



Acting Together in Prehospital Care: Qualitative Insights into an Interprofessional Trauma Training Program

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Abstract

Effective trauma care necessitates a high level of interdisciplinary coordination between paramedics and physicians. In response to this requirement, an eight-hours interprofessional training program was implemented in 2025 at a German educational institution to enhance collaborative competencies in prehospital trauma management. The educational concept was grounded in experiential learning theory and integrated simulation-based scenarios with structured reflection phases. The aim of this study was to explore participants' experiences with the didactic concept and their perceptions of its realization. A qualitative, exploratory research design was applied. Following the training, eight semi-structured interviews were conducted with participating paramedics (n=5) and physicians (n=3). Data was analyzed using qualitative content analysis according to Mayring [1]. Analytical emphasis was placed on identifying key experiential dimensions related to instructional design, team interaction, interprofessional collaboration, and the training's perceived relevance for clinical practice. Participants described the training as highly relevant, motivating, and conducive to effective learning. Authentic case simulations were perceived as particularly valuable in illustrating the necessity of interprofessional coordination during emergency response. Structured reflection phases were highlighted as essential for consolidating knowledge and facilitating metacognitive awareness. Tensions related to professional hierarchies and distinct role perceptions emerged but were constructively addressed through the reflective and interactive design of the training. Findings indicate that intentionally designed, simulation-based learning environments can significantly foster interprofessional collaboration and action competence in prehospital trauma care. The study underscores the importance of reflective, practice-oriented didactic models in strengthening interprofessional teamwork and decision-making under emergency conditions.

Keywords: *Interprofessional training, Prehospital trauma care, Simulation-based learning, Experiential learning, Qualitative research*

1. Introduction

Prehospital trauma care places the highest demands on the competence and capacity for action of the health professions involved. Severe trauma ranks among the leading causes of death worldwide, particularly among younger populations [2], and requires coordinated, time-critical care by interprofessional teams immediately following the event. In the German emergency medical services system, emergency physicians and paramedics work closely together within a physician-led framework. The competencies and scope of practice of both professional groups are defined by the legal framework set out in the emergency services legislation of the respective federal states [e.g. 3] and by the Emergency Paramedic Act (Notfallsanitätengesetz) [4]. Despite this structural connection, interprofessional training formats that address both professional groups jointly and on equal terms remain underrepresented in the practice of initial and continuing education [5]. The quality of interprofessional collaboration in emergency situations has, however, been demonstrably shown to have a direct influence on patient outcomes: unclear role distribution, deficient communication, and hierarchy-related interaction problems are considered key risk factors for errors and gaps in care in prehospital acute care settings [6, 7, 8].

Simulation-based interprofessional training formats offer a promising pedagogical approach to addressing these challenges, as they enable realistic learning experiences under controlled conditions and specifically promote the development of shared clinical competence [7, 9, 10]. Against this background, an eight-hour interprofessional training program for prehospital trauma care was developed in 2025 and piloted during a continuing education event in Pirna, Germany. The program combines simulation-based scenarios with structured reflection phases. The aim of the present study is to qualitatively capture participants' experiences with the didactic concept of the program and to examine their perceptions of its implementation. The findings are intended to contribute to establishing evidence-



based foundations for the further development of interprofessional training concepts in emergency medical services.

2. Background

The didactic concept of the training program under investigation is grounded in two complementary theoretical pillars: Kolb's Experiential Learning Theory [11] and the principles of interprofessional education (IPE) [9, 12, 13]. Both approaches are mutually reinforcing in their pedagogical orientation and together provide a coherent framework for the design and analysis of simulation-based interprofessional learning formats in healthcare.

2.1. Theoretical Approaches

Experiential Learning and Simulation-based learning

Kolb describes learning as a cyclical process comprising four successive phases: concrete experience, reflective observation, abstract conceptualization, and active experimentation [11]. Learning takes place not through passive absorption of knowledge, but through the active transformation of experience into action-relevant cognitive structures. The reflective phase occupies a key role: it fosters metacognitive competencies and enables the transfer of situated experiential learning into generalized knowledge. This is a capability of particularly high practical relevance in dynamic emergency settings [14, 15]. Simulation-based learning (SBL) is well-supported by empirical evidence in health professions education as a tool for fostering clinical and team-based competence [6, 7, 10]. It creates authentic learning experiences under controlled, psychologically safe conditions, making it particularly suitable for complex, time-critical care contexts such as emergency medicine. Within the framework of the Kolb cycle, simulation fulfills the function of concrete experience: it generates emotional and cognitive engagement and activates procedural knowledge. Decisive for learning effectiveness, alongside scenario fidelity, are above all structured debriefing and reflection phases, which have been demonstrably shown to contribute to the consolidation of learning outcomes and the development of collective reflexivity. In this context, debriefing is understood not merely as a post-activity review, but as an independent pedagogical intervention that bridges the gap between concrete experience and abstract conceptualization [6].

Interprofessional Education (IPE)

According to the definition of the World Health Organization (WHO), interprofessional education refers to that form of learning which occurs when members of two or more health professions learn from, with, and about each other [16], with the aim of enabling improved collaboration and patient care. IPE is therefore not merely an organizational format, but a pedagogical program aimed at overcoming profession-specific tunnel vision, fostering mutual appreciation, and developing shared action orientations. The scientific evidence demonstrates that well-designed IPE formats not only positively influence attitudes toward other professional groups, but also measurably promote practical collaborative competencies, such as shared decision-making, structured communication, and a shared awareness of professional roles [5-9]. In emergency medicine, where effective teamwork is directly linked to patient safety, efforts are underway to establish IPE as a component of evidence-based continuing professional development [17, 18].

2.2. Simulation-based Interprofessional Training for Prehospital Trauma Care

The theoretical foundations outlined above constitute the conceptual frame of reference both for the design of the present training program and for the analytical perspective of this study. Their application to the context of prehospital trauma care requires a context-sensitive adaptation that takes into account the structural specificities of the German emergency medical services system.

The simulated trauma scenarios of the program served as the primary experiential anchor in the sense of the first phase of the Kolb cycle. Their authenticity was designed to generate emotional and cognitive engagement, thereby creating preconditions for deeper reflection. The immediately subsequent structured reflection phases assumed the function of the second and third cycle phases: they supported participants to observe what they had experienced, identify patterns, and draw conceptual conclusions. The sequential arrangement of multiple scenarios additionally operationalized the fourth phase (active experimentation) by enabling participants to trial new action strategies immediately [11].



A particular area of tension concerns the structurally embedded hierarchies between emergency physicians on the one hand and paramedic personnel on the other. The German emergency medical services system is traditionally physician-led, and despite the expanded scope of practice introduced by the Emergency Paramedic Act (Notfallsanitättergesetz) [4], the scope of action of both professional groups remains clearly defined by law. Such structural asymmetries are frequently reflected in interaction patterns and communication styles and can substantially affect the quality of interprofessional collaboration. The program therefore pursued the explicit goal of creating a learning space in which both professional groups could engage as equals and jointly reflect on their respective understandings of their professional roles. The combination of IPE principles with Kolb's reflection-oriented didactic approach made it possible not to suppress these hierarchical tensions, but to engage with them constructively as productive learning material [11, 19, 20].

The present qualitative study focuses on this process of translation into practice. The analytical categories of (a) didactic concept, (b) team interaction, (c) interprofessional collaboration, and (d) perceived practical relevance reflect the theoretical target dimensions of experiential learning and IPE, and form the basis for the qualitative data analysis.

3. Data Collection and Analysis

A total of N=23 individuals participated in the training program (paramedics: n=15; emergency physicians: n=8). Data collection was conducted in September 2025 with eight participants of the interprofessional training program, including five paramedics (n=5) and three emergency physicians (n=3). Participants were selected according to the principle of purposive sampling in order to ensure the inclusion of both professional groups. Semi-structured short interviews were conducted immediately following the training. The interview guide was oriented toward the central analytical categories of the study: the didactic concept and its implementation, team interaction within the scenarios, the experienced interprofessional collaboration, and the perceived practical relevance of the training. Participation in the study was voluntary. With participants' informed consent, the interviews were digitally recorded, subsequently transcribed verbatim, and pseudonymized for analysis purposes (paramedics: P1 - P5; emergency physicians: P6 - P8).

Data analysis was conducted using qualitative content analysis following Mayring [1] and pursues an exploratory approach. The procedure was designed as a deductive-inductive process: the superordinate analytical categories were developed in advance on a deductive basis, grounded in the theoretical framework, while the subcategories were formed inductively from the data material. Transparency of the analytical process was ensured through comprehensible documentation of the category formation procedure. Intercoder reliability was secured through independent coding runs and consensual validation.

4. Results

The qualitative content analysis of the interview material yielded four superordinate categories, which were developed deductively on the basis of the theoretical framework and further differentiated through inductively formed subcategories. Table 1 below provides an overview of the category system:

Table 1. Overview of the Category System of the Qualitative Content Analysis.

Category	Subcategories
A – Didactic Concept and Implementation	<ul style="list-style-type: none"> • Structuring of the workflow • Perceived facilitation of learning
B – Team Interaction	<ul style="list-style-type: none"> • Communication behavior • Task distribution within the scenario • Dynamics under time pressure
C – Interprofessional Collaboration	<ul style="list-style-type: none"> • Role understanding • Hierarchical tensions • Mutual professional appreciation
D – Practical Relevance	<ul style="list-style-type: none"> • Transfer to professional practice • Confidence in clinical action

4.1 Category A: Didactic Concept and Implementation



The didactic concept of the training program was consistently rated positively by the participants. Particular emphasis was placed on the high degree of realism of the simulated scenarios and the clear structure of the eight-hour program. The authenticity of the case design proved to be a central factor in the perceived learning effectiveness: participants reported that the setting generated emotional involvement and made the seriousness of the situation tangible. Structured reflection phases following the scenarios were described as didactically indispensable, as they provided the opportunity to analyze clinical workflows and collectively identify areas for improvement.

- *"The cases were designed in such a way that you really had the feeling that this could happen exactly the same way tomorrow. That helped me to engage fully." (P3, paramedic)*
- *"The reflection round afterwards was the most valuable part for me. It was only then that I became aware of what I had actually been thinking in that situation and why." (P7, emergency physician)*

The combination of simulation and structured reflection corresponded to the experience of a complete learning cycle: participants described how the sequence of scenarios enabled them to progressively develop new action strategies and immediately apply them in the subsequent scenario.

4.2 Category B: Team Interaction

The analysis of the interview statements on team interaction revealed that collaborative action under time pressure was perceived as particularly instructive. Participants addressed both successful coordination processes and moments in which communication gaps or unclear task distribution temporarily impaired the team's ability to act. These critical moments, however, were not experienced as failure but rather as productive learning opportunities, particularly when they were explicitly addressed during debriefing.

- *"In the first scenario, we were talking past each other. Nobody knew exactly who was supposed to do what. But that is precisely what we unpacked in the debriefing, and the second time around it went noticeably better." (P1, paramedic)*
- *"I realized how important it is to clearly communicate what I need next. That sounds trivial, but under pressure you forget it quickly." (P6, emergency physician)*

The analysis revealed that team interaction in the simulation context was experienced not only as a domain of competence but also as a mirror of everyday behavioral patterns. The training thus created a space in which both well-established and partially problematic interaction behaviors became visible and accessible to reflection.

4.3 Category C: Interprofessional Collaboration

This category proved to be particularly rich and multifaceted. Participants described an initial field of tension between the two professional groups, resulting from differing role understandings, professional socialization processes, and established hierarchical expectations. Both paramedics and emergency physicians reported an initial sense of uncertainty in their interactions with the respective other professional group within the simulation context. Over the course of the training, in particular through the shared reflection phases, this perception shifted. Participants developed a more differentiated understanding of the competencies and perspectives of the other profession.

- *"At the beginning, I thought: the emergency physician will handle it, I'll hold back. But during the debrief it became clear to me that my knowledge is equally in demand and needed." (P2, paramedic)*
- *"I was surprised by how much the paramedic colleagues contribute. That made me realize that in real practice I perhaps listen too little." (P8, emergency physician)*



The hierarchical tensions were not resolved by the reflective-interactive design of the training, but were made constructively workable. Participants described the shared learning space as an experience in which professional equality was not presupposed but actively negotiated.

4.4 Category D: Practical Relevance

The participants described the training as highly relevant to their professional practice. They emphasized that the competencies acquired (e.g., more structured communication, clear role assumption, and shared decision-making under time pressure) were directly transferable to everyday operational practice. Several participants expressed a desire for regular repetition of this kind of training as well as for its extension to additional professional groups within the emergency medical services system.

- *"Training like this should be mandatory. In eight hours, I learned more about actual collaborative work than in four years of operational practice." (P4, paramedic)*
- *"This showed me where I still have gaps in my communication skills with the paramedic team. That is something I am taking away with me." (P5, emergency physician)*

The transferability of the training was closely linked by participants to its practical relevance: the experience of the learned content being directly applicable was described as a key factor in its usefulness in daily work and as a contribution to enhancing confidence in clinical action.

5. Discussion and Conclusion

The findings of the present study indicate that a reflective simulation-based interprofessional training program can effectively promote the collaborative competence of paramedics and emergency physicians in prehospital trauma care. The positive evaluation of the didactic concept corresponds with the evidence in international literature, which identifies the combination of case simulations and structured debriefing phases as particularly effective for learning [7]. The reflection phases served as significant bridging function between concrete experiential action and conceptual understanding.

The identified communication gaps and coordination problems under time pressure correspond to structural findings from interprofessional emergency research, which identifies unclear role distribution and the absence of feedback routines as central sources of error in acute care [21]. It is significant that participants experienced these deficits as amenable to change through the formalized debriefing process. This points to the pedagogical effectiveness of reflective learning spaces in highly complex care contexts.

The hierarchical tensions reported between the two professional groups are structurally embedded in the German emergency medical services system. While the training program was unable to resolve these tensions, it created the conditions necessary to address them constructively and to develop mutual professional understanding. This underscores that interprofessional competence cannot be presupposed but must be actively cultivated through deliberately designed learning formats.

The study has methodological limitations: the small sample size, the absence of a longitudinal perspective, and potential social desirability effects limit the generalizability of the findings. Future studies should incorporate follow-up assessments and quantitative methods in order to validly capture transfer effects into clinical practice.

The findings provide an empirical basis for the further development of interprofessional training formats in emergency medical services and underscore the educational policy imperative to establish such formats as a permanent component of continuing professional development and advanced training.

REFERENCES

- [1] Mayring P., "Qualitative Inhaltsanalyse: Grundlagen und Techniken", 13th ed., Weinheim, Beltz, 2022.
- [2] World Health Organization, "Injuries and Violence", WHO Fact Sheet, Geneva, World Health Organization, 2024. Available at: <https://www.who.int/news-room/fact-sheets/detail/injuries-and-violence> (Accessed: 21 April 2026).
- [3] Freistaat Sachsen, "Saxon Act on Fire Protection, Rescue Services and Disaster Control (SächsBRKG)", REVOSax - Saxon State Law, Dresden, Saxon State Ministry of the Interior, 2004



- (last amended 2024). Available at: <https://www.revosax.sachsen.de/vorschrift/4911-SaechsBRKG> (Accessed: 21 April 2026).
- [4] Federal Republic of Germany, "Act on the Profession of Emergency Paramedic (Notfallsanitätergesetz - NotSanG)", Federal Law Gazette (Bundesgesetzblatt), Berlin, Federal Ministry of Justice, 2013 (last amended by Art. 7c of the Act of 19 July 2023, BGBl. 2023 I No. 197). Available at: <https://www.gesetze-im-internet.de/notsang/BJNR134810013.html> (Accessed: 21 April 2026).
 - [5] Kaap-Fröhlich S., Ulrich G., Wershofen B., et al., "Position paper of the GMA Committee Interprofessional Education in the Health Professions - current status and outlook", *GMS Journal for Medical Education*, Vol. 39, No. 3, Düsseldorf, German Medical Science, 2022, Doc30. DOI: <https://doi.org/10.3205/zma001538>.
 - [6] Palaganas J.C., Epps C., Raemer D.B., "A History of Simulation-Enhanced Interprofessional Education", *Journal of Interprofessional Care*, Vol. 28, No. 2, London, Taylor & Francis, 2014, pp. 110-115. DOI: <https://doi.org/10.3109/13561820.2013.869198>.
 - [7] Sung T.C., Hsu H.C., "Improving Critical Care Teamwork: Simulation-Based Interprofessional Training for Enhanced Communication and Safety", *Journal of Multidisciplinary Healthcare*, Vol. 18, Dove Medical Press, 2025, pp. 355-367. DOI: <https://doi.org/10.2147/JMDH.S500890>.
 - [8] St. Pierre M., Hofinger G., "Human Factors und Patientensicherheit in der Akutmedizin", 4th ed., Berlin/Heidelberg, Springer, 2020. DOI: <https://doi.org/10.1007/978-3-662-60485-4>.
 - [9] PalLapierre A., Bérubé M., Giroux M. et al., "Interprofessional interventions that impact collaboration and quality of care across inpatient trauma care continuum: A scoping review.", *Injury*, 55, Elsevier, 2024. DOI: <https://doi.org/10.1016/j.injury.2024.111873>.
 - [10] Sezgin M.G., Bektas H., "Effectiveness of interprofessional simulation-based education programs to improve teamwork and communication for students in the healthcare profession: A systematic review and meta-analysis of randomized controlled trials", *Nurse Education Today*, Vol. 120, Elsevier, 2023, Article 105619. DOI: <https://doi.org/10.1016/j.nedt.2022.105619>.
 - [11] Kolb, D., "Experiential Learning: Experience as The Source of Learning and Development." New Jersey, Prentice Hall, 1984.
 - [12] Mohammed C.A., Anand R., Saleena Ummer V. "Interprofessional Education (IPE): A framework for introducing teamwork and collaboration in health professions curriculum." *Med J Armed Forces India*. Vol. 77, Elsevier, 2021, pp. 16-21. DOI: <https://doi.org/10.1016/j.mjafi.2021.01.012>.
 - [13] Global Forum on Innovation in Health Professional Education, Board on Global Health, Institute of Medicine. "Interprofessional Education for Collaboration: Learning How to Improve Health from Interprofessional Models Across the Continuum of Education to Practice: Workshop Summary." Washington (DC): National Academies Press (US), 2, 2013, Interprofessional Education. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK207102/> (Accessed: 27 April 2026).
 - [14] Davitadze, M., Ooi, E., Ng, C.Y. et al., "SIMBA: using Kolb's learning theory in simulation-based learning to improve participants' confidence." *BMC Med Educ* 22, 116, 2022, DOI: <https://doi.org/10.1186/s12909-022-03176-2>.
 - [15] Wang, Z., Wu, P., Shi, S. et al., "Experiences and perceptions of students in occupational therapy regarding the use of desktop virtual environments-based simulation: a qualitative study." *BMC Med Educ* 25, 889, 2025, DOI: <https://doi.org/10.1186/s12909-025-07495-y>.
 - [16] World Health Organization (WHO), "Framework for Action on Interprofessional Education & Collaborative Practice", Geneva, World Health Organization, 2010. Available at: <https://interprofessional.global/wp-content/uploads/2019/11/WHO-2010-Framework-for-Action-on-Interprofessional-Education-and-Collaborative-Practice.pdf> (Accessed: 27 April 2026).
 - [17] Eisenmann, D., Stroben, F., Gerken, J. D., Exadaktylos, A. K., Marchner, M., Hautz, W. E., "Interprofessional Emergency Training Leads to Changes in the Workplace." *Western Journal of Emergency Medicine: Integrating Emergency Care with Population Health*, 19(1). 2018, <http://dx.doi.org/10.5811/westjem.2017.11.35275>.
 - [18] Wesselborg B., Knepperger I., von den Driesch N., Schäfer M., Stephan A., "Interprofessional continuing education in health professions – a scoping review of framework conditions, design processes and evaluation designs." *GMS J Med Educ*. 43 (2), 2026. DOI: <https://doi.org/10.3205/zma001815>.
 - [19] Olde Bekkink M., Farrell S.E., Takayesu J.K., "Interprofessional communication in the emergency department: residents' perceptions and implications for medical education." *Int J Med Educ*. 25 (9), 2018; pp. 262-270. DOI: <https://doi.org/10.5116/ijme.5bb5.c111>.
 - [20] Alnakhli H.I.N., Alibrahim W.S.A., Almasoud M.A.F. et al., "Collaboration in Emergency and Prehospital Settings: The Impact of Teamwork Among Physicians, Nurses, Health Assistants,



and Emergency Medical Services Personnel on Patient Outcomes", International Journal of Computational and Experimental Science and Engineering (IJCESEN), Vol. 10, No. 4, 2024, pp. 2761-2770. DOI: <https://doi.org/10.22399/ijcesen.4239>.

- [21] Rosen, M. A., DiazGranados, D., Dietz, A. S., et al., "Teamwork in healthcare: Key discoveries enabling safer, high-quality care." American Psychologist, 73(4), 2018, 433-450. DOI: <https://doi.org/10.1037/amp0000298>.