

A comparison of mobility assistive devices for elderly and patients with lower limb injury: Narrative Review

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Received:21-02-2020

Accepted:01-05-2020

Published: 15-05-2020

Conflict of interest: No conflict of Interest

Abstract

Older adults, people with chronic conditions, the disabled, and people with mobility impairments suffer from movement difficulties and have the risk of falling. Mobility aids alleviate the impact of mobility limitations or improve independence and reduce the burden of care and help people with mobility problems to move around enjoy greater freedom and independence. These assistive devices are essential to facilitate more movement independence, and reduce pain and boost self-confidence and happiness in regular life of the elderly. In this review paper, we have addressed the context and need for mobility aids. The main objective of the research was to explore different options of mobility assistive devices, and compare their advantages and drawbacks. The study found standard cane as the most popular assistive device of all due to its using convenience. This study can help to find out the limitations of different mobility aids and help to improve features to increase user convenience.

Keywords: Canes, Crutches, Elderly Individuals, Walkers, Wheelchairs, Mobility, Accidental Falls.

1. Introduction

Mobility aids are devices designed to alleviate the impact of mobility limitations or improve independence and reduce the burden of care and help people with mobility problems to move around enjoy greater freedom and independence [1-5]. Typically these assistive devices are effective tools to lessen the mobility limitation of older adults, people with chronic conditions, the disabled, and people with mobility impairments who are at increased risk of falling. These devices provide huge benefits to users, including more independence, reduced pain, and increased confidence and self-esteem. Patients need aids they can use at home to provide them with a way to overcome barriers they face, to provide generalized and specific feedback on their exercise, and to provide motivational elements to help them complete their home exercise programs [6]. They are mainly simple mechanical devices - such as wheelchairs, canes, crutches, and walkers - which enable free movement similar to that of unassisted walking or standing up from a chair. The choice of aid varies depending on the level of fitness, strength, balance capabilities, and risk of falls [1,6,8,9,10,21]. Assistive devices may be used to expand a patient's support base, enhance balance and flexibility, or redistribute weight from the lower limbs to assist relieve joint pain or compensate for weakness or injury. But there are limited, high-quality research examining the effect of different assistive devices on mobility outcomes and prevention of falling. In this study, we have described and compared different types of mobility aids and their features.

2. Necessity of mobility aids

A patient can use a walking aid, either temporary or permanent, to restore functional ambulation and independence. These helps in maximizing function by decreasing pain, improving the ability to self-propel, and prolonging mobility and endurance through ergonomics, individualized wheelchair selection, and configuration, and adaptations for increasing the capacity to handle the daily mobility demands through training, strengthening, and exercise [1-3, 11-17]. In addition, the walking aid will assist in controlling the allowed weight bearing on the injured leg, compensate for the problem of balance, and lessen the risk of a fall. Without assistance or mobility aids, patients face difficulty in walking which can cause increasing isolation, anxiety, and depression. Patients often seek care from primary care physicians for their underlying medical conditions, but physicians frequently fail to fully recognize patients' practical problems [7-12]. Patients using mobility aids have reported improved confidence and feelings of

safety, resulting in increased activity levels and independence [3-7]. The goals of the use of assistive devices are to enhance independent mobility, minimize impairment, postpone functional deterioration, and reduce the cost of care [3,4,7,31,35]. Patients using assistive devices have reported enhanced trust and feelings of safety, resulting in increased levels of operation and independence. There may also be physiological benefits of the use of assistive devices, including enhanced cardio-respiratory control, increased circulation, and osteoporosis prevention [3,7,46].

3. Available assisted devices

Mobility aids are designed to mitigate the effect of limitations on mobility or to increase independence and the burden of care [2,18-20]. Such aids require free movement, similar to that of unassisted walking or standing up from a chair [2,3]. Doctors recommend different assistive walking devices for elderly patients from a number of canes, crutches, and walkers in various types, shapes, and sizes. For many people, including older adults, people with medical illnesses, the elderly, the blind, and people with mobility impairments, these assistive devices are important ways to reduce the impact of mobility limitations [16]. Patients who use mobility aids showed enhanced trust and safety feelings, resulting in increased levels of operation and independence [10,19,20]. Selecting the best outpatient tool requires evaluating several variables, including the cognitive capacity, balance, upper-body and grip-ability, physical endurance, and walking environment of the patient. Studies examined the effect of different assistive devices on the outcomes of mobility and fall prevention [20-23].

3.1. Canes

Canes can help redistribute weight from a poor or painful lower extremity, improve flexibility by raising the support base, and provide tactile ground information to improve balance [20]. Canes have also been related to improved self-reported functionality and confidence [22,24]. There are several cane designs on the market that have specific features for different target users. Even though there are many types of canes available, there is no evidence to support choosing one type of cane over another. Canes are available primarily in three different forms. They are regular canes, canes offset, and quad-canes [22,23,25,26-30].

3.2. Crutches

Crutches are useful for people who need to use their arms for weight-bearing and movement, not just for balance [20]. One crutch will provide weight-bearing support of 80 percent, and two crutches provide

weight-bearing support of 100 %. Crutches, however, require significant energy expenditure and strength in the arm and leg, making them typically inadequate for vulnerable older adults. There are mainly three kinds of crutches like axillary crutches, forearm (lofstrand) crutches, and platform crutches [10,26].

3.3. Walkers

Walkers increase flexibility in patients with lower extremity impairment or impaired balance and promote increased mobility by increasing the support base of the patient and accommodating the weight of the patient. Walkers can be challenging to handle, however, and can result in poor back balance and decreased arm swing [24,26,27]. Walkers need more care than canes, so when using a walker, it is difficult to negotiate stairs. Regular walkers, front-wheeled walkers, so four-wheeled walkers are the types available [27,37-40].

3.4. Wheelchairs

Wheelchairs are used for those who cannot place weight on their lower limbs, or who cannot walk. These may be better suited to people with serious disabilities than walkers, or when walking longer distances is needed. Wheelchairs may be manually driven or electrically operated by the user, guided by someone else. For wheelchair users, communication is difficult as their reaching ranges are limited and body movement is quite difficult [36].

3.5. Mobility scooters

Mobile scooter is similar to a wheelchair. I have a seat mounted on top of either 3, 4, or 5 wheels. The user's feet rest on footboards, and there are handlebars or steering wheels for direction control. They are usually powered by batteries. To those lacking the strength of the upper body or ability to use a manual wheelchair, mobility scooters are useful. Regulations regulating the use of mobility scooters on sidewalks and roads differ according to venue. New users of mobility scooter need to seek guidance and help to increase the likelihood of a positive outcome. More analysis into how therapists handle vulnerability and risk conditions is needed to avoid reduce the possibility into limiting the job opportunities of clients [38].

4. Comparison and choice of mobile aids

Research studies indicate that a cane is most popular for its maneuverability, user-friendliness, and social acceptance [10-20]. A cane is normally advanced in

tandem with the frail or painful leg and on the side opposite. Canes can comfortably carry up to 15 to 20 percent of the body weight of a patient. When a single assisting hand is enough to help the patients walk, then a cane may theoretically be of possible benefit. But, if they need help by using both of their hands to keep their gait steady, a walker might be a safer option [25,26,27]. A front-wheeled walker can suffice if the patient needs weight-bearing assistance but not continuously. a wheelchair may be the best choice for certain patients who can no longer walk comfortably or who have extreme lower extremity weakness [28]. A large walker is more secure, but is also heavier, more voluminous, and can't be used by a patient living in a small apartment, particularly if there are stairs to navigate. Furthermore, unattractive 4-legged canes will spend more time in the closet unless patients and their behaviors support it. Wheel-chairs are most suitable for the elderly who are bed-ridden and unable to move. A physiotherapist may make additional recommendations about effective gait aids to optimize performance [2,16]. In the end, the success and personal interest of a patient will determine the best support. The selection of a suitable device depends on the energy, stamina, vestibular ability, cognitive capacity, vision, and environmental requirements of the patient [28,31]. The choice for the use of assistive devices is determined by whether the patient wants to use either or both upper extremities to maintain balance or weight, and the frequency of this need [2,18, 29, 30,33] and whether the patient requires constant weight-bearing. Among all the mobility aid users, canes were the most popular device used by 72% users, followed by walkers (16%) and wheelchairs (7%) [36].

5. The most popular mobility aid: Cane

Canes are the most popular mobility assistive device [31-38]. An overview of various walking cane types is presented here:

5.1. Standard Cane

A standard cane or straight cane is generally made from inexpensive and lightweight materials. So it helps with the balance for someone who does not need strong weight-bearing support [23,36-38]. It comprises a shaft usually made from either a wood or aluminum. The height of an aluminum cane can be adjusted. It has one contact point on the top and a handle that can come in a variety of types. The crook and derby type handles are only two such examples. Older type canes have curved handles, or crook handles, and are admired for their appearance, even though they provide little support. The derby handle is another typical handle for a Standard Cane. The standard cane is typically used in visual, auditory, vestibular, peripheral proprioceptive, or central cerebral disorder, for minor sensory or

coordination issues. This can help stabilize a patient's gait by having an additional point of contact with the ground, thereby raising the support base [22,26]. Compared to the shaft and another handle form, the derby handle is thick and follows a pattern similar to a long-term sine wave that matches the typical contour. Derby-style handle canes are generally accepted as offering sufficient support by medical professionals [33]. Because of their size and hand positioning relative to the handle, the traditional cane is best suited for those who require more of a direct balance aid rather than a weight support [21,34].

5.2. Offset Cane

The offset cane has one surface contact point, which is identical to a standard cane. If the cane is required to bear weight, such as for patients with osteoarthritic hip or knee pain, then an offset cane could provide greater stability, as it allows force to be placed directly along the cane's shaft [35]. Nevertheless, the shaft's configuration varies so that hand positioning is above the center of gravity of the cane. The shaft of an offset cane curves from vertical at the base to horizontal at the handle instead of being perpendicular to the handle of the cane as with a traditional derby-style cane. The tool used for the handle then encloses the handle's horizontal part, raising its strength and the amount of weight it can bear. Following the shaft's curvature from the base to the handle, the shaft's handle-end will head towards the back of a person as this enables the hand's weight-bearing load to go through the shaft's bend. However, due to its form, many use the tool backward without proper education about its use, with the shaft handle-end pointing to the person's front [21,28,36]. When adequately informed on the product, an offset cane is a standard option given the additional help it offers over the regular cane by medical professionals.

5.3. Quad Cane

For people who want more support than an offset cane can provide but do no longer quite want a walker, the quad cane is an available option. The quad cane has four contact points with the surface. If substantial weight bearing is required, such as in a hemiplegic patient, then an offset 4-legged quad cane might be needed [35,36]. It provides support and provides more weight-bearing through the upper extremities. However, all four tips of the cane must be in contact with the ground at the same time for proper use [23,25]. The base is commonly made out of metal, with "branches," making up the four contact points and a wider base. Quad canes are available in plenty of base sizes, relying on the specified level of support needed. With four factors of contact, the weight-bearing aid

this cane offers is substantially higher than the two canes [30]. As this elegance of cane is determined greater by using its base component, quad canes can be available in both the straight/standard or curved/offset kind of shaft, in conjunction with the variety of handles.

6. Risks associated with mobility aids

While mobility aids provide users with a variety of benefits, the risk of injury associated with their use exists. Underarm crutches, for example, can lead to a disorder called crutch paralysis. This can occur due to excessive pressure on the nerves in the armpit. Failure to use the cane properly may lead to various problems. Research shows that many users are not adequately qualified to use their mobility aid, with only one-third of users receiving their mobility aid from a medical provider and only 20 per cent receiving instruction [11-15, 34-38].

7. Conclusion

Mobile aids are utmost necessity for people with lower limb disabilities and older age who cannot move without assistance. Often other people need walking aid, whether it is because they are elderly or are healing from an accident. A significant support for these reasons is offered by physical therapists who ensure that an individual follows an ordinary attitude and identify atypical behaviors. While physical therapists are well-equipped and trained to distinguish between spikes, their assessments are focused largely on experience and qualitative observations rather than quantitative and analytical evidence. Given the aging world population, the number of people who use walking canes, and the risk of slipping with a walking aid, it is very necessary to provide a tool that can help deter such a scenario. We addressed the context and need for mobility aids, their styles, benefits, and drawbacks in our analysis article. This study revealed that the style, pros, and cons, price, and performance are subject to different variations. We found that the most common cane and, in particular, the standard cane. The best choice depends on the advice of the doctors and the patient's own interests.

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