Workers' Clinical Skills at Out-of-Hospital Emergency Care

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Abstract

Background: Workers' clinical skills at out-of-hospital emergency care greatly affect patient safety and care quality. The objectives of the study was to examine emergency care workers' self-perception of their clinical skills in out-of-hospital emergency care to produce new knowledge that can be used to develop basic and continuing education programmes.

Methods: A quantitative approach was selected. Participants consisted of nurses (86), practical nurses (48) and medical emergency technicians/ hospital and ambulance attendants (8) in out-of-hospital emergency service units in one hospital district in Finland (N=1, response rate 53%).

Self-administered questionnaire with 8 background questions and 70 multi-choice questions analysed using SPSS for Windows 22.

Results: Respondents rated their skills in fluid care, circulation maintenance and care of lifeless patients highest, whereas the results were poorest for skills in intubation and care of gynaecological patients. Emergency care workers' age, sex work experience, type of employment and educational background were associated with variation in their self-rated clinical skills.

Conclusions: Regular updates by means of simulation-based learning or group supervision are required, especially for novices and non-permanent workers to create safe routines in airway maintenance and caring for less common groups of patients.

Background

Emergency care refers to providing urgent care to acutely ill or injured patients and, when necessary, transporting them to definitive care. In Finland, emergency care services are provided by hospital districts. Each hospital district is responsible for both administrative and operative functions required in their areas to assess urgent care needs in out-of-hospital settings and to arrange transport. According to the current legislation, all risk management and safety planning must start with the patients and their right to receive safe, evidence-based and high-quality care [1].

An increasingly wide range of emergency services must be offered today, with increased worker responsibility and independence. A greater number of patients are now treated at home or in another out-of-hospital setting [1]. Considering that patients suffer from life-threatening conditions in challenging settings and that special attention must be paid to factors that affect patient safety, it becomes advisable to regularly evaluate staff competence and skills and define needs for continuing education. Life-long professional development can also be argued to contribute to higher performance and wellbeing at work [1,2]. A number of studies have shown that basic nursing education does not provide sufficient emergency nursing competence. Consequently, supplementary formal emergency nursing education is required to promote and maintain clinical emergency skills [3,4]. Despite all this, there is little research on emergency care workers' perceptions of their clinical skills or competence [5].

Skill, competence and capacity

The concepts skill, competence, qualification, ability, capacity and proficiency are tied to each other. They could all be seen as a combination of knowledge, attitudes, behavior and values. Mastery of a skill is suggested and attributes like creativity, flexibility and accuracy implied [5].

In the Webster's Encyclopedic Unabridged Dictionary of the English language (199, p.1335), skill is defined as 'the ability coming from one's knowledge, practice and aptitude to do something well" and "competent excellence in performance and expertness'. A definition by Paakkonen [5] suggests that ability to do something skillfully is characteristic of the concept of skill, but that it is always associated with knowledge and understanding. Competence and competency, on the other hand, have been popular terms in clinical and professional contexts, including contemporary discussions on nursing skills and knowledge. Comparing the use of the term skill to that of competence, one could argue that, though sometimes used synonymously, competence is more imbued with the ideas of expertise, empowerment and excellence [6]. For Benner [7], nursing competency is the ability to perform a task with desirable outcomes in the real world of varied circumstances. The competent nurse is at the midpoint of a continuum,

preceded by the novice and advanced beginner and followed by the proficient or expert nurse [7]. However, according to Cowan, Norman and Coopamah [8], the application of competence to nursing is controversial and there is no real consensus on the definition of the term. They also demonstrate how, based on existing literature, it seems almost impossible to reach an agreement on how to make a difference between competence and competency.

Clinical competence and skill defined

This study uses the concept clinical competence to refer to a combination of skills, knowledge and attitudes that makes it possible for emergency care staff to master patient assessment and diagnostic functions, respond to clinical critical incidents and to assess the overall situation. Besides fundamental life-saving skills, ability to use a range of technical equipment and administer a limited list of medicines [9,10], clinical competence is considered to involve an ability to ensure patient safety by solving problems, thinking critically and anticipating variables which may impact care outcomes. Emergency care workers are expected to be able to identify, analyse and act on deteriorating patients, near-misses and potential adverse events. Keeping up-to-date by means of continuing education is part of competence [11-14]. Competence in process and risk management is also necessary [1] and situation-sensitivity required to prevent near misses and adverse events [1,15,16]. Risks are often related to medicines [17-20] or to rapid changes in the patient's status [21].

Clinical competence or expertise grows with experience; it has been found, for example, that more experienced paramedics are more competent in assessment, diagnosis and care, preparing their patients for emergency departments better than less experienced workers [22]. Finally, it is interesting to consider what functions or activities take up most of emergency workers' time. An Irish study [23] revealed that emergency nurses most often conduct activities relating to diagnostic function, followed by activities associated with organization and work role competencies. Planning patient care and identifying care priorities were also emphasized, whereas activities relating to administering and monitoring therapeutic interventions were performed least often. It is an essential component of competence that workers recognize, stabilize and transfer patients who require a higher level of care [24].

The concept clinical skill in this study refers to the set of fundamental skills required in emergency care settings, such as managing technological support in hemodynamically unstable patients [25]. The list of clinical skills for this study was selected on the basis of literature and my personal work experience of emergency care.

Methods

Aim

The purpose of the study is to examine nurses', emergency nurses', practical nurses', emergency medical technicians' and hospital and ambulance attendants' self-perception of their clinical skills in out-of-hospital emergency care. The study aims at producing new knowledge that can be used to develop basic and continuing education programmes for emergency care workers. The research question is: How do out-of-hospital emergency care workers perceive their clinical skills?

Data collection and analysis

Data were collected by a questionnaire, sent by e-mail with a link to a Webropol survey tool. All emergency care workers in one hospital district in Finland were approached. The target group consisted of professionals, who had a registered nurse degree or diploma or a vocational qualification to work as practical nurses, emergency medical technicians or hospital and ambulance attendants. Some of the nurses held positions as emergency nurses and some nurses or emergency nurses had been appointed as field managers. The staff worked either in basic or advanced life support teams. The basic level action involves transporting patients, monitoring and preventing deterioration and starting simple life-saving procedures (airway maintenance, cardiopulmonary resuscitation, limited administration of drugs, supporting broken limbs), whereas advanced level action requires arriving at a working diagnosis based on an examination and interview, choosing treatment options and securing the patient's vital functions during transportation (using, for example, ECG interpretation, thrombolytic therapy, light anaesthesia and external defibrillation). Those working in advanced life support must be able to act as rescue managers in situations with multiple patients.

The response rate was 53%. The data comprises material from both a pilot study (N=17) and the actual study (N=125). The questionnaire consisted of 8 background questions, 70 Likert-type multiple-choice questions and 2 open questions. Participants first answered questions pertaining to their age, sex, education, current position, work experience and type of employment (background factors) and then rated their clinical skills on a scale of 1-10, with 1 representing excellent and 10 completely inadequate skills. The skills assessed were related to central life-saving activities (care of lifeless or unconscious patients, cardiopulmonary resuscitation, airway and circulation maintenance and intubation), to other activities frequently undertaken in acute situations (performing and interpreting ECGs, fluid care and pharmacological skills, pain control, wound and burn care) [25,26] and to the care of specific groups (trauma and burn patients, children, pregnant and gynaecological patients) [27]. The questionnaire also contained two open questions about decisions not to transport the patient to hospital.

SPSS for Windows 22 was used to analyse the data. Frequency distributions, means, medians and percentages were calculated and cross tabulation and a chi square test performed to study relationships between respondents' self-rated clinical skills and background variables. Results with p<0.01 or under were deemed statistically significant. Responses to the two open questions will be analysed and discussed in another article.

Research ethics

Generally accepted research ethical principles were observed, including the latest version of Helsinki Declaration [28] and the research guidelines of the Finnish Advisory Board of Research Integrity [29]. Permission to conduct study was requested from the health care organization and an ethical review obtained from the Hospital District Ethics Committee. Participants were informed of the study purpose and of voluntary participation orally and in writing before deciding whether to sign the consent form. All participants responded to the questionnaire anonymously.

Results

Background information

Study participants were nurses (86), practical nurses (48) and medical emergency technicians/ hospital and ambulance attendants (8); a total of 142 out-of-hospital emergency care workers (N= 142). Half of the respondents were women and half men (N=50%). Their age range was 19-58 years (mean 34 years).

The majority of the respondents, 65.5% (N=93), worked in basic and 32.4% (N=46) in advanced life support. Only 2.1 % (N=3) were field managers. Most respondents (60.6%) held a registered nurse degree or diploma. The share of practical nurses was 33.8% and that of emergency medical technicians/hospital and ambulance attendants 5.6%. The majority (74.6%) of the participants had a permanent work contract, whereas 24.6% had a fixed-term contract and 0.7% took occasional jobs. Most respondents (77.3%) had less than 2 years of experience of their current work in emergency care. The range was 0.5 months to 34 years (mean 8.3 years). The background information is depicted in Table 1.

Background information	N	%
Sex	71	50.0
Female	71	50.0
Male		
Age	23	16.2
Under 25 years	55	38.7
25-34 years	40	28.2
35-44 years	24	16.9
Over 45 years		
Current position in	3	2.1
Field management	93	65.5
Basic life support	46	32.4
Advanced life support		
Education	8	5.6
EMT/hospital and ambulance attendant	48	33.8
Practical nurse	86	60.6
Nurse		
Type of employment	106	74.6
Permanent	36	25.4
Fixed-term contract		

Table 1: Respondents' background information.

Self-rated clinical skills

The following section presents the most important findings regarding participant's self-rated clinical skills in relation to the background factors. Measures of central tendency and dispersion are presented in Table 2. The original scale of 1-10 was transformed into a 1-5 scale in a reserved order, with 1 standing for completely or nearly inadequate skills.

Scores were high for the care of unconscious or lifeless patients; 58% of men and 45% of women rated their skills in as excellent (p=.042) and all permanent staff members perceived their skills as excellent or good (p=.002). Similarly, 56% of all respondents reported that their skills in the care of lifeless patients were excellent. The results were 70% (p=.002) for men, a statistically highly significant result, and 44% for women.

	Mean	Median	Range[*]	Standard deviation
Pain control (N=142)	4.46	4.50	2-5	.603
Wound care (N=142)	4.31	4.00	2-5	.686
Pharmacological skills (N=142)	4.42	4.00	2-5	.611
Care of unconscious patients (N=142)	4.48	5.00	3-5	.568
Airway maintenance (N=142)	4.40	5.00	2-5	.608
Circulation maintenance (N=142)	4.52	5.00	3-5	.529
Intubation (N=142)	3.02	3.00	1-5	1.313
Cardiopulmonary resuscitation (N=142)	4.51	5.00	3-5	.580
ECG performing and interpretation (N=142)	4.48	5.00	3-5	.555
Fluid care (N=142)	4.77	5.00	3-5	.440
Care of trauma patients (N=142)	4.37	4.00	3-5	.589
Burn care (N=142)	4.01	4.00	2-5	.679
Care of child patients (N=142)	3.80	4.00	2-5	.690
Care of lifeless patients (N=142)	4.51	5.00	3-5	.592
Care of gynaecological patients (N=142)	3.73	4.00	1-5	.816
Care of pregnant patients (N=142)	3.89	4.00	2-5	.782

Table 2: Respondents' self-rated clinical skills.

More than half (55%) of the respondents, 68% of men and 42% of women (p=.002) regarded their skills in cardiopulmonary resuscitation as excellent. Those who had a longer work history in their current position (p=.036) or in emergency care services in general (p=.001) rated their skills higher than less experienced workers. For example, those who had over 8 years' experience of emergency care, regarded their skills in cardiopulmonary resuscitation as excellent (71%) or good (29%), whereas the results for workers who had worked less than 3 years range in emergency care were good (50%), excellent (38%) and fair (12%).

Fifty-four (54) % of the respondents assessed their skills in circulation maintenance as excellent. Again, men had higher confidence in their skills than women, with 'excellent' ticked by 61% of men and by 47% of women. The self-reported level for airway maintenance varied between barely adequate and excellent (p=.028). While a fair proportion of men and women rated their skills as excellent (54% and 38% respectively) or as good (men 46%, women 52%), with approximately half of permanent staff trusting that their skills were either good (52%) or excellent (48%), one fifth (20%) of those with a fixed-term contract thought that their skills were fair (p=.000). This is statistically a highly significant result. Perhaps not surprisingly, workers with less than 18 months of experience of their

current work rated their airway maintenance skills lower (p=.005) than other groups, while workers with more than 8 years' experience of emergency care rated their skills higher (.007) than their less experienced co-workers.

The scores were lowest for intubation. The respondents' assessments ranged from completely inadequate to excellent skills. Age and experience were associated with the variation; the oldest and simultaneously the most experienced respondents assessed their skills higher than younger workers (p=.000). Another statistically significant finding was that hospital and ambulance attendants and emergency medical technicians rated their intubation skills higher than nurses and practical nurses (p= .002). Nearly one third of women (28%) and 7% of men, and similarly, 44% of those with a fixed-term contract, rated their skills as completely or nearly inadequate. Only 17% of permanent workers and 8 % of workers with a fixed-term contract assessed their skills as excellent (p=.000).

Respondents mainly found their skills in performing and interpreting an ECG good or excellent. Workers with longer experience in the health service had better results than those with less experience; 60% of those with over 8 years of work experience rated their ECG skills as excellent and 40% as good. In workers with under 3 years of experience, 32% rated their skills as excellent and in those with 3-8 years of experience, 47% assessed their skills as excellent.

Most respondents (78%) reported having excellent fluid care skills. Self-rated pharmacological skills were slightly lower in under 25-year-old respondents than in their older co-workers. In the other age groups, 50-55% of the respondents assessed their skills as excellent (p=.032). Those who had worked under 18 months in their current position also had slightly lower scores than other groups (p= .020); 15% of them were insecure about their ability to administer medicines (fair or barely adequate skills). Still, 27% of them chose the option 'excellent skills'. Permanent staff members assessed their pharmacological skills slightly higher than other workers (p=.000). The difference between permanent and fixed-term workers was statistically highly significant.

All male respondents felt that they had good or excellent pain control skills (p=.30). In men, 61% and in women, 39% of the respondents rated their skills as excellent. More than half of permanent staff (57%) chose the option 'excellent'. An examination of occupational groups revealed that a greater share of emergency medical technicians/ hospital and ambulance attendants (63%) and nurses (62%) rated their pain control skills as excellent compared to practical nurses (27%).

Most respondents rated their wound care skills as good or excellent; nobody ticked the option inadequate/nearly inadequate. Scores were slightly higher for those who had worked either less than 3 years of over 8 years in emergency care (p=.030) and in the health service (p=.36). In the middle category (3-8 years in emergency care), one third of the respondents rated their wound care skills as excellent. No other statistically significant differences were observed in the study of background factors.

The results for the care of trauma patients varied between fair and excellent skills. Men had higher scores than women; 56% excellent and 44% good, whereas women's results were: 60% good, 28% excellent and 11% fair (p=.0000, a statistically highly significant result). Again, the results were associated with the amount of work experience; in workers with over 8 years' experience of emergency care, 62% had excellent self-rated skills in caring for trauma patients. The results for workers with 3-8 years' experience of emergency care were good (62%) or

excellent (38%), whereas there was more variation in the responses of less experienced workers with under 3 years' experience of emergency care: 56% good, 29% excellent and 15% fair. There was also a relationship between the respondents' assessments and type of employment; 22% of those with a fixed-term contract rated their skills as fair, whereas all permanent staff members had either good or excellent self-rated skills in caring for trauma patients (p=.000). The self-reported level for burn care skills varied between barely adequate and excellent, with most respondents tending towards the higher end of the scale. Those with a permanent contract had slightly higher scores than workers with a fixed-term contract (p= .062). The study of background factors revealed no other statistically significant results.

The self-reported level for skills in the care of child patients varied between barely adequate and excellent. Over 45-year-old respondents assessed their skills slightly higher than representatives of other age groups (p=.017). Permanent staff had somewhat higher scores than fixed-term workers (p=.019). There was also great variation across the whole scale as regards the care of gynecological patients. Over 35-year-old respondents had slightly higher ratings than younger workers (p=.063). In this area, a greater share of women than of men rated their skills as excellent (21% compared to 4 %, p=.017). Most respondents felt that they had good clinical skills in the care of pregnant women. The association between the rating and experience is clear when the share of those rating their skills as excellent is studied: 8% for those with less than 3 years of experience, 20% for those with 3-8 years of experience and 23% for those with over 8 years' experience of work in the health service.

Discussion

This study revealed that emergency care workers' age, sex, work experience, type of employment and, to some extent, educational background were associated with variation in their self-rated clinical skills. The general tendency was that older respondents, who had more experience of working in emergency care or in the health service in general, rated their skills higher than younger workers with limited work experience. Permanent staff felt more confident about their skills than workers with fixed-term contracts. Neither of these findings seems surprising; older age, longer experience and a permanent position entail more opportunities to practice individual skills. Male workers had higher scores than female workers, except for care of gynaecological patients. It is naturally not clear from the results if this is due to better skills or higher self-confidence. Longer work experience is bound to increase confidence of one's skills, although workers, who have not faced failures, might overestimate their competence. It is also possible that it is more natural for female workers to approach and express empathy in gynaecological emergencies. The finding that hospital and ambulance attendants and emergency medical technicians rated their intubation skills higher than nurses and practical nurses may be explained by their having had more experience of the most critical and life-saving situations. Measured by central tendency and dispersion, respondents rated their skills in fluid care, circulation maintenance and care of lifeless patients highest, whereas scores were poorest and range and standard deviation widest for skills in intubation and care of gynecological patients. It is quite alarming that 35% of the respondents rated their intubation skills as completely or nearly inadequate. Intubation is commonly regarded as a difficult procedure; a study revealed that more than 30% of patients received more than one endotracheal intubation attempt [30]. A larynx mask or tube might be a safer option for inexperienced

workers [31,32]. Regular training with a patient simulator or training under supervision of an anaesthetist is advisable, especially for beginners and fixed-term workers. Patient simulators can also be useful in practising airway maintenance. Simulation learning has been found useful for example in helping learners recognize the need for resuscitation and start chest compressions faster [33,34]. Part of the respondents was insecure about their pharmacological skills. The finding may be partly explained by the fact that practical nurses do not usually administer medicines. Emergency care workers are expected to be able to initiate drug therapy relatively independently based on a rapid assessment and consultation with a doctor. They must be familiar with a wide range of medicines, know the unwanted side effects [35] and understand the role of pharmacological care in the care process. It also seems that especially fixed-term workers might benefit from further training on the care of trauma patients, a finding seconded by another study [24], gynaecological and pregnant patients, and children, who according to Gunnarsson and Stomberg [36] make up only 10% of the patients. Creating routines for less common patient groups is challenging, especially for beginners and fixed-term workers. They would be greatly helped by regular updates with help of simulation-based learning, which can promote critical reflection, problem-solving and decision-making or by group supervision, which can make it easier for the inexperienced to develop expertise more rapidly [37]. According to the results of this study, there was less need for extra training in other areas, for example in fluid and wound care, circulation maintenance or ECG skills. This is a positive result from the perspective of patient safety, because heart symptoms are common in out-of-hospital emergency patients. The finding may be relevant in other countries; according to a study conducted in the United States, monitoring the hemodynamics, skin temperature and moisture, pulse and blood pressure, wound care and ECG interpretation are among the most frequently taught skills in acute care nurse practitioner programmes [38]. This does not, however, mean that there is no need for updating skills and knowledge. In wound care, for example, keeping up to date with evidence-based knowledge and guidelines is imperative [39].

Study Limitations

It is a limitation of this study that the data were collected in a single geographical area (constituting one hospital district) in Finland. The response rate of 53% was relatively low, although this is considered common in e-mail surveys [40]. The low response rate may be partly explained by respondents' reluctance to make an extra effort to open the link and use the Webropol survey tool. The target individuals may have been tired of over-surveying, that is by a repeated flood of questionnaires [41,42].

Conclusions

Based on the results of this study, it is suggested that both basic and continuing education programmes should focus more on airway maintenance and on ensuring optimal oxygen saturation. Care of less common patients, for example children and gynaecological or pregnant patients, should also be practised to create safe routines. Regular updates by means of simulation-based learning or group supervision are recommended for emergency care workers, especially for novices and non-permanent workers.

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