

Simple steps to better health

First steps

Since the Neolithic Revolution 12 000 years ago, people have sought to make lasting alterations to the environment to meet their needs. The first stairs were thought to be simply hewn logs or stones placed in sequence to make incremental ascent and descent easier. Since the earliest Mesopotamian cities, stairs have been an integral part of the built environment.

Despite the enormous benefits that stairs provide, there are dangers associated with their use, and current standards of stair design may need to change to optimize user safety.

Burden of disease

The use of stairs presents many muscular and neurological demands that go beyond those required of walking. Perhaps not surprisingly, accidents while using stairs represent a significant portion of accidental trauma.¹ The burden of injury is disproportionately borne by the elderly and by those with certain medical conditions.²

In persons over 65, falls rank first among causes of death from injury.³ Data from 1992 put the cost of falls in the US at \$10 billion, with an estimated 20% of these attributable to stair use.^{2,3} These figures may underestimate the burden of stairway injury. Falls while using stairs are often more dangerous than those sustained while walking, particularly with respect to the risk of traumatic brain injury or hip fracture.²

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Risky behavior

There are several high-risk behaviors that contribute to falling on stairs—leaving objects on the steps, wearing high-heeled shoes, being distracted, carrying heavy loads, and not using the handrail.²

Physics of stair design

Various standards have emerged in stair design that prescribe how high (the rise) and how deep (the run) stairs must be [Figure].⁴ The position and contour of the handrail is often regulated, as are tolerances for the consistency of stair height. In the UK, for example, private dwellings are permitted to have a stair pitch of 42 degrees. In the US, tread depth can be as low as 9 inches in some jurisdictions.

These details are important. A body of biomechanical research has detailed the mounting challenge posed by stairs of increased height and diminished depth.³ For example, Novak and colleagues suggest that a person's stability on stairs is best when the depth of the tread is at least 13 inches and the pitch is 28 degrees.⁵ Other authors have focused on visual cues, such as high-contrast edging, which is associated with increased foot clearance (and is presumed to reduce the risk of tripping).^{6,7} The evidence that deeper treads and lower rises would reduce the risk of injury is consistent with a call to revise standard stair dimensions to more of a low-riser configuration. Such configurations, however, are understandably more expensive because a larger horizontal footprint is required for the same height gained.

The literature so far tends to rely on proxy measures from biomechanical studies to imply risk reduction. There remains a role for intervention studies to demonstrate a clearer link between low-rise stair design and improvements in morbidity and mortality.³

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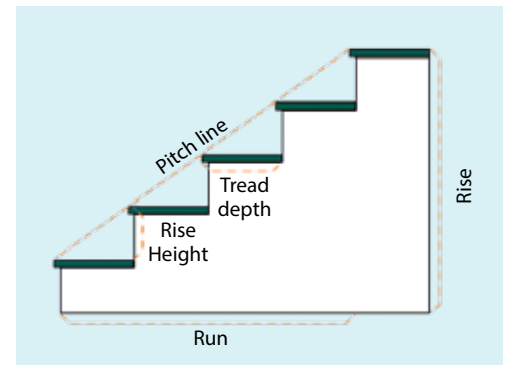


FIGURE. The basics of stair terminology.⁴

Source: Wikipedia

Making stairs safer

In many cases, the risk of stairway falls can be reduced by addressing an individual's strength and balance issues. Wearing corrective lenses and appropriate footwear are simple fixes.

Avoiding the risky behaviors listed above, coupled with use of proper lighting, a handrail, and high-contrast edging, are also inexpensive ways to reduce the risk of falls.

Should building codes be revised to make stairs less steep? More research is needed before taking that last step. ■

—Lloyd Oppel, MD

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