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Multilayered Interpersonal Interactions Among Iranian Emergency Medical Technicians: A Grounded Theory Study

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Abstract

Background

Emergency Medical Technicians (EMTs) provide care in highly dynamic, complex, and unpredictable environments that require continuous interactions with patients, family members, bystanders, colleagues, and other emergency response agencies. Consequently, effective interpersonal interactions are essential for clinical decision-making, coordinated service delivery, patient safety, and quality of care. However, little is known about how EMTs experience, negotiate, and manage these multilayered interpersonal interactions within the sociocultural context of Iranian prehospital emergency care.

Methods

This qualitative grounded theory study was conducted based on Strauss and Corbin approach (2015). Twenty-seven participants, including 21 EMTs, three EMS center managers, and three dispatch physicians, were recruited through purposive sampling followed by theoretical sampling. In-depth semi-structured interviews and field observations were used to collect data. Analysis involved open, axial, and selective coding with constant comparison and memo-writing.

Results

Analysis resulted in the development of a paradigm model explaining the relationships among the major categories. The core category was "Dynamic Multilayered Navigation" which describes the ongoing adaptive process by which EMTs navigate interactions at multiple levels. Causal conditions included mission urgency, complex clinical cases, and emotionally charged family involvement. Contextual factors encompassed cultural and religious sensitivities, resource limitations, and dispatch centralization. Strategies ranged from emotional regulation and active empathy to scene control and inter-organizational negotiation. Consequences included improved care quality and scene management alongside severe emotional exhaustion, chronic anxiety, and feelings of undervaluation.

Conclusions

Based on the findings of this study, the dynamic multilayered navigation model provides a context-specific explanatory framework for understanding interpersonal interaction processes in Iranian prehospital care. Targeted interventions, including communication training, psychological support, and improved inter-organizational coordination are recommended to strengthen patient safety, workforce well-being, and the delivery of prehospital emergency services.

Introduction

Prehospital emergency medical services (EMS) constitute the first link in the chain of survival and operate in highly dynamic, unpredictable and stressful environments (1). The effectiveness of these services depends not only on clinical competence but also on effective interpersonal interactions across multiple levels of care delivery. Here, multilayered interactions among individuals, occurring across intrapersonal, interpersonal, interprofessional, organizational, and interagency levels, represent dynamic social processes through which emergency personnel continuously negotiate, adapt, and make decisions under conditions of uncertainty. These interactions play a critical role in clinical decision-making, scene management, and patient outcomes. Furthermore, these interactional processes are continuously shaped by situational demands, organizational structures, and sociocultural contexts (1, 2). Such interactional processes occur across multiple interconnected levels, including intrapersonal processes such as self-awareness, emotional regulation, and cognitive appraisal, as well as interactions with team members, anxious and aggressive patients and families, bystanders, hospital personnel, dispatch centers, and partner agencies (police, fire services, and the Red Crescent) (2).

According to international studies, important contributors to preventable adverse events in prehospital care are failures in interpersonal and communication processes, which have been associated with a substantial proportion of preventable patient safety incidents (2, 3). These process failures may manifest as delayed clinical information exchange, ineffective team coordination, inadequate management of distressed patients and bystanders, and poor inter-organizational collaboration, all of which may compromise patient safety and provider well-being. These interactional challenges are more difficult in low- and middle-income countries because of high levels of trauma burden, resource limitations, cultural diversity and extensive family involvement during emergency situations (4). Consequently, understanding how emergency personnel experience, negotiate, and navigate these complex interactional processes has become an important priority for improving both patient safety and workforce resilience (5).

EMTs operate within a highly complex system of interactions, requiring continuous negotiation, adaptation, and management of multiple interpersonal demands due to high road traffic mortality rates, ethnolinguistic diversity, and the characteristics of Iran's high-context sociocultural environment. Iranian EMS systems respond to more than 1.2 million missions annually, further increasing the complexity of these interactional demands (6, 7). Despite the recognized importance of these interactions, a review of Iranian literature published during the past decade indicates that previous studies have primarily focused on technical factors, response times, and occupational stress. However, interpersonal interactions have largely been investigated as isolated phenomena rather than as interconnected and dynamic social processes (8). Existing qualitative research in Iran has primarily focused on decision-making challenges and burnout without developing an explanatory theoretical model capable of explaining how these multilayered interactions are experienced, negotiated, managed, and consequentially shaped within the complex context of Iranian prehospital emergency care (9).

In prehospital care, grounded theory research has primarily focused on clinical decision-making and interprofessional collaboration, whereas detailed models regarding how multilayered interpersonal

interactions are experienced, negotiated, and managed within culturally specific settings, particularly those characterized by strong family involvement, remain limited in the prehospital literature (10). International reports have emphasized the importance of context-sensitive evidence to improve communication, coordination, and the quality of emergency health services, particularly in resource-constrained settings (11).

Grounded theory, with its emphasis on social processes, contextual and intervening conditions, and the generation of theory from empirical data is particularly well-suited for explaining such complex and dynamic phenomena as prehospital interpersonal interactions. This methodology enables researchers to identify a core category, causal conditions, action/interaction strategies, and consequences and thereby facilitating the development of substantive model based on participants' experiences. The Strauss and Corbin approach was considered particularly appropriate because of its emphasis on explaining complex social processes and developing explanatory models grounded in participants' experiences (12).

Thus, the current study aimed to develop an explanatory model of multilayered interpersonal interactions among Iranian emergency medical technicians using the Strauss and Corbin grounded theory methodology. The findings may contribute to enhance communication and interpersonal skills training, refinement of communication protocols, and support improvements in the prehospital emergency care services in Iran.

Methods

Study Design

This study employed a qualitative design using the grounded theory approach developed by Strauss and Corbin (2015). This approach is particularly suitable for explaining complex social processes and developing explanatory models grounded in participants' experiences. The primary aim was to explain the processes of emergence, management, and consequences of multilayered interpersonal interactions and to develop an explanatory theoretical grounded in participants' experiences and empirical data.

Setting

The study was conducted in Iran's prehospital EMS centers. Data were collected from November 2025 to May 2026. These centers are responsible for delivering prehospital emergency care across a wide range of situations. Participants' work environments encompassed urban and road bases, ambulance units, the emergency operations centers, and emergency scenes, which are frequently characterized by high time pressure, environmental uncertainty, the presence of multiple responding agencies and stakeholders, and the need for immediate coordination.

Participants

A total of 27 participants were included in the study. The participants included 21 EMTs, three EMS center managers, and three physicians working in emergency operations centers. The participants were eligible if they had at least five years of experience in EMS, were directly involved in prehospital clinical care or operational coordination, and were willing to share their experiences. Managers and physicians were recruited through theoretical sampling to further develop emerging categories and gain diverse perspectives on multilayered interpersonal interactions. Participants who were unwilling to continue the interview or unable to communicate their experiences effectively were excluded from the study. Sampling continued until theoretical saturation was achieved, defined as the point at which no new conceptual properties or relationships emerged from subsequent interviews. Theoretical sampling was used to elaborate the categories that were emerging, to clarify the conceptual relationships, and to further develop the model. As needed, snowball sampling was utilized to recruit people with certain experiences that could further inform the concepts that were emerging. The sampling process continued until the theoretical saturation point was reached (no new conceptual properties or relationships were gained from a new interview after this point). The demographic characteristics of the participants are presented in Table 1.

Table 1
Demographic Characteristics of Participants on the study of Grounded Theory Model of Multilayered Interpersonal Interactions in Iranian Emergency Medical Technicians

Characteristic	Category	Frequency (n)	Percentage (%)
Gender	Male	21	77.8
	Female	6	22.2
Education Level	Bachelor's degree	16	59.3
	Master's degree	7	25.9
	Medical doctor	4	14.8
Job Position	Emergency medical technician	21	77.8
	EMS center manager	3	11.1
	Medical director	3	11.1
Years of Experience	5–10	10	37
	11–15	9	33.3
	More than 15	8	29.6

Data Collection

Data were primarily collected through in-depth, semi-structured interviews. The semi-structured interview guide was developed specifically for this study by the research team. Consistent with the Strauss and Corbin grounded theory methodology, the interview guide was refined iteratively throughout data collection and theoretical sampling as new concepts emerged. The English version of the initial interview guide is provided as Supplementary File 1. Interviews were conducted face-to-face or via telephone and lasted an average of 68 minutes, with a range of 50 to 95 minutes. Initial questions were open-ended and focused on the process of interactions. Theoretical sampling was used to guide additional interviews as data was gathered and analyzed, and the interview guide was modified to elaborate on new categories and better understand the relationships between categories. The interviews typically began with the question, "Can you describe a situation in which you experienced complex interpersonal interactions during an EMS mission”? Examples of probing questions included “What factors or situations lead to the emergence of complex interactions?”, “What constitutes the central core of your multilayered interactions during missions?”, “In what environmental, cultural, or organizational contexts do your interactions take shape?”, “What external factors facilitate or hinder interactions?”, “What actions do you take to manage interactions in different conditions?”, and “What outcomes do these strategies produce for the patient, the team, or yourself?”. Field notes from visits to bases and non-participant observation of dispatch processes were also used to complement the data. Field notes were integrated into the ongoing analysis to enrich contextual understanding and support category development. Observations focused on communication patterns, coordination processes, and interactional dynamics during EMS dispatch activities and were documented as field notes. Analytical memos were created during the data collection and analysis to capture developing ideas, theory and decisions about the development of categories. All interviews were audio-recorded with written or electronically documented informed consent and transcribed verbatim.

Data Analysis

Data analysis was done concurrently and iteratively with data collection, as per the grounded theory methodology of Corbin and Strauss (2015). Open coding was performed line-by-line, resulting in more than 900 initial codes. The initial coding and subsequent data analysis were conducted by the principal investigator, who remained continuously engaged in data collection and analysis throughout the study. The categories were connected to their subcategories through axial coding included Causal condition, contextual condition, intervening condition, action/interaction strategies, and consequences. In selective coding, the core category was identified, and relationships among model components including causal conditions, context, intervening conditions, strategies, and consequences were delineated. The constant comparative method and theoretical memo-writing were used throughout the analysis to refine categories, integrate concepts, and facilitate the development of an explanatory theoretical model grounded in the empirical data.

Rigor

The rigour of the study was defined based on the recommendations of Lincoln and Guba (13). Concurrent data collection and analysis, theoretical sampling, constant comparison, theoretical memo-writing, data triangulation (interviews, field notes and observations), member checking with eight participants, and peer de-briefing with two qualitative researchers with experience in grounded theory added to the credibility. In order to ensure dependability and confirmability, a complete audit trail was maintained, consisting of interview transcripts, coding decisions, analytical memos, and successive versions of the evolving theoretical model. Transferability was enhanced by maximum variation sampling, theoretical sampling, detailed descriptions of the study context and participants, and by continuing the sampling process until theoretical saturation was reached.

Results

Analysis of the interview data resulted in the development of a grounded theory explaining the process of multilayered interpersonal interactions among Iranian prehospital emergency medical technicians. Line-by-line open coding generated more than 900 initial codes from the interview data. These codes were integrated using axial and selective coding and ultimately clustered around the core category and the paradigm model components. The core category that integrated all categories was identified as “Dynamic Multilayered Navigation”. This core category showed the continuous adaptive process of navigating multiple interconnected layers of interpersonal interactions during prehospital missions. These interactions occur within the individual, with patients and families, bystanders, team members, organizations.

Based on our findings, to manage multilayered interactions in the complex and high-pressure prehospital environment, EMTs adopt various action-interaction strategies across different layers. These strategies range from intrapersonal emotional regulation and rapid trust-building with patients and families to scene control, silent coordination with colleagues, and negotiation with partner organizations. However, due to contextual and intervening conditions, these strategies do not always lead to optimal outcomes. Many technicians experience significant challenges that result in dual consequences. Collectively, these strategies and interactions ultimately lead to both positive and negative outcomes including improved or reduced quality of care, short-term team cohesion versus long-term emotional exhaustion, and enhanced or threatened patient safety and provider well-being (Fig. 1).

Causal Conditions

Complex multilayered interactions were primarily driven by causal conditions. Causal conditions refer to the situational demands that triggered and intensified multilayered interpersonal interactions during prehospital emergency missions. The most important were the high degree of urgency during missions, the complex nature of the clinical cases (including multiple trauma, cardiac arrest, poisonings and multi-casualty incidents), the large and emotionally charged family and bystander involvement, and conflicting

demands from different stakeholders. The conditions transformed turned everyday communications into a weighty, dynamic, and emotional experience.

Consequently, participants reported needing to deal with multiple layers of interaction, which put a significant mental and emotional strain on them. The intense presence of families and onlookers at the scene, combined with limited time, turned interpersonal interactions into a major challenge.

“In an accident scene with several casualties and angry family members surrounding us, you only have limited minutes and you have to coordinate simultaneously with your colleague, dispatch, police, and the family...” (P4)

Contextual Conditions

Contextual conditions referred to the structural, organizational, and sociocultural characteristics that shaped how multilayered interactions occurred during EMS missions. The contextual conditions included the structural and socio-cultural characteristics of the Iranian prehospital emergency system. These comprised Iranian family-centered culture, the presence of companions and bystanders, religious sensitivities and gender-related issues (mahram and non-mahram issues), recent centralization of the dispatch system that decreased local familiarity, resource limitations, and public perceptions of free emergency services.

Participants described these contextual characteristics as strongly influencing the interactions and their nature compared to experiences in other countries. Technicians worked in an environment where they had to consider cultural, religious, and social factors as well as effective clinical care.

“Issues related to gender are very important in our country... most technicians are male and when the patient is female, there are problems... cultural and religious issues, mahram and non-mahram, make the interactions more complicated.” (P11)

Intervening Conditions

Intervening conditions referred to personal and organizational factors that either facilitated or constrained EMTs' ability to manage multilayered interactions. Intervening factors included the individual's experience and skills, quality of team composition, fatigue and burnout experienced by the individual, prior communication skills and most importantly the technicians' sense of responsibility, organizational commitment and ethical duty. Participants emphasized that technicians be able to communicate effectively even in challenging circumstances.

However, interactions were compounded by a similar level of commitment, chronic fatigue and organizational constraints, exacerbating the psychological strain. Technicians were not able to remain disinterested, but had to actively engage in empathy, making the interactions more complex.

“You should put yourself in others’ shoes... but you cannot be apathetic either, because legally and ethically you should not be apathetic... so you have to empathize with the patient.” (P1)

Action/Interaction Strategies

Technicians employed various adaptive strategies to navigate multilayered interactions successfully. On the intrapersonal level, emotional regulation, positive self-talk grounded in religious beliefs, and retaining professional and ethical commitment were highlighted. Key strategies in the patient and family layer were: understanding patients' and families' mental frameworks, active empathy, listening, two-way communication, respectful and culturally appropriate language, adaptation and congruence, and avoiding labeling or false reassurance.

Strategies were conducted at team, environmental, and organizational level, through silent communication with team members, scene control and bystander management, negotiation with partner organizations (police, Red Crescent, fire services), and bridging information gaps with dispatch and hospital. As experience grew, the strategies progressed from reactive to more proactive and predictive strategies.

“You need to understand the mental framework of the patient and those around them... once you understand this, you can meet their expectations and a warm and intimate relationship is created.” (P18)

Consequences

Dynamic multilayered navigation had twofold and far- reaching implications. Positive outcomes included improved quality of patient care, better scene management, decreased treatment times, and improved short-term team cohesion. In missions where the technicians successfully completed their interactions, they felt a sense of professional fulfillment and achievement and that they had saved lives.

Negative consequences were substantial and enduring. The most common were severe emotional exhaustion, chronic anxiety, insomnia, intrusions of traumatic scenes during off-duty time, undervaluation (feeling perceived merely as ambulance drivers). Technicians' high ethical duty and failure to remain detached were also associated with a heavy psychological burden which negatively impacted mental health, professional quality of life and long-term performance.

“we have to put our self in their place... in several missions a day with patients in severe and acute emergency conditions... greatly increases psychological stress and burnout. Yet you cannot be apathetic, because legally and ethically you should not be apathetic, so you have to empathize with the patient...” (P7)

Discussion

The findings of this grounded theory study revealed that Iranian prehospital EMTs face a process called “Dynamic Multilayered Navigation of Interpersonal Interactions.” This core category describes the simultaneous management of communications across intrapersonal, patient and family, team, environmental, and intra- and inter-organizational layers within the high-stress, time-sensitive, and

uncertain conditions of prehospital emergency missions. Previous studies that have primarily examined communication, teamwork, or decision-making as separate phenomena. the present grounded theory conceptualizes (8, 14). This explanatory model extends existing knowledge by integrating these interconnected dimensions within the context of prehospital emergency care.

One of the most prominent findings of the present study was the high complexity of the patient and family interaction layer. Technicians frequently use strategies such as understanding the patients' and families' mental frameworks, active empathy, attentive listening, culturally appropriate language, and rapid trust-building. This finding suggests that effective prehospital communication requires continuous negotiation of emotional, cultural, and interpersonal expectations under severe time pressure (15). This finding is consistent with previous research in Iran that emphasized the heavy emotional labor required when dealing with anxious and demanding families in a family-centered culture (10). Internationally, similar challenges have been reported regarding the emotional demands of patient and family interactions in prehospital care (3, 16).These strategies evolve from reactive to proactive and predictive approaches with increasing experience. This progression indicates that interactional competence develops through experiential learning, enabling EMTs to anticipate interpersonal challenges rather than merely respond to them.

The contextual conditions identified in the present study including family-centered culture with extensive bystander presence, ethno-linguistic diversity, religious and gender sensitivities, and dispatch centralization are consistent with research conducted in low- and middle-income countries (LMICs). Bystander intervention and family pressure not only complicate scene management but also increase the risk of verbal and physical violence. These findings further suggest that communication strategies developed in high-income EMS systems may not be directly transferable to culturally distinct contexts such as Iran, where sociocultural expectations substantially influence emergency care interactions (17).

The identified adaptive strategies, such as silent team coordination, scene control, and inter-organizational negotiation, demonstrate technicians’ flexibility and creativity in a dynamic environment. Rather than representing isolated communication techniques, these strategies formed an integrated adaptive process through which EMTs continuously balanced clinical priorities with interpersonal and organizational demands. These strategies align with research conducted in the field of interprofessional collaboration in prehospital care (18, 19).

The dual consequences identified in the present model - improved quality of care, better scene management, and momentary satisfaction on one hand, and severe emotional exhaustion, chronic anxiety, insomnia, intrusive recollections of traumatic scenes, and feelings of undervaluation on the other - are consistent with research findings conducted in Iran and other countries. The feeling of being seen merely as an “ambulance driver” and the heavy burden of ethical responsibility are among the main causes of chronic burnout. This finding is consistent with international research on moral distress and emotional labor among emergency medical technicians (10, 20). These findings highlight that successful interactional performance often comes at a considerable psychological cost, suggesting that

emotional labor represents an inherent component of prehospital emergency practice rather than an individual vulnerability (15).

This study provides an explanatory framework that may inform communication skills training, leadership development, interdisciplinary collaboration, and organizational policies within EMS centers. By conceptualizing interpersonal interactions as a dynamic multilayered process rather than isolated communication events, the model offers a practical foundation for designing context-sensitive educational and organizational interventions.

Limitations

Participant disclosure may have been influenced by the sensitive nature of topics or distress regarding moral distress and workplace violence. To reduce this, confidentiality was carefully maintained and participants were informed that they could withdraw at any time. The translation from Persian to English might have resulted in a slight loss of cultural nuances. This was reduced by iterative back-translations and review by bilingual qualitative researchers. Although these limitations existed, trustworthiness was promoted by extended interactions, member checks and triangulation.

Conclusion

Based on this grounded theory study, a substantive model called Dynamic Multilayered Navigation of Interpersonal Interactions was developed for Iranian prehospital emergency medical technicians. The model conceptualizes interpersonal interactions as interconnected processes occurring across intrapersonal, patient–family, bystanders, team, environmental, and organizational levels.

Adaptive strategies, including silent team coordination, active empathy, and effective scene management, contributed to improved patient care and operational performance. However, these strategies were frequently accompanied by emotional exhaustion, anxiety, burnout, and feelings of professional undervaluation.

This context-specific model contributes to understanding interpersonal interactions in prehospital emergency services and may support evidence-informed improvements in workforce development, communication practices, and service delivery. The findings may inform communication skills training, psychological support programs, leadership development, and inter-organizational collaboration within prehospital emergency systems. Future research should evaluate interventions informed by this model and explore the perspectives of patients, family members, and hospital personnel to further refine and evaluate the applicability of the model across different EMS settings and healthcare systems.

Abbreviations

EMS
Emergency Medical Services

EMTs
Emergency Medical Technicians:**DKZ**:Davoud Khorasani-Zavareh
MSK
Meysam Safi-Keykaleh
PS
Parisa Solgi
MS
Marzieh Seif

Declarations

Competing interests: None declared

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Ethical approval: This study was conducted in accordance with the Declaration of Helsinki and was approved by the Ethics Committee of Hamadan University of Medical Sciences, Hamadan, Iran (approval code: IR.UMSHA.REC.1404.742). In addition, inform consent was taken from participants. Accordingly, interviews declining or leaving was provided to all participants.

Availability of data and materials: The data supporting the findings of this study are available from the corresponding author upon reasonable request. Due to ethical considerations and participant confidentiality, the raw interview transcripts cannot be made publicly available.

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Authors' Contributions: MSK conceptualized and designed the study, conducted the interviews, performed data analysis, and drafted the initial manuscript. PS and MS contributed to data analysis, interpretation of findings, and critical revision of the manuscript. DKZ supervised the study, provided methodological guidance, contributed to data interpretation, and critically reviewed and revised the manuscript. All authors read and approved the final version of the manuscript.

Declaration of generative AI and AI-assisted technologies in the manuscript preparation process:

During the preparation of this manuscript, the authors used ChatGPT (OpenAI) to assist with language translation, improving English grammar, sentence structure, and academic writing style. The AI tool was not used for data analysis, interpretation of findings, or scientific decision-making. All AI-assisted outputs were critically reviewed, substantially revised where necessary, and approved by the authors, who take full responsibility for the accuracy, originality, and integrity of the final manuscript.

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Figures

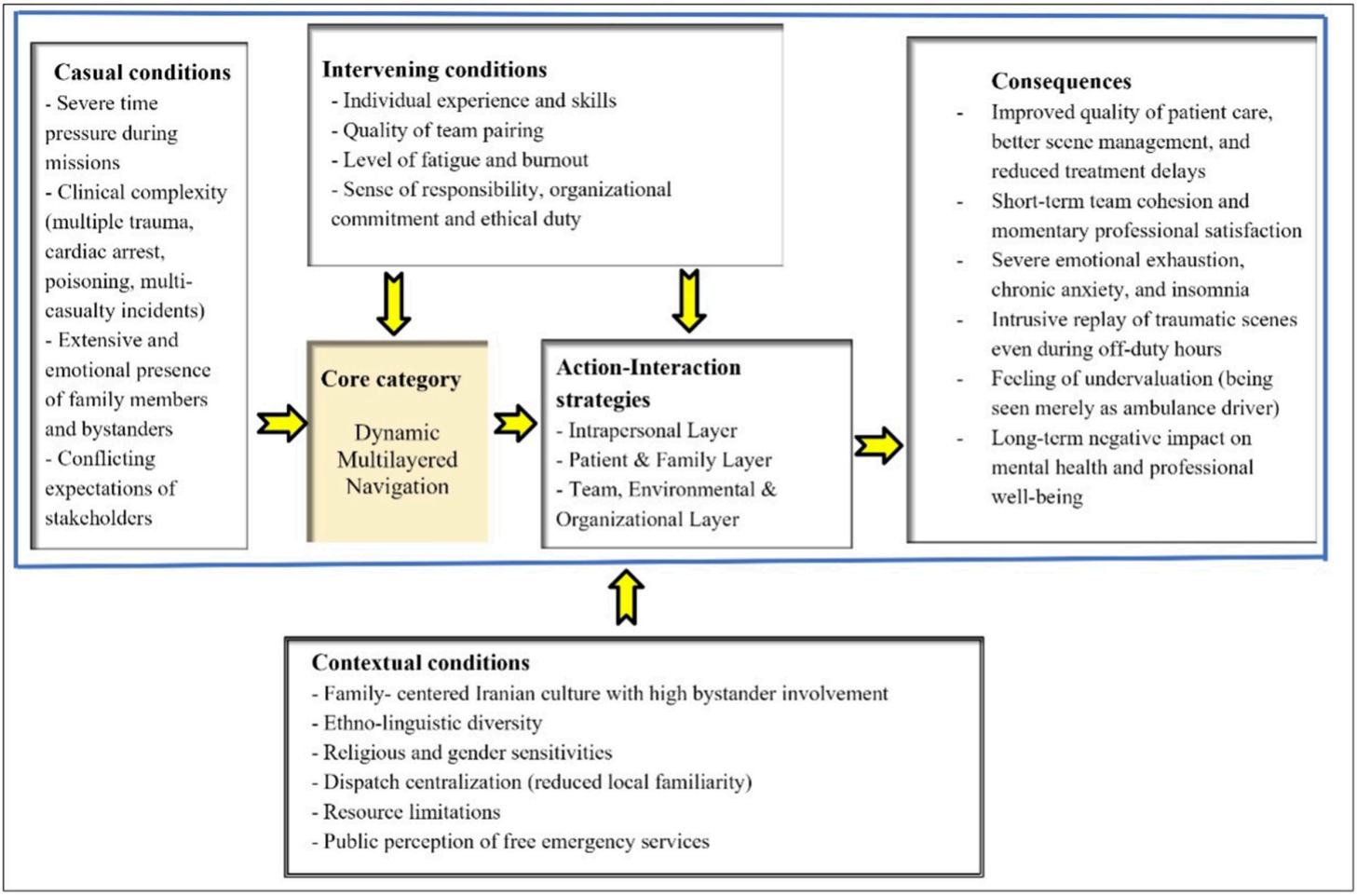


Figure 1

Paradigm model of the grounded theory “Dynamic Multilayered Navigation of Interpersonal Interactions” among Iranian prehospital emergency medical technicians (based on Strauss & Corbin, 2015)

Supplementary Files

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- Supplementaryfile1..docx