
Continuous Infusion of β -Lactam Antibiotics Brings Major Therapeutic Benefits to West Virginia-Based Medical Center

Background: Intermittent dosing has long been the most common method to infuse β -lactam cephalosporin and penicillin antibiotics. Intravenous doses are typically given over about 30 minutes, one-to-four times daily, depending on the drug. Continuous infusion therapy, the administration of these antibiotics over an extended period of time, is a recent innovation which reduces drug costs while improving patient outcomes.

The Greenbrier Experience

Greenbrier Valley Medical Center, located in Ronceverte, West Virginia, is a 122-bed community hospital serving the emergency, surgical, and acute care medical needs of the southeastern region of West Virginia. The Medical Center averages 15 surgeries daily in the areas of general, orthopedic, obstetrics and gynecology, and ear, nose and throat.

The hospital is the epitome of a successful small-town health center and, like its big-city colleagues, it faces a constant struggle to balance costs while maintaining or upgrading quality patient services. In 1995, Greenbrier focused these efforts on improving the costs and outcomes of the intravenous antibiotic program. A review of the medical literature at the time showed that some clinicians were experiencing significant cost reductions and improved clinical results by moving intermittent β -lactam regimens to single drug bolus doses followed by continuous infusions.

Initially, Greenbrier decided to try continuous infusion with cefuroxime for community-acquired pneumonia infections. After developing dosing protocols, the search began for an appropriate infusion pump. A selection committee reviewed the available options. Expensive micro pumps, with their high-cost dedicated disposables, were not selected due to cost. Similarly, full-size infusion pumps had relatively expensive, dedicated disposables and were considered to be too restrictive for patient ambulation. The result of the infusion pump selection process was to purchase 72 Baxa Custom Dual Rate Infusers (DRI).

The DRI unit was far less expensive and complicated than competitive pumps, and allows for the use of low-cost generic syringes and microbore tube sets. The initial custom DRIs were specialized versions of the catalog DRI syringe infuser, with two fixed infusion rates. Rate one was used for bolus infusion over about 20 to 40 minutes. Rate two infused specific syringe sizes and volumes continuously, over 24 hours. In 1999, Greenbrier upgraded their infusers to the new MicroFuse™ Extended Rate Infuser (ERI) model.

Advanced Technology Saves Time and Money

Controlling the increasing costs of pharmaceuticals and related supplies is a challenge facing not only smaller, rural acute care hospitals like Greenbrier, but also larger hospitals throughout the nation. Tight budgets and labor markets require hospitals to provide more services with less labor. Continuous infusion and the MicroFuse Products provided opportunities to reduce drug and supply costs as well. Consequently, Greenbrier was able to cut labor costs by reducing the number of daily doses. The Baxa technology also offered Greenbrier an inexpensive and user-friendly alternative for enhanced drug administration.

"The MicroFuse Extended Rate Infuser saves large sums of money on antibiotics and related supplies," states Michael Barnes, Director of Pharmacy for Greenbrier Medical Center. "With the continuous infuser, we use one 25-cent syringe instead of multiple, 90-cent IV bags. This is just a small example of the cost savings which resulted in a major return on investment for us. It pays for the unit in a very short period of time."

Continuous infusion reduces the number of doses required each day. In turn, this decreases the chance for human error by nurses, technicians, hospital pharmacists, and even physicians. When using the MicroFuse Extended Rate Infusers, only one antibiotic syringe is administered each 24-hour period. The multiple daily interventions required in intermittent dosing to monitor and replace IV bags are eliminated. Nurses make one stop at the bedside to load a syringe, returning only if patients require other assistance. With the constant demands during a nursing shift, this results in significant workflow efficiency.

"MicroFuse Extended Rate Infusers and the continuous infusion concept allow us to prepare medication syringes in advance, saving valuable nurse time and eliminating frequent references to patients' charts," lauds Barnes. "Furthermore, the infuser has helped our nurses and pharmacy staff to reduce drug waste. Our nurses have more time for direct patient care and essential administrative tasks."

While the cost savings and lower doses per day are predictable, Greenbrier has enjoyed a surprise benefit. Through continuous infusion therapy, Greenbrier and its patients have enjoyed a decreased patient length of stay, with lower drug doses. Continuous infusion eliminates the blood level peaks and valleys seen with intermittent dosing. Drug blood levels are maintained consistently above the minimum inhibitory concentration (MIC) required to kill the infection, with lower daily doses. In fact, Greenbrier has documented a length-of-stay reduction, averaging a half-day, for its continuous infusion therapy patients.

The compact size and ease of portability of the unit has been a value-added benefit to patients. As long as the physician agrees, and the medical condition does not warrant against it, the MicroFuse Infuser can be detached from the IV pole mount or hanger and placed in a specially designed "waist pack," which can be worn by the patient. This new mobility frees patients to satisfy their own bathroom needs, move easily throughout the hospital for ancillary

tests, or attend physical therapy sessions without the unwieldy pole apparatus that often tethers them to their beds or hospital rooms. "Our patients can maintain their dignity and sustain a positive attitude while in our facility," continues Barnes.

Especially with the newest MicroFuse Infuser models, Greenbrier has enjoyed extensive benefits due to the product's durability. Previously, Greenbrier suffered extensive malfunctions and equipment breakdowns because of incidental damage due to patient product mishandling. With input from Greenbrier and other clientele, Baxa developed a more durable unit, limiting the number and severity of repairs, and extending the service life of the infuser. The complete upgrade to the new model – the MicroFuse Extended Rate Infuser – was completed in early 1999.

"The days of incessant repairs due to patient accidents have been virtually eliminated," confirms Barnes. "The original model was fabulous, but it did not withstand the rigors of a fall to the floor. We often had large numbers of units out of service for repairs. This new model is virtually indestructible."

Excellent Customer Support

"Baxa Corporation is a prominent technology ally for this segment of our pharmacy operation," continues Barnes. "Baxa has demonstrated its ability to be attentive to industry issues and responsive to Greenbrier's needs. They provide user-friendly technology combined with a technical and repair support program which is unparalleled in the medical equipment industry. As one of its flagship sites for the launch of the original infuser model, we are glad to partner with Baxa for our continuous infusion needs."

About Baxa Corporation and the MicroFuse Infuser

Baxa Corporation's mission is to develop innovative, high-quality products for hospital pharmacies. In more than two decades of rapid growth and change in the healthcare industry, the company has become an industry leader, demonstrating dedicated customer service and a solid reputation for designing niche products for the pharmacy. Today, Baxa products embrace almost all aspects of compounding and dispensing fluid medications, including oral unit-dosing, IV admixture, syringe infusion, and TPN compounding. Baxa Corporation, headquartered in Englewood, Colorado, has subsidiary and sales offices in the United Kingdom, Canada, Denmark, and Japan.

The MicroFuse[®] Infuser was designed for intermittent, fixed-rate drug delivery. It provides a simple, low-cost alternative to proprietary minibag delivery systems and expensive infusion pumps. Specialized Baxa infusers offer delivery for niche drugs and 24-hour infusion therapies.

/ericase.doc

This article was written by CPR Communications, in cooperation with the pharmacy staff of Greenbrier Valley Medical Center.