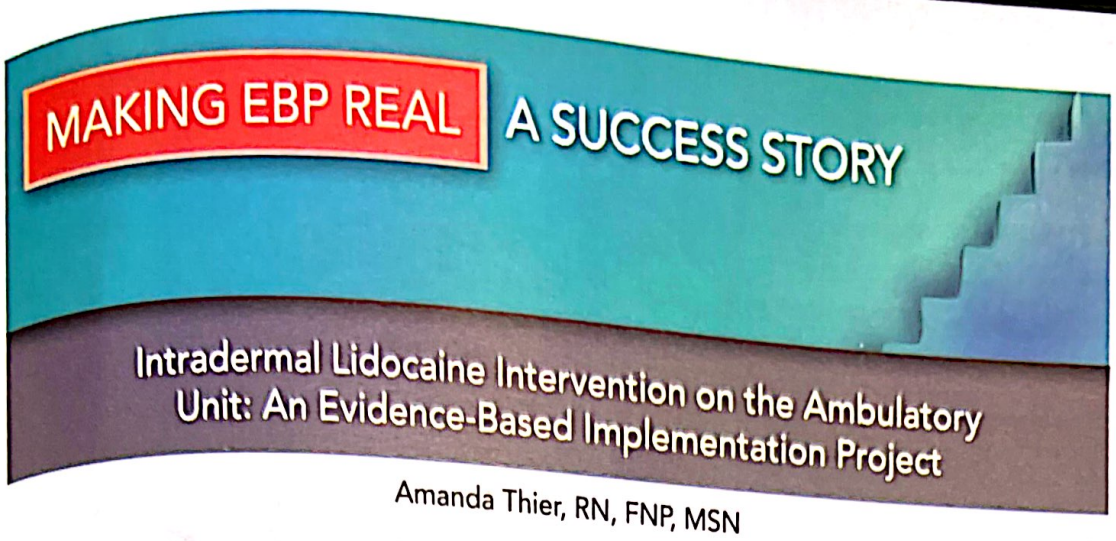

Amanda Thier, RN, FNP, MSN

The Spirit of Inquiry Ignited

Healthcare organizations are nationally measured and reimbursed based on patient satisfaction scores and individualized patient experiences. The Press Ganey (2017) patient experience survey includes scientifically developed patient-centered questions to provide a more comprehensive view of the overall patient experience. Scores from the survey revealed how well the intravenous (IV) service was provided by a nurse and led to an immediate evidence-based practice (EBP) change at a Heart and Vascular Hospital (HVH) in central south United States.

After discharge, a Press Ganey survey is sent to each ambulatory patient at HVH. This follow-up survey asks multiple questions regarding the patient's care, including a specific question about "The skill of the nurse starting the IV." Survey results indicated that the ambulatory unit at HVH was in the 41st percentile for the months of November and December of 2014. Along with the mailed Press Ganey survey, each patient receives a follow-up phone call within 1 day of discharge from a registered nurse within the facility. Data from these phone calls revealed at least one compliant made each day related to the pain or discomfort of a peripherally inserted IV catheter. Specific comments made by patients included "My IV really hurt" or "The nurse stuck me multiple times." Taken together, the low patient satisfaction rate and patient complaints revealed a critical opportunity for improvement in patient satisfaction related to the quality and experience of the IV start.

Asking the Clinical Question in PICOT Format

Therefore the question arises: In ambulatory surgery patients requiring a peripheral IV (P), how does intradermal lidocaine use (I) compared to no pain reduction intervention (C) affect patient's satisfaction (O) during the start of an IV (T)?

Searching for Evidence

In order to provide the strongest evidence for confident clinical decision making, an exhaustive systematic search was conducted. The three electronic databases used for the systematic search were PubMed, the Cumulative Index of Nursing and Allied Health Literature (CINAHL), and the Cochrane Database of Systematic Reviews. Keyword and controlled vocabulary searches included the following terms: *lidocaine, IV insertion, venipuncture, pain, patient satisfaction, vascular access device, venipuncture,* and *intradermal lidocaine.* The systematic search strategy was completed using the same search terms across all databases. In order to make the search inclusive, if the database had its own indexing language or subject headings, the search was conducted using those terms.

The identified PICOT question asks about an intervention, comparing the use of a pain reduction intervention to no intervention. The best study design to answer this specific question is a systematic review or meta-analysis of randomized controlled trials (RCT), or

a single RCT. Therefore, these limits were considered for the search. Furthermore, inclusion criteria for the search were that studies had to: (1) be published in English between 1998 and 2014, (2) report findings of empirical research in the form of a RCT or meta-analysis study, and (3) examine the effect of patient satisfaction related to intradermal lidocaine prior to the IV insertion. The single exclusion criterion was that studies could not involve participants under the age of 18.

The CINAHL search yielded 31 articles that likely would answer the clinical question. After review of the abstracts, eight articles were relevant to the purpose of the evidence synthesis. A hand search of the eight articles' reference lists yielded two additional studies. The PubMed search yielded 20 studies, with 5 studies retained for review. The Cochrane Database of Systematic Review yielded two studies, but only one abstract was relevant to the PICOT question. The retained 16 studies were then moved into critical appraisal.

Critical Appraisal of the Evidence

Rapid critical appraisal (RCA) of the retrieved studies was done to determine which studies were keeper studies, i.e., were they relevant, valid, and applicable to the PICOT question. The RCA involved choosing a proper RCA checklist for each study on the basis of the study's research design. An RCA checklist and a general appraisal overview (GAO) form were completed on all studies. Six studies were discarded and 10 moved forward to evaluation (see sample RCA and GAO on thePoint®).

In the evaluation phase of critical appraisal, one single evaluation table was used to organize data from the studies (see Table 1 on thePoint®). This phase was critical because it identified what the literature indicated was best practice regarding the pain perception after implementing a pain reduction intervention. Completing one evaluation table organized data so comparisons and relationships could be easily identified and used to make the appropriate recommendations for a practice change. From the evaluation table, three synthesis tables were developed to provide an overall understanding of the entire body of evidence (BOE), craft a recommendation, and formulate the basis for the project implementation plan.

In the first synthesis table, the level of evidence was presented and the specific variables throughout the 10 studies were identified. The final BOE included one systemic review study, one meta-analysis, and eight RCTs (see Table 2). In review of the sample for the identified RCTs, samples ranged from 50 to 376 participants within the sample and settings column of the evaluation table. All 10 trials were completed within the last 20 years and all 8 RCT studies were conducted in the United States. Each RCT used similar design methods, such as comparable IV needle sizes, subcutaneous needle sizes, and amount of local anesthetic injected. The independent variables across the studies included a control of no local anesthesia, 4% lidocaine cream, bacteriostatic normal saline, 1% buffered lidocaine, 1% lidocaine, and ethyl chloride spray within multiple practice settings (see Table 2). In each study, the participants were identified as adults older than 18 years of age; however, one study used medical students to make up the participant group, which may be perceived as different from the patient population.

Another comparison made across studies was how intradermal lidocaine prior to IV insertion effected patient satisfaction. Although none of the studies exclusively addressed patient satisfaction, the studies measuring the perception of pain were considered relevant to the clinical question because pain perception is directly related to patient satisfaction. Scales used to measure perception of pain included valid and reliable scales. Studies showed that patient perception of pain decreased with the use of intradermal lidocaine before IV insertion (see Table 3). Local anesthetics used to decrease pain during venipuncture have been studied with equivocal results; however, researchers from level I studies determined that lidocaine was most effective in reducing pain in adults (see Table 3). Additionally, across all ten studies, those that used lidocaine showed pain reduction, regardless of needle gauge of the catheter or the intradermal needle or the amount of lidocaine injected (see Table 2).

TABLE 2

Level of Evidence and Intervention Description Synthesis Table

Study	Halm	Gater-Ristz	Deguzman	Brown	Winfield	Kahre	McNaughton	Burke	Oman	Hattula
Level of Evidence	SR	RCT	RCT	RCT	RCT	RCT	RCT	RCT	MA	RCT
Size (*N*)	*N* = 180	*N* = 252	*N* = 376	*N* = 100	*N* = 94	*N* = 56	*N* = 68	*N* = 145	Combined *N* = 1,559	*N* = 24
IV	Control 1% Lido	1% Lido BLD BNS	BL BNS	Control 1% Lido	1% Lido BNS Pain Ease Spray	BL BNS	Control 4% LC 1% BL	BL BNS	Control BLD 1% Lido BNS NS	Control BL BNS
IV Gauge	18, 20	20	18, 20, 22	18, 20	16	20	20	16–22	16–22	18, 20
Lido Dose ML (ID)	0.3 mL (25–29)	0.8 ± 1 (27)	0.1–0.2 (27)	0.1	0.1–0.3 (27)	1 ±1.3 (30)	0.1–0.2 (30)	0.2 (30)	0.01–1.3 (25–30)	1.32 ± 1.0 (25)
BNS Dose ML (ID)	NA	0.1 (27)	0.2 (27)	NA	0.1–0.3 (27)	0.2 (30)	NA	0.2 (30)	0.1–0.5 (25–30)	0.2 (25)

BL, buffered lidocaine; BNS, bacteriostatic normal saline; ID, intradermal lidocaine needle size; IV, independent variables; LA, local anesthetic; Lido, lidocaine; M ± SD, mean (standard deviation); MA, meta-analysis; MES, mean effect size; NA, not applicable; PS, pain score; RCT, randomized controlled trial; SR, systematic review; VPS, verbal pain scale.

(*continued*)

TABLE 2 *Level of Evidence and Intervention Description Synthesis Table (continued)*

Study	Halm	Gater-Ristz	Deguzman	Brown	Winfield	Kahre	McNaughton	Burke	Oman	Hattula
Pain scale used	VPS (0–10)	VPS (0–10)	VPS (0–10)	VPS (0–10)	Verbal rating	Visual (FACES)	VPS (0–10)	VPS (0–10)	VPS FACES	VPS (0–10)
Lido PS: M ± SD	Males 1.6 ± 1.74 Females 2.4 ± 2.1	Lido 0.8 ± 1.0 BLD 0.8 ± 1.1	1.19 ±1.59	1.4 ± 1.96	1% Lido had least pain ($p < 0.001$)	0.093 ± 1.3	1 ± 3	1.56 ± 1.99	Decreased PS in 10 studies	1.32 ± 1.0
BNS PS M ± SD	NA	1.4 ± 2.1	1.72 ± 1.58	NA	ID BNS: Pain "same as"	2.36 ± 1.45	NA	2.58 ± 2.50	Decreased PS in 2 studies	2.68 ± 1.42
Control PS M ± SD	Males 3.24 ± 2.7 Fe 3.2 ± 2.75	NA	NA	2.8 ± 2.49	NA	NA	7 ± 3	NA	NA	3.11 ± 1.85
Mean reduction reported pain (raw score)	Males (−1.64) Fe (−0.8)	Lido (−0.5) BL (-0.1)	−0.18	−1.4	Poor study design No M ± SD	−2.267	−6	−1.02	−0.46 *(MES calculated using z score)*	−1.36

BL, buffered lidocaine; BNS, bacteriostatic normal saline; ID, intradermal lidocaine needle size; IV, independent variables; LA, local anesthetic; Lido, lidocaine; M ± SD, mean (standard deviation); MA, meta-analysis; MES, mean effect size; NA, not applicable; PS, pain score; RCT, randomized controlled trial; SR, systematic review; VPS, verbal pain scale.

TABLE 3 Intervention and Patient Perception of Pain (Outcome) Synthesis Table

Study	Halm	Gater-Ristz	Deguzman	Brown	Winfield	Kahre	McNaughton	Burke	Oman	Hattula
Level of Evidence	SR	RCT	RCT	RCT	RCT	RCT	RCT	RCT	MA	RCT
1% Lido	↓*	↓*		↓*	↓†				↓*	
BL		↓*	↓*			↓*	↓†	↓*	↓*	↓*
BNS		↑	↑		↓†	↑		↑	↓	↑
No Intervention (control)	↑			↑			↑†		↑	↑
LA Spray Or LA Cream					↑†		↑†			

↑, pain increased with intervention agent; ↓, pain decreased with intervention agent.

*Statistically significant.

†Some statistically significant data.

BL, buffered lidocaine; BNS, bacteriostatic normal saline; LA, local anesthetic; Lido, lidocaine; MA, meta-analysis; RCT, randomized controlled trial; SR, systematic review.

Although there are multiple factors that influence patients' perceptions of pain, offering a pain-reducing agent prior to venipuncture could positively impact the patient perception of pain. The BOE demonstrates that an adult's pain perception can be decreased by the use of intradermal lidocaine prior to IV insertion, regardless of the buffered or unbuffered solution (see Table 2). Both lidocaine agents produced similar results; it was clear from the synthesis tables that patient satisfaction and the perception of pain could be positively affected by the use of intradermal lidocaine prior to venipuncture. This evidence-based project was feasible and important to clinical practice decisions. Therefore, the recommendation from the BOE is to implement intradermal lidocaine before peripheral IV catheter insertion on all patients requiring such access.

Implementation - Linking Evidence to Action

The plan for this project based on the evidence found included the implementation of intradermal lidocaine before IV insertion, assess its feasibility, and the outcomes related to patient satisfaction with ambulatory surgery patients treated at HVH. When patients were admitted to the ambulatory surgery unit at HVH, the placement of an IV catheter was required prior to the procedure for the administration of fluids, blood products, sedation, and medications. The existing standard of practice at the facility for all ambulatory surgery patients involved no pain-reducing intervention prior to the IV catheter insertion. The pain of the needle insertion is not a life-threatening discomfort, and the current practice of insertion of an IV catheter was effectively completed without an anesthetizing agent. However, literature strongly supported the injection of intradermal lidocaine as the most effective anesthetizing agent to reduce the perception of pain and provide optimal patient comfort during the catheter insertion process. In terms of patient preference and satisfaction, most patients want to experience minimal to no pain during the IV catheter insertion and throughout their entire day-surgery experience. The 10 experienced ambulatory surgery nurses, with their expertise and skills in IV catheter insertion, helped apply the evidence from current literature in the EBP project using intradermal lidocaine before the insertion of an IV catheter.

In order to facilitate safe and effective nursing practice change on the ambulatory surgery unit, the Stetler model (Dang et al, 2015) was used to guide implementation, combined with the collaboration of active and passive stakeholders. The EBP model outlined a series of five progressive phases: (1) preparation; (2) validation; (3) comparative evaluation/decision making; (4) translation/application; and (5) evaluation. During phase I, preparation for evidence-based change project was completed. Phase II included validation of the evidence, that is, critical appraisal. Stetler's Model was introduced in phase III with a detailed EBP implementation plan for how to execute the intradermal lidocaine intervention on the ambulatory unit, including how to collect baseline data to effectively evaluate the impact of intradermal lidocaine on patient satisfaction. In phase IV, the Advancing Research and Clinical Practice Through Close Collaboration (ARCC) model (Dang et al., 2015) was used to translate the evidence into practice.

The translation/application phase of the Stetler model incorporated moving evidence into action with a well-planned and executed implementation of the evidence-based change—beginning with identifying key stakeholders and acquiring necessary approval for the project. EBP mentors were identified to support sustainable change. All interprofessional team member were sought out and approvals obtained for the project.

Each checkpoint in the ARCC model timeline was completed. Baseline data collection process showed patient satisfaction scores of 41% on the Press Ganey survey question, "The degree pain was controlled during the IV insertion procedure." Furthermore, the ambulatory unit received on average about 20 to 30 patient complaints a week related to excessive pain with IV insertion. The Standards and Measures hospital-wide council and the electronic health

record (EHR) were sources of baseline data. The goal for outcomes for the project included increased Press Ganey scores and decreased patient complaints after the evidence-based intervention. A data collection tool was implemented to complete at the end of each shift to track project outcomes across the three-month implementation period.

As per phase VI of the Stetler model, a data collection protocol and project protocol were used to facilitate smooth project processes. An IV education course was implemented to help clinical staff use Mosby's education resources as foundational sources of information for all ambulatory nurses to help substantiate the appropriate process for intradermal lidocaine injection. As the project was starting and planning was completed, all team members, including the mentors and stakeholders, participated in a poster presentation to gear up for final plan implementation. Multiple hurdles were encountered and processes were put into place to overcome the challenges. A major struggle throughout the implementation period was nurse buy-in. The charge nurse indicated that nurses were consistently implementing the evidence-based intervention, but staff was frustrated because it was taking additional time to insert the IV catheter. Key personnel engaged the nurses in the third week of implementation to help with ease of the lidocaine process. The additional education allowed the nurses to improve their skills and confidence with the lidocaine process. Evidence-based practice projects must be owned by all stakeholders, not just the project director. Shared ownership by various individuals, providing enthusiasm and help toward one common goal of improved patient satisfaction, moved the project forward. The role of project leader is not to own the project, but to keep the project on track, keep stakeholders informed, remain organized, and, most importantly, ensure that the intervention has fidelity as well as the outcomes are evaluated to with validity and accuracy.

The evidence-based intervention of intradermal lidocaine prior to IV insertion was implemented from September 7th until October 2nd. Throughout the implementation timeframe, there was an effort to foster effective communication among project team members, including mid-project meetings of all key stakeholders.

Outcomes Evaluation

Finally, the last stage of Stetlers Model merged with the ARCC Model timeline, and the final data collection for the project evaluation was conducted with a review of the project processes—particularly were project goals and milestones achieved. A total of 247 ambulatory patients received 1% lidocaine prior to IV insertion. Each week total pain scores on the ambulatory unit were manually gathered from the electronic health record, averaged, and organized in tables. The mean, median, and standard deviation results were calculated using Excel. After the 4-week implementation timeframe, the entire mean pain score was generated. The mean pain score of 1.8 strongly correlates with the expected outcomes in the literature, indicating that lidocaine was an effective pain reduction agent in the ambulatory population. Process indicators suggested that premedication with 1% lidocaine can be effectively executed. Furthermore, there was improvement in the Press Ganey survey results about the extent to which pain was controlled with IV insertion (baseline 1.57 [standard deviation (SD) 0.37]; postimplementation 1.82 [SD 0.33]) and an increase in perception of nurse skill with IV insertion (score at baseline 91.9; post implementation 93.4), all of which indicates successful implementation of the evidence-based intervention.

Dissemination

The success of the project prompted conversations with the nursing director and project mentor around how such a simple intervention impacted patients' perceptions of their care. Involvement of medical and nursing leadership, ambulatory staff,

the Standards and Measures Council, and other staff in the ambulatory setting within the organization made the implementation of the project a success. Because of the success of this project and how it fostered interprofessional collaboration, the organization chose to pursue taking the evidence-based intervention system-wide. The focus of the initiative was achieving patient-centered care goals, promoting safety, and accelerating change within the Magnet environment, further realizing that a nursing-initiated EBP change within the organization demonstrates the requirements to remain a Magnet-recognized organization.

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