Randomized Controlled Comparison of IV Catheter with Coiled Tip Guidewire and Conventional Peripheral IV Catheter

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Introduction: Intravenous therapy is a frequent treatment modality (90%) for hospitalized patients. However, this modality can be associated with pain/discomfort and risk of phlebitis/infections; therefore, first attempt success and dwell time for IV catheters are important outcomes. Currently first attempt success averages 40%, complications occur 47% and IVs dwell time average is 44 hrs. Multiple attempts at insertion, multiple IVs during each admission result in poor patient and clinician satisfaction as well as unnecessary costs. A new peripheral catheter technology that uses a proprietary coiled tip guidewire design previously seen only in central lines is now available (AccuCath™). This prospective study compared AccuCath™ and conventional IV catheters in adult patients. Outcomes that were evaluated included: higher rate of successful placement on first attempt, higher rate completion of therapy, fewer complications, longer dwell times, increased patient and clinician satisfaction and lower overall costs of therapy than conventional IV catheters. With INS (Infusion Nursing Society) standards now stating IVs can dwell until complication there is significant opportunity to improve patient outcomes with guidewire technology that offers greater first attempt success and longer dwell time with AccuCath™.

Methods: Industry and Hospital IRB approval were obtained prior to beginning the study. Adult Medical-Surgical patients who required a non-emergent IV catheter were enrolled and consented. The SICU and telemetry step-down were initially the sites, but the study was expanded with IRB approval to include all of Medical-Surgical adult patients. Randomized enrollment was ensured with sealed envelopes, opened once patient consent was obtained. Study forms were completed by the RN after insertion. The study was conducted over four months with a total of 248 patients (AccuCath™ 123, conventional 125). Data was collected using a standardized instrument. Outcomes were assessed using parametric and non-parametric tests.

Results/Analysis: The study included 248 patients total: 123 AccuCath™; 125 Conventional IVs. First attempt success was 88.6% with AccuCath™ compared to 43.2% with Conventional (p=< 0.001 Fisher’s exact). Complications including infiltration, phlebitis, occlusion, infection occurred only 8% of the time with AccuCath™ and 52% with Conventional (p=<0.001 Fisher’s exact). Dwell time significantly improved with AccuCath™ at mean of 4.39 days compared to Conventional IVs at 1.46 days (p=<0.001 Fisher’s exact). Completion of therapy (IVs in place until no longer needed) was 89% with AccuCath compared to Conventional at 34% (p=<0.001 Two-sided Fisher’s exact). Patient satisfaction with IV insertion for AccuCath™ using a 5 point Likert Scale scored a mean of 4.6 compared to Conventional at 3.06 (p=0.001 Two-sided t test). Patient comfort rating of procedure for AccuCath™ was 4.2 compared to Conventional IVs at 2.9 (p=0.001 Two-sided t test). Patient satisfaction with overall performance scored 4.8 with AccuCath compared
to 2.8 with Conventional ($p=0.001$ Two-sided $t$ test). Overall clinician satisfaction for AccuCath using a 5 point Likert scale scored a mean of 4.5. Cost savings in a Return on Investment model was also significant due to the need to start 50% fewer peripheral IVs.

**Conclusion:** Use of the AccuCath™ was associated with positive outcomes (first attempt success, dwell time, higher completion of therapy), fewer complications and decreased cost of therapy. This study demonstrated that the use of the AccuCath™ was feasible for hospitalized adults, associated with better outcomes without increasing overall cost of care and significantly improved patient satisfaction. Larger studies are needed to validate this technology in other populations and multiple care settings.

**References (optional):**