itself from other

Related work as it focuses on the care providing organization and municipality perspective. The results should not be seen as definite, but rather as relevant points to consider for further work – being research on building future and resilient municipality-provided care scenarios or work within municipality organizations to define plans for managing future care crises. The survey indicates how the municipalities have used both existing and new technology as a resource during the pandemic, but they have also experienced challenges implementing and using, even mundane, technology solutions to provide and manage care. It is also important that all staff, clients, and family members have access to trusted information and hence that the care organization have a system and routines in place to handle that. It is also important to understand that it is the services, enabled through different technologies, that are more important to the municipality management than the service-enabling technology. Indeed, pervasive health goes beyond specific devices and technical solutions. This paper presents aspects to consider when designing pervasive healthcare solutions for a care providing organizational context. Based on the presented work, the authors also like to invite the Pervasive Health community to consider the reality of care providing municipalities and organizations and the systems currently used by these organizations, and how to build pervasive healthcare applications and technologies to integrate with these systems. There is an opportunity for the field of pervasive health to, at a higher degree than today, design for social care organizations and their specific needs – both internally and towards their patients and other customers.

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