Peripheral Intravenous Access in Pediatric Inpatients

J. Routt Reigart, MD, Katie H. Chamberlain, BS, David Eldridge, MD, Elizabeth S. O’Brien, RN, Katherine D. Freeland, BS, Pamela Larsen, DrPH, DNSc, FNP, David Goff, MD, and Timothy H. Hartzog, MD

Abstract

Background. Peripheral intravenous (PIV) line placement is a time-consuming procedure performed on the majority of general pediatric inpatients, with significant discomfort to patients. Objective. To determine parameters of pediatric PIV placement, including success rates, time to success, and factors associated with success. Design. Prospective study involving direct observation of PIV placement by trained research staff. Setting. General inpatient wards at 2 medium-sized pediatric hospitals. Patients. Hospitalized children younger than 19 years. Results. Successful placement was achieved in 95.8% (567/592) cases with a median time of 9 minutes. Children younger than 2 years were less likely to have success on the first attempt (38.9% vs 53.5%) and have longer time to success (11 minutes). Conclusions. Children younger than 2 years experienced lower first-attempt successful PIV placement and took longer. The overall success rate was similar to prior reports; these data are the first to show differential PIV success by patient age.

Keywords

general pediatrics, nursing, therapeutics

Introduction

Placement of peripheral intravenous (PIV) catheters is a common and necessary procedure related to pediatric inpatient admissions. Most pediatric patients admitted to inpatient wards require PIV access for the administration of fluids, medications, or other intravenous therapy. Although a relatively minor procedure, obtaining a PIV may result in anxiety and discomfort for the pediatric patient. Cummings et al reported that disease-related pain, postoperative pain, and PIV line placements are the most common causes of pain in the hospital setting, and that PIVs are the second most frequent cause of the worst pain, exceeded only by disease-related pain. Although PIV placement is one of the most routine procedures in pediatric care, there are limited published data about this procedure. In the pediatric population, obtaining PIV access may be difficult and time consuming because of multiple potential issues, including smaller, less visible veins, lack of patient cooperation, and increased adiposity in infants relative to older children and adults. These potential compounding factors lead to pain and distress for the child and parents.

Peripheral intravenous catheters are often essential to the provision of important or critical therapies for the benefit of patients. Some patients require multiple time consuming attempts before successful placement is achieved. There is a strong need to better understand the determinants of these difficulties and delays in order to improve the care of children. Some potential determinants include age of the child, the experience of the operator, and the technical characteristics of the physical materials used in the process of placement. Some patients (eg, the obese and the chronically ill) present difficulty when hospital personnel attempt PIV access. The chronically ill patient often has an extended length of hospitalization and typically has fewer accessible veins because of vein scarring/sclerosis from multiple...