



**Healthful Patient Seating:  
Perspectives from Caregivers  
and Researchers.** Herman Miller  
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Imagine this scene, playing out thousands of times each day in hospitals around the world: It's time to move the patient out of bed and into a chair. The caregiver has spent the last couple of hours acclimating the patient to the move. Raising the back of the bed to see how the patient responds.

Checking pain levels, blood pressure. Sitting the patient on the side of the bed with feet dangling. And finally getting him ready to stand. Then the nurse must find another caregiver available to assist in moving the patient. The chair is wheeled closer to the bed, the caregivers position themselves on each side of the patient, and carefully they transfer the patient into the chair.

Transferring patients from bed to chair requires a fair amount of strength and a great deal of finesse. Bending and lifting, bearing a patient's weight, and bracing him takes a toll on caregivers. Has the chair assisted the caregiver? Or has it gotten in the way? Can the chair design help the caregiver minimize the risk to her own health while doing the same for her patient?

Once the patient is seated, will he remain there comfortably? After completing a process that may have taken a couple hours, can he recline and rest? Can he shift his position and sit upright to chat with guests? Is his body supported? Or does he ask to be transferred back to bed because he is uncomfortable?

Finding the balance between what helps the caregiver and what helps the patient—without compromising one for the other—is the challenge for patient chairs.

To better understand that challenge and learn more about the current state of patient seating, Herman Miller researchers talked with over 200 caregivers around the country about what works for them—or against them. Researchers spent time in over 15 hospitals and healthcare systems, learning about patient transfer and the patient experience. They also consulted ergonomists, physical therapists, gerontologists, and more than 70 healthcare designers.

"Make the chair work for me, make the chair comfortable for my patient" was the mantra researchers heard over and over. When questioned further on what this meant, caregivers and healthcare designers answered consistently: a chair that is comfortable, functional, and durable.

The fast-paced and critical nature of caregiving requires that the equipment and products caregivers need don't get in the way of effective caregiving. Patient seating is gaining importance in the work of caregiving and getting patients up and moving sooner and more frequently. To patients, patient seating is associated with health and independence. Herman Miller researchers concluded that patients associate chairs with the quality of care.

In what ways can patient seating contribute to a better experience for patients, a more effective tool for caregivers, and improved quality of healthcare delivery for organizations?

Comfort and ergonomics, safety and functionality, and durability and cleanability all play a role. Through their observations and conversations, Herman Miller researchers identified unmet needs in patient seating when it comes to the wishes and requirements of healthcare professionals and designers.

### “Bed Rest as Therapy” to “Ambulation as Recovery”

For a long time, there was no patient seating—only the bed. Bed rest was considered the path to healing, writes Anne Sprague, who uses the example of pregnancy and prescribed bed rest as an historical case study for how treatment protocols have changed. Through the 1800s, the bed was the place for getting better. Immobility helped heal, or so it was thought. It also atrophied the body and led to bedsores, Sprague writes. Studies that are more recent have found that bed rest negatively affects nearly every system in the body. Changes in bone and muscle tissue start within days of beginning bed rest, although combining it with periods of sitting and walking does provide benefits.

Bed rest takes its toll psychologically, as well. The goal of rehabilitation is to get patients back to as fully functional and normal lives as possible. The process of moving from bed to chair and to greater independence is a visible sign of recovery. Today, hospitals routinely measure patients' ability to sit successfully in a chair as the sign that they can be discharged safely.

“Sitting in a chair is considered one of the criteria for going home,” says Deborah Conway, MSN, RN, and director of the Health Care Product Evaluation Center (HCPEC) at the University of Virginia's School of Nursing. “If patients can't transfer from bed to chair, they often can't be released to go home and may instead have to go to a long-term care facility or rehabilitation hospital.”

The simple act of becoming upright serves as a signal to the brain that it can direct the body to activate again. A study of body position and metabolic state found that heart rate, blood pressure, and oxygen consumption were highest in the sitting position, compared with various lying positions. Stroke patients who were able to sit in a chair measured significantly higher levels of oxygen in the blood than they did in any other position. In a survey of 175 nurses and therapists who assessed patient positioning practices, 74 percent of the respondents believed that sitting in a chair was the best position for a conscious stroke patient. And patients with myocardial infarctions benefit from early use of the bedside chair and progressive increase of activity during rehabilitation.

Unfortunately, a patient's comfort when seated has not always been considered in chair design. “Current patient chairs are not designed for comfort,” says Eileen Vollowitz, a physical therapist and ergonomic seating expert. “They are designed as a place to put a patient to see if they can tolerate being upright. What if a chair could actually be good for the patient to be in? And what if it gave a patient a comfortable and supportive alternative to the bed?”



## Comfort and Ergonomics

In the majority of onsite visits and interviews with caregivers, Herman Miller researchers found that comfort was ranked as the most important chair attribute for patients—and one seldom found in the patient chairs caregivers were familiar with. (Ergonomics also ranked highly, and often the two topics were used interchangeably.) Comfort was also cited as important for caregivers, but from a different angle than patient comfort. Having a work tool, as caregivers referred to patient chairs, that was easy to use, functional, and ergonomically considerate of caregiver activities would result in greater comfort for caregivers.

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Researchers concluded that unless a person is comfortable while in the chair, all the other advantages offered by the chair will be of little value. Yet comfort is difficult to measure. Industrial designer Bill Stumpf defined comfort as the absence of awareness. If a patient isn't squirming in a chair to find a more comfortable position, if the front edge of the chair's seat doesn't restrict circulation, and if heat buildup is minimized, then a patient will tend to be comfortable.

In a study on the comfort of wheelchair users, discomfort descriptors included aches and pains, need to move, pressure points, inability to concentrate, instability, and feeling too hot, cold, or damp. Comfort descriptors included the ability to relax, to sit longer, feeling good, and relief. It follows that similar descriptors would apply to a person sitting in a patient chair in a hospital.

Soft does not necessarily mean comfort, as many researchers and caregivers have noted. Overstuffed patient recliners are perceived as comfortable but often fail to provide comfortable support, an important attribute of an ergonomically designed chair. Back support in the sacral and lumbar regions, as well as support of the ischial tuberosities (the sitting bones), was not found in the patient chairs researchers studied. As a result, patients fidget to find a comfortable position, or caregivers use pillows to reinforce support.

There are safety issues associated with discomfort, as well. "If a patient is uncomfortable in the chair, he may try to move himself," says Conway. "A patient may start to get up, realize he is in a great deal of pain, and fall back into the chair or miss it altogether and collapse to the floor. Or the chair may start to tip because the patient can't steady himself. Or a confused patient may trip and fall. There are a number of risks associated with patients moving themselves."

Safety issues are serious for the patient's health, but also serious for the hospital's records and reimbursements. A patient fall is a reportable event, states Conway. Treatment costs from falls will also be the responsibility of the hospital in which they occurred, and not that of Medicare. Effective October 2008, Medicare now labels falls as one of eight preventable illnesses or hospital-caused injuries for which care will not be reimbursed.

Patients who have been in bed for a couple days or are elderly and sedentary are more susceptible to bruising and pressure points. Older, frail patients, says Conway, will tend to bruise easily, since their skin is more fragile, and extensive bed rest may have already

resulted in pressure sores. Soft edges on a chair, especially at the front edge of the seat, can help prevent bruising during ingress and egress. A contoured seat and back that offer even and constant support to the patient's body are important for pressure distribution. Researchers noted that heavily padded recliner-type chairs were often bolstered with pillows to even out the support and adjust the contour.

"Pillows are a quick and easy solution to fitting the seat to the patient, says Doug Bazuin, lead healthcare researcher for Herman Miller. "But pillows can't compensate for an uncomfortable chair."

No single sitting position will be comfortable over an extended time. In fact, it's good for the body to move and change postures while seated. Inactivity can be hard on the body's muscles. Static activity, which includes holding any posture for a period of time, "is characterized by the constant contraction of muscle fibers, which causes congestion, traps waste products, and prevents the flow of oxygen and nutrients into the tissue," notes a Herman Miller research report. The result is fatigue and pain. Chair features can help to keep the sitter active by incorporating rocking features or adjustable tilts.



Postural variation is a critical function of patient care seating, including the ability to recline. For patients in weakened states, chairs that adjust and recline easily and don't require a patient to exert much pressure are essential. Ergonomist Vollowitz feels that a patient's ability to tilt or recline himself is a positive feature for patient seating. "The seat to back angle is a big comfort issue for a patient," she says, "and that is something that could very nicely be under a patient's control." Researchers observed that while some chairs did offer adjustment features, the adjustment mechanisms could also be difficult for the patient to reach or operate.

Chair features that Herman Miller researchers observed were typically basic in design. Few, Bazuin notes, incorporated the sophisticated ergonomic features found in office seating. "A human body is a human body, whether it is working in an office or healing in a hospital," says Bazuin. "It needs certain things. A tilt that moves synchronously, as the human body does, is important for comfort. Pressure distribution is a good idea. Proper support in the ischial tuberosities is important. So is support along the entire back, from the sacral area to the lumbar area. Yet these aren't features we saw in current patient seating."

Herman Miller research found that when a person sits in a chair and uses its reclining backrest, disc pressure can drop by as much as 20 percent. Depending on the patient's ailment or procedure, a greater or lesser tilt angle may be even more beneficial. "Some people have thoracic kyphosis—as they get older, they develop a great curvature in the upper back, they round their shoulders more, and they slump more forward. With a large thoracic curve, the backrest actually has to recline quite a bit more, maybe up to 40 degrees, just to keep the neck and upper thoracic regions upright," says Vollowitz. Deborah Conway's HCPEC report notes that weakened patients "need to recline at a 45 degree angle for better respiratory hygiene or for caregiver access to the thorax for

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treatments." This angle is not supported in many chairs. Chairs that offer a full tilt range can offer an appropriate recline to a wider range of patients.

Comfort extends to the psychological state, too. A sense of well-being, relief, and relaxation is associated with being comfortable. If patients can sit longer in a comfortable chair, then it provides advantages to their physical and mental recovery. Says Conway, "If a chair is comfortable, the therapy of sitting in it would be more positive."

Illness takes a psychological toll. "One of the most debilitating results of illness is the loss of autonomy and dignity," state researchers in the Herman Miller Care Seating report. "Typically, people are thrust into clinical, impersonal environments, have to rely on others for their smallest of needs, and have to deal with unfamiliar frailties and lack of self control. Care seating needs to convey a sense of dignity through its appearance and quality of construction."

The act of moving from bed to chair can send a positive message to the patient: I'm recovering. I'm sitting up. I feel better. The chair patients graduate to should reward them with a comfortable and health-promoting experience. Ergonomically designed products can play a role in that experience. Sitting should signal movement toward independence. Yet when patients sit for a brief time and then ask to be repositioned or put back in bed—simply because they weren't comfortable—the experience can send a negative message to the patient: I'm still hurting. I'm weak. I should be back in bed.

### Safety and Function

Caregivers acknowledged that no single patient chair could include the functionality that would meet most of the needs of a varied patient population and its varied treatments and procedures, from cardiac rehabilitation to knee replacement and labor/delivery. But these caregivers were also clear that few patient chairs effectively address a base level of safety and function. Eight experienced RNs and two senior physical therapists were interviewed through a collaboration between Herman Miller and the HCPEC. All participants agreed that patient chairs were an important component in the recovery and well-being of patients in all care settings. All agreed that current chairs were deficient and "worked against the care provider a significant amount of the time." Even more alarming, they voiced the fear that their patients were not safe in some current chairs.

If the caregiver's tool—the patient chair—is a functional one, chances are it will also be a safer one. "Anything that assists caregivers in getting patients in and out of chairs makes their jobs easier and safer, not only for their patients, but for the caregivers, as well," says Bazuin. He cites statistics from the American Nurses Association as proof. More than one-third of back injuries among nursing personnel are associated with the handling of patients and the frequency with which nurses are required to move patients manually.

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injuries. Nursing personnel—nurses' aides, orderlies, and attendants—are second only to laborers in reporting musculoskeletal disorders. Registered nurses rank in the Bureau of Labor Statistics' 2006 list of at-risk occupations for strains and sprains. The American Nurses Association's "Handle with Care" campaign is intended to raise awareness of the health risks of manual patient handling. The campaign "seeks to reshape the professional and disciplinary dimensions of nursing, influence the mindset of the healthcare industry, and inform federal/state policy by highlighting how safe patient handling produces benefits to patients and the nursing workforce."

Caregiver safety and ergonomic design is one side of the coin. Patient safety and ergonomic design is the other. According to biomechanics engineer James Ashton-Miller, PhD, ergonomics expert and researcher Matt Reed, PhD, and geriatric physician Neil Alexander, MD, all associated with the University of Michigan, the biomechanics of rising from a chair focus on a few features: armrest design, foot space under the chair, and seat height. The ability for patients to place their feet on the floor, which means the chair must have a lower seat height, is more important than a higher seat to assist ingress and egress. They all agree that a patient's ability to have her feet on the floor and under the seat is important for egress. While recliners with integrated footrests might provide a means to elevate the feet, they also prohibit patients from effectively shifting their weight by planting their feet under the seat. These experts all believe that an open area under a chair more effectively assists the patient and the caregiver.

Armrests, when designed with ingress and egress in mind, also improve the safety and functionality of the chair. Armrests that pivot out of the way can help caregivers with some types of transfers, such as quarter turns. Other transfers that require level armrests are also accommodated. Pivoting armrests give caregivers access to the patient while seated, whether it is to change a bandage or check a wound. Wider armrests give patients a comfortable place to rest their arms.

Armrests made of softer materials also provide patients with a better gripping surface when getting in and out of the chair. The length and angle of the armrest play an important role in the transfer process. "You need a forward armrest for ingress and egress," says Vollowitz. "An armrest that angles slightly upward gives patients a guide and leverage tool and still provides a comfortable angle when seated." The ideal design is one that can give the patient more independence, whether moving alone or with a caregiver.

In observing caregivers using patient chairs, it became clear that only a few adjustments were truly necessary. Caregivers told researchers they wanted adjustments, and in theory this is true. Yet in practice, when they were moving quickly and needed intuitive and efficient work tools, few adjustments were made.

Chairs also need to support safely all sizes and shapes of patients. Researchers found that many patient chairs guaranteed weight loads of up to 250 pounds. Yet it is reasonable to assume that patient populations, particularly those with diabetes and heart conditions, may weigh more than the general population. A 250-pound, 6-foot,

2-inch patient or a 100-pound, 5-foot, 3-inch patient both need a comfortable and safe chair that fits their unique sizes and body shapes.

### **Durability and Cleanability**

No chair can be safe and functional if it is broken. “Break easily,” “break frequently,” and “unreliable” were common refrains in caregivers’ evaluations of patient chairs. Researchers observed this firsthand. “It’s an accurate generalization to say that chairs are often broken,” says Bazuin. Anything that moves on a chair, he noted—wheels, wheel locks, adjustment levers, and armrests—was on the list of frequently broken parts.

While data on warranty claims or replacement costs from hospitals is not available, it is clear that a number of patient chairs in use are defective, requiring caregivers to make do and patients to get less performance.

The performance that durability provides extends to the issue of cleanability, too. The stories of patients contracting hospital-acquired infections are well known. These infections pose serious risk for patients and serious liability for healthcare organizations. (They have financial implications, too, due to the pending Medicare reimbursement policy change.) JCAHO (Joint Commission on Accreditation of Healthcare Organizations) standards address hospital furnishings and their ability to be cleaned thoroughly. While improved caregiver and staff hygiene can significantly reduce hospital-acquired infections, it makes sense that products designed for thorough cleaning can help minimize the spread of infection.

The “crumb factor” is how one healthcare designer described assessing the cleanability of chairs. Chairs with gaps and cracks that easily attract dirt and make cleaning more difficult will fall off the list of product recommendations. Chairs that are designed for thorough and easy cleaning are an asset to a hospital organization. Features such as removable fabric and fabrics that withstand cleaning with harsh disinfectants assist in reducing the spread of germs and infection. In addition, a chair that can be moved easily by the housekeeping staff improves the ability to clean the entire patient room.

### **Healthcare Delivery and the Patient Experience**

Over the span of two-and-a-half years, Herman Miller researchers talked with hundreds of caregivers, designers, and consultants. Opinions, perspectives, and ideas were many and varied. All of them—good, bad, and idealistic—boil down to one thing: Everyone cares about taking care of patients in the best possible ways. When products get in the way of doing that or when patients aren’t able to heal in the best environments, then quality of care is compromised. That’s one compromise few are willing to accept.”

What caregivers expressed to Herman Miller researchers was a wish list that would create the perfect patient chair. Yet incorporating all those features into a single and affordable chair is unrealistic. Engineering realities, usability, aesthetics, and price all tip



the scales toward including certain features—and excluding others. “Aspects of chair design such as lowered seat height, increased posterior seat tilt, increased back recline, and increased compressibility interferes with chair egress,” states an article on chair design for older patients. “However, these same factors may increase seating comfort. Furniture designers and manufacturers must find a balance between degree of sitting comfort, ease of egress, and the degree to which the seating device facilitates functional independence.”

Caregivers understand that getting their patients out of bed and up and around is important to their recuperation and their emotional state. Providing patients with chairs that are comfortable and supportive is good for them. Providing caregivers with a patient chair that is a productive and functional work tool is good for them. Finding the balance between what helps the caregiver and what helps the patient without compromising one for the other is what patient seating needs to do.

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