

A Natural Fit: Home Healthcare and Biomedical Engineering

Nestor Damasco, Chris Abe

Home care equipment and biomedical engineering are often thought of as two distinct entities. This is not the case at Rady Children's Hospital in San Diego, CA. At Rady, these two departments mesh under a single umbrella—an umbrella that covers the standards, requirements, wants, and needs of at-home patients as well as in-hospital patients.

Rady Children's Homecare department first opened its doors in 1991 with a mission to restore, sustain, and enhance the health and development potential of children. Homecare provides daily care to over 100 patients in San Diego, Imperial, and Riverside counties. Those services include enteral pumps, supplies, formula, infusion pumps, phototherapy, chemotherapy, growth hormone, pain management, antihemophilia factor, asthma program, and nursing visits.

In the past, the equipment piece of Homecare was handled within the delivery department. The delivery department did the cleaning, tracking, and in-between patient checks on equipment. All of the repairs and maintenance was done by an outside agency. This organizational structure worked for a few years. However, as Homecare began to grow, the amount of equipment also doubled. It became evident over time that the current structure was creating numerous problems as well gener-

ating an enormous expense. The tracking of equipment became difficult as no true database or tracking system was in place. This led to an increase of lost equipment and expense for replacements. Moreover, the turnaround time for maintenance and repairs started to increase to a minimum of two weeks, which drove up rental costs. Suddenly, using an outside agency to handle equipment was no longer cost-effective. It became prudent to explore other avenues to address the needs of home care patients and their equipment.


In 2004, Homecare approached the biomedical repair department (Biomed) about the idea of Biomed's taking over management of home care equipment in an effort to control or eliminate some of the expenses. Biomed accepted this challenge, and brought its expertise into play to improve management of home care equipment. We developed home care equipment policies, and eventually took over management of home care equipment. This article examines the success of this approach.

Home Care Service Challenges


The business of managing durable medical equipment (DME) and servicing home care equipment can be a daunting task. There are inherent pitfalls and challenges created by dealing with families and their homes. For example, for us as a children's hospital, issues arise out of parents' reluctance to have equipment serviced, the cleanliness of equipment, and the unpredictability associated with care in the home.

Issues such as these bring into question the overall standards for how equipment is handled and maintained. In a typical hospital environment there are certain rules and regulations that govern the handling and maintenance of equipment. In the home environment these rules become a little different, if not murky. Frequently the rules and regulations don't apply, are different or are minimally used. As a result, the standard of care for the equipment can be so different that it can create conflicts when patients try to transition their equipment from their home to a hospital setting.

ABOUT THE AUTHORS



Nestor Damasco, JD, is the equipment coordinator for Biomedical Repair and Homecare at Rady Children's Hospital, San Diego, CA. He is responsible for running reports, scheduling preventive maintenance, and equipment management for both departments. *Email: ndamasco@rchsd.org*



Chris Abe, RN, is the senior director of safety and support services at Rady Children's Hospital. She is responsible for 10 operational departments including the biomedical department. *Email: cabe@rchsd.org*

Many hospitals operate at a high standard of care with patient safety as the main focus. As a result, equipment maintenance is viewed with a strident standard following all specific and recommended manufacturer guidelines for testing and maintenance. On the other hand, DME companies' standards are not as high due to the nature of their business. DME companies operate based on payments for services rendered and their reimbursement comes from insurance companies or from patients. Therefore, the amount of services performed for equipment maintenance may not involve the most in-depth testing and scrutiny. The testing may involve the minimum requirements set forth by the manufacturer, what is covered by most insurance companies, and what some patients can afford to pay.

Frequently, additional recommendations of the manufacturer may not be followed. For example, battery changes may not occur every two years, which are routinely done in the hospitals. These recommended test or changes involve out-of-pocket expenses most of these families can't afford. Furthermore, another problem is that in some cases the ownership of the equipment transfers to the patient after ten months. Once that occurs, all maintenance and repair costs fall on them. This added responsibility is often overlooked or neglected. Therefore, parents may go years without getting their equipment serviced because it seems to be working properly, but in reality it may not be functioning at an optimal level.

Equipment Policies Aim for Safety

The different standards by DME companies and hospitals can create a deep divide between the ways equipment is maintained, but today at Rady Children's Hospital that disparity does not exist. We have taken a strong two-prong approach to create an environment that provides the most secure and safe atmosphere for patients.

The first step was to create a specific policy aimed at home care and patient-owned equipment. The policy states that no outside equipment is allowed in the hospital unless it has the most up-to-date preventive maintenance and supporting documentation. Any equipment brought into a hospital must also be run through an electrical safety inspection.

The policy was enacted because patient-owned equipment was entering the hospital past its due date for preventive maintenance. Our objective was to ensure that these patients were getting the best quality of care at the hospital and at home. We wanted to make sure that

the parents understood the importance of having their equipment serviced, and we did all we could to make it possible. We tried to facilitate the process to help families who either did not understand or could not communicate their needs to DME companies. Sometimes this would involve asking the DME company to switch out the equipment for one that was updated on service and maintenance, or having the DME company service the piece before it could be used.

The second step was to police the DME companies by asking for documentation of preventive maintenance on all equipment. We are aware that hospital standards and DME standards are different and, at times, our standards are more stringent. However, as long as DME companies are following their own guidelines then, at minimum, they need to meet their standards.

A few months ago, one particular incident occurred involving a patient-owned ventilator that demonstrates the success of our policy. Biomed received a call about a patient-owned ventilator and our approval was necessary for its use. Biomed went to the room to check the preventive maintenance sticker and retrieve any documentation regarding preventive maintenance. It was found that the ventilator had an outdated sticker and no documentation could be produced to show that the ventilator was recently serviced. As a result, we informed the parents, nursing staff, and respiratory therapist that the ventilator could not be used since it had not been serviced in the last two years.

Next, we called the DME company and informed them of the dilemma and asked them to switch out the ventilator or pick it up and service it as well as provide the supporting documentation. The DME company decided to switch out the ventilator and returned with a new one with an updated preventive maintenance sticker and supporting documentation. However, the ventilator failed its electrical safety check; the power cord was frayed and showed an exposed wire. The DME company was called again and was shocked to hear from us regarding the ventilator, and surprised at how thorough we were in checking every aspect of the equipment. Finally, the DME company came back and brought a ventilator that met all of our requirements.

Biomed Involvement

Beyond creating stronger home care equipment policies, our hospital made a second, more radical change: to have the in-house biomedical repair department handle all of

Homecare's equipment. The move was precipitated by Homecare's dissatisfaction with the cost and poor service of the outside agency handling maintenance and repairs on equipment. Homecare had grown to service over 500 pieces of equipment, which included enteral feeding pumps, syringe pumps, infusion pumps, wallaby's, scales, BP machines and pulse oximeters.

The transition of this engagement to Biomed was smooth and seamless. The diversity and the structure of Rady's Biomed department made it possible for those changes to occur. Unlike some traditional biomed departments, Rady's includes both repair technicians and equipment specialists. Biomed is responsible for repair and maintenance of equipment as well as central equipment distribution. The repair technicians handle most of the maintenance and repair, while the equipment specialists are responsible for the cleaning and distribution of equipment along with the calibration of respiratory equipment. There is overlap between the two, as some equipment specialists have the skill and training to cross over. The trained equipment specialists can do some of the electrical safety checks and some of the less complex preventive maintenance, which gives the repair techs the ability to concentrate on complex repairs and maintenance.

The transition to Biomed involvement began with an assessment of the equipment and the organizational structure. HME/DME computerized equipment management software was installed to help track and document equipment maintenance and repair. Coordination between departments was instituted to help in equipment tracking.

One of the most important and significant changes was the full integration of an equipment specialist stationed at Homecare to handle the cleaning, testing, and tracking of all the equipment. The equipment specialist is supported by a repair tech at the main hospital to handle all the repairs and some of the complex testing. The addition of an equipment specialist at Homecare gave that department someone available to answer general questions on equipment and for troubleshooting. This equipment coordinator was responsible for running preventive maintenance reports and overall database management.

Recall Management Improvements

Notification and followup of recalls related to home care equipment has been significantly improved as a result of this transition. Biomed departments frequently receive

notification of equipment recalls, failures, and software upgrades, and are responsible for determining if they carry that particular equipment and doing any necessary follow-up. Home care equipment is no exception to that policy. At Rady, the biomed/home care equipment coordinator handles all recall notifications and follow-up for this equipment.

However, once a patient owns their equipment and a recall is issued, whose responsibility does it become? For us the answer is simple: we handle the notification and follow-up. If we did not track patient-owned equipment, then these patients would not be notified of any recalls. Patients would be left with equipment that has potential problems, which could affect their care. As a result, we extend our responsibility to these patients.

Our database is set up to track all equipment issued to patients and those converted to purchase after their rental period has expired. We also track equipment purchased directly for our patients.

For example, when a recall notification was issued for an enteral feeding pump that we did not carry, but some of our patients had purchased, our task was to inform the patients of this recall. We contacted every patient affected and facilitated the follow up by requesting new pumps through the company. At first, the company wanted the patients to initiate the process themselves and was going to provide them with the tools necessary to correct the recall. This was unacceptable to us and we insisted the company supply the patients with new pumps. Since these patients could not be without a pump, the only option was for the company to send new pumps which we could exchange for the recalled pumps. The company finally agreed and the patients were informed of the details. The patients were grateful that they were notified of the recall and for Biomed's involvement in the follow-up. They appreciated the extra effort; it gave them piece of mind to know that they were being taken care of.

Service Advantages

The move to have an in-house biomed at Homecare made sense; it was a natural fit. The advantages were seen and felt immediately. The availability of an equipment specialist on-site created coverage that was never available previously. Previously, problems were referred to the outside agency with little or no support. The on-site coverage created a first call response in which questions could be answered and troubleshooting performed immediately.

Moreover, there were opportunities for staff training, inventory control, and technical support for patients. All of this created a rapport with the clinical staff that resulted in early problem identification and reporting. The new database allowed for more efficient device tracking and preventative maintenance scheduling. The accuracy, organization of records, and documentation also improved the use and management of equipment and supply inventory.

Additionally, the procedures for equipment testing and maintenance were made more consistent. Preventive maintenance intervals were set for equipment, and testing was performed monthly to ensure compliance. All of these actions have created a successful completion rate for preventive maintenance at 95%. Since Biomed became a part of home care equipment management, two Joint Commission surveys have occurred and gone well. Both were complimentary of Biomed's involvement with home care equipment.

Homecare can now more easily increase its equipment inventory. As the number of patients increase and the amount of equipment grows, Biomed's involvement eases any equipment management concerns. The database's tracking ability, the accuracy of documentation, and the availability of additional resources at the main hospital provide Homecare with much added support.

Biomed is also better able to support the equipment needs of some complex home care patients who go from the home to the main hospital repeatedly. These situations often involve cardiac and magnesium sulfate (Mg-SO₄) drips. In the hospital, these patients are allowed to use their own pumps because of Biomed's involvement. Biomed has supplied demo pumps for the nursing staff to be adequately trained in the use of the pump prior to patient's arrival. Moreover, if there were any failures with the pump, Biomed is available to troubleshoot or facilitate any exchanges if repairs cannot be made immediately. The communication and interactions between Homecare and Biomed help ease any concerns with these complex patients.

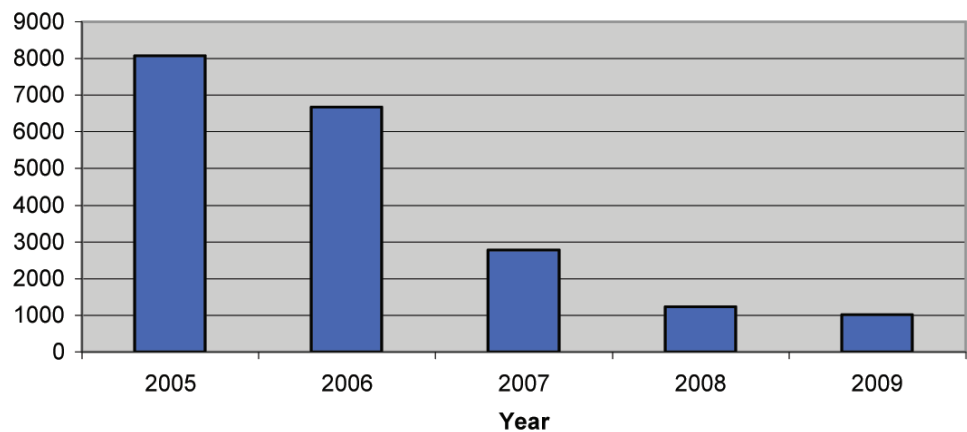


Figure 1. Average Annual Rental Cost

Productivity and Cost Benefits

The teamwork between Biomed and Homecare has resulted in significant productivity and cost benefits. When Homecare approached Biomed about help with home care equipment, the goal was to reduce cost and to provide some financial stability to the department. These results were achieved almost immediately: A savings of \$160,000 was realized in the first year. As the transition continued, many of the incidental costs also diminished. The repair costs decreased because there was no longer a third party involved. Biomed was able to handle all the repairs and maintenance, which drove costs down considerably. Moreover, improved tracking of equipment translated to a sharp decrease in lost equipment. We now have a tightly controlled inventory based in actual usage. Another financial gain was the decrease in use of rental equipment and the elimination of multiple rental companies. Figure 1 shows how rental costs have steadily decreased. The immediate and long-term financial impacts of Biomed's involvement was not expected but was a welcome surprise.

Summary

The involvement of Biomed in management of home care equipment has become a natural fit for Rady Children's Hospital. Managing all aspects of home care equipment through an in-house biomedical engineering department is cost-effective, efficient, provides excellent customer service, and enhances the relationship with the clinical staff and patients. It develops a sense of security for patients and staff that home care equipment is tested and maintained in a stringent manner that promotes safety. ■