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ECRI UPDATE

ECRI Laboratory Notebook Testing Med/Surg and Critical Care Hospital Beds

Picture a traffic jam in a parking garage: Navigating the aisles requires some careful maneuvering when a lot of vehicles are present in a confined space.

A similar experience was observed in ECRI Institute's main testing lab a few months ago, as Ismael Cordero jockeyed electric hospital beds from one spot to another. Cordero, a senior project engineer in ECRI Institute's Health Devices Group, was the project lead for the nonprofit organization's recent testing of hospital beds. The studies focused specifically on models designed for use in med/surg applications and those intended for use in critical care areas. With up to 10 hospital beds occupying the lab at any one time, the job did indeed require some careful maneuvering, as each bed was shuttled from one lab to another for various aspects of the testing.

ECRI Institute published its ratings for med/surg and critical care beds in December and January, respectively.

BED COMPONENTS AND FEATURES

The features available on a bed model will vary depending on the intended application; but, as ECRI Institute's Cordero notes: "Most models are highly configurable. If there's a feature that you want, you may just need to ask the manufacturer for it."

The trend is toward "smart beds" that communicate information to caregivers to improve care or enhance patient safety. For example, some beds offer verbal safety alerts, such as a voice command stating "brake not set"; or the bed might offer visual safety projections, such as a status icon projected onto the floor to alert caregivers when the bed-exit alarm is deactivated. Such features may be of particular interest in med/surg areas, where the degree of patient movement and alertness can vary widely.

Regardless of the intended application, most electric beds marketed today consist of five major components:

1. The bed frame. The bed frame holds a patient support surface or mattress, which may be integrated with the frame or available as a separate component. The platform on which the mattress rests can be raised or lowered to provide a comfortable working height and to facilitate ingress and egress from the bed. Electric motors allow the bed's height and position to be adjusted without the need for manual force, reducing both time and strain.

The mattress platform is typically divided into three or four segments that allow the bed to be positioned in various ways for patient comfort, for performing procedures, and for therapeutic purposes. In some critical care beds, the frame can rotate laterally to facilitate turning the patient for cleaning or for conducting procedures.

Removable headboards and footboards facilitate access to patients for certain procedures, and movable and latchable siderails facilitate patient ingress and egress and protect patients from falls. The bed frame may also include features like integrated scales, motorized drives for transport, a braking and steering system, and a battery backup that can be used during transport or in the event of a power failure to change bed height and positioning.

2. Bed motors. In most beds, separate motors are present to adjust the height and tilt of the bed and to move the head and knee sections. In some beds, additional motors adjust the bed frame length and the elevation of the foot section. Most current beds require constant pressure on the positioning controls to provide continuous motor movement. This critical safety feature helps prevent accidental entrapment and harm.

Some beds additionally have a motor and a drivetrain that can be engaged to help propel the bed during transports.

3. Patient controls. Patient controls typically include adjustment of the height of the head and knee sections, and a nurse call button. Additional controls may include activation of reading lights and room lights and operation of the TV. The controls may be embedded on the siderail or available on a pendant.

4. Caregiver controls. These include controls for all bed positions and for patient lockout. They are typically located in the siderails on the side facing away from the patient, or at the foot of the bed. For bed frames with integrated powered therapy surfaces, the caregiver controls allow control of the surface. Like patient controls, caregiver bed-raising and position controls are usually of the momentary-contact type.

5. Alarm and status system. Beds can include alarms and visual indicators for conditions such as bed-exit, siderail positions, head-of-bed angle less than 30°, bed height, brake activation, and under-bed obstructions. Bed status and alarm conditions are typically transmitted through the nurse call system for central monitoring.

Bed-exit alarms can be set to different levels of sensitivity for patient movement, from minor movements to fully exiting the bed. Many bed-exit alarms can be temporarily paused to reduce nuisance alarms while the patient is being repositioned; after the pause, the alarm is automatically re-armed. Some bed-exit alarms will reset automatically if the patient stops moving and returns to normal rest position within a certain time period.

Many new beds have visual bed status indicator bars at the foot of the bed for easy identification of the bed status by the caregiver.

FINDINGS AND DIFFERENTIATING FACTORS

All the models that ECRI Institute tested for its recent evaluations performed acceptably. However, the models did differ in ways that could affect their appropriateness for particular healthcare facilities. Following are four areas where ECRI's testing revealed factors that should be considered when making bed purchasing decisions.

1. Operation at the bed's maximum rated weight capacity. Testers distributed sand bags on the bed surface to reach the bed's manufacturer-stated safe working load (SWL). The bed was then operated to determine whether it could perform all movements, positions, and functions at that weight. "All beds ultimately passed the test," noted Cordero, "but a few did struggle with some positions at the SWL."

2. Transport on an incline. ECRI constructed a 5-degree ramp to test the beds' braking systems and to measure the force required to push each bed up a typical incline that might be encountered in a hospital. All brake systems worked as expected. However, all the beds required excessive force to initiate and to sustain movement up the ramp when not using a motorized drive. For facilities that include ramps, ECRI Institute recommends bed models that incorporate a motorized drive.

3. Motor noise. Loud bed motors can disrupt a patient's rest; thus, ECRI Institute's test protocol involves measuring the noise levels associated with bed operation. The organization's findings confirm that new motor technology has made the beds very quiet. One of the models tested, however, did not meet ECRI's noise criterion.

4. Battery-powered operation. We tested the functionality of the beds while operating on battery power, as would be the case during transport or in the event of a power outage. Half of the beds retained full functionality when operating on battery power, while the other half lost some functionality. Hospitals need to be aware of which functions will and will not be available if operation on battery power will be required. ⚙

This article is adapted from ECRI Institute's "Evaluation Background: Electric Beds for Medical/Surgical Units" (*Health Devices* 2018 Dec 28) and "Evaluation Background: Electric Beds for Critical Care Units" (*Health Devices* 2019 Jan 30). The complete articles—including model-specific test results and product ratings, along with additional guidance for purchasing and using these types of beds—are available to members of ECRI Institute's Health Devices System and associated programs. To learn more about membership, visit www.ecri.org/HealthDevices, or contact ECRI Institute by telephone at (610) 825-6000, ext. 5891, or by e-mail at clientservices@ecri.org.