

# Intraosseous Vascular Access Skills Retention Study

Candice Thompson<sup>2</sup>, BESS, LP; David Wampler<sup>1</sup>, PhD, LP; Diana Montez<sup>3</sup>, RN,BSN; Scott Bolleter<sup>2</sup>, BS, EMT-P  
The University of Texas Health Science Center at San Antonio<sup>1</sup>, Bulverde-Spring Branch Emergency Medical Service<sup>2</sup>, Vidacare Corporation<sup>3</sup>

## Introduction

Competency maintenance is challenging in the health care environment. Ensuring medical professional procedural proficiency at both the cognitive and psychomotor level can be a daunting task for institutions and services as well as the individual health care professional. The perceived predictability of procedural competence is confounded by frequency of use, institutional support and the allocation of time for all parties involved. Compounding the issue is the unpredictable frequency of applicable patient encounters.

Literature currently addressing competency maintenance includes psychomotor proficiency practice and specifically associated medical knowledge. Several studies have revealed that an individual's procedural competency rapidly decays over time. Supportive evidence of this decay can be found globally in areas such as cardio-cerebral resuscitation.

Traditionally, medical institutions and services procedural evaluate personnel on an annual or semi-annual basis; however, literature review offers minimal insight as to a quantitative assessment of the degradation for both cognitive and psychomotor knowledge in the trained professionals.

The purpose of this study was to investigate the degree of cognitive and psychomotor knowledge retention over a specified time period. An effort was also made to assess any procedural retention differences between experienced medical professionals versus those considered new to the profession. This study was constructed as a prospective, quality assurance centered, assessment of rural emergency medical service providers during a standard protocol update and in-service.

## Materials and Methods

Application and study design were submitted to the University's Institutional Review Board (IRB) for approval. An IRB waiver was granted. Intraosseous Vascular Access (IVA) was selected as the specific procedural competency to be evaluated. An initial written and proficiency assessment was conducted at the commencement of a scheduled procedural in-service and update. Participants were blinded to the exercise and only informed that additional IVA sites were being added to the procedural protocol. Participants were further advised that no prior review would be needed for the activity. Three specific dates were scheduled to engage everyone in the selected service. The medical professionals in this study were previously trained and perceived as competent to practice proximal tibial IVA. A written pre-training questionnaire including certification level or license, years of experience, prior IVA training to date, previous IVA clinical usage, and a Likert scale self-assessment of IVA confidence.

The in-service included review of general knowledge for IVA placement and usage, current IVA site application (proximal tibia) and the addition of two additional sites (proximal humerus and distal tibia). At the completion of the in-service a post-assessment was conducted with each participant.

After six months the previously engaged medical professional were re-assessed with the same post-assessment tools and examiners utilized at the conclusion of their preceding IVA in-service. Participants had no prior knowledge of the re-assessment. IVA procedural competence was assessed using the EZ-IO system (Vidacare®) and specifically designed IVA manikins (Sawbones®). Subjective assessment was done by content experts who have both clinical and educational experience.



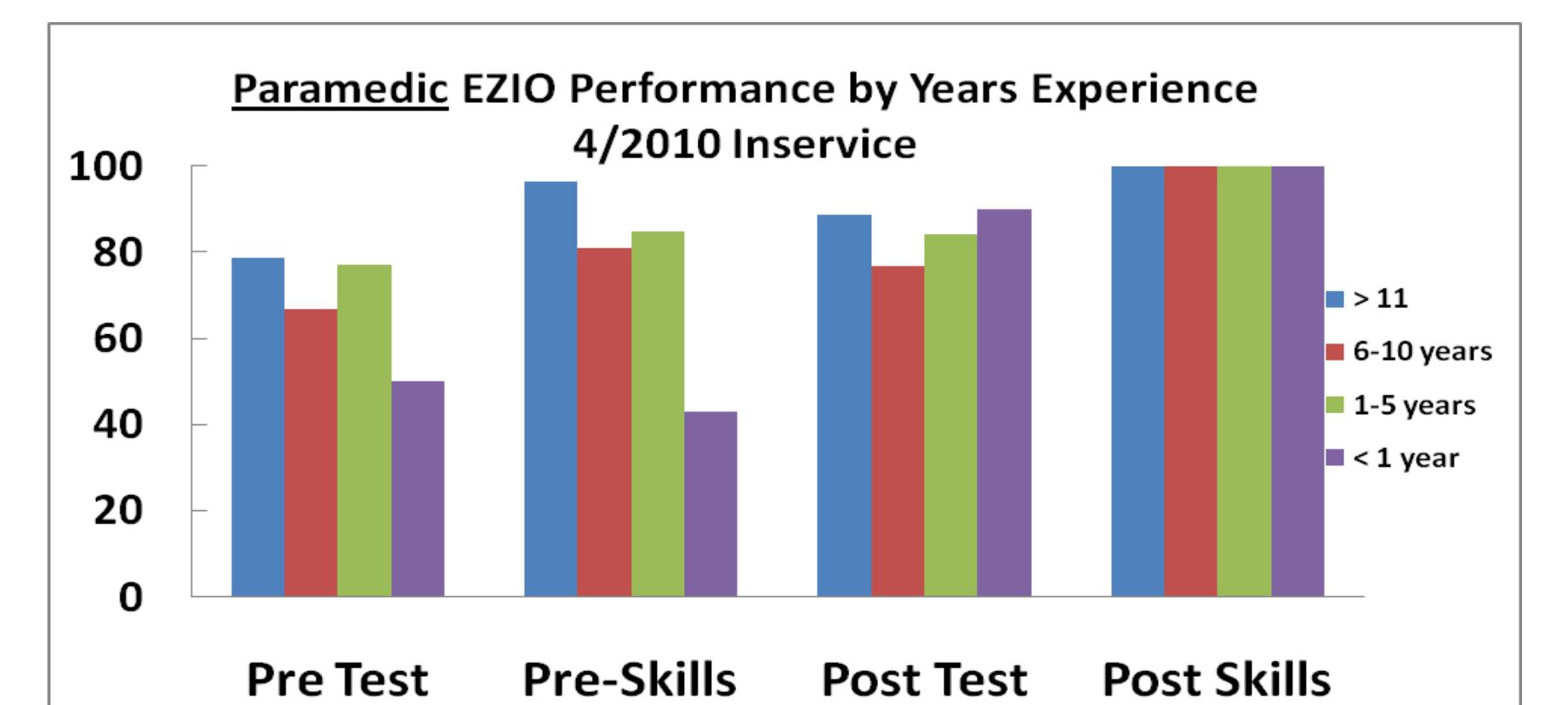
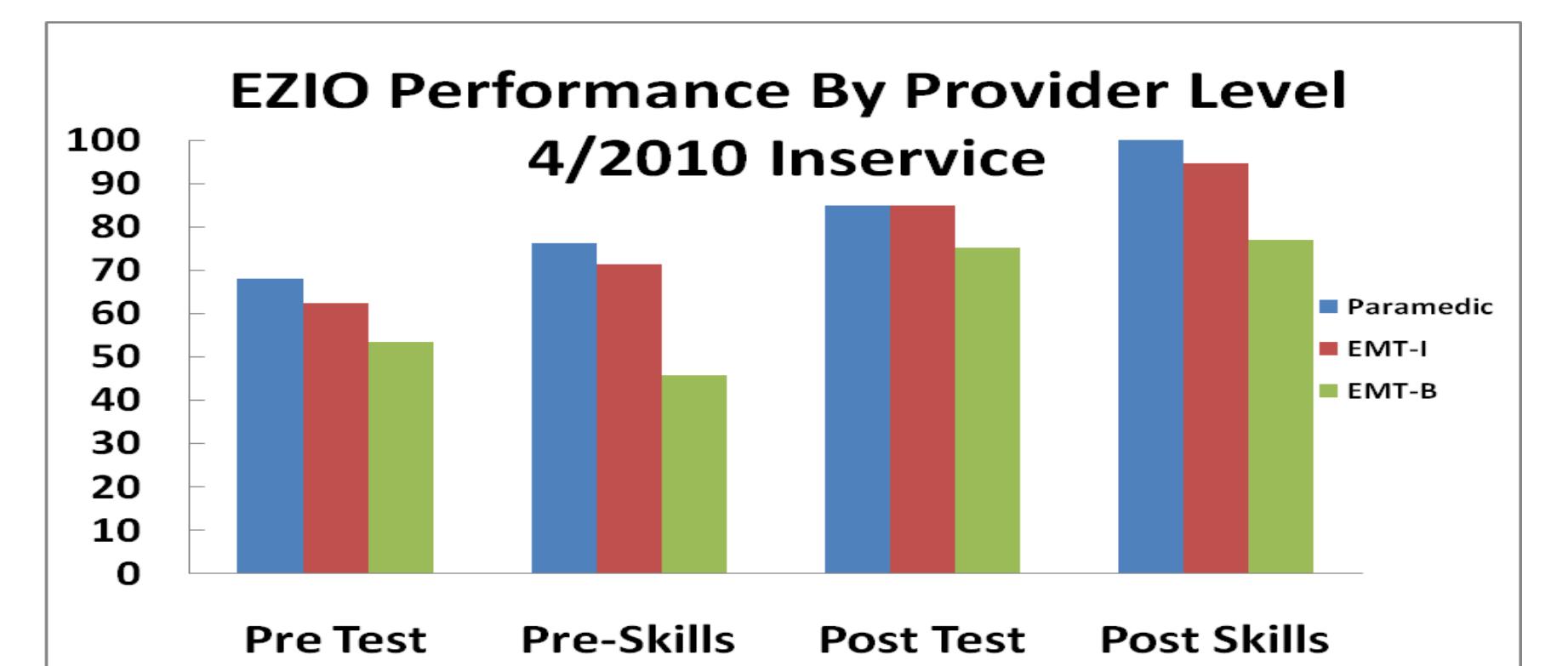
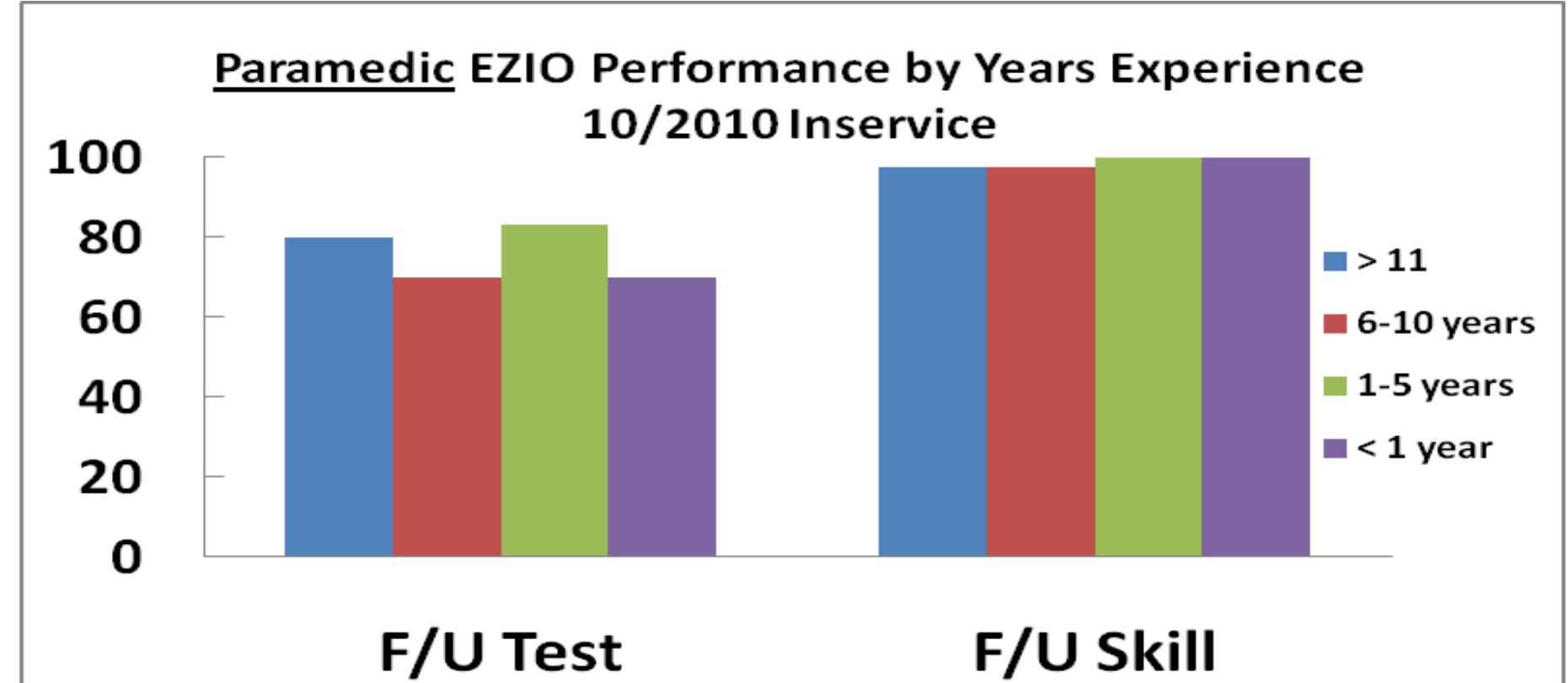
## Results

Forty-one (41) pre-hospital medical professionals participated in the primary evaluation process (19 Paramedics, 4 EMT-Intermediates, 17 EMT-Basics). The Paramedics and EMT-Intermediates acknowledged prior training with the EZ-IO. Minimum competency was determined as 80% accuracy on both the written and procedural evaluation.

Of those evaluated, fifteen (15) demonstrated scores below 80% on the cognitive assessment with thirteen (13) individuals identified as below 80% on the psychomotor assessment.

Within the Paramedic subgroup, 63% demonstrated scores below 80% on the cognitive and psychomotor assessment. With consideration for experience, further evaluation of the paramedic subgroup identified sub-par cognitive knowledge (79%) while demonstrating superior psychomotor skill (97%). In the post-evaluation process, the Paramedic and EMT-Intermediate subgroups demonstrated scores at or above 80% on the cognitive assessment and 100% on the psychomotor assessment.

Experience appeared to offer no significant difference with the follow-up assessment. In the follow-up process, the EMT-Basic subgroup demonstrated score improvement during each assessment phase.



Following a six month time period, Twenty-three (23) of the initial professionals participating in the protocol update were re-assessed (13 Paramedics, 3 EMT-Intermediates, and 7 EMT-Basics). Eleven of the professionals demonstrated 80% scores or higher on the cognitive assessment, and twenty-two on the psychomotor assessment. Within the Paramedic subgroup, 61.5% demonstrated 80% scores or higher on the cognitive assessment and 100% scores on the psychomotor assessment.

## Conclusion

Though medical professionals in this evaluation were able to demonstrate acceptable competency post training, retention of IVA knowledge showed degradation over a six-month period. Certification and license level appear to play a role in retention, however this influence is more apparent with psychomotor skills rather than cognitive knowledge. Additional study may be needed to identify the optimum training and education intervals for procedural competence.

## References

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