

# Nebuliser

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  - components
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  - inputs/outputs
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## 13.3.8 Maintain a nebuliser

Unit B 13.3 Maintaining General Bedside Nursing Equipment

Module 279 18 B Medical Instrumentation I

# Function: deliver drugs

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## What is a nebuliser ?

a nebuliser is a drug delivery device used to administer medication in the form of a mist inhaled into the lungs. It converts **liquid medicine** into a **fine mist** that is easily inhaled.

## Why is it important ?

Nebulizers are commonly used for the treatment of **asthma and other respiratory diseases**

The reason these pharmaceuticals are inhaled instead of ingested is in order to target their effect to the respiratory tract, which speeds up the onset of action of the medicine and reduces side effects, compared to other alternative intake routes.

# Scientific principles

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Nebulizers use **pressurized (compressed) oxygen or air** – or, in some cases, **ultrasonic power** - to break up medical solutions into small aerosol droplets that can be directly inhaled from the mouthpiece of the device.

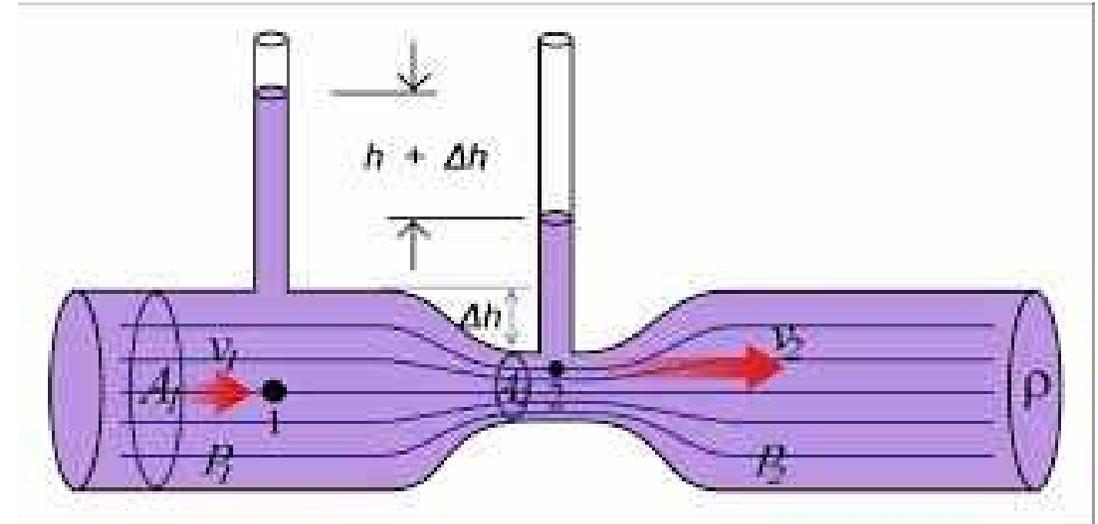
The definition of an aerosol is a "**mixture of gas and liquid particles**," and the best example of a naturally occurring aerosol is mist (fog), formed when small vaporized water particles mixed with hot ambient air are cooled down and condense into a fine cloud of visible airborne water droplets.



# Scientific principles: Venturi effect

The **Venturi effect** is the reduction in fluid pressure that results when a fluid flows through a constricted section of pipe.

This is a way to generate suction with high pressure !



video: 'the venture effect': <https://www.youtube.com/watch?v=Na9ORhYjvJU>

# Scientific principles

The most commonly used nebulizers are **Jet nebulizers**, which are also called "atomizers".

Jet nebulizers are connected by tubing to a **compressor**, that causes compressed air or oxygen to flow at **high velocity** through a liquid medicine to turn it into an **aerosol**, which is then inhaled by the patient.

The ending of the gas tube is **tapered**, so that the Venturi effect creates a **sucking effect** at the output of the tube, causing the creation of the aerosol particles.

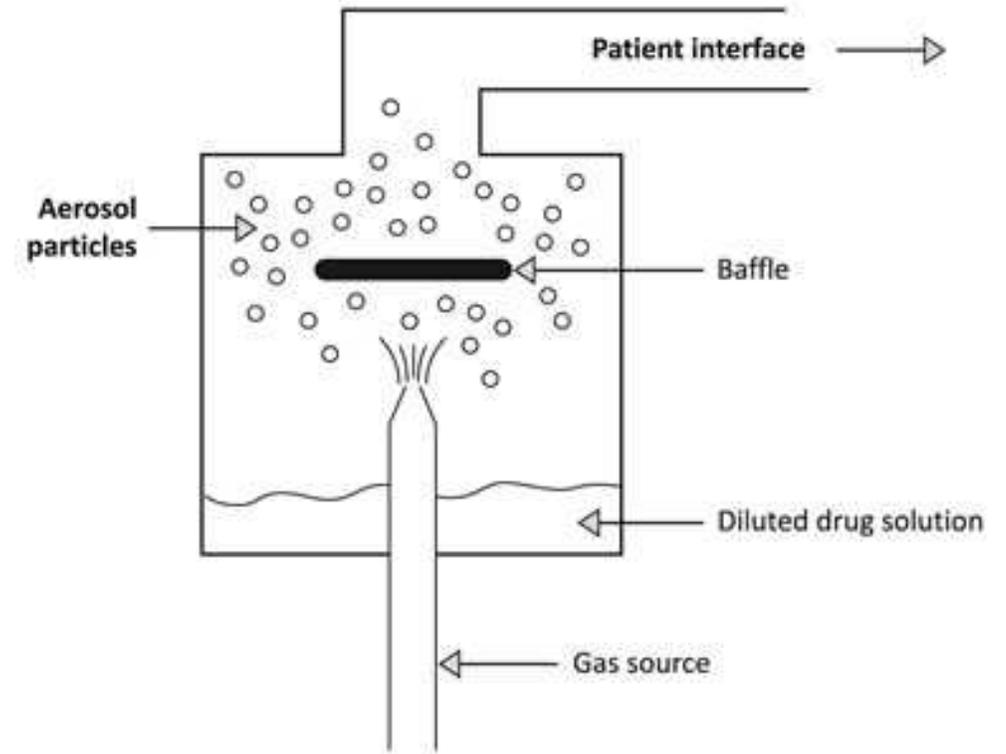
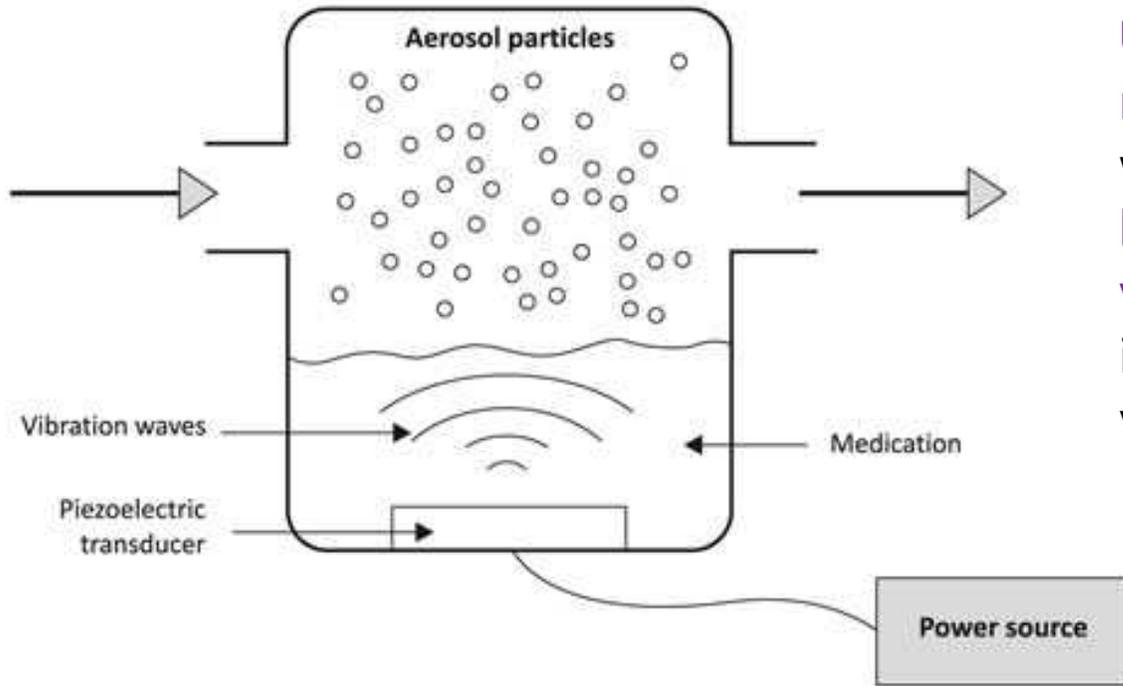


Figure 3 - Jet nebulizer

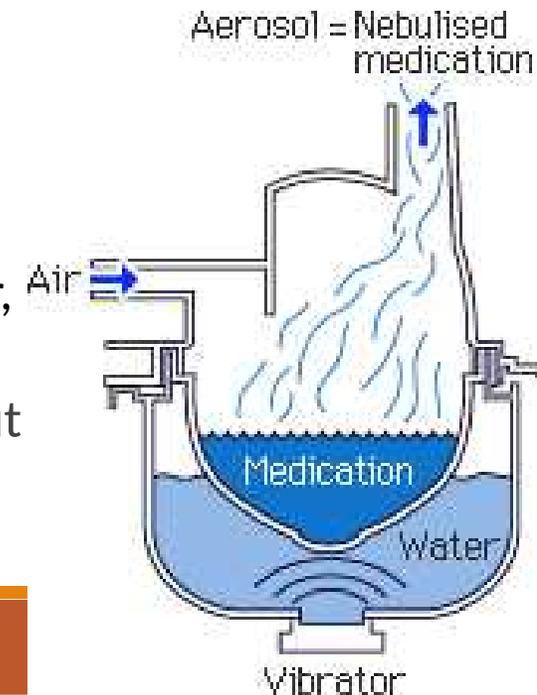
Important variables for a nebulizer are treatment time required, particle size produced, and aerosol drug output. Jet nebulizers are relatively heavy/large.

# Scientific principles



**Ultrasonic wave nebulizers** were invented in 1964 as a new **more portable** nebulizer. The technology inside an ultrasonic wave nebulizer is to have an electronic oscillator generate a **high frequency ultrasonic wave** through the mechanical **vibration of a piezo-electric element**. This vibrating element is in contact with a liquid reservoir and its high frequency vibration is sufficient to produce a vapour mist.

As these create aerosols from ultrasonic vibration instead of using a heavy air compressor, they only have a **weight** around 170 grams. Another advantage is that the ultrasonic vibration is almost **silent**. They generally have a **higher output** rate than jet nebulizers, but a **larger average particle size**. Ultrasonic nebulizers are **more expensive and fragile**, compared to jet nebulizers. and **do not nebulize suspensions** (solid particles that sediment) **well**.



# Preventive Maintenance

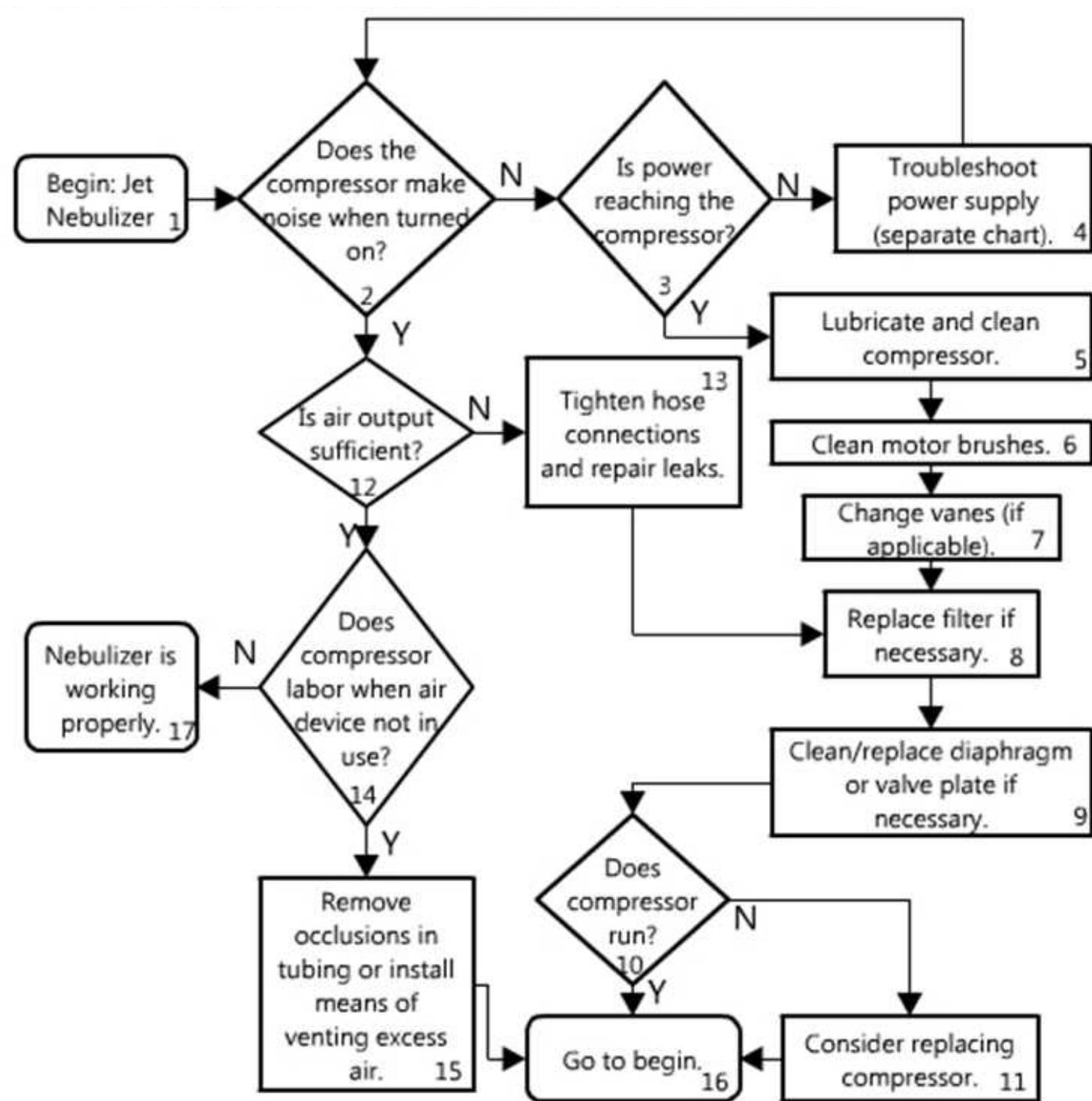
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## Jet Nebulizer

1. Inspect **exterior** of equipment for damaged or missing hardware
2. Inspect **power cord and plug** for signs of damage
3. Turn unit off, **open covers** and inspect for damage
4. **Clean** the unit interior with vacuum or compressed air.
5. Inspect interior for signs of **corrosion** or missing hardware. Repair as required.
6. Inspect electrical components for signs of **excessive heat** or deterioration.
7. Inspect water jet assembly including orifice. Check for **water leakage**.
8. Check **gaskets and O-rings**.
9. Verify **correct operation** of unit with all settings.
10. **Clean exterior** of the unit including accessories, cables, etc.
11. Change **air intake filter** when it is grey or dirty.

# Trouble shooting

- Check Power
- Changing filters
- Removing occlusions
- Check compressor pump (clean, lubricate)



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# END

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see <https://www.thet.org/>

