"National Early Warning Score" (NEWS) in predicting major adverse events among critically ill patients".

Mr. Pramod Kumar Nagesh[#1], Mrs. Susan Jacob[#2], Dr. Sameer kadam[#3]

#1. M.Sc. Nursing (Nurse Practitioner in Critical Care)

#2. Professor, MGM New Bombay college of Nursing, Kamothe Navi Mumbai.

#3. Professor, General surgery, MGM Hospital, Kamothe, Navi Mumbai.

Abstract:

Descriptive survey design with Quantitative approach was adopted with the framework based on Ludwig Van Bertalanffy General system theory. Data was collected from 60 critically ill patients in medical, surgical and EMS-ICU by using non probability convenient sampling technique by using National Early Warning Score (NEWS) to assess the various physiological parameters. Data was analysed using descriptive and inferential statistics. Result shows the positive co-relation between NEWS score and frequency of occurrence of adverse events. (Karl Pearson's co-relation co-efficient "r" = 0.844 was in low score group, 0.996 in medium score group and 0.971 in high score group) Finding of this study reveals that the NEWS score helped in identifying the major adverse events in its early stage.

Keywords: Critically ill patients, Major adverse events, NEWS score, Risk groups, outcome.

Introduction:

Critical illness is a life threatening and multisystem process that can result in increased morbidity and mortality. In most of patients, critical illness occurred by a period of deterioration in physiological parameters. The characteristics of critical illness are severely cardiovascular, respiratory, or neurological derangement, sometimes in combination, reflected in altered physiological observations. The various approaches and scoring systems are used by the health personnel to observe the degree of illness of patients in intensive care unit. For critically ill patients, standard observation techniques and timely intervention is crucial. Patients stay in ICU are always having some physiological changes before developing any adverse events. These physiological changes can be identified by assessment of vital signs including pulse rate, blood pressure, respiratory rate, temperature and oxygen saturation as well as assessment of neurological condition (Glasgow comma scale) of the patients[1].

Patients with critical condition, who are taking several diagnostic or therapeutic interventions and having hemodynamically instability are at higher risk of developing adverse events. These patients require treatment and care by specialized professionals with advanced technology. Intensive care personnel like Doctors and Nurses concentrate patients with this profile. Sometimes the occurrence of adverse events are high in intensive care units. Therefor the adaptation of standardized process of observation and interventions are required to overcome the risk of developing adverse events[2].

Sometimes it is difficult to determine the discharge or shift out to the wards of intensive care patient from the ICU because premature discharge from the ICU result in recurrent re-admission in ICU and therefore result in increased ICU mortality. In order to prevent recurrent re-admission in ICU, may clinical scores have been emerged, but there several limitations to apply the sophisticated criteria in clinical practice.

For critically ill patients, a reliable method of early detection of adverse events followed by timely interventions is required. Many research studies shows that patient may die from altered physiology, caused by disease, but not directly from disease. The first early warning score (EWS) launched in 1997 which combined various vital signs and mental status abnormalities that help to detect potentially critically ill patients. Several modifications in this EWS have done and adopted into clinical practice. In 2012 the royal college of physician (RCP) launched an unified criterion, named as National Early Warning Score (NEWS)[3].

National Early Warning Score (NEWS) is a guide used by medical personnel to quickly identify the degree of illness of patients. NEWS score is a tool that may allow improvement in the quality and safety of management provided to the ICU patients. The main goal of NEWS is to identify the adverse condition of patient and prevent from delay in applying interventions. NEWS score measures six physiological parameters, (respiration rate, oxygen saturation, heart rate, systolic blood pressure, temperature, and AVPU response)[4].

The NEWS score like many other existing early warning score system, is based on a simple scoring system in which a score is allocated to each parameter, already undertaken when patient being observed in hospital. It serves as a tool for medical personnel to help in monitoring their patients and prevent from sudden decline in health condition of patient receiving care in hospital. It is greatly beneficial during an emergency cases wherein the health professionals need to quickly determine the degree of illness of a patient. In other words, it is also helpful in identifying medical patients at risk of catastrophic deterioration in a busy clinical[4].

Now a days various Early Warning Score (EWS) systems are using worldwide, sometimes other parameters are also included in other cases, total number of scores for worsening deterioration are changed due to some system also assign scores to other parameters including urine output, flow rate of oxygen administration, oxygen saturation, and pain scores[5].

NEWS score was launched by the Royal College of Physicians for the aim to create a common system for early identification of patients presenting with acute illness, or deteriorating patients. In current NEWS scoring system a normal vital sign is scored a zero and above, a below normal is scored a 1, 2 or 3 based upon how much variation from normal they are then these scores are summed up and recorded by a nurse every time a patient's vital signs are checked. NEWS is based on the principle that clinical deterioration can be identified through changes in total number of parameters as well as large changes within a single parameter. The scale is calibrated to different population, sometime other parameters are also included[5].

A report of national confidential enquiry into patient outcome and death (NCEPOD) 2007 titled, Emergency admission: a journey in the right direction, recommended that: there should be a clear physiological monitoring plan for each patient in accordance with their clinical condition. This plan of observation should detail what parameters are to be monitored, and the frequency of monitoring the parameters. This should be regardless of the type of ward to which the patient are transferred[6].

The national confidential inquiry into patient outcome and death (NCEPOD, 2005) reported that patients often had prolonged period of physiological instability prior to occurring any major adverse event. This study of 1,677 admission to general ICU's across England, Wales, Northern Ireland, Guernsey and the Isle of Man also reported that 27% of hospital did not us an early warning system. It is also reported that one in four hospitals did not use some form of 'track and trigger' system to improve early identification of deteriorating patients. ICU admission was thought to be avoidable in 21% of cases and communication failure between teams members which leads to delays in referrals to specialized health professionals and in providing appropriate interventions, which leads to increased morbidity and mortality[6].

Methodology:

A descriptive exploratory survey design was adopted to assess NEWS score in predicting major adverse events among critically ill patients. The area chosen for study were MICU, SICU, EMS-ICU. Target population was critically ill patients, aged more than 18years, sample size was 60. NEWS (National Early Warning Score) observation chart was used to assess various physiological parameters of critically ill patients.

4. Analysis and interpretation:

Section -4.1 Distribution of patients based on Socio-demographic characteristics.

Table:1 Distribution of patients based on Socio-demographic characteristics.

		n = 60
Age Group(years)	*f*	%
19-29	9	15.0
30-39	7	11.7
40-49	7	11.7
50-59	18	30.0
60-69	5	8.3
.>70	14	23.3
Gender		
Female	10	16.7
Male	50	83.3

Section -4.2 Distribution of critically ill patients based on various department.
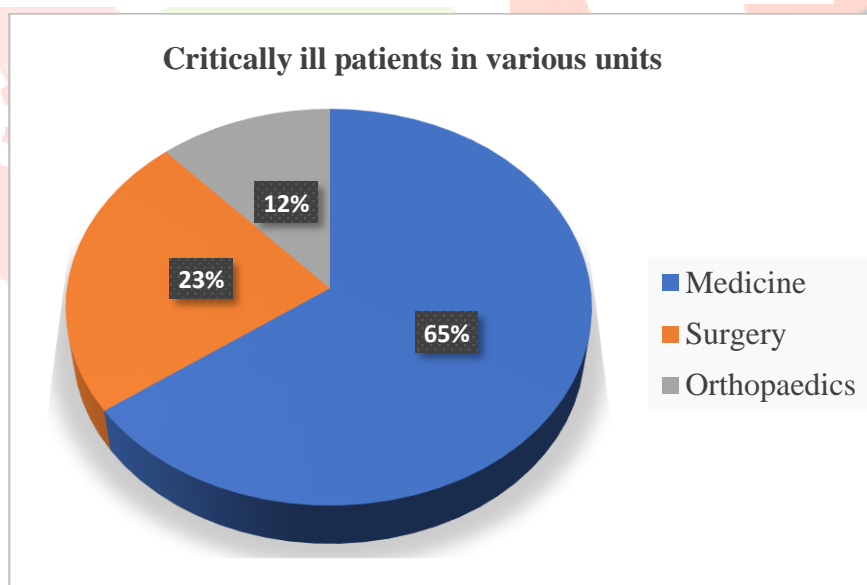
n = 60
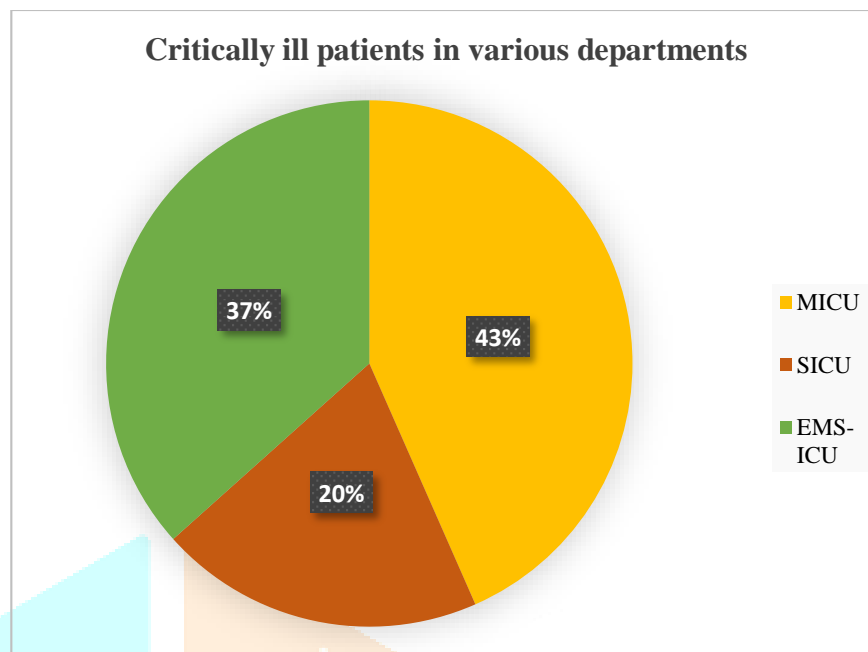
Figure 1: Critically ill patients in various departments.

Section -4.3 Distribution of critically ill patients based on various units.

n =60

Figure 2: Critically ill patients in various units.

Section -4.4 Distribution of critically ill patients based on ventilatory support.

n = 60

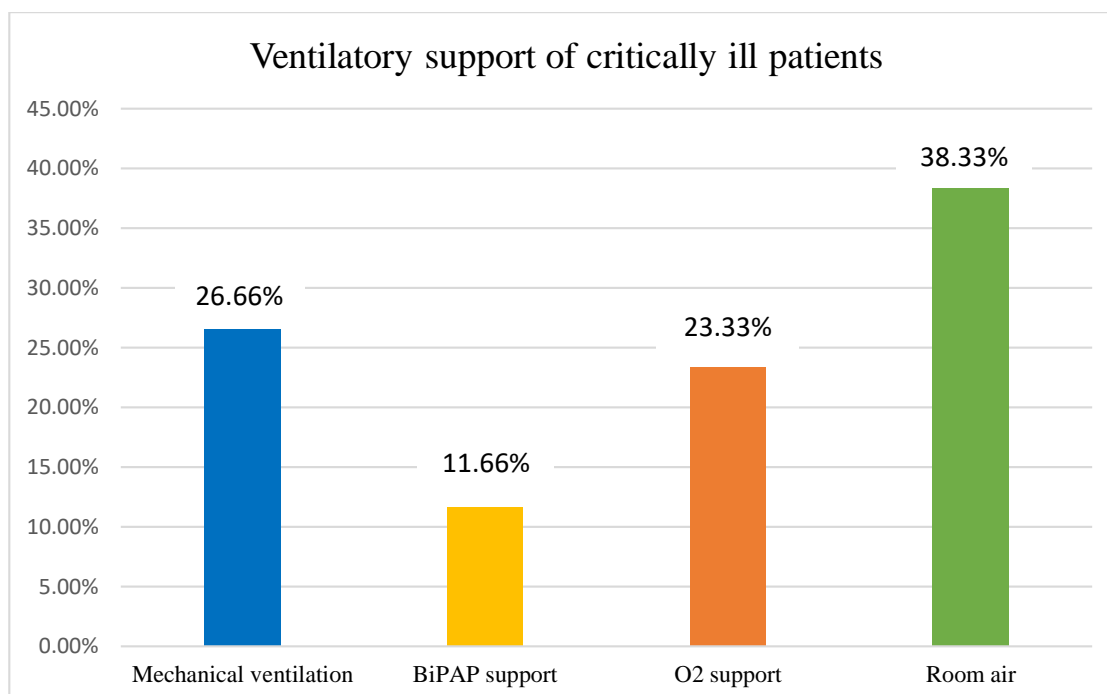**Ventilatory support of critically ill patients**

Figure 3: Ventilatory support of critically ill patients.

Section 4.5 Categorization of critically ill patients in various risk groups by using NEWS score.

Table 2. Categorization related to day wise NEWS score.

n = 60

No. of days	NEWS score			Total no. of critically ill patients
	Low score (0-4)	Medium score (5-6)	High score (≥7)	
Day1	34	14	12	60
Day2	26	16	5	47
Day3	10	8	5	23
Day4	2	4	1	7
Day5	0	0	2	2
Day6	1	1	0	2

Section 4.6 Categorization related to occurrence of number of adverse events as per NEWS score.

Table 3. Day wise occurrence of adverse events in various risk groups.

n = 60

| No. of days | NEWS score | | | | | | | | |
| | Low score group (0 – 4) | | | Medium score group (5 – 6) | | | High score group (> 7) | | |
	No. of patients (n)	Occurrence of adverse events (f)	%	No. of patients (n)	Occurrence of adverse events (f)	%	No. of patients (n)	Occurrence of adverse events (f)	%
DAY 1	34	2	5.88	14	6	42.85	12	5	41.66
DAY 2	26	2	7.69	16	7	43.75	5	3	60
DAY 3	10	2	20	8	4	50	5	3	60
DAY 4	2	0	0	4	2	50	1	1	100
DAY 5	0	0	0	0	0	0	2	1	50
DAY 6	1	0	0	1	1	100	0	0	0

Section-4.7. Co-relate the patients' outcome with NEWS score among various risk groups of critically ill patients.

Table 4. Co-relation of NEWS score with the number of adverse events.

n = 60

| No. of days | NEWS score | | | | | | | | |
| | LOW score group (0 – 4) | | | MEDIUM score group (5 – 6) | | | HIGH score group (> 7) | | |
	No. of patients (n)	Occurrence of adverse events (f)	r	No. of patients (n)	Occurrence of adverse events (f)	r	No. of patients (n)	Occurrence of adverse events (f)	r
DAY 1	34	2	0.844	14	6	0.996	12	5	0.971
DAY 2	26	2		16	7		5	3	
DAY 3	10	2		8	4		5	3	
DAY 4	2	0		4	2		1	1	
DAY 5	0	0		0	0		2	1	
DAY 6	1	0		1	1		0	0	

Section 4.8 Association of National Early Warning Score (NEWS) Score with age group of patients.

Table -5: Association of National Early Warning Score (NEWS) Score with age group of patients.

n = 60

NEWS Score	Low (0-4)	Medium (5-6)	High (≥7)	Total	Chi square Test	P-value	Significant at 5% level
Age group							
19-29	5	4	0	9	12.479	0.254	No
30-39	5	1	1	7			
40-49	5	0	2	7			
50-59	12	2	4	18			
60-69	2	1	2	5			
70+	5	6	3	14			

Section 4.9 Association of National Early Warning Score (NEWS) with the gender of patients.

Table -6. Association of National Early Warning Score (NEWS) with the gender of patients.

n = 60

NEWS Score	Low (0-4)	Medium (5-6)	High (≥7)	Total	Chi square Test	P-value	Significant at 5% level
Gender							
Female	3	4	3	10	3.534	0.171	No
Male	31	10	9	50			
Total	34	14	12	60			

Conclusion:

Clinical deterioration can occur at any stage of a patient's illness, however there will be certain period when patient is more vulnerable to deterioration, e.g. the onset of illness, during surgical or medical interventions and during recovery from critical illness. This deterioration is often preceded by or associated with physiological deterioration. Timely interpretation and escalation of recognised deterioration is of crucial importance in minimising the likelihood of serious adverse event including cardiac arrest and death. Early detection of this physiological deterioration offers the best opportunity to intervene and prevent serious adverse event from further deterioration.

Implications of study

The findings of the present study have implication for nursing practice, administration and education.

Nursing administration:

Nursing administration should take initiative to provide training to the staff about the use of NEWS score by providing them in service education. The training can be provided to the staff about how to use this sophisticated scoring criteria for the ICU patients. Nursing administration should organize a classroom programme to teach the staff about NEWS score. Bedside teaching to the nurses who are working in the ICU will be helpful for easy understanding about the use and benefits of the NEWS score.

Nursing education:

Nursing education can be provided by the including of NEWS score in the curriculum of bachelor's degree. It will be helpful for the students while practicing in the various field in the hospital. Staff working in the various department can be educated about the use of NEWS score by the bedside teaching.

Nursing research:

Various researches were conducted on use of NEWS score in critical care. The research helps the investigator to build up a body of knowledge in the field of clinical practice. As it is a continuous growing profession, nursing research is the method to generate evidence for carrying out nursing care to the critically ill patients.

Recommendations:

Based on findings of present study recommendation for future study are:-

1. Similar study can be conducted on large scale to more generalize the findings.

2. Similar study can be conducted on efficacy of NEWS score in predicting early clinical deterioration after post-ICU transfer.

3. A study can be conducted on NEWS score in determining the discharge or shifting out of patient from ICU.

4. Similar quasi experimental study can be conducted on two groups (experimental and control group).

References:

1. college of physician, National Early Warning Score (NEWS) standardising the assessment of acute illness severity in the NHS, London; RCP, 2012.

2. Avard B, Mckay H, Slater N, Training Manual for The National Early Warning Score and associated Education Royal Programme. Acute medicine; 2011;3 (2): 5-77

3. Morgan RJM, Williams F, & Wright M.M, An early warning scoring system for detecting ,developing critical illness. Clinical intensive care 1994;97(1):38-46. 8/4/11.

4. Kruisselbrink R, Kwijera A, Krowther A, modified early warning score identifies critical illness among ward patients, Plos One, https://doi.org/10.1371/journal.pone.0151408.

5. R.S. Nannan Panday, prognostic value of early warning score in the emergency department and acute medical unit, a narrative review. European journal of medicine 2017; 45(3): 20-31.

6. Haegdorens F, Koenraad G, An intervention including the national early warning score improves patient monitoring practice and reduces mortality: A cluster randomized controlled trial. Leading global research 2019;75 (9): 1996-2005.

7. Shaw J. et. al, Can the prehospital National Early Warning Score identify patients most at risk from subsequent deterioration?. Emergency medicine journal 2017; 34 (8): 533-537 .

8. Scott LJ et al. Distributions of the National Early Warning Score (NEWS) across a healthcare system following a largescale roll-out. BMJ publication 2019; 36 (5): 287-292.

9. Jo S, Yoon J, Lee JB, Jin Y, Jeong T, Park B. Predictive value of the National Early Warning Score–Lactate for mortality and the need for critical care among general emergency department patients. Journal of critical care 2016; 36 (3): 60-68

10. Spångfors M, Arvidsson L, Karlsson V, Samuelson K. The National Early Warning Score: Translation, testing and prediction in a Swedish setting. Intensive and Critical Care Nursing 2016 Dec; 37(2): 62-67.

11. Kivipuro M, Tirkkonen J, et al. National early warning score (NEWS) in a Finnish multidisciplinary emergency department and direct vs. late admission to intensive care. Resuscitation. 2018 Jul;128:164-169. doi:10.1016/j.resuscitation.2018.05.020. Epub 2018 May 21. PubMed PMID: 29775642.

12. Sbiti-Rohr D, Kutz A, Christ-Crain M for the ProHOSP Study Group, et al. The National Early Warning Score (NEWS) for outcome prediction in emergency department patients with community-acquired pneumonia: results from a 6-year prospective cohort study. BMJ Open 2016;6:e011021.

13. Abbott TEF, Cron N, et al. Pre-hospital National Early Warning Score (NEWS) is associated with in-hospital mortality and critical care unit admission: A cohort study. Ann Med Surg (Lond). 2018;27:17–21.

14. Hoikka M, et al. Does the prehospital National Early Warning Score predict the short-term mortality of unselected emergency patients?. Scandinavian journal of trauma resuscitation and emergency medicine 2018; 26 (1):48-55

15. Roque KE, et. al. Adverse events in the intensive care unit: impact on mortality and length of stay in a prospective study, ARTIGO article- 1 2016; 32 (10): e00081815.

16. Rothschild JM et al. The Critical Care Safety Study: The incidence and nature of adverse events and serious medical errors in intensive care. Critical Care Medicine 2005 Aug;33(8):1694-700

17. Molina FJ, Rivera PT, Cardona A, et al. Adverse events in critical care: Search and active detection through the Trigger Tool. World J Critical Care Medicine 2018;7(1):9–15.

18. Vlayen A, Verelst S, Bekkering GE, Schrooten W, Hellings J, Claes N, Incidence and preventability of adverse events requiring intensive care admission: a systematic review. J Eval Clin Pract. 2012 Apr;18(2):485-97.

19. Forster AJ, et al. The impact of adverse events in the intensive care unit on hospital mortality and length of stay. BMC Health Serv Res. 2008;8:259. Published 2008 Dec 17. doi:10.1186/1472-6963-8-259

20. Klepstad PK, et al. Use of National Early Warning Score for observation for increased risk for clinical deterioration during post-ICU care at a surgical ward. Ther Clin Risk Manag 2019;15:315–322.