Modified Early Warning Scoring (MEWS) Tools Including Sepsis Screening Criteria

Literature Review Evaluating the Evidence for Use in Adult Medical-Surgical & Telemetry Patients

Jamie K. Roney, MSN, RN-BC, CCRN-K
Authors

Jamie K. Roney, MSN, RN-BC, CCRN-K
Erin Whitley, BSN, RN
Jessica Maples, BSN, RN-BC
Kimberley A. Stunkard, BSN, RN
JoAnn D. Long, PhD, RN, NEA-BC

Authors have no conflicts of interest, sponsorship, or commercial support to disclose
Learning Objectives

The learner will be able to:

1. Identify discoveries from a review of literature regarding combining sepsis screening criteria with MEWS tools.
2. Identify gaps in available published research linking MEWS usage with decreased failure to rescue events.
Aims of Literature Review

1. Explore impact of MEWS tool usage on patient mortality & failure to rescue events in hospitalized adult medical-surgical/telemetry patients as reported in the literature

2. Validate MEWS physiologic screening parameters for incorporation of international sepsis identification standard values

Provides foundation for MEWS tool adaptation recommendations for institutional use.
Evaluating literature reporting MEWS tools impact & included screening criteria

**Background**

**MEWS Tools**
Few studies have tested reliability & validity

**Patient Condition**
Subtle changes may go undetected

**Evidence**
Paucity of data supports outcome claims

**Patient Outcome**
Screening may decrease cardiopulmonary arrests
A review and evaluation of the MEWS literature was conducted

**Methods**

Objective

Sought to validate MEWS instruments’ impact on significant clinical patient outcomes prior to making recommendations for incorporation into clinical practice.

Evidence Table

Objective

Sought to determine level of evidence & examine impact of use of existing tools in concluding what physiologic parameters should be included in the MEWS tool.

PRISMA*

*Preferred Reporting Items for Systematic Review and Meta-Analyses (PRISMA) 2009 checklist*
Design

Comprehensive review of literature guided by clearly formulated clinical question:

P (Population): Adult patients ≥ 18 years of age hospitalized in medical-surgical or telemetry units

I (Intervention): MEWS system was used to monitor for all-cause deteriorating conditions

C (Comparison): MEWS system was not used to monitor patients for all-cause deteriorating conditions

O (Outcomes): Cardiopulmonary arrests, rapid response team utilization, & mortality

T (Time Period): During hospitalization
Search Strategy

Databases searched:
• The National Library of Medicine database (PubMed), MEDLINE, Cumulative Index to Nursing and Allied Health (CINAHL), the Cochrane Library of systematic reviews, & the Agency for Healthcare Research and Quality (AHRQ)

Search strategy:
• Keywords “EWSS,” “MEWS” & the full spelling of each term
• Literature through 2014
• Identified titles & abstracts were screened if written in English
• Potentially relevant full text studies were examined by two independent reviewers
• Two reference librarians cross verified the strategy
• Exclusion of articles using emergency department or specific disease focus (including sepsis) populations

Search results:
• 544 peer-reviewed articles identified
• 17 articles included in final sample
• 1 additional article included due to high relevance to clinical question reporting CPA as a study outcome in a pediatric population
Literature Review Results

18 articles meeting inclusion criteria (n=17) or relevance (n=1)

- 2 systematic reviews (SR) were rated Level I & Level V
- 6% (1) Level I, 44% (8) Level IV, 6% (1) Level V, 33% (6) Level VI, & 11% (2) Level VII level of evidence
  - 1 SR of 33 descriptive studies rated level V
  - 4 reported a mortality predictive value
  - 2 described a mortality reduction from use of MEWS tools
  - 3 measured the impact on emergency calls to rapid response & medical emergency teams (failure to rescue)
  - 4 articles reported MEWS impact on both mortality & rapid response team utilization (failure to rescue)
Study Quality

- Large variation in the methodological quality of included studies.
- Lack of blinding, randomization, & control groups were reported.
- Baseline characteristics of research samples were not reported.
- Identified gap was the lack of criteria for validation & standardization of MEWS physiologic measurements & reliability testing of adapted tools.
- One systematic review by Kyriacos et al. (2011) & the pediatric article by Randhawa et al. (2011) reported prior reliability & validity testing of MEWS tools.
- The majority of articles were descriptive in nature reporting MEWS tools implementation, evaluation, & staff satisfaction—not impact on clinical outcomes.
Synthesis of Findings

Sepsis Screening Criteria Inclusion

• No MEWS tool adjusted for systemic inflammatory response syndrome (SIRS) vital sign criteria & laboratory values identified — aid in identification of both the at-risk & septic patient

• Of 33 unique physiological scoring tools, none incorporated all 4 SIRS components of sepsis screening (Smith et al., 2008)
  — 7 screened for only 2 of the 4 SIRS criteria.
  — 4 measured oxygen source required for respiratory support instead of oxygen saturation measurements, despite oxygen source indication representing a more accurate picture of respiratory status deterioration.

• Variability in measured physiological components differed between all 33 examined tools (Smith et al., 2008)
Synthesis of Findings

Rapid Response Team (RRT) Utilization

• 3 articles described the ability of MEWS tools to bring support for patients based on abnormal physiological findings
  (Goldhill et al., 2005; Smith, et al., 2008; Subbe et al., 2003)

• 3 articles reported the impact of use of MEWS tools on RRT activation
  (Day, 2003; Odell et al., 2002; Page et al., 2008)

• 4 articles reported the potential or actual impact on both failure to rescue and mortality outcomes of interest
  (Cei et al., 2009; Kyriacos et al., 2011; Randhawa et al., 2011; Robb et al., 2010)

• Jonsson et al. (2011) identified respiratory arrest as the primary reason for emergent admission into the ICU followed by septic shock
  – respiratory rate represented the least documented physiologic finding (while most important discriminator for deterioration)
Synthesis of Findings

Mortality Outcomes

• Approximately 25% of all patients die after recent discharge from an ICU back to the ward. (Goldhill et al., 2005)

• Critical vital signs during the first 48 hours or after day five accounted for 78% of critical vital sign assessment findings in hospitalized patients with worsening conditions. (Bleyer et al., 2011)

• Increasing physiological derangements are directly related to increasing risk of mortality (p<0.0001) (Bleyer et al., 2011; Goldhill et al., 2005)

• 1.15 million individual vital sign assessments on 27,722 patients to determine associations between critical vital signs & mortality.
  – One critical vital sign alone was associated with a mortality rate of 0.92% versus 23.6% with three concurrent critical vital signs. (Bleyer et al., 2011)
Validation of Physiologic Findings

Vital Signs

Respiratory rate changes are the best discriminator between patients who are stable versus those at-risk for deterioration.

Blood pressure & heart rate changes were negligible between stable & at-risk patients.

(Goldhill et al., 2005; Jonsson et al., 2011; Smith, et al., 2008; Subbe et al., 2003)
Conclusion

- Critical assessment of patients requires critically thinking nurses, not mere gathering & recording of vital signs.
- **Clinical picture may be quantified** with scoring tools to assist clinical decision making.
- **Positive benefit to patient outcome may be established** through tool conceptualization & utilization by nurses combining sepsis & all cause screening tools in the acute care setting.
- Development of such clinical screening tools requires **establishing validity & reliability prior to deployment** in nursing practice.
- **High impact clinical outcomes** of interest affecting patient safety, mortality, costs to treat, or length of stay potentially mitigated by MEWS tool use should be **measured & reported**.
Relevance to Clinical Practice

- **Ignored, unassessed, or unreported** physiologic derangement findings mean critically ill patients remain at-risk for deterioration. Consequently, triggers for additional assessment by critical care response teams & practitioners is missed.

- **Erroneous or inappropriate trigger scores** potentially activate unnecessary calls, decrease effectiveness of a MEWS tool, & increase workloads of bedside nurses, physicians, and rapid response team members.

- **Vital sign recording must be supplemented** with accurate findings, recognition of any abnormalities, appropriate frequency of assessment, complete assessment of all physiological parameters, & recognition of critical findings.
References


References


References


References


References


