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Validating a questionnaire- prehospital preparedness for pediatric trauma patients

Karin Bölenius, Christin Vestin, Britt-Inger Saveman, Lina Gyllencreutz *

Department of Nursing, Umeå University, Sweden

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ABSTRACT

In recent decades, prehospital emergency care has undergone extensive development. Today, prehospital emergency nurses (PENs) are well trained and provide advanced care to patients of all ages. Caring for pediatric trauma patients is considered to be particularly demanding. However, in Sweden and internationally, there is a lack of research regarding PENs' preparedness for caring for pediatric trauma patients. Objective: The development and testing of a questionnaire on self-reported preparedness among PENs caring for pediatric trauma patients in a prehospital emergency setting. Methods: Questionnaire development included face and content validity tests resulting in 38 questions. Eighteen of these questions were analyzed by test-retest. The content of the questionnaire was statistically analyzed. Results: Fifteen questions were considered valid after reliability and validity tests. Three questions did not fulfill the stability criteria. The content analyses show a low degree of experience with pediatric trauma patients and half of the participants reported stress symptoms when responding to such alarms. Conclusion: The questionnaire assessing PENs preparedness caring for pediatric trauma patients in Sweden is considered to be suitable for research and clinical practice to improve the care of pediatric trauma patients and the health of PENs, although further testing of the questionnaire is required.

1. Introduction

Prehospital emergency care is the first link in the overall chain of acute care [1] and is provided in various settings, e.g., in the patients' home or public places. Prehospital emergency care includes attending patients of all ages with various diseases and injuries [2,3]. Occasionally, the care is provided in chaotic, hazardous, and often tumultuous settings [4]. Registered nurses working in prehospital emergency care (PENs) need to be flexible and able to change their initial approach instantaneously as dynamic situations are prone to quick changes [5]. Studies [6,7] show that nurses are proven to be especially vulnerable to stress as many have heavy workloads combined with high stress and emotional interactions with others. The emotional demands on PENs are linked to an inability to cope with daily stress and traumatic situations [8–10].

Caring for pediatric trauma patients is a rare and demanding experience [11]. Pediatric trauma care coupled with the fear of failing in responsibility toward the particularly vulnerable pediatric patients was found to contribute to stress [12]. Emergency medical services rate their comfort level of caring for children lower than caring for adults [13]. In fact, several studies emphasize that PENs are not entirely prepared to care for children in advanced emergency situations such as critically ill or multiple children injured simultaneously [11,14]. Several studies also emphasize the need for more training, training exercises, and equipment adapted to trauma care of children [13,15–17]

A focus on improving the preparedness of PENs to care for pediatric trauma patients through, for example, more training sessions may increase the PENs proficiency levels. This might lead to improvements and higher quality pediatric trauma care and improved health among the PENs. However, no preparedness study concerning PENs caring for pediatric trauma patients has been found in the Swedish context. Some studies have developed tools to assess and analyze the preparedness among responders, e.g., nurses facing major incidents [18–20]. To our knowledge, no valid questionnaire assessing the preparedness of personnel caring for pediatric trauma patients in the prehospital emergency setting exists. Therefore, the development of a questionnaire to assess the preparedness of PENs caring for pediatric trauma patients is needed. However, it is important to confirm the validity and reliability of a questionnaire [21]. Thus, the aim was to develop and test a questionnaire on self-reported preparedness among PENs caring for pediatric trauma patients in a prehospital emergency setting.

* Corresponding author at: Department of nursing Umeå University 901 87 Umeå, Sweden.
E-mail address: lina.gyllencreutz@umu.se (L. Gyllencreutz).

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2. Methods

2.1. Design and setting

A questionnaire was developed from a literature review and tested for validity among the PENs in three ambulance stations located in northern Sweden.

2.2. Development of the questionnaire

Initially, the questionnaire (Additional file 1) was designed in cooperation with experts in disaster medicine, emergency care and nursing. To develop the questionnaire, literature covering preparedness e.g. [16,22,23] were read and assessed and throughout their descriptions of preparedness we got ideas about the essentials for generating questions examining the concept. The first draft of the questionnaire contained 39 questions covering preparedness; background characteristics, experience, education, equipment, training exercises, stress, family, knowledge, and readiness related to taking care of pediatric trauma patients in single and mass casualty events in the prehospital emergency setting. Three questions regarding the probability of a mass-casualty incident were also included.

We also read and assessed literature consisting of questionnaires constructions related to prehospital emergency settings [24,25] to get ideas for the construction. Most of the questions were answered using a five-point Likert scale: very high degree, high degree, to some degree, in low degree, and of very low degree. The rest were open-ended or yes or no questions. Three of the authors (C.V., B.I.S., and L.G.) and a graduate student participated in the developmental phase. The questionnaire was developed in Swedish and translated into English by the authors (Additional file 1). Our questionnaire was developed using questions with common, easy, and frequently used concepts and did not include negatives or twisting words.

To achieve face validity, six PENs (working in either rural or urban ambulance stations) were asked to read, fill in, and discuss the questions with one of the authors and the graduate student. They were asked about their perceptions of the questions intelligibility and if the questions were easy to read and answer. Their opinions and perceptions were used to improve and revise the questionnaire. Efforts, such as reading the questions aloud, were also made ensuring that each question was easy to understand, clearly outlined, could not be misinterpreted, and that the entire questionnaire could be completed in approximately 15 min. Further, to achieve content validity, experts in disaster medicine, emergency care, nursing, and researchers with questionnaire development experience advised on the construct and content. As we have not found other questionnaires that can be used as golden standard, concurrent validity is not applicable [26]. The expert group discoursed regarding how logical and how appropriate the questions were to the study purpose. The validity tests resulted in some modifications; e.g., removed, reworded, or added questions.

Table 1
Background characteristics of the participants.

	Participants in first test	
	n = 35	%
Sex		
Male	18	51
Female	17	49
Age (year)		
Md (Q1; Q3) Range	39.5 (33.5; 45) 27–59	
Employment rate		
Full-time	34	97
Part-time	1	3
Number of years employed as PEN		
0–1	3	9
2–5	9	26
6–10	12	34
11–16	11	31
RN with specialist education		
Ambulance	15	42
Anaesthetics	2	6
District	2	6
Intensive care/ Emergency	2	6
No specialist education	14	40

PEN = Prehospital Emergency Nurse
RN = Registered Nurse

2.3. Procedures

The ambulance station heads gave permission to perform the study. An information letter about the study was included with the questionnaires. Responding to the questionnaire was considered informed consent of participation. The participants were assured of confidentiality and that they could withdraw from the survey at any time without declaring a reason. Furthermore, the participants were informed that data would be only presented at a group level. All questionnaires were decoded and kept locked up at the university. Only the researchers had access to the codes and the corresponding names. There was no obvious ethical issues with the study as there was no bounds or relationships between the researchers and the participants. Therefore, it was judged as not a subject to the Swedish Law of Ethical Approval. However, all parts of the study have been performed in accordance to the Helsinki Declaration and with respect to participant's rights of autonomy and self-determination [27].

Sixty PENs from three ambulance stations were invited to participate in the test. The response rate of the first test was 58% (n = 35) (Table 1) and 32 of those also responded to the retest. Of the PENs who participated in the questionnaire, 18 were men aged 31–59 and 17 were women aged 25–55. The median numbers of years working as PENs was four years. More than half of the participants were PENs with specialist training.

2.4. Data analysis

To test the questionnaire for stability, a test–retest procedure was performed. Recommended interval for test-retest is 2 days to 2 weeks [27] which means that a one-week interval seems reasonable for this data collection. The importance of answering the questionnaire on both occasions was stressed to the participants. The questionnaire was coded to ensure that the test and retest questionnaire answers came from the same participant. Only the 18 questions were used in the test-retest analysis; 17 with five - point Likert scale and one with yes or no alternatives. Data from the test-retest was analyzed using Spearman's rank correlation (rs), Kappa coefficient (K), and percentage agreement (%A). The questions were accepted if they passed at least one of two set criteria [28,29].

- Criterion one; $K \geq 0.61$ = good **or** $rs \geq 0.7$ **or** $\%A \geq 90\%$.
- Criterion two: $K \geq 0.51$ = moderate **and** $rs \geq 0.6$ **or** $K \geq 0.51$ = moderate **and** $\%A \geq 80\%$.

In those cases, where a combination of the measures was judged to be acceptable, criterion two complemented criterion one [30].

Additionally, the content of the data in the questionnaire is reported by the 35 participants who answered the first test. The

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