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Preventing Alert Fatigue through use of Predictive Analytics Managed by a Virtual Quality Team

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Session Presenters

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DISCLOSURES

- Presenters have no conflicts of interest to report
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1. Describe predictive analytics in the context of early warning systems

2. Describe components of an early warning system

3. Describe the use of a Virtual Quality Team to mitigate alert fatigue and ensure data capture for measuring outcomes
INTRODUCTION

Evolving healthcare technologies impose upon nurses the ever-growing challenge of Alert Fatigue

While caring for their patients, they are continuously exposed to:

• Hypersensitive Bed alarms
• Acutely exaggerated IV pump alarms
• Fatal alarms for a disconnected pulse oximetry
• Talking Hill-Rom beds
• Every 5-15mins vital signs
• Neuro-checks q 2hrs
• Hourly rounds
• Ventilator alarms
• BiPAP/CPAP alarms
• --- and now ...

Electronic Health Record Chart Alarms
Electronic Health Record Chart Alarms!!

...like Modified Early Warning Scores (MEWS)
**Key Goals of the AAM/Virtual Quality Team Program**

**FIRST-**

- Promotion of early recognition of physiological deterioration
- Predicting today who will be in ICU tomorrow
Key Goals of the AAM/Virtual Quality Team Program

SECOND-

• Reduction of alert fatigue for bedside clinicians

• Support the facility level standardized workflows
Early detection of deterioration in non ICU patients is challenging.

Failure to recognize and rescue deterioration are preventable quality and patient safety concerns.

Increased morbidity and mortality in these patients.
Predictive Analytics allows us to predict deterioration and address patient needs proactively.
PREDICTIVE ANALYTICS

• Predictive analytics began as an early warning system strategy

• Use of big data allow algorithm derived predictions

• Many predictive analytic programs exist
  - Advance Alert Monitor (AAM)
  - Modified Early Warning Score (MEWS)
The predictive analytics AAM program was developed by Kaiser Permanente Division of Research

Implemented by Quality Division
COMPONENTS OF AAM: Advance Alert Monitor

- 99 parameters
- 12 hour lead time
- Reactive to proactive approach
THE AAM/VIRTUAL PROGRAM

• Assists clinicians with clinical pathway decisions for rescue therapies
• Integrates supportive care for patient-centered social work
• Provides palliative care preferences
The Virtual Quality Team

- Masters prepared nurses
- Critical care backgrounds
- Support the facility level standardized workflows
THE AAM/VIRTUAL QUALITY TEAM PROGRAM

Quality Nurse Consultant:
• Receives alert
• Reviews alert
• Calls Rapid Response RN at the hospital – gives SBAR
• RRT RN assesses patient/notifies MD
PROCESS IMPROVEMENT

- Expand an existing virtual e-Hospital platform
- Spread AAM from pilot Alpha and Beta sites
- Develop a remote surveillance team of Quality Nurse Consultants
AAM IMPLEMENTATION

A multi-disciplinary leadership team of:
• Quality Nurses/
• Rapid Response Nurses (RRT)
• Hospital-Based Specialists (HBS)
• Palliative Care
• Social Services

Aligned with:
• Hospital Leadership
• Regional Leadership
AAM/VIRTUAL QUALITY TEAM SPREAD
The Virtual Quality Team ensured

- Standardized continuous monitoring process
- Workflow refinement
The AAM Program:

• Supports robust data analytics

• Provides performance improvement data on a SharePoint website

• Allows facilities to view their weekly and monthly data
PROGRAM INDICATORS

AUTOMATED EARLY WARNING SYSTEMS CAN MITIGATE FAILURE TO RECOGNIZE, COMMUNICATE, OR ACT ON SIGNS OF EARLY CLINICAL DETERIORATION

A PATIENT’S DECLINE IS GENERALLY PRECEDED BY CHANGES IN A PATIENT’S RESPIRATORY RATE, HEART RATE, OXYGENATION AND MANY OTHER CLINICAL TRIGGERS APPROXIMATELY 6 TO 24 HOURS PRIOR TO CLINICAL DETERIORATION (6–10)

EARLIER RECOGNITION AND ACTION CAN REDUCE THE ASSOCIATED ADVERSE EVENTS SUCH AS UNPLANNED ADMISSIONS TO THE ICU AND UNEXPECTED DEATHS (11)
How does AAM differ from MEWS?

The AAM/Virtual Quality Team Program differs from MEWS in three ways:

• Technology

• Process

• Multidisciplinary Collaboration
Technology:

AAM is more robust and each parameter is weighted according to risk

The AAM program’s algorithm has over 99 parameters including:

--LAPS - laboratory-based acute physiology score

--COPS - comorbidity point score

MEWS scores only:

- heart rate
- blood pressure
- respiratory rate
- temperature
- mentation
COPS2

Comorbidity Point Score (vs 2) (COPS2) – a dimensionless number based on all diagnoses a patient has received in the preceding 12 months.

The higher the COPS2, the greater the comorbidity burden.

LAPS2

Laboratory-based Acute Physiology Score (vs 2) (LAPS2) – a dimensionless number based on physiologic data from the preceding 24 or 72 hours (vital signs, neurological status, pulse oximetry, and 16 laboratory tests).

The higher the LAPS2, the more unstable the patient.

AAM Score

- AAM Score – discrete probability estimate of the likelihood of deterioration in the next 12 hours.
- Based on age, sex, COPS2, LAPS2, care directive, individual vital signs, vital signs trends, individual laboratory tests, and how long a patient has been in the hospital.
Process:

AAM/Virtual Quality Team Program

The AAM program captures data inputted to the EMR every hour and sends alerts to the AAM virtual quality team nurse.

Modified Early Warning Score

MEWS operates as an alarm within the chart for the primary nurse to review, adding to other environmental and chart alarms and alert fatigue.
Multidisciplinary Collaboration

The AAM Quality Nurse Consultant activates multidisciplinary collaboration between

- Rapid Response Nurse
- Social Services/Palliative care services
- HBS - whose orders generate action from
  1. Laboratory
  2. Radiology
  3. Respiratory
  4. any other department
Translating Predictive Analytics into Highly Reliable Care

- Identify highest risk inpatients to prevent deterioration and reduce mortality and LOS
- Respect patient goal of care
- Shift safety culture from reactive to proactive
- Quality Virtual Nurse performs Expert review of AAM Alert
- Maximize benefits of EMR and data science

- Standard Work for alert response by RN & Physician to assess and evaluate the patient, communicate robust plan and expedite orders
- Integration of palliative care and Social services teams for symptom management and life-care planning
- On-site Education, coaching, implementation, support to train staff & leaders
- Notifies RRT RN
- Reduces Alarm Fatigue
- Integration of AAM model into KP HealthConnect to effectively scale & maintain technology
EVALUATION

• In many of our hospitals, there is inconsistency between when the clinical deterioration occurs and when it is detected.

• It was also noted that there is variation in clinician response.

The AAM Program ensures:
• Standardized actions and responses
• Reduced alarm fatigue
• Improved interdisciplinary communication
CONCLUSIONS/OUTCOMES

• AAM is a technology for proactive detection.

• We have developed a standardized spread process alongside a highly skilled virtual quality team.

• Team of experts, using common language and agreements on how we work together

• Reduction in LOS and mortality

• A difference in differences study was done and the results with currently in review for publication
• We are now working with other KP Regions to assess for inter-operational transferability.

• The AAM Program is a first step toward a vision where predictive analytics and remote monitoring ensure patients remain safe from harm.

• Ensures their goals are incorporated into treatment decisions before adverse outcomes occur.
LESSONS LEARNED

• The overall goal of implementing AAM in 21 KPNC hospitals was achieved through leadership alignment.

• Regional and Hospital leadership teams jointly prioritize, promote, and implement resources.

• A system-wide approach of leadership and multidisciplinary collaboration made this innovation possible.
Questions
References:


