



Economic Advantages of EZ-IO[®] Compared to a Central Line in the ED

Achievement of rapid and stable venous access is a critical step in the management of unstable patients in the Emergency Department (ED) setting. Drugs must be given to facilitate airway management, support blood pressure, raise blood sugars, alter cardiac rhythms, reverse toxins, etc. Fluids and blood products also frequently need to be given rapidly to treat shock.

Large bore peripheral IVs have long been the first option for obtaining venous access in critically ill or injured patients. However, in a significant percentage of patients, successfully placing peripheral IVs can be time consuming or impossible, causing delays in patient care. Emergency physicians and trauma surgeons routinely place central venous catheters (central lines) in these patients to ensure stable vascular access which provides rapid delivery of drugs to the central circulation. The Centers for Disease Control and Prevention (CDC) estimate that more than five million central lines are placed in the US each year.¹ Many of these are placed as part of the resuscitation efforts of unstable ED patients.

Unfortunately, central lines have a significant complication rate, and that rate increases when the lines are placed in a situation where sterile conditions are suboptimal, ultrasound guidance for placement is rarely used, and the femoral site is most commonly chosen for placement. Femoral lines are more commonly placed in this setting for a number of valid reasons: they are technically easier to place, there is no risk of pneumothorax, and the site is out of the way of airway management efforts or chest compressions that may be underway. However, several large studies have shown that femoral lines placed in the ICU setting have blood stream infection rates of about 10 percent.²⁻⁴ Clearly that rate is higher for lines placed in the ED, where the conditions of placement are less controlled. When a patient gets a blood stream infection from a central line, that patient's mortality rate increases by 10 percent to 35 percent, and the cost of care increases by approximately \$40,000 per patient.^{1,5} Both the Institute for Medicine and the JCAHO have encouraged hospitals to make efforts to reduce catheter related infections, and many hospitals have responded by implementing policies that limit the settings and types of physicians who can place central lines and actively discourage the use of central lines when possible. Additionally, many hospitals have a policy that all central lines placed in the ED must be replaced when the patient arrives in the ICU, exposing the patient to a second procedure. Ultrasound guidance for central line placement is also strongly encouraged, having been shown to significantly reduce complication rates for pneumothorax and hematoma. However, most ED physicians lack immediate access to an ultrasound machine or the training to use ultrasound for line placement. Also, it is unclear that use of ultrasound would significantly reduce the infection rate for femoral line placement in the ED.

International organizations issuing guidelines for resuscitation (American Heart Association, European Resuscitation Committee, International Liaison Committee on Resuscitation) have recognized the high complication rates and time delays associated with central line placement. All of these organizations now discourage placement of central lines during patient resuscitations.

The Advanced Trauma Life Support course has also encouraged large bore peripheral IV placement over central line placement. Until recently, however, physicians had no option other than placement of a central line in unstable patients with difficult peripheral vascular access.



The EZ-IO® by Vidacare now provides physicians with the ability to achieve stable, secure vascular access through the intraosseous route in both adult and pediatric patients. Studies have shown that drugs given through the intraosseous route reach peak serum concentrations in times that are essentially equivalent to central lines, even in patients in cardiac arrest. The complication rates associated with the placement of an EZ-IO catheter are less than 0.5 percent, and there have been no significant complications (including no reported cases of osteomyelitis) with over 10,000 insertions. Any drug, fluid, or blood product that can be given through a peripheral line can safely and effectively be given through an EZ-IO. The catheter can be placed in the proximal or distal tibia, or proximal humerus in both adult and pediatric patients, providing a variety of insertion sites above and below the diaphragm. Use of the EZ-IO as the initial choice for vascular access in unstable patients with difficult or delayed peripheral vascular access would allow for patient stabilization and delivery of all drugs and/or fluids requiring immediate delivery. Once the patient is stabilized, then time can be taken to properly use sterile precautions and ultrasound guidance to place a subclavian line rather than a femoral line. In some patients, the need for a central line may be avoided altogether.

Placement of subclavian lines under sterile conditions with ultrasound guidance would reduce the blood stream infection rate from 15 percent to less than one percent,³ and would almost completely eliminate the other complications associated with subclavian line placement. Not only would complication related patient mortality rates be significantly reduced, but the cost of care of these patients would also be reduced by \$40,000 for each patient in whom a central line related blood stream infection is avoided. At a cost of \$99 per usage, the cost/benefit analysis for using the EZ-IO as the initial vascular access choice rather than central line placement is clear from both an economic and patient safety perspective.

References

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