

## Bolus until Better

by Jeff Hurley, MD



**N**ormal saline.

No other therapy has proven itself more important than normal saline. From the treatment of blood loss

in trauma to the relative hypovolemia and fluid sequestration in sepsis, the administration of intravenous fluids is the cornerstone of a multitude of problems in the emergency department needing acute intervention. The ideas behind the administration of fluids vary with different disease states. However, many of these ideas regarding resuscitation can be extrapolated to the problems facing health care in the inner city.

Over the last year and a half, I have had many interesting cases. One of the most memorable was that of an 18 year old with a 1.5 cm stab wound to the right chest at the midclavicular line. Without the rapid infusion of saline, auto-transfusion of blood from the chest tube, and uncrossed blood, this patient would have surely died. Only after we were able to moderately stabilize the patient's vitals were we able to perform a thoracotomy in the operating room and subsequently discover and repair the hole in his right atrium.

In medical school we are taught complex treatment algorithms. But when it comes to the treatment of acute illness the best advice is to simply "treat the patient." The fluid management of such entities as hyperosmolar hyperglycemic syndrome, diabetic ketoacidosis, and hypo and hyponatremia is based on a controlled and predictable calculation. Eventually, we recognize that not all patients fall into this simplistic treatment plan, and the ultimate course of action in fluid replacement, prior to the controlled treatment, is to "bolus until better."

Researchers have been obsessed with resuscitation and have investigated virtually every aspect of it. Everything from monitoring of the central venous pressure to checking the base deficit and

to assessing the ABG/VBG for acidosis has been researched in an attempt to better diagnose the intravascular compartment and guide fluid management. While all of these monitoring modalities have a place in the management of patients, I have yet to find a better test for the adequacy of the intravascular compartment than the fluid challenge. And only when sufficient fluids have been given and appropriate urine output has been established has the objective been obtained.

Congestive heart failure patients obviously fall on the other end of the fluid spectrum, but they too are a group of patients who benefit from bolus drug administration. The exact problem in this patient population is too much fluid, and the treatment is diuresis. But when a patient arrives in the emergency department with an acute exacerbation of congestive heart failure, the symptoms of shortness of breath and the fluid accumulating in the alveoli is more a function of Starling's equation, and the use of nitroglycerin or nesiritide in bolus form to decrease preload and wedge pressure is what the patient acutely needs. Diuresis with lasix will help the patient, but the effective endpoint of adequate diuresis has only been reached when the patient is no longer on the nitroglycerin drip. The route of administration of nitroglycerin is therefore dependent on the severity of the patient's illness. Some patients with mild CHF can be treated with a simple nitroglycerine patch, whereas others have needed multiple doses of sublingual nitroglycerine and then high infusion drips until the drug has reached its therapeutic maximum. Simply put, these patients are bolused until better.

Parallels can be made from the treatment of an acutely ill patient to that of the county system in Los Angeles. At Martin Luther King Jr. Hospital, the lack of available resources has resulted in the emergency department becoming the first and last line of treatment for a community in desperate need of better health care. As a second year resident

managing the critical care area of the emergency department, I can say that I have never sent a patient in DKA to the ICU. Instead, I have closed the gap on every single one, and in some cases discharged the patient home after a few days in the emergency room. The inefficiency of such a system is beyond comprehension, and it limits the impact that the hospital can have on the community.

One of biggest problems is the lack of nursing staff. This deficiency has led to inefficiencies with virtually every aspect of care from the wait time to be seen to the time of disposition. In addition, a smaller census in the hospital increases the per capita cost of care since there is a mismatch between patient needs and hospital resources. Administrators have looked at some of these numbers and stated that some services should be cut because of these inefficiencies. This would be akin to giving nitroglycerin to a septic patient—completely backwards. Quite the contrary, increasing the resources available to the hospital will optimize care and reduce inefficiencies.

As we head into a new year, it is time for an infusion of solutions—a fluid challenge so to speak. I recently read an article in one of the weekly journals that stated the breaking point for emergency room solvency was estimated at an uninsured rate of about 25%. That being said, damage to one of the last lines of health care in the county could have far reaching implications for all the surrounding hospitals. The impact may be felt throughout the system and it is time for the Board of Supervisors, hospital administrators, and the private sector to determine the role of the county health care system in Los Angeles. And only after the importance of such a system is realized will it become apparent that the saying, "bolus until better" still holds true.

*Jeff Hurley is a second-year emergency medicine resident at Martin Luther King Jr. Hospital in Los Angeles County.*