Gabriel is a young adult with osteogenesis imperfecta (OI). He has a manual and a power wheelchair, both of which he uses independently. Why does he need two mobility bases? In Gabriel’s case, as with many wheelchair users, a combination of factors led to utilization of more than one mobility base. Gabriel is able to self-propel an ultra lightweight manual wheelchair for short distances over smooth, level surfaces. He cannot propel longer distances, over varied terrain or up slopes due to poor biomechanics, decreased muscle strength and decreased endurance. His OI has resulted in contractures and short stature. Due to limited range and small upper extremities, his biomechanics are poor and it takes quite a bit of effort to move short distances. Due to the extent of the contractures and his muscle strength, as a result his endurance is low. He uses a power wheelchair for longer distances and negotiating a non-level, non-smooth world. The power wheelchair requires far less effort, both in terms of strength and endurance. So why does Gabriel even need a manual wheelchair? Well, besides providing a back-up to the power wheelchair, the manual wheelchair provides independent mobility within the home. Gabriel’s home is not accessible, so he uses the manual wheelchair indoors and the power wheelchair out in the community.

**Manual Wheelchairs: Clinical Criteria for Efficient Self-Propulsion**

If you are assessing a client for independent wheelchair mobility, it is essential to determine whether to order a manual or power wheelchair. If a manual wheelchair is indicated, many bases are available to best meet an individual’s needs. The following are clinical indicators for efficient manual wheelchair self-propulsion:

1. **Efficiency: this is a combination of effort and speed.**
   a. Effort/Fatigue/Distance: If a client can propel, but only with great effort, then propulsion is not efficient. Functionally, the client may be too fatigued to participate in mobility related activities of daily living (MRADLs) or to propel more than short distances. Fatigue is a big deal. Clients with MS or autoimmune conditions may lose function (temporarily or even permanently) if pushed past a certain fatigue level. Muscle fatigue can lead to increased muscle tone in clients with neurological disorders, such as cerebral palsy, as the body tries to compensate for those tired muscles. Clients with decreased cardiopulmonary function should not exert themselves to a level of fatigue as the heart may be overtaxed and respiratory status compromised.

   b. Speed: Great effort typically results in decreased speed. Speed is important for a variety of functional tasks. Crossing the street is a prime example. If the client takes too long to move from point A to point B, MRADLs may be affected and school and work tasks compromised.

2. **Body mechanics:** one drawback of long term manual wheelchair use is repetitive stress injuries of the shoulder. Clients who otherwise could continue using a manual wheelchair may have to switch over to power solely because their shoulders are so deteriorated. Proper set-up of the manual wheelchair and propulsion training can decrease risk of future damage. If a client is unable to use an efficient stroke pattern, as in Gabriel’s case, propulsion efficiency decreases (increased effort and decreased time) and repetitive stress risk increases.

3. **Terrain:** only a small portion of our environment consists of smooth, level surfaces such as linoleum hallways. Many homes have carpets of varying naps and thresholds of varying heights. Propelling over carpet and over thresholds requires considerably more strength than propelling over a smooth and level surface. Outdoors, the challenges increase. Terrains now include cement and asphalt (which may include cracks and potholes) and grass. Although a variety of tires are available, no manual wheelchair does well in gravel, sand, snow and ice. Propelling over varied terrain, such as sidewalks, requires more strength and endurance than smooth and level surfaces.

As the push for a Separate Benefit Category for Complex Rehab Technology moves forward, we all must be ready to play hard.

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4. **Slopes:** slopes include ramps, driveways and curb cuts. Curb cuts have a fairly gentle slope, but ramps are not always compliant with the American with Disabilities Act and require quite a bit of strength to go up, to prevent rearward rolling and to prevent undue acceleration when going down.

5. **Non-accessible situations:** some manual wheelchair users are able to pop a wheelie to get up and over curbs and other obstacles. This is an important skill to increase independence in the community. Very few power wheelchairs can manage curbs.

If the client cannot self-propel a manual wheelchair efficiently (effort and time) and under required everyday circumstances (terrain and slopes), a power wheelchair may be indicated.

**POWER WHEELCHAIRS: CLINICAL CRITERIA FOR EFFICIENT MOBILITY**

In reality, a power wheelchair is always more efficient than a manual wheelchair as less effort and time is required. So why not order power wheelchairs for everyone? Physiologically, self-propulsion does provide some cardiovascular work, which is a good thing for most people. Funding realities – manual costs less. Accessibility – the world is inaccessible enough to manual wheelchairs, but power wheelchairs require even more accommodation. A manual wheelchair can often be carried up stairs, if necessary. A power wheelchair weighs about 300 lbs! A manual wheelchair can sometimes be folded or otherwise disassembled and placed in a trunk or the back seat of a car. A power wheelchair generally requires an accessible vehicle.

Socially, people using manual wheelchairs are viewed as more “able” than a power wheelchair driver.

The following are clinical indicators for efficient and independent power wheelchair mobility:

1. **Cognitive:** if a client understands how to use a manual wheelchair, but cannot do so efficiently, they should be able to use a power wheelchair. If you are not sure if the client understands the task, assess mobility skills and provide mobility training to develop skills, as indicated.

2. **Vision:** vision (acuity and perception) requirements vary from manual to power wheelchairs. In a manual wheelchair, the client’s hands are on the wheels or rims. If the frame contacts something, such as a wall, the client will feel this more so than a power wheelchair driver. This provides additional feedback that can compensate for impaired vision in a manual wheelchair. Also, the manual wheelchair will only “bump” a wall, whereas a power wheelchair may literally begin to “climb” a wall, depending on how it is programmed. Many power wheelchair drivers have low vision and do well in familiar environments, particularly indoors. Outdoors is more difficult due to lighting and varied terrain, such as gravel and curb drop offs. I have worked with clients with no vision who drive a power wheelchair, typically using a cane in one hand and driving slowly. Depth perception does not develop until independent mobility occurs, so if the client has had no previous independence at all, it may take a few weeks for this skill to mature.

3. **Motor:** a manual wheelchair has significant motor requirements. Large bilateral coordinated upper extremity movements are used. Motor requirements for power wheelchair driving are quite different. The joystick is the most common access method. A variety of non-proportional access methods are available, as well.

4. **Other factors:**
   a. Power seating: after choosing a power wheelchair, lots of specific features are available to meet an individual’s needs. One feature is power seating, including tilt, recline, elevating legrests, seat elevators and standers. A key difference in manual and power wheelchairs is independence in this area. Although some of these seating features are available on manual wheelchairs, the client can rarely control the feature independently. Power wheelchairs provide independent control.

If a client cannot self propel a manual wheelchair efficiently or use a power wheelchair safely and independently, a manual wheelchair for dependent mobility (i.e. caregiver propulsion) may be indicated.

When evaluating a client for a wheelchair, it is important to determine whether a manual or power wheelchair will provide the most efficient and appropriate mobility for an individual’s needs. Even clients who can self-propel may benefit from a power wheelchair for increased independence and efficiency.

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