Project Title

Technology with Right Activation Parameters and Good Clinical Response: SAVE LIVES

Project Lead and Members

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Organisation(s) Involved

Ng Teng Fong General Hospital

Project Period

Start date: March-August 2016

Completed date: March 2018

Aims

The Project was conducted across all acute wards in the hospital led by Cardiac life Support committee with support from Intensive Care Medicine Department Doctors, Nurses, Respiratory Therapists, Ward Nursing, Ward Doctors, Medical Informatics, Facilities and Biomedical dept. It is a multi-disciplinary team approach with input from clinical and non-clinical team.

It started in the period of March-August 2016, with the development of Peri Cardiac arrest criteria with manual activation of code blue team. The technology was implemented in March 2019.

The patient group was Peri arrest patients with the focus to reduce cardiac arrests which has poor survival outcomes.

Background

Ng Teng Fong General Hospital is 700 bed`s acute and 400 bed`s Community hospital co-located in Singapore's West. Opened in July 2015, it has a catchment of nearly 2 million people. Within the first 1 year, there were nearly 100,000 Accident and Emergency

attendances, followed by nearly 40,000 hospital admissions, resulting in stress across the system, across clinical specialities, as the majority of nursing and medical staff were working together for the first time dealing with acutely ill patient resulting in delays in recognizing rapidly deteriorating patients and failure to activate help was costing lives.

Despite having a hospital policy on recognising deteriorating patients, the incidence of cardiac arrests was high (1.64 per 1000 hospital admissions) in first year and a serious reportable event occurred which resulted in preventable patient death. Staff feared to call and did not know whom or when to call the ICM code blue team which did not help the situation. This led to the birth of the "Peri-Arrest Criteria for Code-Blue Activation" (PACCA).

In spite of meeting the criteria, there were still missed cases and the code blue team was not activated. On average, the cardiac arrest rates were 1.2 per 1000 hospital admissions. This led to the drive to enhance the manual alert process through the automation of triggering alerts and activation – "Post Automation" has improved compliance, reduced human error and fear.

Methods

The Peri-Cardiac Arrest criteria were derived, validated and implemented into the EMR (Electronic Medical record) system. Smart technologies such as bedside monitor, automated activation system were also HL7 integrated with the EMR system. Once the nurse validates the vitals in the bedside monitor, the data auto-flows into the EMR system. When the Peri-Cardiac Arrest criteria are met, an EMR built-in algorithm automatically triggers an alert to be sent to the automated activation system which in turn activates all code blue team members simultaneously within 25 seconds. To allow flexibility for patients who do not require higher support of care, the EMR system is also designed to tailor to exclude certain locations and certain groups of patients.

For this "Post Automation" roll out, multiple roadshows and training tailored to each ward and group of nurses (e.g., Endoscopy, OT, community hospital) were conducted.

To sustain the system, there are daily self-tests, integrated maintenance and user feedback is garnered to improve user compliance to smart technologies. Also, weekly code blue reports were generated for analysis and derive modifications to prevent or reduce false alarms and improve system reliability. Progress updates were submitted to the management on a regular basis

Results

Weekly reports of activations are collected. Reports of Code blue analysed using Utstein method. Pictures added with data.

Big reduction in cardiac arrest incidence with increasing pick up of patients in Peri arrest situation, with survival rate of approximately 70% compared to average 20% in cardiac arrests

- June 2018 and November 2019, no cardiac arrests in whole month
- No missing of patients due to human fear (No SRE)
- 25% reduction in incidence of cardiac arrest post automation (March 2018 - Feb 2019), with only 10% increase in workload
- Able to sustain and keep the incidence of cardiac arrest at 0.8 for 1000 hospital admissions again from March 2019 to Feb 2020.

Lessons Learnt

Involve non-clinical colleagues in implementation of projects from the start. They are part of Life support committee now. Multidisciplinary approach and patience is the key.

Conclusion

Technology is becoming important aspect in healthcare. Embrace it.

Using Technology as safety net, it has saved lives and allowed nurses in frontline to concentrate on patient care, rather than waste time in calling doctors for help

Project Category

Automation, IT & Robotics, Workforce Transformation, Care Redesign,

Keywords

Automation, IT & Robotics, Workforce Transformation, Care Redesign, Quality Improvement, Efficient Care, National University Hospital, Cardiac Arrest, Peri Arrest, Code-Blue, Electronic Medical Record, Waiting Time, Process Improvement, Process Redesign

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TECHNOLOGY WITH RIGHT ACTIVATION PARAMETERS AND GOOD CLINICAL RESPONSE:SAVE LIVES

- ❑ CARE REDESIGN
- ❑ WORKFORCE TRANSFORMATION
- ☑ AUTOMATION, IT, ROBOTICS INNOVATION

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1. Define Problem, Set Aim

Background

- Ng Teng Fong General Hospital (NTFGH) which opened in 2015, annually has about 100,000 A&E attendances and 40,000 hospital admissions. As a new hospital with medical and nursing staff from across the world working together under a high workload to deal with acutely ill patients resulted in delays in recognizing deteriorating patients and failure to activate help cost lives.

- In the first year, NTFGH faced an incidence of 1.64 cardiac arrests per 1000 hospital admissions and a serious reportable event of a preventable patient death. Staff feared to call and did not know whom to call for help despite having a hospital policy "Peri-Arrest Criteria for Code Blue Activation" (PCCAA) on recognizing deteriorating patients.

Problem/Opportunity for Improvement

- Deteriorating patients who met the PACCA criteria were still missed and the Code Blue Team was not activated. In 2016 , the cardiac arrest rate was 1.2 per 10000 hospital admissions.
- This led to the drive to innovate by integrating the existing digitalized activation process with the automation of triggering of alerts from the Electronic Medical Record(EMR) system with a multidisciplinary team of clinical and non-clinical members.

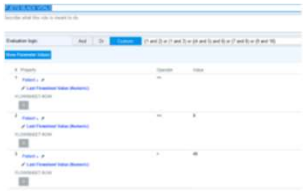
Aim

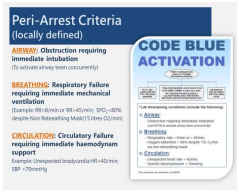
- To reduce cardiac arrest rate by 25% from 1.2 to <0.9 in NTFGH by 2019.

2. Strategy for Change

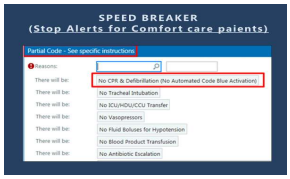
EMR Based Automated Alerts for Peri-Arrest Patients

- In-house derivation, validation and implementation of the medical Peri-Arrest criteria to build automated alert algorithm on the EMR.

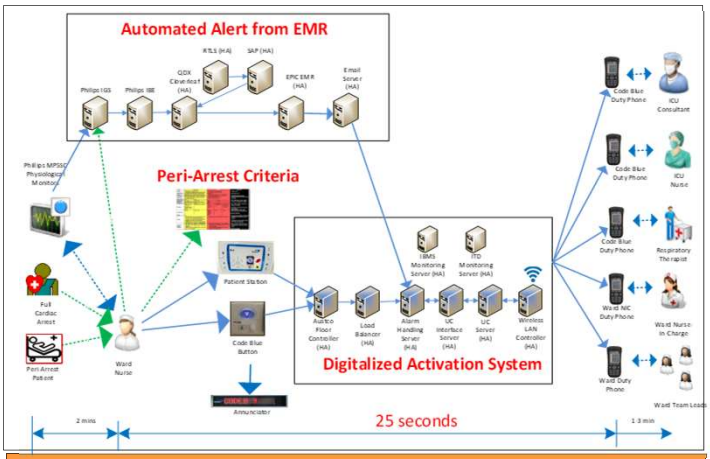




- End-to-end process and system integration where the nurse validates patient's vitals on a bedside monitor which auto-flows to the EMR's built-in algorithm with necessary filters for certain locations and patients who do not need higher support care.



- Peri-Arrest criteria once met, will trigger an automated alert to a digitalized activation system which sends the alert to all code blue team members simultaneously who receive the alert within 25 seconds.



3. Interventions and Results

Improvement in Cardiac Arrest Rate

- Cardiac arrest dropped 25% from 1.2 to 0.8 per 1000 hospital admissions over a period of 12 months since implementation of "Post Automation" with only 10% increase in workload

- Increased pick up of patients in Peri arrest situation, with survival rate of approximately 70% as compared to average 20% in cardiac arrests. No SREs for preventable deaths as all deteriorating patients were captured by the system and the Code Blue Team activated.

- For Jun 2018 and Nov 2019, there were no cardiac arrests. Further, for 6 out of the 23-month implementation period there was only 1 cardiac arrest per month. Able to sustain cardiac arrest at 0.8 for 1000 hospital admissions from Mar 2018 to Feb 2020.

4. Learning Points

- Involvement of non-clinical colleagues in implementation of from the start. They are now apart of the Cardiac Life Support Committee.

- Using existing technology and infrastructure as a safety net and to automate data input and filtering functions has saved lives and allowed nurses to concentrate on patient care.

- Multidisciplinary approach and patience is the key to developing, implementing and sustaining innovation and improvement.

Ng Teng Fong General Hospital | Jurong Community Hospital | Jurong Medical Centre

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