

Knowledge Domain: Mechanical
Unit: Cleaning
Skill: Using a Damp Cotton Cloth

Tools and Parts Required:

- | | |
|---------------------------|--|
| 1) Water | 6) Vinegar |
| 2) Lint-free Cotton Cloth | 7) Alcohol |
| 3) Toothbrush (optional) | 8) Acetone (can use nail polish remover) |
| 4) Dirty Equipment | 9) Ammonia |
| 5) Soap | |

Introduction

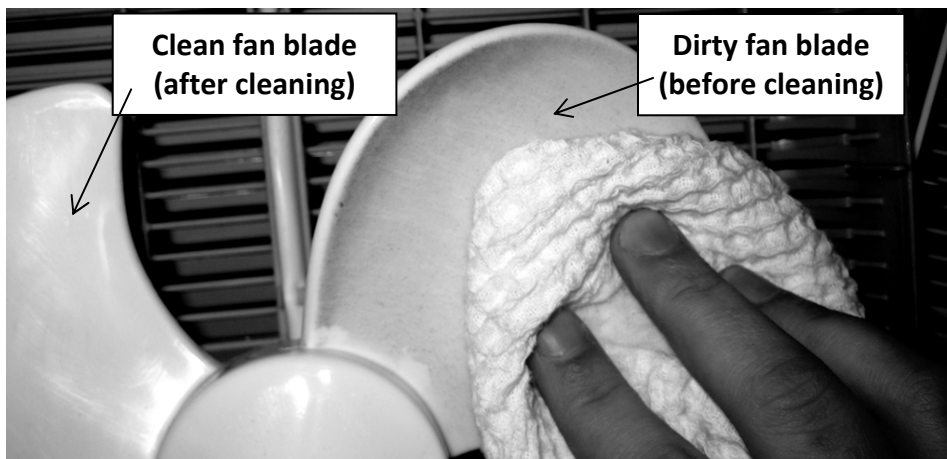
Dirt is a serious problem for medical equipment. Dirty sensors and contacts can cause the equipment to not function correctly. A simple cleaning can be sufficient to improve functioning of a device. Cleaning removes unwanted material. Cleaning is **NOT** disinfection or sterilization.

Example

Below is a picture of centrifuges that were covered in dust after an earthquake. After cleaning with a damp cloth, the centrifuges were returned to service.



The photos below shows a disassembled box fan before and after cleaning.



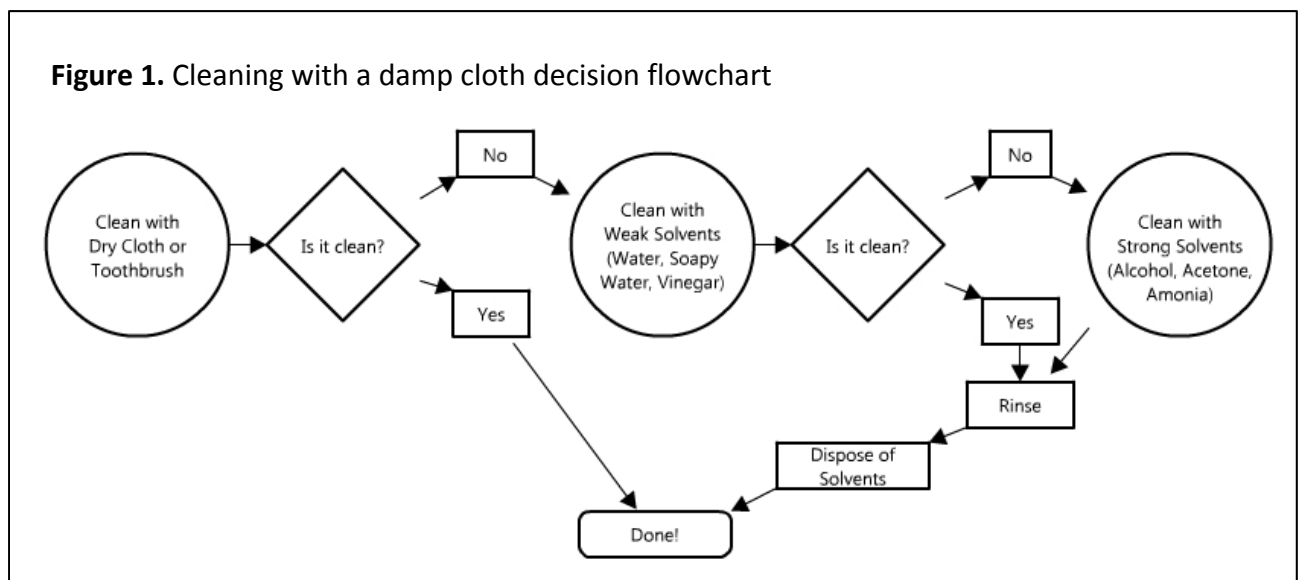
Identification and Diagnosis

Equipment that is being used will become dirty. Dirt is brown, gray, white, or other colors. A machine that has uneven color or a different color than the original color may be dirty. Dirty materials will not appear shiny. Run your finger across the surface of the machine. If your finger changes color, the machine is dirty.

Dirt on the inside of the machine may not be obvious. Doors that fail to close, bad contacts, or other malfunctioning may be due to dirt inside the machine. As machines age, they may not function as well as new machines. Dirt usually collects around the top of a machine and near air inlets and outlets. Thorough cleaning may improve functioning. Dirt, dust, debris, and anything that is not part of the equipment should be removed during cleaning.

Procedure

Water can damage delicate equipment. Do not pour water directly on equipment. Follow the flowchart below to clean the equipment. Refer to the detailed instructions below.

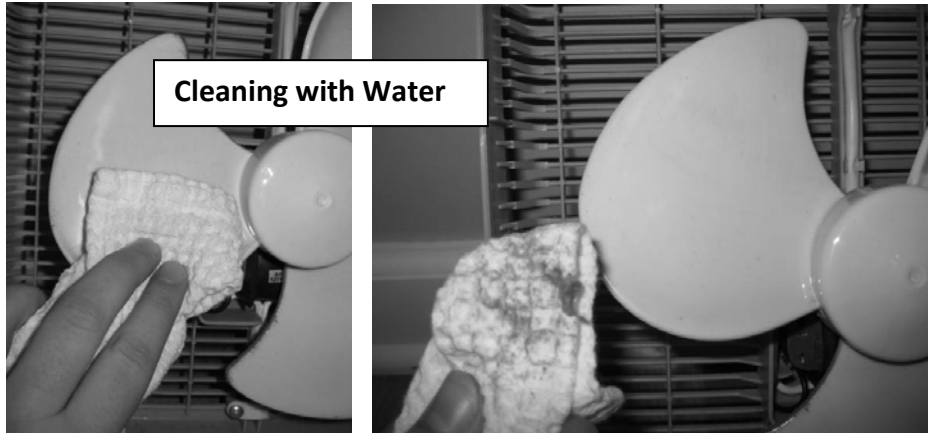


- **Dry Cloth or Toothbrush.** Use a dry cloth or soft brush to loosen dirt. Friction is very important for removing foreign materials. Your cloth should be lint-free. The cloth should not leave any residue or pieces on equipment you are cleaning. An old toothbrush can be effective for cleaning spaces that are difficult to reach.

Note: Water, soap, and vinegar are weak solvents. Always try the weak solvents first. Some cleaning requires a stronger solvent. Strong solvents like alcohol, ammonia, and acetone should be used with caution. Always use strong solvents in a well-ventilated area. Use gloves and eye protection when possible. Do not ingest strong solvents.

- **Weak Solvents**

- Water. Only if a dry cloth does not clean sufficiently, use a moist cloth to clean. Wet the cloth. Wring out excess water before cleaning equipment. Never use water on circuit boards or exposed electronics.



- Soapy Water. In some cases, dirt cannot be removed using water alone. Mix a small amount of soap into water. Wet a cloth with the soapy water. Wring out excess water before wiping the equipment.
 - Vinegar is a useful cleaning agent. Vinegar is a weak acid. Use vinegar to dissolve mineral deposits like scale. Moisten a cloth with vinegar. Rub the surface with the cloth. Leave the vinegar on the area for 10-30 minutes. Wipe with a water-moistened cloth to remove the vinegar. Use caution on delicate surfaces. Vinegar can damage metals when left for long periods of time.
- **Strong Solvents**
 - Alcohols such as ethanol and methanol are strong solvents. Strong solvents remove more dirt than water or weak solvents remove. Ethanol dissolves epoxy and paints. **Caution:** Alcohols will also dissolve labels and instructions that may be painted on the machine.

Alcohol can be found in the hospitals in pure form. When not available, cheap, unflavored vodka (ethanol) can be used as a cleaner. Mix alcohol with water to dilute. For a stronger cleaning agent, add soap to the alcohol and water mixture.



- Acetone dissolves epoxy, paints, plastics, spilled melted plastic. **Caution:** acetone can also dissolve PCB, circuit board, casing, and labels that are painted on. Use a small amount of acetone on a cloth. Wipe the cloth carefully only on the areas you want to clean. If you cannot find acetone, you can buy a bottle of nail polish remover instead. Acetone is commonly used in nail polish remover. You can also use non-acetone nail polish remover, which contains a similar solvent, ethyl acetate.
- Ammonia is a strong cleaner. Use gloves and eye protection when working with ammonia. Ammonia can be mixed with water to clean glass, mirrors, or metals. Ammonia does not leave streaks after cleaning. Mix a small amount of ammonia with a large amount of water. There is not a specific recipe. More ammonia may be needed for stronger cleaning. Start with a bucket full of water and add a small cup of ammonia. Add more water or more ammonia as needed. **Caution: Do not mix ammonia with sterilizing solvents and chemicals.** The mixture will create a fatal gas.

Ammonia mixed with soap and water removes grease effectively. Add one squirt (1 spoonful) of soap to the ammonia and water mixture to make soapy ammonia.

- **Rinse**

- Use a clean cloth to wipe excess soap or solvent off the cleaned area. Rinse the cloth thoroughly in clean water. Wring out excess water. Wipe off the cleaned area with the damp cloth. Rinse the cloth again in clean water.
- Wring the cloth and wipe off the cleaned area a second time.
- You may need to repeat this process more than twice.
- Completely rinse and remove all cleaning solvents after cleaning. Excess soap causes dirt to adhere more quickly. Strong solvents may damage equipment or corrode materials over time.

- **Dispose of Solvents** When you finish cleaning, dispose of the solvents safely. Avoid rinsing strong solvents into the water supply, gardens, or patient areas. Strong solvents are toxic.

Table 1: Description of various solvents

Safety	Solvent	Safely mixes with:
Safest	No solvent (dry cloth)	
Safe	Water	
	Soap and Water	
	Vinegar	Water, Soapy water
	Alcohol (ethanol, methanol)	Water, Soapy water
	Ammonia	Water, Soapy water
Corrosive	Acetone	Water

Exercise

In this exercise you will practice using different solvents to clean. Your instructor will provide you with different equipment to clean. Clean using at least three different solvents. You should try to remove dirt, grease, and plastic or epoxy. Be sure to wear protective gloves and eyewear when necessary. Your instructor will not mix your solvents for you. You will practice mixing your own solvents.

Your instructor must verify your work before you continue.

Preventative Maintenance and Calibration

Regular cleanings are recommended for maintenance of healthcare equipment. Regular cleanings help equipment function optimally. Regular cleanings make cleaning easier and less time consuming.

Inspect the top of the equipment and the air inlets and outlets. Clean the dirty areas if needed. Clean buttons and switches often. Buttons and switches collect dirt quickly because of use. Clean any labels that are obscured by dirt.

Cleaning the device is not a substitute for disinfection or sterilization. When you return equipment to service, insure that staff knows the equipment has not been disinfected or sterilized.

Always calibrate every medical device before returning it to use.