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ALGORITHM-BASED PROACTIVE RAPID RESPONSE TEAM ROUNDS: DEVELOPING A SAFETY NET FOR PATIENTS AND NURSES

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Introduction: The future of Rapid Response Teams (RRT) is to move from reactive calls to proactive surveillance. The Electronic Medical Record can be optimized to promote nurse-to-nurse education while providing a safety net for the management of hospitalized patients. **Hypothesis:** The use of algorithms within the EMR for Early Warning Scores (EWS) can increase anticipatory nursing interventions for patients at risk for deterioration. **Methods:** The Rothman Severity of Illness Index (RI) is a graphic display of an algorithm based on 26 variables that provides a timeline of the patient's condition throughout hospitalization to support the clinical evaluation of patients to help identify critical changes or slow deteriorations that may be difficult to detect. The RI was implemented in all inpatient areas of a 210-bed teaching hospital in Florida in 2011 to drive proactive 'surveillance' rounding by Rapid Response Team nurses (RRT RN). The RRT RN identifies relevant cases and rounds on 2–4 patients while delegating additional patients to the charge nurse for follow-up and report back to the RRT RN. The reasons and interventions for each patient visit were recorded. **Results:** 206 patient graphs were inspected by RRT RNs over 3 weeks. Surveillance visits were conducted on 162 occasions (average 3.9 visits/12h) and represented a 1013% increase in patient encounters compared with traditional reactive RRT calls (N = 16) during the same period in 2010. Nursing-driven interventions and/or nurse-to-nurse coaching was implemented 89 times (average 2.1 visits/12h) and demonstrated anticipatory nursing care such as prompting calls to providers for relevant assessment findings and lab results (19%, N = 17) and nurse-to-nurse mentorship (59.6%, N = 53) including code status dialogue, documentation inconsistencies, and sepsis screen coaching. **Conclusions:** The use of 'smart' algorithms combined with the clinical experience of RRT RNs effectively increased anticipatory nursing care for patients at risk for deterioration while promoting expertise-sharing among nurses. Further study of the patient safety and quality implications of data-driven proactive rounds is warranted.

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EDUCATIONAL LEVEL OF EMERGENCY PHYSICIANS IS ASSOCIATED WITH PROLONGED SCENE TIME IN HELICOPTER EMERGENCY MEDICAL SERVICES (DOCTOR-HELICOPTER) IN JAPAN

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Introduction: It is advocated that pre-hospital time from scene to admission should be kept as short as possible in severe disease such as trauma, acute myocardial infarction and acute ischemic stroke. In Japan, emergency physicians (EPs)-staffed helicopter emergency medical service (HEMS), called as "Doctor-Helicopter", is prevailing now, but it is unknown about the impact of educational level of EPs on pre-hospital scene time. **Hypothesis:** Educational level of EPs may be associated with prolonged scene time in EPs-staffed HEMS. **Methods:** We performed a retrospective cohort study on 12 months. All patients were included if they were referred directly from scene to hospital by EPs-staffed HEMS. The dispatch of HEMS was decided according to our local protocol. Data were abstracted including demographics, diagnosis, physical status on HEMS arrival, scene time and interventions by EPs. EPs were stratified according to their educational level into 2 groups, junior doctors (with 4–5 years of ongoing emergency medicine experience) and senior doctors (with 6–10 years of experience). Outcome measure was prolonged scene time (PST), defined as $\geq$ 15 minutes. Logistic regression model was used to evaluate the association between educational level and outcome. **Results:** Of 61 consecutive patients, 33 were enrolled into PST group and 28 were enrolled into non-PST group. 2 junior doctors and 4 senior doctors attended our HEMS. Compared to non-PST group, PST group had significantly more women (42.4% vs. 21.4%, p = 0.082), less cardiac arrest patients and more trauma patients (3.0% vs.25.0%, 51.5% vs. 42.9%, respectively, p = 0.034), less hypotension (systolic blood pressure = $<$75 mmHg) (15.2% vs. 32.1%, p = 0.014), less bradypnea (respiratory rate = $<$9/minute) (9.1% vs. 32.1%, p = 0.049) and more often treated by junior doctors (48.5% vs. 25.0%, p = 0.059). Multivariate logistic regression analysis showed that treatment by junior doctors only was significantly associated with PST (adjusted odds ratio 4.11, 95%CI 1.01–16.61, p = 0.047). **Conclusions:** Educational level of EPs was associated with prolonged scene time in EPs-staffed HEMS. Educational effects on junior doctors need to be determined in further studies.

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AIRWAY MANAGEMENT SKILLS FOR PEDIATRIC CRITICAL CARE NURSE PRACTITIONERS: A SIMULATION-BASED TRAINING PROGRAM

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Introduction: Airway management skills are essential for pediatric critical care nurse practitioners (NP). Our objective was to develop and implement a simulation-based training program to better prepare our critical care NPs for airway management. **Hypothesis:** We hypothesized that tracheal intubation performed by NPs in a pediatric ICU is more successful compared to those by pediatric residents, as determined by first-attempt intubation success rates. **Methods:** The NP airway training program was developed by pediatric critical care NPs and attending physicians specifically trained in simulation-based education. The program was implemented in FY2011 and consisted of a 4-hour structured airway management skills training with a didactic discussion and one-to one hands-on training with partial task trainers and whole body simulators, followed by one week of airway management training in the operation room. The instructors were critical care medicine attendings/senior fellows. The first attempt success of tracheal intubation was measured using local airway database (NEAR4KIDS) during FY2009–11. This was compared to the performance by residents. Fisher's exact test with p$<$0.05 as significant. **Results:** Thirteen NPs (81 %) completed the training in FY2011. NPs were the first laryngoscopist in 39/566 (6.9%) of all ICU oral primary intubations (3.3% in FY2009, 8.5% in FY2010, 7.9% in FY2011). This increase was not significant over years (p = 0.11). First attempt success rate was not different when compared to Residents (NP: 25/39 (64%) vs. Residents: 83/171 (49%), p = 0.11). This finding was similar when analyzed for each academic year (p$>$0.1 for all FYs). NPs were successful in 4/5 (80%) in FY2009, 9/14 (64%) in FY 2010, and 12/20 (60%) in FY 2011. This NP first attempt success rate, however, did not change over the time (p = 0.89). **Conclusions:** The simulation-based airway training program for pediatric critical care NPs was successfully implemented and performance was tracked by a local NEAR4KIDS database. NPs performance measured by first attempt success was not different from the Residents and did not improve during the observation period. Further follow-up is warranted to evaluate training effectiveness and mitigation if necessary.

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ORGANIZATIONAL COMMUNICATION EFFORTS FOR PREVENTING CATHETER RELATED BLOOD STREAM INFECTIONS (CRBSIS) IN A MEDICAL INTENSIVE CARE UNIT

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Introduction: CRBSIs are a significant source of mortality. Substantial evidence shows that successful implementation of the "central line bundle (CLB)" can significantly reduce CRBSIs. The CLB consists of five practices: hand hygiene; CHG skin antisepsis; maximal barrier precautions; optimal site selection; and daily review of line need. We previously showed that low compliance with CLB in MICU was associated with the absence of an organizational communication network related to CLB. This prospective study seeks to improve implementation of the CLB in the MICU and also examine communication dynamics underlying successful implementation of CLB. **Hypothesis:** Our aim is to improve implementation of CLB in MICU through periodic quality improvement (QI) interventions over a 52-week period, and also: 1)Examine dynamics (direction, frequency, and content) of communication related to CLB in the MICU through weekly communication logs from RNs and MDs; and2)Examine bedside compliance with CLB in the MICU through weekly chart review. **Methods:** The institution initiated the study (Grant R03HS019785 from AHRQ) in Jan 2011 and has so far compiled data for 26 weeks. QI interventions include 1) feedback of CLB compliance data to MICU staff, and 2) education on how CLB prevents CRBSIs. **Results:** MICU compliance with "catheter certification," i.e. hospital protocols of having the catheter insertion process observed by a member of vascular team (to ensure adherence to first four CLB practices) rose from 30% at baseline, to 100%. Additionally, MICU launched a system for "catheter maintenance," i.e., daily review of line need (to ensure adherence to fifth CLB practice). The system addresses need for central lines during morning rounds. Concurrently, MICU CRBSI rate declined from 3.6 to 0.8 per 1000 catheter days (p$<$0.05). These process improvements are concurrent with increased communication among RNs and MDs, on CLB processes, as well as increased engagement related to catheter safety (i.e., a culture of safety). **Conclusions:** The study suggests that the combination of process, communication, and culture changes has helped MICU significantly reduce its CRBSI rate, and we hope that they will also help MICU sustain the reduction.