Development and psychometric properties of the stressor scale for emergency nurses

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ABSTRACT

Introduction: Emergency department nurses are exposed to specific stressors and report higher stress levels than nurses in other hospital departments. This study aimed to develop and test the psychometric properties of a questionnaire-based instrument for identifying stressors for emergency department nurses.
Methods: The instrument's content and face validities were examined by five experts and nurses in emergency nursing field. The test-retest reliability was examined on 30 emergency department nurses. The construct validity, including an exploratory and a confirmatory factor analysis, was tested on 405 emergency department nurses. Cronbach's alpha values and intra-class coefficients were calculated.
Results: The instrument's content and face validities were satisfactory. The exploratory factor analysis provided a five-factor solution, whereas the confirmatory factor analysis provided a final four-factor solution with 25 items distributed among the factors Life and death situations, Patients' and families' actions and reactions, Technical and formal support, and Conflicts. The Cronbach's alpha values ranged from 0.89 to 0.93 per factor, and the intra-class correlation coefficient was 0.89, indicating good homogeneity and stability.
Conclusions: The instrument's content, face, and construct validities were satisfactory, and the internal consistency and test-retest reliability were good. This instrument can be useful in the management of emergency departments.

1. Introduction

Nurses experience high levels of work-related stress [1]; however, nurses who work in different environments and contexts experience different stressors [2]. A stressor is defined as any factor or event that threatens an individual's health or reduces normal functioning [3]. In the workplace, stress occurs when the job requirements do not match the resources, capabilities, and needs of the workers [4].

Nurses who work in emergency departments (EDs) are exposed to specific stressors that are related to the work characteristics of the ED and report higher levels of stress than nurses who work in other hospital departments [5]. Patients arrive to the ED without prior notice, often by ambulance, at any time of the day and night [6]. The ED staff must provide initial treatment for a broad spectrum of conditions, which are

occasionally life-threatening, that require immediate attention, causing stress [7]. Other stressors include experiencing the severe trauma or sudden death of a patient, inappropriate behaviors of patients and relatives (e.g., physical and verbal violence), overcrowding of patients [5], and complaint of patients and relatives due to misunderstandings about the triage system at the ED [8,9]. In addition, shortages of ED nursing staff, unavailability of physicians, shortages of necessary medical equipment [5], lack of adequate rest, low wages, and conflicts with colleagues are perceived as organization-related stressors [10]. ED nurses are also exposed to stressors related to working under high time pressure conditions with high job demands and low decision authority. They also occasionally receive unclear and inadequate information to perform their tasks and assignments in the work shift. Furthermore, receiving fewer rewards than nurses in other hospital department is

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reported as stressor to ED nurses [5].

In summary, the stress factors that are specific to ED nurses could be related to the work requirements; the characteristics of the department; the relationships with other caregivers, patients and their families; and the work organization. These stress factors may generate an imbalance between demands and control in the work situation [11,12].

The high level of stress in EDs causes physical and psychological problems, such as fatigue and burnout [8,13]. ED nurses have higher rates of absenteeism and sick leave than both general medicine nurses and pharmacists, which is presumably a consequence of occupational stress [14]. In addition, occupational stress contributes to job dissatisfaction in ED nurses and may cause these nurses to leave their jobs [15], which leads to a shortage of ED nurses. The identified sources of stress in an ED [5,7,10] may change over time due to improvements or deterioration in the work organization [11].

Various measurement instruments, such as the Nurse Stress Scale [16], the Medical Personnel Stress Survey [17] and Charge Nurse Stress Questionnaires [18], have been used to measure stressors and stress levels in general nurses and ED nurses. However, because certain items on these instruments are not related to the ED setting and certain ED-specific stressors are not included in the existing instruments, the sensitivity of these instruments may be low [19]. To the best of our knowledge, no established instrument that assesses the specific stress factors in ED nurses is available. A reliable and validated instrument for measuring the specific sources of stress that influence ED nurses could be helpful for organizations seeking to improve the work conditions in the ED and reduce the staff turn-over rate. Therefore, the aims of this study were to develop and test the psychometric properties of a questionnaire-based instrument that identifies specific stressors in nurses in EDs.

2. Methods

2.1. Study design

This study utilized a cross-sectional, correlational study design involving 1) item generation; 2) evaluation of content validity and test-retest reliability; and 3) evaluation of internal consistency and construct validity. The study was conducted between March 2015 and June 2017.

2.2. Development of the stressor scale for emergency nurses (SSEN)

In phase 1, the items were generated and a response format was chosen. The preliminary item pool for the SSEN was generated based on a scoping literature review as described by Davis, Drey, and Gould [20] and themes/categories or sub-themes/sub-categories related to ED nurses' experiences of work stress described in previous qualitative studies involving 36 interviews with ED nurses [8,9]. For the scoping literature review, the key search terms included "occupational stress OR work stress OR stress at work" AND "nurs∗" AND "emergency room OR emergency department OR accident and emergency department." In total, 25 studies (see Appendix I), including both qualitative and quantitative studies, were selected. The chosen response format was a six-point Likert scale ranging from 0 ('not at all') to 5 ('to a very high degree'). A six-point rating scale was chosen to prevent participants from choosing a neutral rating, which would have decreased the sensitivity of the measurement [19]. The ratings concerned the extent to which an item was perceived as stressful by the respondent.

In phase 2, the content and face validity and test-retest reliability of the questionnaire were examined. After constructing the first version of the questionnaire, five experts (one associate professor in nursing, two professional-level ED nurses, and two senior professional-level ED nurses), who had experience in conducting studies and a good understanding of the ED setting, performed the content validation. The experts were asked to rate the content validity of the items using the

Table 1
Demographic characteristics of the participants in phases 2 (pilot test, n = 30) and 3 (n = 405).

Variables	N (%)		Mean (SD)	
	(n = 30)	(n = 405)	(n = 30)	(n = 405)
Age (years)			36.9 (8.4)	33.9 (8.7)
Sex				
Male	2 (7)	49 (12.1)		
Female	28 (93)	356 (87.9)		
Employment status				
Full time	29 (97)	402 (99.3)		
Part time	1 (3)	3 (0.7)		
Work position				
Practitioner level	27 (90)	357 (88.1)		
Management level	2 (7)	24 (5.9)		
Others	1 (3)	24 (5.9)		
Years of working as a nurse			14.5 (9.7)	11.4 (8.9)
Years of emergency care experience			11.8 (7.5)	9.4 (7.8)
Average number of working hours per month			258.4 (91.3)	253.3 (63.4)

following four-point scale: 1 = not relevant, 2 = somewhat relevant, 3 = quite relevant, and 4 = highly relevant.

The face validity was evaluated by the same five experts and four ED nurses (two from a public hospital and two from a private hospital). To determine the face validity, the following open-ended questions were added: "Please give your comments and reflections for each statement in this instrument (the SSEN) regarding clarity, layout, and readability" and "Is there anything that you think should be revised?" The first author (NY) delivered the instrument and instructions to the experts and ED nurses. After two to three weeks, NY met with each expert and ED nurse to discuss the content and face validity [19].

To evaluate the test-retest reliability, i.e., the correlation between two sets of response scores on the instrument, a pilot test was performed with a two-week interval between measurements [21,22]. A convenience sampling technique was used to recruit participants who were ED nurses employed in either a public (n = 16) or private (n = 14) hospital in Thailand with at least one year of emergency care experience. The details regarding the sample are provided in Table 1. A contact person at each hospital distributed the questionnaires to the participants and collected the completed questionnaires. Two weeks after the first measurement, the contact person distributed the questionnaire again to the participants. This procedure was employed to prevent the participants from remembering their initial responses. The participants were also asked how long it took them to complete the questionnaire.

In phase 3, the construct validity and internal consistency of the questionnaire were tested. A convenience sampling technique was used to recruit participants using the same inclusion criteria as those used in the pilot test (phase 2). EDs in hospitals located in four regions in Thailand were randomly selected. Fifty-three hospitals (38 public and 15 private hospitals) were contacted; 27 public hospitals and 8 private hospitals responded and agreed to participate in the study. In total, 491 questionnaires, including an information sheet and consent forms, were sent to a contact person at each selected hospital and distributed to the participants. In total, 422 questionnaires were returned, 405 of which were completed (see Table 1), yielding a response rate of 82%. No significant differences were observed in the parameters between the two samples in phase 2 and phase 3. A rule of thumb was applied to determine the appropriate sample size for a factor analysis, and a sample size of 200 was considered acceptable [23]. Hence, the data set was divided in half; the first 200 completed questionnaires were used for an exploratory factor analysis (EFA), and the remaining 205

Table 2
Summary of item revision.

Categories	Removed items	Added items	Total number of items after the revision
Workplace characteristics and organizational context (n = 27)	11	–	16
Tasks and job characteristics (n = 12)	2	–	10
Situations associated with co-workers in the workplace (n = 18)	3	–	15
Situations associated with patients and relatives (n = 17)	3	4	18
Total number of items	19	4	59

completed questionnaires were used for a confirmatory factor analysis (CFA).

2.3. Data analyses

The index of content validity per item (I-CVI) was calculated to measure the degree to which the items on the instrument were judged as having an adequate operational definition for the construct of measuring ED-related stressors [24]. This index was computed according to the number of experts who provided a rating of either 3 or 4 on the 4-point relevance scale divided by the total number of experts. An I-CVI value of 0.78 or higher was considered acceptable [24]. The face validity was evaluated according to the comments and reflections on each statement from the five experts and four ED nurses. Then, the items were reviewed and revised according to the experts' and ED nurses' recommendations.

The coefficient alpha (Cronbach's alpha) was calculated to evaluate the internal consistency of the instrument [25]. A Cronbach's alpha value ≥ 0.70 was considered acceptable [22,26]. The test-retest reliability was assessed by calculating the intra-class correlation coefficient (ICC) between the two datasets collected over a two-week interval. The ICC measures the degree of the relationship between measurements in terms of consistency of absolute agreement. Thus, an ICC ≥ 0.70 indicates a good correlation between the first and second measurements and good stability [22,27].

An EFA using a principal component analysis for extraction with varimax rotation was performed to test the construct validity of the instrument. The purpose of performing an EFA is to investigate the underlying structure in a pattern of correlations among the observed variables [28], reduce the number of items, and emphasize the apparent factors [29]. A Kaiser–Meyer–Olkin (KMO) measurement of sampling adequacy of ≥ 0.6 was performed before the EFA [28]. The number of extracted factors was determined by examining eigenvalues > 1 and performing the scree test and a Monte Carlo simulation for parallel analysis [29,30]. The factors were rotated using an orthogonal (varimax) rotation with Kaiser normalization, and the cut-off point for the factor loadings was 0.60 or higher [23,28]. Descriptive statistics were used to characterize the participants and evaluate item properties, such as skewness and kurtosis.

A CFA was performed to test and confirm the factor structure obtained from the EFA. The adequacy of the CFA model was assessed according to fit indices, including chi-square (χ^2), χ^2/df, the Goodness of Fit Index (GFI) [31], the Comparative Fit Index (CFI), and the Root Mean Square Error of Approximation (RMSEA) [32]. The χ^2 statistic should be non-significant but is sensitive to the sample size [33]. Hence, we also used χ^2/df with a cut-off < 3 as suggested by Kline [34] to determine the minimally acceptable ratios. A value of 0.9 or greater indicates that the CFA model has an acceptable fit in terms of the GFI and CFI [31]. According to the rule of thumb for the RMSEA, a value < 0.08 represents a marginal fit, while a value > 0.10 indicates a poor fit [32]. The final model of the CFA was compared with two alternative models to verify the best fit [23,28]. The Akaike Information Criterion (AIC) was used to estimate the quality of each model, and the lowest AIC value was considered to represent the best model fit [32].

The Statistical Package for the Social Sciences (SPSS) version 22.0

was used for the analyses. A p-value < .05 was considered statistically significant.

2.4. Ethical considerations

This study was approved by the ethics/research committees of the provincial public heath office and all included hospitals in Thailand. All participants received written information about the studies, and informed consents were obtained from the organizations, nursing directors and ED nurses before participating in the study.

3. Results

3.1. Item generation

A preliminary 74-item pool was generated for the instrument, including items related to the categories workplace characteristics and organizational context, tasks and job characteristics, situations associated with co-workers in the workplace and situations associated with patients and relatives, which were synthesized from the literature review and results from previous studies [8,9].

3.2. Content and face validity

Seven items with I-CVI scores below 0.78 were removed. Regarding the face validity, all ED nurses found the questionnaire easy to read and understand. The five experts provided comments and reflections regarding the layout, clarity, sentence structure, and wording of the items. Table 2 shows the results of the revision and the total number of items after the revision.

3.3. Construct validity

The data (n = 200) were approximately normally distributed, except for 6 items that had a marginal value below −1 regarding skewness. The value of the KMO measurement was 0.91, which indicated an adequate sample size. The EFA provided several values for the number of possible factors to be extracted and suggested ten factors with eigenvalues > 1. Kaiser's criterion [35] and a parallel analysis using a Monte Carlo simulation for parallel analyses suggested the extraction of 5–10 factors. Because the analyses may have resulted in an overestimation of the number of factors extracted [28], a scree test was performed to identify the number of factors that remained above the point of inflexion to be extracted [36]. A five-factor solution was suggested according to both the parallel analyses and the scree test, and these factors accounted for 58% of the cumulative variance. Therefore, five factors were extracted. Table 3 displays the eigenvalues associated with these five factors.

The authors discussed these five factors to create appropriate names for each of the factors and then compared these factors with items derived from the interviews and scoping literature review. Five items with a factor loading lower than 0.6 were deleted, including three items in factor 1 and one item in factors 2 and 4. Finally, the EFA results provided five factors and 31 items.

Before performing the CFA, the normality of the data (n = 205) was

Table 3
Total variance explained.

Factors	Initial eigenvalues		
	Total	Percentage of variance	Cumulative percent
1	22.14	37.53	37.53
2	4.40	7.46	44.99
3	3.55	6.02	51.01
4	2.24	3.80	54.81
5	2.14	3.64	58.46

evaluated. The skewness and kurtosis values showed that the response distributions approximated normal distributions ranging from -0.85 to -0.20 and -0.54 to 0.84, respectively. The 5-factor model was further analyzed by performing a CFA, and the initial analyses showed that all five factors had a poor fit. Hence, four items that had factor loading < 0.6 and had explained variances $< 40\%$ were deleted, and ten item error terms were allowed to co-vary freely. The ten item error terms were allowed to co-vary freely because the pair of items had a similar meaning or reflected a similar situation that their factor did not mirror.

The item error terms were allowed to co-vary freely because the items "to witness colleagues being verbally assaulted by patients and/or their relatives" and "to witness colleagues being physically assaulted by patients and/or their relatives" both related to witness situations that did not evidently mirror the factor Patients' and families' actions and reactions. Similarly, another two corresponding pairs of items, i.e., the pair "no support in performing work from the supervisor/head nurse at the ED" and "no support in performing work from the organization manager/director" and the pair "to feel uncomfortable working with a colleague at the emergency department" and "to feel uncomfortable working with the attending physician", were allowed to co-vary freely. Moreover, the pair of items that reflected situations related to disasters and accidents involving several people might relate to aspects that are not reflected by the factor life and death situation as this factor does not necessarily capture mass casualties.

After these modifications, factor 5 was deleted because only 2 items remained in the factor. Thus, the final model consisted of 4 factors with 25 items with high Cronbach's alpha values for each factor (see Table 4). The fit indices of the final model showed a significant χ^2 level (*p-value* $< .001$) and a slightly low value of GFI. However, the CFI, χ^2/df and RMSEA were acceptable, and the AIC indicated that the four-factor final model was the best model compared with two alternative model solutions, including one general factor and a four-factor model with a single second order factor (see Table 5).

3.4. Test-retest and internal consistency reliability

The ICC for the 59-item pool was 0.91. After performing the CFA, the recalculated ICC for the 25-item SSEN was 0.89 for the whole instrument with a Cronbach's alpha coefficient of 0.89–0.93 per factor.

4. Discussion

The SSEN, which is an instrument intended to measure stressors that are specific to ED nurses, was developed and tested for reliability, content, and face and construct validity. The scale was designed as a self-administered questionnaire that determines the extent to which a situation in the ED is a stressor for ED nurses.

The instrument had satisfactory content and face validity. Face validity pertains to how the test respondents perceive the instrument and should be determined according to the individuals representing the population without involving experts in the field [25]. Therefore, to strengthen the face validity of the instrument, four ED nurses were invited to evaluate the face validity. The results from the pilot test

showed good test-retest reliability with high ICC values for the 59-item pool and demonstrated good stability of the instrument [27].

Based on a complex statistical procedure, a five-factor solution was judged to be the most suitable in the first factor analysis (EFA). However, the selection of number of extracted factors has a subjective element which depends on the researchers' judgement [28]. On the other hand, the large sample size, i.e. over 200, speaks for the stability of the statistical test on the number of extracted factors [36].

The five-factor SSEN solution that resulted from the EFA was further analyzed by performing a CFA to confirm the factor model [23]. The results of the second factor analysis (CFA) provided a final model with a four-factor solution and acceptable values for most fit indices. In an ideal factor analysis, only items that mirror the pre-specified factors in the instrument should be included [23]. We allowed some pairs of items that also appeared to reflect some other phenomena. In a complex situation, such as the stressful ED setting, we find it realistic that some pairs of items mirrored concepts other than the intended specific stressors, and therefore, we do not believe that the assumptions of the measurement were seriously violated [23,28].

The characteristics of the final model were acceptable, although not optimal. However, we compared our final model with competing models and found it to be the most parsimonious [32].

The SSEN is intended to measure stressors that are specific to ED nurses. However, the four factors appear to be similar to existing instruments that measure stressors for nurses in general, such as Death and dying, Conflict with physician, and Conflict with other nurses, which are stressors included in the Nurse Stress Scale [16]. This similarity is general, but on a specific level the items on the SSEN are related to the ED setting, while the other instruments are not. For example, the life and death situation items on the SSEN differ from the Death and dying items on the Nurse Stress Scale, and the items on the SSEN ask specific questions related to the ED setting, such as accidents involving several people, while the items on the Nurse Stress Scale ask general questions, such as performing procedures that patients experience as painful [16]. Therefore, we believe that the items on the SSEN that ask about specific situations related to the ED setting can enhance the sensitivity of the instrument in measuring stressors in the ED setting [19].

The items on the SSEN were based on 36 interviews with ED nurses and a scoping literature review that emphasized specific stressors for ED nurses, and the model was tested and confirmed by performing a CFA. Moreover, the content and face validity of the SSEN were evaluated by five experts within the emergency nursing field and 4 ED nurses. Thus, the items on the SSEN can be regarded as measuring stressors that are specific to ED nurses.

An acceptable and adequate Cronbach's alpha value for a newly developed instrument is ≥ 0.70 [22,26]. The current study showed that the Cronbach's alpha coefficient of the factors in the SSEN ranged from 0.89 to 0.93, and the results indicate that the items are highly correlated with one another, which is suggestive of an adequate level of homogeneity [22,26]. Consistently with the CFA results, the number of items was reduced. The strengths of this study are that the final model of the SSEN was confirmed by performing a CFA, whereas not all existing instruments have been confirmed using this method. Only one existing measure of stress in nurses has been confirmed with a CFA [18]. Furthermore, we performed a CFA using a separated sample from the sample in which the EFA was performed. In this sample, all retained items clearly loaded on their factors and explained over 50% of the variances in most instances. To evaluate changes in perceived stressors, future studies should evaluate the predictive validity of the SSEN for stress reactions, such as fatigue, burnout, absenteeism, intention to leave the current job, and work performance.

The content validity of the SSEN was evaluated by Thai experts, and future studies should confirm the content validity in different contexts, such as in Western countries. A reassessment of the content validity of the SSEN is recommended before application of the instrument in other

Table 4
CFA results of the 4-factor solution with factor loadings, explained variances and Cronbach alpha values ranging from 0.89 to 0.93 per factor.

Factors	Question related to	Factor loadings	Explained variances	Cronbach alpha	
				n = 200	n = 205
Life and death situation (F1)				0.91	0.91
	Cardiopulmonary resuscitation (CPR)	0.88	0.78		
	Death and dying	0.89	0.79		
	A patient with a critical illness	0.84	0.71		
	Disaster	0.72	0.52		
	An accident involving several people	0.68	0.46		
	Suicide attempt	0.77	0.60		
Patients' and families' actions and reactions (F2)				0.92	0.93
	Encountering verbal assault	0.80	0.64		
	Witnessing colleagues being verbally assaulted	0.87	0.75		
	Witnessing colleagues being physically assaulted	0.88	0.78		
	Encountering physical assault	0.83	0.69		
	High performance demands/expectations	0.82	0.68		
	Photo and/or video recording posted in a negative way on social media	0.76	0.58		
	Lack of an understanding of the triage process	0.65	0.42		
	Complaints about the nursing performance	0.78	0.61		
Technical and formal support (F3)				0.89	0.91
	Broken medical equipment	0.78	0.61		
	Lack of clear policies	0.81	0.65		
	Lack of necessary medical equipment	0.80	0.64		
	Lack of support from the supervisor/head nurse	0.81	0.65		
	Lack of support from the organization manager/director	0.80	0.65		
Conflicts (F4)				0.91	0.93
	Being criticized and/or blamed by a physician	0.92	0.86		
	Being criticized and/or blamed by a colleague nurse	0.92	0.85		
	Being criticized and/or blamed by a supervisor/head nurse	0.90	0.82		
	Feeling uncomfortable with working with a colleague	0.69	0.47		
	Having a conflict with the physician in charge of a patient	0.83	0.69		
	Feeling uncomfortable with working with the attending physician	0.70	0.49		

Table 5
Results of the CFA of the final model and alternative models.

Models	χ^2	P	χ^2/df	GFI	CFI	RMSEA (CI)	AIC
Four factors, final model	658.90	.00	2.49	0.80	0.91	0.08 (0.07–0.09)	658.90
One second order factor	678.68	.00	2.55	0.79	0.91	0.08 (0.07–0.09)	796.68
One general factor	1503.93	.00	5.57	0.55	0.74	0.15 (0.14–0.15)	1613.93

GFI = Goodness of fit index; CFI = Comparative fit index; RMSEA = Root mean square error of approximation; AIC = Akaike information criterion.

contexts.

5. Relevance to nursing practices

The SSEN is intended to identify stressors for ED nurses to allow these stressors to be addressed and the work environment/situation to be amended. The instrument can be useful for emergency head nurses, nurse managers, and hospital directors in detecting the current stressors within the ED in their organization. The results of the measurements can be used to discuss and plan for managing and reducing stress factors for emergency nurses.

6. Conclusion

A 25-item self-report instrument was developed from a 74-item pool. The EFA provided a five-factor solution for the SSEN, and the CFA confirmed the final model with 4 factors, including life and death situation, patients' and families' actions and reactions, technical and formal support, and conflicts. The content, face, and construct validities of the SSEN were satisfactory, and the internal consistency and test-retest reliability were good.

We declare that this manuscript is original, has not been published before and is not currently being considered for publication elsewhere.

Appendix I. Details on research articles in the scoping literature review

Authors/ countries	Study approaches	Aims	Samples	Main findings
Adriaenssens et al. (2015)The Netherlands	A complete two-wave panel design, quantitative approach	To examine the influence of changes over time in work and organizational characteristics on job satisfaction, work engagement, emotional exhaustion, turnover intention and psychosomatic distress in emergency room nurses	170 ED nurses	Changes in job demand, control and social support predicted job satisfaction, work engagement and emotional exhaustion. Work-related interventions are important to improve occupational health in emergency room nurses and should focus on lowering job demands, increasing job control, improving social support and ensuring a well-balanced reward system
Adriaenssens et al. (2012)The Netherlands	A cross-sectional study, quantitative approach	To examines (1) the frequency of exposure to and the nature of traumatic events in Emergency Nurses, (2) the percentage of nurses that report symptoms of PTSD, anxiety, depression, somatic complaints and fatigue at a sub-clinical level, and (3) the contribution of traumatic events, coping and social support to PTSD symptoms, psychological distress, somatic complaints, fatigue and sleep disturbances	248 ED nurses	ED nurses frequently confront work-related traumatic events (death or serious injury of a child/adolescent was perceived as the most traumatizing event). Traumatic events were related to anxiety, depression, and somatic symptoms, and 8.5% met clinical levels of PTSD
Adriaenssens et al. (2011)The Netherlands	A cross-sectional study, quantitative approach	To examine (1) whether emergency nurses differ from a general hospital nursing comparison group in terms of job and organizational characteristics and (2) to what extent these characteristics predict job satisfaction, turnover intention, work engagement, fatigue and psychosomatic distress in emergency nurses	254 ED nurses and 669 General ward nurses	Emergency department nurses report more time pressure and physical demands, lower decision authority, less adequate work procedures and fewer rewards than a general hospital nursing population. Decision authority, skill discretion, adequate work procedures, perceived reward and social support by supervisors prove to be strong determinants of job satisfaction, work engagement and lower turnover intention in emergency nurses
Bailey et al. (2011)UK	Qualitative study: observation and interview	To explores how emergency nurses manage the emotional impact of death and dying in emergency work and presents a model for developing expertise in end-of-life care delivery	28 ED nurses	Barriers that prevent the transition to expertise contribute to occupational stress and can lead to burnout and withdrawal from practice
Declercq et al. (2011) Belgium	A cross-sectional study, quantitative approach	Compared the respective contribution of an individual's subjective response and the frequency of exposure to critical incidents to the development of symptoms of posttraumatic stress disorder (PTSD)	136 Dutch-speaking nurses and ambulance personnel	Stressors that elicited the most intense effects within this population were those involving children and those where workers encountered

				limitations in supplies and resources. There was no relationship between the frequency of critical incidents encountered and the occurrence of PTSD symptoms
Gates et al. (2011)USA	A cross-sectional study, quantitative approach	To examine how violence from patients and visitors is related to emergency department (ED) nurses' work productivity and symptoms of post-traumatic stress disorder (PTSD)	230 ED nurses	Ninety-four percent of nurses experienced at least one posttraumatic stress disorder symptom after a violent event, with 17% having scores high enough to be considered probable for PTSD. In addition, there were significant indirect relationships between stress symptoms and work productivity
Gevers et al. (2010)The Netherlands	A cross-sectional survey study, quantitative approach	To determine the combined effect of acute and chronic job demands on acute job strains experienced during medical emergencies, and its consequences for individual teamwork behavior	23 nursing members at the ED and 25 emergency physicians	High acute job demands influenced effective teamwork behavior during medical emergencies. Acute emotional demands resulted in acute job strain. Although acute cognitive and physical strains were also detrimental, effective teamwork behavior was particularly impeded by acute emotional strain
Gholamzadeh et al. (2011) Iran	A descriptive survey, quantitative approach	To investigate the sources of job stress and the adopted coping strategies of nurses who were working in an Accident and emergency department	90 ED nurses	These stressors were reported: problems related to physical environment, work load, issues dealing with patients or their relatives and handling their anger, exposure to health and safety hazards, lack of support by nursing administrators, absence of the corresponding physician in the emergency room and lack of equipment
García-Izquierdo and Ríos-Rísquez (2012)Spain	A cross-sectional study, quantitative approach	To examine the relationship and predictive power of various psychosocial job stressors for the 3 dimensions of burnout in emergency departments	191 ED nurses	Emotional exhaustion, cynicism, and reduced professional efficacy were reported as predictors for burnout. Excessive workload and lack of emotional support was a predicted dimension for emotional exhaustion. Cynicism had 4 predictors that included interpersonal conflicts, lack of social support, excessive workload, and type of contract. Finally, variability in reduced

				professional efficacy was predicted by 3 variables: interpersonal conflicts, lack of social support, and the type of shift worked
Healy and Tyrrell (2011)Ireland	Descriptive-surveydesign, quantitative approach	To reports on a study of nurses' and doctors' attitudes to, and experiences of, workplace stress in three EDs in Ireland, and offers some suggestions on how stress among ED staff can be reduced	90 ED nurses and 13 ED physicians	The effects of stressful incidents in ED staff can be profound. Witnessing aggression, violence or the death of patients or participating in resuscitation can be emotionally and physically demanding
Hunsaker et al. (2015)USA	A cross-sectional study used a nonexperimental, descriptive, and predictive design	To determine the prevalence of compassion satisfaction, compassion fatigue, and burnout in emergency department nurses throughout the United States and to examine which demographic and work-related components affect the development of compassion satisfaction, compassion fatigue, and burnout in this nursing specialty	284 ED nurses	The low level of manager support was a significant predictor of higher levels of burnout and compassion fatigue among emergency department nurses, while a high level of manager support contributed to a higher level of compassion satisfaction
Kogien and Cedaro (2014)Brazil	A cross-sectional study, quantitative approach	To determine the psychosocial factors of work related to harm caused in the physical domain of the quality of life of nursing professionals working in a public emergency department	189 ED nurses	Low intellectual discernment, low social support and experiencing a high-demand job and a passive job were the main risk factors for damage in the physical domain of quality of life
Kowalenko et al. (2013)USA	A longitudinal, repeated-measures design, quantitative approach	To describe the incidence of violence in ED health care workers (HCWs) over 9 months	213 ED workers (117 ED nurses)	The physical threat was reported as violent events in the ED. Significant differences in violent events were reported between registered nurses (RNs) and medical doctors (MDs) and patient care assistants. The RNs felt less safe than the MDs (P = .0041)
Lavoie et al. (2011)Canada	Qualitative study with semi-structured interviews	To identify support activities for emergency room nurses who have been exposed to traumatic events, to prevent post-traumatic stress disorder	12 ED nurses	ED nurses described traumatic events both as witness and as victim; the context surrounding a traumatic event influenced its perception. Peer support, psychoeducation and emergency room simulations were identified as supports after exposure to traumatic events
Lu et al. (2015)China	A cross-sectional study, quantitative approach	To describe the relationship between coping strategies and occupational stress among ED nurses in China	113 ED nurses	The stressors of ED nurses mainly come from the ED specialty of nursing (2.97 ± 0.55), workload and time distribution (2.97 ± 0.58). Too

				much work, criticism, instrument equipment shortages, night shifts, and professional rank concerns were the factors influencing occupational stress with respect to positive coping styles. Too much work and issues with medical insurance for ED nurses were the factors influencing occupational stress with respect to negative coping styles
Nielsen et al. (2013) Denmark	A descriptive survey, quantitative approach	To investigate the relationship between 12 work-related stressors and the occurrence of adverse events in an ED	118 ED workers (98 ED nurses)	Two hundred fourteen adverse events were reported during the 979 studied shifts. High variability of stressors and emotional impact among the different groups of participants was found
Oliveira et al. (2013)Brazil	Qualitative study with observation and semi-structured interviews	To explore the understanding of the social representations of nurses in the emergency room and their relationship to stress	10 ED nurses	Three themes: work overload, precariousness of interpersonal relationships, and lack of motivation in the workplace were found and described as situations related to social representations and to stress
Pereira et al. (2014)Brazil	A cross-sectional study, quantitative approach	To assess occupational stressors among nurses working in urgent and emergency care facilities.	49 nurses in the urgent and emergency care units	ED nurses working in a highly complex healthcare facility identified performing nursing care as the most stressor. While those working in a healthcare facility with medium complexity considered activities related to staff management as a stressor
Popa et al. (2010) Romania	A cross-sectional survey study, quantitative approach	To investigate factors and levels of occupational stress in emergency medical workers	4693 emergency care personnel (260 ED nurses)	A high risk of burnout consisting of high emotional exhaustion (EE) and high depersonalization (DP). Possible explanations for this might be linked to high patient flow, emergency department crowding, long work hours and individual parameters such as coping mechanisms, social development and work environment
Ramacciati et al. (2015)Italy	Qualitative study with phenomenological approach	To investigate the feelings experienced by nurses following episodes of violence in the workplace	9 ED nurses	ED nurses felt that violent episodes were inevitable. Facing such episodes led to "feelings of being vulnerable," "fear," "angry," and

				"being alone and unsupported by management." These feelings were described as "long-lasting effects." Gender differences were also found to play an important role in the emotional response
Rugless and Taylor (2011)Australia	Observational study, quantitative approach	To examine patterns of, and attitudes to, sick leave taken by ED and other hospital staff and to compare ED doctor and nurse psychosocial work conditions	158 ED staffs (87 ED nurses)	The high rate of ED nurse sick leave might be related to their considerable psychological job demand and perceived lack of supervisor support.Compared with ED nurses, ED doctors had significantly more job insecurity and supervisor support but less psychological job demand (P < .05)
Sawatzky and Enns (2012)Canada	A cross-sectional survey study, quantitative approach	To explore the factors that predict the retention of nurses working in emergency departments	261 ED nurses	Twenty-six per cent of the respondents will probably/definitely leave their current emergency department jobs within the next year. Engagement plays a central role in emergency department nurses' intention to leave and is associated with job satisfaction, compassion satisfaction, compassion fatigue, and burnout (P < .05)
Westphal et al. (2015) Switzerland	A descriptive survey, quantitative approach	To examine whether mindfulness protects against the impact of work-related stress on mental health and burnout in emergency room (ER) nurses	50 ER nurses	Interpersonal conflict was reported as the main stressor. Nurses working more consecutive days since last taking time off were at greater risk for depression, and those reporting more work-related interpersonal conflicts were at greater risk for burnout. Mindfulness was associated with reduced anxiety, depression, and burnout
Wolf et al. (2014) USA	Qualitative descriptive exploratory design, narrative inquiry approach	To better understand the experience of emergency nurses who have been physically or verbally assaulted while providing patient care in US emergency departments	46 ED nurses	"Environmental," "personal," and "cue recognition" were identified as the themes. Overall, nurses believed that violence was endemic to their workplace and that both limited recognition of cues indicating a high-risk person or environment and a culture of acceptance of

				violence were barriers to mitigation
Zampieron et al. (2010)Italy	A cross-sectional study, quantitative approach	To quantify the perceived aggression towards nurses working in two Italian health care institutions and to verify the hypothesis of an association between the characteristics of aggressors and the type of aggression	595 nurses at two health care institutions (38 ED nurses)	Nurses (more often female nurses working in the ED and in geriatric and psychiatric units) experienced aggression in the previous year (49%), 82% of which was only verbal. Aggression at work was related to fatigue, stress and work dissatisfaction

Appendix II. Reference lists of the scoping literature review

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