Project Title

Automated Code Red Alerts (ACRA) and ICU Outreach Nursing (ICUORN) Service

Project Lead and Members

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Organisation(s) Involved

Ng Teng Fong General Hospital (NTFGH)

Healthcare Family Group(s) Involved in this Project

Nursing

Applicable Specialty or Discipline

Intensive Medicine

Project Period

Start date: 2020 (Pilot phase)

Completed date: 2023

Aims

The first-of-its-kind in local public healthcare institutions (PHIs), Automated Code Red Alert (ACRA) system was piloted in Ng Teng Fong General Hospital (NTFGH) in 2020. This automated alert system, along with ICU Outreach nursing (ICUORN) service, improves care escalation by automating the identification of clinically deteriorating patients while in GW, and triggers notification to the appropriate clinicians, thus reducing cardiac arrests in GW and unplanned ICU admissions. The combination of ACRA triggering system and ICUORN service aims to improve compliance rate to timely and appropriate care escalation and facilitate efficient intervention during clinical deterioration in the GW.

1. To improve compliance rate to timely and appropriate care escalation.

2. To facilitate efficient intervention during clinical deterioration in the General Wards (GW).

3. To reduce cardiac arrests and unplanned ICU admissions in the General Wards.

Background

Patients in General Wards are at risk of deterioration due to marked changes in their vital signs. Compliance to care escalation by nurses was between 0-15%, leading to serious outcomes such as unplanned ICU admissions, respiratory or cardiac arrest, and death. The Automated Code Red Alert (ACRA) system, along with ICU Outreach Nursing (ICUORN) service, was piloted in NTFGH in 2020 to improve care escalation by automating the identification of clinically deteriorating patients and triggering notifications to appropriate clinicians.

Methods

1. Two-pronged approach: ACRA automated triggering and upskilling of ICU nurses to ICUORNs.

2. General Ward nurses assessed six physiological parameters: respiration rate, oxygen saturation, systolic blood pressure, pulse rate, level of consciousness, and temperature.

3. Data fed into ACRA system, with monitoring frequency based on patient severity using the National Early Warning Score 2 (NEWS2) and hospital policy.

4. Automated notifications triggered to ICUORNs and senior clinicians for prompt care escalation.

5. Proof-of-Concept (POC) testing phase followed by gradual implementation across all inpatient wards.

6. Integration with other projects like TELE-NIV and VitaScout for continuous monitoring of critically ill patients.

Results

1. 100% compliance rate in escalating care to the right clinicians.

2. Reduction in incidence of In-Hospital Cardiac Arrest (IHCA) from 1.42-1.46 (2020-2021) to 1.17 (2023).

3. Reduced ICU/HD admissions through early intervention to only 8% of alerted patients.

4. Seamless transfer to ICU/HD through ICUORN for closer monitoring and early intervention.

5. Efficiency and resource optimization with ICUORN, preventing patient deterioration and enhancing access to critical care resources.

Lesson Learnt

A key lesson learnt was that GW patients can be effectively managed by clinicians with ICUORN support using smart technology. The implementation of the ACRA system with the ICUORN service ensured efficient timely intervention during clinical deterioration, facilitating timely identification of at-risk patients in the GW. Digitising processes and leveraging of existing infrastructure, including the NEWS2 score, has improved compliance to escalation policies, resulting in reduced unplanned ICU admissions, shorter hospital stays, and decreased costs.

Additional Information

National Healthcare Innovation & Productivity (NHIP) 2024 – Best Practice (Automation, IT and Robotics category)

Conclusion

The implementation of the ACRA system with ICUORN service has ensured efficient and timely intervention during clinical deterioration, significantly improving patient safety and care quality. The approach has led to reduced unplanned ICU admissions, shorter hospital stays, and decreased costs.

Project Category

Technology

Digital Health, Sensors, Data Analytics

Workforce Transformation

Job Redesign, Upskilling

Keywords

Automated Code Red Alert, ICU Outreach Nursing, Clinical Deterioration, Early Intervention, Patient Safety, Critical Care

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