

## Understanding Gender Dimensions in Prehospital Teamwork and Patient Safety

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### Abstract

Effective teamwork plays a crucial role in emergency medical services in enhancing patient safety. However, the possible impact of staff gender on communication patterns, patient safety outcomes, and overall team performance has rarely been considered. This study seeks to investigate these largely neglected aspects. An anonymous descriptive survey was conducted via an online questionnaire distributed to emergency physicians and paramedics. Respondents were asked to share their views on teamwork, communication, patient safety, and error management.

A total of 714 prehospital professionals from various regions across Germany joined the study. Overall, 65.7% of female participants reported having harmed a patient (men: 72.9%), while 52.6% felt ashamed after committing mistakes (men: 31.7%). Only 19.0% of the women assessed their communication skills as very good, compared with 81% of the men. A larger proportion of women than men avoided speaking openly about errors out of fear of seeming incompetent (28.4% versus 15.5%). Both male and female respondents cited their colleagues' personalities as a major factor in ineffective team communication (women: 89.4%; men: 84.9%). During periods of intense stress, communication frequency decreased (women: 35.9%; men: 31.0%) and statements often became imprecise (women: 18.7%; men: 20.1%). Issues related to team communication and collaboration in emergency rescue services do not appear to be influenced by gender. Female staff seem to struggle more with openly discussing mistakes, possibly because they face higher expectations. Emergency service organizations should modify their working arrangements to better suit women's needs, thereby supporting improved error handling. Overall, cultivating a culture of constructive error and communication is vital to raising patient safety standards.

**Keywords:** Patient safety, Gender, Communication, Teamwork, Error

### Introduction

Teamwork forms the essential foundation for delivering patient care within emergency medical services (EMS). Just like in other high-risk professional settings, the effectiveness of teamwork is largely determined by the quality of interactions among team members. Yet, the topics of communication, teamwork, and error

management in EMS have not been sufficiently explored through a gender lens.

Expectations tied to conventional female communication styles tend to affect judgments more powerfully than women's actual capabilities [1]. Stereotypes consist of widely held beliefs about the typical qualities of a particular group. In such cases, the traits associated with group membership often overshadow the individual's unique attributes (for example, general perceptions of women prevail over the specific qualities of female paramedics) [2]. Men are commonly viewed as assertive, competitive, and self-reliant, whereas women are seen as warm, approachable, and cooperative [3]. These perceived traits might therefore create variations in communication styles, team dynamics, and approaches to error management. Despite this possibility, no targeted

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studies have addressed the matter directly. Insights gained from mixed-gender teams in other high-risk fields outside medicine cannot be directly applied to healthcare without critical evaluation [4].

In German EMS, women did not establish a meaningful presence until the early 21st century. Much like in firefighting or policing, they were previously excluded from these roles or limited to very narrow specialized functions [5]. This form of occupational segregation has shifted gradually. In a 2000 overview of EMS in Germany, Behrendt did not refer to female paramedics [6]. Women were mentioned solely under the general heading of medical personnel listed as male/female emergency physicians [6]. Ongoing societal developments [7] have led to a steady rise in the number of female staff. Parallel trends have been documented in other countries, such as the USA [8]. At present, 30.9% of paramedics in Germany are women, and 62.4% of medical students are already female [9].

The purpose of this research is to outline the experiences of German EMS teams concerning errors, teamwork, and communication, specifically from a gender-based viewpoint. So far, only limited reliable data have become available on this key component of the healthcare system.

## Materials and Methods

This investigation used a descriptive, anonymous, and voluntary framework. To conduct empirical social research, the team used a standardized, non-validated questionnaire, which helped maintain strong objectivity throughout the process. The intended respondents were paramedics and prehospital emergency physicians. Questions focused on individuals' own actions and the conduct of colleagues they had encountered firsthand in emergency medical services (EMS) situations. None of the specific items was crafted to evaluate distinct traits or features. Everyone who took part consented to their responses being used in scientific analysis. All information was stored in a fully anonymized form on a server located in a SOC 2-accredited data center. The facility also held ISO 27001 certification and operated in accordance with the General Data Protection Regulation (GDPR). No data could be connected to any particular person. Participants received no payment or other rewards. The entire project followed the ethical standards set out in the Declaration of Helsinki. The Ethics Committee of the State Medical Association of Hesse decided that formal ethical approval was unnecessary

because the information was gathered without any identifying details (decision reference number FF67/2016).

The questionnaire was developed based on 17 initial assumptions about communication and patient safety issues specific to EMS, as proposed by the research team. Each item stemmed from a thorough examination of relevant published studies that concentrated on communication practices and risk management strategies. Questions were grouped into several broad sections: agreement to join the study (one question), sociobiological background of respondents (5 questions), organization of rescue services (2 questions), communication (19 questions), teamwork (7 questions), error handling (9 questions), and education or training (10 questions). The communication section is further split into team interaction (16 questions) and patient handover (3 questions). For this paper, the team examined only items related to views on errors during EMS shifts, patient injuries during treatment, internal team dialogue, and reasons for communication failures. Several questions were omitted from the current evaluation because they did not align with the main focus. In total, the questionnaire contained 3 open-ended items, 38 single-choice items, and 12 multiple-choice items. The design prioritized respondents' personal perceptions. When inquiring about the extent of harm, short scenario examples were added to help participants judge their own experiences more accurately. An expert panel reviewed the full questionnaire layout. Because the authors were affiliated with Goethe University Frankfurt, they received guidance on questionnaire construction from the Institute for Biostatistics and Mathematical Modeling at the university's Center for Health Sciences. Invitations were dispatched by regular mail in a neutral format to leaders of ambulance stations across Germany and to regional medical directors in EMS. The letters asked these leaders to share the survey link with their teams. Each invitation included a direct web address leading to the online form.

### *Inclusion criteria*

- (1) Paramedics (PMs)
- (2) Prehospital emergency physicians (EPs)
- (3) Staff members working for a German ambulance service
- (4) Voluntary and unpaid involvement in the research
- (5) Acceptance of the stated data protection rules

### *Exclusion criteria*

(1) Not satisfying at least one inclusion requirement

#### Data analysis

Because the project was purely descriptive and did not involve any intervention, no formal sample size estimation based on hypotheses was calculated. Differences in categorical features between the two gender groups were assessed with the chi-square test and the Fisher-Freeman-Halton exact test. Spearman's correlation was used to examine nonparametric data. Every statistical comparison was performed using two-sided testing with a significance threshold of 0.05. Raw data were handled in Microsoft® Excel software 2016 for Windows (Microsoft Corporation, Redmond, USA). All statistical computations were executed using BiAS version 11.06 software (epsilon-Verlag, Frankfurt, Germany).

#### Results and Discussion

Altogether 722 completed forms were received. Eight submissions arrived completely blank and were therefore discarded. This left 714 questionnaires that met the inclusion criteria and were included in the analysis. The overall completion rate stood at 0.98.

Within the sample, 17.9% (128) identified as women and 82.1% (586) as men ( $P = 0.01$ ). On average, respondents were  $35.9 \pm 10.5$  years old and had accumulated  $12.5 \pm 9.4$  years of professional experience (**Table 1**). A large majority viewed their EMS work as highly demanding (women 96.8%, 124; men 90.5%, 530;  $P = 0.01$ ).

**Table 1.** Participants. From: Gender-sensitive considerations of prehospital teamwork in critical situations.

|                                | Female          | Male            |
|--------------------------------|-----------------|-----------------|
| Age, years                     | $33.2 \pm 10.1$ | $36.3 \pm 10.4$ |
| Professional experience, years | $8.7 \pm 7.6$   | $13.2 \pm 9.5$  |
| PM                             | 16.0%           | 84.0%           |
| EP                             | 23.0%           | 77.0%           |

#### Patient harm

Responses regarding personal encounters with and concerns about causing patient harm revealed clear gender differences (**Table 2**).

**Table 2.** Harm to patients and fear of consequences of harm. From: Gender-sensitive considerations of prehospital teamwork in critical situations

| Item                                                                                                                      | Female         | Male           | P-value |
|---------------------------------------------------------------------------------------------------------------------------|----------------|----------------|---------|
| <b>Have you ever been responsible for harm to a patient?</b>                                                              |                |                |         |
| No                                                                                                                        | 34.3%<br>(44)  | 27.1%<br>(159) | 0.09    |
| Yes, but the extent of harm is unclear                                                                                    | 15.6%<br>(20)  | 16.8%<br>(98)  | 0.76    |
| Yes, resulted in short-term harm                                                                                          | 46.8%<br>(60)  | 57.6%<br>(338) | 0.02    |
| Yes, resulted in medium-term harm                                                                                         | 5.4% (7)       | 6.9%<br>(40)   | 0.57    |
| Yes, resulted in long-term harm                                                                                           | 4.6% (6)       | 5.8%<br>(34)   | 0.61    |
| <b>How concerned are you about legal, occupational, or civil consequences if a patient is harmed due to your actions?</b> |                |                |         |
| High concern regarding short-term harm                                                                                    | 78.9%<br>(101) | 85.1%<br>(499) | 0.08    |
| High concern regarding medium-term harm                                                                                   | 42.9%<br>(55)  | 50.5%<br>(296) | 0.12    |
| High concern regarding long-term harm                                                                                     | 20.3%<br>(26)  | 23.5%<br>(138) | 0.43    |
| <b>Reasons for reluctance to disclose mistakes</b>                                                                        |                |                |         |
| Concern about legal repercussions                                                                                         | 48.4%<br>(62)  | 44.9%<br>(263) | 0.46    |
| Concern about job-related consequences                                                                                    | 42.1%<br>(54)  | 40.8%<br>(239) | 0.77    |
| Feeling embarrassed in front of colleagues or supervisors                                                                 | 52.6%<br>(67)  | 31.7%<br>(186) | < 0.01  |
| Lack of recognition from colleagues after admitting an error                                                              | 44.2%<br>(57)  | 37.5%<br>(220) | 0.14    |
| Errors are not personally relevant                                                                                        | 5.3% (7)       | 5.8%<br>(34)   | 0.88    |
| Lack of interest or concern about errors                                                                                  | 3.2% (4)       | 15.2%<br>(89)  | < 0.01  |

#### Communication error

Both genders showed comparable levels of interest in communication issues (female 70.4%, 90; male 79.8%, 468;  $P = 0.01$ ). Within this area, only 19.0% (24) of the female respondents rated their personal communication abilities as very good, while 81.0% (475) of the male respondents did so ( $P < 0.01$ ). Female participants appeared more affected than males by worries about preserving their perceived competence, feelings of shame, or concerns over possible sanctions linked to their communication style (**Table 3**).

**Table 3.** Deficits in own communication and how to deal with them. Multiple responses are possible. From: Gender-sensitive considerations of prehospital teamwork in critical situations

| Item                                                                                                                                                                       | Female      | Male        | P-value |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-------------|---------|
| <b>If you failed to recall information given once during patient care, what prevented you from asking again?</b>                                                           |             |             |         |
| “Time constraints prevented me from asking.”                                                                                                                               | 34.7% (44)  | 35.3% (207) | 0.83    |
| “I was managing too many responsibilities simultaneously.”                                                                                                                 | 62.1% (79)  | 57.8% (339) | 0.42    |
| “I did not want to appear inattentive.”                                                                                                                                    | 16.8% (22)  | 14.1% (83)  | 0.38    |
| “I was concerned about appearing incompetent.”                                                                                                                             | 28.4% (36)  | 15.5% (91)  | < 0.01  |
| “I felt that asking again was unnecessary.”                                                                                                                                | 3.2% (4)    | 5.2% (30)   | 0.33    |
| “I have never forgotten such information.”                                                                                                                                 | 9.5% (12)   | 14.3% (84)  | 0.13    |
| <b>If you made an incorrect verbal statement in patient care that resulted in harm (e.g., requesting amiodarone instead of epinephrine), how would you feel afterward?</b> |             |             |         |
| “I would feel guilty because trained professionals are expected not to make errors.”                                                                                       | 85.7% (110) | 84.9% (498) | 0.78    |
| “I would not consider it severe, as mistakes are part of routine practice.”                                                                                                | 8.4% (11)   | 12.0% (70)  | 0.27    |
| “I would worry about how I am perceived by colleagues.”                                                                                                                    | 18.5% (24)  | 10.9% (64)  | 0.01    |
| “I would experience feelings of shame.”                                                                                                                                    | 47.1% (60)  | 35.5% (208) | 0.01    |
| “I would be concerned about possible sanctions.”                                                                                                                           | 42.9% (55)  | 28.7% (168) | < 0.01  |

In patient handovers, 43.1% (55) of the women reported that colleagues paid them less attention than their male counterparts. This figure rose to 50.0% among non-physician female staff and fell to 31.1% among female emergency physicians. As age increased slightly (female rho 0.30, male rho 0.23) and years of service grew (female rho 0.22, male rho 0.17), female respondents became less inclined to mention interruptions during patient handoffs. Clear gender differences emerged, especially in the observed communication patterns of fellow team members (Table 4).

**Table 4.** Experienced and owns communication behavior. From: Gender-sensitive considerations of prehospital teamwork in critical situations

| Item                                    | Female | Male | P-value |
|-----------------------------------------|--------|------|---------|
| <b>Observed communication practices</b> |        |      |         |

|                                                                                  |             |             |      |
|----------------------------------------------------------------------------------|-------------|-------------|------|
| Seeking feedback from team members following challenging patient care situations | 85.9% (110) | 82.0% (481) | 0.29 |
| Hearing unappreciative or negative remarks from colleagues                       | 9.3% (12)   | 4.9% (29)   | 0.05 |
| Experiencing more frequent interruptions during patient care and handovers       | 33.5% (43)  | 40.2% (236) | 0.16 |
| <b>Self-reported communication practices</b>                                     |             |             |      |
| Repeating assigned tasks before carrying them out                                | 36.7% (47)  | 44.3% (260) | 0.11 |
| Clearly announcing the completion of an assigned task                            | 73.4% (94)  | 72.8% (427) | 0.89 |
| Using colleagues' names when delegating or transferring tasks                    | 83.5% (107) | 79.6% (466) | 0.29 |
| Forgetting information communicated during patient handovers                     | 12.5% (16)  | 13.4% (79)  | 0.76 |
| Failing to transfer information at the appropriate time during handover          | 12.5% (16)  | 12.9% (76)  | 0.88 |
| Distorting or altering information during handover                               | 0.7% (1)    | 2.5% (15)   | 0.32 |
| Experiencing confusion under conditions of high stress                           | 5.4% (7)    | 5.9% (35)   | 0.82 |
| Misinterpreting information under high stress                                    | 7.0% (9)    | 10.2% (60)  | 0.26 |
| Expressing information inaccurately under high stress                            | 18.7% (24)  | 20.1% (118) | 0.72 |
| Reduced communication effectiveness under high stress                            | 35.9% (46)  | 31.0% (182) | 0.28 |
| Using an inappropriate tone under high stress                                    | 10.1% (13)  | 9.0% (53)   | 0.69 |
| Committing errors or slips during high-stress situations                         | 10.1% (13)  | 8.3% (49)   | 0.51 |

In general, 60.9% (76) of female participants and 55.4% (325) of male participants rated emergency physicians as effective team members ( $P = 0.41$ ). These judgments rested entirely on personal subjective views. By comparison, 92.6% (119) of women and 91.8% (538) of men considered paramedics to be strong team players ( $P = 0.66$ ). Additionally, 11.7% (15) of the female group (male 9.8%, 57;  $P = 0.49$ ) noted that particular team compositions tended to trigger more frequent communication mistakes (Table 5).

**Table 5.** Which of these causes that can lead to poor professional communication have you personally faced? From: Gender-sensitive considerations of prehospital teamwork in critical situations

| Factor | Female | Male | P-value |
|--------|--------|------|---------|
|--------|--------|------|---------|

|                                                                           |                |                |        |
|---------------------------------------------------------------------------|----------------|----------------|--------|
| Leadership-related behavior                                               | 56.9%<br>(73)  | 68.2%<br>(400) | 0.01   |
| Organizational and operational structure of work/business                 | 38.2%<br>(49)  | 54.0%<br>(316) | < 0.01 |
| Personality and behavior of colleagues                                    | 89.4%<br>(114) | 84.9%<br>(498) | 0.23   |
| Insufficient availability of training opportunities on the topic          | 26.8%<br>(34)  | 36.0%<br>(211) | 0.04   |
| Limited awareness regarding existing training opportunities on this topic | 17.9%<br>(23)  | 26.1%<br>(153) | 0.05   |
| Personal characteristics or individual traits                             | 39.8%<br>(51)  | 33.5%<br>(196) | 0.16   |

The proportion of female and male respondents in the survey accurately mirrors the current gender balance found in German emergency medical services [9]. Irrespective of gender, participants described their EMS duties as challenging and showed strong interest in communication-related matters. It is therefore reasonable to assume that professionals of both sexes hold similar professional self-perceptions, consistent with Koch *et al.*'s [10] findings. Since men and women undergo identical training programs and work under the same conditions, any observed differences in how they perceive situations or evaluate themselves are likely attributable to gender.

#### Patient harm

Reports of remembered patient harm occurred at similar rates for both men and women. Short-term harm was more commonly recalled by individuals across genders, though men reported it significantly more often. It remains unclear whether the female participants in this sample actually exercise greater caution toward patients, as suggested by Tsugawa *et al.* [11] and Rouse *et al.* [12], or whether they perceive themselves as more careful to align with societal norms. The women in the study appeared more strongly affected than the men by feelings of shame after causing harm and by anxiety about appearing incompetent. Fuzzy-trace theory offers one possible explanation, suggesting that such emotions may distort recollections [13]. According to this theory, memories can be altered or shifted in both their central meaning and finer details [13, 14]. As a result, it is conceivable that women truly cause less harm, yet because of shame or fear, they subjectively feel responsible for more incidents.

When dealing with patient harm, female staff seemed to favor a more transparent handling of mistakes. This openness may indicate greater acceptance of a culture of

candid error, which could ultimately strengthen team effectiveness over time [15]. No gender-based distinctions emerged regarding fear of penalties connected to varying levels of patient harm. Interestingly, concern about sanctions diminished as the seriousness of the harm increased, and this pattern held for both genders. One explanation could be that most participants had limited direct exposure to extremely severe cases. The study found no gender-related differences in overall risk perception.

#### Error management

Irrespective of gender, participants held high expectations regarding their own professionalism. Consequently, they tended to view errors as a significant source of emotional strain. This emotional strain could hinder open communication. The resulting psychological insecurity obstructs all initiatives aimed at enhancing workplace safety [16].

Similar proportions of women and men showed little interest in openly addressing errors. Men reported feeling ashamed of their errors significantly more often and were therefore reluctant to discuss them openly. One potential explanation for this pattern is male role conflict (between the ideal of the flawless man who shows zero tolerance for mistakes and the role of the professional paramedic, who promotes open dialogue). However, the existing data do not allow for a definitive clarification of this point.

Women appeared to be more strongly influenced by their desire to avoid appearing incompetent. Naturally, it should be noted that women often need to prove themselves in a male-dominated setting. It is plausible that women experience intensified feelings of perceived incompetence and shame because of their minority position within EMS environments [17].

Irrespective of employees' gender, an open error culture must be actively and intensively fostered in EMS settings. When feelings of supposed incompetence and shame obstruct the objective analysis of errors, these underlying barriers need to be eliminated. Adverse events, mistakes, and similar incidents should be discussed openly so that their outcomes can be properly examined and understood [18].

Committing an error in a high-risk work environment does not automatically indicate incompetence. Nevertheless, hiding an error creates the impression of incompetence.

Regarding female employees' self-perception, a further increase in their representation in the workforce could be beneficial. Such an increase might lessen their minority status and thereby enhance their self-assessments [17]. Moreover, working conditions should be adjusted to better meet the requirements of female employees [12]. For instance, supervisors could place greater emphasis on issues such as shame associated with errors and feelings of perceived incompetence during performance reviews. Staff could be supported in identifying and handling their emotions constructively. During training, paramedics should be instructed that gender does not determine competence or the likelihood of making errors; instead, these aspects are rooted in our shared human nature. All personnel working in EMS should be encouraged to embrace an open error culture, acknowledge errors they have contributed to, and actively identify early signs of potential errors in the workplace [18].

#### *Communication*

Interest in communication is equally strong across genders. Men tend to rate their own communication skills more highly. This difference might stem from the stereotypical spectrum of gender-linked behaviors [13, 18], which serves as a reference point for both men and women. The details of this behavioral spectrum are deeply embedded in society's collective awareness, perpetuated by popular scientific narratives and partly grounded in research findings from the second half of the 20th century [19-21]. Expectations regarding typical female communication patterns influence our judgments more strongly than women's actual performance [1]. However, the results of those earlier studies may have been affected by the unequal social positions occupied by women and men during that period. In general, women's achievements are frequently underestimated in gender-specific ways when their performance is not evaluated in a truly objective manner [22].

Furthermore, Bergmann *et al.* conducted simulation studies demonstrating that substantial cognitive effort is required to disentangle the influence of female gender from assumptions about competence. This linkage persists widely across the population [23]. To address this challenge, we advocate for systematic training in reflecting on one's own communication and on others' communication. Contemporary insights from communication research should be integrated into such programs, and outdated thinking patterns must be dismantled over time.

Irrespective of gender, the primary factor associated with deficient communication was the multiplicity of tasks during patient care and handoffs. Although female participants were more inclined to report inattention from their conversation partners, no notable gender differences emerged regarding complaints about interruptions during patient handovers. Koch *et al.* clearly demonstrated that such self-assessments can be misleading when it comes to interruptions in one's own speech flow and the allocation of nonverbal attention by one's dialogue partner [10]. Nevertheless, despite these observations, we maintain that targeted interventions can be designed based on the substantial number of reported conversational disruptions.

Standardized and focused communication practices, along with better-coordinated teamwork, could help decrease cognitive load and reduce adverse events. Consistent with the sterile cockpit rules applied in aviation, specific rules of conduct should be established for EMS teams operating in the field [24]. In aviation, these rules emphasize the importance of concentrating on the control and execution of tasks in demanding situations (for example, during take-off or landing). Both genders should communicate clearly and explicitly, employing precise language, I-statements, and closed feedback loops. Additionally, we recommend that all involved parties actively focus on the speaker, allow them to finish speaking, and maintain consistency between verbal and nonverbal attention.

A standardized language protocol for patient handoff should be implemented regardless of gender. This measure could help mitigate the influence of disruptive personality traits among participants in handovers as well as unequal communication dynamics (such as between paramedics and emergency physicians, paramedics and nurses, or prehospital emergency physicians and emergency room physicians). The soft skills required for this must be embedded as a core component of professional training across all relevant professions.

#### *Team communication*

Female participants reported receiving less respectful and appreciative communication from others. Regrettably, this study cannot pinpoint the origin of such communication (whether from colleagues, emergency department staff, patients, or family members). A possible team-level explanation is that women form a minority within EMS. This minority standing may lead to lower status on teams and, in turn, to less respectful

interactions. Leaders of emergency medical services and emergency department directors should actively promote respectful dialogue across all team members. That said, both patient outcomes and overall teamwork clearly benefit from gender-diverse teams [15]. Drawing on the critical mass theory, recruiting substantially more women into EMS roles would help drive meaningful cultural shifts [25].

Both men and women employed closed-loop communication to a similar degree [26]. Nevertheless, there is still significant potential to increase the consistent application of this technique. Information omission occurred independently of gender. Although men showed a slightly higher tendency to alter details during handovers, only a very small number of participants (in the low single digits) were involved. A similar pattern emerged concerning the effects of stress on communication volume and accuracy. Taken together, these observations indicate that women and men rely on comparable cognitive processing mechanisms and respond similarly to surrounding conditions. Reduced communication and vague phrasing under pressure pose substantial dangers to patient safety. For this reason, we see no need for gender-targeted educational interventions. Instead, the priority should be building universal skills for managing stressful situations effectively. Crew resource management programs should also be introduced to enhance communication among all emergency personnel. Targeted training in team communication, open to everyone regardless of gender, is strongly advised.

#### *Teamwork*

Slightly more than half of the participants considered emergency physicians to be effective team players, and this view did not differ between men and women. In contrast, over 90.0% of respondents from both genders rated paramedics as strong team players.

Men and women identified largely the same reasons for ineffective teamwork. Men, however, noted marginally more issues related to leadership, work planning, and access to training. This outcome nevertheless reinforces the idea that underlying assumptions about teamwork problems are mostly independent of gender. Prehospital findings thus diverge somewhat from clinical settings, where female residents frequently encounter greater difficulty earning recognition from their teams [27]. In EMS recruitment processes, personality characteristics deserve far greater weight. This is especially true when

hiring emergency physicians, who automatically take on leadership responsibilities in the German system; leadership-relevant traits should be carefully evaluated. Existing operational and organizational frameworks should also be scrutinized for elements that either support or undermine communication. Participants were comparatively less likely to blame problems on a lack of theoretical knowledge about good communication practices. Notably, the German paramedic training curriculum [28] already includes modules on team communication, while physician training does not. Irrespective of gender, respondents linked difficulties more to the practical application of this knowledge in routine work. Therefore, every EMS leader and frontline employee bears responsibility for ensuring that established principles of effective teamwork are actively practiced each day.

Communication challenges in EMS generally show little association with staff members' gender. Variations tend to surface instead in how individuals perceive their personal shortcomings. Women appear to face stronger internal barriers when discussing mistakes in patient care or communication breakdowns. Admitting personal errors openly proves more difficult for women than for men. According to study participants, individual personality traits of team members play a major role in successful collaboration. Gender itself, however, does not emerge as a relevant factor for high-quality teamwork. Similar observations were reported by Baker in military contexts [29].

We conclude that cultivating a culture of constructive error management and communication is vital to strengthening teamwork. Work processes could be refined to better accommodate the needs of female staff. Two central justifications for this are that women experience heightened shame regarding communication weaknesses and greater anxiety about potential sanctions compared with men. When shame or fear blocks information sharing, team-based communication and cooperation can suffer. Practical steps might include conducting error discussions in secure, non-punitive settings, handling fears with greater sensitivity during reviews, and shielding staff from undue sanctions. These efforts should be reinforced through ongoing training focused on error management, team communication, and constructive discussion practices.

#### *Limitations*

Given the study design, it is important to recognize that ambulance personnel who were particularly interested in communication topics may have been more inclined to join the research. Individuals with lower interest or motivation in this area might have chosen not to participate.

In addition, self-evaluations are prone to the halo effect, which creates an overly favorable view of one's own abilities [30]. Assigning oneself to a gender category can therefore produce distorted internal judgments when stimuli align sufficiently with expectations. Such processes may give rise to false memories, further skewing self-perceptions [28].

The research did not assess differences in core linguistic competencies among EMS personnel, including clarity of expression, range of vocabulary, and overall language comprehension, all of which affect professional communication.

## Conclusion

Patient harm, communication breakdowns, and teamwork effectiveness in EMS environments are largely unrelated to the gender of employees. Where differences do appear, they more commonly relate to how staff members view their own deficiencies. Women encounter greater hurdles when addressing errors in patient care or failed communication. Discussing personal mistakes openly is harder for women than for men. Conversely, men may sometimes avoid discussing errors because it can provoke feelings of shame. Study participants emphasized that the personalities of individual team members are key to productive teamwork. Gender, by comparison, is not a meaningful determinant of teamwork quality. We conclude that actively developing a positive culture around errors and communication—one that eliminates shame and fear of seeming unprofessional—is essential for reducing patient harm. Further increasing the number of women in EMS would help alleviate the psychological burden associated with minority status. All EMS personnel should internalize the understanding that gender does not define their capacity for effective teamwork; what truly matters is their individual mindset.

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