Implementing an Early Warning Score Across Disciplines

Nisha Patel, MD/MPH(c), Brandon George, PhD, Rebecca Jaffe, MD
Thomas Jefferson University

BACKGROUND

The Modified Early Warning Score (MEWS) was implemented at Jefferson in June 2017 to proactively identify hospitalized patients who are experiencing clinical deterioration. Many initiatives to increase staff understanding and acceptance of the MEWS protocol have taken place during the first nine months (Figure 1).

MEWS has an afferent arm and an efferent arm. The *afferent arm*, which is continuously calculated within the electronic medical system, is a weighted aggregate score based on a combination of patient vital signs and key labs. The efferent arm includes the firing of a MEWS alert within the electronic medical system and staff response (Figure 2). Lactate was incorporated in the efferent arm due to a high proportion of MEWS patients with a diagnosis of sepsis and to align this process with hospital sepsis initiatives.

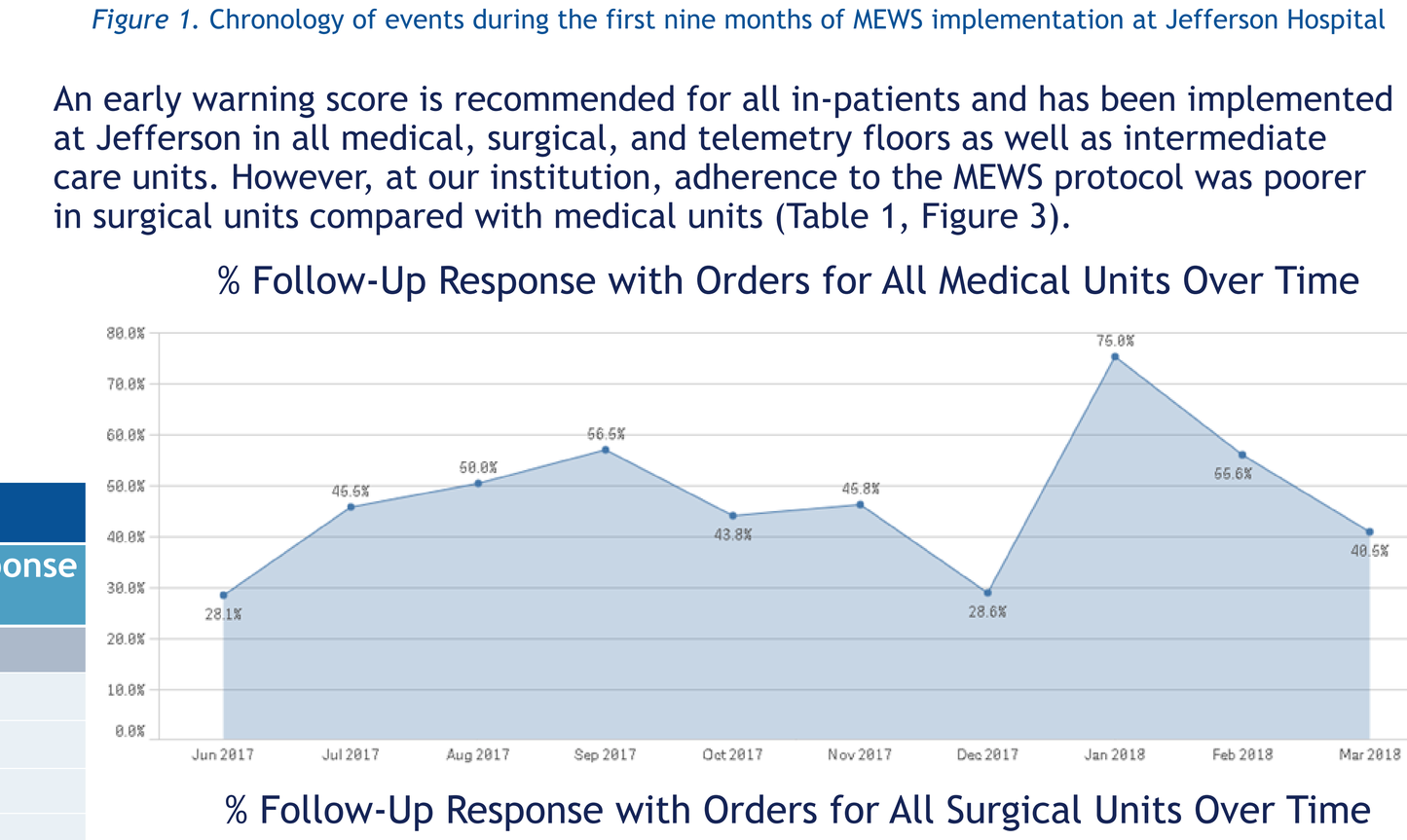

Figure 1. Chronology of events during the first nine months of MEWS implementation at Jefferson Hospital

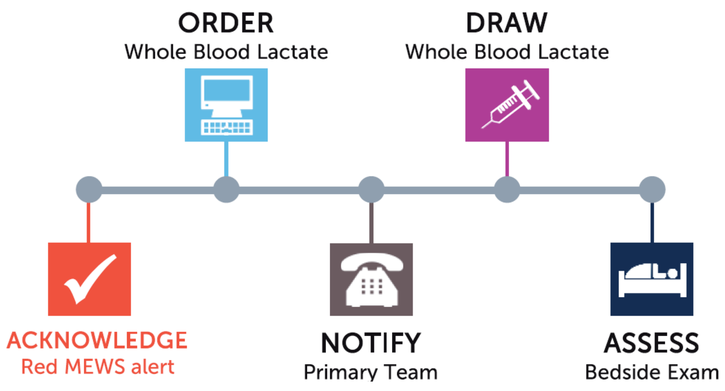

Figure 2. Graphic used to educate staff regarding the anticipated workflow when a MEWS alert fires.

Medical Units			
	Total Alerts	Total Alerts with Follow-Up Response	% Follow-Up Response with Orders
TOTAL	252	97	41.2%
Unit #1	76	27	33.3%
Unit #2	57	24	62.5%
Unit #3	44	18	33.3%
Unit #4	17	8	37.5%
Unit #5	39	13	30.8%
Unit #6	12	4	75.0%
Unit #7	7	3	0.0%
Surgical Units			
	Total Alerts	Total Alerts with Follow-Up Response	% Follow-Up Response with Orders
TOTAL	60	18	33.3%
Unit #1	38	12	16.7%
Unit #2	7	3	66.7%
Unit #3	6	0	0.0%
Unit #4	4	2	50.0%
Unit #5	4	1	16.7%
Unit #6	1	0	0.0%

Table 1. Follow-up response is defined as a staff member acknowledging the electronic MEWS alert as "follow up required" as opposed to "vital signs entered incorrectly" or "patient condition already known". Responses with orders are those responses after which a lactate was ordered within 2 hours. During the first three months of MEWS implementation, medical units had a higher total number of MEWS alerts and higher follow-up response and order rates than surgical units.

AIM

To identify and address barriers to MEWS process implementation in surgical patients. Overall, our goal for adherence throughout Jefferson Hospital is 60% across all units.

STRATEGY FOR CHANGE

1. Identify barriers to MEWS process implementation

⇒ Interviewed surgical stakeholders for cause analysis

- Perception that MEWS does not apply to surgical patients, alerts normal post-op vital sign variation

⇒ Conducted literature review

- Identified gaps in literature for data regarding the validity of early warning scores in surgical patient populations

2. Increase knowledge of the MEWS process as it applies to different populations through local data analysis with SPSS software

⇒ Compared characteristics of patients who trigger a MEWS alert at Jefferson Hospital and determined if these characteristics differ in medical versus surgical patients

- *Chi-square test*

⇒ Determined significant differences in outcomes (in-hospital mortality, discharge to hospice, hospital LOS, RRT, ICU transfer, intubation) for patients who receive a MEWS alert as a medical versus surgical patient when accounting for age, sex, and race

- *Binary logistic regression* for categorical variables
- *Cox regression model* for LOS

An early warning score is recommended for all in-patients and has been implemented at Jefferson in all medical, surgical, and telemetry floors as well as intermediate care units. However, at our institution, adherence to the MEWS protocol was poorer in surgical units compared with medical units (Table 1, Figure 3).

Figure 3. Of all MEWS alerts fired with provider follow-up responses, medical units (*top*) ordered lactate more consistently over time and almost always more often than surgical units (*bottom*).

STUDY OUTCOMES

- Surgical patients were younger than medical patients by approximately 2.7 years (95% CI: 0.329-5.124).
- Being a surgical patient increased the odds of having Commercial/Medicare/Commercial+Medicare insurance by 56.9% (95% CI: 1.148, 2.144).
- Most differences between medical and surgical patients who received MEWS alerts were *not statistically significant* or indicated that surgical patients have *higher odds* of having poor outcomes
  - Longer length of stay (HR = 0.675, p<0.001)
  - ICU transfer (OR = 1.504, p=0.011)
  - Intubation post-alert (OR = 2.470, p=0.006)
  - Of those patients who survived to discharge, surgical patients had *lower odds* of being discharged to hospice (OR = 0.452, p=0.006)

DISCUSSION AND NEXT STEPS

Our strategy for improving hospital-wide adherence to the MEWS process began by increasing surgical membership on the MEWS workgroup and subsequently identifying, acknowledging, and objectively analyzing their concerns.

Interviews with surgical stakeholders identified skepticism of MEWS process application to surgical patients as a reason for poorer implementation in surgical units. Our data analysis of patients with MEWS alerts provided objective support for use of the MEWS process across all disciplines.

In the future, we aim to locally disseminate these results to surgical stakeholders to increase their engagement with MEWS implementation. We will do so with future case conferences and educational interventions.

ACKNOWLEDGEMENTS

MEWS Workgroup at Thomas Jefferson University Hospital
Department of Performance Improvement