



Evaluation of Nurses' Approaches to Deteriorating Patients: Survey Study

Levent Özdemir , Nurcan Doruk , Handan Birbiçer , Ashnur Sagün , Mustafa Azizoğlu 

Department of Anaesthesiology and Intensive Care, Mersin University School of Medicine, Mersin, Turkey

Cite this article as: Özdemir L, Doruk N, Birbiçer H, Sagün A, Azizoğlu M. Evaluation of Nurses' Approaches to Deteriorating Patients: Survey Study. *Turk J Anaesthesiol Reanim.* 2021; 49(4):320-324.

Abstract

Objective: Prevention of cardiopulmonary arrest in hospitalised patients is the first and most important step in the life-saving chain. When the condition of the inpatients is worsened, nurses are usually the first to see and evaluate the patient. The aim of this study was to evaluate the attitudes of the nurses working at the Mersin University Hospital, during their routine follow-up to the deteriorating patients and the early warning scoring (EWS) awareness.

Methods: A web-based questionnaire was sent to all nurses working in inpatient services and intensive care units (ICUs) and registered to the hospital database at Mersin University Hospital via e-mail. In the questionnaire, a total of 10 multiple-choice questions were asked to the nurses questioning the unit they worked for, the EWS they used, the complaints they frequently complain about and the applications for the call for help. A total of 146 nurses were included in the study.

Results: 43.8% (n = 64) of the participants were in ICU, and 56.1% (n = 82) were in service units. Participants were asked whether they used a special scoring system to recognise the deteriorating patient; 45.2% (n = 66) used the scoring system; and 54.8% (n = 80) reported that they did not use it. Participants working in ICU were more likely to use EWS system. Participants answered the most commonly used scoring system as the Glasgow Coma Scale (n = 40). The participants reported that the most common respiratory distress (n = 135), changes in consciousness (n = 109), palpitations (n = 98) and chest pain (n = 92) occurred in the deteriorating patients. Participants reported that they frequently asked for help from a doctor (80.1%), other nurses (7.5%) and a blue code team (7.5%).

Conclusion: According to the findings, it is necessary to determine the habits of calling for help and raising awareness for a functional EWS.

Keywords: Deteriorating patient, early warning score, nursing assessment, patient safety, hospitalised patients, practice nursing, physiological responses, critical care outreach

Introduction

Prevention of cardiopulmonary arrest (CPA) in hospitalised patients is the first and most important step of the life-saving chain.¹ Just 20% of the patients could be discharged from hospital after CPA has occurred.^{2,3} When the condition of the inpatients is worsened, nurses are usually the first to see and evaluate the patient, so the nurses have a central role for this situation. Many different early warning scoring (EWS) systems have been developed for rapid intervention of deteriorating patients, implementation of examination and treatment modalities and be able to handle different protocols for follow-up. To know how and in what way EWSs, designed by each hospital according to its own local conditions, practically used is important for control of efficacy.

In this study, to evaluate the approaches of the nurses working at the Mersin University Medical Faculty Hospital during their routine follow-up to deteriorating patients and their observations for applications made by the team coming for help, through a survey is aimed.

Methods

Ethics committee approval for this study was received from ethics committee for the non-invasive clinical studies in Mersin University. A web-based questionnaire entitled as "Evaluation of nurses' approaches to deteriorating patients" was sent to all nurses working in inpatient services and intensive care units (ICUs) and registered to the

Table 1. Use of EWS According to the Unit Participants Work

	ICU	Service units	Total
EWS users, n	50	16	66 (45.2%)
EWS non-users, n	14	66	80 (54.7%)

EWS: early warning score; ICU, intensive care unit.

hospital database at Faculty Hospital via e-mail. A total of 146 nurses answering the questionnaire were included to the study.

In the questionnaire, a total of 10 multiple-choice questions were asked to the nurses. Information letter about the aim and qualification of the study was given to the participants at the beginning of the questionnaire. Questions including the demographic information, first complaints expressed by deteriorating patients, frequently encountered signs and symptoms of the patients, the EWSs they used, their routine to call for help and their observations about the intervention methods of the team coming for help were asked to the nurses.

Statistical Analysis

For statistical evaluation, data were analysed using the STATA MP 11 for Windows package programme (Texas, USA). Descriptive statistics were used for categorical variables, and frequency calculations were expressed in percentages. The questionnaire form applied to the nurses participating in the study is presented at the end of the study (Appendix 1).

Results

A total of 146 nurses answering the questionnaire were included to the study. 43.8% (n = 64) of the participants were working in the ICU, and 56.1% (n = 82) in the service units. Participants were asked whether they used a special scoring system to recognise the deteriorating patient; 45.2% (n = 66) reported that they use a scoring system, while

54.8% (n = 80) reported they do not use any. Rate of EWS system use found significantly higher in the participants working in ICU (Table 1).

Glasgow Coma Scale (GCS) (n = 40) was the most common answer from scoring system users to the question asking which EWS system they use; and followed by Appearance, Pulse, Grimace, Activity, Respiration (n = 3), Modified Aldrete Scoring (n = 3). EWS answer was given by only one participant.

In order of frequency, respiratory distress (n = 135), changes in consciousness (n = 109), palpitations (n = 98) and chest pain (n = 92) were found as the first complaints expressed by the deteriorating patients to the participants. Participants also reported that they most frequently call for help in situations like decrease in oxygen saturation, respiratory depression and change in consciousness (Figure 1).

Participants reported that they most frequently asked for help from the service doctor (80.1%), other nurses (7.5%) and the blue code team (7.5%). Assessment of consciousness, oxygen supply, aspiration and drug administrations were reported as the initial interventions made by the team coming for help; and arterial blood gas analysis, electrocardiography (ECG) and biochemical tests were reported as the first tests asked (Figure 2).

Participants reported that adrenaline (n = 115), dopamine (n = 65) and inhalation treatment (n = 63) were applied by the team coming for help in order of frequency. Participants also replied the question about the most difficultly provided medical equipment during an intervention to the patient as different sized facial masks, non-invasive ventilator and ECG device.

Discussion

Deterioration of patients can be early recognised by making regular registrations about hospitalised patient's physiological parameters like respiratory rate, oxygen saturation, heart rate, arterial blood pressure and state of consciousness. Use of these physiological parameters as a EWS has a critical role on preventing of CPA by providing a chance for early intervention.

Researches are available that find mortality and cardiac arrest rates significantly lower at hospitals using EWS effectively.^{4,5} EWSs have been used in many different clinical fields like ICUs, emergency services, postoperative care units and inpatient wards. Subbe et al.⁶ found a significant decline in mortality rate with the use of EWS in a research they made in ICU (63% vs. 33%). Moon et al.⁷ determined a significant decline in cardiac arrest calls with the use of EWSs at two hospital accepting all adult patients. With the addition of EWS protocol to the standard nurse team, early recognition of the deteriorating patients has been provided by early

Main Points

- An appropriate and timely triggered early warning score (EWS) system can prevent many cardiac arrest cases from occurring.
- Each hospital needs to develop EWS in accordance with its local conditions and the characteristics of the patient groups.
- To achieve this, it is necessary to identify existing deficiencies and error points in applications.
- This study provides information to increase the awareness and problems faced by nurses in hospitals that have not yet used a routine early warning scoring.

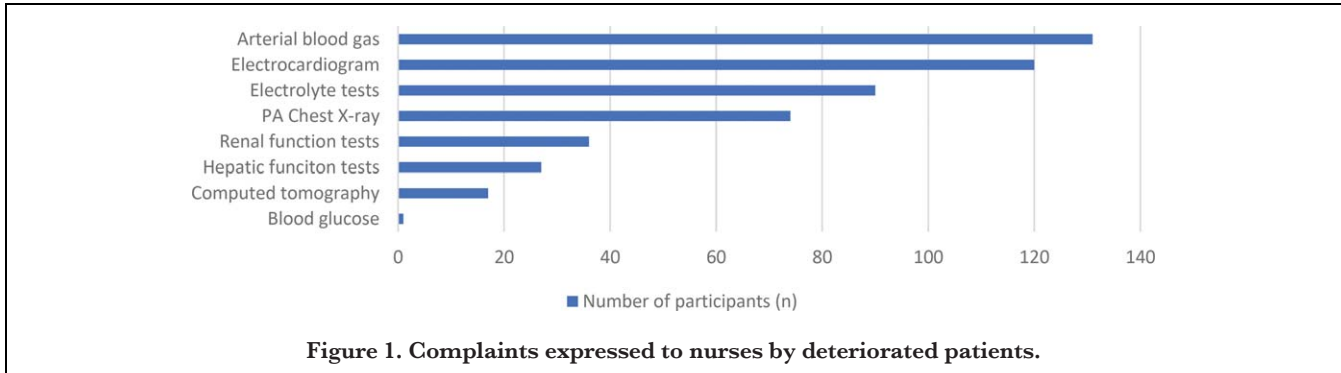


Figure 1. Complaints expressed to nurses by deteriorated patients.

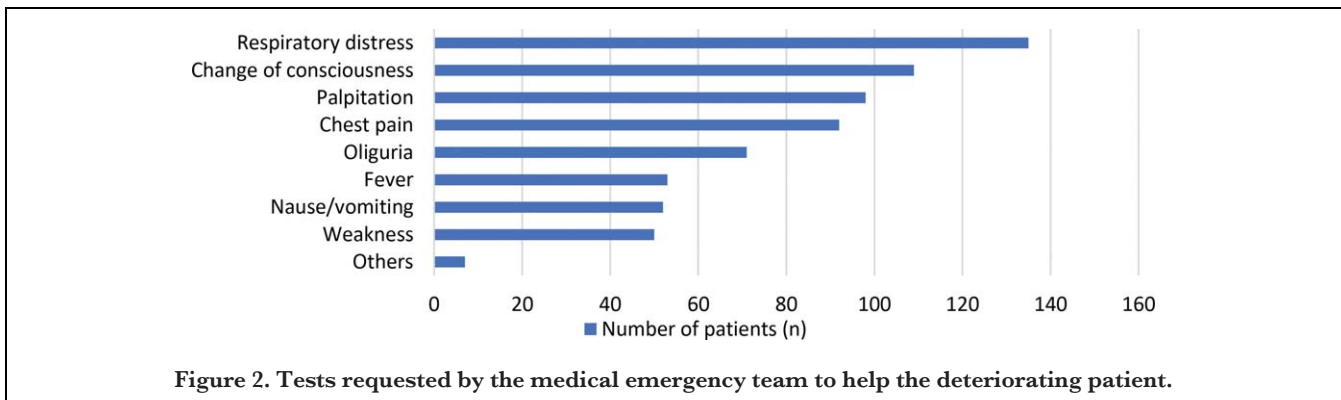


Figure 2. Tests requested by the medical emergency team to help the deteriorating patient.

triggering and determining the need for ICU in these studies. Also, in EWS by constitution of a scoring system appropriate for their local conditions, both making a risk classification with the score achieved by the patient and clarifying the frequency of doctor's visit seem as important points.

Any routine EWS system is not used in the hospital, our study was conducted. However, each ward follows a follow-up scheme in accordance with its patient characteristics. This leads to an inability to establish a standard for calling the medical assistance team. In our study, the majority of EWS users were ICU workers. Although EWS systems used in ICU and wards make a difference, GCS is the most preferred one. For many cases, change in consciousness may occur after deterioration of other physiological parameters. Since the GCS mainly reflects the state of consciousness, it may reflect the changes in the patient's condition later and it is not possible to recognise the deterioration early.

In our study, it is seen that the worsening patients or their relatives frequently convey dyspnoea, change in consciousness, palpitations and chest pain to their nurses. These complaints can occur frequently in many life-threatening clinical situations. It is important to determine the severity of the complaints reported by the patients and create an action chart. Although some of these patients are seriously symptomatic, EWSs may not be high and medical emergency teams cannot be triggered. If these elements, which constitute the afferent

way of protecting against cardiac arrest, such as the deteriorating patient and calling for early help, are not determined clearly, a situation such as not starting the necessary action and being late may be encountered.⁸ For this reason, it should be determined which symptoms should be the criteria for calling the medical emergency team alone (even if the EWS score is normal). Between beginning of the patients' complaints and development of arrest, there is often a time that a quality assessment can be made. In the studies conducted, the median value of hospital admission period before cardiac arrest was found to be 1–2 days in inpatients.^{3,9} In addition, it has been determined arrest mostly developed due to cardiac causes (50–60%) and primary respiratory failure (15–40%) in hospitalised patients.¹⁰ Primary neurological-induced arrest rates were found to be much lower in inpatients.¹¹

The nurses participating in the study stated that when the patient deteriorates, they often inform the service doctor, and more rarely other nurses in the service. Medical emergency response team is directed with blue code application (national code blue number 2222) for cardiac arrest cases in the hospital our study conducted. However, it was observed that blue code application was not applied frequently only for patients who did not have arrest and whose condition deteriorated. Service doctors who work especially in inpatient services may not have sufficient information and equipment about critical patient management. In addition, studies have shown that the rate of cardiac arrest increases,

especially at weekends and night shifts.¹² This situation is probably due to the lower number of staff and to the weakness of patient follow-up during the rest period. Taking the patient to an advanced ICU is an approach that requires the related branches of expertise to make decisions together.

The participants stated that the team that came for help first evaluated the patient's consciousness, provided oxygen support, applied orotracheal aspiration and administered various medications. Conscious patients were found to have lower arrest rates than patients with impaired consciousness. Especially in patients with change in consciousness, if airway reflexes are not intact, providing airway patency, aspirating secretions and supplying additional oxygen are known as approaches that can prevent cardiac arrests.¹³

Participants reported that the team that came for help most frequently requested arterial blood gas, ECG, electrolytes and chest X-ray tests. Review and correction of 4H-4T (4H: hypoxia, hypovolemia, hypo/hyperkalemia, hypothermia, and 4T: tension pneumothorax, tamponad, thrombosis, toxins) summarize especially the reversible causes in patients with worsening condition and may both protect the patient from arrest. If arrest occurred in the patient, it may positively affect the success of cardiopulmonary resuscitation.¹⁴ Therefore, the tests required in patients whose condition deteriorates should actually be those that can review these causes. When the observations of the nurses participating in our study are examined, it has been seen that the requested tests cover the reversible causes significantly. It is also reported that various evaluations will be useful depending on the characteristics of the service where the patient is located. Especially in surgical services, bleeding, control of drains and recovery from anaesthesia should be carefully monitored in the postoperative patient group.

The participants reported that the incoming team applied adrenaline, dopamine and inhalation therapy most frequently. Adrenaline is used especially in cases of cardiac arrests with non-shockable rhythm. Frequent adrenaline administration of the incoming team suggests that the patient is in a state of periarrest or arrest, and therefore, the team sees the patient in the late stages of deterioration. The early recognition of the deterioration in the patient's condition and the early evaluation of the medical team is the most important practice that determines survival. The most frequent adrenaline administration was interpreted as an indication that the afferent route was too late to recognise and trigger the worsening patient.

Limitations

There are some limitations and difficulties in survey studies on how EWS works. In our study, the internal dynamics, equipment and operation of each service were not consid-

ered. The urgency and worsening criteria of each service for their patients are different. It is, therefore, difficult to create a single common EWS for all patients. Therefore, in a study that focuses on the afferent path of EWS, it is often not possible to achieve homogenisation. However, we think that the deteriorating patients provide valuable information to ensure some standards and early triggering based on the common physiological changes.

Conclusion

As a result, EWS is an efficient and simple method that can be applied at the bedside. It seems appropriate to set standards according to the local conditions and possibilities of each hospital. In particular, the studies evaluating the afferent path of EWS, we think that it is useful for identifying habits, revealing and correcting errors, determining the task of everyone's working area in the service, concentrating on the issues that are found to be lacking in the in-hospital trainings, planning awareness studies, establishing standards for early recognition and appropriate triggering.

Ethics Committee Approval: Ethical committee approval was received from the Mersin University (20/03/2019, 2019/138).

Informed Consent: N/A

Peer-review: Externally peer-reviewed.

Author Contributions: Conception - L.Ö. and N.D.; design - L.Ö., N.D., and H.B.; supervision - N.D. and H.B.; funding - A.S. and M.A.; materials - A.S.; data collection and/or processing - A.S. and M.A.; analysis and/or interpretation - L.Ö. and M.A.; literature review - H.B.; writing - L.Ö.; critical reviews - N.D.

Conflict of Interest: The authors have no conflicts of interest to declare.

Financial Disclosure: The authors have no conflicts of interest to declare.

References

1. Nolan J, Soar J, Eikeland H. The chain of survival. *Resuscitation*. 2006;71(3):270-271. [\[CrossRef\]](#)
2. Sandroni C, Nolan J, Cavallaro F, Antonelli M. In-hospital cardiac arrest: Incidence, prognosis and possible measures to improve survival. *Intensive Care Med*. 2007;33(2):237-245. [\[CrossRef\]](#)
3. Nolan JP, Soar J, Smith GB, et al. Incidence and outcome of in-hospital cardiac arrest in the United Kingdom National Cardiac Arrest Audit. *Resuscitation*. 2014;85(8):987-992. [\[CrossRef\]](#)
4. Paterson R, MacLeod DC, Thetford D, et al. Prediction of in-hospital mortality and length of stay using an early warning scoring system: Clinical audit. *Clin Med*. 2006;6(3):281-284. [\[CrossRef\]](#)
5. Pazar B, Yava A. Evaluation of early warning scoring system and nursing guide application in post-anaesthesia care unit. *Turk J Anesth Reanim*. 2013;41(6):216-222. [\[CrossRef\]](#)

6. Subbe CP, Davies RG, Williams E, Rutherford P, Gemmell L. Effect of introducing the modified early warning score on clinical outcomes, cardio-pulmonary arrests and intensive care utilisation in acute medical admissions. *Anaesthesia*. 2003;58(8):797-802. [\[CrossRef\]](#)
7. Moon A, Cosgrove JF, Lea D, Fairs A, Cressey DM. An eight year audit before and after the introduction of modified early warning score (MEWS) charts, of patients admitted to a tertiary referral intensive care unit after CPR. *Resuscitation*. 2011;82(2):150-154. [\[CrossRef\]](#)
8. Massey D, Chaboyer W, Anderson V. What factors influence ward nurses' recognition of and response to patient deterioration? An integrative review of the literature. *Nurs Open*. 2017;4(1):6-23. [\[CrossRef\]](#)
9. Perman SM, Stanton E, Soar J, et al. Location of in-hospital cardiac arrest in the United States-variability in event rate and outcomes. *J Am Heart Assoc*. 2016;5(10):1-8. [\[CrossRef\]](#)
10. Radeschi G, Mina A, Berta G, et al. Incidence and outcome of in-hospital cardiac arrest in Italy: A multicentre observational study in the piedmont region. *Resuscitation*. 2017;119:48-55. [\[CrossRef\]](#)
11. Legriel S, Bougouin W, Chocron R, et al. Early in-hospital management of cardiac arrest from neurological cause: Diagnostic pitfalls and treatment issues. *Resuscitation*. 2018;132:147-155. [\[CrossRef\]](#)
12. Gluyas H. Errors in the nursing management of a deteriorating patient. *Nurs Stand*. 2017;32(12):41-50. [\[CrossRef\]](#)
13. Tran S, Deacon N, Minokadeh A, et al. Frequency and survival pattern of in-hospital cardiac arrests: The impacts of etiology and timing. *Resuscitation*. 2016;107(1):13-18. [\[CrossRef\]](#)
14. Soar J, Nolan JP, Böttiger BW, et al. European resuscitation council guidelines for resuscitation 2015. Section 3. Adult advanced life support. *Resuscitation*. 2015;95:100-147. [\[CrossRef\]](#)

Appendix 1
The questionnaire form applied to the nurses participating in the study

Dear participant,

This questionnaire purposes to gather information about EWS systems and symptoms of the deteriorating patients in the scope of the research entitled as “Evaluation of nurses’ approaches to deteriorating patients; survey study.” Results will help to evaluate the use of EWS and research for awareness.

The questionnaire includes 10 questions. It takes approximately 5 minutes to answer the questions. Participation in the research is based on voluntariness. You may leave the ongoing research at any time, provided that you inform the corresponding author. The information obtained from you during the research will be kept in secret by the researcher and the data collected will be used for scientific purposes only. The accuracy of your answers to the questions found in the survey is very important for the quality of the research. Therefore, we ask you to respond correctly to the questions, and thank you for your cooperation.

Corresponding Author
 Levent Özdemir

Survey Questions

EVALUATION OF NURSES’ APPROACHES TO DETERIORATING PATIENTS: SURVEY STUDY

1. Name of the clinic/unit you work?

2. Do you use a special scoring system to recognise a deteriorating patient?
 - Yes
 - No
3. If you use a early warning scoring, could you write the name of it?

4. What are the first complaints of the deteriorating patients referred to you frequently? (Multiple choices can be marked.)
 - Excessive perspiration

- Change in consciousness
- Palpitation
- High fever
- Nausea-vomiting
- Chest pain
- Fatigue
- Reduction of urine out-put
- Respiratory distress
- Other:

5. Which one of the following patient parameter deterioration makes you call for help? (Multiple choices can be marked.)
 - Bradycardia
 - Tachycardia
 - Hypertension
 - Hypotension
 - Hypothermia
 - Hyperthermia
 - Respiratory distress
 - Decrease in oxygen saturation
 - Change in consciousness
 - Reduction/absence of urination
 - Blood gases values
 - Electrolyte values
 - Bleeding
 - Other:
6. Where/who do you usually reach to call for help?
 - Service doctor
 - Reanimation/intensive care unit
 - Blue code team
 - Other nurses working in service
 - Other:
7. Line up the interventions usually provided by the team coming for help? (Please place in the priority order. Number from the first intervention, you frequently see it’s done first [1], to the last intervention [7].)

	Usually the first intervention	2.	3.	4.	5.	6.	Usually the last intervention
Aspiration							
Drug administration							
Endotracheal intubation							
O ₂ supply							
Assessment of consciousness							
Non-invasive mechanical ventilation							
Auscultation of respiration and heart							
Chest compression							

8. Which are the most frequently used drugs by the team coming for help to deteriorating patient? (Multiple choices can be marked.)

- Diuretics
- Steroids
- Adrenaline
- Noradrenaline
- Antihistaminic
- Atropine
- Dopamine
- Mannitol
- Inhalation treatment

9. Which tests are frequently asked by the team coming for help? (Multiple choices can be marked.)

- Electrolyte
- Renal function tests
- Liver function tests
- ECG

- PA chest X-ray
- Arterial blood gases
- Computed tomography (CT)
- Magnetic resonance imaging (MRI)
- Other:

10. In the service/unit you work, especially for which equipment or devices do you have difficulties to recruit? (Multiple choices can be marked.)

- Bag-mask
- Different sized facial masks
- Emergency drugs (adrenaline, noradrenaline, atropine, etc.)
- Defibrillator
- ECG device
- O₂ tube
- Intravenous fluids
- Aspiration catheter
- Other: