



# Wheeled Repair Alliance: Workshop Materials



Available in pdf format at <https://techowlpa.org/wheeled-repair-alliance>

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## Agenda

1. Introductions
  - a. Learn about barriers to traditional avenues of wheelchair repair & the importance of preventative maintenance.
  - b. Base knowledge – pre survey!**
2. Activity Stations
  - a. Become familiar with different types of wheelchairs.
  - b. Learn the cleaning and lubrication needs, common adjustments, and how to identify signs of damage in each section:
    - i. Rear Wheels
    - ii. Frame and Upholstery
    - iii. Caster Wheels
3. Discussion
  - a. Share goals for how you want to provide or access repair services. What additional supports do you need?
    - i. Consider physical and social barriers to the accessibility of your services
  - b. Learn where to refer people for work that is beyond your scope, including seating clinics in your area.
4. Wrap Up
  - a. Learning survey**
  - b. Don't forget your participation certificate and/or tools on your way out!

## Learning Survey for Manual Wheelchairs

Use the QR codes below if you choose to fill out this survey digitally!

<b>Do you know how to:</b>	<b>Not at all</b>	<b>Somewhat confident</b>	<b>Fully confident</b>
Identify and tighten loose nuts and bolts			
Check weld points for cracks			
Identify plastic parts (such as clothing guard or shrouds) in need of replacement			
Check if cushions and upholstery need replacement			
Check pushrims for wear, sharps, and loosening			
Check and adjust tire pressure			
Patch or replace an inner tube			
Check whether spokes are adjusted correctly			
Check whether bearings are working properly			
Check wheel alignment			
Check for caster flutter			
Remove dirt and lint from the caster axles			
Clean a manual wheelchair quick-release wheel axle and axle housing			
Lubricate manual wheelchair moving parts, such as the folding mechanism, front casters, and exposed hinges			
Check whether wheel locks (brakes) are working properly, and adjust them if necessary			
Contact a wheelchair maintenance expert to have a wheelchair professionally serviced			

<b>Do you have the resources you need to:</b>	<b>No</b>	<b>Somewhat</b>	<b>Yes</b>
[Bike shops] Be comfortable working with, marketing to, and making your space accessible to wheelchair users?			
[Users] Carry out or direct wheelchair care tasks and locate assistance when needed.			

Pre-survey at [forms.office.com/r/OBMBtby9wb](https://forms.office.com/r/OBMBtby9wb)

Post-survey at [forms.office.com/r/mk5BeducG2](https://forms.office.com/r/mk5BeducG2)



## Workshop Activities

### Station One – Rear Wheels & Pneumatic Tires

#### Inspection

- Look for wear, cracks, or bulges in the tire tread.
- Check tire pressure. Press down firmly with your thumb; if the tire depresses more than 5mm (eg a stack of three pennies) it needs air.
- Check pushrims for wear, sharps, and loosening.
- Check whether spokes are adjusted correctly. Gently squeeze two pairs of spokes together at a time; there should be little to no give.
- Check wheel alignment. The chair should travel in a straight path when coasting on a flat surface. (This can be easier to see if you wet the wheels or roll through a puddle.)

#### Action

- If air is needed, use your pump to fill to the listed pressure.
  - If the tire is not holding air, there may be a hole. See the following page for instructions on how to patch or replace the inner tube.
- Clean the axle and axle housing. If your chair is due for quarterly maintenance, follow the lubrication instructions.

**Why?** Problems such as low tire pressure or misalignment will make your wheelchair difficult to maneuver and require more energy to propel, increasing the stress on your shoulders. Loose or bent spokes can eventually cause the wheel to collapse. Regular cleaning prevents rust and damage, and decreases friction.

#### Cleaning and Lubrication

1. Detach the rear wheels from your wheelchair frame. If you have quick-release tires, simply press the center mechanism to release the axle. For fixed wheels, unscrew the nut and remove the bolt that goes through the center of your wheel.
2. Spray a small amount of lubricant on a cleaning cloth and wipe down the axle. With a dry portion of the cloth, wipe away any excess. There should not be streaks or drips.
3. Next use your spray to lubricate the folding mechanism (eg cross-brace), the top of the front caster forks, and any other exposed hinges, such as folding footrests. Wipe away any excess.
4. All parts should be moving smoothly but nothing should feel slippery or unstable.

Tips to avoid damage: take photos if you need help remembering where parts came from. Failure to put small pieces like spacers back in place can change the angle of the wheels and otherwise impact balance.

*Did you know* – some wheels are intentionally mounted with the top of the wheel closer to the user, while the base angles outwards. This angle is called “camber.” Camber adds increased speed and stability, and is very common on sports wheelchairs.

**Reference video** is available from [NCHPAD](#), where Derek demonstrates tightening spokes, inflating tires, and caring for a quick-release wheel.

## Replacing Inner Tubes

These instructions are for pneumatic (air-filled) tires. Please see the subsection on solid tires if you need to replace those.

1. Detach the rear wheels from your wheelchair frame. If you have quick-release tires, simply press the center mechanism to release the axle. For fixed wheels, unscrew the nut and remove the bolt that goes through the center of your wheel.
2. Deflate the tire. You can do this by removing the valve cap and using a Phillips-head screwdriver or other thin tool to depress the pin inside the valve.
3. Use a tire lever to separate your tire from the hub of the wheel. This tool is placed between the tire and the rim, allowing you to pry the tire over the rim. Work your way around the rim until the tire is free. Pull out the inner tube.
4. You will now be either patching the old inner tube (if you do not have a replacement on hand) or installing a new inner tube.
  - a. To patch, first you need to locate the hole. One way to do this is placing the tube in water. When you press on the tube, you will see bubbles come from the hole.
  - b. Follow the instructions in your tire patch kit: rub the (dry) area with the provided grit tool to improve adherence. Place the adhesive patch. Let it sit for the recommended time before re-inflating.
  - c. If the damage is too great, you will have to replace the inner tube.
5. To re-install an inner tube, it must be partially inflated. Fill it with enough air to give it shape and prevent kinks.
6. Insert the inner tube into the tire.
7. Insert the wheel hub starting with the valve. Work your way around the tire to get all the edges inside the rim.
8. Finish by inflating the rest of the way until you reach recommended pressure. Secure the valve cap.

Tips to avoid damage: you can get plastic tire levers at bicycle shops or sporting goods stores. Do not use other tools, like a screwdriver, for this purpose. You may puncture the tube.

*Did you know* – the tools and process for replacing inner tubes on a wheelchair is the same as a bicycle! You may just need a different size tube.

## Substation – Solid Tires

Solid tires, sometimes called anti-puncture or flat-proof, are often made with urethane or polyurethane. They are heavier and stiffer than their pneumatic counterparts. You will also notice that your new tire measures smaller than its listed diameter. This is intentional. You'll need to stretch the tire to fit it over the wheel rim.

### Replacing Solid Tires

We recommend using a solid wheelchair tire installation tool in a securely mounted vise. This tool consists of two pegs: one to act as the axle for the wheel and a second peg to stretch out the tire. If you do not have this setup, you will need another method of keeping your wheel in place while you work. Do not leave it attached to the wheelchair.

- 1) Detach the wheel from your wheelchair and slide it onto the appropriately sized peg on the installation tool.
- 2) Take care not to damage the rim while removing the old tire. Try to do this the traditional way using two tire levers and as a last resort consider cutting off the tire.
- 3) Loop the new tire around the second peg of your installation tool and lay it over the wheel. You will be holding the tire at points close to the pegs to start. Don't worry about reaching all the way across the wheel.
- 4) Begin to turn the wheel, guiding the tire onto the wheel as you go.
- 5) Once the tire has been rotated onto the entire wheel, give it a couple more turns to settle it correctly into the center of the rim.
- 6) Firmly tap upwards on the wheel to lift it off the installation tool.

Tips to avoid injury: be aware that it takes a significant amount of force to stretch a solid tire. If you are having difficulty, try warming the new tire by putting it on hot water to make it more malleable. You can also use zip ties to secure each section of the tire as you work your way around the wheel.

*Did you know* – sometimes it is not cost-effective to replace tires. If you are using a standard wheelchair with mag wheels and rubber tires (such as the model common in healthcare facilities), price out the cost of replacing the entire wheel.

**Reference video** is available from [New Solutions](#), demonstrating their solid wheelchair tire installation tool (part # M040E, available at many online DME suppliers).

## Station Two – Frame and Upholstery

### Inspection

- Identify and tighten any loose nuts and bolts.
- Check weld points for cracks.
- Identify plastic parts (such as clothing guard or shrouds) in need of replacement.
- Identify parts which are designed to be removable (some footrests, arm supports, clothing guards, etc) and check that they can be released and latched with ease.
- Check if cushions and upholstery need replacement.
  - An air-filled cushion should have no leaks. Foam should bounce back when pressed. Gel should be pliable and not brittle.
- Check whether wheel locks are working properly.
  - When in the open position, the locks should not interfere with the free movement of the wheel. When in the locked position, the locks should make full contact with the surface of the wheel.

### Action

- Adjust placements and tighten loose nuts and bolts as necessary.

**Why?** Cracks in the frame or failures in bracing mechanisms can lead to collapse. Deterioration of the cushion and upholstery contributes to skin breakdown and increases risk of pressure sores. Wheel locks keep your chair stable and secure during transfers.

### Adjusting Wheel Locks

Before adjusting the wheel lock, check the tread and air pressure of your tires. Make sure that they are at the proper degree of inflation. This impacts how well your locks work!

1. Loosen the bolts holding your wheel lock to the frame of the chair. You can now move the assembly forward or backward as needed to align better with your wheels.
  - a. When in the open position, the locks should not interfere with the free movement of the wheel.
  - b. When in the locked position, the locks should make full contact with the surface of the wheel.
2. After adjusting the position, remember to retighten your bolts.

*Did you know* – wheel locks come in several different styles. The most common are “push to lock” and “pull to lock” levers. They can have extension bars for ease of reach and gripping. Another option are “scissor locks,” which mount flush to the frame to be out of the way while propelling and transferring.

**Reference video** is available from [WhizzKidzUK](https://www.whizzkidz.co.uk), showing how to adjust a wheel lock.

## Station Three – Caster Wheels

### Inspection

- Check whether bearings are working properly.
  - Lift the wheel off the ground and spin it; wheels should rotate freely and slowly come to a stop. Turn the caster fork; it should pivot 1-2 times.
- Check for caster float and flutter.
  - Caster float is when the wheels do not touch the floor evenly when on a flat surface.
  - Caster flutter is a rapid vibration or shimmying motion in the caster wheels when propelling straight. (You might also have experienced this with rattling shopping carts!) Causes can include a loose stem bolt, misaligned housing, or worn bearings.

### Action

- Remove debris from the caster axles. You might use scissors or tweezers for this task.
  - Any time you clean or replace wheels, recheck their motion. If your wheels stop quickly or spin backwards, the nut and bolt holding the bearing may be too tight or too loose.

**Why?** Dirt, lint, and hair can build up around the axle bearings and cause unnecessary wear, as well as making your chair more difficult to maneuver. Performance and stability are also decreased by caster flutter and float.

## Cleaning Caster Wheels

1. Use a wrench and socket to remove the bolt that goes through the middle of the caster wheel. You will need to hold one side while turning the other side.
2. Slide out your caster wheel. Set aside the washers and (if present) spacers.
3. Remove any debris and wipe the parts clean. Note that you do **not** need to lubricate the bolt that goes through your caster wheels.
4. To reassemble, insert the bolt into the fork, followed by a washer and (if present) a spacer. Align the caster wheel with the bolt, then add your next spacer (if present) and washer.
5. Reattach the nut on the outside of the bolt and use your wrench and socket to tighten.

Tips to avoid damage: always apply pressure evenly when working around bearings; pushing too hard on one edge can result in them getting stuck.

*Did you know* - there are bearings in your rear wheels, bearings in the center of your caster wheels, and also bearings in the caster housing above the fork! They are responsible for most of the movement in your wheelchair and it is normal for them to wear out over time. If your wheels are making a knocking or squealing sound, the bearing may need to be replaced.

**Reference video** is available from [Adapted Adventures](#), where Kasey gives us a nice close up of all the hair that gets stuck in casters.