

## Research Article

# Interdisciplinary communication on digital emergency networks in ambulance services: An exploratory study

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## Abstract

**Background:** Ambulance workers have to communicate with several different groups of emergency personnel. Such communication is often interactive in the sense that the communicators cannot see each other, and this may affect the reliability of the information exchange.

**Aim:** The aim of the study was to understand how paramedics perceive interactive dialogue with police officers and fire fighters. In particular, the study aimed to identify the communicative challenges of a new shared digital radio network in terms of knowledge gaps and interdisciplinary relations.

**Method:** Within a qualitative framework, the study used individual interviews to understand paramedics' experiences within a reflective life world perspective. Giorgi's method for systematic text condensation was applied to categorize results along thematic dimensions corresponding to research questions.

**Results:** The paramedics maintained that communicative and professional distance made it difficult to ensure effective interdisciplinary communication on the digital network. They described typical misunderstandings they tried to avoid, but lack of face-to-face contact made it difficult to communicate successfully.

**Discussion:** The challenges described by the paramedics have four aspects: (i) The significance of securing communicative attention, (ii) the importance of having a shared language, (iii) the need to avoid misinterpretation, and (iv) the importance of understanding attitudes. The findings suggest that there is a potential for improvement in interdisciplinary prehospital dialogue along all these dimensions.

**Conclusion:** Sound information exchange is a crucial condition of performance in prehospital work, but there is little focus on interdisciplinary communication on digital networks in education and training of paramedics. The study suggests that interactive and interdisciplinary communication skills are crucial non-technical skills that are underrated in ambulance services.

## Introduction

It has been extensively documented that health workers have to meet two types of communicative challenges in order to achieve organizational performance goals [1-3]. They must ensure effective external dialogue in relations with patients, and effective internal information exchange in relations with coworkers in other professions. The external relations have received most attention in the literature on health communication, but effective internal communication can be just as important [4-6].

Internal communicative challenges are especially salient in prehospital medical work. The ambulance service not only serves as a link between different health institutions. Paramedics also have to communicate with emergency personnel who do not have a medical background. This communication is often interactive in the sense that sender and audience are not in an ordinary face-to-face relation [7]. It also has a significant interdisciplinary dimension that can make it difficult to ensure that the information exchange is effective.

This article presents an exploratory study of how paramedics in Norway perceive interdisciplinary dialogue over a new national digital network designed to facilitate and improve communication between the emergency services. The research design was qualitative and a naturalistic methodological approach was employed [8]. Semi-structured interviews were used to clarify the paramedics' thoughts and beliefs about the interdisciplinary dialogue. The article argues that such an understanding can yield in-depth knowledge of communicative

challenges in prehospital work, and that there should be more focus on such challenges in the education and training of emergency personnel.

The next two sections of the article clarify the background assumptions on which the study is based, together with its design and the method that was used. Section four presents the main findings along thematic dimensions corresponding to the research questions, and the fifth section discusses these findings in the light of theoretical perspectives on communication and social interpretation.

## Background

A key characteristic of ambulance services is the comprehensive use of interactive communication that does not involve an ordinary face-to-face encounter. Paramedics are obviously involved in many face-to-face relations, but the interactive dialogue is an important part of their work. Communication channels like radio and telephone are used extensively, and successful interactive dialogue is crucial for achieving performance goals [9-11].

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Paramedics' interactive communication is largely specialized, in the sense that senders and audiences are typically health personnel with a shared understanding of the procedures and challenges of prehospital work. For instance, paramedics and ambulance coordinators in acute emergency telephone centers have the same knowledge of what information to report concerning the patient's condition on their way to the hospital and of the standard procedures for assessment of the patient's condition, treatment and transport. This shared framework of understanding facilitates dialogue and action guidance [5,6].

However, not all prehospital interactive communication is intraprofessional. In many countries digital emergency networks have been developed to facilitate direct interdisciplinary communication between all the emergency services, including the police, fire service and other rescue services. In Norway a new shared network has been gradually implemented throughout the country in recent years. The intention is to make information exchange transparent and effective by making sure that all the emergency services receive relevant, updated information.

It is the first responder to an accident who is responsible for opening a channel in the digital network when there is reason to believe that all the emergency services are needed. When ambulances, police and fire fighters are dispatched at the same time, typically to a situation like a serious car accident, it is imperative that the information provided is specific and adapted to the information needs of each profession. The responsibility for ensuring communication is formalized in management structures, and managers in the three emergency services have overall responsibility for controlling and supervising interaction within their respective professional areas. In the case of ambulances, this managerial position is often described as 'Operative Leader Health' (OLH). The police have the overall responsibility for operations at the accident site, but OLH is responsible for coordination and control of the health operations.

There is widespread public agreement that a shared digital network is the way forward in emergency work. Shared knowledge and effective information exchange is a key to interoperability when professionals are operating together [7,12,13]. This does not, however, mean that communication over the network is simple. On the contrary, interactive communication between the emergency services can be especially challenging. The reason is not only that the services often approach accident sites from different locations, but that the communication is interdisciplinary – ambulance, police and fire services interpret information and situations from different professional perspectives [14].

There is obviously much face-to-face communication between emergency personnel in operations at an accident site. But a significant amount also takes place before they arrive, and even when working together on site they have to maintain interactive communication with the emergency communications centers and other off-site resources. Since each emergency service to a large extent has its own tools and terminology, effective communication may be difficult to achieve in such situations.

In general, there is a communicative distance in all forms of contact via telephone, radio and other forms of data transmission, since body language and contextual observations cannot be used as interpretive clues [15,16]. The interdisciplinary dimension in interactive dialogue between the emergency services makes it even more challenging to bridge this distance. The different professional backgrounds of emergency personnel are reflected in their professional perspectives,

and these differences influence interpretation of verbal and nonverbal speech acts [7,17].

### Non-technical skills in prehospital work

To communicate interactively with the police and fire services, paramedics need certain technical skills. For example, they need to know how to operate the various channels in a complex digital network. Acquiring these skills can be challenging, but the learning procedures and competence aims are straightforward. Mastering the techniques is a matter of learning standard procedures for operating the equipment.

Learning how to interpret, express and convey messages in communicative relations cannot, on the other hand, be reduced to practical teaching manuals [18,19]. Determining who the audience is, what should be communicated and how it should be communicated, requires non-technical skills [5,6]. As Fletcher [20] observes, these skills are

*"... sometimes referred to under the general heading of 'human factors', but more specifically, as they do not relate directly to the use of medical expertise, drugs and equipment (i.e. clinical knowledge and technical skills), they can be described as non-technical skills".*

The importance of having non-technical skills in prehospital communication is obvious: there are no procedures for telling paramedics exactly how to adapt their written messages and verbal speech acts to their audiences' interactive perspectives [4,6]. Formulating an appropriate message requires individual non-technical skills – understanding what needs to be communicated. Social skills are necessary to express a message in such a way that it is understood by the audience.

In the literature on operative psychology, there is general agreement that human resources are vital for analytic planning and cooperation [21]. However, little attention is paid to this in the literature on acute medicine and prehospital work; in an illuminating review article, Summers and Willis [6] show that only eight studies have been published on non-technical skills in prehospital work. Given that non-technical skills occupy a prominent position in this area of health care, it is safe to say that they should receive a much stronger focus in future research.

### Study design and method

The present study highlights one aspect of the neglected area of non-technical skills in prehospital work. By confining the study to paramedics' interactive communication with the police and fire services, the study focused on one of the most difficult forms of professional interaction that paramedics are involved in. The aim was to explore how paramedics perceive challenges of this interaction. How, as health professionals, do they think it is possible to ensure an effective dialogue over a limited communication channel when their audience does not have health service training?

There are naturally many ways to study prehospital communication. Every method is subject to certain limitations, and a full understanding of the challenges of interactive emergency communication will require more research [22,23]. The present study has taken a phenomenological approach, based on the assumption that listening to the voices of health workers can have important normative consequences [24]. On an individual level, such consequences can improve the ability of ambulance personnel to ensure effective communication with police officers and fire fighters. On a system level, they can give ambulance

service managers a better knowledge of how communication between the emergency services can be improved by organizational means [12].

## Method

The study aimed to obtain an in-depth understanding of paramedics' experiences. The design was qualitative, since it would be difficult to understand the paramedics' narratives without achieving a detailed understanding of their thoughts and beliefs.

Individual interviews were used to find out how the paramedics experienced interdisciplinary communication. The reason why individual interviews was chosen rather than observation studies or focus group interviews is that this has a prima facie legitimacy as a method of revealing the individual's thoughts and beliefs about a particular topic [8,22]. Contextual limitations in the research area may justify other methodological approaches, but no such limitations were relevant in the present study [22]. Thus the method of individual interviews suggested itself as the natural choice for collecting data.

## Participants

Invitations to participate in the study were posted on a website used by paramedics in the national public health services in Norway. The initial invitations provided information about the project and contact details. More than 50 paramedics responded, and 25 were chosen for individual interviews. The informers had to be qualified paramedics, but no other variables like gender, age or place of work were used as inclusion criteria.

Before the interviews, the paramedics were encouraged to ask questions about any points they wished to have clarified, so that they could gain a thorough understanding of the research project. They were asked to sign a form that explained the nature of the research and the aims and scope of the interviews, and a statement that their participation was voluntary and based on informed consent.

Each interview had a semi-structured form and lasted from 45 to 60 minutes. The reason for choosing this form of interview is that it enables the researcher to draw up a thematic plan for how to conduct the interviews – an interview guide – which can then be individually adjusted if necessary [22,25].

The paramedics were given the opportunity to read transcripts of the interviews. Five chose to do this, and two had minor comments on the written material, but none had any substantial suggestions for changes.

In the presentation of the main findings below, the information provided by the paramedics has been completely anonymized. It is impossible to trace the paramedics' narratives to any particular place or person. The aim is to identify the general challenges of interdisciplinary communication, and for this purpose it has not been necessary to reveal any personal information.

## Analysis

The interviews were analyzed in accordance with Giorgi's [26] influential method of systematic text condensation. With this method, central thematic concepts in interviews are identified, developed and gradually refined on the basis of further analyses of written transcriptions [22,26]. The material is codified according to these concepts, and restructured and revised in the light of further analyses [26,27].

In the present case, three thematic concepts emerged from systematic reinterpretation of the empirical data: communication,

interdisciplinary challenges and organizational limitations. These concepts constituted a framework for further analyses on the basis of key words assigned to each of them. For instance, the key word 'dialogue' was assigned to communication, and 'professional distance' to interdisciplinary challenges. The key words were in turn linked to the meaning of expressions in the narratives where they occurred. In this way, all the empirical material was systematized within a thematic framework.

## Results

The results of the study were categorized along three dimensions, corresponding to three research questions:

- 1) What were typical challenges in the interdisciplinary communication on the digital network?
- 2) How did the paramedics attempt to meet these challenges?
- 3) How did organizational limitations make it difficult to ensure effective interactive communication?

## Typical challenges

All the paramedics made a sharp distinction between interactive dialogue with health workers and interactive dialogue with other emergency personnel. Furthermore, they all agreed that it was normally easier to communicate effectively with the former than with the latter group. The following was a typical statement:

*"This [interdisciplinary communication] can be very challenging. We have problems with the interdisciplinary dimension of the network communication. We often misunderstand each other, and we don't always understand the intentions at the other end of the line. It's so difficult to interpret when we can't see each other".*

When asked to elaborate on this, many specific episodes were mentioned. However, all the paramedics emphasized two types of challenges they often faced. The first was related to language and problems of shared meaning, the second to the need to avoid misinterpretation.

## Language

Four of the paramedics talked about 'tribal languages', which they said was a well-known term in the services concerned. This referred to the intra-professional use of language, and they maintained that the ambulance, police and fire services all had different frameworks of meaning that made it difficult to exchange information. Terms had to be explained and their use had to be adjusted to the interpretive perspectives of the other professions. But as one paramedic said, 'It's still difficult to understand how we are understood when we are not face-to-face.' All the paramedics emphasized this difficulty.

Furthermore, even when the paramedics were aware of potential misunderstandings, the time it took to explain language expressions sometimes crucially affected the health operations. Three of the paramedics reported that they sometimes hesitated to communicate information to the other emergency services on the digital network, because 'it takes too much time to explain things' as one said. As an example another paramedic mentioned the initial emergency message ambulance personnel are required to send when they are first responders to an accident site. This message is formalized as a structured procedure describing observable facts like the context of the accident and the number of patients, but it was not always easy to ensure that such information was communicated effectively:

*“This [the initial message] is supposed to be transmitted on the radio, but the problem is that there are no interdisciplinary routines for how the message should be understood. If I send the message, then I meet reactions like ‘What do you mean?’ or ‘Can you elaborate?’ But this steals too much time from working with the patient, so I’ve simply stopped going through the full procedure”.*

The paramedic said that this was a ‘typical problem’, and a ‘well-known challenge in the services’. This was confirmed by the other paramedics. They all considered that it took too much time to convey detailed explanations on the network, and that this had negative consequences. One paramedic emphasized what happened if he went through the full procedure. ‘[Then] I’m sitting in the car explaining and repeating things instead of attending to the patients. It is frustrating.’

All the paramedics agreed that the lack of a shared language was a problem that affected interdisciplinary communication. As one said, ‘In our services detailed messages are not sent very often. There is a feeling that the idea of extensive mutual understanding is hopeless.’ Many said that this had led to loss of motivation. One paramedic elaborated: ‘We stopped trying to secure optimal [interactive communication] a long time ago. Now we just do our best. We try to focus on the patients.’ Many of the paramedics emphasized that this resignation was not to be confused with laziness. The problem was that if they followed the communication procedures in strict detail, the communication became too time consuming. They knew that the procedures were not followed rigidly, but this fact was outweighed by considerations for the patients.

### Associative misinterpretation

The second type of challenge described by the paramedics was the need to avoid what one of them aptly characterized as associative misinterpretation: ‘Even when we have a common understanding of the words on the screen in the car, misunderstandings often arise in the sense that we [the emergency services] associate the messages with very different thoughts and beliefs.’ Many paramedics described cases in which transmitted information was not interpreted in a way that corresponded to the sender’s communicative intention. One paramedic gave an illuminating description of how this typically happened on the way to an accident site:

*“When we receive written information about the site on the screen in the car, we get pictures in our heads. We anticipate reality, but when we arrive things are often different. It’s not the way we think [it will be] at all. Often when we cooperate with the police and get descriptions [of the accident site] from them on the way to the patients, the reality turns out to be different from what we thought. When we arrive, the situation is not the way we interpreted the police”.*

Acquiring a correct and comprehensive understanding of messages from the other emergency services was perceived to be an ‘enormous challenge’, and the problem was not necessarily the actual language of the message. As one paramedic said: ‘The message is often received, and we often understand the message that is directly expressed. The problem is that we interpret this message differently.’ Another gave an example of a situation where the ambulance personnel had received the message ‘No one is badly injured’ from the police. This sentence was in itself understood – the paramedics grasped the literal meaning of the words – but the beliefs they associated with the message turned out to be wrong: ‘We thought one ambulance would be enough. When we arrived, it turned out that three patients needed stretchers. We had to send for more resources.’

All the paramedics agreed that such misunderstandings happened easily in interactive communication. ‘It’s so difficult to know how the reality is at the other end.’ One paramedic described a situation in which the ambulances and fire brigades were dispatched to two different streets with the same name. This was not discovered until the fire brigade arrived at the wrong address. In this case the misunderstanding was soon discovered, but several paramedics said that they had experience of other geographical misunderstandings that had significant negative consequences.

### Ensuring effective communication

The second research question concerned what the paramedics were doing to ensure effective communication on the digital network. They had many thoughts about this, and referred to a variety of well-established principles like securing audience attention and ‘closing the loop’ by getting feedback.

These general communication principles did not only apply to interdisciplinary communication. As one paramedic said, ‘We check our communication all the time, it’s not something special in interdisciplinary work.’ A striking finding of the study was that many of the paramedics also referred to more specific principles they used in interdisciplinary dialogue. Many held that there was something special about this kind of communication that required, as one said, a ‘different mentality for checking communication.’ In order to bridge the interdisciplinary gaps on the network, it was necessary to pay attention to basic conditions for communication, like establishing a shared platform of language and exploring audiences’ interpretations of verbal and nonverbal speech acts. One paramedic said that ‘We try to create an understanding of the job we do.’ Another told an illuminating story:

*“I was in charge of the health operations at the scene of the accident. After a while, I was contacted on the radio by the police. The telephone operator asked if we could open the road soon, since there were no alternative roads for the traffic. I had to explain that assessment of the patients was our primary priority, but this was very difficult on the radio. It seemed to me that the operator did not understand me... It was the communicative distance that was the problem. He couldn’t see us or the patients. I solved the problem by explaining in detail the observational knowledge I had. This did the trick. I sensed that he became much more understanding of our situation”.*

The necessity of explaining actions was described as fundamental. To avoid conflict, the paramedics had to explain the medical situation and the basis for their decisions. This sometimes succeeded, as in the above example, but sometimes it did not. As one of the paramedics said: ‘We try to explain what we’re doing and what we want to do, and this can help but sometimes we just can’t get through.’ In these cases the paramedics blamed the poor communication on fundamental knowledge gaps and lack of mutual understanding. However, as a rule it was possible to improve interactive communication by giving or asking for explanations.

### Internal cooperation

In addition to what they did to ensure effective direct communication on the digital network, many of the paramedics said that they tried to improve the general quality of the communication by discussing communication problems with colleagues in the ambulance service. This was done informally, as when the paramedics had lunch together at an ambulance station, but also formally, as in a debriefing after a major accident. As one said: ‘We try to discuss events with



each other and our station leaders, so that we're better prepared for communicating with the police and fire services next time we face a similar situation.'

The paramedics said that learning how communication had failed in specific situations had given them a better understanding of the pitfalls of interactive dialogue. The following was a representative statement: 'We learn a lot from going through cases where the communication was not optimal.' At the same time, many of the paramedics emphasized that analytical debriefing about factual matters was not enough, since their communication practices were grounded in a professional mentality, and this mentality affected the way they communicated with the other emergency services. As one paramedic said: 'There is a way of thinking among our group of health workers, and this influences how we think and talk about others.'

When asked to elaborate on how their professional mentality influenced the emergency communication on the digital network, many of the paramedics used the concept of attitudes. One said 'It's not merely about how we sometimes misunderstand each other. It is also about attitudes, how we think about each other as people and how we're willing to accept others' judgments.' The concept of trust was mentioned as an especially important attitude. Several paramedics emphasized that it was hard to establish a professional atmosphere for accepting the legitimacy of decisions made by personnel from another emergency service. Once again, the problem was blamed on the communicative distance. As one paramedic said: 'We do not really know most of these people [in the other emergency services]. They are only voices. Lack of trust comes so easily.'

Many of the paramedics emphasized that although the problem of trust was inherent in the professional culture and interdisciplinary distance, it was also related to the mentality in particular ambulance services. As one paramedic said: 'Our team mentality does something to us and the way we communicate with them [the other emergency services].' Such team mentalities were perceived as crucial. One described how they could differ as follows: 'I've worked in several ambulance services, and the quality of the emergency communication differs. In some places [the personnel have] a positive attitude towards the police and a willingness to understand their perspectives. In other places this is not so good.'

Furthermore, it was believed that the considerable differences between mentalities and attitudes meant that there was a strong potential for improving interactive communication between services in some services: The positive attitude of some ambulance services could be made to apply everywhere. As one paramedic aptly put it: 'We managed to create a shared positive attitude towards the police where I used to work. Why shouldn't this be achieved where I work now?'

### Organizational limitations

The third research question concerned organizational challenges, and how organizational limitations made it difficult to ensure effective interactive communication. All the paramedics believed this to be important. As one said, 'The system is to blame for many misunderstandings. The system has a structure that makes it difficult to get to know the police and fire brigades. We don't know their goals and how they reach these goals.' Many said that although they did their best, communication could never be optimal under such organizational conditions. The following was a representative statement: 'Our training should be designed in a different way, so that we [the emergency services] learn to know each other better. We should focus more

on our interaction with the other emergency services.' Several of the paramedics emphasized that this would not necessarily require resource-intensive arrangements. As one of them said: 'It doesn't take that much. It can't be that difficult to arrange a few meetings and exchanges of experience.'

Three of the paramedics illustrated the importance of face-to-face contact by describing how they had worked as fire fighters before they became qualified as paramedics. One said: 'I know what that job is like, so I know how they [the fire fighters] think. This makes it easier for me to communicate now.' Five others had worked in ambulance services where they had been invited to participate in further education courses about on-site coordination. Police officers had also participated, and the paramedics reported that they had learned a great deal from attending the courses together with the police. However, most of paramedics said that in the services where they worked they were offered no opportunities to participate in courses with other professions. A representative statement was: 'In our services there is absolutely nothing related to interdisciplinary work. There is a growing distance and lack of understanding between us and the other emergency services.'

Some drew a parallel with cooperation with the emergency telephone centers. They said that they had been able to participate as observers at the centers, and that this had made communication easier. They considered that this should be compulsory for the other emergency services as well. The paramedics all agreed that there should be much more 'mutual learning' as one said, and that the specialized nature of the individual emergency services made this difficult. As one said: 'As it is now we're islands. In the old days we saw each other much more'. Many maintained that this was a negative development and that the systematic specialization of the emergency services was increasing, which in turn increased their isolation.

### Individual initiative

Although the paramedics criticized their own service for not acknowledging the importance of interdisciplinary communication on the digital network, they also admitted that they themselves could do more to improve the dialogue. As one said, 'I think we all could do better if we focused more actively on how we understand each other.' Once again, this was a question of attitudes, of being interested: 'We tend to live in our own bubble. We need to be more proactive and try to imagine what the world looks like from the perspective of the police and fire fighters.'

Although this type of personal sensitivity was believed to be important, the paramedics emphasized that it was not sufficient to meet the challenges. They maintained that in the final instance the key to cooperation was to meet face-to-face and learn from each other. However, for an individual to take the initiative to participate as an observer was not realistic. 'You can't simply call a police unit and ask them if you can take part in their operations. This has to be arranged at system levels.' Many of the paramedics blamed central management for not perceiving the importance of mutual understanding. 'Nowadays it's all about money and focusing on one's own budgets. But poor interaction is also expensive in the larger picture. It's all taxpayers' money.' The paramedics maintained that their immediate superiors were not to blame – that such decisions were taken on a higher level in the organization. As one said: 'Our first-line managers don't have the resources to take us out of health operations and send us on courses with the police.'

## Discussion

The main finding of the study was that the paramedics experienced a number of challenges to effective interdisciplinary communication, and that individual and organizational limitations made it difficult to meet them. It is instructive to view the perceived challenges from the perspective of theories about the nature of successful communication. Since it would fall outside the limits of the present study to analyze social interaction on all levels, this article will focus on three theoretical perspectives that are especially important for understanding the paramedics' experiences.

### Having a common language

As shown above, many of the paramedics complained about the lack of a shared language. They talked about 'tribal languages', explained that the meaning of some terms differed from service to service and maintained that the differences were enhanced by the communicative distance on the digital network.

In theories of communication, the importance of shared meaning is often linked to the idea of concept exchange [18,28]. Concepts are traditionally understood as what a particular expression means to a person – how something is represented in the person's thoughts about the world. As Burge [29] observes, 'A concept can be regarded as a way of thinking of an object or property.' Concepts are constituents of thoughts and beliefs, and should be distinguished from what they actually refer to in the world. It is, for instance, possible to think of water as (the concept) water, but also as H<sub>2</sub>O. This idea of concepts as mental representations also implies that concepts should be distinguished from public language expression (two different words can express the same concept). Nevertheless, it is communicators' understanding of the words they use that determines the meaning of the concepts they express [29]. This means that a concept can be shared only if both communicators have a sufficiently similar understanding of the language they are using to express that concept [30,31].

The qualification 'sufficiently similar' is important here, since communicators never have exactly the same understanding of the language they use. Consequently, if two people were to need an identical understanding in order to share a concept, they would never be able to communicate. This is generally regarded as an implausible conclusion and a *reductio ad absurdum* implication of the idea that communication presupposes an identical understanding. Theorists have instead argued that two people are able to communicate if their understanding of the language they are using overlaps sufficiently.

In relation to the present study, this theoretical framework of concept possession has two dimensions. Its explanatory dimension concerns how it can be used to explain the main finding that it was difficult for the paramedics to ensure effective interactive communication in interdisciplinary contexts: the reason for many of the misunderstandings that occurred was that the paramedics and the other emergency services personnel lacked a sufficiently similar understanding of the language they were using. Thus much of what the paramedics said about the challenges of interdisciplinary communication can be understood in the light of the above-mentioned condition for communication. The problem was that the emergency services had different beliefs about the meaning of expressions. The expressions were used in what Wittgenstein [32] refers to as different 'language games' – the systematic use of language that conforms to local practices for a group of speakers.

The second, normative, dimension of the theory of concept communication concerns how communicators should attempt to

ensure dialogue. It follows from the theory that the aim of achieving a shared platform of concepts should be understood contextually, since there are many ways of passing the threshold to a sufficiently good understanding of a concept. However, as a general rule, grasping a meaning explanation is a *prima facie* norm. Someone who has understood such an explanation has passed the threshold for possessing the concept in question. In relation to this study, the consequence is obvious. It does not take much time to convey explanations of terms that have a specific meaning within a profession. Consider a term like 'electrocardiograph', which is a central term in a paramedic's vocabulary. For a police officer, this word might be nothing more than an empty sound. By explaining what it means, paramedics can convey so much that the recipient of the explanation passes the threshold for possessing the concept electrocardiograph.

### Misinterpretations

Another point made by the paramedics was related to misinterpretation: even when they understood a message expressed in words, they often interpreted it in very different ways. From a social interaction perspective, this phenomenon corresponds to an influential theoretical communication condition [7,33]: When two people associate a verbal statement with the same idea involving the same concepts, they may still associate the idea with very different beliefs. This was exactly how the paramedics described many cases of poor communication.

Such misinterpretations can have many causes. In the present case one of them is particularly relevant: in communicative processes senders only say what they think is necessary to convey everything they want to convey. This is known as the economical principle of communication. Sperber and Wilson [34] describes it as follows:

*"When communicating, humans automatically aim at maximal relevance, i.e. maximal cognitive effect for minimal processing effort. This is the single general factor which determines the course of human information processing."*

A frequently used metaphor here is the iceberg: when senders attempt to communicate something to an audience, they use as few words as they think is necessary. They assume that the audience will understand not only what they are actually saying, but also the part of the communicative iceberg that is beneath the water surface. The whole of the message includes many beliefs that are not expressed in words and therefore only indirectly accessible to the audience. This means that communication can only succeed if the audience manages to grasp the hidden part of the iceberg [33]. If the audience has an interpretive perspective that is not very different from the sender's perspective, then communication usually succeeds. But if the audience's interpretive perspective is very different from that of the sender, the beliefs that the audience associates with the expressed message will often be very different from the beliefs that the sender intends to communicate [31,35].

This analytical perspective can explain why associative misinterpretation often happened in the interdisciplinary emergency communication. Messages expressed by the paramedics were shaped by their professional perspectives, and the other emergency services had limited knowledge of these perspectives. Similarly, when the paramedics were the audience, their interpretations of the others' communicative acts were shaped by their medical and practical backgrounds, and this made it difficult to achieve complete understanding. In both forms of communication, the problem was the same – it was difficult to bridge

the communicative distance. The knowledge gaps and interactive nature of the communication made it difficult to communicate observational facts about the accident scene.

### Attitudes

As shown above, many of the paramedics mentioned the essential part played by trust and sincerity in good communication, but said that the interdisciplinary distance in the emergency communication made it difficult to avoid negative interpretations. Having a positive attitude was recognized as the ideal, but lack of face-to-face contact and other organizational limitations created practical difficulties.

The importance of attitudes in communication has been stressed by Løgstrup [36] in his influential theory about sincerity as the ethical starting point in human dialogue. Løgstrup argues that in social relations, the natural aim is to meet others with attitudes of trust and sincerity: 'It is a characteristic of human life that we normally encounter one another with natural trust... our life would be impaired and wither away if we were in advance to distrust one another, if we were to suspect the other of thievery and falsehood from the very outset.' Løgstrup does not argue that distrust is never legitimate. His point is that if there is no especially good reason to formulate negative thoughts about other people, then it is unjustified to do so.

The paramedics acknowledged this ethical norm, but the professional distance made it difficult to apply it in real-life communication with the other emergency services. Limited understanding of others' motives created an atmosphere of doubt and uncertainty. Furthermore, even when the paramedics' attitude was positive, they found it difficult to communicate this. Interpretive barriers prevented them from appearing trustworthy and considerate. This finding corresponds to the theoretical principle that expressing an attitude is not the same as conveying an attitude [37]. It is a general principle that a sender's intention, as the sender understands it, has limited communicative value if the audience does not perceive it in the same way [38]. This principle has received a lot of attention in patient communication, but it is equally relevant to interdisciplinary communication [1].

The problem of conveying attitudes was a two-way phenomenon in the emergency communication; it also applied when the paramedics were the audience. They reported that they were sometimes too quick to ascribe negative attitudes to other professionals. Part of the reason was that they often experienced incongruent communication – a mismatch between a communicative action and a contextual belief suggesting a different interpretation [19,39]. This happened, for instance, when police officers transmitted a positive evaluation of the paramedics' actions over the radio. The paramedics heard the message but doubts about the senders' intentions outweighed the literal meaning of the words.

### Organizational culture

As shown, the paramedics connected problems of interpretation with their particular professional mentality. What they described as their 'way of thinking' constituted a significant communicative challenge in relation to other services. In his influential analysis of organizations, Schein [40] refers to such ways of thinking as organizational culture which he defines as follows: 'A pattern of shared basic assumptions learned by a group as it solved its problems of external adaptation and internal integration (...) A product of joint learning'.

Stein's definition has received a lot of attention in analyses of organizational performance. It has been extensively documented

that the way employees in an organization think and act is not merely influenced by formal rules [41]. Practices are also shaped by informal norms, roles and ideologies [42,43]. This clearly happened in the communication described by the paramedics. As many of them emphasized, the problem was that they had developed norms of meaning in isolation from the other emergency professions.

Since these norms were grounded in a professional culture, it is obviously important to achieve a collective focus on how culture influences practice. First-line managers have a special responsibility for creating critical awareness of cultural practices [12,47], but this should also prevail at higher levels. Organizational competence-building activities to improve interdisciplinary understanding need to be developed. By participating in such activities, the emergency services will be able to acquire a shared sense of meaning and bond as professionals working together towards the same fundamental goals [44-48].

In sum, the findings of the study strongly suggest that communicative challenges related to profession-specific cultures should receive more focus in the education and training of emergency personnel. As one of the paramedics said, it does not take much to get a sense of another person's perspective. The present findings suggest that this factor is not acknowledged in the organization of the emergency services. The communicative distance is huge, and the challenges are profound. The findings indicate that strengthening interdisciplinary competence should have a higher priority in professional education and training than it has today [49-52].

### Conclusion

The main findings presented in this article can be divided into two categories. On the individual level, the most important finding is that paramedics perceive many communicative challenges in interdisciplinary dialogue, and that they find it difficult to meet these challenges. The findings suggest that the difficulties are grounded in knowledge gaps between personnel of different professions, and that knowledge of practical communication principles can help paramedics to bridge these gaps: in order to overcome professional distance and achieve dialogue, it is necessary to adjust communication and interpretation to others' interpretive frameworks. The findings suggest that such principles should have an important role in competence-building.

On the organizational level, the most important finding of the study is that there is a need to make specific organizational arrangements for improving interdisciplinary dialogue. Furthermore, it is not enough to describe to paramedics how the other emergency professions think. A purely abstract knowledge about others' goals and means of reaching those goals is difficult to translate into practice. Face-to-face contact is also crucial to shared understanding. It is essential to meet, get to know each other and learn from each other. In the final instance, efficient professional bonding and an interdisciplinary team mentality cannot be established simply on the basis of daily digital communication and hectic interaction in operational situations.

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