

if venous access cannot be readily achieved in a pediatric resuscitation ([Kleinman, Chameides, Schexnayder, et al, 2010](#); [Tobias and Ross, 2010](#)). **Intraosseous infusion** provides a rapid, safe, and lifesaving alternate route for administration of fluids and medications until intravascular access is possible.

A large-bore needle, such as a bone marrow aspiration needle (e.g., Jamshidi) or an intraosseous needle (e.g., Cook), is inserted into the medullary cavity of a long bone, most often the proximal tibia. This procedure is usually reserved for children who are unconscious or for those who are receiving analgesia because the procedure is painful. Local anesthesia should be used for semiconscious patients. A battery-powered (EZ-IO) intraosseous needle driver is also available for use in prehospital and hospital settings and has a high rate of success in pediatric resuscitation and stabilization ([Greene, Bhanaker, and Ramaiah, 2012](#)).

Once the bone marrow needle is in place, the needle should stand alone and feel secure. Tape and gauze are used to secure the needle to the leg. Gauze should be built up around the needle to provide support and prevent trauma or dislodgment. Drugs may be pushed and fluids delivered via an infusion pump. Observe the dependent tissue closely for swelling because extravasation may be hidden under the leg, and compartment syndrome may result. Other complications, although rare, include fractures, skin necrosis, osteomyelitis, and cellulitis ([Tobias and Ross, 2010](#)). The intraosseous line may be discontinued after IV access has been achieved.

Maintaining Fluid Balance

Measurement of Intake and Output

Accurate measurements of fluid intake and output (I&O) are essential to the assessment of fluid balance. Measurements from all sources—including gastrointestinal and parenteral I&O from urine, stools, vomitus, fistulas, NG suction, sweat, and drainage from wounds—must be taken and considered. Although the practitioner usually indicates when I&O measurements are to be recorded, it is a nursing responsibility to keep an accurate I&O record on certain children, including those: