

Introducing Random Safety Audits (RSA) in a Neonatal Intensive Care Unit (NICU)

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Abstract

Random safety audits (RSA) have been shown to be effective in improving standards of clinical practice. 19 data collection audits were performed relating to hygiene, safe prescribing, oxygen pulse oximetry monitoring and documentation in keeping with the requirements of the new Medical Practitioners Act (MPA) 2007. Hygiene audits (range from 20/25 to 21/21 80%-100%) and safe prescribing audits (range from 23/25 to 25/25 86%-100%) achieved n=25 100% compliance with unit guidelines over a 3 month period. Compliance with oxygen pulse oximetry monitoring guideline limits improved from 4/27 (15%) to 9/16 (56%). Compliance with requirement and use of Physician IMC registration number in documentation was only 10/18 (56%). RSA's led to improvements in hygiene and prescribing. Compliance with oxygen monitoring guideline limits highlighted the need for greater education. Awareness of legal requirements relating to documentation improved but this has not translated into a change in practice. RSA's can facilitate real time quality improvement in daily clinical practice.

Introduction

Patient safety is defined as freedom from accidental injury. It is a major concern for healthcare providers, the general public, and policy makers. Neonatal Units have extremely vulnerable patients with a recognized potential for medical errors related to the complexity of intensive care provided to premature very low birth weight infants. However, a recent study summarizing anonymous voluntary reports from 54 neonatal intensive care units (NICUs) participating in a Vermont Oxford Network quality improvement collaborative revealed large numbers of errors in virtually all domains of neonatal intensive care. Random safety audit (RSA) has been demonstrated to be an effective way to improve patient care in a simple and cost-effective manner. It has been feasible to adapt this process for NICU practice in USA and UK. RSA was effective in improving medical practice, due to the instant feedback, continued emphasis on infection control, good clinical practice and improved teamwork. RSA is performed in a 'real time' i.e. quality assessment during actual clinical practice. Additionally, quick feedback allows for immediate awareness and change in practice where necessary. A formal action plan can be made and the standard can be re-audited within a short timeframe, typically weeks. The aim of this study was to investigate the effects of a series of RSA in the Neonatal Unit in Cork University Maternity Hospital focusing on hygiene standards, safe prescribing, oxygen saturation (SpO₂) pulse oximetry monitoring, central venous catheter care and legally required medical documentation.

^{1,4}. In both studies,

Methods

Audits performed involved the 5 following quality issues. Hygiene audits assessed presence of five barriers of hand hygiene i.e. wrist watches, rings, clean nails, false nails and sleeves above elbows. These audits were performed without prior warning during NICU clinical rounds. Availability of alcohol gel containers located in NICU was recorded. Safe prescribing audits included an observation of 4 achievable standards: a clearly documented antibiotic plan in doctor's notes, presence of legible handwriting, use of generic drug names and correct doses on the prescription chart. Oxygen is a common therapy for premature infants. Higher oxygen levels may increase retinopathy of prematurity and respiratory problems, but lower oxygen levels may affect other long-term outcomes such as neurodevelopment. Although there are no universally agreed alarm limits between which to maintain SpO₂, our neonatal unit guidelines recommend using SpO₂ monitors to determine oxygen requirements, aiming to keep our preterm infants below 34 weeks gestation saturating at around 90%, by setting the upper alarm limit at 94% if they require oxygen and the lower alarm limit at 86%. For more mature infants greater than 34 weeks gestation, we aim to keep them saturating in the mid to upper 90's, by setting the upper alarm limit at 98% if they require oxygen and setting the lower alarm limit at 92%.

Central venous catheters are small gauge silastic or polyurethane catheters inserted into a peripheral vessel and advanced until the tip is positioned in a central vein outside of the heart: either the superior or inferior vena cava. These lines are used to provide supplemental parenteral nutrition to premature extreme low birth weight infants to support their nutrition while enteral nutrition is being established over the first weeks of life. As premature infants are immunocompromised, these central venous catheters are susceptible to infection as well as other potentially serious complications including pericardial effusion, cardiac tamponade, pleural effusion, ascites, venous thrombosis and catheter removal difficulties. These central venous catheters must therefore be well maintained and infection free. Competent placement, good catheter maintenance and care are all important. Clear documentation regarding time and date of insertion and line tip location ensure that all members of the healthcare team give consideration to the presence of this central venous catheter, and consideration to earlier removal with a potential for a reduction in catheter related blood stream infections and these other complications. The audit relating to central venous access reviewed whether central venous access details (date of insertion and location of central venous line tip) were documented at bedside and in medical record as per the protocol in our hospital.

The Medical Practitioners Act 2007 (Section 43(8)) introduced new record keeping obligations for medical practitioners, effective from July 2009. Doctors are now legally obliged to include their Irish Medical Council (IMC) registration number, together with their name, when recording clinical details pertaining to each patient. Our RSA assessed awareness and compliance of doctors with writing their IMC registration number after their signature and

printed name in all medical documents, including medical notes and prescriptions. Three rounds of 5 care bundles (19 standards) of RSA were performed. After each round, results were presented to staff by short verbal presentations. In addition to these presentations, posters updating staff on audit findings were placed in tutorial room, on call rooms and notice boards in common staff meeting rooms. Non-compliance with standards was discussed immediately with relevant staff members in a real time when possible. Results and strategies for quality improvement were also discussed at teaching sessions. Small laminated guidelines outlining unit protocol for oxygen pulse oximetry were displayed at the staff desks in the NICU. Data collection tables were designed for the purpose of this study and data was analyzed using standard statistical tools.

Results

In 3 months three cycles of 19 standards were successfully completed. Compliance rates achieved for all audits are shown in the table. RSA were effective in improving compliance in all audits. The hygiene audits and safe prescribing audits both achieved 100% compliance. Correct oxygen saturation pulse oximetry limits at monitors improved from 15% to 56% compliance. Central venous catheter care documentation steadily improved over the three cycles achieving 100% compliance with documentation in medical notes after the third RSA cycle. Although the awareness of the requirement for use of their IMC registration number increased (78% to 93%), the actual documentation rules were complied with in 56% of cases.

Discussion

Real time RSA's performed during routine work are examples of rapid cycle models for quality improvement known as PDSA (Plan, Do, Study, and Act) cycles. This organizational learning across the entire multidisciplinary team over small frequent cycles with real time feedback contributes to a culture of quality improvement in the neonatal unit, and encourages participation in improvement as individuals see initial signs of success in the early cycles. Our RSA's and prompt feedback effectively improved the standards and quality of care in our neonatal unit. The benefits included both an increased awareness in routine care standards and documentation requirements. Continued emphasis on infection control and safe medication prescribing shows these standards are very good locally. Sustainability of RSA's as a quality improvement tool depends on our motivation and commitment to patient safety in complex clinical environments.

We chose the 5 quality audits above following multidisciplinary discussions of patient care in our NICU identifying our unit's strengths and weaknesses. Our compliance with hygiene audits was very high from the beginning of the RSA and at the end reached 100%. Cooperation among all staff members and close supervision by clinical pharmacists to make prescriptions safe and avoid errors may have contributed to 100% compliance to these standards. The RSA focusing on oxygen saturation pulse oximetry monitoring highlighted poor understanding around the unit guideline amongst medical and nursing staff. Rapid feedback to staff concerning central venous catheter care led to improved catheter related documentation at both the bedside and in the medical records.

The Medical Practitioners Act 2007 requires all registered medical practitioners to quote their registration number on all documentation and records, whether in paper or electronic format relating to their medical practice⁶. A recently published audit demonstrated that the Medical Council requirement was absent in all but 3 (0.9%) of entries doctor's signatures are frequently illegible, the IMC number may be the only means of establishing an individual doctor's identity. Although the awareness among medical staff of the requirement to use their IMC number after our RSA increased, actual documentation of the IMC registration number was observed in only 38% of notes. As with any quality improvement, whether locally or nationally driven, information, education and communication amongst all stakeholders is necessary to translate change and improvement into daily clinical practice. To facilitate this change, some countries such as Malaysia have supplied all medical practitioners with rubber stamps that contain details of full name together with their registration number to ensure all registered medical practitioners use their full name and their registration number in all official matters

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There are some limitations to using RSA. It does require dedicated staff and communication among all team members to maintain compliance and prevent RSA fatigue. In our unit RSA met great support from all team members initially. Data was collected by a junior doctor (MS) during medical ward rounds involving doctors and nursing staff. The clinical team did not know in advance which items were to be audited on a given day. The idea of being assessed evoked great interest among team members with mainly positive comments. Hospital staff, including doctors, nurses and health care assistants were updated about the audit results on a regular basis. Feedback was given to all team members through presentations and posters with audit findings placed in tutorial room, on-call rooms and common staff notice boards. Non-compliance with standards was discussed immediately with staff members. This real time engagement with positive reinforcement and encouragement of the benefits for infant care contributed to improvement in standards compliance seen between RSA cycles. The RSA results frequently generated active discussions among team members leading to closer examination of many aspects of infant care. On many occasions staff were seen to be motivating each other in order to improve the quality standard being measured confirming the axiom that 'what gets measured gets done'. RSA was championed in the unit by Consultant Neonatologists frequently reminding all multidisciplinary team members about the quality standards being measured and the importance of compliance with these standards for improvement in delivery of care to infants.

Ursprung et al and Lee et al showed that RSA's could be adapted for general measures and for particular needs of neonatal units. Although the number of collected data in this report is small, this reflects that the RSA's were performed randomly in a real time in the actual clinical environment. Some have expressed concerns that RSA are time-consuming, but in our experience the process was both simple and efficient.

The Health Information and Quality Authority was established in May 2007 as part of the Irish government's health reform programme to drive continuous improvement in Ireland's health and social care services. It is an independent Statutory Authority, with broad ranging functions and powers, reporting directly to the Minister for Health. Its functions include setting standards and monitoring healthcare quality. In its recently published guideline on developing key performance indicators, HIQA acknowledges that quality assessment has become increasingly critical - unless we actually measure the quality and safety of care, we cannot determine if improvements are being made to and use of good quality information is a key component of performance measurement and improvement for high quality, safe and reliable healthcare. Performance improvement involves monitoring the current level of performance and instituting changes where performance is not at the desired level. We believe that this performance improvement can be facilitated in local health care settings in a simple and cost-effective way by RSA's.

¹⁰. Access

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