

Anatomy of a Manual Wheelchair



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Abstract

- This presentation illustrates the components of a manual wheelchair.
- Note pages contain a brief description of the function of each component.



This presentation illustrates the components of a manual wheelchair.

Presenter/s Bio-sketch

- Dr. McKeough is an Associate Professor of Physical Therapy at Shenandoah University in Virginia.
- He received his doctorate in the control of human movement from Columbia University and teaches physical therapy intervention with individuals who have suffered spinal cord injury.



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Learning Objectives

- To be able to identify the primary components of a manual wheelchair and describe their function.



At the conclusion of this presentation the learner will be able to identify the primary components of a manual wheelchair.

Performance Objectives

Given an appropriate wheelchair or illustration:

- be able to identify the primary components of a manual wheelchair and describe the functions of each.



At the conclusion of this presentation the learner will be able to identify the primary components of a manual wheelchair.

Manual Wheelchair Components Labeled



Click on name to magnify

- | | | |
|---|--|--|
| 1. Push handle bracket tube | 10. Axel plate | 19. X-Hinge |
| 2. Backrest | 11. Frame | 20. Swing-away foot rest |
| 3. Swing-away, padded armrest | 12. High wheel lock | 21. Crossbrace |
| 4. Pneumatic tire | 13. Swing-away release | 22. Caster fork |
| 5. Aluminum handrim | 14. Caster housing cover | 23. Caster wheel |
| 6. Aluminum wheel rim | 15. Caster plate | 24. Caster tire |
| 7. Spokes | 16. Caster housing | 25. Flip-up foot rest |
| 8. Rear wheel hub | 17. Seat cushion | 26. Heel loop |
| 9. Release axel | 18. Seat sling | |



This slide shows a manual wheelchair with the primary components identified by number. Each of these components will be described in the following slides.



Push handles are extensions to the top of the backrest frame that project backwards from the wheelchair and permit an aid to help propel the chair from behind.



The back rest is the suspension between the upright components of the seat frame against which the operator rests his/her back.



Swing-away arm rests are the frame components on which the operator rests his/her arms. Swing-away arm rests may be rotated out of the way during transfers without having to remove them from the chair.



Wheelchair tires provide the contact between the wheelchair and the ground. They can be grouped into 3 general classes: pneumatic, semi-pneumatic, and solid rubber. Pneumatic are filled with air and provide a cushioned ride but are susceptible to flats. Semi-pneumatic are filled with gel instead of air to maintain cushioning but eliminate the possibility of flats. Solid rubber are the most durable and maintenance free but provide the roughest ride.



The hand or push rim is attached to the outside of the wheel and provides the surface against which the operator pushes with his/her hand to propel the chair. The hand rim is made of strong, light-weight material like aluminum.



The wheel rim is the surface on which the tire is mounted. It is made of strong, light-weight material like aluminum. The wheel rim is connected to the axel by the spokes.



The spokes are the suspension system by which the tire and rim are connected to the axle. Spokes are made of strong, light-weight material, either wire or plastic. Spokes are also responsible for keeping the wheel in round.



The hub is the center component of the wheel to which the spokes connect. The hub also houses the axel.



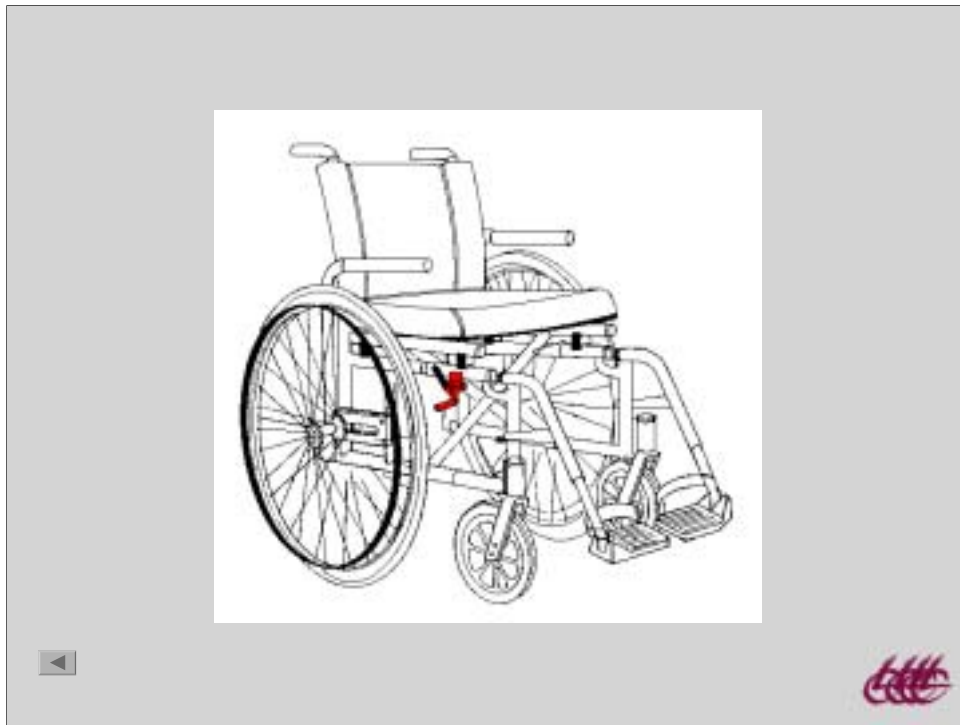
The quick release axel permits the wheel to quickly and easily disconnected from the frame.



The axle plate connects the wheel to the frame via the axle. Because the axle plate is adjustable it permits the wheel base to be lengthened to increase wheelchair stability or shortened to increase mobility.



The wheelchair frame is the rigid, tubular structure that supports the seat and the wheels.



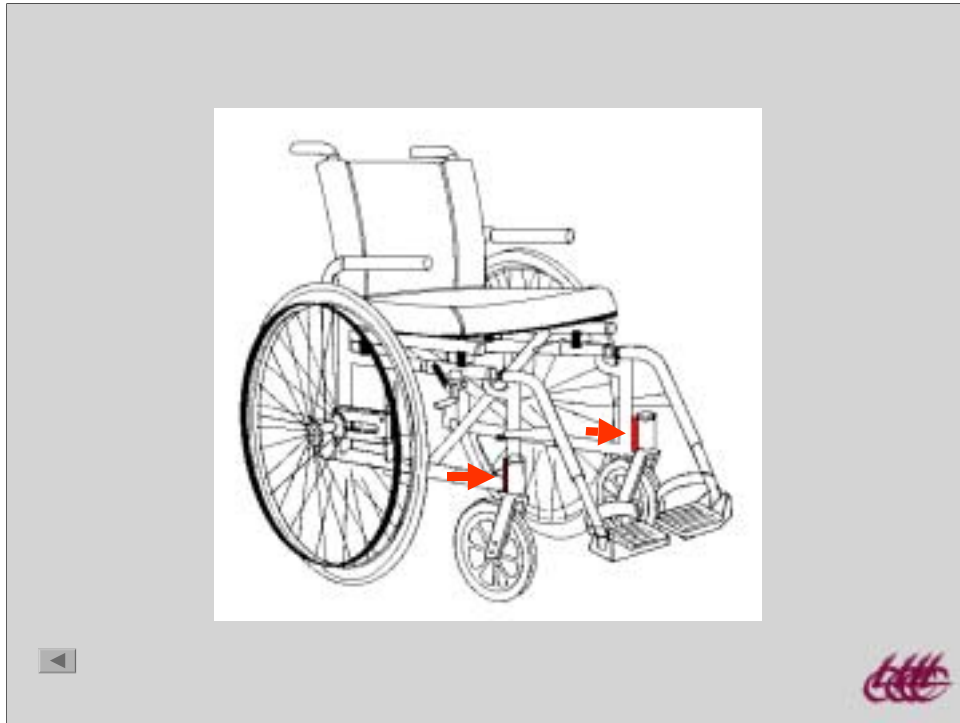
The brakes are the components that permit the wheels to be locked in place preventing unwanted motion. There are many types of brakes and they can be positioned in many locations on the wheelchair. All brakes extend from the frame to the wheels and use some form of mechanical locking (lever) system.



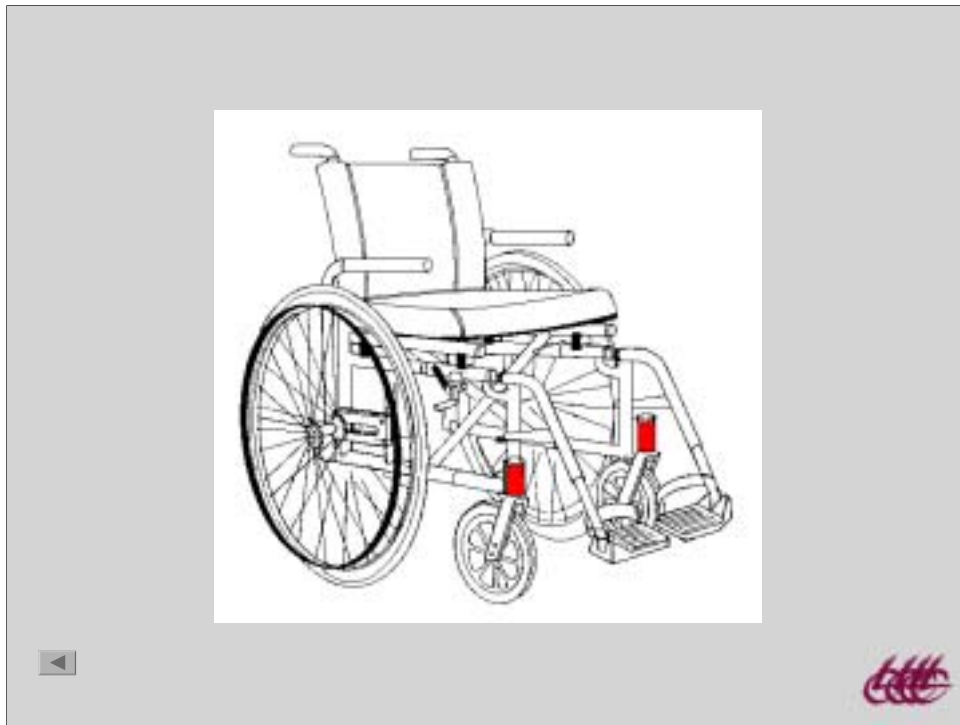
The swing-away release level permits the foot rests to be rotated out of the way during transfers without having to remove them from the chair. The release level is always located within easy hand access of the seat.



The caster housing cover is a removable cap that permits the ball bearings inside the caster housing to be lubricated.



The caster plate is a rigid surface by which the tubular caster housing is connected to the tubular frame.



The caster housing is a tubular extension of the wheelchair frame. It is filled with ball bearings and receives the caster fork projection. Together they form a pivot joint about which the caster can rotate 360 degrees. This arrangement increases the maneuverability of the chair.



The seat cushion is made of compliant material that permits the dispersion and absorption of force (pressure) between the operator's body and the sitting surface. Seat cushions come in many varieties across a wide range of prices.



The seat sling is the suspension between the frame components on which the seat cushion rests. In folding frames the seat sling is flexible permitting the frame to fold. In rigid frames the seat sling is rigid providing a more stable base of support.



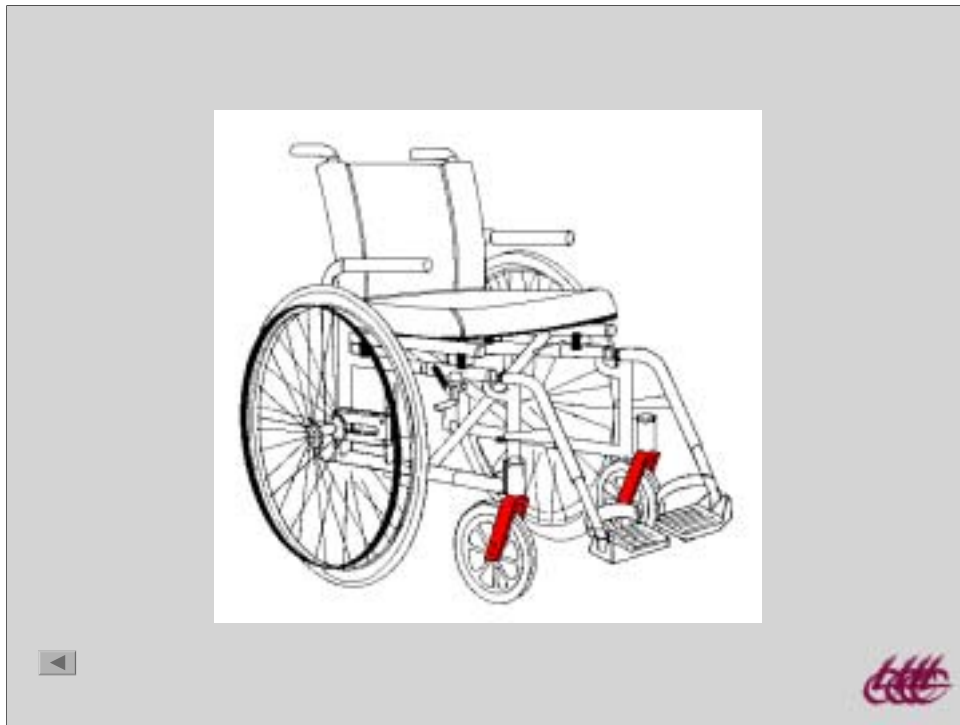
The X-hinge extends from the frame to the cross supports (X-member) of a folding frame and permits the wheelchair to be folded into a more compact size.



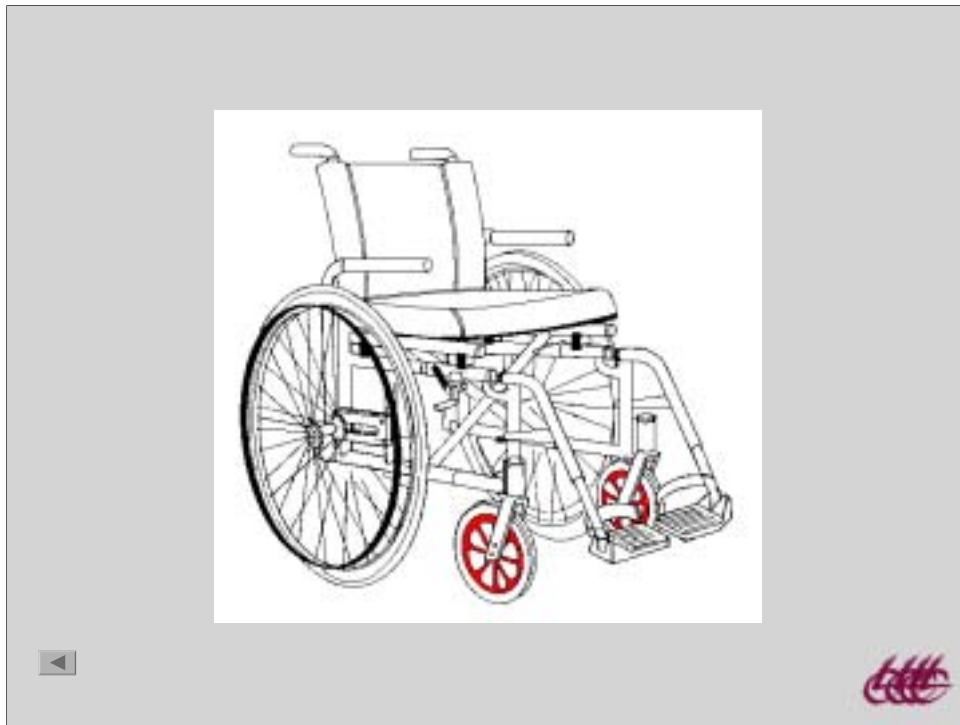
Swing-away foot rests provide a platform on which the foot may be supported. The hinged connection with the frame allows the foot rest to be rotated out of the way (swung-away) for transfers.



Cross braces (X-members) provide strut support between the two side frames. Because the cross braces connect to the frame by hinges, the chair may be fold and become more compact.



The caster fork connects the caster wheel to the frame via the caster housing.



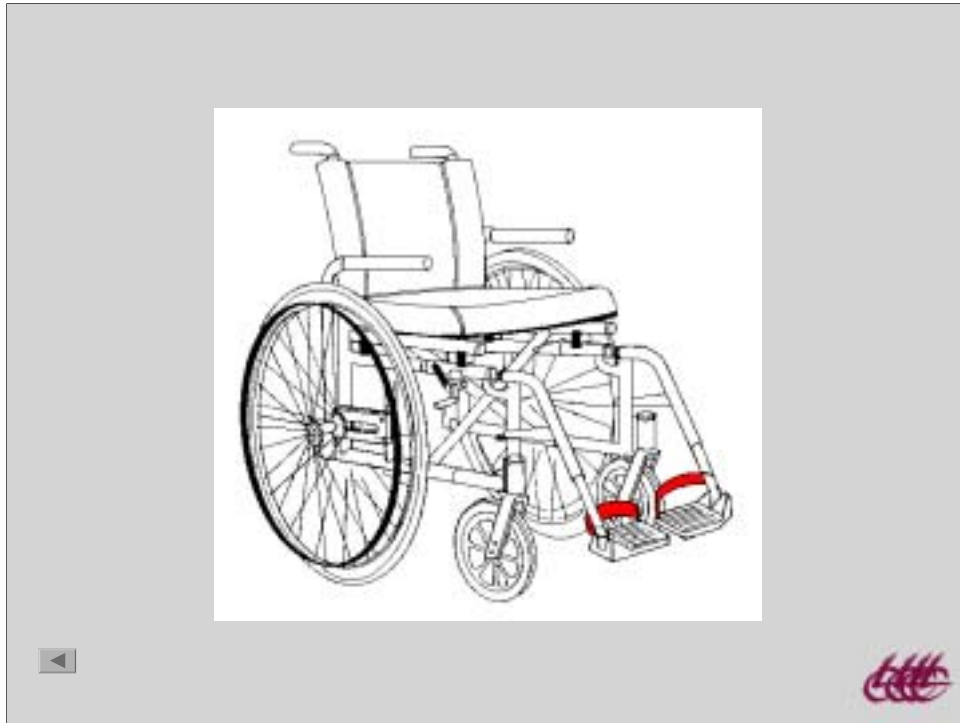
The caster wheel provides the base on which the caster tire is mounted and connects to the frame via the caster fork. Casters vary in size from 4 to 8 inches and increase the maneuverability of the wheelchair. The smaller the caster the greater the mobility. The larger the caster the greater the stability.



The caster tire provides the contact between the caster and the ground. Tire materials vary from solid plastic to pneumatic. The firmer the material the greater the maneuverability, the softer the material the more cushioned the ride.



The flip-up foot rest provides the support surface on which the operator's foot rests. This type of foot rest may be flipped-up out of the way during transfers.



The heel loop is usually made of nylon and attaches to the back surface of the foot rest. It provides support to the heel and helps to keep the foot positioned on the center of the foot rest.

Review Questions

- Identify the location of the seat back.
- Identify the location of the wheelchair frame.
- Identify the location of the swing-away foot rest.
- Distinguish between the seat cushion and seat sling.



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Recommended Reading

- [The anatomy of a powered wheelchair.](#)



Recommended Reading

- The anatomy of a power wheelchair