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CLINICAL NOTES

INNOVATIVE HEALTHCARE SOLUTIONS

A diverse look at client mobility

By Linda Norton, BSc OT, OT Reg (Ont)

A recent Internet search of the term "mobility" included the following definition: "Mobility is movement that involves changing the position of oneself or an object. A person with a mobility impairment may have difficulty with walking, standing, lifting, carrying, balancing, climbing stairs, or having the stamina and endurance to do these kinds of activities...."

In clinical practice, financial constraints and the push for discharge dates can make assessing mobility, at least from a broader perspective, difficult. And how we think about and approach the topic of mobility also impacts our decisions and thus the well-being of our clients. Indeed, mobility has a significant impact on our clients' quality of life and safety.

In this issue of *Clinical Notes*, I have selected from previous issues some important articles that have been written on the broad topic of mobility. Each author explores the subject from a different perspective; for example, wheeled mobility, bathroom safety and mobility, or a diagnosis-specific approach.

As you read these selected articles, challenge yourself to look at the broad scope of mobility and how it affects your clients. Then, based on your new-found knowledge, find ways to link your clients with the services and resources they need to ensure that all areas of their mobility are addressed.

Ambulatory aids: A basic guide

By Yvon Boudrias, BSc, PT; Susan Geis, BSc, PT; and Yvonne Jamieson, BSc, PT

An ambulatory aid can give a person, who would otherwise be unable to walk, the proper support for safe, independent walking. The following information will introduce a few of the walking aids available on the market.

Canes

The use of a cane has many benefits which include assisting with balance and decreasing the weight load on an affected leg. However, of all the walking aids available, canes provide the least stability. The height of the cane should be adjusted so that the handle is level with your client's wrist when standing tall with her arms at the side. As a general rule, a cane is held in the hand opposite to the affected leg. When walking outside in the winter, an ice pick should be installed at the tip of the cane.

There are three simple motions to note when your client is getting used to walking with a cane: First, she should, at the same time, place the cane and affected leg one step length forward. Then, she should bring the sound leg forward by one step length. Have her repeat the pattern, making sure that the affected leg moves forward with the cane.

For going up stairs, she should place the sound leg up one step, bring the cane and affected leg up together onto the same step as the sound leg, and repeat the pattern. Remember it's "up with the good." When going down stairs, have her place the cane and affected leg down one step, then bring the sound leg down onto the same step and repeat. This time, remember "down with the bad."

Quad cane: Use of a quadruped cane will decrease the load on the affected leg and assist with balance. This provides a more stable gait than with a single point cane. Quad canes come in two sizes: large-base and small-base. Both types are held in the hand opposite to the affected leg. The quad cane is fitted in the same manner as the single cane. This height allows for the elbow to be slightly bent when using the cane.

When walking with a quad cane, your client should place the cane and affected leg one step length forward and bring the sound leg forward by one step length. Have him repeat the pattern, noting that the affected leg should move forward together with the cane.

To travel up stairs, have him place the sound

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leg up one step, bring the cane and affected leg up onto the *same* step as the sound leg and repeat. When going down stairs, he should place the cane and affected leg down one step. Bring the sound leg down onto the *same* step. Repeat the pattern.

A note of caution: the base of a quad cane may be too large for the step. By turning the cane sideways, your client will allow all four legs of the cane to rest on the step.

Crutches

The two most common types of crutches are axillary crutches and forearm crutches. Both types of aids help to take weight off one leg either completely or partially.

Have your client stand tall with her arms at the side, then adjust the crutch height so that your client's two fingers can fit between the armpit and the axilla pad. Adjust the handle to wrist level so that the client's elbow is slightly bent when using the crutches.

To help your client properly hold axillary crutches, squeeze the top of the crutches between your client's arms and rib cage while pressing down on the handles. It is very important that his body weight be taken through the hands, not through the armpits.

If your client is using forearm crutches, have him stand tall with his arms at his side and adjust the crutch height so that the handles are level with his wrists. Then, while holding the handles, adjust the cuffs to a comfortable position (just below the elbows). The proper way for your client to hold forearm crutches is, with the handles facing forward, to slide the forearms into the cuffs and grasp the handles.

To comfortably walk with crutches, your client can place the crutches one step length forward, supporting his body weight through the hands, and swing the sound leg forward one step length past the crutches. He should then repeat the pattern at his own speed and comfort level.

To walk with crutches, with partial weight through the affected leg, your client should place the crutches and affected leg one step length forward, supporting his body weight through the arms and partially through the affected leg, and then bring the sound leg forward by one step length. Again, have him repeat the pattern as comfortably as possible.

To go up stairs on crutches, he should place the sound leg up one step, and then bring the crutches and affected leg up onto the same step as the sound leg and repeat. When going down stairs, he should place the crutches and affected leg down one step, bring the sound leg down onto the same step and then repeat.

If your client will use stairs that have a railing, he can use the same pattern as with two crutches. In this situation, one hand will hold the railing, while the crutch that is not being used can be carried at right angles to the other crutch or alongside the other crutch as one.

Walkers

The three most common types of walkers are standard, two-wheeled and four-wheeled. Walkers have many benefits, which include decreasing the load taken through the legs; assisting with balance; providing more stability than a cane, quad cane or crutches; and collapsibility for easy storage and transportation in a car. Walkers have few drawbacks; however, they are bigger and thus require more space to manoeuvre, and they are not designed to be safely used on stairs.

Mobility tips to share

- Use cane in the hand opposite to the affected leg.
- Attach an ice pick to the cane tip for added safety in winter.
- Adjust the height of the cane or walker so that the handle is level with your client's wrist, with the arm hanging by the side.
- The affected leg should move along with the cane or crutches.
- When walking, start by placing the walking aid and the affected leg one step length forward.
- When going up stairs, the sound leg goes up first ("up with the good").
- When going down stairs, the affected leg goes down first ("down with the bad").
- Do not bear weight through the armpits when using axillary crutches. (Bear weight through the hands.)
- Do not use walkers on stairs.
- Always lock a walker's brakes before sitting down or standing up.
- A walking aid should be prescribed and adjusted by a qualified professional, who should provide instruction on how to use the walking aid.

To use a walker correctly, your client should stand tall with her arms at the side and adjust the walker height so that the handles are level with her wrists.

Standard walkers: A standard walker is more stable than a walker with wheels but requires adequate strength and balance to lift safely. Standard walkers are usually used indoors for short distances and to help with transfers.

To properly use a standard walker, your client should lift the walker and place it one step length forward. Then, while bearing part of her weight through the walker with her hands, she can take a step forward into the walker, first with the affected leg, then with the sound leg. The client should always stay within the base of the walker.

To turn with a standard walker, have her place the walker at a slight angle (in the direction of the turn), take a couple of steps to partially turn the body and repeat this pattern until the turn is completed. Remember to ensure that the walker's four legs are in contact with the ground.

Two-wheeled walkers: These walkers are not as stable as a standard walker but are more stable than a four-wheeled walker. Also, they do not have to be lifted.

To use a two-wheeled walker, your client should push the walker forward as she walks. To turn a two-wheeled walker, she should place the walker at a slight angle in the direction of the turn, then take a couple of steps to partially turn the body. Have her repeat this pattern until the turn is completed.

Four-wheeled walkers: Four-wheeled walkers are easy to manoeuvre and are equipped with a seat; a basket and tray to carry items; and handbrakes as an added safety measure. Larger wheels make them easier to use outdoors.

To use a four-wheeled walker, your client can simply push the walker forward as she walks. Remind her to be certain that the brakes are locked before she stands up or sits down. Also, ensure that while walking, she always stays within the base of the walker.

Adapted with the permission of the authors from The Rehabilitation Centre website.

The authors are physiotherapists at The Rehabilitation Centre in Ottawa, ON.

Assistive devices and the ALS patient

By Teresa Riverso, OT

Amyotrophic lateral sclerosis (ALS), more commonly known as Lou Gehrig's Disease, is a relentlessly progressive and fatal neuromuscular disease. Currently, there are no known causes, treatments or cures for this devastating disease.

Diagnosis is based on a "clinical picture", rather than any one specific laboratory test. Progression of the disease varies from person to person. The average life expectancy from onset of the disease is 2.7 years; however, an individual with ALS can fall anywhere within the range of six months to over 20 years. Death usually occurs because of cardiopulmonary arrest or bronchopneumonia.

According to the ALS Society of Canada, the estimated incidence of ALS worldwide is approximately three cases per 100,000 people. This figure is on the rise. ALS is age dependent, and as our population ages, more cases of ALS are being diagnosed.

ALS is non-discriminatory on the basis of race, social status and economics; there are no boundaries. There does, however, seem to be a greater incidence of ALS occurring in females than in males.

The clinical picture

There are a variety of forms of ALS due to differing pathogenesis. The clinical syndromes that health care providers may be familiar with include sporadic ALS, familial ALS (about two per cent of the population), western Pacific ALS, progressive muscle atrophy, progressive bulbar palsy and primary lateral sclerosis.

In these syndromes, there is a loss of cortical motor neurons, anterior horn cells and bulbar motor neurons as well as involvement of the secondary gliosis in the corticospinal

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Linda's corner

Linda Norton, Rehabilitation Education Co-ordinator at Shoppers Home Health Care, answers your seating and mobility-related questions.

Q The facility where I work is becoming "restraint free," and management has asked me to remove from all of the facility chairs all positioning trays, straps and other devices. I'm concerned that this will lead to increased falls and client injury.

A An individual assessment of each client is warranted in this situation. The therapist must establish the ideal position for the client and the supports needed to enable the client to maintain a functional posture. For clients where falls are a concern, the therapist must determine the underlying cause if possible (e.g., a client is trying to stand when she does not have the physical ability) and examine "restraint-free" ways of addressing these concerns.

When interventions such as increasing the contour in the seat or lowering the seat-to-floor height does not address these concerns, the therapist may identify a positioning strap or device as a necessity.

It is important to document the assessment findings, including the use of a positioning device that might be considered a restraint. Different provinces have different regulations as to what procedures are necessary to follow to use such devices, and it is important to follow these regulations.

Q I've been asked to recommend a therapeutic support surface for a client who has a Stage III pressure ulcer over her right greater trochanter. I've noticed that her heels are red when she is in bed, but my colleague says not to worry as the skin is not broken. Do you have any suggestions?

A Non-blanchable erethemia of the skin is considered a Stage I pressure ulcer under the National Pressure Ulcer Advisory Panel definitions (www.npuap.org) even though the skin is not broken. Implementation of a positioning program with the heels supported above the support surface, or provision of a device to manage pressure on the heel, is indicated.

As well as, a number of factors, other than pressure, need to be considered. These include

How the surface will impact

- the client's bed mobility
- independence with functional activities (e.g., getting dressed in bed)
- ease of care for the caregiver
- transfers

Other things to consider include

- How will the surface impact the client's living situation? (e.g., Does the surface impact the client's partner?)
- How easy is it to maintain the surface? Are there any special instructions that must be followed?
- Can the client afford a therapeutic support surface?
- Does the client lie on his or her pressure ulcer? Is he or she able to remain positioned off the ulcer?

Examining each of these factors will lead you to recommend a therapeutic support surface that manages pressure yet also fits the client's lifestyle choices.

Contact Linda via phone **416-232-1706** or e-mail **lnorton@shoppersdrugmart.ca**

ALS patient... *continued from page 3*

tract. Signs and symptoms usually begin in a particular area of the body, such as the leg or arm, with mild weakness and muscle wasting or spasticity. The disease usually then progresses, initially unilaterally, then bilaterally and widespread until, in the extreme case, there is very minimal or no motor function. Sensory function usually remains intact as does cognitive function (although there is now some controversy about this latter function). Control over bowel and bladder functioning remains normal. Some of the signs and symptoms that you may see include muscle weakness, cramping, atrophy, flaccidity, spasticity, contracture; fasciculation; hyporeflexia; dysarthria (difficulty swallowing; dyspnea (shortness of breath at rest); fatigue; sialorrhea (excessive salivation) and weight loss.

TABLE 1

Assistive devices

Area of need	Useful assistive devices
Personal hygiene	Long-handled sponge, wash-mitt, built-up handles for toothbrushes, comb, etc., electric razor, hand-held shower head, raised toilet seat, nail brush/clipper with suction cups, bathseats, grab bars
Dressing	Button hook, velcro, dressing stick, zipper ring, long-handled shoehorn, suspenders, sock, shoeaid, elastic shoelaces
Positioning	Ankle-foot orthosis, wrist splints, transfer board, wedge cushion for sitting in bed, cervical collars, head strap, head supports, wheelchair cushions for position and prevention of sores, E-Z lift chairs, hydraulic/ceiling lifts
Ambulation	Canes, walkers, manual wheelchairs, palm guard cuffs, electric wheelchairs with swivel togs or head or mouth controls, scooters
Feeding	Mobile arm support, non-skid matting, plate guard, rocker knife, built-up utensils, two-handed mug, suction machines for excess salivation
Meal preparation	Lap tray, lightweight pots, built-up handle on utensils, adapted paring boards, milk carton holders
Housekeeping	Lightweight mops, vacuums, long-handled tub brush, doorknob extension lever, grip aid for stove knobs, taps, keys
Leisure activities	Card holder, gardener's seat, spring action scissors, book holders, prism glasses, pencil holder
Communication and environmental control systems	Manual and computer assisted forms of communication are available. Check with your local hospital to see if they have an assistive technology clinic or an augmentative communication clinic.
Ventilation	Prescribed by a respirologist
Home modifications	Ramps, stair gliders, lifts, elevators

Management of ALS

Many management issues need to be addressed by health care providers throughout the course of this disease. Some of these issues include

- How does the individual and his/her family manage daily symptoms at home?
- What information does the individual and the family need to cope with the disease?
- What physical and emotional support systems need to be put in place to assist the individual and the family?
- How do we, as health care providers, enhance functioning, self-esteem, and quality of life for the individual and the family?

There are obviously more issues that can be listed. The constraints of this article make it difficult to list and address all of the issues, all of which are very important and crucial in the care of the individual with ALS.

The role of assistive devices

The types and purposes of assistive devices are numerous. Table 1 attempts to identify the types of assistive devices that can be utilized. The main and most important aspect of the provision of assistive devices that professionals must always keep in mind is the timing of the introduction of these devices. Due to the unpredictable nature of ALS, an individual's condition and ability level can change overnight. One must keep on top of not only current needs but also the future needs of the individual.

The main goal of managing care for an individual with ALS is to help them maintain as much independence for as long as possible. One of the ways to achieve this goal is through the use of assistive devices. The greatest loss that an individual with ALS experiences is the loss of control of function over his/her body. For some, it is a gradual process; for others, it is a rapid process. Providing assistive devices in a timely fashion as the individual's condition changes is crucial to maintaining independence. As health care providers, we must do all we can to ensure that, no matter the life expectancy of the individual with ALS, he/she can live with dignity, quality and comfort.

Teresa Riverso, OT, is an occupational therapist and owner of Supportive Environments. She can be reached at 905-770-3990.

Paediatric mobility: Manual wheelchairs

By Rowan Kimball, PT

The realization that a child will need to use a manual wheelchair can be a traumatic and difficult time for parents and families. Sensitivity and understanding by therapists and dealers are required, as families must learn about their child's specific needs and what can or cannot be expected of various systems.

Folding frames: Typically, a folding frame manual wheelchair is supported by a centre cross-frame, allowing both sides of the wheelchair to come closer together to make a narrower "package" for transportation and storage. Some chairs now have back canes that also fold down to the seat rails.

This type of chair is not the most energy efficient for the user. It is most convenient for the family whose child has difficulty walking distances and manoeuvering in malls or through crowds of people. It also works very well for a child who needs the support of a seating system and who has limited wheeling abilities.

For many families, this is the only type of wheelchair that the funding source will approve as it is "growable", both in seat width and seat depth, by changing the cross brace and seat rails. There are now many features that can be added to a folding frame wheelchair to make it easier to wheel.

Camber, while increasing the total width of the chair, certainly improves the chair's manoeuvrability and allows maximum advantage to the child who wants to participate in sports. Adjustable axel plates allow for optimum positioning of the wheels.

Wheels and casters come in many sizes and configurations. If a wheelchair will be used mainly indoors or on paved, smooth surfaces, the smaller and narrower varieties will work well. When a family enjoys an active outdoor lifestyle, then the larger and wider casters and wheels are better; however, compromise is often necessary, as easier movement over rough ground may make indoor manoeuvrability more difficult. Added to this is a choice between pneumatic and solid tires. Pneumatic tires require regular maintenance but can give a more comfortable ride over rough ground.

Brakes are usually mounted to the sides of the chair, with a pull-to-lock being preferable, so that during wheeling, the forward arm stroke cannot accidentally apply the brake. Scissor brakes and rear brakes are also options on some chairs. Many children find that brake extensions are useful, allowing them to reach and apply the brakes independently.

Reverse configuration is when the large wheels are positioned forward, with the casters to the rear. This set-up assists both young children and new wheelers to explore the effects of pushing on the wheels and the resulting movement. While this position is more difficult for caregivers to push the chair, it is far easier for occupants to gain movement and control of their chairs.

The front hangers offer more room for leg length growth when 70^0 hangers are used instead of 90^0 hangers. Generally, these will swing away for easier transfers, although some models now have a "lift-off" design. A few paediatric wheelchairs now have a single footplate option that swings under the frame during transfers. Along with the swing-away style hanger, footplates should flip up and can be angle-adjustable for better foot support.

Arm rests can be removable or flip-away to provide easier access for wheeling. Removable arm rests can be misplaced or left behind and often need to be removed by the caregiver, thus reducing the child's independence. The flip-away style can more easily be operated by the child. Arm rests come in either full length or desk length. For most children, access to tables, desks, computers and games is an essential part of life, and the desk length option is essential.

On smaller size chairs, it can often be difficult to find the space to mount the many parts of a seating system; a second rail can be advantageous in this situation.

Where seating and positioning are crucial, adjustable seat-to-back angles are an important and necessary feature.

All paediatric wheelchairs should be set up with anti-tippers to prevent unexpected tipping of the chair.

Rigid frames: A rigid frame chair provides the child with a more responsive and manoeuvrable chair. To store or transport the chair, however, requires more space, as the frame itself does not fold.

This type of chair tends to be lighter-weight with fewer moveable parts. A rigid frame chair is also more energy efficient, as none of the child's energy is lost to the flex of the frame as in a folding frame chair.

Usually, a rigid frame wheelchair is more appropriately selected when the bulk of the child's growth has taken place, as there is no growth available in seat width.

For teens who are active and independent wheelchair users, this type of chair works well and is often more aesthetically pleasing.

Tilt-in-space/recline: Tilt-in-space is a feature that allows the entire seating unit to be angled back to approximately 40-50 degrees. It does not change the seat-to-back angle as the recline feature does.

Some of the benefits of using tilt are to change the weight-bearing surfaces, reduce the compressive forces of gravity, assist the user to perform independent weight shifts and optimize feeding positions. For children who are prone to frequent seizures and sleep patterns, tilt provides for easier physical management without having to remove them from the chair. Recline is a feature that allows the wheelchair to open the seat-to-back angle into a flat or almost flat surface. The difficulty with this is that by changing the angle, the contours of a seating system no longer conform to the client's shape. There are some products available on the market designed to overcome this. For a short-term recline position (e.g., post-operative), any chair with an adjustable seat/back angle can be modified to maximize this angle.

One-arm drive: This feature can be fitted to many of the folding-style wheelchairs. It is very useful for a child with one stronger arm who cannot wheel straight by any other means. The attachment adds significant weight to the chair and is an added part to be removed each time the chair must be folded.

References are available upon request.

Rowan Kimball, PT, is a physical therapy consultant on the equipment team at the Centre for Child Development, Surrey, BC.

Aids for people with arthritis: Assistive devices benefits

By Sydney Lineker, BSc (PT), MSc, and Hazel Wood, BSc (OT)

Assistive devices and equipment are often prescribed to address functional problems or to reduce the impact of the client's environment. Use of assistive devices appears to be increasing as the population ages. They are typically used to make tasks easier and safer to perform and to facilitate independence.

Device use has been associated with reduced pain, disability and handicap. Devices may also reduce caregiver burden. Frequency of device use may vary depending on the type of device, education level, duration of the condition and living arrangements. For example, people who live alone may be more compliant in device usage.

Factors affecting usage

In recommending a device, it is essential that it meets the client's functional needs and is compatible with their ability and with the physical features of their home. For example, a raised toilet seat should be the right height and the right shape to fit securely on the toilet. As well, devices need to be easy to operate, esthetically acceptable, reliable and durable.

Acceptance of the underlying condition or disease may also affect a person's acceptance and use of assistive devices. Underuse of devices may be due to personal, caregiver, health professional and societal attitudes towards devices, lack of awareness or knowledge of available devices, or the associated costs. A person may perceive a device as inconveniencing others (e.g., a raised toilet seat or bath bench), thus decreasing usage. There may be a stigma attached to some devices, such as a cane, whereas other devices are normalized and thus more readily accepted (e.g., long-handled shoehorns).

Device use appears to be enhanced by proper training, opportunities to practice with the device and by demonstrating the device in the context or the environment in which it will be used.

Assistive devices

Assistive devices are a common component for the treatment of arthritis. They are often prescribed or recommended to substitute for reduced range of motion, muscle strength, endurance, manual dexterity and mobility; to improve body mechanics (promoting joint protection) or the pattern of gait; and to promote safety during activity. People with inflammatory arthritis are often more reliant on assistive devices or equipment than people with osteoarthritis, using more devices or using them longer or permanently.

Studies confirm that many people with arthritis do not know what devices are available to them, and self-recommended assistive devices are sometimes unsuitable to their needs. People with arthritis need to be educated about the selection of suitable devices and the alternatives of rental or purchase. They should also be educated about where to obtain devices for current and future reference. In addition, they should be informed about the appropriate use of devices (e.g., those that should be used on an ongoing basis to promote joint protection and energy conservation versus those that could be discarded, temporarily or permanently, if function improves).

In addition, people with arthritis can be shown how to modify existing equipment or devices as necessary, such as lengthening the handle of a brush or enlarging the grip of a garden tool.

Device use can also be viewed as promoting safety and preventing functional decline in healthy populations (e.g., grab bars). A combination of two approaches is likely needed: providing devices to help people with disabilities adapt to the environment and modifying the environment to accommodate all people, including those with disabilities.

References are available on request.

Sydney Lineker, BSc (PT), MSc, is a Research Coordinator with The Arthritis Society Consultation and Rehabilitation Service and Hazel Wood, BSc (OT), is Regional Director, Central East Region, The Arthritis Society.

For more information about assistive devices for people with arthritis, visit The Arthritis Society website at www.arthritis.ca.

Aging and disab

By Janet Gleason, MSc OT, Cert. Gerontology, OT Reg (Ont)

Advances in health care services have enabled increased longevity in people living with disabilities. As health care providers, we are seeing disabled people surviving into old age and thus being impacted by the normal aging process. In prescrib-

Changes
Skeletal
Muscle, heart and lung
Kidney and bladder
Stomach and intestinal
Endocrine gland
Nervous system
Sensory vision
Sensory hearing
Sensory tactile sensation
Sensory taste and smell

ility: Seating and mobility considerations

ing the appropriate seating and mobility technology, especially for our older clientele, we need to be cognizant of these changes. As well, as funding resources continue to be limited, disabled individuals are required to use their equipment for long periods of time, during which the aging process continues to take its toll.

The following chart presents some of the key aging-related factors that professionals, working with disabled individuals requiring seating and mobility technology, need to consider.

Janet Gleason, MSc OT, OT Reg (Ont), is the Professional Practice Leader, Occupational Therapy, at Providence Healthcare in Toronto, ON.

The normal aging process	Seating and mobility considerations
Bones lose calcium resulting in thinner, weaker bones, possibly kyphosis, posterior pelvic tilt, decrease lumbar lordosis, fractures, etc. Joints become rough, stiff and painful.	Contoured back support, open up the hip angle to accommodate posterior pelvic tilt, minimize lumbar lordosis, shock absorption features/pain management features (frame, cushion, tires). Need to support joints through properly adjusted seat to floor height, footrests, armrests, etc.
Muscle size and strength decreases. The heart muscle has to beat faster to meet exertion levels. Lungs become stiffer and more difficult to inflate.	Light weight in both wheelchairs and cushions (aluminum/titanium frame vs. steel chrome). Reduce energy expenditure requirements: set-up and adjustability, size and type of wheels, mount rear wheels forward, add camber, 95° front caster mount, all four limbs may be needed for propulsion, power options.
Kidneys get smaller, filter less blood and are less able to remove waste material efficiently. After age 70, the bladder is less expandable and often cannot empty completely. In men, the prostate gland surrounding the urethra often enlarges making it difficult to urinate.	Moisture-proof cushions and covers, minimize pommels, maintain easy access for urination.
Secretion of saliva decreases, often making it more difficult to swallow. As the intestine ages, food tends to collect and it becomes dry and difficult to move causing constipation.	Position in space options. Position as upright as possible to aid digestion, dynamic tilt, head position, etc.
The gland produces hormones that help control blood sugar, blood pressure and body temperature. Falling hormone levels allows blood sugar to rise causing bones to become fragile and menopause to occur.	Fragile bones: prevention, protection, comfort. The healing process of fractured bones is enhanced through early mobilization and weight-bearing.
Cognitive changes are not associated with the normal aging process; however, movements do become slower, balance decreases, hand movements are not as steady, and co-ordination declines.	Stable seat surface, low seat-to-floor height and level frame to enhance transfer ability, camber, forward wheel position.
Normal vision changes include difficulty seeing in dim light, decrease in the peripheral field, and the lens turning yellow causing difficulty seeing colours.	Black on black is both difficult to see and distinguish, brighter colours such as yellow or red should be considered. Personal preferences in colour should always be considered. Colour LED displays for battery chargers and speed gauges (red/yellow/green).
Some hearing loss is normal, especially in the higher pitch range.	Horns — volume and low pitch.
Skin becomes less sensitive to touch and temperature.	Plastic-coated hand rims.
Taste and smell become less sharp and the taste for sweet, sour and salt becomes less defined, thus food tastes bland and neglecting eating becomes common.	Obtain information from family members/caregivers if odour is possibly an issue. Consider extra/incontinent cushion covers.

Bathroom safety: Prevention makes the difference

By Carmine Milantoni, BSc (OT), and Charlene O'Connor, BSc (OT)

The bathroom has been identified as a primary area in which the elderly are at risk for falls. Falls are common occurrences for the elderly and can result in serious physical and emotional consequences. One-third of individuals over the age of 75 have falls, and approximately 75 per cent of falls occur in the home. In Canada, accidental falls are the fifth and second leading cause of hospitalization for elderly men and women, respectively. Common fall-related injuries include head trauma, soft tissue injuries, dislocations and fractures. In addition, the fear of falling and re-injury may lead the elderly to restrict their level of activity and, ultimately, falls may precipitate admission to a long-term-care facility. In fact, falls are a major factor in decisions by older persons and their families to pursue placement in long-term-care facilities.

Bathrooms contain the most environmental hazards when compared with other rooms in seniors' homes. As a place where older people perform their daily routines, the bathroom is not always conducive to the safe performance of these tasks. Bathroom activities often place demands on elderly adults which put them at risk of falling (i.e., walking barefoot on slippery tile or stepping into a bath tub). Therefore, bathroom safety is a major concern for elderly persons, their families and their caregivers.

Bathroom safety statistics

33%
of people over age 75 have falls

75%
of falls occur in home

40%
of all household accidents occur in the bathroom

Surveys of severely disabled elderly reveal:
68% do not have grab bars
80% do not have raised toilet seats
46% do not have non-slip bath mats

Increasing safety in the bathroom

Many falls in the bathroom can be predicted and ultimately prevented. Occupational therapists play a critical role in identifying potential risk factors for falls by conducting home safety assessments. As a result of their recommendations and patient education, the bathroom environment can be made a safer place for the elderly to perform their daily tasks. Table 1 outlines potential safety hazards in the bathroom and some possible solutions for increasing bathroom safety.

Although bathing gets more difficult with age and declining health, the elderly can largely compensate for their loss of function with assistive devices. Surprisingly,

TABLE 1
Bathroom assessment/interventions

Risks/problems to be assessed	Possible interventions
• wet/slippery surfaces	• non-stick strips, non-skid mats
• pathways cluttered	• remove clutter
• dim lighting	• ample lighting, nightlight at night
• loose throw rugs or mats	• remove throw rugs; non-skid backing
• toilet seat too low or wobbly	• raised toilet seat; versa frame; safety pole; commode chair
• taps difficult to turn off or reach	• tap turners; hand-held shower head
• soap, shampoo difficult to reach	• accessible shelves; soap dish with suction cups
• holding on to toilet paper holders, towel racks, soap dishes	• grab bars
• outlets, switches, sink difficult to reach	• re-locate outlets and switches to accessible height
• bending in shower/tub to wash feet	• long-handled sponge
• tub transfers difficult	• bath board; bath bench; tub transfer bench; grab bars; safety pole; tub clamp-on rail; lift systems
• other	• mark cold and hot faucets clearly; temperature regulators; leave door unlocked; wheelchair accessible modifications

it has been found that many elderly persons with severe disabilities lacked assistive devices in the bathroom. As much as 68 per cent of this population did not have grab bars, 80 per cent did not have a raised toilet seat, and 46 per cent did not have a non-slip bath mat.

Of greatest concern is the fact that although the elderly consider falls to be preventable and understand the importance of fall-related risk factors, they do not necessarily consider themselves susceptible to falling. The elderly may reject or not use equipment because of the perception that there is no need for the devices. Additional reasons for not using equipment include its unsuitability, high cost, and/or the stigma associated with using equipment. The occupational therapist must consider these reasons for non-use when recommending equipment and/or safety modifications.

In order to reduce the incidence of non-use, the following strategies should be employed: obtain knowledge of the physical and sociocultural characteristics of the client's home before prescribing equipment; include the caregiver in the process of training the client about the equipment; use short intervals when training; and offer more practice opportunities in the home.

Prevention makes the difference

Knowing that each year about one-third of people over the age of 75 have falls in the home tells us that we cannot ignore this issue. Improving bathroom safety can make a difference in preventing falls among the elderly. Assistive devices and home modifications are a means of improving the safety and functionality of the elderly living in their homes. Occupational therapists are skilled at assessing home safety issues, recommending appropriate equipment and modifications, providing education, and improving awareness of risk factors for falls.

References are available on request.

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Fitting the bariatric client:
Seating and mobility prescription considerations

By Sheila Buck, BSc (OT), Reg (Ont), ATP

Placing a bariatric client in a wheelchair is not as simple as ordering something that is bigger, wider or longer. Several factors must be considered to ensure not only proper fit but also to maximize chair rollability and parts durability. When measuring a bariatric client for a wheelchair, the following factors must be addressed.

Measurements: The client should sit on a solid surface during measurement. Due to a client's weight, soft surfaces will roll and dip, creating illusions of internal rotation of the hips and possibly resulting in smaller measurements than are required. Measurements should never be taken in a lying or supine position as the distribution of the adipose tissue is much different than in sitting and will skew measurements.

Ensure that the client's femur is level and not on an upward or downward slope from the hip joint. In a sitting position, the client is also observed with the abdominal mass in position, where it may interfere with leg adduction. Measurements should be taken with a flat line/flat hand and never by circling around the abdomen. The tissue mass should be gently gathered to a firm measurement without pitting the tissue or pressing so hard that indentations are observed.

Seat width: Measure the widest part of the client in a seated posture. This may vary due to gluteal femoral weight distribution; therefore, the widest point could be at the trochanter or perhaps at the lower femur due to excessive abduction from abdominal mass. If this is the case, both measurements should be taken to determine the final wheelchair measurement. With bariatric clients, the seat width measurement is the most critical, as it will determine the overall functionality of the chair related to environmental barriers. For clients with pear-shaped bodies where there is greater gluteal distribution, a wider chair may result in poor support through the armrests and in difficulty for the client reaching to the handrims. Consideration should then be given to slide on wider armrests or trays for arm support and to place camber in the wheels and allow for larger wheel sizes to increase access and comfort. Recognize the potential need for mechanical lift slings or weight shifting, and therefore add one to two inches to the final client measurement to gain the wheelchair measurement.

Seat depth: Measure from the back of the buttocks—again against a firm surface to the back of the knee or calf area, whichever would hit the seat of the wheelchair first. For some clients, it may be the back of the knee; for other clients with large calf areas, it may be one to two inches below the back of the knee depending on the cushion height. The actual seat depth of the wheelchair and cushion should allow for approximately one to two inches of relief from the back of the client's knee to prevent circulatory problems, pressure points or shearing, and interference with foot propulsion. The seat surface should support the whole gluteal region to maximize pressure relief. For clients who exhibit a large posterior bulbous gluteal region, a chair with a longer posterior seat pan with the ability to move the back posts forward above this area for back support should be explored. Alternatively, back supports that are contoured for lower cutouts, are biangular, or are adjustable in tension through strapping can be mounted in the chair.

continued on page 12

Seating and mobility: The intervention process for the older adult

By Guylaine Desharnais, OT

In reviewing the literature, it is apparent and widely recognized that older adults can benefit from the use of properly fitted seating and wheeled mobility systems.

For both prescriber and provider, however, wheelchair and seating equipment provision remains a multi-faceted process where one is faced with the challenge of many choices and options to consider as well as numerous possible configurations.

This article briefly reviews the decision-making process I employ to select equipment to create an optimally fitted seating and mobility system.

Intervention principles

Following are principles that form the basis to my interventions.

Comfortable and functional seating over corrective seating: It is the old first aid principle of "life over limb" which I have translated to seating and wheeled mobility intervention with the older adults.

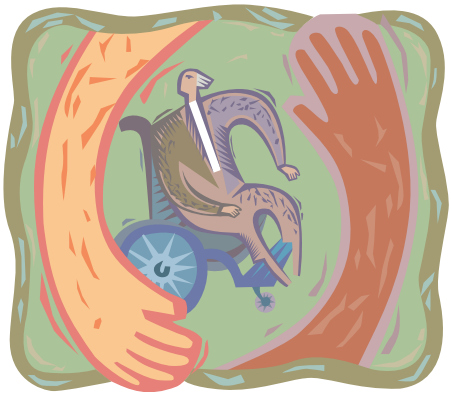
The goal for intervention is "to ensure optimal quality of life." In order to meet this goal, comfort and function become the priorities. I will correct a poor posture only if it limits comfort and function, and I will limit the amount of correction to ensure that comfort and function are maintained.

Older adults are not immobile; they are limited in mobility: Being mobile means the individual will move and shift his or her position on the seat

- for pressure relief to maintain good skin integrity
- for postural relief to maintain comfort in long term sitting
- to make postural adjustment for position of rest or for function

Being limited in mobility means not being as successful in shifting position. We need to provide the older adult with the best possible base to sit on and allow life to happen.

Creating a restraint-free environment: The use of restraints denies the individual the ability to move and shift position on the seat.



It can also become an environmental barrier. For example, the use of a lap tray prevents the individual to sit with others at a table. Even if brought close to the table, he or she still sits behind the others and not with them.

For all interventions, restraints such as a pelvic positioning belt or any seating equipment that has a "restraint" component, is introduced only at the end of the process after all other options have been assessed and tried.

There are two basic types of restraints: *active* restraints restrict movement; *passive* restraints limit movement.

While allowing for movement on the seat, I want to control or limit the undesirable component of a movement; for example, shifting the pelvis forward on the seat. Shifting the pelvis forward can easily become sliding forward. Once past a certain point of sliding forward, it is very difficult, if not impossible, to bring the pelvis back on the seat. It then becomes a safety issue of falling out. So I want to maintain the ability to shift position on the seat but control the sliding.

Slow memory-foam seat cushions are used to decrease peak pressure by allowing the pelvis to sink in the surface with decreased resistance to conform to the sitter's shape. Foam is also an immobile surface. By sinking in the foam surface, the pelvis is trapped and thus immobilized. Therefore, by its nature, a slow memory-foam seat cushion can be used as a passive restraint to control the undesirable component of a movement. (The objectives of the intervention process are highlighted in Table 1 on page 11.)

The process of providing a seating and mobility system is a two step-process. I consider the seating system first and then the mobility base.

1. Seating system

Base of support – Pelvis

Assessment – Tendency for movement: With the client in the supine position, assess pelvis mobility to determine the tendency for movement. For example, on assessment, it is established that the pelvis can be mobilized from the neutral position to a full posterior tilt. The pelvis cannot be moved toward an anterior tilt. So the range available for movement is from neutral to full posterior tilt; therefore, the tendency for movement will be toward a posterior pelvic tilt. Identify contributing factors that can feed this tendency. Intrinsic factors, such as high extensor tone, and/or extrinsic factors, such as a stretched sling backrest, can compound the tendency.

Intervention – Seating equipment: The intervention must first address the positioning needs of the pelvis, to support it in its optimal position. For example, using a rigid backrest to block posterior tipping. Then address factors that may feed the tendency. For example, using a slow memory-foam seat cushion as a passive restraint.

Angles of the seating system

Assessment – Lower extremities ROM: Lower extremity range of motion dictates the primary angles of the seating system. Hip flexion dictates thigh-trunk angle, which must be translated into seat-to-back angle. Knee and ankle range of motion dictates the type of foot support required.

Intervention – Seating equipment: Set the seat-back angle to accommodate the amount of comfortable hip flexion. If hip flexion is limited, use a backrest with an adjustment in recline or angle-adjustable back post to open the hip angle.

Select a foot support, footrest hangers and footplate to accommodate possible knee and ankle ROM limitation.

Selecting a backrest

Selecting a backrest is a two-step process. First, select the primary shape of the backrest; second, determine the type of trunk support required. The primary shape of the backrest must accommodate the shape of the back to maximize support to the trunk and to ensure optimal pressure distribution. These must match just like two pieces of a puzzle.

Assessment: The objectives for the assessment are to establish if a spinal deformity is present, if it is fixed or flexible, and to determine the shape of the back.

- In supine and sitting, look at the position and alignment of the shoulders and the head.
- Sitting on the edge of the mat table, check the alignment of the spinal processes, look at skin fold, feel the rib cage.
- What is the shape of the spine? Is the shape symmetric or asymmetric?

Intervention — Seating equipment: Select a backrest that conforms to the shape of the back. For example, using a flat backrest for a client with a fixed mid-thoracic kyphosis may result in leaning, turning, shifting and sliding to unload the prominent spinal processes.

Trunk support

Assessment: The assessment is to determine the quality of trunk control to provide the support required and where it is needed to ensure free use of the upper extremities. Sitting unsupported on the edge of the mat table, how does the client manage his or her sitting position against gravity?

- Hands-free sitter. Able to maintain trunk in the upright sitting position and has free use of upper extremities.
- Hands-dependent sitter. Able to maintain the trunk in the upright position using upper extremities for support. When asked to move their arms, the trunk begins to collapse.
- Prop-sitters. Unable to maintain the upright sitting position without full support.

What is the tendency in falling? Note the direction (falling over to the side, falling back) and the type of falling (rigid, collapsing/crumbling under gravity).

TABLE 1

Intervention objectives

Determine the individual's optimal sitting position.

- Establish the potential for independent mobility.
- Generate a description of the seating and mobility system.
- Select seating equipment and the mobility base.

Intervention — seating equipment: Trunk support is provided through the selection of appropriate back height and the use of lateral trunk support.

For the older adult, I prefer to use a deep contoured backrest to add on lateral trunk support as it supports the whole lateral aspect of the trunk. It is a "midline hug".

Consider the orientation in space. By changing the orientation in space of the seating system, we can use gravity to minimize muscle work necessary to hold the position, to assist with postural alignment and postural control, and to optimize sitting tolerance and comfort in long term sitting.

2. The mobility system

Ask yourself: is the client able to mobilize a wheelchair independently?

If *yes*, does the person propel with upper and/or lower extremities?

- Assess for possible limitations in range of motion and strength as this impacts on the wheelchair set up.

If *no*, is there potential for independent mobility?

- Assess quality of movement in upper and lower extremities, and range of motion and strength.
- Compare upper and lower extremities' mobility to determine possible preferred method of propulsion.
- Set up the mobility system.

Consider a tilt-in-space wheelchair for individuals who cannot tolerate upright sitting or who are immobile in sitting.

As a general rule, tilt-in-space wheelchairs are not used if the individual can mobilize a wheelchair. Tilt-in-space wheelchairs do have some advantages over a geriatric chair. They are designed for seating with a greater choice of components; they can be fitted with any off-the-shelf seating equipment; and they don't have a finite shape but offer an infinite number of possible configurations.

Tilt-in-space wheelchairs are designed for greater mobility. They are lighter, shorter and narrower than geriatric chairs. They also offer a choice of rear wheel and caster for indoor and outdoor mobility.

Guylaine Desharnais, OT, is an occupational therapist with Vancouver General Hospital, part of the Vancouver Coastal Health Authority.

Bariatric client... *continued from page 9*

Seat height: Measure from the client's heel (shoe or actual, depending on client's standard footwear, lack of footwear or foot propulsion) to the back of the knee where the seated surface comes into contact. Ensure that the thighs are level relative to the hip joint. The final wheelchair seat-to-floor height will be critical to the client's functionality. If the client is a foot propeller, then the finished seat-to-floor height, including the cushion, should be the same as the measured knee-to-heel height. This may vary up or down by one inch depending on the type of foot propulsion. If the client uses arms only for propulsion, then the seat height should be set according to comfort level in transfers (if independent) or to access to environmental areas.

The bariatric client must be provided with a wheelchair that allows for a forward centre of mass and for the ability to move the rear axle into a forward position.

Backrest height: Measure from the seat surface to the inferior border of the scapula. Depending on the client's ability to wheel the chair with his arms, the actual back height may equal this measurement or be one to two inches higher or lower to provide good back support without interfering with arm and scapular mobility. As noted above, when discussing seat depth, the backrest may need to be contoured or fit around the client's bulbous, gluteal mass; therefore, two measurements may need to be taken to reflect this. Due to the amount of weight that can be placed against a backrest, a solid-style backrest or at least an adjustable one is recommended to ensure adequate posture over time.

Angle-adjustable back posts: The ability to open up the seat-to-back angle may be critical for those clients who have a large abdominal mass that restricts hip flexion or anterior pelvic tilt. This can also reduce the pressure of the mass on the thigh, which can create increased moisture trapping and pressure ulcers.

Armrest height: Measure from the sitting surface to the underside of the arm with the elbow bent so that the arm is parallel to the seat surface. Add to this measurement the height of the cushion to be used to determine if the height of the armrest will be adequate. Armrest heights are often an area of poor fit due to a lack of adequate height adjustability. Armrests are critical to assist the client in reducing neck and thoracic pain by providing adequate support for the shoulder girdle. Often bariatric clients have a compromised respiratory status and require armrests on which they can lean forward to increase the depth of their breathing. Pressure relief, moving from sitting to standing, and weight shifting are other tasks that require adequate arm support.

Centre of gravity: In the average person, the centre of body mass is located approximately one inch forward of sacral vertebrae. In order to maximize wheelchair performance and propulsion, approximately 80 per cent of the body weight should be distributed over the rear axle. In bariatric clients, this centre of body mass may be several inches forward due to abdominal masses or bulbous gluteal mass; therefore, the bariatric client must be provided with a wheelchair that allows for this more forward centre of mass and for the ability to move the rear axle into a forward position, which will enhance access to the handrim to maximize propulsion.

Tires: Due to weight issues, solid mag tires should be utilized to decrease maintenance issues and increase tire longevity. Although pneumatic tires will provide a smoother ride outside, they may have a tendency to roll off the rim during turning and may experience sidewall fatigue over time. Maintaining adequate pressure is critical to enhancing a chair's ride.

Power wheelchair: Many clients may require power wheelchair applications due to cardiac insufficiency. The above measurements are as critical for power wheelchairs as they are for manual wheelchairs in determining size. Heavy duty wheelchairs, especially those made for the bariatric population, should be considered in order to avoid frames that may be susceptible to metal fatigue, impact and shear forces. Motor pull and durability are also critical.

Once the above factors have been considered, then the client's seating must be factored to maintain positioning. Solid backs with lateral wrapping for trunk support may interfere with positioning of lift slings and also add to the overall width of the wheelchair due to the need to get the client into the shape. Swing-away laterals or short higher-mounted laterals may alleviate this problem. Seat cushions must be considered for contour as well the depth of seat wells, which will vary with each individual based on their weight distribution. Materials of the covers and support surfaces should also be considered for the ability to wick away moisture. Footrests should be solid with minimal moving parts to enhance durability, especially for those who tend to push off the footplate when repositioning their body. Often, footplates are too narrow and may not provide adequate support medially.

Ultimately, when prescribing bariatric wheelchairs, the goal is to enhance mobility and function while maintaining accessibility, comfort, pressure relief and durability. If you have considered all of these factors, you can assist your client in moving onward instead of being left in bed for the lack of a mobility device that fits.

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