

UNIT NO. 5

A FAMILY PHYSICIAN'S PERSPECTIVE ON PRESCRIBING AMBULATORY AIDS FOR THE ELDERLY

Dr Koh Wee Boon Kelvin

ABSTRACT

Ambulatory aids extend the mobility of patients who have gait disorders. Knowing the functions of a cane, walker, and crutches helps in appropriate prescription of these devices. There are 8 suggested steps to go through when prescribing ambulatory aids: (1) Conduct a thorough review of patient's medical conditions to determine if the elderly patient is safe for ambulation (2) Evaluate the patient's ambulatory expectations and ambulatory requirements (3) Screen if the patient will benefit from using unilateral or bilateral support ambulatory aid. (4) Choose the most appropriate ambulatory aid based on the patient's conditions, expectations, and the need to use upper extremities for balance or weight bearing while ambulating (5) Ensure proper fitting of the ambulatory aid (6) Provide education or training to use the ambulatory aid effectively (7) Determine if the patient requires physical assistance in addition to the ambulatory aid (8) Review the use of ambulatory aid regularly and check ambulatory aids periodically for wear and tear.

Keywords: Ambulatory aid, walking device, elderly, family physician, gait disorders

SFP2011; 37(3): 32-36

INTRODUCTION

(1) What is an ambulatory aid?

An ambulatory aid is a piece of equipment or appliance that aids ambulation by providing an extension to the upper limb or limbs, and this helps to transmit body weight and provide support for the person when he/she walks. Properly used, ambulatory aids extend the mobility and balance of individuals with gait disorders that cannot be medically corrected.

(2) Increasing need for ambulatory aids

With the increase in number of people who are elderly in Singapore, the number of such people who can be helped with ambulatory aids will be substantial. With a continuing decline in fertility and the improvement in health care, Singapore faces a "silver tsunami" in the near future. Senior citizens aged 65 years and older are projected to increase to 900,000 in 2030^{1,2,3,4}. By then, one in every 5 residents will be a senior. As

the proportion of senior citizens keeps growing, it is expected that the number of vulnerable elderly with chronic health problems and functional limitations, especially in ambulation, will increase. In Singapore, the proportion of senior citizens who were fully ambulant and physically independent decreased from 95.9% in 1995 to 92.2% in 2005.³

The prevalence of ambulatory aid usage is highest amongst the oldest age groups, with the risk of limited walking capacity increasing with advancing age. (See Table 1). Family physicians can expect to see more elderly patients using various assistive ambulatory aids coming to their clinics.

TABLE 1 – MOBILITY STATUS OF SINGAPORE SENIOR CITIZENS (2005)³

Mobility Status	Age Group (%)		
	55-64 years	65-74 years	≥ 75 years
Ambulant and physically independent	96.8	92.9	77.7
Ambulant and physically independent but require ambulatory aid	2.8	4.8	12.9
Require some physical assistance to move around and need some assistive device	0.3	1.3	6.2
Not bedridden but require total physical assistance for movement	0.1	0.4	1.2
Bedridden and require regular turning in bed	0.0	0.5	2.9

(3) Safe use of ambulatory aids

Many patients and/or their family members receive little or no professional assistance when selecting an ambulatory aid. Inappropriate selection of such a device can result in a poor gait pattern, which increases energy expenditure and the risk of falls. Family physicians are therefore well placed to assess and advise this group of patients in choosing the correct ambulatory aid.

FUNCTIONS OF AMBULATORY AIDS

Ambulatory aids function to:

- Increase area of support for ambulation and so decrease the risk of falls.
- Increase patient's stability.
- Redistribute and off-load the weight on a painful leg and thereby relieve pain.
- Improve balance in a patient with unsteady gait.
- Provide sensory feedback for ambulation.

Elderly patients, who require ambulatory aids, use them for the maintenance of physical mobility and for falls prevention.

KOH WEE BOON KELVIN, Associate Consultant, St Luke's Hospital

The maintenance of physical mobility status is essential to the health and well being in an elderly. Without ambulatory aids, mobility impairment can predispose the elderly to falls and their associated complications such as fractures and intracranial haemorrhage. Even in the absence of serious physical injury, falls have psychological consequences such as the fear of further falls, loss of confidence and loss of self-worth. All these together accelerate functional decline leading to further loss of physical independence and decreased quality of life. The case for appropriate ambulatory aids is therefore strong.

WHEN DO ELDERLY PATIENTS NEED AMBULATORY AIDS?

The need for ambulatory aids arises when elderly patients' abilities to maintain their balance during ambulation is impaired by gait disorders that are medically untreatable. Many factors are involved in determining one's ability to maintain balance during ambulation and these are ultimately important in determining if the elderly will benefit from using an ambulatory aid.

Factors affecting ambulation can be broadly classified into the following 4 categories. Impairments in any of these categories can potentially render a patient unsafe to ambulate independently.

(1) Balance / Coordination disorders

These include cerebellar ataxia, peripheral sensory disorders, and visual impairment. Patients with cerebellar ataxia tend to present with broad based gait with increase trunk sway and irregular stepping. Patients with peripheral sensory gait disorders tend to present with unsteady and uncoordinated gait. Visual impairment can arise from cataracts, retinopathy, or due to secondary to the decreased ability in depth perception, differentiation in colour contrast or the longer time required for accommodation when entering from a bright environment to a dimly lit room in the ageing eye. These result in loss of balance during ambulation.

(2) Motor dysfunctions

Motor dysfunctions that affect ambulation include parkinsonism, post-stroke spasticity, and foot-drop.

(3) Musculoskeletal dysfunctions

Musculoskeletal dysfunctions that affect ambulation include arthritis and myopathy. Patients in this category complain of lower limb joint pain, or decreased strength. They often present with an antalgic gait if there is pain, or a waddling gait if there is decreased strength.

(4) Cognition & psychiatric disorders

Conditions in this category include dementia, history of psychiatric disorders and post-stroke cognitive impairment. In most patients with severe cognition and psychiatric disorders

affecting mobility, their conditions cannot be cured or reversed and they may not benefit from using ambulatory aids.^{6,7}

WHAT ARE THE COMMON AMBULATORY AIDS LOCALLY AVAILABLE FOR ELDERLY PATIENTS?





The most basic forms of ambulatory aids can be categorised into 3 groups: canes (walking sticks), walkers (walking frames), and crutches. These ambulatory aids can be further modified or fitted with accessories to cater to the specific needs of the elderly.

Canes (Walking sticks)

Canes, commonly known as walking sticks locally, widen the patient's base of support thereby increasing one's balance for ambulation.^{8,9} Only one upper extremity is required to use this aid. The elderly is able to engage in stairs climbing activities with this cane.

The commonest materials used for these canes are wood or aluminium. A cane is basically made up of 3 parts: handle, shaft and base. Each of these individual parts may be modified to enhance stability to suit the elderly needs. Figure 1 shows variations to the standard cane available locally.

FIGURE 1. TYPES OF CANES AND FEATURES

Types of canes	Features relevant to their use
 <p>Standard cane</p>	<ul style="list-style-type: none"> Commonly made of wood. Good hand function is required to grip the handle properly. Height of cane is not adjustable to suit the patient's height. Therefore, the cane must be custom fitted for length. Increases balance and support for patient but does not allow patient to bear considerable weight on it.
 <p>Functional grip cane</p>	<ul style="list-style-type: none"> Commonly made of aluminium and is lighter than standard wooden cane. Good hand function is required to grip the handle properly. Handle fits more comfortably with hand grip than standard cane "C" handle Height of cane is adjustable to suit the patient's height
 <p>Offset Cane</p>	<ul style="list-style-type: none"> Features are similar to the functional grip cane. The design allows added ability to displace some of patient's weight onto the shaft of the cane. Useful in patients with painful lower limb joints.
 <p>"Quad" cane or Quad stick</p>	<ul style="list-style-type: none"> Features are similar to the functional grip cane The multiple-legged base of quad cane confers more stability than the single point cane. Broadening the base of the quad cane will increase stability for the patient. It allows greater displacement of patient's weight onto the shaft of the cane than the offset cane.

Walkers (Walking frames)

Walkers, commonly known as walking frames locally, provide a wider and more stable base of support than do canes or crutches.⁸ They may be prescribed for elderly patients requiring

more assistance with balance, those with a fear of falling, and the uncoordinated.⁸ It is also best suited for those undergoing early gait training for rehabilitation.

Good grasp and bilateral arm strength are pre-requisites for the proper usage of walkers, although forearm support modifications can be used instead. Walkers are conspicuous in appearance and they also interfere with the development of smooth gait patterns. As such, elderly patients often limit the use of walkers to the home. Walkers cannot be safely used to engage in stair climbing activities.

Walkers are available in various sizes, are adjustable in height, and come in different designs. The following shows some variants of the walkers commonly available locally.



FIGURE 2. TYPES OF WALKERS (WALKING FRAMES) AND FEATURES

Types of walkers (Walking frames)	Features relevant to their use
 <p>Standard walkers</p>	<ul style="list-style-type: none"> • Four legs, no wheels. • Usually made of lightweight aluminium to reduce weight-carrying burden for user. • Height of walker is adjustable to suit the patient's height • Allows good support as well as displacement of patient's weight entirely onto the walker • Impacts negatively on walking efficiency – Gait is not fluid; it starts and stops • Frame can be folded for easy storage in a car boot
 <p>2 wheel walker</p>	<ul style="list-style-type: none"> • Four legs, two front wheels. • Also called the wheeled frame or rollator. • Larger wheels are better for uneven terrain. • Ambulatory aid of choice if balance (as opposed to reduced weight-bearing ability) is the main problem. • Frames can be folded for easy storage in a car boot • Examples of conditions which will benefit – frontal lobe-related gait disorders, moderate to severe Parkinson's disease, or moderate ataxia.
 <p>4 wheeled walkers</p>	<ul style="list-style-type: none"> • Four legs, four wheels. • It has been modified to provide sturdier construction, larger wheels, hand-braking systems and a seat. • Can be used if the patient requires a larger base of support and does not rely on the walker to bear weight. • Best for higher functioning patients who walk long distances and require minimal weight bearing. • Suitable patients for this walker – patients with mild to moderate Parkinson's disease, ataxia as well as community ambulant patients.
 <p>Platforms on walkers</p>	<ul style="list-style-type: none"> • Forearm platforms are present instead of handles • Serves to redistribute the body weight so that device can be used without putting stress on the wrist or forearm.

Crutches

Crutches increase patients' base of support, thereby improving lateral stability. In contrast to canes, the elderly patient may allow greater transfer of the body weight to the crutches. The use of crutches requires the elderly to have good stability, upper body and bilateral upper arm strengths.

FIGURE 3. TYPES OF CRUTCHES AND FEATURES

Type of Crutches	Features relevant to their use
 <p>Axillary crutches</p>	<ul style="list-style-type: none"> • Provides support from axilla to the floor. • Often used bilaterally and requires good bilateral grasps, bilateral upper arm strength and trunk stability to use this aid. • Height of some axillary crutches is adjustable to suit the patient's height • Allows up to 80% of patient's body weight to be displaced onto the crutches during ambulation¹⁰ • Patients should avoid resting their entire body weight onto the crutches to reduce the risk of compressive brachial neuropathies.
 <p>Forearm crutches</p>	<ul style="list-style-type: none"> • Provides support from wrist / elbow to the floor. • Often used bilaterally but can be used unilaterally. • Requires good bilateral grasps, bilateral upper arm strength and trunk stability to use this aid. • Height of some forearm crutches is adjustable to suit the patient's height • Allows up to 50% of patient's body weight to be displaced onto the crutches during ambulation¹⁰

AN APPROACH TO PRESCRIBING AMBULATORY AIDS

An approach to prescribing ambulatory aids is to go through the following 8 steps.

(1) Review patient's condition & current weight bearing status

A thorough review of patient's medical conditions is critical in determining if the elderly patient is safe for ambulation. When the patient is deemed unsafe for independent walking, family physicians should consider if the use of ambulatory aids would assist to maintain the patient's mobility independence.

In addition to the patient's medical conditions, family physicians should evaluate the patient's upper body strength, coordination, hand function and physical endurance as these functions are required for the proper use of ambulatory aids.

More importantly, family physicians must decide if the usage of ambulatory aids is feasible. Some medical conditions or injuries may cause mobility impairments that are too severe for an elderly to be helped by ambulatory aids. Others with cognitive impairment or psychiatric disorders may find it difficult to understand or remember how to use ambulatory aids. In these situations, wheel-chair ambulation may be the most suitable recommendation.

Patient's current weight bearing status also determines the recommendation on the type of ambulatory aids. For example, patients recovering from a recent hip fracture may be advised not to weight bear on the affected leg for a few months. In this situation, it may be appropriate to recommend a walking frame in the initial phase and change to a walking stick / quad stick when weight bearing is allowed on the affected leg.

(2) Evaluate patient's ambulatory expectations and ambulatory requirements

A patient's expectation of his mobility goes beyond the choice of ambulatory aid. If a patient has no desire for ambulation, he/she may do poorly in ambulatory rehabilitation or may even choose to avoid ambulation entirely. Family physicians are encouraged to explore deeper regarding patient's poor motivation (e.g. undiagnosed depression)

If patient's ambulatory expectation is beyond his/her physical capabilities, family physicians serve an important role in aligning patients' expectations.

(3) Determine use of unilateral or bilateral support ambulatory aids

The next consideration in the assessment is to determine if the patient needs to use one or two upper extremities for balance or weight bearing while walking. A quick screening test that the family physician can employ in the clinic would involve walking with the patient while holding his or her hand.⁷ If the patient's gait and balance improve with the physician's support, the patient is likely to benefit from an ambulatory device. If a single assisting hand helps the patient walk, then logically a cane may be appropriate to recommend. However, if there is a need to hold both the patient's hands to steady the gait, a walker might be a better choice.

(4) Choose the most appropriate ambulatory aid

Table 2 shows the choice of ambulatory aids based on the considerations of the patient's conditions, expectations, and the need to use the upper extremities for balance or weight bearing while walking.

TABLE 2. SUGGESTED CHOICE OF AMBULATORY AIDS

Disability	Choice of ambulatory aids
Mildly impaired balance/stability	Single-point walking stick
Unilateral lower limb pain/mild weakness	Single-point walking stick
Moderate impaired balance/stability	Quad-stick
Moderate-to-severe unilateral weakness /hemiplegia	Quad-stick
Bilateral lower extremity weakness/paralysis	Bilateral crutches
Severely impaired stability	Walker
Impaired wrist or hand function	Platform forearm walker

(5) Ensure proper fitting of the ambulatory aid

With a cane or walker, the most accepted approach to measurement is to select an ambulatory aid with a length that equals the distance between the patient's wrist crease and the floor, measured when the arm is relaxed at the patient's side. The patient should be donning the shoes that will be worn when walking. The patient's elbow should be flexed 15°-30° when holding the cane in contact with the floor. The cane should be used on the opposite side of the affected leg. (See Figure 4)

When using axillary crutches, the top of the crutch should extend from a point the width of 2-3 fingers below the armpit (axilla) to a point on the floor outside the patient's foot. The patient's hand should rest at a level that allows him/her to flex his/her elbows about 15-30°.

FIGURE 4. CORRECT AID HEIGHT



*The patient's left leg is the affected leg



The patient using axillary crutches

(6) Provide education on the use of ambulatory aid

Many patients benefit from referral to a physiotherapist for assistance with proper fitting of the device and additional training to use it effectively.

Walking on level ground with the use of a cane (See figure 5 - The patient's left leg is the affected leg). Hold the cane on the side of the sound leg. The cane is moved forward first, followed by the affected leg and lastly the sound leg.

Ascending steps with the use of a cane (See figure 6 - The patient's left leg is the affected leg). Hold the cane on the side of the sound leg. If the device is a quad cane, the base of the cane can be turned sideways to fit onto the step. When ascending steps, the cane is moved up the step first, followed by the sound leg and lastly the affected leg.

FIGURE 5. WALKING ON LEVEL GROUND WITH THE USE OF A CANE



FIGURE 6. ASCENDING STAIRS WITH USE OF A CANE**FIGURE 7. DESCENDING STAIRS WITH USE OF A CANE**

Descending steps with the use of a cane (See figure 7 - The patient's left leg is the affected leg). When descending steps, the cane is placed on the step below first, followed by the affected leg and lastly the sound leg.

(7) Determine if physical assistance is required in addition to the ambulatory aid

Apart from the ambulatory aid recommendation, the family physician must also determine if the patient can ambulate with the ambulatory aid independently. If this is not possible, the family physician should recommend that a caregiver be present to provide physical assistance in ambulation. Carer training to assist in patient's ambulation is strongly recommended. It is also useful if family physicians have specific ambulatory devices in the clinic for demonstration. If in doubt, family physicians should consider referring the patient to a physiotherapist for a complete mobility assessment.

(8) Review and maintenance of ambulatory aid

The family physician should conduct regular reviews to ensure that the patient is using the ambulatory aid correctly. History of recurrent falls or recent near fall incidents whilst using ambulatory aids may indicate improper prescription or usage of ambulatory aids, and a thorough review is warranted.

Maintenance of ambulatory aids is also important. The walking frames need to be checked periodically. This includes reviewing the frames for metal fatigue, wheels and tips of the legs for wear and tear, and the handles for grip. Similarly for canes, the base of the canetip for wear and tear, the shaft for cracks, and the handle for grip.

CONCLUSIONS

Ambulatory aids extend the mobility of patients with gait disorders. It is important to know the functions of a cane, walker, and crutches. Go through the 8 steps of prescribing ambulatory aids to ensure effective use of ambulatory aids.

Acknowledgements

I thank St Luke's Hospital's medical and rehabilitation departments, especially senior therapists Mr Lim Kong Beng and Ms Rachel Chew, for reviewing this article and also A/Prof Goh Lee Gan for his invaluable advice.

REFERENCES AND FURTHER READING

1. Shantakumar G. The future demographic landscape of Singapore. *Singapore Med J* 2003;38(10):409-11.
2. Goh LG. Future health issues and delivery needs of the elderly. *Singapore Med J* 2003;38(10):418-21.
3. The National Survey of Senior Citizen in Singapore 2005, MCYS. www.mcys.gov.sg/MCDSFiles/Resource/Materials/NSSC2005.pdf
4. Report of the Committee on Ageing Issues 2006, MCYS. http://app1.mcys.gov.sg/Portals/0/Summary/research/CAI_report.pdf
5. Joyce BM, Kirby RL. Canes, crutches and walkers. *Am Fam Physician* 1991;43:535-42.
6. Hook FWV, Demonbreun D, Weiss BD. Ambulatory devices for chronic gait disorders in the elderly. *Am Fam Physician* 2003;67(8):1717-24.
7. Lam R. Choosing the correct walking aid for patients. *Canadian Family Physician* 2007;53:2115-6.
8. Delisa JA. *Physical Medicine & Rehabilitation. Principles and Practice.* Chapter 64.
9. van Zuilen MH, Rodriguez O, Paniagua, MA, & Mintzer MJ. *Choosing the Appropriate Assistive Device: A Card Sorting Activity.* Miami, FL: University of Miami, Geriatrics Institute, 2007.
10. Kedlaya D, Lorenzo CT. Assistive devices to improve independence. <http://emedicine.medscape.com/article/325247-overview>

LEARNING POINTS

- Ambulatory aids extend the mobility of patients who have gait disorders
- Knowing the functions of a cane, walker, and crutches helps in appropriate prescription of these devices.
- In prescribing ambulatory aids, there are 8 steps to go through to ensure an appropriate choice is recommended.