1. Introduction
Caring for patients in the medical intensive care unit (MICU) requires residents to perform several essential competencies. In a time-sensitive, emotionally, and physically stressful environment, MICU residents are expected to manage medically complex and acutely ill patients. Residents must also acquire knowledge regarding management of complex critical illness. Exposure to critical care medicine varies widely among medical schools in the United States, and little is known about the preparation of first-year residents to provide MICU care. Anecdotal evidence from critical care faculty at our own institution indicates that first year resident preparation varies widely, and knowledge gaps often exist. This is confirmed from findings of a survey study of resident physicians that many do not have adequate evidence-based knowledge about how to manage patients receiving mechanical ventilation [1]. Residents also expressed dissatisfaction with their training in critical care medicine and mechanical ventilation [1].

High-fidelity patient simulators are being used with increasing frequency to train health care providers in safe, controlled environments. The use of simulation technology has the potential to shape medical education and the quality of care that residents provide [2]. The American Board of Internal Medicine (ABIM) recommends that internal medicine residents receive simulator training before performing invasive procedures on patients [3]. Previous studies of simulation-based education have established its effectiveness to improve skills and reduce costs in areas such as laparoscopic surgery [4-6], endoscopy [7], advanced cardiac life support (ACLS) [8-10], emergency airway management [11], trauma resuscitation [12,13], bronchoscopy [14], obstetric emergencies [15,16], and central venous catheter insertion [17-19].

Despite widespread use of simulation, little is known about the effectiveness of simulator training as a method of preparing residents for clinical rotations, such as the MICU. Stanford University investigators developed a scoring system to evaluate management of septic shock using patient simulators and were able to differentiate the quality of resident performance in simulated scenarios [20]. In another study, medical students performed better during a simulated scenario of dyspnea if they received simulator training rather than problem-based learning [21]. However, neither study determined if simulation-based education transferred into improved clinical care.

The aim of this study was to determine the effect of simulation-based education on the knowledge and skills of first-year internal medicine residents managing critically ill patients receiving ventilator support in the MICU. We hypothesized that a simulation-based educational intervention would boost resident knowledge and skill as assessed by a bedside skills assessment checklist.