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A Two-Phase Study of Fluid Administration Measurement During Intraosseous Infusion

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Study Objectives: Intraosseous (IO) vascular access involves needle insertion into the intramedullary space for fluids/drug administration. Two actions are necessary for optimal IO infusion flow rates: high pressure syringe flushing of the IO space and using an IV pressure bag or infusion pump for maintaining fluid administration. Two studies were designed and sponsored by Vidacare Corporation to determine the infusion flow rates delivered through the tibia and humerus.

Methods: The studies were approved by IntegReview Institutional Review Board and adult volunteers were consented. The first phase focused on the proximal tibia site, followed by the second phase which focused on the proximal humerus site. Data were tabulated and analyzed using PASW statistics (Version 17.0, SPSS, Inc. Chicago, IL).

Results: Ten volunteers were selected for each study. Five participants from the first (tibial) study also participated in the second (humeral) study. One participant who started the second study withdrew and was replaced. Of the sixteen total participants, 9 were female and 7 were male, and the mean age was 34.3 \pm 7.7 (range: 23-48) years. All IO insertions were successful on the first attempt. The highest mean infusion flow rate was achieved at a maximum pressure of 300mmHg for both studies. In the left tibia, the mean flow rate at that pressure was 828 \pm 231ml/hour (range: 360-1,152ml/hour). For the right tibia, the mean flow rate at that pressure was 1,048 \pm 831ml/hour (range: 336-3,300ml/hour). The highest flow rate was achieved in the proximal humerus with a mean of 5,093 \pm 2,632ml/hour (range: 828-9,000ml/hour). See Figure.

Conclusions: At all infusion pressure levels, the humerus provided substantially greater flow rates than the tibia. For most situations, adequate IO infusion rates can be achieved using the tibial site, but the proximal humerus site should be strongly considered when greater infusion flow rates are required.

