In burn rehabilitation, multiple areas need to be addressed by the rehabilitation team to return the patient to independent living as soon as possible. Burn care, including hydrotherapy, debridement, blister and open wound care, massage, scar management, edema control, and fitting of pressure garments, take up much of the available treatment time for both occupational and physical therapy. Additional areas of treatment such as range of motion, positioning, strengthening, splinting, coordination, balance, activities of daily living (ADL), and functional mobility must be addressed in burn rehabilitation. With such a long problem list, any device that can streamline treatment is a welcome addition. The edema bar is a device designed to provide the patient with upper extremity burns with a means to independently elevate the arms and hands to reduce swelling from edema and to increase range of motion. It can also assist in improving balance and ambulation. A review of available products revealed no similar devices on the market.

Fabrication

Fabrication of the edema bar requires knowledge in sawing, welding, drilling, and fitting of screws. Most maintenance departments should be able to assist in its construction. The device consists of a three-sided base, two vertical poles, and an adjustable crossbar. The vertical poles are reinforced by four support bars. Five hard floor swivel casters on the bottom of the base give the device mobility. Supplies and dimensions include the following:

- For the base, two 48 in. x 1 in. square steel pipes for the sides and one 30 in. x 1 in. square steel pipe for the front
- For the vertical bars, four 23 in. x 1 in. square steel pipes as supports and two 80 in. x 1 in. square steel pipes placed in the center of the side base bars
- For the adjustable crossbar, one 30 in. x 1 in. round steel pipe with a 2 in. x 2 in. square steel pipe welded on each end, square steel pipe ends to fit over the two vertical bars, and screw knobs installed on the end of the crossbars to permit height adjustments
- For mobility, four casters placed 6 in. from the ends on the side base bars and one placed in the center of the front base bar
- On the base, four bumpers placed one on each corner

Application

Edema Control

The device allows for sustained elevation of the upper extremities as tolerated by the patient. The crossbar can...
be adjusted to accommodate patients of different heights and further assist with edema control as range of motion increases. The adjustable crossbar also allows the patient to elevate the upper extremities independently or with assistance while sitting, standing, or ambulating. The screw knobs on the crossbar allow the therapist to quickly accommodate the height of the device to the patient's treatment needs.

**Range of Motion and Stretching**

In burn rehabilitation, preventing or correcting contractures via appropriate positioning and stretching is primary and should begin on the first day of admission (Ause, Richard, & Miller, 1994). Stretching or increasing range of motion can help increase the amount of stress that the muscles and tendons can withstand, maintain joint and muscle flexibility, and maintain or improve range of motion (Meyers, 1992). When the patient is sitting, standing, or ambulating, the edema bar allows for prolonged stretching of the upper extremities through grasping the crossbar in an overhead position (see Figure 1). The crossbar permits full available elbow extension while stretching the shoulders (long stretch position) to reduce the contracting effects of scar tissue. Stretching of different muscle groups of the upper extremities and chest can be achieved by varying the hand placements along the vertical poles and crossbar.

**Balance and Ambulation**

Often, burn patients are isolated and confined to their beds for extended periods to prevent infections and encourage wound and graft healing. Inactivity contributes to the wasting of muscles; weakness of muscles, ligaments, tendons, and bones; degeneration of joint cartilage; and contractures (Meyers, 1992). Activity reverses the wasting of muscle tissue (Meyers, 1992). For example, ambulation can help slow the loss of lean body mass and increase cardiopulmonary and respiratory functions (Harden & Luster, 1991). It also gives the patient a sense of accomplishment toward the goal of returning home. The edema bar gives support for ambulation, as a walker would, while simultaneously addressing range of motion, stretches, and edema control. Patients can be cued for posture and balance activities by changing hand placements and amounts of support. The open-back frame allows independent ambulation without hitting heels on a bar. For those patients who require assistance to ambulate or transfer, this feature allows enough room for one to three therapists to get close enough to ensure safety during these activities.

**Conclusion**

The edema bar has been used for 3 years in our rehabilitation unit with patients who have had full-thickness thermal or electrical burns of the upper extremity that range from 40% to 85% of total body surface area. We have found that the device is a useful tool in helping to meet rehabilitation goals. The device has been effective in edema control and in increasing range of motion of the upper extremities, permitting active functional use of the upper extremities to complete ADL and to ambulate independently. We have had no adverse experiences in using the device. It permits the patients to have control over their own body position and duration of use and to monitor their own level of pain. The therapist is able to evaluate, monitor, and upgrade treatment as the patient progresses. Although it is important that all disciplines on the burn team assist, encourage, and motivate the
patient throughout the rehabilitative process, it is up to the patient to carry over into ADL the skills developed with devices such as the edema bar. ▲

Acknowledgments
We thank Cathy Spear, OTR, Paul Olson, and Tim Harbst, MD, for their inspiration and assistance with the article.

References
