

## Sources of Stress for Nurses in Neonatal Intensive Care Units of East Azerbaijan Province, Iran

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### ARTICLE INFO

**Article type:**  
Original Article

### Article History:

Received: 11 Mar. 2012  
Accepted: 18 May. 2012  
ePublished: 28 Nov. 2012

### Keywords:

Nurse  
Care  
Stress  
Neonatal intensive care unit

### ABSTRACT

**Introduction:** Stress is one of the main factors affecting one's efficiency as well as staff health and quality of nursing services. Neonatal intensive care units (NICUs) can be stressful environments for nurses, infants and families as well. Since there is no evidence in this regard in Iran, the present study aimed to determine stress levels related to care delivering in NICU from the viewpoint of nurses in NICUs of East Azerbaijan Province, Iran during 2011. **Methods:** This was a descriptive study including a purposive sample of 110 nurses working in NICUs of hospitals in East Azerbaijan Province. The data collection tool was a self-report questionnaire. The validity and reliability of the questionnaire were assessed by content validity and Cronbach's alpha coefficient ( $\alpha = 0.84$ ). **Results:** According to factor analysis, the stressors included environmental and nurse and human factors. Stress sources in total and separately in each category were reported as moderate. The mean and 95% confidence interval of the factors in the categories were 2.75 (0.84); 2.59-2.91 and 3.21 (0.72); 3.07-3.35, respectively. Therefore, human factors caused significantly higher levels of stress compared to environmental factors ( $p < 0.05$ ). **Conclusion:** Stressors involved in NICU nursing include environmental and human factors. Planning to remove or reduce their impact can improve the quality of nursing services in intensive care units and, thus, decrease the adverse effects of stress on workers.

## Introduction

Known as the most valuable organization capital, human resources are currently faced with numerous problems. Management experts and organizational psychologists have focused on factors influencing human performance. They have tried to identify these factors by applying necessary arrangements to increase positive impacts and diminish negative factors.<sup>1</sup> Stress is a response or reaction of the body to internal or external stimuli which are called stressors. In response, the body uses a strategy for coping with the situation.<sup>2</sup> In other words, stress source or stressor refers to any events in which environmental or internal needs or

both are more than the individual coping resources.<sup>3</sup> Stress is an inseparable part of lives of hospital staff which affects their health and life quality.<sup>4</sup>

According to the literature, stress of nurses is one of the factors reducing the quality of patient care.<sup>5</sup> On the other hand, stress of nurses is influenced by advanced and critical care in intensive care units.<sup>5-8</sup> Mohammad,<sup>9</sup> Shahbazi,<sup>10</sup> and Khodaveici et al.<sup>11</sup> have also shown that nurses in intensive care units experience high levels of stress.

Neonatal intensive care unit (NICU) is a unit designed to provide for sick and premature infants with care during the transitional period after birth in which the infant has the most physiological changes.<sup>12</sup> The environment of

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This article was derived from MSc thesis in Tabriz University of Medical Sciences. No: 288

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NICU can be stressful for nurses as well as infants and their families.<sup>8</sup> In these units, many personnel are involved in the treatment and care of infants. Neonatal specialists, nurses (usually a head nurse and primary nurses who are in charge of only one infant and perhaps a clinical nurse specialist trained in neonatal care), residents, and medical, nursing, and even midwifery students are present at any NICU. Among all staff members, nurses are responsible for the majority of everyday care procedures of the infants.<sup>12</sup>

During the past 4 decades, stress has been considered as a problem in intensive care units which can be caused by various factors and conditions.<sup>5</sup> Stress in intensive care units predisposes the personnel to work problems and eventually depression.<sup>13</sup> Besides, NICUs are different from adult intensive care units in nature. Highly vulnerable patients, the presence of parents as members of the care group, and specific developmental needs of infants are unique features of care in NICUs. In a study to evaluate stressors of nurses in American NICUs, Bunker-Hellmich showed that the physical structure of the unit can be a source of stress for nurses and parents.<sup>6</sup> In Iceland, Haves suggested death, high work pressure, conflicts with physicians, and low knowledge and preparation as sources of stress for nurses in NICUs.<sup>8</sup> On the other hand, social, economic, and cultural differences of various countries can alter the kind and effectiveness of stressors.<sup>8</sup> However, most previous Iranian studies in NICUs have focused on treatment problems of infants and have not evaluated sources of stress among nurses of NICUs.

One of the main goals of the third millennium is to reduce mortality in infants and children. Factors enhancing service quality would obviously reduce mortality. Since human resources can affect service quality, identifying current situation and planning strategies to reduce or eliminate weaknesses and stressors can definitely maximize the efficiency of human resources and thus the quality of nursing services.

Therefore, the present study aimed to determine and describe stressors in NICUs from the perspective of nurses in NICUs of East Azerbaijan Province, Iran. The results of this study should answer the question of "What are the stress sources for nurses in NICUs?"

## Materials and methods

In 2011, Descriptive study recruited nurses (n = 110) working in NICUs of East Azerbaijan Province. The research environment was 7 hospitals of Alzahra, children, talegani, shams, 29 bahman in Tabriz and shahid beheshti in Maraghe and khatamolania in Mianeh (Cities in East Azarbaijan Province, Iran). Nurses were included if they were working in an NICU for at least one shift per week, had worked in an NICU for a minimum duration of six months, had a high school diploma, or a bachelor's or master's degree in nursing, and were willing to participate. Nurses with a previous experience of severe stress (like death of a relative, divorce, or severe accidents) in the recent 4 weeks or with a history of medical or psychiatric illnesses and consumption of related medications were not enrolled. In this study, the study sample was the same as the study population.

The data collection tool was a self-report questionnaire consisting of demographics (16 items) and different aspects of special care in NICU (42 items). The second part of the questionnaire was designed based on review of the literature and using various previously developed tools to cover all general and specific stressors in NICUs.<sup>5, 6, 14-16</sup>

A 6-point grading scale was used in this study to evaluate different events and how stressful they were in viewpoints of nurses. The scale included 6 choices: "I have not encountered this problem", "Not stressful at all", "Very little stressful", "Moderately stressful", "high stressful", and "very high stressful". In the results presented in this study 3 stress levels of moderate, high and very high are integrated and reported as moderate or high stress.

After reviewing the accuracy of the translation by an English language expert and two professors, content validity was checked by 13 university Faculty members. The questionnaire was then filled out by 10 nurses and its reliability was confirmed by a Cronbach's alpha coefficient of 0.84.

Once approved by the ethics committee of Tabriz University of Medical Sciences (Tabriz, Iran), the questionnaires were distributed among the nurses in NICUs. They were collected after completion. In order to ensure confidentiality of the information, mentioning the questionnaires were filled out as anonymous and collected in a box. Moreover, they were not distributed by the researcher. Participation in the study was optional. Data analysis was performed using descriptive indicators such as number, percent, mean, and standard deviation (SD) in SPSS ver. 13 (SPSS Inc., Chicago, IL, USA).

## Results

Most participating nurses in this study were female (99%), aged 24-52 years old [mean age: 33.67 (5.93) years], were married (70% among whom 96.2% had one child), and had a bachelor's degree (96.2%). In addition, the majority of participants were on contract (49.5%), had less than 10 years of working experience (65.1%), had a nursing position (93.6%), and worked in rotating shifts (91.5%). More than half of the nurses (54.5%) worked in an NICU for 42-45 hours a week while 92.2% of the subjects worked 1-5 extra shifts every month. Moreover, 81.8% of the nurses took care of an average of 4 patients and more in a shift.

Table 1 shows the frequency distribution of stressors related to the nature of care in NICUs from the perspective of nurses working in NICUs of hospitals in East Azerbaijan Province. Using factor analysis of principal components with varimax rotation for the first 2 components, Kaiser-Meyer-

Olkin (KMO) = 0.79, and irritation = 0.35, the stressors were divided into two groups of environmental factors such as available space, light, atmosphere, and noise (items 1-16) and nurse-related factors and human interactions (human factors) including interactions with infants, colleagues, managers, and students and characteristics of nurses (items 17-40). Only two items, i.e. non-nursing but necessary tasks such as paperwork and having difficulty working with nurses of the opposite sex, were not included in either category. The reasons could be gender distribution among the studied subjects (mostly females), the presence of a fixed secretary in all units which made such problems less important to the nurses, and few observations in data.

The mean (SD) of all factors ( $n = 42$ ) was 3.00 (0.68) with a 95% confidence interval (95% CI) of 2.88-3.13. The mean (SD) value in the first and second groups were 2.75 (0.84) (95% CI: 2.59-2.91) and 3.21 (0.72) (95% CI: 3.07-3.35), respectively. Stress scores were divided into 3 ranges of mild (1.00-2.33), moderate (2.34-3.67), and severe (3.68-5.00). Therefore, stress sources in total and separately in each category were reported as moderate. It should be noted that in calculating mean values, the factors that were not experienced were considered as "missed". Each item was thus scored 1-5 according to having its experience and its level of stressfulness.

Based on factor analysis in the two categories, environmental factors and human factors were the main causes of stress. The mean and 95% confidence interval of the factors in the categories were 2.75 (0.84); 2.59-2.91 and 3.21 (0.72); 3.07-3.35, respectively. Therefore, human factors caused significantly higher levels of stress compared to environmental factors ( $p < 0.05$ ).

**Table 1.** The frequency of stressors for nurses in neonatal intensive care units (NICUs) of hospitals in East Azerbaijan Province, Iran

	Missed (n)	Not Noticed	Not Stressful at All	A Little Stressful	Moderately or Highly Stressful	Mean (SD)	95% (CI)
Lighting in NICU	1	1 (0.9)	37 (33.9)	21 (19.3)	50 (45.5)	1.94(1.25)	1.51-2.37
Space for medical care	1	1 (0.9)	25 (22.9)	24 (22)	59 (54.1)	2.34(1.18)	1.93-2.75
Monitors and equipment	1	1 (0.9)	18 (16.5)	32 (29.4)	58 (53.2)	2.60(1.09)	2.22-2.97
Space for chart work	1	2 (1.8)	39 (35.8)	34 (31.2)	34 (31.2)	1.97(.98)	1.63-2.30
Space for visitors to wait	4	3 (2.8)	27 (25.5)	30 (28.3)	46 (43.4)	2.05(.96)	1.72-2.38
Constant noises of monitors and equipment	1	-	8 (7.3)	12 (11)	89 (81.7)	3.48(1.22)	3.06-3.90
Sudden alarm noise	1	-	6 (5.5)	6 (5.5)	97 (89.0)	3.60(1.16)	3.19-4.00
Many sick babies	2	2 (1.9)	9 (8.3)	8 (7.4)	89 (82.4)	3.42(1.48)	2.91-3.93
Space for general care	1	8 (7.3)	29 (26.2)	27 (14.8)	45 (41.3)	2.02(.92)	1.71-2.34
Large number of people working	2	17 (15.7)	23 (21.3)	23 (21.3)	45 (41.7)	2.42(1.11)	2.04-2.81
Space for personal Attention to a baby	7	4 (3.9)	18 (17.5)	47 (45.6)	34 (33.0)	2.08(1.06)	1.71-2.45
Space for visitor-staff consultation	3	12 (11.2)	27 (25.2)	33 (30.8)	35 (32.7)	2.22(1.03)	1.87-2.58
Space for staff-staff consultation	3	3 (2.8)	39 (36.4)	32 (29.4)	33 (30.8)	2.17(1.17)	1.76-2.57
Privacy of visitors	2	11 (10.2)	31 (28.7)	26 (24.1)	40 (37.0)	2.34(1.25)	1.91-2.77
Overall atmosphere clutter in NICU	3	4 (3.7)	30 (28.0)	10 (9.3)	63 (58.9)	2.74(1.68)	2.16-3.32
Taking care of 2-3 neonates	2	2 (1.9)	7 (6.5)	12 (11.1)	87 (80.6)	3.51(1.19)	3.10-3.93
Handling death and dying neonate(s)	1	12 (11)	6 (5.5)	12 (11)	79 (72.5)	3.74(1.46)	3.24-4.24
Rendering nursing care to critically ill neonate(s)	1	1 (0.9)	12 (11.0)	5 (4.6)	91 (83.5)	3.85(1.39)	3.37-4.33
Diluting multiple intravenous drugs	2	1(0.9)	5 (4.6)	9 (8.3)	93 (86.1)	3.71(1.01)	3.36-4.06
Prioritizing nursing care in NICU	5	2 (1.9)	13 (12.4)	26 (24.8)	64 (61.0)	2.85(1.03)	2.50-3.21
Handling hemodynamic monitoring	2	1 (0.9)	15 (13.9)	18 (16.7)	74 (68.5)	3(.80)	2.72-3.27
Working as a respiratory nurse	3	2 (1.9)	21 (19.6)	28 (26.2)	56 (52.3)	2.51(.91)	2.19-2.83
Working collaboratively with healthcare professionals	8	11 (10.8)	8 (7.8)	16 (15.7)	67 (65.7)	2.28(1.01)	2.93-3.63
Working in the NICU after a detailed NICU orientation	2	5 (4.6)	18 (16.7)	27 (25)	58 (53.7)	2.82(.98)	2.49-3.16
Applying a correct septic technique of endotracheal tube suctioning	2	1 (0.9)	23 (21.3)	26 (24.1)	58 (53.7)	2.74(1.09)	-3.11 2.36
	3	2 (1.9)	21 (19.6)	33 (30.8)	51 (47.7)	2.48(.98)	-2.82 2.14

Values are expressed as number (%) unless otherwise declared.

**Table 1.** The frequency of stressors for nurses in neonatal intensive care units (NICUs) of hospitals in East Azerbaijan Province, Iran (continues)

	Missed (n)	Not Noticed	Not Stressful at All	A Little Stressful	Moderately or Highly Stressful	Mean (SD)	95% (CI)
Preparing neonate(s) for specific procedure(s)	2	-	15 (13.9)	27 (25)	66 (61.1)	2.68(.93)	2.36-3.00
Participation in delivering in-service education	5	11 (10.5)	42 (40.0)	27 (25.7)	25 (23.8)	1.88(.93)	1.56-2.20
Performing painful procedures	2	1 (0.9)	4 (3.7)	27 (25)	76 (70.4)	2.74(.91)	2.42-3.05
Conflict with a physician	4	6 (5.7)	7 (6.6)	12 (11.3)	81 (76.4)	3.4(1.16)	2.99-3.80
Conflict with a supervisor	5	5 (4.8)	11 (10.5)	13 (12.4)	76 (72.4)	2.88 (1.25)	2.45-3.31
Unpredictable staffing and scheduling	3	2 (1.9)	4 (3.7)	9 (8.4)	92 (86.0)	3.45(1.09)	3.08-3.83
Difficulty in working with a particular nurse	2	4 (3.7)	23 (21.3)	30 (27.8)	51 (47.2)	2.34(1.08)	1.97-2.71
Absence of physicians in emergency situations	2	4 (3.7)	5 (4.6)	11 (10.2)	88 (81.5)	3.68(1.25)	3.25-4.11
Feeling of being inadequately trained	6	9 (8.7)	11 (10.6)	18 (17.3)	66 (63.5)	3.02(1.17)	2.62-3.43
Insufficient time to complete nursing tasks	3	4 (3.7)	10 (9.3)	10 (9.3)	83 (77.6)	3.37(1.35)	2.90-3.83
Being exposed to health and safety hazards	1	3 (2.8)	2 (1.8)	6 (5.5)	98 (89.9)	3.88(.71)	3.63-4.13
Death of a patient with whom you had developed a close relationship	3	2 (1.9)	4 (3.7)	14 (13.1)	87 (81.3)	3.65(.90)	3.34-3.96
Being in charge with inadequate experience	2	5 (4.6)	8 (7.4)	10 (9.3)	85 (78.8)	3.65(1.41)	3.17-4.14
Watching a patient suffer	1	2 (1.8)	1 (0.9)	9 (8.3)	97 (89.0)	2.74(1.01)	2.39-3.08
Too many non-nursing tasks, such as clerical work, required	3	6 (5.6)	14 (13.1)	32 (29.9)	55 (50.0)	2.02(1.09)	1.65-2.40
Difficulty in working with nurses of the opposite sex	9	22 (21.8)	38 (37.6)	12 (11.9)	29 (28.6)	3.88(.75)	3.62-4.14

Values are expressed as number (%) unless otherwise declared.

While minor stress cannot be problematic, moderate and high levels of stress should be taken seriously. Therefore, to simplify the results, moderate, high, and very high levels of stress were combined and reported as moderate or higher.

In response to the open question regarding other stressors for nurses in NICU,

some factors such as lack of sufficient skilled personnel, device failure, and abnormalities and congenital anomalies in infants (like cleft palate and cleft lip) were revealed after data collection completed.

In order to determine the most important stress sources, the highest mean values of items in each category of environmental

factors and human factors were first identified. Afterwards, other factors were prioritized by comparing 95% CI of their mean with that of the previously identified factor. The most important stressors among the environmental factors were sudden and unexpected alarm sounds from monitors, large number of infants hospitalized in the unit, continuous noises from monitors and equipments, and noise pollution. In addition, the overall atmosphere of the NICU (air conditioning) was reported by 58.9% of the nurses as a main cause of moderate to high stress.

Among human factors, the most important stressors for the nurses were health and safety risks, watching the infants suffering, times taking care of very ill infants, unpredicted, unorganized working shift schedules, dealing with dying or dead infants, not having access to physicians or residents in emergency cases, death of an infant with whom they had a close bond, having responsibilities in the NICU without enough experience, not having enough time to finish all nursing tasks, getting criticism and blames from the physicians, and having more than standard responsibilities (taking care of 2-3 or more infants in NICU). Conflicts with the supervisor (72.4%), operating procedures on infants (70.4%), setting time priorities for taking care of patients among nurses (68.5%), and being a respiratory nurse (65.7%) were also introduced as moderate to high stressors.

## Discussion

According to available evidence, the intensity of stress, as an intrinsic characteristic of lives of nurses, is increasing. Identifying sources of stress among nurses in NICUs is one of the essential steps in providing information to improve the quality of nursing services and thus infant mortality.<sup>17</sup> On the other hand, the health of NICU staff members would be ensured and maintained by attending to stressors. This study was performed to determine the sources of stress among nurses

working in NICUs of East Azerbaijan Province during 2011.

The review of literature has shown a few related studies in NICUs. So, it is added other ICUs studies in discussion.

In the present study, all items listed in table 1 were reported by the nurses as sources of moderate and high stress in NICU. High and moderate levels of stress among nurses have been mentioned in several studies.<sup>17-19</sup> In addition, stress of nurses in intensive care units has been particularly described to have special sensitivity.<sup>20</sup>

In the present study, most nurses in NICUs reported moderate and high levels of stress. While several other studies on stress in ICUs revealed the same levels of stress,<sup>21,22</sup> only Hays et al. showed all factors to cause mild levels of stress for nurses.<sup>23</sup>

This is a fact that NICU is a place that produces stress and pressure. NICU staff members thus turn out to be irritable due to relationships between staff, special emotional feelings when facing patients at risk of dying, frequent fluctuations between success and failure, and demands imposed by teamwork. All these stimuli provoke feelings such as insufficiency and insecurity that will in turn negatively impact on interpersonal relationships and disturb the capabilities of the staff in making good connections with colleagues and families of patients.<sup>24</sup>

According to the results of this study, NICU nurses believed human factors (interactions with infants and colleagues along with the characteristics of nurses) to potentially cause moderate stress. The effects of these factors on stress were significantly more than environmental factors. Astbury,<sup>25</sup> Oehler et al,<sup>26</sup> Benica et al,<sup>27</sup> Fields et al,<sup>28</sup> and Bratt et al.<sup>29</sup> reported similar findings about stressors and their specifications among nurses.

### Environmental Factors

As mentioned previously, NICU is a unit for taking care of ill infants during transitional period after birth. With the

presence of preterm infants suffering from the greatest amounts of change, the nature of this unit is quite different from adult intensive care units. This unit has its own specifications, developed technology, and special physical design and equipments which should both meet standard criteria. In designing an NICU, spaces, lighting, atmosphere, sounds, and other environmental factors should be strictly considered to prevent further stress, exhaustion, tendency to leave work, professional interpersonal problems with colleagues, and negative effects on work and life of nurses.<sup>30,31</sup>

Based on our results, in the viewpoint of NICU nurses, environmental factors (available spaces, lighting, atmosphere, and noise) had potential of causing stress for nurses. Sawatzky,<sup>32</sup> Mohamed et al.,<sup>33</sup> Al-Omar,<sup>34</sup> Bailey et al.,<sup>35</sup> Heuer et al.,<sup>36</sup> Gomes et al.,<sup>37</sup> Foster et al.,<sup>38</sup> and Lipsky<sup>39</sup> suggested comparable results.

Findings related to sounds are similar to Hwee Ling et al.,<sup>5</sup> Bunker-HellmichL,<sup>6</sup> Miles et al.,<sup>15</sup> Heuer et al.,<sup>36</sup> Gomes et al.,<sup>37</sup> Laube and Stehle,<sup>40</sup> Caldwell and Weiner,<sup>41</sup> and Morrison et al.,<sup>42</sup> results.

Our findings related to large numbers of infants hospitalized in NICUs were also in line with previous studies.<sup>37,43</sup> Furthermore, according to the literature, the physical aspects of work such as sudden noise from the equipment in the unit is one of the stressors for nurses.<sup>42</sup> In the present study, the overall atmosphere of the NICU (air conditioning) was also introduced by the nurses to cause moderate to high levels of stress. Oates and Oates,<sup>24</sup> Mohamed et al.,<sup>33</sup> Cronqvist et al.,<sup>44</sup> Eisendrath and Dunkel,<sup>45</sup> and Cox et al.,<sup>46</sup> revealed similar findings. A reason might be the high temperature in the NICU due to the conditions of infants, especially preterm infants.

#### **Nurse and Human relationship factors**

In line with the findings of Fathi on intensive care units,<sup>47</sup> Lancaster and

Kornones,<sup>43</sup> and Gomes et al.,<sup>37</sup> our nurses perceived health and safety risks as important stressors.

Furthermore, consistent with studies of Hwee Ling et al.,<sup>5</sup> Oates and Oates,<sup>24</sup> and Cronqvist et al.,<sup>44</sup> in this study, taking care of too many patients (2-3 or more) by one nurse was also found to cause considerable stress.

Unpredictable, unorganized working shift schedules were also reported to trigger moderate to high levels of stress by 86% our nurses. Congruent results were also indicated by Benica et al. in Australia,<sup>27</sup> Gomes et al.,<sup>37</sup> Lancaster and Kornones,<sup>43</sup> Bratt et al. in USA,<sup>29</sup> Coffey et al.,<sup>48</sup> Laube and Stehle,<sup>40</sup> Li et al.,<sup>49</sup> Sherbafynagad,<sup>50</sup> Pinikahana and Happell.<sup>51</sup> Such results confirm the inadequate number of nurses in the current care system. Hiring relief staff in hospitals can perhaps reduce the intensity of stresses due to the abovementioned reasons. Besides, eliminating disproportionate workload and staffing through appropriate scheduling and decreasing unpredicted changes would lead to lower stress levels.<sup>50</sup>

In this study, emotional bond with the patient as well as bad prognosis and sudden death of infants were also indicated as other sources stress among nurses. Gomes et al.,<sup>37</sup> Cronqvist et al.,<sup>44</sup> Jacobson,<sup>52</sup> Kornfeld,<sup>53</sup> Nadelson,<sup>54</sup> and Gibbons et al.<sup>55</sup> reported similar results. Witnessing death of a patient was reported as a source of stress not only by our participants, but also by different researchers such as Mohamed et al.,<sup>33</sup> and Laube and Stehle.<sup>40</sup>

In line with our findings, Bunker-HellmichL,<sup>6</sup> Li et al.,<sup>49</sup> and Moos and Schaefer<sup>56</sup> indicated another factor, i.e. taking care of very ill infants, as a stressor in NICUs. Pinikahana and Happell implied death of patients with whom nurses had emotionally bonded to be a stressor.<sup>51</sup> In contrast, Hays et al. concluded that there is no stress in dealing with dying patients.<sup>23</sup>

In the present study, having no access to physicians in emergency cases in NICUs was reported by 81.5% of the nurses as another

factor causing moderate to high level of stress. Similar results were also published by Sherbafynagad,<sup>50</sup> Pinikahana and Happell,<sup>51</sup> Kornfeld,<sup>53</sup> Caldwell and Weiner,<sup>41</sup> and Vreeland and Ellis.<sup>57</sup> The absence of the physician at the time of patient death was also reported as a stressor in NICU.<sup>50,51</sup> These two situations may cause stress due to weak performance and dependency of nurses in times of crises. In other words, the presence of a doctor is crucial during crises since his/her absence will cause legal and operational problems for the nurses.

In general, while many stressors reported by NICU nurses were similar to those suggested by other nurses, some sources of stress were specifically indicated by NICU nurses. Among such unique stressors were death of infants after an emotional bond had been formed, preparing infants for special procedures (like umbilical vein catheterization), and the overall atmosphere of the unit (air conditioning) due to the required heat and humidity for the infants.

Since long-term moderate and high levels of stress can cause health complications for the personnel and reduce the quality of provided services, it is advised to find ways to minimize environmental and human-related stressors in NICUs.

## Conclusion

In the present study, 2 categories of environmental and Nurse and human factors were found to be stressors for NICU nurses. In addition, human factors caused significantly higher levels of stress than did environmental factors. Overall, stressors in NICUs were described as moderate. Having programs to reduce or eliminate these factors could increase the quality of services provided by nurses in NICUs and thus decrease the negative impact of stress on human resources.

The results of this study might not be extendable to other provinces in Iran. Moreover, personality differences, mental situations, perceptions of stress among

nurses, exhaustion, and work environment of nurses can affect the responses to the questions we raised. However, such factors cannot be controlled which is a limitation of the present study.

## Ethical issues

None to be declared.

## Conflict of interest

The authors declare no conflict of interest in this study.

## Acknowledgments

Appreciations go to the authorities and nurses in neonatal intensive care units of participating hospitals. The authors are also grateful to the research deputy of Tabriz University of Medical Sciences (Tabriz, Iran) for their financial support. This article was derived from MSc thesis in the Tabriz University of Medical Sciences, Nursing and Midwifery faculty (related research project No: 908).

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