

ORIGINAL RESEARCH

The Effect of Emergency Department Overcrowding on Efficiency of Emergency Medicine Residents' Education

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Abstract

Introduction: Creating a calm and stress-free environment affects education significantly. The effects of the emergency department overcrowding (EDO) on the training of emergency medicine residents (EMR) is a highly debated subject. Therefore, this study aimed to evaluate the effect of EDO on efficiency of EMR's education. **Methods:** In this cross-sectional study, the effects of overcrowding on EMR's education in the resuscitation room and acute care unit. Data collection was done using a questionnaire, which was filled out by the second year EMRs. The crowding level was calculated based on the national emergency department overcrowding scale (NE-DOCS). The relationship between the two studied variables was evaluated using independent sample t-test and SPSS 21 statistical software. **Results:** 130 questionnaires were filled out during 61 shifts. 47 (77.05%) shifts were overcrowded. The attend's ability to teach was not affected by overcrowding in the resuscitation room ($p=0.008$). The similar results were seen regarding the attend's training ability in the acute care unit. **Conclusion:** It seems that the emergency department overcrowding has no effect on the quality of education to the EMRs.

Key words: Crowding; emergency department; education; resistance training

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Introduction:

Education is a series of purposeful activities planned by the educators, in the form of interaction between them and the learners (1, 2). Education is one of the most important ways of ensuring the success of plans in all dimensions of the society. In addition, learning includes all the skills and knowledge gained by one, over the course of their life (3-6). Eliminating confounding factors in education can increase the effectiveness of education (7-9). One of the major confounding factors in education is the educational environment (10). Creating a calm and stress-free environment affects the training significantly. Some studies believe that emergency department overcrowding (EDO) can affect the training of emergency medicine residents (EMR) while others do not (11-19). Overcrowding can affect the interaction between the educator and learner (15). On one side, the excessive workload can create opportunities for learning and increase the efficiency of learning but on the other hand, less time is available for the interaction between the educa-

tor and the student (16). The effects of EDO on the training of EMRs is a highly debated subject. Therefore, this study aimed to evaluate the effect of EDO on the efficiency of EMRs' education.

Methods:

Study design and setting

This cross-sectional study aimed to evaluate the effect of EDO on the efficiency of EMRs' education. The study was carried out in 2013-2014 in Shohadaye Haftome Tir Hospital, Tehran, Iran. The protocol of study has been approved by the ethics committee of Shahid Beheshti University of Medical Sciences. The questionnaires were anonymous and the participants granted permission before the study.

Participants

The participants were all second year EMRs who were willing to take part in the study. The ability of the attend to teach the principles was evaluated in resuscitation room and the acute care unit. None of the residents evaluated an attend twice.

Data collection



Data collection was done using a questionnaire, which was filled out by the second year residents. The residents evaluated her/his attends on the subject of teaching skills, creating a fear-free environment, willingness to teach, accessibility, level of busyness during the shift, number of visits/shift, interpersonal relationship skills, and their overall teaching scores. Also both the resident and attend were asked about the crowding of the shifts. Each question was given a score ranging from 1 to 10 (1 being the least and 10 the most possible score). In addition, the emergency crowding score was calculated based on the national emergency department overcrowding scale (NEDOCS). At the end of each 12-hour shift using NEDOCS the department's crowding was evaluated. If the score was less than 100, the department was considered not overcrowded and if it was higher than 100, the shift was considered overcrowded. The reliability of the questionnaire was approved by 2 emergency medicine specialists and 1 epidemiologist. The validity of the questionnaire was confirmed by calculating Kronbach's alpha (0.79).

Statistical analysis

The appropriate sample size for this study was 130, which was calculated by considering the standard deviation of 1 not overcrowded and 1.5 in overcrowded hours (20), power of 90%, confidence level of 95% ($\alpha=0.05$), and error of 0.5. The data were analyzed using SPSS 21. The results were given as means and standard deviations. The relationship between the department overcrowding and the quality of education was evaluated using independent sample t-test. In all the analyses $p<0.05$ was considered as significance level.

Results:

130 questionnaires were filled out during 61 shifts (26 night shifts and 35 day shifts, 27 residents evaluated 8

attends). 47 (77.05%) shifts were overcrowded. The attend's ability to teach was not affected by overcrowding in the resuscitation room. In the overcrowded shifts the number of visits done by the attend were significantly higher ($p=0.008$) (Table 1).

It is notable that similar results were seen regarding the attend's training ability in the acute care unit (Table 2). Also in this unit, the number of visits done by the attend were significantly higher in the overcrowded shifts ($p=0.03$).

Discussion:

The results of this study showed that from the EMRs' point of view, the attends achieve the highest scores in creating a fear-free environment, interpersonal relationship skills, accessibility and teaching skills during EDO. It is worth noting that the total teaching score achieved by the attends was 6.8 (out of 10) in the resuscitation room and 6.5 (out of 10) in the acute care unit. It was also demonstrated that EDO has no effect on the attends' teaching skills and abilities.

Some researchers believe that emergency department overcrowding can negatively affect emergency residents' training and learning (14-19). In contrast to the results of the present study, Skeff et al. express in their study that job stress has a negative impact on education (21). Also Atzema et al. propose in their review study that overcrowding might affect the interaction between the educator and the student as this interaction needs a calm environment for asking questions, concentrating on the educator's training and reaching a conclusion regarding the educator's instructions. These principles might be affected by the department overcrowding. These researchers express that the department overcrowding is an important factor causing time limitations for training. Also excessive workload and the need to take care of and treat the patients leaves little time

Table 1: the mean score regarding the evaluated factors in the resuscitation room based on the department's crowding

Evaluated factor	NEDOSC		Total score	P
	< 100	> 100		
Creating a fear-free environment	8.4 \pm 1.4	8.7 \pm 1.3	8.6 (1.3)	0.83
Teaching skills	6.6 \pm 2.4	7.1 \pm 2.4	6.8 (2.4)	0.36
Willingness to teach	5.6 \pm 2.9	6.8 \pm 2.3	6.2 (2.65)	0.07
Accessibility	6.5 \pm 2.8	7.5 \pm 2.2	7.0 (2.5)	0.13
Interpersonal relationship skills	8.0 \pm 1.7	8.3 \pm 2.9	8.2 (2.0)	0.59
Overall teaching score	6.3 \pm 2.2	7.2 \pm 2.1	6.8 (2.15)	0.11
Level of busyness during the shift	5.2 \pm 2.6	6.8 \pm 2.7	6.1 (2.8)	0.02
Number of visits/shift	4.0 \pm 2.5	5.7 \pm 2.6	5.2 (2.5)	0.008



Table 2: The mean score regarding the evaluated factors in the acute care unit based on the department's crowding

Evaluated factor	NEDOSC		Total score	P
	< 100	> 100		
Creating a fear-free environment	8.4 ± 1.8	8.3 ± 2.0	8.4 (1.9)	0.76
Teaching skills	6.8 ± 2.5	6.5 ± 2.0	6.7 (2.2)	0.59
Willingness to teach	5.5 ± 2.9	5.8 ± 2.4	5.7 (2.7)	0.6
Accessibility	6.9 ± 2.9	6.7 ± 2.7	6.3 (2.8)	0.24
Interpersonal relationship skills	8.2 ± 2.0	7.8 ± 1.9	7.95 (1.0)	0.36
Overall teaching score	5.9 ± 2.5	6.9 ± 2.0	6.5 (2.3)	0.09
Level of busyness during the shift	5.1 ± 2.8	6.1 ± 2.9	5.8 (2.9)	0.19
Number of visits/shift	4.0 ± 2.6	5.4 ± 2.1	4.9 (2.3)	0.03

for the attends to ask the residents questions and wait for their answers (14). However, the results from the present study showed that overcrowding did not affect the attends' education score. This disagreement in the results can have 2 reasons. Firstly, as can be seen, the studied emergency departments are crowded most of the time and therefore the constant crowding can result in the emergency medicine attends being adapted to these situations and having their skills developed so that they can give the necessary education in little time. Secondly, the attends who have participated in this study have had relatively high interpersonal relationship skills (a score of 8.2 out of 10). Therefore, the interaction between the residents and the attends has been more affected by this factor rather than the EDO. But in line with the results of this study, Mahler et al. determined that no significant difference exists between the residents' perceptions regarding the educational value in the overcrowded and non-overcrowded times (22). These researchers express that in the overcrowding period, the residents do less visits and treatment processes while the attends are busier. Therefore, it is possible that the residents have more time to learn, study and observe the correct treatment processes done by the attend. The emergency department overcrowding gives the residents the opportunity to observe various clinical cases and directly observe the correct ways of managing and treating the patients because at the times of overcrowding, the attends do more visits. Therefore, we can say that the EDO possibly not only doesn't impact the attends' presented education negatively, but also can result in an increase in the efficiency of the education. This mostly depends on the attends' educating skills. We should not leave out the educational principles of the health system. The principles of the educational system, including the points of view, beliefs, schedules, and regulations can all affect the teaching methods. Rigid and inflexible regulations and nonprofessional decisions, and the educational system being in line with the students' needs or not can all affect education (3, 10, 23).

Conclusion:

Based on the results of the present study, EDO has no effect on the educational skills and abilities of the attends. They achieve the highest scores in creating a fear-free environment, interpersonal relationship skills, accessibility and teaching skills in both overcrowded and non-overcrowded situations.

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Conflict of interest:

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