

Does the implementation of modified early warning scores spare workforce by decreasing the frequency of nurse assessments?

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ABSTRACT

Objective: Early warning score based physiological track and trigger systems are used as clinical pathways to recognize and manage the deteriorating patient in a timely manner. We aimed to demonstrate that the utilization of early warning scores would spare workforce by decreasing the frequency of nurse assessments.

Methods: The database of an institutional quality improvement process to implement a modified early warning score (MEWS) based surveillance system was used. The surveillance algorithm basically led to an increased frequency of patient assessment as with increasing MEWS. The total and mean numbers of nurse assessments before and after the implementation of the surveillance algorithm were analyzed retrospectively.

Results: In the acute medical care unit, the mean number of nurse assessment per day decreased by 31.8%. The basal number of nurse assessment per day was much lower in the surgical ward, but still the utilization of MEWS resulted in a 22.2% decrease. No adverse events occurred during the study period.

Conclusion: Implementation of standard algorithm based surveillance strategies based on MEWS may help to direct the scarce and extremely valuable sources of workforce to those patients who are more demanding clinically. Those countries and institutions, which aren't utilizing early warning score surveillance system might benefit from this experience.

Key words: early warning score, nurse, assessment, quality, workforce

Introduction

Early warning score based physiological track and trigger systems are used as clinical pathways to recognize and manage the deteriorating patient in a timely manner. These systems preferably utilize an electronic database [1] and computer based system [2], yet paper based systems are still in place in many centers. Modified early warning scores (MEWS) and Vitalpac™ Early Warning Score (ViEWS) were validated as predictors of mortality when used on admission or at any time during the hospital stay [2]. Moreover, nurse led rapid response systems utilizing MEWS were shown to decrease code calls enhancing patient safety [3].

Patient assessment and observation are the primary tasks of the nurses. The ultimate goal of nursing assessments is to prevent untoward effects, mainly cardiopulmonary arrests and death in the hospital. In the demanding health system of today,

nurses have to work for extra hours and under time pressure while trying to accomplish many tasks simultaneously. The workload of the nurses, taken together with the constraints of appointed staff requires rational workforce planning.

We aimed to demonstrate that the utilization of early warning scores would spare workforce by decreasing the frequency of nurse assessments.

Patients and Methods

This study was performed by retrospectively analyzing the database of a quality improvement process in a 664-bed, tertiary care university hospital in Turkey. The evaluation and the publication of the data were approved by the Executive Board of the Hospital. A 28-bed adult surgical ward and a 10-bed adult acute medical ward were selected as pilot wards to implement a new nursing assessment and

surveillance system by the Hospital Administration. These wards were selected for the study since their case mix were assumed to be similar within the same season within each ward and the nurses were experienced, fixed staff of those wards.

The implementation process was designed in two phases. Before the implementation of MEWS, the frequency of assessment was determined as such: routine assessments at hours 10, 11, 13, 14, 17, 19, 21, 23, 01, 03, 06 and extra assessments if it was a postoperative patient (every 15 minutes for the first hour, every 30 minutes for the second hour), if the patient had a temperature over 37.8°C, if the patient had a blood pressure less than 90/60 mmHg or if the patient seemed unwell. The frequency of extra assessments was arbitrary as otherwise determined.

The first part of the process consisted of a period of 15 days in August 2012 (pre-implementation period). Total number of patient days and the total number of nursing assessments were recorded. The MEWS was introduced to the nurses of the pilot wards and the nurses were trained to use this scoring system in order to make decisions about the vital sign assessment frequency [4]. Score assessment required the assessment of the vital signs and the consciousness level with regard to the AVPU scale. The algorithm basically led to an increased frequency of patient assessment as with increasing MEWS (Table 1).

After a wash-out period of 15 days, the wards were again observed in terms of the ratio of occupied beds, the number of patients and the total number of nurse assessments in September 2012 (post-implementation period).

The database that had the recordings of the nurse assessments and the bed occupancy rates were analyzed retrospectively. Descriptive statistics were used to analyze the total and mean number of nurse assessments.

Results

In the acute medical care unit, the mean number of nurse assessment per day decreased from 17 to 11.6, which resulted in a 31.8% decrease in the frequency of nurse assessments (Table 2). The basal number of nurse assessment per day was much lower in the surgical ward (8.1 assessments/patient day), but still the utilization of MEWS resulted in a 22.2% decrease (6.3 assessments/patient day). No adverse events occurred during the study period.

Discussion

Time spent on patient assessment/treatment processes exceed the time spent on many other activities, which means a critical planning on this task is crucial for effective workforce planning [5]. We demonstrated that, implementing a MEWS system

Table 1. Modified early warning score based assessment algorithm

Score	3	2	1	0	1	2	3
Respiratory rate (/minute)		<9		9–14	15–20	21–29	>29
Heart rate (/minute)		<40	41–50	51–100	101–110	111–129	>129
Systolic blood pressure (mmHg)	<70	71–80	81–100	101–199		>199	
Temperature (°C)		<35		35–38.4		>38.4	
AVPU*				A	V	P	U

*Alert; Responds to Voice; Responds to Pain; Unresponsive

Assessment frequency:

0-1 point — every 4–6 hours

2 points – every 1–2 hours

3-4 points or any single score ≥ 2 – every ½-1 hour and the ward doctor should be informed

≥ 4 the ward doctor should be informed urgently, there may be an impending critical condition

If the systolic blood pressure is below 90 mmHg or if there is tachycardia in a patient with known heart failure or if the heart rate is below 40/minute or if there is a sudden change in the consciousness level of the patient — the ward doctor should be informed urgently

Each patient should be evaluated in his/her own conditions. A low score does not guarantee that the patient will not get worse. If the staff is anxious about the condition of a patient, the assessment frequency can be increased.

Table 2. The number of patient days and nurse assessments before and after the implementation of the MEWS based algorithm

	Pre-intervention period	Post-intervention period	Difference
Total number of patient days surveyed			
Acute medical care	124	115	-9
Surgery	271	337	+66
Total number of nurse assessments			
Acute medical care	2105	1329	-776
Surgery	2195	2119	-76
Mean number of nurse assessment per patient day			
Acute medical care	17	11.6	-5.4
Surgery	8.1	6.3	-1.8

MEWS, modified early warning score

Total number of patient days = number of patients × days the patients stayed in the ward

Mean number of nurse assessment per patient day = Total number of nurse assessments / Total number of patient days surveyed

as a part of an algorithm that will guide the time intervals for nurse assessment resulted in decreased nurse workload. Healthcare services research, as this study, will clearly help in workforce planning of health facilities.

Nurses are one of the major keystones of a high quality healthcare system. While they are expected to deliver a safe and intense care to their patients, they are also put under the stress of new responsibilities such as implementing new care bundles, recording patient data and paper work [6]. Time constraints might have negative impacts on the critical decision making processes of the nurses [7]. Hence, today we need to explore the ways to most effectively utilize their workforce while keeping the safety net intact.

The effects of implementing a standardized algorithm may have different impacts depending on the basic rules of a hospital; in the case of our pilot study it resulted in a marked decrease in the number of nurse assessments per patient day. However, de Meester and colleagues demonstrated that the implementation of a standardized nurse observation protocol based on MEWS increased the number of observations and decreased the number of serious adverse events for patients who have been discharged from the intensive care unit [8]. Another interventional study by the same group also demonstrated that such a protocol together with a rapid response system increased the frequency of O₂

saturation, consciousness and respiratory rate assessment while having positive impact on patient outcomes in the 6-day postoperative period [9]. This project did not utilize a rapid response team aside from the code. Similarly Jones et al reported an improved observation frequency with the utilization of EWS [10].

The strength of this study is its real life setting without any intervention to the ward conditions, without any inclusion or exclusion criteria. The limitation of the study was we couldn't monitor the disease severity of the patients to match for the two periods. However, the patient population was considered to be homogenous through out the study periods in each ward.

In conclusion, implementation of standard algorithm based surveillance strategies based on MEWS helps to direct the scarce and extremely valuable sources of workforce to those patients who are more demanding clinically. Those countries and institutions, which aren't utilizing early warning score surveillance system might benefit from this experience.

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