



BMJ Open From hearing to seeing: medical dispatchers' experience with use of video streaming in medical emergency calls – a qualitative study

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To cite: Idland S, Iversen E, Brattebø G, *et al.* From hearing to seeing: medical dispatchers' experience with use of video streaming in medical emergency calls – a qualitative study. *BMJ Open* 2022;**12**:e063395. doi:10.1136/bmjopen-2022-063395

► Prepublication history and additional supplemental material for this paper are available online. To view these files, please visit the journal online (<http://dx.doi.org/10.1136/bmjopen-2022-063395>).

Received 30 March 2022
Accepted 05 December 2022



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ABSTRACT

Objectives Video streaming has recently been introduced as an additional tool for communication between medical dispatchers and caller. Research implies that video streaming may be a useful tool for the dispatchers, but more knowledge is needed. With this study, we wanted to explore how the dispatchers experience using video streaming as an additional tool in medical emergency calls.

Design An explorative, qualitative study using semi-structured focus group interviews.

Setting Two emergency medical communications centres in Norway where video streaming recently had been introduced. Interviews were conducted during 24 June 2020 and 26 June 2020.

Participants We recruited 25 medical dispatchers, either nurses or emergency medical technicians who worked at the two centres.

Results The results are categorised into three themes: (1) change in dispatcher's perception of the patient and the situation, (2) reassurance for the dispatcher and (3) worries about increased time consumption and the possibility of unpleasant images.

Conclusion The dispatchers experienced that the use of video streaming in medical emergency calls might contribute to a better comprehension of the situation and following more precise resource allocation, as well as greater reassurance for the dispatcher and improved relationship between the dispatcher and the caller. Further research with an aim to measure effects and safety of video streaming during medical emergency calls is needed.

BACKGROUND

In recent years, advanced mobile smartphones with high-quality cameras have enabled us to communicate in new ways. During the spring of 2020, the opportunity for communication through video streaming as an addition to audio during medical emergency calls was launched in four emergency medical communication centres (EMCCs) in Norway. This solution gives the medical dispatchers (dispatchers) the opportunity to

STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ The interviews were conducted when video streaming was still a new tool for the medical dispatchers, hence their experience was limited.
- ⇒ The number of males and females participating in the interviews were almost similar.
- ⇒ The initial step of the analysis was performed by several of the authors, which contributed to obtain a wider analytical space.
- ⇒ The two emergency medical communication centres (EMCCs) included cover quite urban areas. EMCCs covering more rural areas could have contributed with different dispatcher experiences.

see the patient through the caller's smartphone camera, provided the caller consents. It is a live-only solution, and no video is stored.¹

There is limited scientific knowledge on the use of video streaming as an adjunct to medical emergency calls. Existing work mainly concerns simulated cardiac arrest situations and video-instructed cardiopulmonary resuscitation (CPR). These studies imply that video images might improve dispatchers' understanding of cardiac arrest situations^{2,3} in addition to improving bystander CPR.⁴⁻⁶ Recent studies have investigated whether the use of video streaming in real life emergency calls was useful and feasible, in which video streaming was found to be a useful supplement for the dispatchers in several circumstances.⁷⁻⁹ A report from the early launch of video use in EMCCs and out-of-hours (OOH) primary emergency communication centres in Norway indicate advantages of using video streaming for decision-making, as well as for instructing the caller in the first aid.¹

There is a need for more knowledge about video streaming as an additional support tool in medical emergency calls. Video streaming in EMCCs is a relatively new research

topic. For this reason, we chose a qualitative, explorative approach. The study's findings may contribute to generate new hypothesis on the topic. The aim of this study is to explore the dispatchers' experiences with the use of video streaming of medical emergency calls.

METHODS

Study setting

Trained dispatchers, who are either nurses, emergency medical technicians (EMTs) or paramedics, answer medical emergency calls in Norway. Calls are categorised as acute, urgent or low acuity based on the Norwegian Index for Medical Emergency Assistance (Index), a criteria-based decision-making tool and resources dispatched accordingly.¹⁰ The dispatchers choose the symptom card most relevant for the call among the 39 cards in the Index.¹¹ Subsequently, they assess the patient, working their way through symptoms from high acuity to low acuity.¹⁰ Determination of the call's urgency and allocation of resources is particularly challenging as the dispatchers solely base their decisions on audio from the telephone call.^{12,13} In addition to making these decisions, the dispatchers instruct the caller in first aid.^{10,14}

The use of video as an additional support tool during medical emergency calls was piloted from the beginning of June 2020 in the two EMCCs participating in the study. The same solution for video streaming was used in both EMCCs. All dispatchers in the two EMCCs completed an educational programme to use the video solution, which consisted of one-to-one training and check-out. The training lasted for between 30 min and 1 hour, based on individual needs.

Video streaming technology enables the dispatcher to access video through the caller's smartphone. The procedure developed for the usage of video contained instructions for the dispatchers to clarify index criteria before activating the video function, and to initiate an emergency response if categorised as acute prior to activation of the video stream. The caller must provide verbal consent prior to activation of the video streaming. In the available solutions, no footage is stored from the video stream, and it is one-way only; the caller cannot see the dispatcher.¹

Data collection

For this qualitative study, we conducted seven qualitative focus group interviews with dispatchers in the two EMCCs. The interviews lasted 30–60 min. Focus-group interview was chosen as preferred method, as it is suitable to learn about experiences in interactive environments.¹⁵ MH, EI and GB developed an interview guide in advance, which was discussed after each interview (see online supplemental file 1). Two of the authors switched between conducting the interviews (MH and EI) and another of the authors (GB) participated as observer during three of the interviews. After the seven interviews, we had received sufficient information of high quality to enlighten the

Table 1 Participant characteristics of the 25 medical dispatchers (EMTs, paramedics or nurses)

	N	%
Female dispatchers	11	44
Male dispatchers	14	56
Experience in years EMCC		
0–5 years	10	40
6–10 years	6	24
11–15 years	3	12
16–20 years	5	20
>21 years	1	4
No of times video use		
0–10	19	76
11–20	3	12
>21	3	12

Groups by EMCC experience in years: 0-5 years, 6-10 years, 11-15 years, 16-20 years, equal or above 21 years. Groups by number of times with video streaming use: 0-10 times, 11-20 times, equal or above 21 times.
EMCC, emergency medical communication centre; EMTs, emergency medical technicians.

themes from the interview guide,¹⁵ even though, for unanticipated reasons, two of the interviews only had one informant. Interviews were conducted in the locations of the two EMCCs, 24 June 2020 and 26 June 2020.

Participants

We invited participants from two Norwegian EMCCs, in different parts of the country. Invitations were sent to the leaders and key personnel in the two EMCCs, who forwarded the invitation to all employees in the EMCCs. The interviews were conducted during daytime, which meant that some of the dispatchers would be at work, while some turned up after shifts. For the latter group, they were paid extra hours. The criterion for participating was that the dispatchers had had the opportunity to use video. In addition, we aimed to recruit informants with varied experience with video use as well as work experience in the EMCCs. Participants consented verbally before the beginning of the interviews. All participants were either registered nurses, paramedics or EMTs.

The number of participants in the focus-group interviews varied from one to seven, and their work experience in their current EMCC employment ranged from a few months to more than 20 years. In total, 11 women and 14 men participated. The number of times the dispatchers used video varied from training only to more than 30. None dropped out or withdrew their consent. **Table 1** summarises the participants' experience with years worked in the EMCC and use of video streaming.

Analysis

The interviews were audio recorded, then transcribed manually by the main author (SI). These transcriptions

were analysed, using systematic text condensation as described by Malterud,¹⁵ a thematic analytical approach. This approach consists of four steps. During the first step, MH, EI and SI read the transcriptions, obtaining an overall impression and suggesting preliminary themes. SI performed the next three steps. During the second step, code groups were developed from these themes and meaning units sorted within groups. In the third step, meaning groups were coded and subgroups were identified, after which condensations of meaning groups for each subgroup were agreed on. In the fourth and final step, an analytical text was written from the condensations (for more details, see online supplemental file 2). The process of analysis was continuous throughout writing the article.¹⁶

Patient and public involvement

Patients or the public were not involved in designing or conducting this study.

RESULTS

Our analysis revealed important aspects of the dispatchers' experiences with video.

Most of the dispatchers experienced video streaming as a useful supplement. Several believed that using video increased quality on assessment, instructions to caller and the entire decision-making process. Furthermore, according to the dispatchers, video streaming could increase reassurance of both dispatcher and caller. There were some worries regarding longer calls and increased emotional strain because of unpleasant visual impressions.

Video streaming may change the dispatcher's impression of the patient and current situation

Several of the dispatchers had experienced that their impression of the patient and the situation changed when they initiated video streaming. One of the dispatchers said that by using video, the actual condition of the patient was more quickly revealed. Cases with uncertainty about the patient's main problem were also mentioned, in which video streaming had given the dispatchers the opportunity to disclose the patient's condition more precisely because of the addition of visual images. Some patients were reported to be more severely ill or injured than first perceived from verbal communication only, while others turned out to be less severe. A common example of the latter was injuries where the caller described massive bleeding, but video streaming revealed only modest bleeding not requiring an ambulance dispatch. The dispatchers stated that this visual feedback provided clinical experience in a different way than handling calls by audio only, resulting in improved learning.

'The calls I've had, we have actually gotten an understanding of the situation being more severe than the caller has managed to explain, when I think about it (...) I actually thought it was going to be the other way around, so I've been kind of surprised by this' (2)

Several of the informants thought video streaming was very useful in guiding bystanders in first aid. One of the dispatchers had used it to achieve the correct recovery position for an unconscious patient. Before video streaming was activated, the bystander had confirmed that the patient was placed in recovery position. With video streaming, the dispatcher observed that the patient still was supine. The dispatcher who experienced this, believed that there are situations where the caller, due to for example, emotional stress, automatically confirms what the dispatcher asks for without having completed the action. CPR was given as an example by another dispatcher, who addressed the difficulty of assessing quality of telephone CPR. In contrast, two dispatchers questioned whether having a live video of an unconscious person or bystanders performing CPR was necessary. They pointed out that it was problematic not receiving consent from the patient.

Dispatchers experienced that video streaming improved decision-making regarding further care for the patient. An example was amputation injuries, where it is important to transport the patient to a hospital with replantation services. Other examples were situations in need of additional resources, for example, more people for carrying aid, and also the value of having established this before the arrival of the ambulance. Referring to improved patient logistics, several of the dispatchers felt that the use of video had made dispatch of the correct resources easier. One of the dispatchers described how he felt that using video had changed his resource allocation for some of the calls:

'We can, to a larger extent, dispatch the right aid to the right patients. Avoid overutilization of code red dispatches to patients where it's not required, however, for those patients who really are in need, we might dispatch even more correct aid as well as prepping the paramedics on what they are going to meet.' (25)

Some believed that it could prove useful if the video images could be shared with other instances involved in the situations as well, for example, ambulance, physicians on-call or air ambulance. In addition, dispatchers from both locations had used video streaming to assess the terrain for possible helicopter landing spots in situations where rescue of injured persons was necessary.

Reassurance for the dispatcher

Several of the dispatchers had positive experiences with the immediate visual feedback that video streaming often offered. Moreover, receiving visual confirmation of the decisions which had been made was perceived as reassuring. A few of the dispatchers felt that communication became more face to face than with audio only and that video streaming improved the relationship with the caller. Using video had reassured several of the dispatchers in diffuse situations, for example, whether an unconscious patient was breathing or not. Some of the dispatchers also felt more confident in transferring the call to the OOH

primary care emergency communication centres when having used video. One of the dispatchers described how he felt video streaming gave him an extra sense of reassurance in his decision-making:

‘All these years we have worked without getting confirmation of what we do is correct, was the patient actually unconscious? Often we don’t know, right, (...) it feels good to get a confirmation. You get a good feeling when you see, I did the right thing, I’ve already dispatched the car, right.’ (22)

Several of the dispatchers reported that they had experienced the caller to be more reassured and satisfied when using video. They thought the caller no longer felt as alone in the situation and was comforted by the fact that the dispatcher could see the situation together with them. One dispatcher believed this was partly due to the dispatcher being able to confirm what they saw, which is easier than explaining the situation in words only. However, a few of the dispatchers felt they usually communicated sufficiently with the caller with verbal communication only to get the answers they needed.

One of the dispatchers explained how several of her colleagues felt video streaming contributed to reassuring the caller:

‘What I’ve heard by most is that the caller doesn’t feel overridden, meaning that the parents of a child doesn’t feel like someone is undermining their opinion of the situation, you see the same things, assess the same things, and they feel comforted by this, okay, you can see my child and you tell me that this is going to be fine.’ (5)

On the other hand, a different dispatcher had experienced situations where she felt that the use of video increased bystanders’ stress, and that communication with bystander deteriorated with video. She had, during a call, experienced that filming the situation was too much for the parent she was communicating with, both talking to her and trying to take care of his child at the same time. In addition, in situations with technical problems, both dispatchers and callers often experienced this as frustrating. Nonetheless, most dispatchers experienced the caller to be open and positive towards video streaming, even among older callers. Some felt that the caller perceived it only natural to have video streaming as a possibility during the call.

According to several of the dispatchers, video streaming as an additional support tool in the call made the patient more ‘real’ and triggered more emotions in the dispatcher. This was perceived as positive, having the potential to improve dispatchers’ attitudes. A dispatcher stated that during busy days in the EMCC, he felt like the patients just turned into a list of parcels he had to prioritise. Using video, this list turned more ‘human’. Another dispatcher explained how she perceived the patient in a different way with video streaming than with audio only:

My relationship with the patient quickly becomes an index criterion, they are ill or they become their symptoms, you see it as, okay, ‘pain thighbone, possible fracture of the femur’, it’s not ‘girl 14 years old, likes horses’, it becomes very distant from the patient. Something as simple as just looking at a young girl in severe pain, strongly affected by this, with a swollen thigh, a possible fracture of the femur, then you suddenly go ‘oh, there’s a human being connected with this diagnose’. (5)

Video streaming might increase time consumption and introduces unpleasant visual impressions

Some of the dispatchers worried that using video would increase time consumption in busy EMCCs. One felt that using video absorbed too much time because of the need to clarify the most suitable index criterion before activating video streaming. He felt video streaming might be an even more useful tool for the dispatchers if they had the opportunity to activate it from the onset of the call:

‘If you have the capacity, it’s a great supplement, but it consumes some time. During busy periods you haven’t got the capacity to use it, you just have to answer the next call without getting to use the video (...). If it in some way could be activated earlier, if that was possible, I think it would turn out to be a great tool.’ (8)

If there were several calls in the EMCC at the same time, he felt he should answer the next call instead of spending time using video. Another dispatcher had experienced that video streaming actually was helpful during busy periods due to more effective confirmation of information, and thereby an aid to quicker decision-making. Others believed that video streaming still was a tool too new for them to tell whether it was time-consuming or not, feeling a need for more experience to be comfortable with the usage of video. One of the dispatchers questioned whether video streaming could increase the dispatcher’s work tasks in a way that diverted their attention or made them forget other important tasks.

The transition to having both sound and video images might increase the need for debrief of the dispatchers due to unpleasant visual impressions. A few of the dispatchers felt discomfort activating video in situations with, for example, children involved, wanting to protect themselves from disturbing images. One of the dispatchers told of a situation involving an infant and CPR, where she could not bring herself to activate video, because she did not wish to see the actual situation. How the dispatchers felt about unpleasant images varied among other things with clinical experience.

However, some felt that video helped them in seeing the actual images instead of visualising the situation, giving them more closure for each call.

Of course, with video, the need for colleague debrief will probably increase compared to when we didn’t

have video. At the same time, it might be positive, not creating images for oneself, you can actually see what you hear, then it's okay, you stop your spin of thoughts. (21).

DISCUSSION

The dispatchers experienced that video streaming in EMCCs had the possibility to enhance their understanding of situations and patient conditions in the medical emergency calls, in addition to possibly increasing both dispatcher's and caller's reassurance and confidence. Even though the majority of the dispatchers thought of video streaming as a positive contribution, there were still some concerns, for instance increase in time-use for each call and exposure to unpleasant visual impressions.

In our study, several dispatchers had experienced that video streaming improved their assessment and understanding of the patient due to a more accurate impression of the situation. A recent Danish study on dispatchers' use of live video revealed a similar trend. The dispatchers' impression of the patient changed more often in the cases where video streaming was used.⁸ A previous study exploring dispatchers' perception of medical emergency calls states that the caller's description of the problem and the caller's emotional state might affect the dispatcher's understanding of the situation.¹² Situations where such problems occur might be easier for the dispatcher to understand and solve using video streaming. The dispatchers in our study experienced that a more accurate impression caused by video use had contributed to a more precise decision-making and allocation of resources in several cases. In the Danish study, a larger part of cases with change in emergency response was also seen in those cases where dispatchers had used video.⁸ However, these results are descriptive and do not provide details for these cases.

Our informants appreciated the opportunity for feedback and reassurance which video streaming offers, obtaining visual image on patient condition or on instructions given to callers. Moreover, they valued the reassurance video streaming provided about whether they had made the right decision for each call. Studies exploring telephone-triage nurses and medical dispatchers' experience with decision-making showed that feedback on the decisions they had made and reassurance of having made the correct decision was important for them. In addition, increasing own knowledge and competence were other important factors for their job satisfaction.^{12 13} According to value-expectancy theory addressing work performance where the element of feedback has been added, highly accessible positive feedback impacts motivation and performance.¹⁷ Increase in opportunities for feedback with video streaming for the dispatchers can thus participate in enhancing job satisfaction for dispatchers.

Some of the dispatchers in our study thought the visual information on bystander compliance with first

aid instructions provided by video streaming might contribute to instructions that are more accurate or a quicker correction of bystander first aid, if needed. This corresponds with studies where video-instructed CPR has been investigated, which indicate that video streaming may improve quality of bystander CPR.^{4 5} According to recent studies, video streaming has contributed to, for example, improvement of bystanders' hand position and compression rate and depth.^{6 18} In addition, a systematic review comparing conventional dispatcher instructed CPR with video instructed CPR by dispatcher has shown increased prehospital ROSC and survival to hospital discharge in the video group.¹⁹

A simulation study on video-instructed CPR reported that video streaming improved caller reassurance.³ This study reported that the persons receiving video instructions for CPR stated they felt safer and more confident knowing the dispatchers could see the situation. Similar findings were reported in a study where out-of-hospital cardiac arrest cases are assessed with video surveillance recordings, which suggests that dispatchers believe that use of video might increase caller confidence.² Our findings support these results, even though our study has not explicitly explored the caller's perspective. Increase in caller's reassurance might affect emotional state and may enable the caller to obtain closure of the situation. Higher reassurance and confidence during the emergency call might aid the caller to perform first aid of higher quality. However, one of the informants in our study addressed situations where she had experienced that the caller became agitated and was negatively impacted by video use, which shows that video streaming's contribution to higher reassurance does not apply to everyone. The caller's experience with video streaming during medical emergency calls should be explored in future studies.

Time consumption was addressed as a possible issue by the dispatchers in our study. Some worried that using video would increase time spent on each call, while others believed this time use would adapt after having become more familiar with the tool. In the recent study from Denmark, the calls where video streaming was employed had a longer duration.⁸ However, according to the protocol for video use in our study, the dispatchers were to assess whether the call was categorised as acute and, if so, dispatch resources prior to activating video. Some of the informants in our study felt video streaming would be even more useful if having the opportunity to activate earlier in the call. This may influence the possible increased length of the call, as addressed in the Danish study.

Strengths and limitations

If the interviews for the study had been postponed for a certain time, the dispatchers would have gotten the opportunity to become more familiar with the use of video leading to other results. However, as the scientific knowledge on the use of video between dispatcher and caller in EMCCs still is sparse, we believe it was important

to conduct this study in an early stage. Our results have brought forth themes concerning video streaming relevant for further research, as well as for internal skills enhancement. It would be relevant to repeat this study at a later stage to explore whether new information on dispatchers' experience emerges with more use of video streaming.

All dispatchers who had completed the educational programme received the invitation to participate in the interviews, which decreases the probability that only persons in favour of video use were invited.

The authors who performed the interviews are employed as physicians in one of the EMCCs. In addition, the author who participated as an observer has earlier had an employment related to the other EMCC. This might have affected how the informants responded in the interviews. On the other hand, the interviewers' knowledge of the EMCCs might have positively affected how the dispatchers talked, being aware that the interviewers understood the institution in which they work.

During the first part of the analysis, three of the authors (MH, SI and EI) discussed the text, themes and meaning units as a group. This is an advantage as a wider analytical space is easier to obtain with more authors than just one,¹⁶ and thereby a strength in our study.

As a qualitative study, this study contributes with a deeper understanding of the experiences of the dispatchers who participated in the interviews. For questions about, for example, association or causality, studies with other research designs must be conducted. We did not collect information on baseline characteristics of the dispatchers, hence comparison of meaning units sorted by such characteristics is not possible.

Future perspectives

Recent development in mobile phone technology has made video streaming of medical emergencies readily available for dispatchers at EMCCs. Consequently, further research on the effect of video streaming of emergency calls is important, as knowledge of the potential of video streaming in real life situations is still scarce. Our findings in this explorative study should be followed up with other methods such as surveys for the dispatchers. The study suggests areas relevant for further research, such as video streaming influence on triage, dispatcher and caller alliance, time consumption, physical stress for dispatchers and caller experience.

CONCLUSION

The dispatchers felt that video streaming in some situations have contributed to a better understanding of the context of the call. Several of them also experienced to be more comfortable with their decisions regarding resource allocation when having used video streaming, in

addition to an improved experience of the medical emergency call. However, our respondents feared that the use of video might increase the duration of emergency calls, as well as introducing the issue of unpleasant visual impressions for the dispatchers.

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Acknowledgements We would like to thank the participants from the two EMCCs.

Contributors SI transcribed the interviews, conducted the systematic text condensation analysis and wrote the draft for the manuscript. MH participated in conducting the interviews, participated as a major contributor in the analysis, as well as in revising the manuscript. EI participated in conducting the interviews, contributed to the initial phase of the analysis, as well as revising the manuscript. GB participated in the interviews, as well as revising the manuscript. JK-J participated in planning the study, as well as revising the manuscript. All authors read and approved the final manuscript. Garantor for this study is MH.

Funding SI has received grants from the Laerdal Foundation, grant number 3623. The funder was not involved in any parts of the study.

Competing interests None declared.

Patient and public involvement Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

Patient consent for publication Not applicable.

Ethics approval Ethics approval was not needed for this study as we did not collect data from interventions or invasive procedures on human beings, nor from personal health data. However, the study was still presented to the Norwegian Regional Committees for Medical and Health Research Ethics, committee South-East (ref. 150707). The committees considered the study to be outside of their jurisdiction, meaning that the committee agreed that approval was not needed from the Norwegian Regional Committees for Medical and Health Research Ethics. This because the study does not involve data collection as mentioned above. The study's data were approved by Data Protection Officers at the two hospitals included in the study. Participation was voluntary, and all names were anonymised during the transcription. Because participation was voluntary and informants joined the interviews only if they wished to, consent was obtained verbally. Sound recordings were stored securely and deleted after the writing process. Participants gave informed consent to participate in the study before taking part.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement Data sharing not applicable as no datasets generated and/or analysed for this study.

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