Safer Elevators for Seniors

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Senior residents depend upon their facility management to provide a safe home and management wants nothing less. Elevators are necessary for residents to avoid stairs with all the difficulties and dangers they pose, but elevators are also dangerous to the elderly and infirmed.[1]

What many facility operators do not realize is that there are options to configure elevators to be friendlier to residents and to serve them more safely. The elevator maintenance companies will not tell you about these options unless you ask. Ask, and they will gladly change the settings of the equipment in favor of the residents. You have to ask as they simply do not think about the needs of seniors.

Most of the steps are simple adjustments not repairs. However, one important addition can be added for about $2,000 per elevator.

Safety over speed is fundamental

Most residents have the luxury of time in retirement and are willing to take the extra time to be safe. Elevators can be adjusted to respect this need. Ask a resident:

> "Would you rather go down to dinner every night in 5 minutes flat and risk falling and breaking your hip one day or would you prefer to take 10 minutes and be safer?"

The answer is obvious of course, but where elevators are concerned, no one is asking the question. There are a number of specific things facility administrators can do to respond appropriately and they are covered in this article.

Faster elevator operation at each floor means the elevator car can leave sooner and reach another floor sooner where people are waiting. While this regimen is desirable for high-rise office buildings downtown, it has no place in senior living facilities.

Doors are the number one problem

Ninety-five percent of the problems encountered by residents are while entering and exiting the elevator. This quantity divides into 20 and 80 percent segments. Twenty percent of the problems are from mis-leveling, meaning the elevator is not level with the floor when the doors

open. This is a maintenance problem and not the subject of this article except to say that good maintenance is important for safe elevators.

The remaining eighty percent of the entry/exit problems revolve around the operation of the doors. Elevator doors are controlled by electronics. The electronics controls:

- *How long* the opened doors remain open
- *How slowly* or how fast the doors close (fast doors are forceful doors)
- *How friendly* the doors are when they find an obstruction in their closing path
- *How well* the doors sense or "see" the person trying to enter or exit.

Door dwell-opened time (How long the opened doors remain open)

The average elevator doors are set to begin closing in 3 to 6 seconds after opening. What is the hurry? Once opened, doors should remain fully opened for at least 20 seconds or more. This is in fact an ADA Code requirment[2]. Once in the car, an impatient resident can always press the Door Close (DC) button to get going sooner. However, most residents will be more comfortable with the service set this way and fewer injuries and lawsuits will result. Ask the elevator maintenance company to set this time much longer and comply with ADA requirements.

Door speed and force (How fast the doors close)

Elevator doors exert force when they strike a person. Forces rise with increasing door closing speed. Any physical touching of any user is undesirable but it is unacceptable around seniors. The Safety Code[3] allows speeds of up to 1 foot per second and forces as great as 30 pounds but half the speed and one-tenth the force would be much better**.** Ask the elevator maintenance company to slow the door speed and force way down. Because of other requirements in the Elevator Safety Code[4], one-third the "normal" speed and force should be immediately obtainable.

Impatient elevators (Obstruction in the door closing path)

When a building is on fire, special rules apply. Doors need to close so that firemen can use the elevator for access and rescue. To provide for this, the doors go into "nudging mode" and move slowly but inexorably to close allowing the elevator to respond to firemen.

"Nudging mode" works this way:

> After a period of time when the doors have not closed for whatever reason, they close at a reduced speed and force without regard for anything in the way.

However, "nudging mode" is an option during normal operation that is often left enabled simply by chance. Nudging is fundamentally wrong for senior living facilities as the doors will close on residents and poses a high risk for injury and liability.

Besides knocking people down, doors in nudging mode have been known to squeeze and trap the handicapped. This happened recently to a wheelchair bound man in Michigan. Nudging has been outlawed for the entire State for many years[5]. Hopefully more states will follow Michigan's lead. In the meantime, ask the elevator maintenance company to turn nudging off.

<u>Sensing or "seeing" a person in the way</u>

Fifty years ago, human operators ran elevators. Then, in the 1950's, elevators began to operate automatically. Today, the eyes, ears, common sense and compassion of a human being have been replaced with electromechanical devices that decide if, when and how to close the doors. Sensors detect obstructions and attempt to reopen closing doors as needed. The first such device was a mechanical bar on the leading edge of the moving door that touched the obstruction to detect it. This concept of a mechanical object touching passengers to detect their presence should be outlawed in senior facilities. Unfortunately, many elevators in two and three story senior facilities are still equipped with this mechanical bar making them inherently dangerous and in violation of the ADA[2]. Imagine something as inappropriate as pushing on frail people before backing off.

For 30 years, various configurations of light beams have been arranged to detect objects in the direct path of the car doors. For the last 10 years, camera systems have been available that look out into the hallway to detect people giving them even more time to safely enter and exit. The cost of this very best, state-of-the-art protection is around $2000 or less per elevator[6]. This small, one-time, capital expenditure is well worth the protection it provides from both injuries and lawsuits.

You have to ask

A physical therapist, Susan Parys, at an East Coast senior living facility, became concerned with the speed and force of the elevator doors and began searching for solutions. Taking charge, she found the telephone number for the elevator maintenance company.

The first words from the young mechanic when he arrived were:

"There is nothing wrong with these elevators."

and, by elevator industry standards, he was absolutely correct. Their dialog was complicated by their differing knowledge and background. However, she explained the need, he responded with a simple screwdriver adjustment, and the time the doors remained opened was greatly increased. The residents now have several facility elevators that are set appropriately for their needs.

So yes, *you really do have to ask*.

Conclusion

The speed and force with which doors close, and the way they sense people in the way, are critical requirements for safe elevators in senior facilities. These facts are recognized at some level by all the major elevator manufacturers and service organizations, including Otis[7], Kone[8], Schindler[9], and ThyssenKrupp[10]. However their field personnel often set doors to close too fast and leave nudging mode enabled for no particular reason other than that they are young and healthy and not in tune with senior needs. Owners depend upon their elevator maintenance company to tell them about options and inform them about safer alternatives. This missed communication leads to injuries to residents and lawsuits against facilities but it does not have to be this way.

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[1] "Elevator-Related Injuries to Older Adults in the United States, 1990 to 2006", Gregory K. Steele, DrPH, MPH, et. al., The Journal of Trauma Injury, Infection and Critical Care, Volume 68, Number 1, January 2010.

[2] The American National Standards Institute (ANSI) publishes A117.1 "Accessible and Usable Buildings and Facilities". See sections: 407.3.3.2 Contact and 407.3.3.3 Duration.

The Access Board publishes the ADA Accessibility Guidelines (ADAAG). See section 4.10.6.

[3] The national code for safe operation of elevators is published by the American Association of Mechanical engineers and is known as A17.1. The current document is 470 pages in length. Digging directly into the Code is best left to elevator personnel. Just ask for their help.

[4]ASME A17.1a-2008 Elevator Safety Code. See section: 2.13.4.2.1(c)

[5] State of Michigan, Dept. of Energy, Labor, and Economic Growth, Elevators, Chapter 3, ASME A17.1 Modifications: The door reopening device and door open button shall remain in operation at all times when the elevator is operating on normal service. Any devices which are designed to bypass either door opening device when the door is open for a predetermined amount of time (nudging) shall not be installed. This does not include operation under fire and other emergency conditions.

[6] Three-dimensional door obstruction sensing equipment vendors include: Adams Elevator, Janus Elevator, Otis Elevator and others. (Google for details)

[7] Otis Elevator. www.Otis.com. 860-676-6000.

[8] Kone, Inc. www.Kone.com. 309-764-6771.

[9] Schindler Elevator USA. www.Schindler.com. 973-397-6500.

[10] ThyssenKrupp Elevator: www.ThyssenKruppElevator.com. 877-230-0303.

About the author

Stephen Carr, Ph.D. is an engineer with Technology Litigation Corporation, who specializes in elevator and escalator safety and accident investigation. Dr. Carr has analyzed over 230 accident cases in 37 states over the past decade. Forty investigations have reached into senior facilities and most of these accidents were preventable. Carr can be reached at 800-656-8876 extension 102 or C.Stephen.Carr@gmail.com.