

The Impact of a Vein Illumination Device on Peripheral IV Catheter Insertions in a Pediatric Infusion Center

Purpose

The purpose of this study was to evaluate the impact of a vein illumination device on the first attempt success rate and number of attempts required for successful insertion of a peripheral intravenous (IV) catheter in pediatric patients requiring infusion therapy.

Background

- IV access is required for virtually all patients treated in the Infusion Center at this internationally recognized pediatric hospital.
- Goal is success on the first attempt, however 1st attempt success rate was only 85%.
- Incidence of 3 or > attempts was 6.3% and number of attempts per patient was 1.27.
- Opportunity for improvement existed so the team explored methods to enhance the IV insertion experience.
- Literature search revealed evidence of imaging devices improving 1st attempt success rates & anecdotal reports of decreasing number of attempts.
- Imaging devices were evaluated & trialed.
- Vein illumination device (AccuVein AV300) purchased.
- After demonstrated proficiency, data was collected on number of attempts using AccuVein.

Method

Data collected on the number of attempts to insert an IV using AccuVein was compared to baseline data collected using standard technique of palpation & visualization.

- Number of attempts self-reported by nurses
- Non-randomized pediatric patients (birth – 18 years)
- Control group ($n = 444$) → **standard technique** (Feb–Apr 2009)
- Experimental group ($n = 260$) → **AccuVein** (Oct–Dec 2010)

Outcome variables:

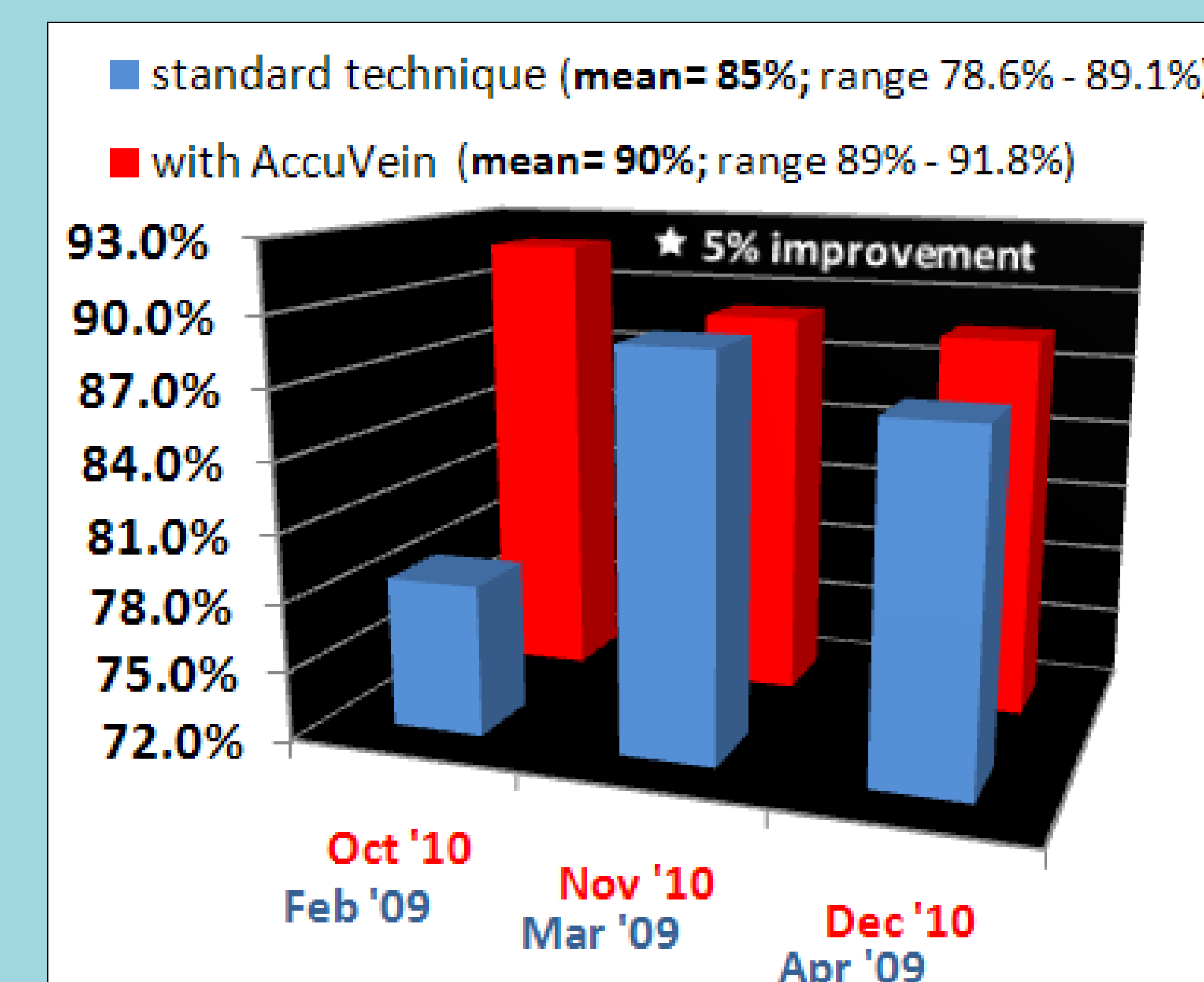
- 1st attempt success rate
- Number of attempts per patient

Comparison of Results

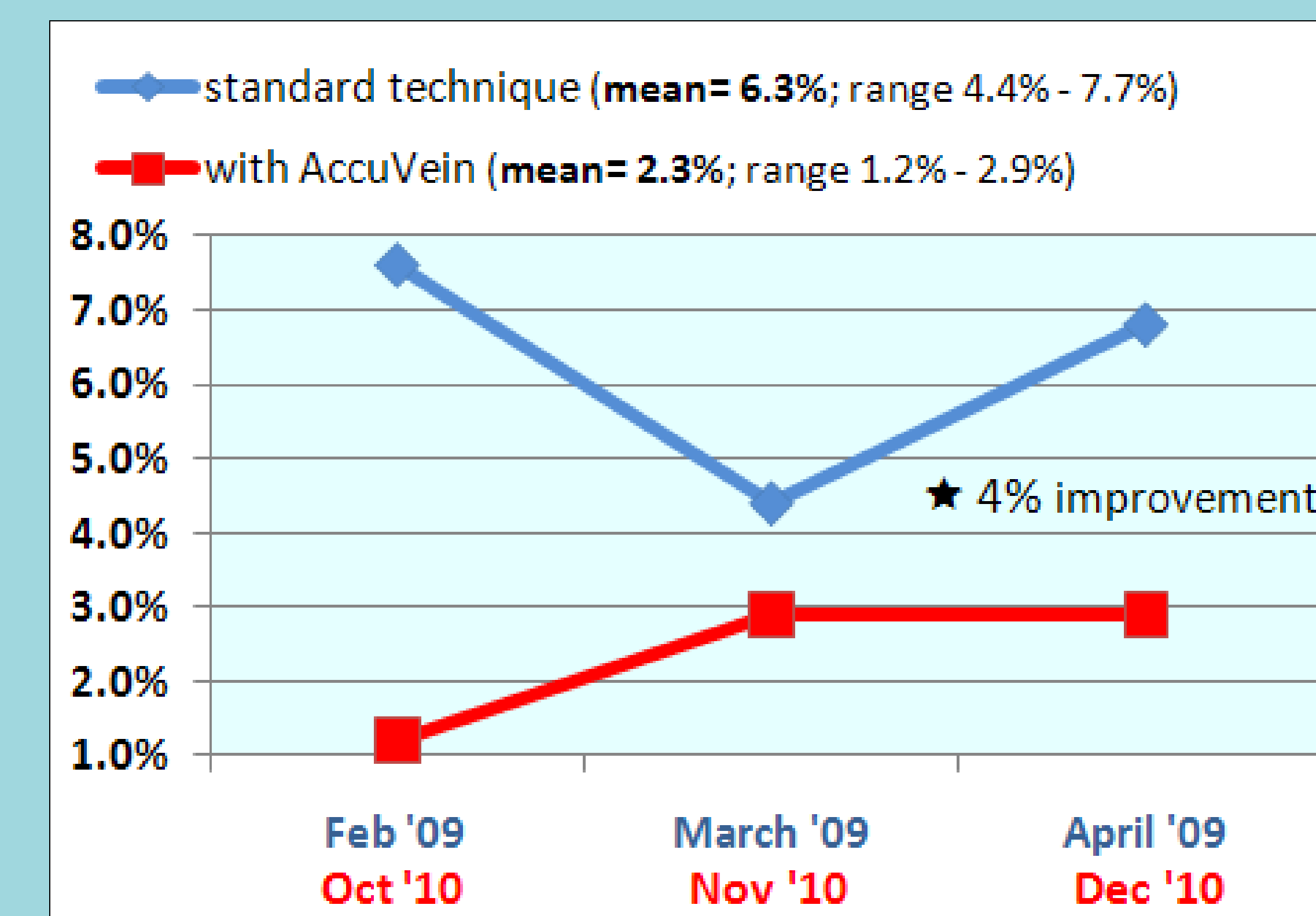
Variable	n	1st attempt	2 attempts	3 or > attempts	# of attempts per patient
Control (standard technique)	443	84.9%	9.1%	6.3%	1.27
Experimental (AccuVein)	260	89.8%	7.9%	2.3%	1.14
	n = 703	↑ 4.9%	↓ 1.2%	↓ 4%	-0.13

*In the experimental group, 100% of patients requiring > 2 attempts had the IV successfully placed on the 3rd attempt whereas 3.4% of the control group required > 3 attempts (4 to 7 attempts).

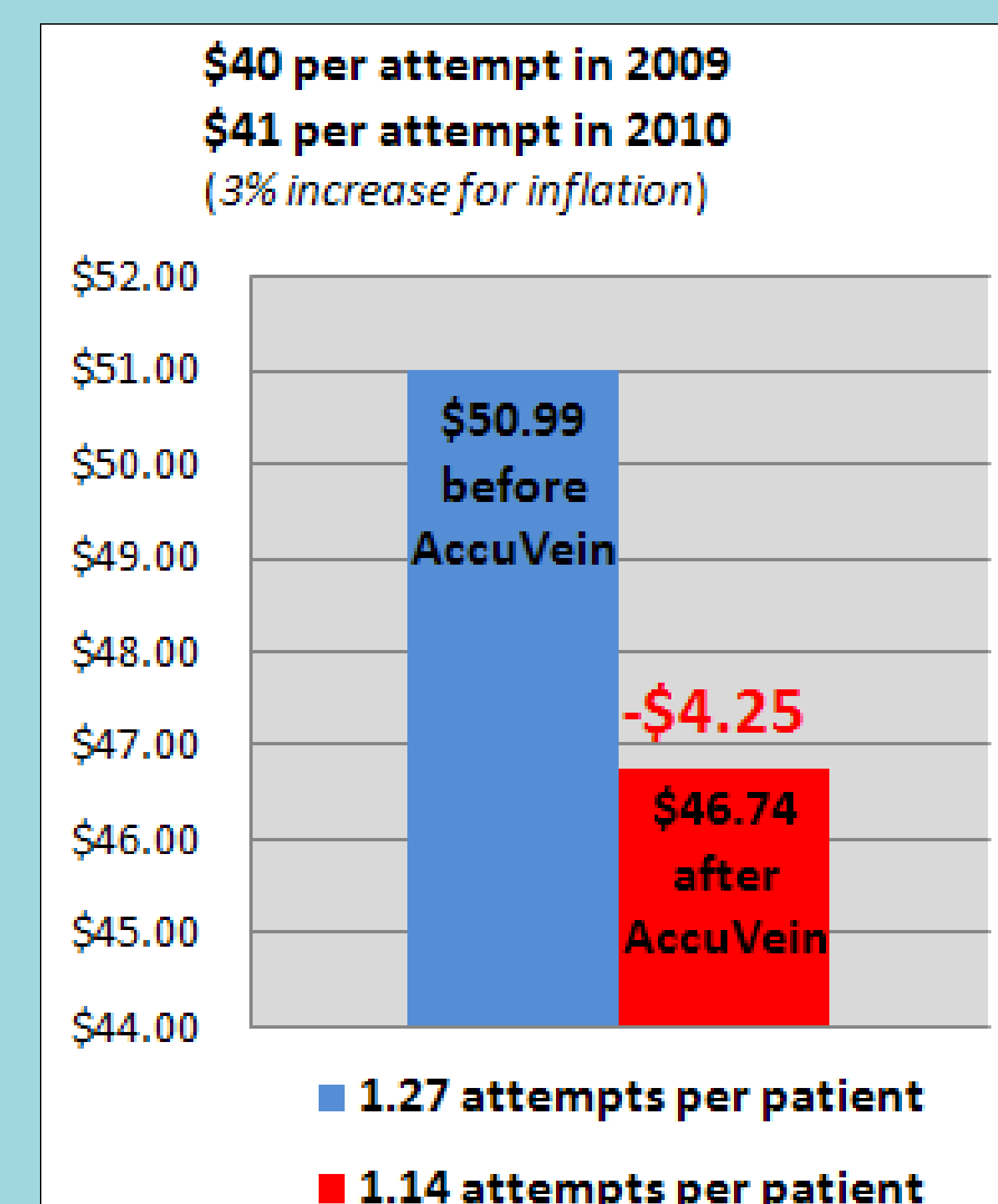
1st Attempt Success Rate



3 or > Attempts



Expense per Patient



Annual volume of 4,500 patients:

- ✓ ~\$1,600 savings per month
- ✓ >\$19,000 annual savings
- ✓ \$4,250 savings per 1,000 patients

AccuVein AV300

AccuVein is the first portable, light-weight, non-contact infrared vein illumination device to highlight the position of veins on the skin in real-time by detecting hemoglobin up to 8mm below the surface of the skin.



Why AccuVein?



- Easy to learn, point-and-click technology
- Hand-held device with hands-free ability
- Reasonably priced (under \$5,000)
- Rechargeable battery-operated
- Weighs only 10 ounces
- No patient contact
- Real-time image
- Works with all skin tones / conditions
- No image processing, calibration or focusing required

Results

Primary Outcome Variables:

- 1st attempt success rate increased by 5% (85% to 90%)
- Number of attempts/patient reduced from 1.27 to 1.14

Secondary Outcome Variables:

- 3 or > attempts decreased by 4% (6.3% to 2.3%)
- Reduced costs of labor & supplies by \$4.25 per patient (>\$19,000 annual savings)
- Anecdotal reports of increased satisfaction

Limitations

- Lack of randomization
- Convenient sample from one institution
- Self-reported results (# of attempts)
- Patient specific variables not included
- Nurse related variables not included
- IV catheter/ site variables not included
- Newly hired RN during experimental data collection

Implications

AccuVein AV300 Vein illumination device:

- Improves 1st attempt success
- Decreases number of attempts for IV insertions
- Preserves veins
- Increases efficiency & proficiency
- Ensures proper & efficient use of resources
- Decreases unnecessary & costly procedures
- Decreases costs (supplies & labor)
- Enhances the IV experience
- Improves patient, family & nurse satisfaction
- Promotes building of trust, cooperation & confidence
- Supports high-quality patient care & outcomes
- Complies with practice standards- Infusion Nurses Society 33(H): "The nurse should consider using visualization technologies that aid in vein identification and selection."