Featured Article

Using Checklists and Repetitive Simulation to Improve Patient Safety: A Pilot Project with the Impella® Left Ventricular Assist Device

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Abstract
Background: Low-frequency, high-risk patients in a cardiac intensive care unit have a greater risk for medical errors with serious clinical consequences. Patients with an Impella® left-ventricular assist device were chosen as representative of this population.
Methods: This project involved the development and implementation of two specialized crisis checklists with repetitive simulation sessions for patients with an Impella® left ventricular assist device. Participants included 26 cardiac intensive care unit nurses who were identified as Impella® superusers. Evaluation measures included nursing performance, patient and manikin outcomes, self-confidence, and self-efficacy.
Results: The participants were found to have improved adherence to critical processes of care and reduced errors in management of patients with an Impella® left ventricular assist device in simulated as well as actual patient events.
Conclusion: The results while limited due to small sample size do provide support for the use of safety checklists in combination with repetitive simulations to improve adherence to critical safety practices as well as self-confidence for low-frequency high-risk patients.

Low-frequency, high-risk patients in a cardiac intensive care unit (CICU) have a greater risk for medical errors with serious clinical consequences (Donchin et al., 2003; Garrouste-Orgeas et al., 2010; Huang et al., 2010; Rothschild et al., 2005). In these situations, expanding patient complexities interface with equally complex physiologic monitoring and life support systems requiring both intricate human interaction and a substantial commitment to safety practices to reduce the likelihood of human error (Donchin et al., 2003; Garrouste-Orgeas et al., 2010; Rothschild et al., 2005). In such high-risk, high-stake

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environments, failures in core patient safety processes during care can lead to potentially catastrophic results and poor outcomes (Donchin et al., 2003; Garrouste-Orgeas et al., 2010; Huang et al., 2010; Rothschild et al., 2005).

> **Key Points**
> - Core patient safety processes must be maintained in low-frequency, high-risk patient encounters.
> - The utilization of crisis checklists in complex health care encounters has demonstrated a positive impact on patient safety and outcomes.
> - Repetitive simulation using crisis checklists to manage low-frequency, high-risk patient encounters with the Impella® left ventricular assist device demonstrated improved adherence to critical processes of care.

Background

In health care settings, the CICU represents one of the most complex highly sophisticated environments requiring the nurses who work there to have highly specialized knowledge, skills, and attitudes (KSAs) in order to safely and efficiently coordinate patient care (Jansson, Kääriäinen, & Kyngäs, 2013). Impella® left ventricular assist device (LVAD) patients are one example of a low-frequency, but high-risk, stressful patient care event in the CICU that requires rapid and coordinated care (Abiomed, 2012; Froesch et al., 2011; McCulloch, 2011). The Impella® LVAD is a percutaneously placed partial cardiac assist device that is used in the CICU to provide continued hemodynamic support for patients with cardiogenic shock, severe cardiomyopathy with acute decompensation, high-risk percutaneous coronary intervention, as a bridge to recovery, or as a bridge to cardiac transplantation (McCulloch, 2011). Common complications include hemodynamic instability due to low cardiac output, bleeding related to device placement or anticoagulation, limb ischemia, vascular injury, hemolysis, aortic valve damage, displacement of the distal tip of the device into the ventricle or aorta, infection, and device failure or malfunction (Abiomed, 2012; McCulloch, 2011).

Education for low-frequency, high-risk patient populations such as the Impella® LVAD can be challenging as experience with the device and managing these critically ill patients is dependent on the patient population (Aebersold, Tschannen, & Bathish, 2012; Schmidt, Goldhaber-Fiebert, Ho, & McDonald, 2013). Traditionally, CICU nurses receive didactic education, training, and support for patients with an Impella® LVAD. Unfortunately, there is rarely, if ever, an opportunity to practice managing potentially life threatening low-frequency clinical events such as the Impella® LVAD in a safe setting without jeopardizing patient care (Jansson et al., 2013). As a result, there is no assurance that the nurses charged with providing care have actually gained the necessary KSAs required to safely manage both the device and the critically ill patient (Aebersold et al., 2012). Yet, all CICU nurses are expected to perform efficiently, effectively, and safely when managing these highly dynamic critically ill patients (Jansson et al., 2013). The complexity of the device, lack of exposure, and lack of opportunities to learn in a safe environment each contribute to an increased likelihood of serious errors in this highly vulnerable patient population (Gittell, 2009).

The purpose of this pilot project was to explore the effect of developing and implementing two specialized crisis checklists combined with repetitive simulation sessions on patient outcomes and adherence to best practice guidelines for patients requiring the Impella® LVAD in a CICU. Specific goals of this implementation project included the following:

1. Exploring the effects of the repetitive simulation-based learning experiences and the specialized crisis checklist intervention on CICU Impella® LVAD patient and manikin outcomes (e.g., Patient Safety Quality Incident reports).
2. Exploring the effect of a specialized crisis checklist intervention on:
   a. Nursing team member's adherence to best practices related to the care of CICU patients with an Impella® LVAD during a simulated learning experience.
   b. Nursing team member's perceptions of self-confidence and comfort in managing patients with an Impella® LVAD.
3. Exploring the nurse's perceptions of usefulness and clinical relevance of the Impella® LVAD crisis checklist.

Literature Review

Checklists

Checklists are one methodology that have clearly demonstrated positive effects for facilitating complex multistep processes leading to error reduction in several high-risk work environments (Arriaga et al., 2013; Clark et al., 2012; Gordon, Darbyshire, & Baker, 2012). The use of a safety checklist can improve situational awareness by ensuring that all relevant data are assessed and comprehended, that problems are anticipated, and that the correct course of action is selected (Russ et al., 2013). As a result, communication, teamwork, and compliance with established evidence-based protocols are enhanced reducing the likelihood of error (Aspesi et al., 2013; Clark et al., 2012; Russ et al., 2013; Thomassen et al., 2011; Treadwell, Lucas, & Tsou, 2014). Checklists also reduce reliance on memory, especially in rare, highly dynamic, and unpredictable