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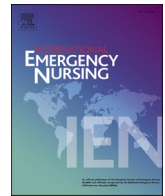
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“Like a rainy weather inside of me”: Qualitative content analysis of telephone consultations concerning back pain preceding out-of-hospital cardiac arrest

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ABSTRACT

Introduction: Cardiac arrest patients presenting with back pain are at risk of not receiving the appropriate help when calling emergency medical services. In telephone consultations regarding patients with back pain preceding an out-of-hospital cardiac arrest, we investigated how communication between caller and call-taker influenced the call-taker's interpretation of back pain descriptions and decision-making about choice of response.

Method: The study was conducted using 20 recorded phone calls from 17 patients who contacted the Copenhagen Emergency Medical Services (Denmark) reporting back pain up to 24 hours before an out-of-hospital cardiac arrest. Qualitative content analysis was applied.

Results: Two main categories emerged: (1) reasons, including subcategories: reported conditions, descriptions of conditions, patient's interpretation of condition and patient's own remedial actions; and (2) considerations, including subcategories: assessment of the severity, call-taker's interpretation of the condition, arguments for chosen response and conditions not facilitating further communication by the call-taker.

Conclusion: In telephone consultations regarding patients with back pain preceding an out-of-hospital cardiac arrest the communication was influenced by the communicative preconditions of the call-taker. Communication in consultations where ambulances were not dispatched was characterized by complex descriptions of symptoms not easily fitting into the health system's interpretations of conditions warranting an urgent response.

1. Introduction

Back pain is a non-specific symptom and can both be representing non-life-threatening musculoskeletal disease, be an infrequent atypical sign of heart disease, and of rare life-threatening conditions like aortic dissection [1]. The correct evaluation of the condition is thus of utmost importance. While early recognition of occurred out-of-hospital cardiac

arrest (OHCA) during emergency medical calls is associated with improved survival [2–4], knowledge of communication related to early warning signs presentation when contacting emergency medical services (EMS) prior to OHCA is sparse.

Communication between caller and call-taker is characterized by complex decision-making based on the interaction between the caller and call-taker, where a range of contextual factors, such as the caller's

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personality and the call-taker's professional skills can complicate the interaction [5–7]. Furthermore, ineffective communication in 9-1-1-calls are found to have an impact on the chance of survival among OHCA victims [8]. Moreover, for conditions with a low incidence, it can be challenging for the call-taker to identify high risk patients of severe illness [9]. This emphasizes the importance of an advanced level of communication between the patient/bystander and the health professional where the caller's ability to describe and communicate experienced symptoms as well as the call-taker's ability to interpret the caller's symptom description accurately affects the implementation of efficient and necessary treatment.

To gain knowledge about patients' descriptions of and communication about back pain preceding an OHCA we obtained access to recordings of all calls made to the Copenhagen EMS. We aimed to explore the communication in telephone consultations between call-taker and callers describing back pain within 24 h before developing OHCA. Specifically, we analysed how communication between caller and call-taker influenced the call-taker's interpretation of back pain descriptions and implementation of treatment.

2. Methods

We employed a social system theoretical approach to examine characteristics in communication in automatically recorded telephone consultations between caller and call-taker concerning descriptions of back pain preceding an OHCA.

According to Niklas Luhmann [10], telephone consultations can be observed as interaction systems with the function of reducing complexity by making decisions on behalf of the health system [11]. Systems of interaction are characterized as communicative systems defined as limited in time, and in processing of complexity [10]. Communication is observed as a synthesis of three selections; information, utterance (from German *Mitteilung*), and understanding (from German *Verstehen*) or misunderstanding of the uttered information [12–14]. Communication in the telephone consultations consisted of two parties; the caller and the call-taker, where the caller interpreted experienced conditions and communicated them to the call-taker, who then interpreted the information uttered by the caller. Following Luhmann's system theory, participants in an interaction system are defined as separate psychic systems [15].

2.1. Setting

The study was conducted using recorded phone calls from people who contacted the Copenhagen Emergency Medical Services (EMS) during the period 01.01.2016 to 31.12.2018. In all selected calls the caller was describing back pain and all calls were recorded within 24 h prior to OHCA. The Copenhagen EMS consists of the 1813-medical helpline and the emergency number 1-1-2. The 1813-medical helpline is a regional 24-hour non-emergency medical helpline and administers guidance, using a locally developed electronic decision support tool system [16], refers to emergency departments or dispatches ambulances. The emergency number 1-1-2 is to be contacted in case of an emergency where the urgency is evaluated, using the Danish Index system [17], and ambulances are eventually dispatched. Call-takers at the Copenhagen EMS consist mainly of specialised nurses, and less so of physicians and paramedics.

Using the Civil Registration Number, a unique personal identifier issued to all Danish residents, linking information across national administrative registries is possible [18]. Patients who suffered an OHCA were identified in the Danish Cardiac Arrest Registry [19] and this was linked with telephone consultations with the EMS in an administrative database from the Copenhagen EMS. The recorded telephone consultations were stored on a server at the Copenhagen EMS.

2.2. Data collection

The selection of patients is illustrated in Fig. 1.

We divided the patients into two main categories depending on the triage in the telephone consultations (Table 1). Patients were defined as 'no treatment (n.t.)' if they were referred to 'self-care', 'contact your general practitioner' or 'issue of prescription'. Patients were defined as 'offered hospital referral (o.h.)' if they were triaged to dispatch of an ambulance. Patients are marked with (n.t.) or (o.h.) after their pseudo name. In the analysis, we used "patient" as a joint denomination regardless of the caller being the patient or a bystander.

2.3. Data analysis

Telephone consultations selected for analysis were transcribed verbatim by the first author (BJ), and a test sample of the transcripts was reviewed by an experienced researcher (HVN) to ensure accuracy. We identified the caller and the patient as well as the call-taker enabling analysis of the communication in the telephone consultations. In the transcripts, they were anonymised for ethical reasons. The transcripts were entered into Nvivo12 (Massachusetts, Burlington). Qualitative content analysis with a subsumption strategy for generating categories was applied, where concepts of the material were subsumed into sub-categories based on the research question [20]. Data analyses were discussed among the first author (BJ) and two experienced researchers (HVN,HB) until consensus was reached. In qualitative content analysis data saturation is provided when replication in categories are obtained [21]. This was ensured with the 17 patients.

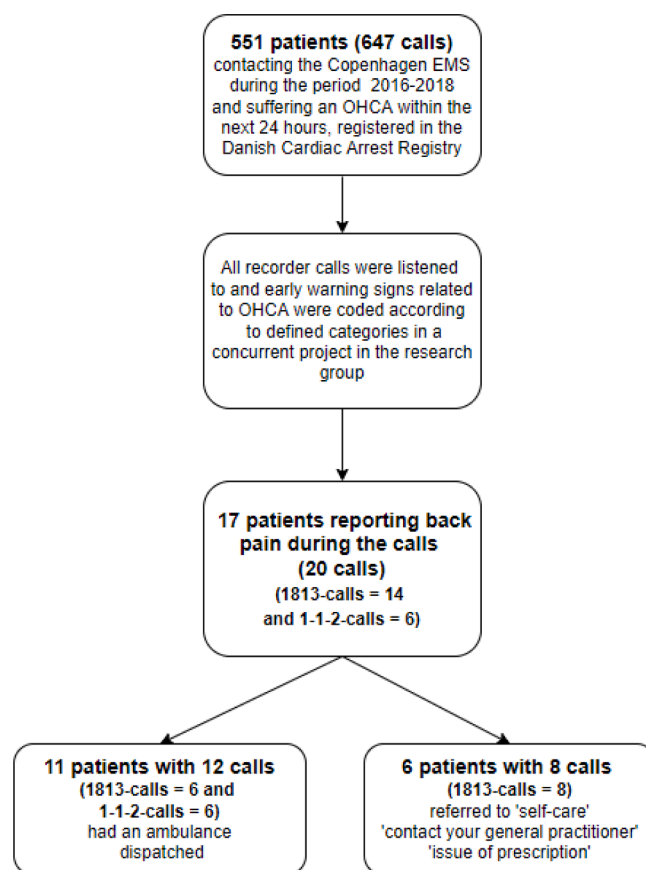


Fig. 1. Selection of patients suffering an OHCA within 24 h after contacting Copenhagen EMS complaining of back pain during the period 2016–2018. Abbreviations: EMS: emergency medical services; OHCA: out-of-hospital cardiac arrest; 1813: 1813-medical helpline; 1-1-2: emergency number 1-1-2.

Table 1

Characteristics of patients and information on telephone consultations divided into subgroups depending on the call-taker's chosen response.

Pseudo name	Age (years)	Gender	Type of call	Who the caller is	First selection of information uttered by patient	Location of back pain	Nr of calls ^a	Total call time ^b
Group 1: No treatment (n.t.)								
Amy(n.t.)	50	Female	1813	Patient	Sudden onset of pain in the chest and in the back	Between shoulder blades	3	21
Bianca(n.t.)	47	Female	1813	Patient	Sudden onset of nerve pains in the back	The shoulders	1	6
Christie(n.t.)	74	Female	1813	Patient	Back pain	Left side from above and down in the buttock	1	8
Donna(n.t.)	53	Female	1813	Bystander	Awful earache	Not specified	1	4
Ella(n.t.)	89	Female	1813	Bystander	Tremendous pain in the back	Between shoulder blades near the spine	1	7
Alan(n.t.)	76	Male	1813	Patient	Back pain	Lower part of the back	1	6
Group 2: Offered hospital referral (o.h.)								
Fiona(o.h.)	82	Female	1813	Bystander	Aneurism	Upper back left side	1	8
Barry(o.h.)	66	Male	1813	Patient	Extremely intense chest pains	Upper part of the back	1	4
Chris(o.h.)	72	Male	1813	Patient	Tremendous pain in the back	Lower part of the back	2	24
Frank(o.h.)	69	Male	1813	Patient	Has problems breathing	Between shoulder blades	1	5
Jack(o.h.)	73	Male	1813	Bystander	Syncoped in the kitchen	Left shoulder and in the back	1	7
Damon(o.h.)	55	Male	1-1-2	Patient	Super queasy and dizzy	Between the shoulder blades	1	15
Eric(o.h.)	71	Male	1-1-2	Patient	Tremendous pain in the back	Between the shoulder blades	1	3
Gerry(o.h.)	42	Male	1-1-2	Patient	Hot all over	Not specified	1	7
Harry(o.h.)	84	Male	1-1-2	Bystander	Cold sweat	Not specified	1	4
Ian(o.h.)	57	Male	1-1-2	Bystander	Great pain in the chest	Between shoulder blades	1	5
Kevin(o.h.)	66	Male	1-1-2	Bystander	Back pain	Lower part of the back/in the middle of the back	1	3

Abbreviations: (n.t.): no treatment; 1813: 1813-medical helpline; (o.h.): offered hospital referral; 1-1-2: emergency number 1-1-2.

^a Up to 24 h before out-of-hospital cardiac arrest (OHCA).^b The numbers are rounded to the nearest whole minute.

3. Results

We analysed the communication in telephone consultations among 17 patients (Table 1).

Two main categories were generated in the analysis together with subcategories (Fig. 2), consisting of reasons and considerations as to why a certain response was chosen in the telephone consultations.

3.1. Reasons (patient's perspective)

3.1.1. Reported conditions

Most patients reported pain elsewhere in addition to back pain. Among patients referred to no treatment, all but one reported a variation of back pain as the first selection of information, the primary condition discussed in the telephone consultations. In contrast, heterogeneity in first reported symptoms was observed among patients where an ambulance was dispatched, independently of whether calls were made to 1813-medical helpline or emergency number 1-1-2 (Table 1).

Contrary to males, all females contacted the 1813-medical helpline;

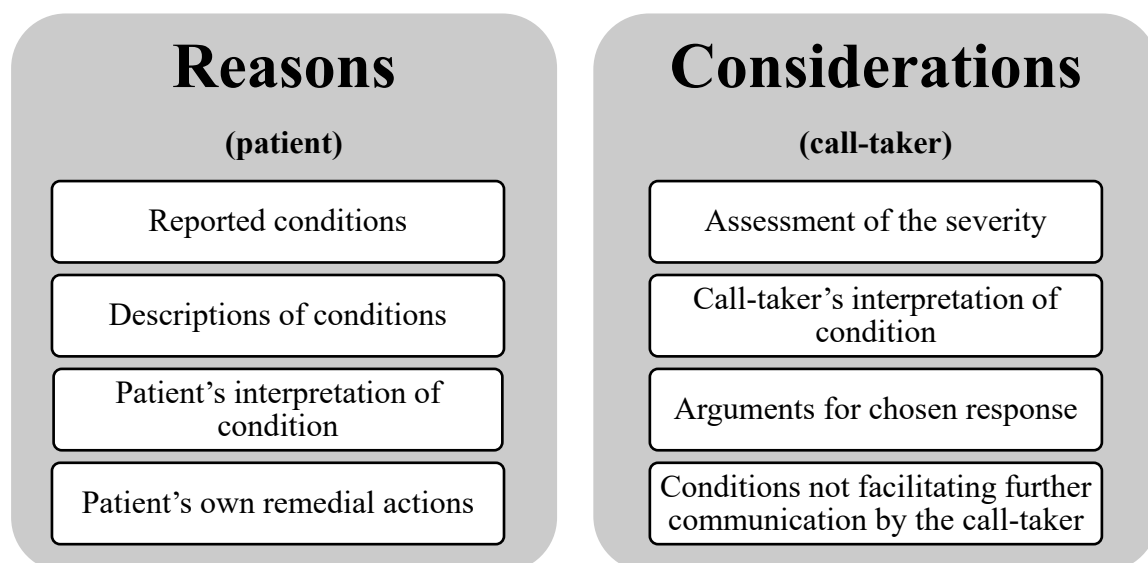


Fig. 2. Main categories together with subcategories. 'Reasons' explore the patient's perspective and 'Considerations' explore the call-taker's perspective.

furthermore, all females, except Donna, reported back pain as the primary condition and did not have chest pain or trouble breathing, symptoms the health system identifies as life-threatening.

Two of the 17 patients only reported one symptom; Alan(n.t.) and Chris(o.h.) both explicitly reported the technical term 'lower back pain' as the only reason for contacting the 1813-medical helpline.

3.1.2. Descriptions of conditions

Nearly all patients explicitly described the location of their back pain (Table 1). The location of back pain alone did not lead to a specific choice of response by the call-taker, as patients referred to no treatment as well as patients offered treatment in hospital described identical locations of back pain.

Some patients described the back pain as an excruciating pain; some described an oppressive pain in the back, shoulders, or chest; and others explained a radiating pain to the arm, shoulder, neck or back. For the last group, the pain was hard to locate, some felt only pain in the back, and some vomited together with the back pain. There was no clear pattern between descriptions of experiences of back pain and the response chosen by the call-taker.

Some patients who uttered back pain as the first selection of information expressed neither being able to lie down, sit down nor stand due to the pain. Eric(o.h.)'s wife told the call-taker *"he can hardly walk or stand or lie down or anything"*. Some patients described a feeling of not being able to settle down. In all of Amy(n.t.)'s three calls, she several times expressed *"I just cannot settle down by lying in any way, then it hurts"* and when she described the pain *"...some kind of sharp sudden pain, and then it was like a rainy weather inside of me... it just developed insidiously"*. For other patients, the pain was becoming aggravated. In Ella(n.t.)'s case, the back pain was described as a sudden striking pain under or between the shoulder blades with continuous aching followed by vomiting. Bianca(n.t.) explained she had been sleeping but was awakened by severe pain in her back and up by the shoulders along with radiating pain to the neck and left arm.

3.1.3. Patient's interpretation of condition

In half of the cases, three 1813-medical helpline calls and all six emergency number 1-1-2 calls, the patient did not make any explicit interpretation of the condition or symptoms. Two of the 1813-medical helpline calls resulted in no treatment. In contrast, among the remaining eight patients contacting the 1813-medical helpline, four patients made an explicit interpretation of the condition and were referred to no treatment. They all reported a variation of pain in the back as the first selection of information. The last four patients explicitly connected their present symptoms to non-fatal conditions but received an ambulance anyway because the call-taker interpreted the reported symptoms to indicate heart disease. Frank(o.h.) experienced shortness of breath and explained *"I usually feel this way when I suffer pneumonia"*. In Barry(o.h.)'s case his wife explained *"he has had it [chest pain] when he may have been stressed, when he was working"*.

Among males, pain between the shoulder blades was interpreted by the call-taker as possible heart disease leading to dispatch of an ambulance, independently of which service was called. Females with pain between the shoulder blades chose to contact the 1813-helpline where the back pain was interpreted by the call-taker as harmless.

3.1.4. Patient's own remedial actions

The patient's remedial actions were solely observed in 1813-medical consultations. Unsuccessful implementation of self-care in the form of consumption of analgesics was not observed as justification for the call-taker to dispatch an ambulance. Bianca(n.t.), Alan(n.t.), Amy(n.t.) and Chris(o.h.) all explained how they had tried to relieve the back pain with analgesics, but without effect.

3.2. Considerations (call-taker's perspective)

3.2.1. Assessment of the severity

In emergency number 1-1-2 telephone consultations, the call-takers started the consultations with, *"What has happened?"*, *"What is wrong?"* or *"What can I help with?"* indicating an expectation of need of assistance due to an emergency. Conversely, in 1813-medical helpline telephone consultations the call-taker awaited patient uttered information before questions were asked, indicating an expectation of need for guidance and not an emergency in need of assistance. In 1813-medical helpline telephone consultations where patient reported conditions did not facilitate dispatch of an ambulance, the communication was characterized by a greater extent of spontaneous utterances by the patient.

3.2.2. Call-taker's interpretation of condition

Overall, in cases where the call-taker explicitly interpreted reported conditions, independently of calls were made to the 1813-medical helpline or the emergency number 1-1-2, it resulted both in no treatment as well as an offer of hospital referral. Three distinct themes emerged from the analysis of the call-taker's interpretation of conditions: confirmation, disproof, and interpretation. Firstly, the call-taker confirmed the patient's interpretation implicitly. Both Alan(n.t.) and Chris(o.h.) uttered low back pain as the first and only selection of information, the call-taker asked about being able to control urination and defaecation indicating awareness of differential diagnosis but did not explicitly express the underlying interpretation. Secondly, the call-taker disproved the patient's interpretation explicitly. When Amy(n.t.) expressed concern about heart disease, the call-taker responded, *"because you can provoke the pain physically, we can eliminate that the heart is cause of the pain"*. Thirdly, the call-taker made own interpretation either implicitly or explicitly based on conditions reported by the patient. In cases where the call-taker's implicit interpreted conditions reported by the patient, the patients received an ambulance. This differed from symptoms being interpreted explicitly where seven out of twelve were offered treatment in hospital. In Amy(n.t.)'s case, the call-taker stated *"...it appears to be some kind of pulled muscle or muscle pain on the backside"* and in Bianca(n.t.)'s case *"... it sounds a bit like acute lower back pain, although it is strange how that may happen [she was awakened by the pain]"*. Reports of chest pain or sudden onset of shortness of breath together with dizziness and pain in the upper back lead to ambulance dispatch. This was observed independently of implicit or explicit interpretations made by the call-taker or whether calls were made to the 1813-medical helpline or the emergency number 1-1-2. Discussing the evaluation of the condition was seen. Kevin(o.h.)'s wife dismissed the call-taker's interpretation, which resulted in dispatch of an ambulance; the call-taker commented, *"We will come out and take a look at him"*.

3.2.3. Arguments for chosen response

All six emergency number 1-1-2 calls resulted in dispatch of an ambulance. In three consultations, the call-taker explicated the justification for dispatching ambulance response: *"male with chest pain"*, *"because I think, it can be the heart you are feeling"* and *"because it could be chest pain"*. Another justification for offering treatment in hospital in emergency number 1-1-2 telephone consultations were sudden onset of dizziness and cold sweat together with pain between the shoulder blades. In these instances, the patients did not report chest pain. Five of the eleven patients who called 1813-medical helpline were offered hospital referral. Chest pain justified dispatching ambulance response among three patients, which also is consistent with the triage guidelines. The last two patients reported pain in the back; Chris(o.h.)'s condition worsened during the telephone consultation and Fiona(o.h.) was known with an aneurysm.

3.2.4. Conditions not facilitating further communication by the call-taker

If the patient uttered several symptoms, the call-taker asked the

patient to choose the predominant symptom to facilitate further communication or the call-taker singled out a specific symptom for further communication. Amy(n.t.)'s first call revealed various information in her first spontaneous utterance, to which the call-taker responded, *"where is the biggest problem now?"*. Bianca(n.t.) made a spontaneous utterance about cold sweat at the same time the call-taker asked about back pain, being the first selection of information uttered by the patient in the telephone consultation. The spontaneously uttered information did not facilitate further communication by the call-taker, indicating patient and call-taker having different perceptions of relevant information concerning decisions about a condition.

4. Discussion

Our study illustrates telephone consultations as an interactive communicative diagnostic negotiation where interpretation of conditions is made both by patient and call-taker. By applying Luhmann's social systems theory, the patient and the call-taker are understood as separate psychic systems, which are accessible to each other exclusively through communication in the telephone consultations. Decision-making about choice of response relies in part on the information given by the patient, based on the patient's interpretation of the experienced condition, initially reflected in which service the patient chooses to contact, but also on the call-taker's interpretation of understanding. This finding is supported by several studies that showed the role of communicative interaction in EMS telephone consultations having decisive influence on the correct interpretation of condition including recognition of an approaching OHCA [2,8,22,23]. Telephone consultations are challenged by the lack of face-to-face interaction as well as identifying conditions with low incidence [9,24]. Gamst-Jensen [5] similarly found that inadequate symptom descriptions are associated with under-triage. In contrast van Rensburg et. al. [22] found consistent lay descriptions across languages when callers explained the occurrence of OHCA.

In addition to back pain being a common condition [25], it is also a multidimensional phenomenon [1], which challenges the health system's function of reducing complexity through telephone consultations. Our findings suggest several contextual factors influencing descriptions of symptoms and ultimately choice of response. Patients expressed different descriptions of back pain, both concerning the location and how the back pain manifested. Amy's description of back pain *"...some kind of sharp sudden pain, and then it was like a rainy weather inside of me..."* illustrates the difficulties patients are facing when trying to explain something never experienced before. This is in line with Richards et. al. [8], who found that language used during 9-1-1 calls affected OHCA recognition. We do not know the subsequent diagnosis or cause of death, but the immediate OHCA following the calls suggests that all had severe conditions, Amy possibly describing having a rupture of the aorta. Furthermore, most patients reported symptoms besides back pain indicating a complex symptom presentation, which challenges the call-taker's decision-making as to the severity of the condition.

The structure of Copenhagen EMS implies that patients can differentiate conditions and contact the service equivalent to the severity of the experienced condition. However, citizens do not always react accordingly [25,26]. In some cases, both the patient and the call-taker found it difficult to interpret the condition. Half of the patients where an ambulance was dispatched contacted the 1813-medical helpline indicating an interpretation of the condition as not being an emergency, nevertheless, hospital referral was offered when patients reported conditions that the call-taker interpreted as potentially life-threatening based on the triage screening guidelines. Conversely, patients referred to no treatment illustrates cases where the call-taker might have misinterpreted the seriousness of the condition as the patients suffered an OHCA within 24 h after the last telephone consultation. Call-takers at the emergency number 1-1-2 anticipate an emergency whereas call-takers at the 1813-medical helpline would expect a need of guidance

and as a result, the telephone consultations are pre-structured differently. This is emphasized by the first selection of information uttered in the telephone consultations. Emergency number 1-1-2 telephone consultations were initiated with the call-taker asking a variation on *"What is wrong?"*. The question helps the patient to select the information interpreted as relevant for decision-making about the choice of response by the call-taker and they assist the structure of the telephone consultation, that is to obtain crucial information as quickly as possible. By contrast in 1813-medical helpline telephone consultations, the call-taker awaits information from the patient before clarifying questions are asked, giving the telephone consultation a more unfocused structure making it difficult for patients to navigate in the interaction. The finding that spontaneous utterances are more frequent in 1813-medical helpline telephone consultations supports this. In addition, information uttered by the patient not facilitating further communication by the call-taker were predominantly observed in 1813-medical helpline calls.

Awareness of possible signs of acute heart disease was present in most telephone consultations among males independently of whether calls were made to the 1813-medical helpline or the emergency number 1-1-2. Symptoms that could indicate heart disease, as listed in the triage guidelines [17], were used as treatment justification in the hospital; however, when elaborating questions about symptoms presumably not indicating heart disease to the call-taker, the patient was referred to no treatment. This suggests that the call-taker interpreted symptoms in accordance with the health system's distinction in relation to severe conditions as justification for offering hospital referral. Yet, our findings show that warning signs in patients developing OHCA is not solely being manifested in agreement with this distinction, particularly among females. Similarly, Watkins et al [23] found that being a female considerably reduced the probability of OHCA being recognized by the call-taker. Taken together, this indicates an increased awareness to differences in symptoms presentation between gender could benefit females in EMS telephone consultations.

When the patient explicitly interpreted experienced condition as the technical term "low back pain" as the only reported condition, the call-taker affirmed the interpretation made by the patient and guided the patients to increase their intake of analgesics. There was no indication of awareness of possible life-threatening condition neither by the patient nor by the call-taker. Yet, the patient might not ascribe the same understanding of the technical term as the health system, and just borrows the term in order to communicate [8]. From a social systems perspective the communication is completed, given the mutual understanding of the condition synthesized through the three selections of communication, understood as a selection of information, utterance and understanding [13,14]. Nevertheless, given the OHCA following within the 24 h, the condition was apparently misinterpreted both by the patient and the call-taker, which emphasizes the challenges connected to interpreting conditions in telephone consultations.

The study does not imply that all patients with back pain should be evaluated for an approaching OHCA, as prodromal back pain connected to OHCA is an infrequent occurrence [27]. However, our study emphasizes the call-taker's role in telephone consultations to the EMS. The professional call-taker must be aware that patients are not trained health professionals, and therefore patients are not necessarily able to communicate according to the health system's own logic. Following this, when patients call the non-emergency 1813-medical helpline as opposed to the emergency number 1-1-2, then the patient's understanding of the condition as less urgent should be part of the interpretation made by the professional call-taker and not necessarily seen as relevant. This presents a barrier to understanding the condition as urgent or potentially life-threatening.

5. Methodological considerations

A major strength of the study is the use of 'real time' recorded information and thus neither interpreted based on the result, nor limited

to survivors. In addition, we selected patients with ‘back pain’ as a comparable condition, independently of a specific call-taker or whether calls were made to the 1813-medical helpline or the emergency number 1-1-2. While we do not have direct access to the thoughts behind the evaluation leading to the choice of response, we gain knowledge of reasons and considerations from interpretation and comparison as well as information of subsequent OHCA. Although it did not affect the communication, a limitation is that we do not know the cause of OHCA.

6. Conclusion

Telephone consultations can be understood as a dynamic communicative interactive negotiation, where a response decision depends in part on the patient’s ability to interpret and utter experienced conditions but also on the call-taker’s interpretation of conditions. The health system is based on a professional understanding of symptoms, which is also apparent in communication concerning early back pain signs preceding an OHCA. This suggests that telephone consultations where ambulances were not dispatched are characterized by descriptions of conditions that are complex and do not fit into the health system’s interpretations of conditions warranting an urgent response. The health system seemed to be communicating on its own professional condition, assuming the patients had the same understanding of concepts. Particularly in 1813-medical helpline consultations, the patients seemed to be expected to interpret relevant information among several conditions experienced simultaneously.

Ethical statement

Research Ethics approval for registry-based studies is not required according to Danish legislation (Act on Research Ethics Review of Health Research Projects. Natl Comm Heal Res Ethics 2018. <https://en.nvk.dk/rules-and-guidelines/act-on-research-ethics-review-of-health-research-projects> (accessed October 7, 2021). This study complied with the Declaration of Helsinki and was approved by the data responsible authorities Region Hovedstaden (Approval number: P-2019-191) and the Danish Patient Safety Authority (Case number: 3-3013-2795/1, reference: EMGW).

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Declaration of Competing Interest

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Author contributions

Study design and data analyses: BJ, HVN and HB. Data acquisition: SNB, HCC and FF. Data collection: all authors except HVN. Validation of the transcript accuracy: HVN. Revision of the coding process: BJ, HB and HVN. Generation of the first draft of the study manuscript: BJ. Manuscript preparation and revision: All other authors. Funding acquisition:

CTP.

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