



The case for quality improvement in the Neonatal Intensive Care Unit



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ABSTRACT

Quality improvement (QI) is now a central part of the work of clinicians throughout healthcare. It is based on clear scientific principles, a valid way of measuring change and has theories of reliability and human factors that underpin the interventions.

The Neonatal Intensive Care Unit (NICU) is a highly complex adaptive system that lends itself to the application of QI principles. This will require the development of a safety culture that continually seeks to improve. Clinicians and all those who work in NICU will require training in the methodologies of QI and patient safety to effect change. Working together in collaborative networks can accelerate change.

In this paper we discuss some of the key concepts and provide some examples of improvement in the NICU.

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1. Introduction

The challenges to implement good practice by neonatologists are immense with the development of new interventions that can improve outcomes for the babies in the Neonatal Intensive Care Unit (NICU) if applied reliably. In this paper, we will examine the evidence for quality improvement (QI) in the NICU and consider ways to continually

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improve processes, so that the long-term outcomes for neonatal intensive care are enhanced. This will be done within the ethos of equitable and safe person centred care. Shah et al. [1] provide a comprehensive overview of the challenges and successes in quality improvement. In this paper we will provide a practical overview of what has been done and what still needs to be achieved. The fundamental problem is that of variation and this paper will examine ways to improve outcomes by decreasing variation. To achieve this, we will introduce concepts of quality improvement, with a few illustrative examples to demonstrate benefits of quality improvement.

2. The aim of high reliability

The concepts of high reliability, which are derived from studying other high-risk industries, are now being applied to complex adaptive health systems such as NICU [2]. Constant mindfulness of the inherent risks to safety and how these can be prevented, also called situational awareness, is a framework present in all highly reliable complex systems. In the NICU this would involve Anticipation of what may happen in real time and Containment of unsafe events. Anticipation includes a preoccupation with potential and actual failure at all level of the processes to deliver care before and after it happens, for example, a neonate collapsing, timing of medications and intervention, then understanding the root causes for and mitigating these. This requires being sensitive to how the NICU is run and the challenges that are faced. Containment of challenging events and high-risk situations will require organisational learning in order to develop resilience and learning. Highly reliable organisations such as nuclear power and commercial air travel have revealed common features, which facilitate the move from low to high reliability. These are leadership, robust continual improvement, anticipation of the future by learning from the past, and containment [3]. A highly reliable NICU will constantly perform at a level of sustained excellence.

The challenge is to learn how to adapt the theory to the complexity of the healthcare system in which babies are different, service delivery is variable and healthcare professionals are not trained in the theories of patient safety. Hollnagel [4] suggests that in healthcare one develops resilience by learning to adapt to the degree of natural variability but at the same time delivering reliable care. NICUs may be more reactive without the anticipation that is required or commonly followed articulated processes. Doctors are trained to be individuals and do not necessarily follow guidelines or protocols reliably [5]. Knowledge of safety principles such as human factors and of improvement methodology may be limited or not be a routine part of training for NICU staff members.

An answer has been to consider standardisation of processes wherever possible in order to have less variable outcomes. Standardisation of processes should take into account the individual needs of patients where necessary, resulting in reliable care. Quality can be improved, if one designs systems that prevent harm and enable processes in the first place. The essential principles required are standardisation of the routine processes, checklists and care bundles.

3. A culture of quality and safety

Highly reliable and safe organisations are never content with their current level of safety or quality and continually seek to improve. The development of a safety culture cannot be assumed; rather it needs to be developed. Profit et al. [6] demonstrate that units with a high degree of safety awareness, cohesive team work and a clear vision do better than those do not. Assessment of the safety climate can correlate with the safety outcomes on a unit. The development of a culture that fosters and enhances safety is the first step on the QI journey and may require examination of what care should look like. Chassin and Loeb [3] suggest that committed leadership is essential for setting a common vision. Sexton et al. [7] demonstrated that Safety WalkRounds™ improve

teamwork and decrease burnout. Whitfield et al. [8] have concluded that change is dependent on the prevailing culture of the NICU. They found that those with strong group and developmental cultures are considered more receptive to quality improvement.

4. The aim of quality improvement

Evidence based medicine (EBM) aims to ‘improve the quality of care by identifying and promoting practices that work, while eliminating those that are ineffective or harmful’ [9]. However, as Glasziou et al. [10] describe, there is a considerable gap between what we know from research and what we do in clinical practice. Some feel the final step to the practice of EBM is to evaluate ones' own performance. This is where quality improvement provides a framework to do the ‘right things right’.

The aim of the quality improvement movement is to enable clinicians to care for their patients so that the care outcomes are the best that can be achieved. In neonatal care, there have been many rapid medical advances that have decreased mortality and morbidity. One can question the case for quality improvement. We need to ask whether this is the best we can do. It is in the context of person centred care that the experience of the neonates and their parents becomes the key underlying factor. The outcome is not simply life or death but rather what the family and child experience over the course of their life as a result of the time spent in the NICU. Real outcome measures in health care are not what immediately happens but what the survival actually means for the neonate. If there is a long-term morbidity then outcome needs to be measured in terms of that morbidity. Considerations of the lifetime outcomes have been shown to improve care for patients and are the most important measure to collect [11].

If we examine the outcomes of different neonatal units, we can discover where the issues lie. Survival is not uniform, nor is the burden of morbidity that graduates of NICU have to endure. It is when one examines risk adjusted comparative outcomes that one uncovers extensive variability. Although more babies are surviving, the morbidity and mortality rates are not necessarily falling year on year. Outcomes of units are difficult to compare without adequate risk adjustment and should relate to patient outcomes rather than volume [12]. As medical science advances and complexity increases, so does the likelihood of error, which is of particular relevance in the complex environments of neonatal intensive care. In addition, many of the interventions we undertake can cause avoidable harm and impact on the later functional development of the infant and child.

5. The theory and methodology of quality improvement (QI)

Quality improvement is “the combined and unceasing efforts of everyone – healthcare professionals, patients and their families, researchers, payers, planners and educators – to make the changes that will lead to better patient outcomes (health), better system performance (care) and better professional development (learning)” [13]. This is the responsibility of all health care providers. The purpose of quality improvement theory is to provide the methodology to improve care. The underlying goal is one of reliability, defined as the baby receives the care needed and wanted the first time every time.

The concepts of quality improvement are not new and were pioneered by two statisticians, Shewhart and then Deming. Deming laid the foundations by describing a means to combine subject matter knowledge with the theories of change which is essential to allow us to develop, test and implement changes that result in improvement [14]. The ‘Science of Improvement’ constitutes four inter-related perspectives which, when understood and applied, result in sustainable change. In order to change, we need to understand the system within which we work as well as the people who work within that system. The NICU is a micro-system within a larger hospital system and interfaces with other micro-systems the hospital, such as obstetrics, surgery

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