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ORIGINAL RESEARCH

A Multi-Modality Conversation Analysis of Post Expansions Among Physicians in Ambulance: A Qualitative Descriptive Study

Yinong Tian[1], Yixuan Cui[2], Xin Li[1], Su Liu[3], Yonggang Su[1]

[1]School of Foreign Languages and Literature, Shandong University, Jinan, Shandong, People's Republic of China; [2]The First Clinical Medical College, Guangzhou University of Chinese Medicine, Guangzhou, People's Republic of China; [3]School of English, University of Sheffield, Sheffield, UK

Correspondence: Yonggang Su, School of Foreign Languages and Literature, Shandong University, Jinan, Shandong, People's Republic of China, Email syg@sdu.edu.cn

Background: Ambulance communication is essential to emergency medical care, directly influencing patient outcomes, operational efficiency, and multidisciplinary collaboration. Effective communication is key to enabling physicians to treat the patients not the clock. There has been little research carried out in the ambulance setting to identify physicians' communication challenges. The aim of this study was to qualitatively explore its sequence organization in the ambulance interaction through conversation analysis and to improve the clinical education associated with healthcare practice.

Methods: Data collection took place within ambulances from an international hospital in China between May 2024 and October 2024. We undertook multi-modal conversation analysis on 10 videos, including 12 physicians, 10 patients and 8 companions, to examine the interaction among participants in the ambulance. Videos were transcripted based on the Jefferson Transcription System.

Results: Different from other context, there is a significant variation in the way physicians response to the patients' dispreferred responses in the ambulance. The recurring pattern, the request-dispreferred response-post expansion sequence, in ambulance communication is frequently seen. Physicians employ three hand gestures as effective post-expansions: holding hands, grabbing hands, and lifting hands, to enhance the multiparty coordination and improve the emergency efficiency.

Conclusion: This study demonstrates how physicians secure tactical moments and interactional space with patients and companions in the ambulance within the institutional turn-taking mechanism. It furthers the understanding of ambulance physicians' non-verbal behaviour by analyzing the interaction dilemma and provides a new perspective to help healthcare workers avoid the miscommunication and secure good communication in the medical emergency.

Keywords: ambulance, conversation analysis, sequence organization

Introduction

In an ambulance, minutes matter at every turn. While in other medical settings, there are few constraints on what participants do in those turns,[1] in ambulance services, communication is largely limited. Communication in emergency medical services is widely recognized as a determinant of patient outcomes.[2] Ambulance services encounter a variety of challenges due to the unpredictable, uncontrollable, and dynamic conditions in the prehospital field, ranging from patient safety to communication challenges, like wireless information technology,[3] resistance to adopting new technology[4] and language barriers.[5,6]

A number of patients in ambulance are atypical populations in which the trouble is primarily with language, speech, and hearing.[7] They are undergoing emotional and cognitive strain as they want to speak for themselves but fail most of the time. Physicians in the ambulances still need to respond to patients' most urgent needs at their most vulnerable times. Empirical research has shown that communication challenges physicians to experience concerns about interpersonal relations, ethical issues, and choices of communicative strategy[8] instead of medical issues. For physicians, it was

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professionally challenging to find the "right words" in a sense. As a result, communication failures during handover have become a recognized patient safety risk as a top five World Health Organisation improvement priority.[9,10]

However, aside from these possible communication challenges, little is known about how life-saving communication is recognizably done by ambulance physicians in distinctive manners.

Previous conversation analysis literature on prehospital emergency medicine has focused on the procedures of emergency calls,[11,12] localization [13,14] and how medical decisions are made during urgent emergency calls.[15] Researchers also explored the communication links,[16] communication quality in triage [17] and patient experience with telephone triage.[18] Although involving multiple areas in prehospital emergency medicine, these studies overlook the multimodal, real-time negotiation of care in ambulances, where physicians must adapt to constraints and design their actions to reduce conflicts when patients show denial by moment. This gap is critical, as 23% of emergency medical errors are traced to communication breakdowns.[19]

How to "communicate" with patients who are minimally responsive in the ambulances is still an unanswered question in practice. Besides, too often, trainee emergency physicians have no idea about using resources to allow the "greatest good for the greatest number" to be accomplished, which could be a hidden damage in the ambulances.

In order to understand how ambulance care is achieved through physicians and provide further guidance, it is important to analyze how they give responses step by step. This study aims to examine

1) How physicians respond to and design their talk to the patient's denial;
2) How post-expansions are organized through hand gestures by physicians;
3) The distinctive practices through which these sequences are performed.

Using video recordings of actual ambulances, we investigate how physicians organize their responses towards patients' denial on a micro level, sequence by sequence, and how in doing so they bring about an overall structural organization toward a specific goal: a well-planned and highly coordinated ambulance care service.

Methods

The study followed the methodology of conversation analysis (hereafter CA).[20–22] As Paul[23,P15] said, CA's basic analytic strategy is taking what people are doing, that is, saying, not saying, saying something in a particular manner, at a particular moment, etc., and trying to find out the kind of problem for which this doing might be a solution. Here, we encounter communication challenges in ambulances, special phenomena, and aim to anticipate and mitigate these challenges. Therefore, it is particularly suited to analyze the dynamic interactions with the support of CA.

An initial data set of 10 videos in an ambulance from an international hospital (Harrison International Peace Hospital) based in China was collected from May 2024 to October 2024 under the participants' consent. All videos were for patients who were transferred in urgent to the hospital. This means that patients needed emergency medical help when the ambulance and physicians arrived on the scene; Patients showed little response or awareness, and therefore, someone other than the patient was also in the ambulance.

Physicians were recruited through purposeful sampling to make sure they had more than five years of experience in prehospital care, including ambulance transfers. We identified 20 physicians, 12 of whom consented to participate; 15 patients, 10 of whom consented to be involved in this study; 16 patients' companions, 8 of whom consented to be recorded. All participants have completed consent procedures and given permission to audio-video record interaction. No follow-up was needed for this real-time interactional study.

During the recording, we observe many challenges, such as environmental challenges, ambulance motion, and limited space. The noise from the road or engine sometimes distracted participants from verbal changes. Besides, sudden turns could also lead to the interruption of communication, and the limited space inside the ambulance affected gesture clarity and eye contact. Two recordings with excessive noise and motion were deleted to ensure clarity. The selection of extracts was transcribed according to the transcription conventions[24] and the multi-modal transcription conventions.[25] The Chinese-English translation system for CA was applied with some changes to present the data. The transcription consists of three lines, including *pinyin*, the phonetic symbols for Chinese characters, followed by a verbatim translation of each Chinese word, and a literal translation in English. To improve credibility, we incorporated patient or companion feedback

Table 1 Abbreviations of Some Descriptions in the Extracts

Abbreviations	
Abbreviations	**Note**
DOC	Doctor
PAT	Patient
COM	Companion

on communication clarity. Besides, we also had the second and third authors code the same interaction sequences to ensure inter-rater reliability.

We targeted adjacency pairs[26] where physicians initiate the request and receive the denial from patients, followed by sequence post-expansions.[21,27] These post-expansions were presented as responses from physicians in our data.

A list of abbreviations is presented in the following (see Table 1 for the abbreviations of some descriptions in the extracts).

Findings

The social actions participants perform in interaction occur sequentially, one following another. There is no exception in the ambulance. Instances of actions, not limited to requests, invitations, and summons, could form adjacency pairs,[28,29] the unit of sequence construction. Although adjacency pairs have variations (not limited to summons-answer, greeting-greeting, and invitation-acceptation); however, in our data, many adjacency pairs are presented as "request for action-granting/denial". A typical request sequence is shown in Extract (1).

(1) Ambulance Interaction

1. Phy: Cmon().ma'am:::receive some oxygen=
2. Com:=By all means
3. Pat: No::: sleep↓

Here, the base sequence is in line 1 where a request regarding oxygen receives a return granting with a volume raise from the patient's companion. This is immediately refused by the patient in line 3 with a drop in intonation. Although the basic two-part sequence can and does stand on its own in interaction,[22] many request sequences are not self-contained but rather occur with one or multiple sequence expansions. When a request is denied, physicians accommodate or revise a preceding dispreferred second pair part in various types of post-expansion,[21] in the kind of post-expansion that can be observed in our data. As Schegloff[21] noted, there are two main post-expansions: non-minimal, which is treated as not adequate for closure, and minimal post expansions, which provide a sequence closure to the second-pair part action.

Here, a physician initiates a request to assess the patient in Extract (2).

1. Phy: Look at me s[i r]
2. Pat: (°N O°)
3. Phy: #Lift clothes off the patient's stomach–#

#Figure 1

In line 2, the patient denies the request-that is, provide a second-pair part to the base first-pair part from line 1 because the patient's unclear response prevents the physician's assessment. The physician soon initiates a post-expansion sequence in a non-verbal way to check the patient's condition. Compared with post-expansions in previous studies, like Oh,[20] Okay[30] and Great,[31] this post-expansion is proposed especially as non-verbal behaviors under a life-threatening and restricted encounter when the physician have to interpret the patient's in-directive responses and then save their life. The following findings will introduce three types of hand gestures we found in the ambulance videos.

Figure 1 The ambulance physician attempted to lift clothes off the patient's stomach to check the patient's condition after receiving verbal refusal from the patient. The physician showed sustained attention to the clinical details of this patient.

Three Hand Gestures as Effective Post-Expansions

Hold Hands to Soothe Patient Emotion

Since many patients, without the ability to speak clearly, are restricted in the ambulance beds, physicians' post-expansions following a patient's disagreement could hardly be presented in various ways. Extract (3) is a straightforward case of the physician's non-minimal post-expansion which is not restricted to the normal response design. The physician took the initiative to hold the patient's hands, serving as an effective post-expansion tool to soothe the patient's emotion, including acute fear, anxiety, frustration, and helplessness.

1. COM: ta xianzai jiu shi (0.5)fu bu doushi xuezhong().zheshi XX kaide bingli=
   She now is (0.5)abdomen are haematoma().this is XX medical history=
   She is now(0.5)there are haematomas all over the abdomen().this is the medical history from XX hospital=
2. PHY:=((naguo bingli chakan))haishi yaoqu yiyuan zaikankan
   =((Take the medical history look)) need to hospital to check check
   =((The doctor takes the medical record and looks at it)) we still have to go to the hospital for further treatment
3. PAT: [°bu::: bu°]=
   [°No::: no°]=
   [°No::: no°]=
4. PHY: =((zhudong shenshou wozhu huanzhe de shou))
   =((The doctor reaches out and holds the patient's hand))
   #Figure 2
5. PAT:((zhudong wozhle yisheng de shou))
   ((The patient holds the doctor's hand))
   #Figure 3

In this conversation, a companion introduces the basic condition of this patient and passes a medical record to the physician. Note further that, after the sequences in which the physician's evaluation remarks turn out to have been registered by the companion (line 3), the patient has its unusual action-import with weak "no"; namely, a declining of the possible treatment which the physician had planned. This dis-preferred action[32,33] invokes difficulty in answering the question as put since it is nearly impossible for the physician to introduce the importance of treatment through narrative post-expansions[34] in this setting since this patient is in a coma. Therefore, the physician here raises the possibility of working out of "no" through a not challenging post-expansion. He takes the initiative to hold the patient's hand

Figure 2 This figure occurred in the ambulance during the patient transfer. In response to the patient's emotional reluctance, the physician held the patient's hand, performing a non-verbal action that conveyed empathy and reassurance. This moment illustrated how emotional support was managed through embodied actions in an ambulance.

Figure 3 This figure showed a significant moment of patient responses following the physician's previously embodied support. The patient actively responded by holding the physician's hands in return, which demonstrated a shift from passive resistance to active engagement, indicating gradual acceptance of the upcoming treatment.

(Figure 2), which provides a place in which he can express empathy and reduce the patient's anxiety. Since the second part (the patient response) makes clear how the first was understood and acted upon,[35] this third position (non-minimal post-expansion) is a natural locus for such actions, visibly embodying the direction of possible compromise.

On this understanding, the choice of the patient to hold the physician's hand can thus be a non-verbal sequence-closing thirds (line 6). It marks the beginning of her back down from her previous answer and a new alliance with the physician based on cooperation rather than confrontation.

Grab Hands to Support Patients Preferences

Post expansions of physicians in ambulances are not restricted to holding the patients' hands. In the following extract, in which an initial request for history taking triggers the companion's response, the patient's physical resistance is still not adequately responded to, offering a difficulty for the physician:

Extract (4)

1. PHY:chi le duochang shijian().chile duoshao dou buzhidao?
   Eat already how long time(). eat how many also do not know?
   How long did she take().You do not know how many pills she took?
2. COM: bu [zhi dao a]
   No [know it huh]
   Not[know it huh]
3. PHY: [xie hui er ↑]ta zhe shi tuchulai dema?
   [Rest a while↑]She is it spit out?
   [Take a break↑]Is this what she spat out?

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4. COM: zhe shi bu(). tu de wo bu zhi dao().XX XX XX=
   This is no().spit out I do not know().XX XX XX=
   These are the pills that were().spit out I do not know().XX XX XX=
5. COM: =((jiashu 1 jiao huanzhe mingzi bingqie mo ta lian))
   =((The companion called the patient's name and touched her head))
   #Figure 4
6. PHY: °en°bie mo le (2.0)neng zheng yan?
   °En°no touch uh(2.0)Can open eyes?
   °En°stop touching her face(2.0)Can you open your eyes?
7. (2.0)
8. PAT:((huanzhe yong shou shitu qugan jiashu de shou))
   ((The patient tried to ward off a family member with her hand))
   #Figure 5
9. PHY:((yisheng bangzhu huanzhe huanhuan fangxia shou))hao
   ((The physician helped the patient to lower his hand slowly))Alright
   #Figures 6 and 7
10. PAT: bi::: bi::: ~bu~
    Nose:::Nose:::~No~
    Nose:::Nose:::~No~
11. PHY:((yisheng bang zhu huan zhe nao nao bizi))
    ((The physician used cotton swabs to help the patient scratch her nose))
    #Figure 8

Figure 4 The companion responded with limited information about the physician's clinical questioning. The companion failed to confirm the patient's details and then called her name and touched her hand. This gesture functions as an affiliative act.

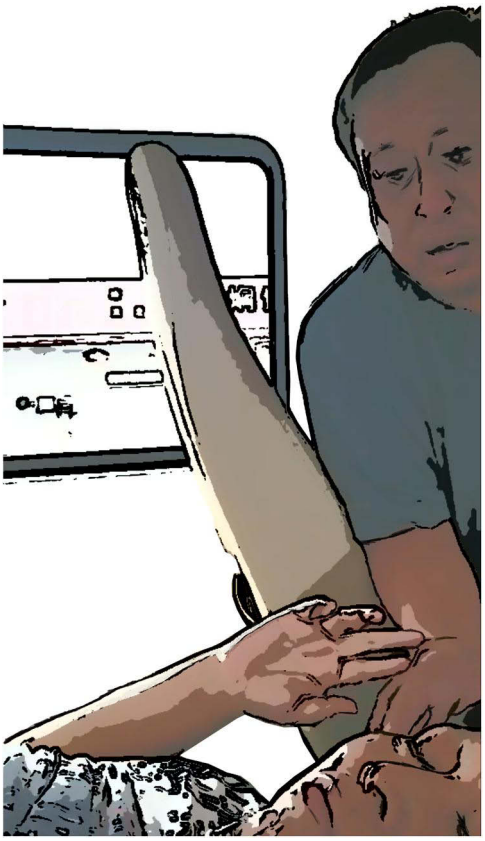

Figure 5 The patient produced a nonverbal action, raising her hand to ward off the companion's touch. This gesture represented an embodied resistance and minimal alertness, which indicated the clear assertion of personal boundaries and possible communication challenges.

12.PAT: ((huanzhe shenti ping wen tang xialaile))
((The patient's body was lying down steadily))
13.COM:wending xialaile ((jiashu kan xiang huan zhe))
Stabilize now ((The companion looks at the patient))
She has stabilized now ((The companion looks at the patient))
#Figure 9

Physicians, as a default, design their questions such that they prefer answers that confirm positive, optimistic states.[36,37] However, in response to the companion's touch and the personal state question "Can you open your eyes?" (line 6), the patient responded with some delay (line 7) and resistance through non-verbal behavior, which became the trouble source.

This sequence, which the patient has been promoting, becomes an request-withholding sequence. Since the patient was in a minimally conscious state, the physician had to "understand the patient as a unique human being",[38] and tried to find a way out during the gap of silence at which a response is due from himself. Different from the mechanisms for repair described for verbal action in other studies,[39] we see that the physician located the trouble source in line 9; specifically, he initiated a non-verbal post-expansion (Figures 6 and 7) to help the patient to lower hands (line 3). This time, the physician's efforts are designed not to re-do the question in this entirety but rather to understand the patient's preference, that is, the patient's self-identified needs and decisions related to their treatment.

By offering the hand gesture, the physician brought a possible closure by its sequence-closing thirds (Alright). However, the patient resumed this talk with a help-seeking behavior; it is with a continuation of her second pair part turn, elaborating on her physical discomfort state. As a part of the actual contingencies of providing help to a patient, the physician must manage the practical accomplishment of a task that includes overcoming obstacles.[22, p527] Therefore, the

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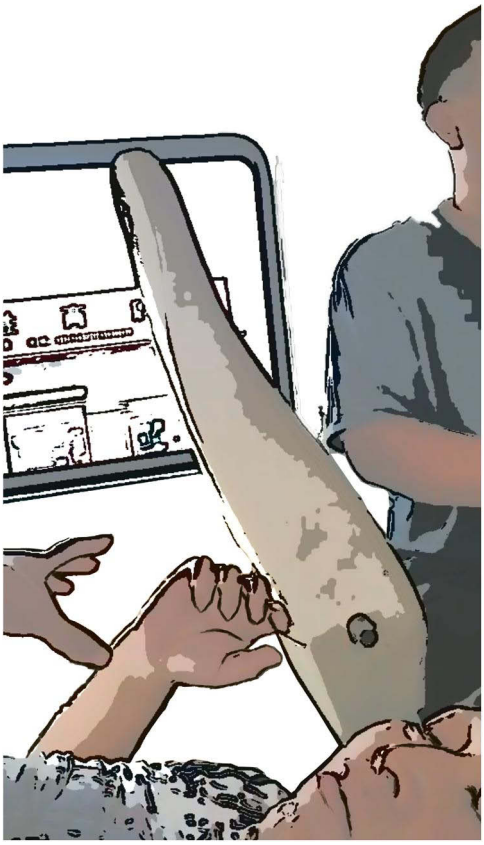

Figure 6 These figures captured the follow-up to the patient's previous action. The physician assisted the patient in lowering her hand with a verbal softener. This gesture illustrated a balance between medical expertise and patient autonomy.

physician attends quite precisely to help this patient by meeting the patient's requests with an overstretched arm and hand gesture (scratch the patient's nose in Figure 8), in the interests of getting the patient to withdraw her resistance and return to a constant and steady function.

On completion of this elaboration, the pending response by the patient to the current history-taking conversation is received, and it is noted that the physician has come to success in this as suggested by the patient's comfortable position (line 12). It then comes to closure when the responsive action of its second pair part is accepted in a further sequence-closing third when the companion issues a positive assessment (line 13; Figure 9).

Lift Hands to Reduce Patient Pain

In our earlier discussion of post-expansion, it is noted that efforts to deal with communication troubles launched by the patient aimed mainly at the patient's well-being indirectly (emotion management and treatment preferences). When the trouble occurs after the physician's requests and other initiations, this sequence often constitutes the beginning of post-expansions. Extract (5) features a patient, a patient's companion, and a physician; here, proper patient positioning was achieved through ongoing communication.

12. PHY: shuai naer le?
    Fall where?
    What part of your body did you fall on??
13. COM: dui. ta shuai shang().zai jia shuai le yizhou le heping kande, xianzai xiazhi you zhege mamu de ganjue
    Right. She fell injured().at home fall one week come He Ping see, now lower leg has this numbness feeling
    Yes. She fell down and got injured().She came to He Ping hospital one week after she fell down, now there is numbness in her lower legs.
14. [xiamian you daianji de chuxue

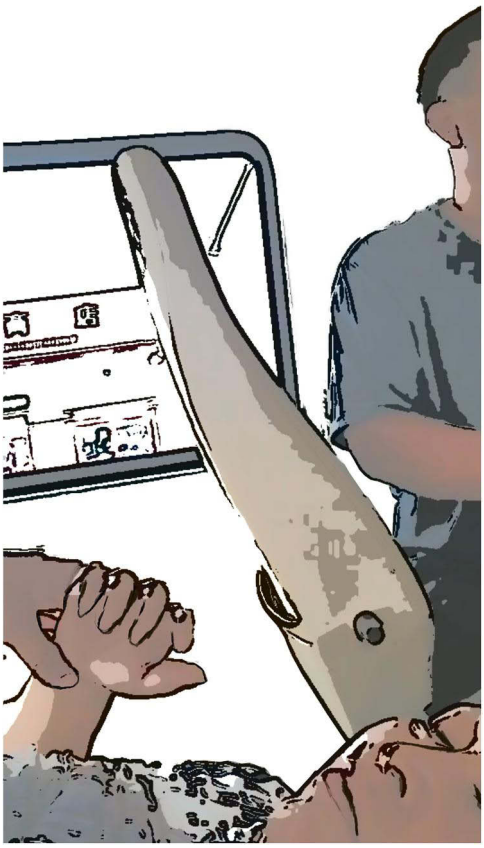

Figure 7 The physician finally held the patient's hand.

[Underneath has large area bleeding
[There is massive bleeding under her body
15. PHY: [song song shou daniang wo kan kan
[Release release hand old lady I see see
[Release hands granny let me see your wounds
(10.0)
16. PAT: (a. hhh)
(Uh.hhh)
(5.0)
17. PAT: teng~zhen~((huanzhe zhoumei, wei wei nuo dong you shou))
Painful~Needle~
That's painful~Needle((The patient frowns, slowly moved her right hand))
#Figure 10
PHY: tai tai daniang=((yisheng zai xunzhao heshi de xiahsoudian))
Lift lift granny=((The physician looks for a gap to lift hands))
Lift hands lift hands granny=((The physician looks for a gap to lift hands))
#Figure 11
(5.0)
18. PHY: dong dong=((yisheng zhuazhu huanzhe de xiukou))
Move move=((The physician grabbed the patient's sleeve cuffs))
Move move your hands=((The physician grabbed the patient's sleeve cuffs))

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Figure 8 This figure showed a subtle but interesting moment. The patient uttered ambiguous sounds, and the physician understood it as a relief request. This gesture reflected the physician's experience and attentiveness.

#Figure 12

19. PHY:= lai bu teng ha= ((yisheng changshi tiqi huanzhe de xiukou))
    =Come not painful oh=((The physician tries to lift patient's sleeve cuffs))
    =Let us move it's not painful oh=((The physician tries to lift patient's sleeve cuffs))
    #Figure 13
20. PHY:= ai dui=((yisheng jinyibu changshi tiqi huanzhe xiukou))
    =Uh right=((The physician further attempts to lift the patient's sleeve cuffs))
    =Uh yes=((The physician further attempts to lift the patient's sleeve cuffs))
    #Figure 14
    (2.0)
21. PAT:wo::wo::wo::< ((huanzhe zhudong changshi yidong shenti))=
    >Me::me::me::<((The patient initiates body movement))=
    >I::I::I::<((The patient initiates body movement))=
22. PHY:=dui zheyang shufu ha((yisheng shunli tiqi huanzhe xiukou))
    =Right this way comfortable oh ((The physician lifts hands and cuffs smoothly))
    =Okay feel better now right ((The physician lifts hands and cuffs smoothly))
    #Figure 15
23. PAT: ((huanzhe meitou shuzhan))
    ((The patient's eyebrow is relaxed))
    #Figure 16

Figure 9 This figure described a moment when the patient became stable; the companion showed concern by looking toward the patient. The stable condition was constructed through both participants' efforts.

Figure 10 This figure showed a complex interaction involving the physician's inquiry, the companion's response, and the patient's embodied action. The patient expressed the pain through verbal and nonverbal actions.

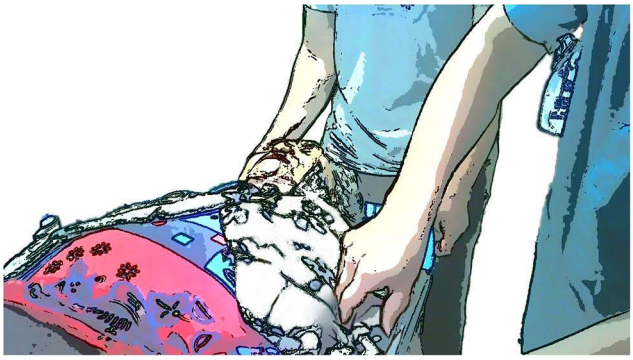

Figure 11 This figure presented a moment of interaction as the physician tactically searched for a chance of contact, aiming to minimize the patient's discomfort.

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Figure 12 This figure described a moment in which the physician moved from tentative communication to more directive instructions. This figure clearly showed how repetition and instruction were combined to improve patient compliance in ambulances.

Figure 13 This figure was associated with the physician's effort to persuade the patient to move during the transfer. Verbal and embodied resources were applied to achieve patient comfort.

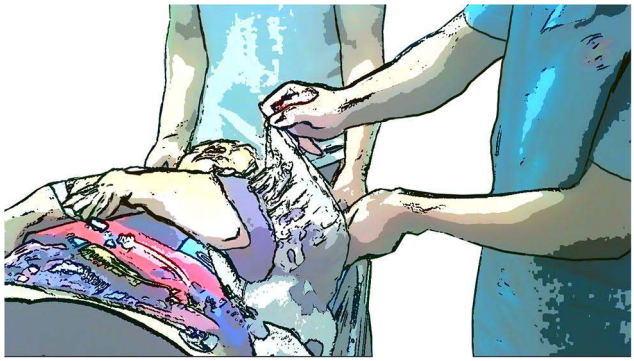

Figure 14 This figure captured the physician's continuous attempts to assist the patient. Repeated embodied actions were used alongside verbal encouragement to facilitate patient engagement.

The opening sequence starts with the physician verbally checking out her injury in the ambulance. After this question-answer adjacency pair, the physician initiates a new invitation (line 17), aiming for more injury-related information from the patient herself. The patient makes unclear sounds first delayed with a ten-second silence. This response token aligns with and is fitted to the action pursued by the previous question,[40,41] but it does not convey the essential information. After a five-second silence, the patient engenders further talk with a turn initial 'Painful', which embodies a process of emotion presentation and corrects herself in the transition place by providing an answer that does fit the words from the physician. And this is strongly reinforced by the patient's post-positioned 'needle' which explicitly shows the cause of pain.

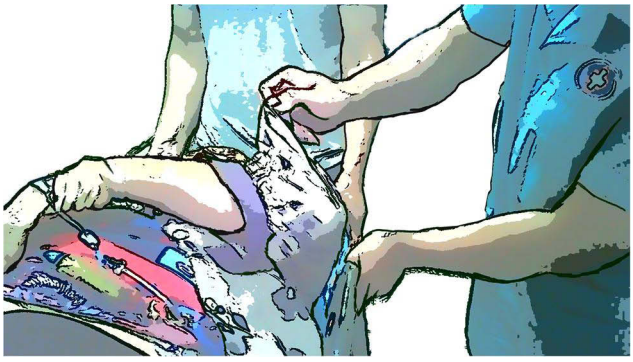

Figure 15 When the patient initiated body movement herself, the physician offered positive reinforcement. This interactional alignment showed the presence of shared participation between physicians and patients in the ambulance.

Figure 16 This figure described a subtle transition of the patient, indicating a sign of relief. This moment highlighted the importance of taking facial cues as a strategy to support treatment.

The physician apparently registers the 'pain' that the patient has just conveyed and its action-import, a declining of 'release hand'. The physician briefly elaborates on the request from line 20 and launches a "pain-check" post expansion in which he guides the patient to lift his arms and check out the wound after a 5-second silence. The physician stands firm and the patient backs down with no disagreeing responses in this silence. Here, the physician takes this silence as a go-ahead response and proceeds to a proposal post-expansion from line 21. The physician continues to lift sleeve cuffs slowly while verbally encouraging the patient to cooperate with treatment. Specifically, at the almost completion of this interaction, the provision of an evaluative and positive stance toward the patient's cooperation with treatment regimens is due. Followed by a 2-second silence, the patient's body movement, along with the repetition of "I" establish mutual orientation within the collaborative accomplishment of this turn-at-talk,[42] which provides a slot for obtaining a favorable treatment outcome. At that moment, the physician realizes that extra interactional work is no longer needed to "avoid or minimize rejections if possible".[43] The physician resumes his encouragement and finally lifts the patient's hands as the sequence approaches possible completion, followed by the patient's "weak agreement" presented as "relaxed eyebrows".

Discussion

Through analyzing the ambulance video among physicians, patients, and family members, we explored how physicians' responses were made out of sequences of actions and how these post-expansions were organized (eg, what nonverbal and verbal actions come). While CA has been applied to clinical interactions[44,45] and prehospital settings,[46] few focus on the negotiation regarding ambulance service, especially from a multimodal perspective. Existing research on emergency communication focuses on verbal exchanges[47] or hospital triage,[48] leaving ambulance-specific interactions underexplored. Here, we opened a new way to help more physicians with communication difficulties in a limited interactional context: the ambulance. The roles of hand gestures in the post-expansions have been analyzed, and this has led to some preliminary observations.

First, the physician's hand gestures towards patients functions as a floor-taking cue. According to the Communication Accommodation Theory (CAT),[49] people adjust their communication (eg, speech, gestures) to converge with or deviate from others. However, there is little existing evidence regarding the physician's adapt language, like hand gestures, in physician-staffed ambulances. It was established that the most recurrent embodied feature of these patients was lying on the stretcher without many responses while physicians "treat the clock and not the patient".[50] Therefore, few studies focus on their hand gestures nor communication patterns between physicians and patients. Nevertheless, although the use of verbal responses requires more time on physical concerns (especially in a coma along with life-threatening injuries), ambulance patients in our data are not exclusively restricted to providing answers to physicians' questions through silence or verbal actions, which actually becomes a challenge in ambulance services. In the first extract, we have shown how the patient holds the doctor's hands to withdraw her disagreement attempt after the physician's post-expansions (holding hands) and how her failed attempt is linked to the sequence closure: the patient did not display a readiness to yield her disagreement. It was noted that an activity such as history-taking, organized through a sequence of adjacency pairs, places substantial constraints on next actions.[51] Ambulance physicians' hand gesture actually breaks the constraints for patients, and these hand gestures are also extended to a sequence-closing third when they do not construct the turn in a fashion designed to close the sequence with respect to both information receipt and action acceptance. In other extracts, different usages deployed as sequence-closing moves- "grab hand" and "lift hand" -contribute similarly to the shaping of the interaction and preferred closure.

Second, the dis-preferred responses from patients in ambulances regularly lead to non-verbal post-expansion in a sequence. In the previous studies, request-response-feedback sequences are only discussed in the aphasia cases,[52] not to mention those request-prefaced sequences in specific medical setting like the ambulance. Many expansions (pre, insert and post) are oriented to the possibility of dis-preferred responses. The same holds for post expansions in the ambulance interaction in the same way as suggested by Muntigl & Zabala[53] with respect to Schegloff's study.[21] We conclude the request-prefaced sequences as request-dispreferred response-post expansion sequences in which the post-expansion is achieved as a hand gesture, and this type of sequence represents newly available "speaking" opportunities for both physicians and patients.

As the Uncertainty Management Theory (UMT)[54] argues, participants manage uncertainty rather than always seeking to eliminate it. Consistent with this theory, physicians in ambulances can accept this ambiguity without distress, manage their own responses in directions the patients need by expanding sequences they themselves initiated. Physicians in this case not only act as agents of medical process by initiating sequences and performing the expansion of those sequences but also the person who provides emotional certainty and always stands up for patients. These different hand gestures reveal and reflexively achieve different conversation goals of physicians; besides, this has also demonstrated the importance of hand gestures to the effective three-party interaction in the ambulance.

Third, post-expansions with emotional support towards patients in physician-initiated sequences also represent a demonstration of patient agency in the upending of the traditional asymmetry within medical communication, revealing the practice of patient-focused care in the ambulance. Drew and Heritage[55] argued that talk in institutions involves "special and particular constraints" on what some or all participants may contribute. In the case of the traditional physician-patient interaction, some have argued that this manifests through the asymmetry which lies at the heart of the medical enterprise: it is, in short, founded in what physicians are there for.[56] Physicians often possess superior knowledge to take treatments to save patients' lives without interruptions. This asymmetrical presentation is closely connected to issues of power and authority. Structurally, power in talk relates to the number and type of turns speakers are able to secure; interactionally, power manifests in the actions speakers can accomplish with those turns.[57] However, interactions that render participants to call for an ambulance are characterized by an inability to manage this condition.[58] With context-driven asymmetry, time constraints, patient conditions and other factors often force physicians in ambulances to prioritize patients over communication, which aligns with Bourdieu's concept of habitus.[59] In our data, rather than legitimizing unilateral decisions, physicians voluntarily give up some controls of turns through post expansions featured with nonverbal behavior (hand gestures) in turns. These findings challenge theories of medical power, suggesting it is not static but dynamically modified to fit situational needs rather than fixed. The improvement of power shifts fluidly between various participants could promote early diagnosis and timely treatment to save more patients in need.

Organizational performance in ambulance medical practice depends on successful communication between physicians, patients and sometimes companions. Physician-patient communication can be multifaceted and multidimensional,[60] not to mention in the ambulance. In this study, physicians plunge into active roles who cure, emphasize and value patients through non-verbal behavior. The hand gestures featuring with various types serve as the physicians' responses to the patients' denial, which actually promotes good communication in ambulances and is important for three kinds of reasons. Our study contributes to existing physician-patient research in three ways:

Firstly, the ultimate objective of any doctor-patient communication is to improve the patient's health and medical care.[61] Communication in the ambulance is a more complex process compared with normal doctor-patient communication, and miscommunication is a potential pitfall, especially in terms of pre hospital treatment when ambulance patients are in a coma. Therefore, it is essential to understand and respond to participants' verbal and non-verbal behavior as clues to patients' physiological and medical conditions. The analysis of hand gestures in this study provides a new perspective to help healthcare workers avoid the miscommunication and secure good communication in the medical emergency.

Secondly, hand gestures create bridges between physicians and patients, enabling understanding where words may not suffice, thus enhancing multiparty coordination and improving emergency efficiency. In the videos, physicians make full use of hand gestures to "listen" to what patients "say", and respond with professional medical emergency treatment. It is noted that the mobilization of embodied resources like hand gestures is a means of avoiding excessive mental and physical strain and even stress that can contribute to the worsening of a patient's condition. The possible further communication trouble is naturally erased, and more patients are saved from death at the last minute.

Thirdly, although our study focuses on the multiparty interaction, especially the interaction between physicians and patients, we found out the asymmetry inherent in normal physician-patient relationships has been changed in the ambulance. Different from traditional medical communication, it is neither the physician nor the patient demonstrates control of the conversational floor. Joint efforts from both participants help to maintain or regain the patients' health and well-being. Cooperation in medical communication is highlighted, which offers a new reference for the communication study in medical scenarios and for the training of healthcare workers.

By examining physician use of the post-expansion practice in the method of multi-modal conversation analysis, our study demonstrates how physicians secure tactical moments and interactional space with patients in the ambulance within the institutional turn-taking mechanism. The "pure" conversation analysis involved in this study details one way in which physicians are in synchrony with patients in the ambulance. However, this study aims to go further than simply providing line-by-line analysis; instead, it seeks to speak to questions of communication dilemma in the ambulance. Future research should take into account not only embodied resources for interacting but also embodied practices for treating patients in an intersubjective way, so extending the diversity of resources participants mobilize to produce and understand interaction in particular medical settings.

Limitation

While this study offers insights into ambulance interactions, several limitations should be acknowledged. First, the number of video recordings may limit the range of interactional situations and cultural environments. The ambulance interactions in rural or urban areas may have significant differences. Second, this study focused on the ambulance transfer in a limited period of time, which did not include other emergency care and seasonal influences. Third, focusing on the hand gestures as post-expansions overlooks other nonverbal behavior, like eye contact, which could possibly change the interactions.

Conclusion

The findings did illustrate many observations in ambulance communication and report the significance of non-verbal behavior in both theory and practice. With the method of conversation analysis, this study highlights the distinctive practices through which the request-dispreferred response-post expansion sequences are locally and interactionally produced and oriented by all participants in the ambulance. In particular, there are a number of ways in which these findings could be applied in reality and offer insights for broader settings. First, the patterns that frequently appeared

during interactions could be incorporated into the clinical education for physicians in ambulances. When physicians meet a similar emergency, they can assess and manage it through non-verbal behavior in an organized and systematic way.

Additionally, protocols such as Hospital Notification & Alert Systems can be modified as a result of these interactions. Emergency medical services should notify hospitals of both patient status and critical details (eg, emotion alerts via unusual physical gestures). Furthermore, this research advances the use of artificial intelligence in emergency medical care. As more patterns are examined, AI may be able to identify them and advise doctors, facilitating effective communication between participants. Going forward, it will be important to develop a greater understanding of how physicians respond to patients' denial using non-verbal responses in different healthcare settings. Extending this to include more in-depth multi-modal analysis will probably help clarify how other nonverbal behaviors are performed in a range of more interactionally complex ways.

Data Sharing Statement

The data that support the findings of this study are available on request from the corresponding author, Yonggang Su. The data are not publicly available due to information restrictions that could compromise the privacy of research participants.

Ethical Approval and Informed Consent Statements

In addition to following national guidelines on the ethical conduct of research, the researchers also made sure that this study was complied with the Declaration of Helsinki. Situated ethics is applied by first having a sign posted in the ambulance notifying patients and companions that video cameras were in use. When the patients were transferred to the hospital, researchers then obtained verbal or written consent from the conscious patients or their legal representatives, like family members, if the patients were unconscious, impaired in some way, or otherwise unable to give consent. This study was approved by the Ethical Review Board of the School of Basic Medical Science, Shandong University (ECSBMSSDU2023-1-076).

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Disclosure

The authors declare that there is no conflicts of interest in this work.

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