

BMJ Open Quality **When do medical operators choose to use, or not use, video in emergency calls? A case study**

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SUMMARY

Background An evaluation report for a pilot project on the use of video in medical emergency calls between the caller and medical operator indicates that video is only used in 4% of phone calls to the emergency medical communication centre (EMCC). Furthermore, the report found that in half of these cases, the use of video did not alter the assessment made by the medical operator at the EMCC.

We aimed to describe the reasons for when and why medical operators choose to use or not use video in emergency calls.

Method The study was conducted in a Norwegian EMCC, employing a thematic analysis of notes from medical operators responding to emergency calls regarding the use of video.

Result Informants reported 19 cases where video was used and 46 cases where it was not used. When video was used, three main themes appeared: 'unclear situation or patient condition', 'visible problem' and 'children'. When video was not used the following themes emerged: 'cannot be executed/technical problems', 'does not follow instructions', 'perceived as unnecessary'. Video was mostly used in cases where the medical operators were uncertain about the situation or the patients' conditions.

Conclusion The results indicate that medical operators were selective in choosing when to use video. In cases where operators employed video, it provided a better understanding of the situation, potentially enhancing the basis for decision-making.

BACKGROUND

In Norway, when someone dials the medical emergency number 1-1-3, they are connected to the nearest emergency medical communication centre (EMCC).¹ The calls are answered by medical operators, who are nurses, paramedics or emergency medical technicians. Based on the reported symptoms, the operator provides necessary guidance while dispatching one or more ambulances and, if needed, a doctor or air ambulance, depending on the severity of the situation.² If there is no immediate threat to life or health, the emergency call is transferred to the patient's corresponding emergency primary care centre for further follow-up.

WHAT IS ALREADY KNOWN ON THIS TOPIC

- ⇒ There has been an increasing interest in, and rapid implementation of video communication during emergency calls. However, the use remains limited, despite studies indicating that video frequently influences the assessments made by operators.
- ⇒ Most of the previous studies have been based on simulated situations or primarily focused on cases where video was used in specific situations such as assessing the quality of cardiopulmonary resuscitation, secondary triage or guiding callers in first aid measures, providing a somewhat one-sided view of the situation.

WHAT THIS STUDY ADDS

- ⇒ This is one of the first studies to describe the reason why medical operators choose to use video or not.
- ⇒ The results demonstrate that operators are selective in choosing when to use video, as it is used primarily in cases where operators are uncertain about the situation or the patient's condition.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

- ⇒ Despite few respondents, the findings and method can form the basis for the development of future studies.
- ⇒ When operators opted for video, they indicated that it provided better situational understanding and strengthened the decision-making.



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Through simulated calls, Tuden *et al*³ found that telenurses attempt to visualise what the caller is experiencing. Video recordings revealed instances where nurses touched their own arm or leg to understand the potential 'image' of the situation. Yet a Norwegian pilot project in 2019 demonstrated that video only was used in 4% of phone calls at the EMCCs and in 1% of the calls to the emergency primary care centres.⁴ Since then, the use of video calls between operators and callers during medical emergency calls has proven to be a valuable tool,^{5,6} and it has been found that in approximately half of the cases, it influences the assessment made by the operator.^{4,6} An emergency operations centre in the UK

introduced video triage during the COVID-19 pandemic as a supplement to their traditional 999-telephone triage.⁷ Doctors experienced that it provided a better examination of the patient than just a telephone call, thus improving the decision-making. Patients who received video consultations were also satisfied with this solution, and they had a 10% lower rate of recontact with the healthcare system within 24 hours compared with those who received assistance only over the phone.⁷ The benefit of telemedicine in rural and remote facilities is recently studied, providing further insights into its use for secondary triage and clinical advice to ensure that patients are referred and transported to the appropriate level of care.⁸ Video has also proven to be suitable for assessing the quality of cardiopulmonary resuscitation⁹⁻¹¹ and to improve guidance for the caller in first aid measures such as stopping bleeding or placing an unconscious person in the recovery position.⁵ However, many of the previous studies were based on simulated situations⁹⁻¹¹ or primarily focused on the cases where video was used.^{4 5 7 11} Thus, they provide a somewhat one-sided view of the situation.

Using a qualitative approach, we sought to describe the reasons for when and why operators chose to use, or not use video, and thereby gaining new insights into this emerging field.

METHOD

Case description

The case study was performed in cooperation with Oslo EMCC. This is the largest in Norway, serving a population of approximately 1.5 million inhabitants, coordinating between 70 and 90 units in its area. The EMCC manages critical incidents and acute medical situations and coordinates urgent and planned transfers² and is responsible for all air ambulance operations in the South-Eastern Health region. Video has been available at Oslo EMCC since June 2020, as an additional support tool during medical emergency calls.^{4 5} It was fully up to the operator's discretion to consider if video may provide significant information to determine the appropriate response or resource, or to provide better advice or guidance.

No downloads, applications or special software or hardware were needed to activate the video, neither for the EMCC nor for the caller. However, the mobile phone had to be a 'smartphone' with a camera, Wi-Fi or 3-5G network access and a web browser. The EMCC operator logged on to the video solution in a web browser, at the start of their shift using a two-step sign-in. If the operator initiated video, the caller was asked for consent and instructed to activate the speaker. A link was sent to the caller by SMS (text) message, and when accepted, the one-way video started. The operator could switch between front and back cameras on the caller's phone and could end the video streaming without ending the call. If the caller did not accept camera sharing, had a low battery or the phone was in power-save mode, video would not

commence, and further instructions were required from the operator to help resolve the issue.

Data collection

Data collection took place during selected shifts at Oslo EMCC from October to November 2021, with one of the authors present during these shifts. Whereas the research had a case study design, Oslo EMCC considered this as an internal quality improvement initiative, approved by the departmental leader. Medical operators at the EMCC received written information about the study. Participation was voluntary and based on consent. It was emphasised that the EMCC was in a demanding situation and that data collection should not compromise the operators' capacity or response time.

Participants were provided with a sheet containing two columns, one for cases where video was used and another for cases where video was not used. They were free to choose which and how many calls to include. In the included emergency calls, they noted whether video was used and the reasons why or why not they used video in the emergency call. The use of notes was chosen to ensure that it would not be time-intensive or resource-intensive for the operator. Operators were also entrusted to write themselves, preventing alterations in wording or potential misinterpretation of the raw material. The information was anonymous throughout the processing. It was explicitly stated that personally identifiable information should not be reproduced, such as the patient or caller's name, date of birth/social security number, address or any other information about the nature of the incident that could make it identifiable. Hence, a table describing the callers or patients' age, gender, demographics, etc is not provided in this article.

No sensitive nor identifiable data were recorded, such as the specific form's date/shift or information that could identify participating colleagues. Therefore, the study falls outside the scope of requiring a formal privacy application.^{12 13}

Analysis

The study was conducted through thematic analysis¹⁴ of notes written by medical operators. All data material was gathered in an Excel document, with one sheet for 'video not used' and another for 'video used.' The codes formed primary patterns (codes) that created subthemes and overarching themes (table 1).

RESULT

A total of four different informants submitted a total of six forms, reporting 19 cases where video was used and 46 cases where it was not used. All the informants were women with a minimum of 2 years of experience as medical operators.

Situations where the informants used video were categorised into three overarching themes. The themes were 'unclear situation or patient condition,' 'visible problem' and 'children.' Similarly, situations where video was not

Table 1 Examples of the analysis of cases where video was not used, focusing on the subtheme ‘invisible’ condition

Raw material	Codes	Subtheme	Theme
Prolonged alcohol consumption. Could have mentioned something about the home situation, but it would not have changed the outcome.	Intoxicated ‘Invisible’ condition’	‘Invisible’ condition	Perceived as unnecessary
Migraine. Nothing to see.	Pain ‘Invisible’ condition		
Abdominal pain in an adult, nothing to see on video.	Pain ‘Invisible’ condition		
Dizziness—not visible	‘Invisible’ condition		

used in the emergency call were also categorised. The themes were ‘cannot be executed/technical problems,’ ‘does not follow instructions,’ ‘perceived as unnecessary.’ Furthermore, the overarching themes were divided into subthemes (tables 2 and 3).

Situations where video was used

Video tended to be used when the operator reported that the situation or patient condition was unclear (table 2). In situations involving an intoxicated caller and/or patient, there was significant uncertainty and difficulty in accurately describing the problem.

Quote: ‘Drunk, bleeding, lying outside. Too dark to see much’.

Furthermore, the use of video seemed to be reliant on the operator’s expectation that the symptom would be observed visually. In two cases, video was used to assess the skin in cases of suspected blood clots in the legs, and once for a chronic wound. In these cases, it was explicitly noted that video was very useful.

Quote: ‘Clarify signs of arterial thrombus, DVT [deep venous thrombosis], erysipelas, etc. Very useful!’

Regarding children, operators often experienced the situations as unclear, especially for the youngest children. Video was used to determine the amount of bleeding from cuts and injuries, as well as non-traumatic bleeding such as nosebleeds and bloody vomiting. None reported the use of video on children with injuries, only in one accident.

Quote: ‘Child in accident. To assess condition and pain of a 9-year-old with stomach pain after being hit by the scooter handlebar in the stomach’.

Included in the category of ‘injury’ are fractures, wounds and cuts, but the distinction between injuries and accidents was not entirely clear. Accidents recurred in all three overarching themes and included serious patient injuries, as well as the use of video to assess the extent of the accident or the accident scene. Furthermore, the transition between consciousness and overall condition was somewhat unclear; patients waking up when addressed encompassed both reduced consciousness and reduced overall condition.

Pain was indicated to be ‘visible’, even though pain as a phenomenon is both invisible and subjective.

Table 2 Situations where video was used

Theme	Unclear situation or patient condition	Visible problem	Children
Subtheme	Intoxicated caller/patient	Skin	Unsure
	Bleeding		Baby
	Injury		Fever
	Accident		
	Consciousness		
	The patients’ general state/condition		
	Pain		

Overarching theme horizontally with corresponding subtheme vertically. Light blue column: subtheme recurred in one overarching theme. Medium blue: subtheme recurred in two overarching themes. Dark blue: subtheme recurred in all three overarching themes.

Situations where video was not used

Sometimes video could not be conducted, either physically or technically (table 3).

Quote: ‘The caller has left the scene’.

In many cases, video was not used because the operator perceived it as ‘unnecessary’. These would be the instances where they report to ‘already have a good understanding’ or that there is ‘nothing to see’. Other times the operators stated that the situation was ‘urgent regardless’ as in the case of chest pain, cerebral events or when vital measurements had been taken, and they assessed that video would not change the outcome. Several mentioned not using video when healthcare professionals or the police were the callers.

Quote: ‘Calling from the police station due to a seizure. Choosing to trust the police and to be considerate of the others at the location’.

In some instances, they stated that video could have been useful, as in events in public places, but they wanted to spare the patient or avoid the time delay associated with

Table 3 Situations where video was not used

Theme	Video cannot be executed	Does not follow instructions	Perceived as unnecessary
Subtheme	Caller is not with the patient	Language barriers	In a public place
	Error/technical failure	Panic	Police present
	Low battery on the mobile phone	Confused/confusion	Healthcare professional present
	Age		Already has a good understanding
	Disabled/multihandicapped		Emergency response regardless
	Intoxicated caller/patient		Invisible condition

Overarching theme horizontally with corresponding subtheme vertically. Light blue column: subtheme recurred in one overarching theme. Medium blue: subtheme recurred in two overarching themes.

video. A combination of physical and cognitive barriers also led to the decision not to attempt video, as in cases of advanced age, various disabilities or emotional distress.

Quote: ‘Caller (mother) is panicking’.

DISCUSSION

In this study, we sought to describe the reasons for when and why operators chose to use, or not use video. We found that the operators were selective when they used video, using it in situations where they were uncertain about the situation or the patient’s condition.

Paradoxically, some conditions, where the caller and/or patient was intoxicated, were identified both as a situation where video was used and a situation where video was not used. Tuden *et al*³ studied how nurses, through telephone communication, made decisions and employed decision support systems. In some instances, the nurse mentioned that they recognised the situation from previous experiences, and therefore, acted spontaneously. Such recognition-based decisions are common in complex, time-constrained situations where decision-makers possess a high level of expertise, such as in emergency medicine,¹⁵ similar to the setting in the current study. However, when the problem or solution was not apparent, Tuden *et al*³ noticed that the nurse would sometimes pause, review the decision support system, or contemplate potential issues or conditions affecting the patient without explicitly discussing this ‘uncertainty’ with the caller. We found the operators’ self-perceived level of uncertainty with the situation to be the deciding factor of whether to initiate video, rather the condition itself. This might be why some conditions are found in both tables, such as an intoxicated caller and/or patient, that sometimes it is the reason for not using video, and at other times, it is the main reason for considering video necessary, depending on the situation.

If video is primarily used when one is uncertain, there is no wonder that previous studies have indicated that video altered the assessment and the response in approximately half of the cases.^{4 6} This potential reduction in overestimation or underestimation of the severity was also reported in a qualitative study of EMCC operators’ experiences with video, where some of the operators believed

that video could contribute to better resource utilisation.⁵ Thus, it would be tempting to develop a guideline to increase the use of video. However, this would be challenging to implement as it seems that was the operators’ subjective need that triggered the decision to use video and not any specific symptom or condition.

In the pilot report, ‘unconscious adult,’ ‘injuries’ and ‘unclear problem’ were recurring situations where EMCC operators reported using video.⁴ This was in accordance with our findings (table 2), and it seems to suggest that the callers were perceived to particularly overestimate bleeding amount and injuries, and thus, operators found great utility in video. According to Idland *et al*,⁵ several operators perceived video as a reassurance for their own decisions. This is consistent with our findings, where operators felt that video confirmed that the patient’s severity matched what they had perceived during the phone call. It was not ‘unnecessary’ or ‘useless’; on the contrary, it strengthened the quality of the assessment. Furthermore, operators emphasised that it became easier to provide advice and guidance to the caller, as mentioned in the pilot report.⁴ These instances would, therefore, be reflected as instances where the operators’ assessment would be deemed ‘unchanged’, even though the operator found video useful.⁴

According to the Danish study, unconscious patients were one of the largest patient groups where EMCC operators chose to use video.⁶ Consciousness was also noted in the pilot report⁴ as a frequent reason for using video, while in our study, it was explicitly mentioned only once that consciousness was assessed. There might be under-reporting of the use of video for consciousness assessment in our study, or it could be that this was done so automatically when using video that operators did not consciously think about it. The same pattern was observed in the assessment of respiration using video. Medical operators are accustomed to hearing breathing sounds over the phone, and it is likely that the conscious or unconscious assessment was made before they choose to start the video or not.

Similarly, video was reported to be used for some conditions such as fever and pain while for other conditions like dizziness, it was not used. When a patient has a high

fever there are visual clues such as flushed skin and one can assess if the general condition is reduced. What then is a paradox is that a patient with prominent vertigo also could have observable signs, often appearing uncomfortable, pale and cold sweating. As mentioned, pain was indicated to be 'visible' and something that could be objectively assessed, even though pain as a phenomenon is both invisible and subjective. We understand the operators to mean that pain expressed physically could be objectively assessed, allowing them to form an opinion about whether the patient was affected by pain and to what degree, whether it was mild, moderate or severe pain that was being expressed. It is also likely referred to as a way of gaining situational understanding. It should be noted that the depth and scope of the data material are limited, and it is pertinent to question how aware operators are of the position of power they possess, being able to overrule callers.

We also found it interesting that no cases indicated that video was used when the caller was healthcare professional or a police officer. This is understood as the operator feeling that they trusted the caller to provide sufficient information, and that video would not add anything. However, when taking the results from the vCare project⁸ regarding clinical advice, referral and retrieval into account, it seems that there is potential for a new and expanded use for the video solution at the EMCC, that needs to be investigated further.

Time was a common factor mentioned. This aligns with the findings of Lin *et al*¹⁰ that the use of video creates an undefined time delay and that one therefore must assess the benefit against the potential time loss. In many cases, the medical operators stated that the situation was 'urgent regardless,' as in the case of chest pain, cerebral events, where vital measurements, such as pulse, blood pressure, had been taken, and they assessed that video would not change the outcome. Implicitly, this suggests that they were confident in their decision, and that they did not want to spend 'unnecessary' time on video. Linderoth *et al*⁶ expand on this, for example, when there was only a short time until the arrival of the ambulance or to avoid a delay in answering emergency calls.

Several challenges regarding videocalls have been identified.¹¹ In the data material, operators attempted to use video without success in only five cases. This is lower than Bell *et al*⁷ who found that video was not feasible in 40% of cases. One possible reason could be that operators made a possibly unconscious, selection when choosing to offer the use of video, as it is fully up to the operator to decide whether to use video or not. In contrast, most other studies required that there were two bystanders on site.¹¹ There were no cases where language problems were the reason for using video, but in several cases, it was cited as a reason not to use it. This could be interpreted as the process of sharing video is more challenging to convey than the incident itself. There were also no recorded cases where video was used for substances other than alcohol or when the main issue was related to psychiatry.

Strengths and limitations

This is one of the first studies to investigate the reasons why medical operators choose to use video or not. The study was originally undertaken as an internal quality improvement initiative, using a simple study design of text analysis of notes. Despite few respondents, the findings and the method can serve as a basis for the development of future studies. For instance, focus group interviews might provide deeper insights into organisational aspects of the use of video than the current study design.

CONCLUSION

The results indicate that operators were selective in their use of video. Video was offered to the caller when operators were uncertain, either about the situation or the patient's condition. In almost all cases where video was used, the issue was visible in some form. Technical issues or challenges from the caller's side caused video calls to fail in some instances while in other situations, operators deemed it unnecessary. When operators used video, it enhanced their situational understanding, facilitated recognition of the situation, thereby strengthening the decision-making.

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