NURSE KNOWLEDGE OF EMERGENCY MANAGEMENT FOR BURN AND MASS BURN INJURIES

CONNAISSANCES DES IDE CONCERNANT LA PRISE EN CHARGE EN URGENCE DES BRÛLÉS, ISOLÉMENT ET EN CAS DE CATASTROPHE

Lam N.N., Huong H.T.X., Tuan C.A.
National Institute of Burns, Hanoi, Vietnam

SUMMARY. A survey was conducted on 353 registered nurses working in Emergency and Trauma departments of district and provincial hospitals in Vietnam. Contents of the survey included first aid and initial care for burn and mass burn injuries. Only 15.3% of participants correctly answered over 50% of the items. The average percentage of correct answers was 39.7%. For cases of mass burn injuries, 53.6% of nurses recognized oral fluid resuscitation to be an appropriate method. Pre-transportation intubation for suspected inhalation injury was indicated by 44.6% of participants. Meanwhile, only 5.4% of nurses gave the correct answer regarding burn triage. A significantly higher knowledge level was recorded among nurses who had attended training courses in the past (54.8 ± 10.5% vs. 38 ± 9.7% respectively; p < .001). Meanwhile, work experience and place did not influence knowledge level. To improve the burn emergency management of nurses, further and continuing education is highly recommended.

Keywords: emergency burn management, mass burn injuries, nurse knowledge

RÉSUMÉ. Une étude a été réalisée auprès de 353 IDE travaillant dans des services d’urgences d’hôpitaux vietnamiens. Le questionnaire portait sur le secourisme et les soins initiaux aux brûlés, se présentant isolément ou dans le cadre d’une catastrophe. Seuls 15,3% des participants avaient plus de 50% de bonnes réponses, la moyenne étant de 39,7%. Cependant, 53,6% des IDE attestent que la réhydratation orale est utilisable en cas d’afflux massif mais seuls 5,4% des réponses sur le triage étaient correctes. L’intubation prophylactique avant transport en cas d’inhalation de fumées était validée par 44,6% des répondants. Les réponses étaient meilleures chez les IDE ayant bénéficié par le passé d’une formation (54,8 +/- 10,5% VS 38 +/- 9,7% ; p<0.001) alors que ni l’expérience ni le lieu d’exercice n’influençaient les connaissances. Ainsi, des plans de formation sont nécessaires pour améliorer les connaissances des IDE sur la prise en charge des brûlés.

Mots-clés : brûlés, urgence, prise en charge, catastrophe, IDE, connaissances

Introduction

First aid and appropriate initial management are considered to be important steps in the progress of the management of burns, including mass burn injuries. In fact, most burned patients in Vietnam are initially treated at local emergency departments of district hospitals rather than in specialized burn centers. This is most likely the case in other countries also. After being given first aid and stabilized at the scene, burn injury victim(s) are transferred to the emergency department for initial management, prior to referral to the closest burn unit for definitive care. In cases of mass burn casualties, emergency departments will triage and provide emergency treatment to the burned victims. Nurses working in these departments are often required to assist the local teams. They may be deployed to the scene. Thus, the knowledge and practical skills of nurses in these departments play an important role in improving the quality of burn care.

It is estimated that more than 90% of burn-related deaths occur in developing or low and middle-income countries. Limitations have been reported regarding the first aid provided and the initial management of burned patients before they were transferred to a specialized burn unit, such as the Vietnam National Institute of Burns in Hanoi. This is especially the case for mass burn injuries. In order to improve burn care in Vietnam, we need to explore nurses’ knowledge of burn management practices in the Emergency and Trauma Department of district and provincial hospitals.

This study attempts to evaluate nurses’ knowledge of emergency burn management using a simple knowledge-based questionnaire.

Materials and methods

From February to June 2016, a survey was conducted on 353 registered nurses working in the Emergency or Trauma Department of district or provincial hospitals in 10 provinces. The questionnaire was delivered in person; the participant had 30 minutes to answer 11 questions (see appendix). The contents of the survey included: (1) general information including work...
place, working experience and previous participation in training courses; (2) knowledge of first aid for thermal and eye injury, calculating burn surface area, concept of the Parkland formula, manifestation of inhalation injury and awareness for intubation, appropriate methods of fluid resuscitation and triage for mass burn injuries. The percentage of correct answers was considered to represent overall knowledge level. Data was tabulated and analyzed using T test and Chi Square to compare mean and distribution of values between groups using Stata 11.0 software and p value ≤ .05 was considered a significant level.

**Results**

A total of 353 nurses participated in the survey. Characteristics of the participants are shown in Table I. Two hundred and forty-seven (69.9%) were working in provincial hospitals. One hundred and fifty participants (42.5%) had more than 5 years of working experience since graduating from nursing school. However, only 10.2% of participants had taken part in training courses for first aid and burn management.

Regarding first aid, Table II indicates that 93.2% of participants knew to use fresh cool water instead of applying traditional remedies such as fish sauce, butter or toothpaste, commonly used in the community. Eighty-three point six percent of the participants indicated they understood not to use proportional remedies such as fish sauce, butter or toothpaste, respectively. Half of the participants recognized the manifestations of inhalation injury. Regarding fluid resuscitation methods, 53.5% of nurses provided the correct answer. Pre-transportation intubation for suspected inhalation injury was indicated by 44.6% of participants. Meanwhile, only 5.4% of nurses gave the correct answer regarding proper triage procedures.

The overall results are indicated in Table IV. Only 54 nurses, accounting for 15.3% of participants, had more than 50% correct answers. The average percentage of correct answers was 39.7% (ranging from 6.7 to 73.3%) of the total questions; no one achieved all the correct answers.

**Table IV - Overall survey results (n = 353)**

<table>
<thead>
<tr>
<th>Percentage of correct answers</th>
<th>Number of participants</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 – 25%</td>
<td>22</td>
<td>6.2</td>
</tr>
<tr>
<td>26 – 50%</td>
<td>277</td>
<td>78.5</td>
</tr>
<tr>
<td>&gt; 50%</td>
<td>54</td>
<td>15.3</td>
</tr>
<tr>
<td>Average (%) &amp; 95% CI*</td>
<td>39.7±19.9 (6.7 – 73.3)</td>
<td></td>
</tr>
</tbody>
</table>

* CI: confidence interval

The relationship between overall result and proposed criteria is shown in Table V. Nurses who had undertaken training courses had a significantly higher knowledge level than those who had not (54.8 ± 10.5% vs. 38.0 ± 9.7% respectively; p <.001). Knowledge levels were not significantly different between nurses working in provincial hospitals and those in district hospitals (39.5 ± 10.6% correct answers vs. 40.3 ± 11.9% respectively; p=0.51). It was also noted that working experience was not significantly related to knowledge level amongst nurses (p =.014).

**Table V - Relationship between overall result and proposed criteria**

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Subgroup</th>
<th>Mean ± SD*</th>
<th>95% CI**</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Workplace</td>
<td>Provincial hospital</td>
<td>39.5 ± 10.6</td>
<td>38.2 – 40.8</td>
<td>0.51</td>
</tr>
<tr>
<td></td>
<td>District hospital</td>
<td>40.3 ± 11.9</td>
<td>38.0 – 42.6</td>
<td></td>
</tr>
<tr>
<td>Working experience</td>
<td>&lt; 5 years</td>
<td>40.5 ± 11.0</td>
<td>39.0 – 42.0</td>
<td>0.14</td>
</tr>
<tr>
<td></td>
<td>n = 203</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>≥ 5 years</td>
<td>38.8 ± 11.0</td>
<td>37.0 – 40.5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>n = 150</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Training courses</td>
<td>No</td>
<td>38.0 ± 9.7</td>
<td>36.9 – 39</td>
<td>&lt;.001</td>
</tr>
<tr>
<td></td>
<td>n = 317</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>54.8 ± 10.5</td>
<td>51.3 – 58.4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>n = 36</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Percentage of correct answers; ** CI: confidence interval

**Discussion**

Many burned patients admitted to the specialized Burns Hospitals in Vietnam did not receive proper first aid. Knowledge and practical skills of healthcare providers play an important role in the success of a patient’s care. Current worldwide reports indicate different levels of knowledge of first aid and initial management for burns amongst healthcare providers. Insufficient knowledge of emergency burn management has been reported in developing countries. In 2005, a survey by Kut and colleagues on knowledge among 510 occupational physicians in Turkey showed that only 21.8% of total participants had adequate knowledge of appropriate burn classification, and 96% had insufficient knowledge of first aid for burn injuries. In 2016, a survey by Alomar and colleagues on 408 pediatric healthcare providers in Saudi Arabia indicated that 41% of participants knew to use fresh cool water for both adult and pediatric burned patients (22.1% and 28.6% respectively). Half of the participants recognized the manifestations of inhalation injury. Regarding fluid resuscitation methods, 53.5% of nurses provided the correct answer. Pre-transportation intubation for suspected inhalation injury was indicated by 44.6% of participants. Meanwhile, only 5.4% of nurses gave the correct answer regarding proper triage procedures.

Table II - First aid knowledge and ability to calculate total body surface area burned (n = 353)

<table>
<thead>
<tr>
<th>Contents of survey</th>
<th>True</th>
<th>False</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>%</td>
<td>N</td>
</tr>
<tr>
<td>Using cool fresh water for first aid</td>
<td>329</td>
<td>91.2</td>
</tr>
<tr>
<td>Materials can be applied on burn wound</td>
<td>295</td>
<td>83.6</td>
</tr>
<tr>
<td>First aid for eye injuries</td>
<td>236</td>
<td>66.9</td>
</tr>
<tr>
<td>Calculating total body surface area burned</td>
<td>27</td>
<td>7.7</td>
</tr>
</tbody>
</table>

Table III shows that 52.4% of the participants had an understanding of the use of the Parkland formula. On the other hand, less than one third gave the correct answer regarding sufficient urine output when performing fluid resuscitation for both adult and pediatric burned patients (22.1% and 28.6% respectively). Half of the participants recognized the manifestations of inhalation injury. Regarding fluid resuscitation methods, 53.5% of nurses provided the correct answer. Pre-transportation intubation for suspected inhalation injury was indicated by 44.6% of participants. Meanwhile, only 5.4% of nurses gave the correct answer regarding proper triage procedures.

Table III - Knowledge of fluid resuscitation and mass burn injuries

<table>
<thead>
<tr>
<th>Contents of survey</th>
<th>True</th>
<th>False</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>%</td>
<td>N</td>
</tr>
<tr>
<td>Parkland formula</td>
<td>185</td>
<td>52.4</td>
</tr>
<tr>
<td>Required urine output for fluid resuscitation of adult burned patient</td>
<td>78</td>
<td>22.1</td>
</tr>
<tr>
<td>Required urine output for fluid resuscitation of pediatric burned patient</td>
<td>101</td>
<td>28.6</td>
</tr>
<tr>
<td>Manifestations of inhalation injury</td>
<td>181</td>
<td>51.3</td>
</tr>
<tr>
<td>Appropriate method of fluid resuscitation in cases of mass burn injuries</td>
<td>189</td>
<td>53.5</td>
</tr>
<tr>
<td>Triage procedures for mass burn injuries</td>
<td>19</td>
<td>5.4</td>
</tr>
<tr>
<td>Indication for intubation before transportation</td>
<td>154</td>
<td>44.6</td>
</tr>
</tbody>
</table>
first aid, and 97% percent had insufficient knowledge about the duration of application. In addition, a high rate of participants answered that it is possible to use remedies such as toothpaste, fish sauce, ice or oils to cover the burn wound. A report by AL-Sudani and Ali in 2017 on the knowledge of nurses selected from burns wards in non-teaching hospitals in Baghdad revealed that only 8.7% passed the pretest basic questions. Traditional remedies are also commonly used in Vietnam. According to the current results, there are still a small number of nurses who consider using such remedies instead of fresh water.

Similar to other developing countries, Vietnam has a limited number of specialized burns hospitals. Most burn patients receive initial management at district or provincial hospitals prior to transfer. Hence, it is essential that nurses in the Emergency Department of those hospitals have adequate knowledge of initial burn management. Results of the current survey indicate that there is a significant gap in nurses’ knowledge in terms of burn surface area estimation, use of the Parkland formula and required urine output for fluid resuscitation. Inappropriate estimation of the burned surface area as well as misunderstanding of the Parkland formula may lead to over or under resuscitation and the sequela associated with this, such as renal failure and other related medical issues. This not only impacts on-going care outcomes for the patient but can significantly increase the cost associated with this care.

The current study also indicates that nurses have limited knowledge of the management of mass burn injuries, especially in triage (only 5.4% provided correct answers), and the indication for intubation. Due to limited resources, oral fluid resuscitation for minor burned patients, even in mass burn injury situations, is the recommended method in Vietnam. This has to be carried out with care, and requires the patient to be alert and able to follow commands. Swallowing assessment is not available in Emergency and Trauma Departments. In order to measure fluid input, intravenous fluid may be the preferred method. However, it is not the only way, especially in a mass burn injury situation with limited resources. Even severely burned patients with TBSA over 30% can be given oral fluid initially, so that fluid resuscitation is not delayed. 53.5% of nurses answered this correctly. Due to swelling of the airways and use of high doses of anesthetic drugs, some burned patients may require intubation prior to transfer to the burns units. Not only is respiratory function affected without intubation, but when the procedure is done later it can definitely induce further trauma to the airways. Lack of knowledge and insight may influence the chances of survival of these burned patients.

Knowledge can be gained by frequent exposure. Hence, a correlation is expected between working experience and knowledge. Regarding knowledge of emergency burn management, the findings of the current study reveal that there is no significant relationship between nurses’ knowledge and their years of experience in emergency burn care and mass burn injury management. This implies that nurses in emergency departments are not getting the right learning opportunities from their working environment. Delivery of knowledge may have to rely on formal or informal learning methods.

Similar to other reports, only 15.3% of nurses from the current survey gave more than 50% correct answers. None of the participants were able to provide correct answers to all the questions. Since they are the front line clinicians, there are real concerns about the care burned patients are receiving at such a critical stage. In addition, our results reveal that working experience does not affect our participants’ overall level of knowledge of burn care. According to the survey, only 10.2% of participants had undertaken training courses for first aid and burn management. The same situation was reported in a study by Alomar et al. (2016), conducted in Saudi Arabia, which revealed that only 15% of participants had taken part in first aid training. This suggests that nurses are not regularly engaging in further or continuing education, or in refresher courses on the management of acute burns and mass injuries.

In developed countries the situation is better, but still shows limitations. For example, Rea et al. conducted a study in Western Australia that showed that only 18.8% of healthcare providers gave the right answers to questions on the burn scenario. In 2013, Tay et al. conducted a survey in England to assess burn first aid knowledge among healthcare workers. This showed that 59% of participants had attended a first aid course. However, only 16% achieved correct answers to all questions.

Previous studies have shown that knowledge of first aid is correlated with first aid training courses. A study by Rea et al. indicated a statistically significant difference between participants who had taken part in a first aid course and those who had not. The current study has similar results and is in agreement with that statement: nurses who undertook training courses had a significantly higher knowledge level (53.1%) than those who had not participated in any training course (44.5%). Works by AL-Sudani and Ali (2017) showed that nurses could significantly improve their knowledge from 8.7% to 100% right after attending a training course. Our study also proved that participating in training courses is an independent factor affecting knowledge level. These results emphasize the importance of attending regular training courses for healthcare providers.

One of the reasons for this gap in knowledge is a limited educational curriculum at nursing schools, as well as a lack of continuing medical education that focuses on burn emergency management. Clearly, additional courses are required to fill the gap in formal nursing education in order to update the knowledge of healthcare providers. Training courses for doctors are provided on a regular basis, and this should extend to nurses. A survey by Meschial & Oliveira in 2014 in Brazil indicated that only 22.4% of nursing students had adequate knowledge of initial burn management. In 2016, a cohort study by Kua Phiec Hui et al. at the children’s emergency department in Singapore showed a statistically significant increase in knowledge immediately after a short training course (22.9% vs. 78.3%). Ahmed and Mohamed (2016) compared nurses’ knowledge and performance with burned children at the pediatric burn unit before and after the educational program. After the implementation of the program, over 90% of nurses showed greater knowledge and an improved performance in pediatric burns management. The role of burn training in improving nurses’ knowledge has also been reported by Tay et al., EL-Sayed et al. and Mussa & Abass.

Conclusion

Our study indicates insufficiencies in nurses’ knowledge of emergency burn management and mass burn injury response. Working experience does not correlate to level of knowledge. Training courses significantly contribute to an improvement in their knowledge. It is necessary to conduct continuing medical education for nurses, regardless of their working experience and place of work.
BIBLIOGRAPHY


Acknowledgements.
We are grateful to all the staff of the National Institute of Burns, Hanoi, for helping us to collect the data.
APPENDIX

QUESTIONNAIRE FOR BURN FIRST AID AND INITIAL MANAGEMENT

I. General Information

Workplace:  
☐ Provincial hospital  
☐ District hospital

Working experience:  
☐ < 5 years  
☐ ≥ 5 years

Participated in burn training course:  
☐ Yes  
☐ No

II. Please read the following questions and choose the correct answers

Q1. Is using cool fresh water the best first aid measure for thermal injury?

☐ Yes  
☐ No

Q2. Right after injury, should the following materials be applied to a burn wound?

☐ a. Ice  
☐ b. Toothpaste  
☐ c. Fish oil

☐ d. Honey  
☐ e. None of above

Q3. If the patient has eye injuries, what is the most appropriate emergency management?

☐ Transferring the victim to the nearest hospital as soon as possible  
☐ Finding and applying neutral agent  
☐ Irritating and continuously blinking with fresh water  
☐ Using high pressure water to clean the injured eyes

Q4. Burn surface area of an adult patient with burns on the head and neck, both upper extremities and front torso is ……….%TBSA.

Q5. Estimated Parkland formula for adults is:

☐ a. 1ml/kg/% TBSA  
☐ b. 4ml/kg/% TBSA

☐ c. 5ml/kg/% TBSA  
☐ d. 4ml/kg/h

Q6. Required urine output indicating enough fluid given to adult burn patient:

☐ a. 3ml/kg/h  
☐ b. 2ml/kg/h

☐ c. 0.5ml/kg/h  
☐ d. As much as possible

Q7. Required urine output indicating enough fluid given to pediatric burn patient:

☐ a. 1ml/kg/h  
☐ b. 2ml/kg/h

☐ c. 3ml/kg/h  
☐ d. As much as possible

Q8. Manifestation of inhalation injury:

☐ a. Occurred in closed space  
☐ b. Face burn  
☐ c. Change in voice

☐ d. Difficulty breathing  
☐ e. Carbonaceous  
☐ h. Coma  
☐ g. All the above signs

Q9. Appropriate method of fluid resuscitation in cases of mass burn injuries:

☐ Oral fluid resuscitation with care  
☐ Intravenous only

Q10. Transferring priority victims in cases of mass burn injuries:

☐ First come first served  
☐ Depends on severity of victims as triage

Q11. In cases of mass burn injuries, is intubation indicated for suspected inhalation injury before transferring?

☐ Yes  
☐ After assessing the risk during the transfer process  
☐ Only for respiratory distress

Thank you!