BMC Emergency Medicine

RESEARCH

Open Access

Design and psychometric testing of a moral intelligence instrument for pre-hospital emergency medical services personnel: a sequential-exploratory mixed-method study

Fateme Mohammadi[1], Rasoul Salimi[2], Salman Khazaei[3] and Mostafa Bijani[4,5*]

Abstract

Background Moral intelligence is a significant and influential factor in the delivery of principled and high-quality care. This is because moral intelligence is the ability to recognize and be sensitive to moral issues, which contributes to the organization of appropriate behavior in the face of moral issues. This is particularly pertinent given that pre-hospital emergency medical services personnel (prehospital EMS personnel) frequently encounter stressful and tension-filled situations. Thus, intelligent reasoning and ethical conduct at the scene of an incident are of paramount importance. Also, there is no special tool available for measuring the moral intelligence of prehospital EMS personnel. Hence, there is a necessity for the design and psychometric evaluation of a specialized instrument to assess the moral intelligence of prehospital EMS personnel with a sequential exploratory approach. Accordingly, the present study was conceptualized and implemented with the objective of designing and psychometrically evaluating an instrument for measuring the moral intelligence of prehospital EMS personnel.

Methods This study employed a mixed-methods design with a sequential exploratory approach. The research was executed in two distinct phases. In the first phase, a conventional content analysis method was utilized to explore narratives expressed by 34 prehospital EMS personnel. It was in the second phase where the psychometric properties including face validity, content validity, construct validity and reliability were measured. A total of 210 prehospital EMS personnel participated for exploratory and confirmatory factor analysis. Kaiser-Meyer-Olkin, Bartlett's tests, Cronbach's alpha coefficient, as well as test-retest were used for data analysis.

Results The moral intelligence of prehospital EMS personnel was conceptualized as emotional stability coupled with intelligent reasoning, oriented towards the provision of ethical care and moral courage in patient advocacy. In the exploratory factor analysis (EFA) phase, the questionnaire was distilled into three dimensions: "Emotional stability combined with intelligent reasoning" (11 items), "Ethical care" (12 items), and "Ethical courage" (7 items), accounting for 74.38% of the observed variance. Confirmatory validity also confirmed the structure of the tool obtained from the previous step. The instrument's reliability, as assessed by Cronbach's alpha coefficient, was reported at 0.95 for the entire scale.

*Correspondence:
Mostafa Bijani
bizhani_mostafa@yahoo.com

Full list of author information is available at the end of the article

Conclusion The Moral Intelligence Scale for prehospital EMS personnel demonstrated acceptable psychometric properties. Consequently, healthcare administrators may employ this instrument to assess moral intelligence in prehospital EMS personnel. Furthermore, when deemed necessary, they can identify and implement the most appropriate strategies, including educational interventions, to enhance moral intelligence among prehospital EMS personnel. Thus, it is suggested that future studies explore the psychometric properties of this tool with a larger sample size and in different cultures.

Keywords Moral intelligence, Emergency medical services, Psychometric evaluation

Introduction

Professional competence remains a contentious issue in medical sciences, primarily because the foremost responsibility of these professions is to deliver healthcare services of the highest quality to patients, with the aim of preserving and enhancing community health [1]. As such, the acquisition and enhancement of professional competence are considered fundamental aspects of medical professions [2]. In medical sciences, professional competence is defined as the acquisition of specialized knowledge and skills in patient care and treatment, the ability to establish constructive interactions, proficiency in crisis management, and adherence to medical ethics principles [3]. It is noteworthy that one of the most crucial dimensions of medical ethics, which influences ethical attitudes and performance in critical situations, is moral intelligence [4].

Moral intelligence is defined as the capacity and ability to discern right from wrong, possess strong ethical values, and act upon them [5]. This concept posits that ethical principles are not hereditary; rather, individuals learn how to be virtuous [6]. Indeed, moral intelligence, by shaping a positive image in the human mind, is instrumental in developing cognition and sensitivity towards ethical issues and facilitates the organization of behaviors in crisis situations [7]. It assists individuals in exhibiting intelligent and optimal behaviors [8, 9]. Furthermore, moral intelligence contributes to the formation of robust teamwork and enhanced productivity while deterring criminal actions [10]. Research indicates that tranquility, trust, cohesion, and job performance improve when managers and employees possess moral intelligence skills. Conversely, low moral intelligence can lead to psychological and physical disorders such as anxiety disorders, stress, and ineffective stress management [9–12]. In this context, prehospital EMS personnel face numerous ethical conflicts and challenges, such as treatment or transfer refusal by patients or their companions, violence and assault, avoidance of cardiopulmonary resuscitation, lack of knowledge about patients' physical and psychological conditions and patients whose conditions are critical as well as unstable and who are in a life-threatening situation during care provision [13–15]. Among these, the most important challenges of prehospital EMS personnel are centered around end-of-life care and palliative care, intoxicated and non-compliant patients, scene management and patient and personal safety and communication with linguistically and cultural diversity patients [16]. Adherence to ethical principles and the development of moral intelligence lead to enhanced service quality, increased employee commitment and responsibility, and ultimately, improved satisfaction among service recipients and organizational stability [17]. Therefore, adherence to professional ethical principles and the acquisition of moral intelligence in healthcare are essential for promoting patient health and satisfaction [18]. Mahmoudirad et al. (2020) asserted in their study that the development of moral intelligence among healthcare providers is effective ln improving safe care as well as reducing physical and psychological harm to patients [19]. Additionally, Bijani et al. (2021) stated that knowledge, experience, and clinical skills contribute to the professional abilities of prehospital EMS care personnel in clinical decision-making. Proficient teamwork and time management skills can prevent confusion when dealing with a large number of casualties requiring care. Effective clinical decision-making skills not only assist personnel in making correct decisions but also enhance their flexibility and enable them to adapt to challenging and unpredictable situations [20]. The most prominent and widely used instruments for assessing moral intelligence are those developed by Lennick. et al. Moral Intelligence Questionnaire, though initially designed to measure the moral intelligence of organizational managers, has subsequently been employed for various individuals and age groups. This questionnaire comprises 40 questions across 10 dimensions (acting based on principles, values, and beliefs; employee truthfulness; perseverance for the right; employee commitment fulfillment; personal decision responsibility; acknowledging mistakes and failures; service responsibility; employee interest and attention to customers; employees' ability to forgive their own mistakes; employees' ability to forgive customer mistakes) and has demonstrated appropriate validity as well as reliability [21, 22].

Prehospital EMS personnel encounter numerous challenging and stressful situations that significantly impact their performance and moral intelligence. Accordingly, the development of a specialized instrument for assessing their moral intelligence appears necessary. On this

basis, the present study was designed with the objective of developing and psychometrically evaluating an instrument for measuring the moral intelligence of prehospital EMS personnel.

Methods

This study employed a mixed-methods approach with a sequential exploratory design. In the initial phase, interviews were conducted with 34 prehospital EMS personnel, from which key themes were identified and analyzed using conventional content analysis. In the quantitative phase, the psychometric properties of the instrument were examined to assess its validity and reliability.

Phase I. instrument development

Qualitative stage

In this phase of the present study, the researchers sought to define and elucidate the concept of ethical intelligence prehospital EMS personnel. To achieve this objective, they employed the qualitative content analysis method, which is particularly efficacious in explicating phenomena within the cultural context of perspectives held by individuals who have long-term engagement with the subject matter [22, 23]. Note that conventional content analysis, one of the most prevalent and significant qualitative content analysis methods, facilitates a more profound understanding of how individuals perceive and interpret a phenomenon by identifying both commonalities and differences in their constructions of meaning [22]. Furthermore, conventional qualitative content analysis proves to be an appropriate methodology for deriving reliable and valid results from textual data, thereby enabling the generation of new knowledge and innovative insights into the phenomena under investigation [23–25]. Thus, a qualitative approach utilizing conventional content analysis was adopted to explore this subject.

The study employed purposeful sampling to select 34 prehospital EMS personnel from three cities, in Iran's west and southeastern regions. Notably, purposeful sampling is a method used in qualitative research to identify and select the individuals or groups of individuals who are especially knowledgeable about or experienced in a phenomenon [26]. Inclusion criteria consisted of willingness to participate, a minimum of 12 months' work experience in city and road emergency bases, Iranian citizenship, and proficiency in Farsi. Data collection methods encompassed face-to-face, semi-structured interviews. Interviews were conducted with the 34 participants in quiet prehospital settings during their off-duty hours, with the time and location selected according to participants' preferences.

The in-depth interviews were designed to elucidate participants' perspectives comprehensively. Each interview commenced with general inquiries, such as "Can you describe a typical workday?" and "What does professional ethics mean to you?", before proceeding to more specific questions: "What factors influence your ethical performance?", "What does moral intelligence signify to you?", and "In your opinion, what factors contribute to moral intelligence?". Follow-up questions were posed based on respondents' answers to enhance clarity, including "Could you elaborate further?", "What do you mean by that?", and "Can you provide an example?". Additional probing questions were formulated to explore other aspects of moral intelligence as they emerged. With participants' informed consent, interviews were audio-recorded. Each interview lasted between 75 and 90 min. Immediately following each interview, the first author conducted multiple reviews of the recordings to gain a comprehensive understanding and identify key insights, which informed the planning of subsequent interviews. In this study, the interviews were continued until all the authors agreed that saturation had been established and that no new codes, categories, or themes would be created and saturation has occurred. This is because saturation occurs when there are no new categories emerging where the categories are saturated based on their characteristics and dimensions [26, 27]. Supplementary file1: Interview Guide and Question.

Data were analyzed using MAXQDA software version 22. The interview data underwent conventional content analysis through a five-step process: (1) immersive review of each text to acquire deep insights into the phenomenon under study; (2) determination of meaning units based on study objectives and questions; (3) extraction of important points as open codes, considering both explicit and implicit meaning units; (4) categorization of codes under broader titles based on similarities and differences; and (5) continued analysis until themes were extracted [28, 29].

Qualitative trustworthiness refers to the meticulousness, consistency, and transparency of the research. It is the application of systematic, disciplined, and stringent methods to ensure the credibility, dependability, confirmability, and transferability of research findings [26].

In this study to ensure the trustworthiness of the process, Guba and Lincoln's criteria were employed [30]. The credibility and reliability of the findings were enhanced through various methods, including a comprehensive examination of data sources such as semi-structured interviews and field notes, as well as prolonged engagement with the data. Furthermore, member checking and peer checking were utilized to validate the extracted concepts and themes. It was through this process that 6 participants and 4 peers confirmed the alignment of the findings with their own understandings and interpretations. The transferability of the study was ensured by providing a thorough description of the participants,

interviews, and analysis. Confirmability was achieved through accurate recording of participant narratives and the provision of a detailed study report, thereby facilitating the possibility of follow-up by other researchers. The analysis yielded 798 codes, which were subsequently categorized into 31 subcategories, 11 categories, and three main themes: "Emotional stability combined with intelligent reasoning," "Ethical care," and "Ethical courage" (Fig. 1).

Item generation

The development of the assessment scale started with the generation of 40 potential items derived from the qualitative data, encompassing the primary themes that emerged. In addition to these, 8 supplementary items were incorporated based on findings from the literature review [14, 21, 22, 24], culminating in an initial pool of 48 items. Subsequently, the research team conducted a thorough evaluation of the items, during which 7 were identified as redundant and consequently eliminated. This rigorous process resulted in a final set of 41 items, which were then categorized into three distinct dimensions: "Emotional stability combined with intelligent reasoning" (15 items), "Ethical care" (18 items), and "Ethical courage" (8 items). It was through this meticulous item generation and refinement process that the assessment scale took its final form.

Phase II. psychometric properties

Quantitative stage

Face validity (qualitative and quantitative face validity)

Qualitative face validity The revised instrument, comprising 41 items, was subsequently administered to 25 emergency medical technicians, adhering to the same inclusion criteria employed in Phase 1. These participants were tasked with evaluating each item in terms of its difficulty, relevance, grammatical correctness, vocabulary, and overall intelligibility. Through this assessment, the participants affirmed the simplicity, clarity, and topical relevance of the items.

Quantitative face validity

In addition to this qualitative evaluation, an impact score was calculated for each item. This quantitative assessment involved participants rating each item on a five-point Likert scale, ranging from one (denoting "very little" impact) to five (indicating "very much" impact). A score exceeding 1.5 was deemed acceptable, in accordance with established methodological standards [31].

Content validity

Qualitative content validity

The assessment of content validity was conducted through consultation with a panel of experts comprising 15 professionals, including specialists in instrument development, holders of doctoral degrees in nursing, and emergency medical technicians. This expert panel was tasked with evaluating the items in terms of language,

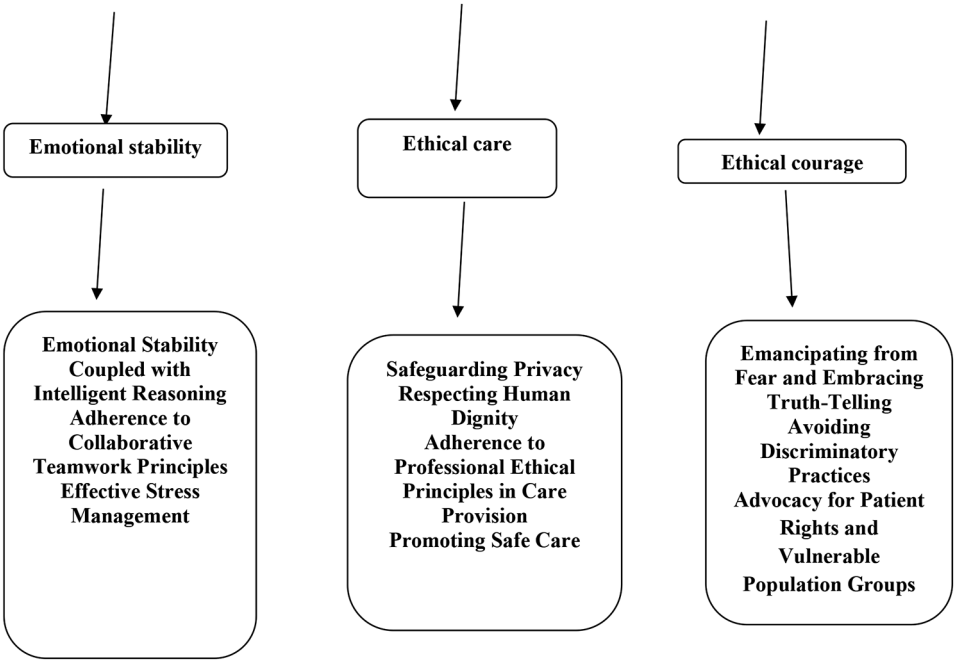

Fig. 1 The main themes and subthemes of the moral intelligence Scale for prehospital EMS personnel

comprehensibility, and appropriateness to the Iranian cultural context. Based on their evaluation, the panel recommended the removal of three items, resulting in a set of 38 questions for quantitative analysis of quantitative content validity using both the content validity ratio (CVR) and content validity index (CVI) [25, 31].

Quantitative content validity

To facilitate this process, the instrument was returned to the panel with a request to evaluate the items based on their relevance and importance to the study's subject matter. According to the Lawshe table, the acceptable CVR threshold was established at 0.49 [31, 32]. It was at this stage that five items with a CVR of 0.33 were eliminated from the study. Subsequently, the content validity index (CVI) was assessed for each of the remaining items. The revised instrument was then redistributed to the panel members, who were instructed to rate each item's relevance, simplicity, and clarity on a four-point Likert scale ranging from 1 to 4. The CVI was calculated not only for individual items but also for the instrument as a whole. For the purposes of this study, a CVI value exceeding 0.8 was deemed acceptable [26]. However, it was found that three items scored below this threshold and were consequently removed from the instrument.

Item analysis

Based on the preceding stage, a 30-item instrument was developed. Thirty eligible prehospital EMS personnel were enlisted to self-rate on these items using a five-point Likert scale (1 = Never, 2 = often, 3 = sometimes, 4 = rarely, 5 = Always). The inter-item correlation coefficients ranged from 0.3 to 0.7, with the total score across all items exceeding 0.3 [26]. As all items met these predetermined criteria, it was determined that no further item deletion was necessary. The final scale comprised three subscales: "Emotional stability combined with intelligent reasoning" (11 items), "Ethical care" (12 items), and "Ethical courage" (7 items) (Table 1).

Contrast validity (exploratory factor analysis, convergent validity)

The minimum sample size recommended for exploratory factor analysis (EFA) typically falls between 3 and 10 cases per questionnaire item [25]. However, to prioritize the robustness of the EFA in this study, 210 prehospital EMS personnel per questionnaire item were recruited. To achieve the most appropriate structure, the following criteria were considered: eigenvalues exceeding 1.0, factor loadings greater than 0.4, and the 'elbow criterion' for eigenvalues [26–33]. The Kaiser-Meyer-Olkin (KMO) test and Bartlett's test of sphericity were performed to evaluate sample adequacy. For exploratory factor analysis, a KMO index closer to 1 indicates greater sampling adequacy, while Bartlett's test should yield a p-value less than 0.05. In this study, as all factor loadings exceeded 0.4, no item elimination was necessary.

Confirmatory factor analysis

Confirmatory factor analysis was implemented using 210 prehospital EMS personnel other than the ones who were involved in the exploratory factor analysis stage. Confirmatory factor analysis was conducted using AMOS 22 software, employing several indices to evaluate the model's effectiveness. To ascertain the model's adequacy, the following stringent criteria were applied: a goodness of fit index (GFI) exceeding 0.90, a root mean square error of approximation (RMSEA) below 0.08, a Tucker Lewis Index (TLI) surpassing 0.90, and a comparative fit index (CFI) exceeding 0.90, in accordance with established conventions [25–32].

Reliability

To ensure the reliability of the instrument, both Cronbach's alpha coefficient and test-retest reliability analysis were employed. Internal consistency reliability was evaluated by calculating Cronbach's alpha coefficient with a sample size of 200 participants. An alpha coefficient exceeding 0.7 was deemed acceptable. For test-retest reliability, the intra-class correlation coefficient (ICC) was calculated using data collected from 100 participants at a two-week interval [26–33].

Results

A total of 420 emergency medical technicians were recruited using a convenience sampling from three cities and 15 prehospital emergency bases in Iran's west and southeastern regions. The mean participant's age was 36.75 ± 2.51, ranging from 24 to 49 years. Most individuals participating in this phase were men (57.33%), married (92.00%), had a bachelor's degree (84.00%), had about 16.02 + 1.28 years of work experience.

Construct validity (exploratory factor analysis)

Exploratory factor analysis, employing varimax rotation, identified three principal factors, as reported in Table 1. These factors collectively accounted for 71.54% of the observed variance. The factor loadings for individual items ranged from 0.74 to 0.90. The three extracted factors were: "Emotional stability combined with intelligent reasoning" (11 items), "Ethical care" (12 items), and "Ethical courage" (7 items). These factors broadly corroborated the main themes identified in the qualitative data, as depicted in Fig. 1.

Construct validity (confirmatory factor analysis)

The confirmatory factor analysis yielded a model comprising three factors: "Emotional stability combined

Table 1 Varimax factor loadings of the items of the moral intelligence scale for prehospital EMS personnel

Factors' names	Item	Communality	Factor loading
Factor 1: Emotional stability combined with intelligent reasoning	1. I conduct a primary assessment of the incident scene.	0.86	0.901
	2. I establish care priorities at the incident location.	0.085	0.898
	3. I operate in coordination with the medical team on site.	0.83	0.892
	4. I maintain effective communication with colleagues at the scene.	0.80	0.885
	5. I calmly and verbally direct bystanders and onlookers away from the incident area.	0.76	0.878
	6. I endeavor to mitigate stress within the incident environment.	0.71	0.872
	7. I strive to maintain composure and equanimity at the scene.	0.70	0.870
	8. I exercise control over my personal fear and emotional responses during the incident.	0.68	0.766
	9. I demonstrate initiative at the incident location.	0.63	0.751
	10. I aim to deliver optimal performance within the shortest timeframe possible.	0.62	0.747
	11. I attempt to alleviate patient stress.	0.61	0.744
Factor 2: Ethical care	12. I adhere to safety protocols in patient care.	0.83	0.892
	13. I ensure that care procedures (interventions) do not cause harm to patients.	0.82	0.888
	14. I endeavor to establish patient trust.	0.81	0.886
	15. I interact with patients in a respectful and courteous manner.	0.79	0.883
	16. I demonstrate respect for patients' religious beliefs and perspectives.	0.77	0.880
	17. I obtain patient consent prior to initiating any care procedures or physical contact.	0.75	0.875
	18. I respect patients' gender identity.	0.72	0.873
	19. I maintain patient confidentiality.	0.70	0.869
	20. I honor patients' right to autonomy and decision-making.	0.68	0.765
	21. I refrain from disclosing incident details to unauthorized parties.	0.64	0.753
	22. I address patients using appropriate and respectful language.	0.63	0.750
	23. I provide necessary explanations to patients or their companions before implementing care procedures.	0.60	0.740
Factor 3: Ethical courage	24. I uphold truthfulness, even when potentially disadvantageous to myself.	0. 80	0.884
	25. I accept responsibility for my personal errors.	0.78	0.891
	26. I advocate for the rights of patients and vulnerable groups at the incident scene.	0.74	0.873
	27. I deliver care without discrimination.	0.70	0.769
	28. I report any errors or negligence at the incident scene to the appropriate authorities.	0.66	0.763
	29. I am receptive to constructive criticism.	0.62	0.746
	30. I address my personal medical and care-related negligence in accordance with established laws and regulations.	0.61	0.743

with intelligent reasoning" (11 items), "Ethical care" (12 items), and "Ethical courage" (7 items). The correlations between these factors and the total ethical intelligence score were as follows: Emotional stability combined with intelligent reasoning (0.91), Ethical care (0.90), and Ethical courage (0.92). Additionally, significant inter-factor correlations were observed: between Emotional stability combined with intelligent reasoning and Ethical care (0.90), between Emotional stability combined with intelligent reasoning and Ethical courage (0.91), and between Ethical care and Ethical courage (0.91).

The model's goodness of fit was substantiated by a chi-square value of 521.47 ($df = 86$, $p = 0.034$). Furthermore, the Goodness of Fit Index (GFI) was 0.93, indicating a good fit with the uni-dimensional model of the PTES construct. Additional indices were evaluated to further validate the model: Root Mean Square Error of Approximation (RMSEA) = 0.041, Comparative Fit Index (CFI) = 0.93, Normed Fit Index (NFI) = 0.90, and Tucker-Lewis Index (TLI) = 0.92. All these indices collectively affirmed that the extracted model provided a good fit for the ethical intelligence scale, as illustrated in Fig. 2.

Reliability

The reliability of the questionnaire was evaluated using Cronbach's alpha coefficient for internal consistency and test-retest reliability. The Cronbach's alpha coefficient for the entire 30-item instrument was 0.95, while the coefficients for the three subscales—Emotional stability combined with intelligent reasoning, Ethical care, and Ethical courage—were 0.96, 0.95, and 0.95, respectively. To assess test-retest reliability, 100 prehospital EMS personnel were invited to complete the questionnaire again after a two-week interval. The test-retest correlations for each subscale were as follows: Emotional stability combined with intelligent reasoning (0.90), Ethical care (0.91), and Ethical courage (0.90). The overall test-retest correlation coefficient for the entire instrument was 0.90 (Table 2).

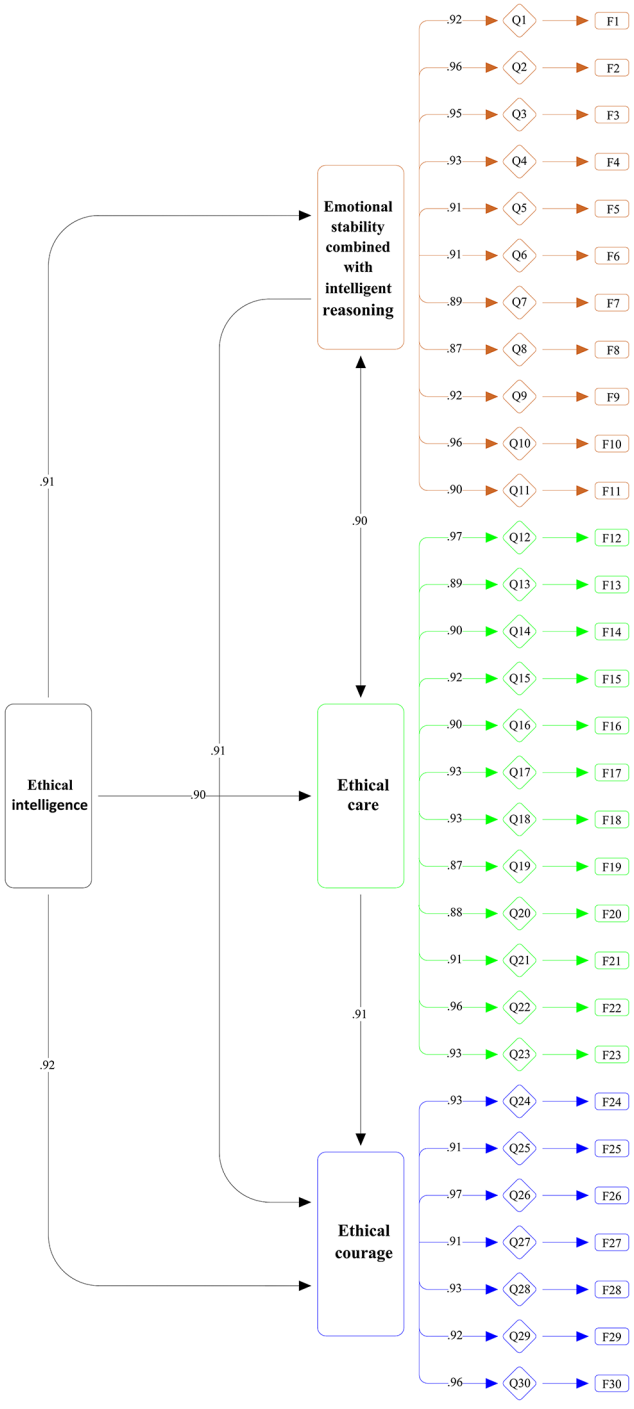

Fig. 2 Confirmatory factor analysis

The final instrument, comprising 30 items, was structured into three subscales: "Emotional stability combined with intelligent reasoning" (11 items), "Ethical care" (12 items), and "Ethical courage" (7 items). All items were scored on a five-point Likert scale, ranging from 1 (never) to 5 (always). The instrument was designed to be completed within 10 min, with total scores ranging from 30 to 150. Higher scores are indicative of greater moral intelligence. For interpretative purposes, the range of scores was categorized as follows: 30–70 (low moral intelligence), 71–110 (moderate moral intelligence), and 111–150 (high moral intelligence). The English language version of the moral intelligence Scale for prehospital EMS personnel presented in supplementary file2. Also, the Persian language version of the questionnaire presented in related file.

Table 2 Mean (standard deviation) and intra-class correlation coefficient (ICC) values for the domains of the moral intelligence scale for prehospital EMS personnel

Factor	Dimensions	Mean ± SD	ICC	Confidence interval
1	Emotional stability combined with intelligent reasoning	45.12(2.65)	0.90	0.58–0.90
2	Ethical care	48.69(2.38)	0.91	0.54–0.96
3	Ethical courage	26.53(2.46)	0.90	0.57–0.94
Moral intelligence Scale (total)		120.34(2.49)	0.90	0.56–0.932

Discussion

The moral intelligence of pre-hospital emergency medical technicians was defined as emotional stability combined with intelligent reasoning aimed at providing ethical care and moral courage to support patients. Subsequently, based on the derived conceptual framework, an instrument was designed and psychometrically evaluated for measuring the moral intelligence of pre-hospital emergency medical technicians. This scale was initially designed with 41 items across three dimensions. During the content validity ratio assessment, 5 items were eliminated, and in determining the content validity index, 4 additional items were removed, resulting in a 32-item scale for face validity evaluation. In the face validity determination, 2 items had impact scores below 1.5 and were subsequently removed. In the exploratory validity phase, the questionnaire structure was inferred in three dimensions: "Emotional stability combined with intelligent reasoning" (11 items), "Ethical care" (12 items), and "Ethical courage" (7 items). The confirmatory validity phase corroborated the instrument's structure from the previous stage without item removal or relocation. The scale's reliability was reported as appropriate using Cronbach's alpha and test-retest methods. These findings suggest the suitability of this instrument for assessing the moral intelligence of pre-hospital emergency medical technicians in the Iranian context. Note that specialized instruments for measuring moral intelligence, as a crucial dimension of healthcare providers' professional competence, are not readily available to researchers. In this regard, four instruments have been employed in studies to evaluate the moral intelligence and ethical competence

of healthcare providers, which will be comprehensively discussed herein.

The "Competence Scale for Health Care Professionals in the Cardiac Operating Room" was developed by Mohammadi et al. (2024) in Iran to assess the moral intelligence of healthcare providers in cardiac operating rooms. This instrument comprises 30 items across three dimensions: "moral sensitivity" (16 items), "moral commitment" (9 items), and "moral courage" (5 items). The scale demonstrates appropriate face and content validity. In the exploratory validity phase, the factor loadings of the items ranged from 0.41 to 0.93, where three factors were identified, explaining 73.04% of the observed variance. The confirmatory validity phase corroborated the instrument's structure without item removal or relocation. The instrument's reliability, calculated using Cronbach's alpha coefficient, was reported as 0.94 for the entire scale. The test-retest examination revealed no statistically significant difference between pre-test and post-test moral intelligence scores ($p = 0.51$) [25]. Although this instrument exhibits suitable validity and reliability for assessing healthcare providers' moral intelligence, the working environment of pre-hospital emergency medical technicians differs substantially from that of the operating room. Prehospital EMS personnel need to evaluate accident scenes within a limited timeframe, employing emotional control and intelligent reasoning to provide the most ethical care to patients about whom they have no prior knowledge or information. Therefore, designing a specific instrument to measure the moral intelligence of prehospital EMS personnel could prove effective and efficient.

One of the most widely used instruments for evaluating healthcare providers' moral intelligence is the Lennick, Kiel. This questionnaire consists of 40 items across 10 dimensions (acting based on principles, values, and beliefs; employee honesty; perseverance for rights; employee commitment to promises; personal decision responsibility; acknowledging mistakes and failures; service responsibility; employee interest and attention to customers; employee ability to forgive their own mistakes; employee ability to forgive customer mistakes). This questionnaire demonstrates appropriate face, content, and construct validity, as well as reliability [21]. Although this instrument has been utilized for years to measure moral intelligence in various environments and possesses suitable validity and reliability, it was initially designed to assess the moral intelligence of organizational managers. While it has subsequently been applied to individuals in diverse situations, it does not specifically address the moral intelligence of pre-hospital emergency medical technicians and, hence, does not provide precise information for identifying and elucidating primary challenges.

The Ethical Competency Assessment Scale for Home Care Nurses was developed by Asahara et al. in 2013 in Japan. This instrument is composed of 45 items across five dimensions: ethical sensitivity, ethical judgment, ethical motivation, ethical character, and ethical decision implementation. The scale demonstrates appropriate face and content validity. In the exploratory validity phase, the factor loadings of the items ranged from 0.41 to 0.93. Additionally, the instrument exhibits acceptable confirmatory validity, and its reliability for the five dimensions, ranges from 0.78 to 0.93, which is deemed acceptable and appropriate [28]. This aligns with the present study. However, it is important to note that this instrument was designed to assess the ethical competency of home care nurses within a cultural context distinct from that of Iranian society. Furthermore, the needs of patients in sudden emergencies and disasters differ significantly from those of patients receiving home care. Moreover, home care environments are generally more controlled, with caregivers experiencing less stress and tension, which may influence their intelligent reasoning and subsequent provision of ethical care. Thus, while some items evaluating ethical competency may be similar between the two studies, the disparate care environments and patient needs necessitate a more specialized instrument.

Another prominent scale used to measure healthcare providers' ethical competence is the Competency Inventory for Registered Nurses (CIRN). This instrument assesses professional competence using 55 items across seven dimensions: critical thinking and research aptitude, clinical care, leadership, interpersonal communication, legal and ethical practice, professional development, and education. Only one dimension, legal and ethical practice, with eight items, pertains to ethical competence. Some items in this instrument bear similarity to those in the scale developed in the present study. The CIRN demonstrates acceptable Content Validity Ratio (CVR), Content Validity Index (CVI), construct validity, and reliability, aligning with the current study [34]. However, despite its suitable validity and reliability, it was not exclusively designed to assess healthcare providers' ethical competence. Further, ethical competence is a concept contingent upon culture, organizational climate, and environment. The high-stress, high-pressure environment of accident scenes underscores the importance of developing a specific instrument to measure the moral intelligence of prehospital EMS personnel.

Limitations

One limitation of the present study was that participants were pre-hospital emergency medical technicians from urban and road-based stations affiliated with public healthcare providers. Inclusion of pre-hospital emergency medical technicians from private healthcare

providers could broaden the scope of our findings. Another limitation was the use of individual interviews for data collection in the qualitative component (first stage) of the study, as employing other data collection methods could yield richer results for this qualitative research. Therefore, it is recommended that further studies be conducted on assessing the moral intelligence of pre-hospital emergency medical technicians using additional qualitative data collection methods, such as observation and focus groups, in conjunction with individual interviews. Accordingly, it is suggested that the psychometric features of this tool be evaluated in emergency medical technicians in private centers with a larger sample size, so that the challenges and needs of these personnel can be identified and training programs can be planned to improve their moral intelligence.

Conclusion

The moral intelligence of prehospital EMS personnel was defined as possessing emotional stability combined with intelligent reasoning aimed at providing ethical care and demonstrating moral courage to support patients. The instrument developed in this study, encompassing three dimensions - "Emotional stability combined with intelligent reasoning," "Ethical care," and "Ethical courage" - demonstrated appropriate face, content, exploratory, and confirmatory validity. Consequently, healthcare managers can utilize this instrument to evaluate the moral intelligence of prehospital EMS personnel. Furthermore, it is suggested that the psychometric properties of this instrument be tested with a larger population of prehospital EMS personnel across various cultures, to identify the needs and plan appropriate educational interventions for improving their competence and moral intelligence.

Abbreviations

CVI Content validity index
CVR Content validity ratio

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12873-025-01171-6.

Supplementary Material 1

Supplementary Material 2

Acknowledgements

The authors appreciate prehospital EMS personnel who participated in the study. Also, the authors would like to appreciate Prehospital Emergency Research Center (PERC), Tehran, Iran, for supporting this research.

Author contributions

MB and FM was involved in the conception and organization of the study. MB, RS and MK, were involved in the execution and data collection of the study; FM, MK and MB participated in statistical analysis design and/or execution. All authors contributed to the preparation, critical review and all of them approved the final manuscript.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not for profit sectors.

Data availability

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate

The Research Center in western Iran granted ethical approval for this study (IR.UMSHA.REC.1403.561). All methods were conducted in accordance with the relevant guidelines and regulations, and adhered to the ethical principles outlined in the Declaration of Helsinki. Prior to each interview, the researcher provided a self-introduction, elucidated the study's objectives, and assured participants of the confidentiality of their information. It was emphasized that participants retained the right to withdraw from the study at any time without incurring any negative consequences. Subsequently, informed written consent was obtained from all study participants.

Consent to publish

Not applicable.

Competing interests

The authors declare no competing interests.

Author details

[1]Chronic Diseases (Home Care) Research Center and Autism Spectrum Disorders Research Center, Department of Nursing, Hamadan University of Medical Sciences, Hamadan, Iran
[2]Department of Emergency Medicine, School of Medicine, Besat Hospital Hamadan University of Medical Sciences, Hamadan, Iran
[3]Environmental Health Engineering, Department of Environmental Health, School of Health Research Center for Health Sciences, Health Sciences & Technology Research Institute, Hamadan University of Medical Sciences, Hamadan, Iran
[4]Department of Medical Surgical Nursing, School of Nursing, Fasa University of Medical Sciences, Fasa 81936-13119, Iran
[5]Prehospital Emergency Research Center (PERC), Tehran, Iran

Received: 17 July 2024 / Accepted: 2 January 2025
Published online: 23 January 2025

References

1. Konttila J, Siira H, Kyngäs H, Lahtinen M, Elo S, Kääriäinen M, Kaakinen P, Oikarinen A, Yamakawa M, Fukui S, Utsumi M. Healthcare professionals' competence in digitalization: a systematic review. J Clin Nurs. 2019;28(5–6):745–61.
2. Hökkä M, Martins Pereira S, Pölkki T, Kyngäs H, Hernández-Marrero P. Nursing competencies across different levels of palliative care provision: a systematic integrative review with thematic synthesis. Palliat Med. 2020;34(7):851–70.
3. Forsman H, Jansson I, Leksell J, Lepp M, Sundin Andersson C, Engström M, Nilsson J. Clusters of competence: relationship between self-reported professional competence and achievement on a national examination among graduating nursing students. J Adv Nurs. 2020;76(1):199–208.
4. Mohammadi F, Tehranineshat B, Ghasemi A, Bijani M. A Study of How Moral Courage and Moral Sensitivity Correlate with Safe Care in Special Care Nursing. ScientificWorldJournal. 2022;2022:9097995. https://doi.org/10.1155/2022/9097995. PMID: 35874846.
5. Sadeghi A, Adeli Z, Shamsaei F. Moghim- Beigi A. relationship between nurses' ethical intelligence and patient' satisfaction from nursing care. J Nurs Manag. 2016;4(3):65–76.
6. Lennick D, Kiel F. Ethical intelligence: enhancing business performance and leadership success. New Jersey: Pearson Prentice Hall; 2007.
7. Yousefi P, Heshmati H. Ethical intelligence and its position in nursing profession. Dev strategies med edu., Saylıgil H, Yıldız O. Z. New concept in clinical care: proposal of an ethical.

8. Borba M. Building ethical intelligence: The seven essential virtues that teach kids to do the right thing. Translated by Firoozeh Kavousi. Tehran: Roshd Publications; 2005. [in Persian].
9. Oztürk H, Saylıgil O, Yıldız Z. New concept in clinical care: proposal of an ethical intelligence scale. Acta Bioethical. 2019;25(2):265–81.
10. Dehghan Manshadi M. Investigating the ethical intelligence relationship with work conscience and organizational commitment with emphasizing the islamic approach of Meybod city school principals. Appl Issues Islam Edu. 2018;2(3):67–86.
11. Bijani M, Torabizadeh C, Rakhshan M, Fararouei M. Professional capability in triage nurses in emergency department: a qualitative study. Revista Latinoam De Hipertensión. 2018;13(6):554–60.
12. Pakcheshm B, Dehghan M, Bagheri I, Kalani Z. The relationship between ethical intelligence and job satisfaction in nurses working in Afshar Hospital in Yazd, 1396. J Educ Ethics Nurs. 2020;9(3):72–8.
13. Sandman L, Nordmark A. Ethical conflicts in prehospital emergency care. Nurs Ethics. 2006;13(6):592–607.
14. Austin MT, Diaz JJ Jr, Feurer ID, Miller RS, May AK, Guillamondegui OD, Pinson CW, Morris JA. Creating an emergency general surgery service enhances the productivity of trauma surgeons, general surgeons and the hospital. J Trauma Acute Care Surg. 2005;58(5):906–10.
15. Jafari M, Ebadi A, Khankeh HR, Maddah SS, Hosseini M. Development and validation of ethical distress scale in pre-hospital emergency service providers. Int J Emerg Serv. 2022;11(2):263–76.
16. Bruun H, Milling L, Mikkelsen S, Huniche L. Ethical challenges experienced by prehospital emergency personnel: a practice-based model of analysis. BMC Med Ethics. 2022;23(1):80.
17. Fonseca SM, Cunha S, Faria S, Campos R, Queiros C. Why are emergency medical technicians' coping strategies dysfunctional? Direct and indirect effects of resilience and perceived stress. Int Emerg Nurs. 2021;56:100995.
18. Izadi F, Bijani M, Fereidouni Z, Karimi S, Tehranineshat B, Dehghan A. The Effectiveness of Teaching Nursing Ethics via Scenarios and Group Discussion in Nurses' Adherence to Ethical Codes and Patients' Satisfaction with Nurses' Performance. ScientificWorldJournal. 2020;2020:5749687. https://doi.org/10.1155/2020/5749687. PMID: 32565750.
19. Mahmoudirad G, Khoshbakht H, Sharifzadeh G, Izadpanah A. Relationship between ethical intelligence and psychological safety among emergency and intensive care units nurses. Health Spiritual Med Ethics. 2020;7(1):2–8.
20. Bijani M, Abedi S, Karimi S, Tehranineshat B. Major challenges and barriers in clinical decision-making as perceived by emergency medical services personnel: a qualitative content analysis. BMC Emerg Med. 2021;21:1–2.
21. Lennick D, Kiel F. (2008). Ethical Intelligence: Enhancing business performance & leadership success. New Jersey: Warton School Publishing, 2008. 290 s. ISBN 0-13-234986 – 8.
22. Isfahani MN, Pari FA, Pakravan F, Esmailian M. Evaluation of ethical distress and ethical intelligence among medical residents. Med E Ethicale. 2024;73(1).
23. Bijani M, Mohammadi F. Ethical challenges of caring for burn patients: a qualitative study. BMC Med Ethics. 2021;22(13):1–10. https://doi.org/10.1186/s12910-021-00582-x.
24. Renjith V, Yesodharan R, Noronha JA, Ladd E, George A. Qualitative methods in Health Care Research. Int J Prev Med. 2021;12:20.
25. Mohammadi F, Borzou SR, Khazaei S, Bijani M, Masoumi SZ, Hosseini SK. Designing and psychometric assessment of the moral intelligence scale for healthcare professionals. Sci Rep. 2024;14(1):4515.
26. Mohammadi F, Rakhshan M, Molazem Z, Zareh N, Gillespie M. Development of parental competence scale in parents of children with autism. J Pediatr Nurs. 2020;50:e77–84.
27. Lind G. O significado e medida da competência moral revisitada- um modelo do duplo aspecto da competência moral. Psicologia: Reflexão E Crítica. 2000;13(3):399–416.
28. Asahara K, Ono W, Kobayashi M, Omori J, Todome H. Development and psychometric evaluation of the moral competence scale for home care nurses in Japan. J Nurs Meas. 2013;21(1):43–54.
29. Speziale HS, Streubert HJ, Carpenter DR. Qualitative research in nursing: advancing the humanistic imperative. Lippincott Williams & Wilkins; 2011.
30. Guba EG, Lincoln YS. Competing paradigms in qualitative research. Handb Qualitative Res. 1994;2:105.
31. Waltz CF, Strickland OL, Lenz ER. Measurement in nursing and health research. Springer publishing company; 2010.
32. Ayre C, Scally AJ. Critical values for Lawshe's content validity ratio: revisiting the original methods of calculation. Meas Eval Couns Dev. 2014;47(1):79–86.
33. Polit D, Beck C. Essentials of nursing research: appraising evidence for nursing research. In: Baltimore: Lippincott Williams and Wilkins; 2013.
34. Ghasemi E, Janani L, Dehghan Nayeri N, Negarandeh R. Psychometric properties of persian version of the competency inventory for registered nurse (CIRN). Iran J Nurs. 2014;27:1–13.

Publisher's note