

Continuous Oxygen Administration In Haiti

Respiratory technicians are responsible for checking all patients for respiratory distress, managing oxygenation for unstable patients, estimating daily use, managing oxygen supply, and oxygen concentrators.

Tools needed:

- Pulse oximeter **Important:** Check that your pulse oximeter has batteries



(Have extra AAA batteries on hand)

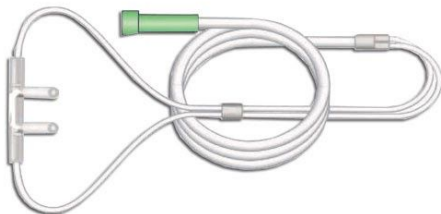
- Crescent wrench for changing tanks



- Flow Rate Chart that tabulates the length of time tanks last under given flow rate (liters/min) (see below)
- Oxygen concentrators (if available) Must always have a backup tank in place near the concentrator for when the electricity is turned off or if the concentrator is not sufficient. (should also have surge protector if using oxygen concentrators)



- Nasal Cannula - use to deliver 1-5L/min oxygen



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- Non-Rebreather Mask or Simple Mask -use to deliver 5-25 L/min of oxygen (although can be used for 1-5L/min as well if weaning or nasal cannula is not available)



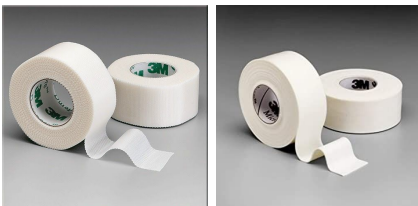
- Oxygen extension tubing



- Tubing connectors



- Tape- silk tape and foam tape work well



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- Oxygen tanks and flow rate regulators

Types of Regulators

Regulator for Large Cylinder (most commonly size tank found in Haiti)



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Tool to change regulator - crescent wrench



Regulator for Small Cylinder (E Cylinder)



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Tool to turn E Cylinder on and off- tank wrench



If you do not have the tank wrench you can use crescent wrench

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Procedure for every shift:

FIRST- Check new arrivals and unstable patients for respiratory distress

SECOND- Check tank levels on all patients starting at high demand and unstable and moving to stable replacing tanks that are close to empty.

THIRD - Check oxygen saturation levels on all oxygen dependant patients and then all other patients going from sickest to least sick

- **Goal oxygen saturation is 92%-96%**, measured via oximeter
- Discuss with doctor goal oxygen saturations as can vary
- Do not aim for high oxygen sats in patients who are stable and breathing comfortably (ie 94-95 is fine)
- Do aim for higher oxygen (96-98) sats in patients with initially low saturation (ie 85% and lower) and high work of breathing to allow them to rest
- Wait at least 5 minutes before making a change to oxygen based on oximeter reading to ensure true reading, unless the patient is in respiratory distress.
- If you change the oxygen flow rate wait at least 15 min to assess the effect of your change
- Record each Pt's name, oxygen flow rate (number of liters per minute of oxygen) and their oxygen saturation and any changes made on oxygen log, present log to doctor in charge.

FOURTH - Perform daily maintenance

FIFTH - Estimate daily use

At the end of the day -replace any oxygen tanks that are anticipated to run out overnight. Inform night oxygen attendant of any patients that are very sick and all patients who will run out of oxygen overnight. Share calculations for planned tank usage. Combine tanks with oxygen splitters to allow for 2 tanks to last the night on a patient without running out.

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Patient with difficulty breathing:

Signs of distress

- Using whole body to breathe, muscles that are sucked inward between the ribs when breathing, movement of trachea, and nasal flaring
- Not able to speak in full sentences
- Unable to stand
- Breathing fast
- Or: Unconscious, barely responsive

***If possible keep an extra tank with regulator near all unstable patients ***

Recommendations when a patient is in distress

- Send someone to alert MD of patient in distress
- **Stay with patient!!**
- Ensure the patient is sitting up. A cardboard box and pillows behind their back can be used to keep the patient sitting upright.
- CHECK EQUIPMENT to ensure it is working properly
- Increase oxygen while waiting for further instructions from the doctor.
- Check oxygen saturation

Daily Maintenance:

Check tank, regulator, and oxygen delivery device on the patient for leaks

DAILY

- If there is a leak from tank - change regulator to another tank
- If there is a leak from regulator - change regulator
- Use duct tape to seal leaks in regulator or leaks at connection with tank
- If there is a leak from nasal cannula or mask- use tape and try to tape device before obtaining another mask or cannula (check entire length of tubing for places where damage may have occurred, including where rats have chewed)

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- DO NOT use a humidifier for oxygen. This will reduce oxygen levels.

Estimating daily use:

- How much will be used through the day
- How much will be needed to get the current pt census through the night
- How many will need to be full or half full tanks for the night
- How many extras are to be kept on hand
- Order tanks to be delivered
- Remember if you have leaks you will empty tanks more rapidly



Oxygen Flow Rate Chart For Large Tank (most common size available in Haiti)

Liters/Min Lit/Min	Time Tank Last Tan Boutey Dire (hrs/he)	Time Tank Last Tan Boutey Dire (days/jou)	Pressure of Full Tank Si Tank Pleine jusqua (PSI)
0.5	230	9.58	2200
1.0	115	4.79	
1.5	76.75	3.20	
2.0	56.57	2.36	
3.0	38.37	1.60	
4.0	28.78	1.20	
5.0	23	0.96	
6.0	19.18	0.80	
8.0	14.38	0.60	
10.0	11.51	0.48	
15.0	7.67	0.32	

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Weaning Oxygen:

- Wean patients slowly
- Do not further wean patients with less than three hours in your shift to observe them after reduction of oxygen
- Do not wean more than 1 LPM per two hour

Safely Avoiding Waste In The Oxygen Supply:

- Use up partial tanks with attention to those below ¼ full
- Put nearly empty tanks on stable patients, especially those who can tell you when it is out
- Use oxygen connectors to join two tanks together so tanks will not have to be changed so frequently
- Put several nearly empty tanks by these people so that when one is empty if you are not there they will be switched to another nearly empty tank.
- To allow tanks to be fully emptied, link 2 oxygen tanks together with a Y connector or stopcock to deliver oxygen to one nasal cannula or mask (each tank providing half of the patient's oxygen needs) This way if a tank runs out it prevents a swift drop in oxygen as they are not likely to run out at the same time. USE THIS TECHNIQUE ON STABLE PATIENTS ONLY.

About Oxygen concentrators:

- Typical Oxygen concentrators deliver 0.5-5 L/min of oxygen
- When a patient's oxygen needs decrease to under 5L/min consider switching them to an oxygen concentrator, if available, in order to preserve your tank supply.
- If you have more patients than concentrators than put the patient with the higher oxygen demand on the concentrator
- Things piled on or around the oxygen concentrators may cause them to overheat. They need good ventilation.
- Remember that O₂ from concentrators is cheaper

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- **Always** have a backup tank in place near the concentrator for backup when power is out. Patients should be taught how to switch themselves to the tank when the power goes out.
- Long extension cords have line loss, decreasing the amount of electricity delivered to the machine. Also thin extension cords do not handle enough current to safely run the concentrators.
- In dusty environments, concentrators can fail to concentrate oxygen from the air. If a patient's oxygen is dropping, it may be because the concentrator is not delivering oxygen.
- Always plug concentrator into a surge protector to guard against power surges that occur regularly in the power grid. These power surges can damage the concentrator or even break it all together.

Concentrator maintenance

- Wash outer filter with water twice a week
- Internal filter are found behind a body panel on the outer case usually on the back and should be replaced every 3-6 months
- The internal filters can have the dust knocked out of them to extend their life but this should not be a substitute for replacement
- If the condenser is alarming, turn it off and after one minute turn it back on.
 - If it continues to alarm allow it time to cool down
- If it is not functioning and does not alarm:
 - check that it is plugged in and that it is turned on
 - Test the outlet by trying to plug something else in it to see if it is functioning
 - Try a different outlet
 - On the main controls panel there is a small push button. This is the reset button for the fuse. Depressing it will reset the fuse.
 - If this does not work the unit may still be hot and attempt to reset it in an hour or so
- YouTube has repair and service instructions

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- Keep broken regulators and machines as parts may be used to fix others

When able to receive goods from the U.S.-

- Replacement outer filter material can be ordered from Amazon by the sheet as “reticulated foam filter” 45-60 ppm is the desired density at approx 3/8 to 1/2 inch thickness



- Replacements can be ordered by brand and model number on the machine or from the serial number on the filter, generally from Amazon

Troubleshooting tips:

- 1st secure new oxygen supply before diagnosing supply problem
- Check for blockages along the line such as crimps, disconnections, valves damaged, incorrect valve position or items sitting on the tubing (especially bed legs).
- Change out tank regulators
- Check function of concentrator by checking for actual air flow at the nozzle
- For patients who are critically ill, who also may be confused due to illness, it is recommended to have a built-in backup oxygen source on the patient. Use both nasal cannula and mask on one patient to deliver oxygen from 2 separate tanks so that if a mask falls off or the patient removes their mask

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while unattended they still have another oxygen source to prevent a swift drop in their oxygen levels.

Helpful Tips:

- Keep the tank wrench in the same place at all times when not in use
- Regulators are all kept in the same place except for one emergency one that you keep stashed
- Route tubing away from areas of traffic
- Long runs of tubing have increased resistance which decreases the amount of oxygen delivered and make the concentrators work harder

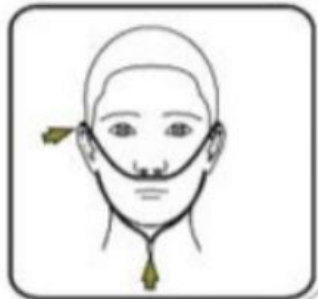
Nasal Cannula Placement



Each prong of the cannula should curve downward into one nostril.

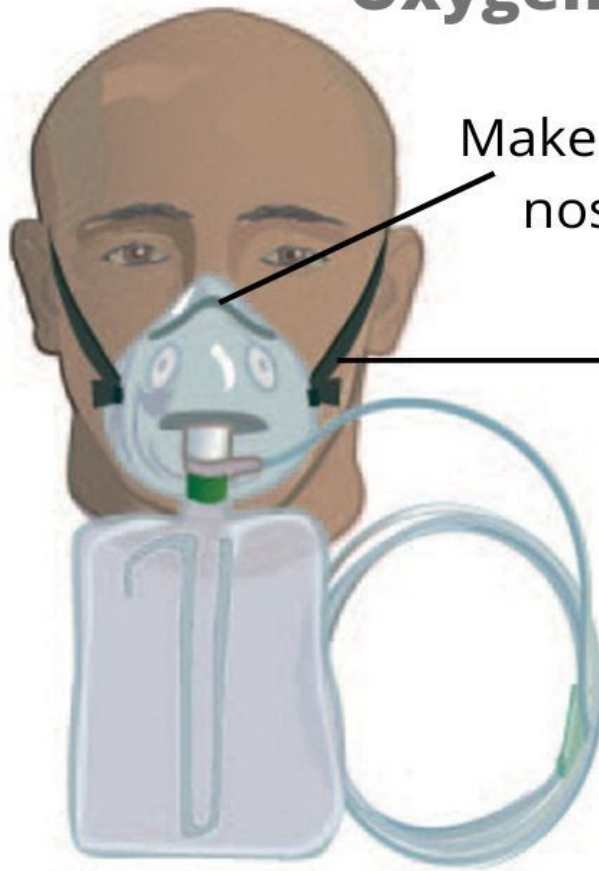


Loop the tubes over patient's ears.



Adjust the tubes under patient's chin by sliding the tube adjustor up or down.

Oxygen Mask Placement



Make sure to adjust metal over nose to make a good seal.

Tighten straps to hold mask to face, covering both mouth and nose.

If patient is on higher flow settings consider taping mask to their face to keep a good seal.

How To Change Regulator On E Cylinder (small oxygen tank)



Turn off the oxygen flow

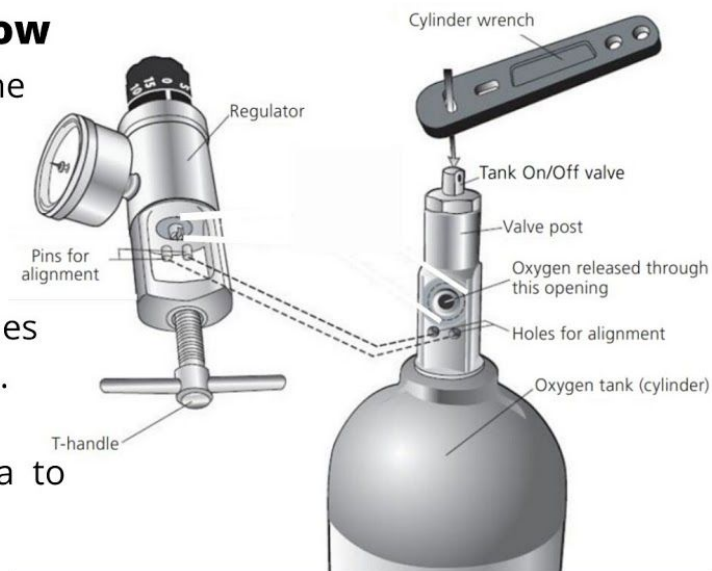
1. Using the small tank wrench, turn the cylinder on/off valve clockwise to close it.
2. Let the pressure out of the regulator by opening the flow regulator knob.
3. When the gauge reads zero, turn the flow regulator knob to zero.

Change the cylinder

1. Loosen the T-handle.
2. Slide the pegs inside the regulator out of the holes on the valve post and remove the regulator.
3. Attach the regulator to the new cylinder by slipping the regulator over the valve post of the cylinder.
4. Align the pegs located on the inside of the regulator with the holes in the valve post.
5. Slide the regulator forward so the pegs go into the holes
6. Turn the T-handle on the regulator until it is **tight**.

Turn on the oxygen flow

1. Place the tank wrench on the cylinder's on/off valve.
2. Open the valve by turning it counterclockwise one full turn.
3. Adjust the flow knob on the regulator until the gauge reaches the flow rate the patient needs.
4. Check for oxygen flow.
5. Attach mask or nasal cannula to regulator.



How To Change Regulator On Large Oxygen Tank



Turn off the oxygen flow

1. Using the knob on top of tank, turn the on/off valve clockwise to close it.
- 2 Let the pressure out of the regulator by opening the flow regulator knob.
- 3 When the gauge reads zero, turn the flow regulator knob to zero.

Change the cylinder

1. Loosen the regulator with crescent wrench.
2. Unscrew regulator by hand and remove it from the tank.
3. Attach the regulator to the new tank by screwing regulator on to tank by hand.
4. Use crescent wrench to turn regulator until it is **tight**.



Turn on the oxygen flow

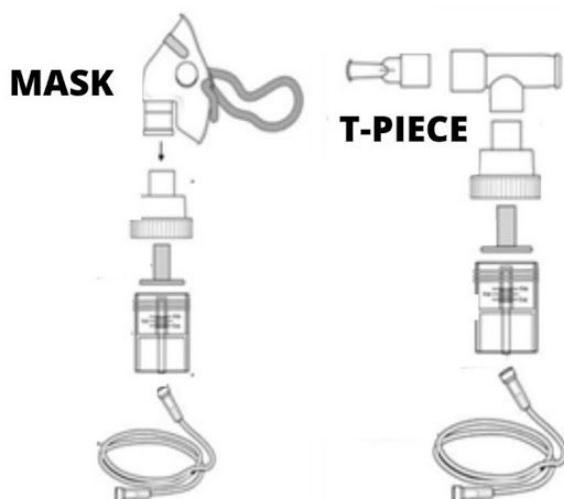
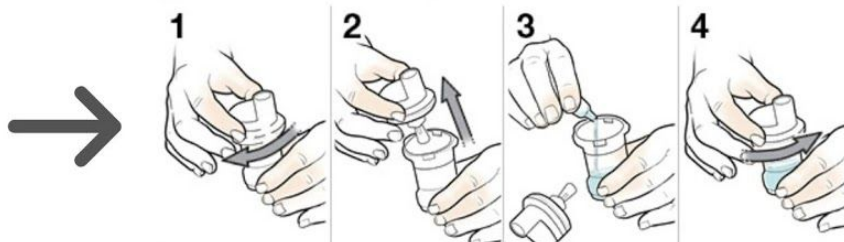


1. Turn on oxygen by turning knob on top of tank counterclockwise.
3. Adjust the flow knob on the regulator until the gauge reaches the flow rate the patient needs.
4. Check for oxygen flow.
5. Attach mask or nasal cannula to regulator.

How To Administer A Nebulizer

Attention: Nebulizing can increase the spread of Coronavirus. DO NOT USE NEBULIZERS on Coronavirus patients unless absolutely necessary. Make sure caregiver is wearing an N95 mask and face shield. Keep patients away from others in a separate room if possible. If patient is stable do not stay with patient during treatment. Place tape over holes in mask.

1. Add medication to chamber (no more than 10mls per treatment)



2. Add either mask or T-piece to top of medication chamber

-If using T-piece, ask patient to place the narrow end of T-piece between their teeth and close their lips around the thin end of the t-piece and breathe normally.

-If using mask, place mask over patient's mouth and nose and ask them to breathe normally.

3. If patient needs oxygen (or no electricity is available) attach end of tubing to oxygen tank regulator and dial flow meter to 6-8 L/min .
Treatment is finished when medication smoke disappears.



If patient does not need oxygen a nebulizing machine can be used if electricity is available.

Attach tubing to machine and turn on. Treatment is finished when medication smoke disappears.

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Continuous Positive Airway Pressure (CPAP)



Attention: Use of a CPAP Machine can increase the spread of Coronavirus. DO NOT USE CPAP on Coronavirus patients unless absolutely necessary. Make sure the caregiver is wearing an N95 mask and face shield to prevent the spread of the virus. Keep patients away from others in a separate room if possible.

A CPAP Machine delivers continuous flow of air at a constant pressure. This helps improve the exchange of oxygen in the lungs by keeping lungs better inflated at all times. Oxygen can be added to the CPAP machine to deliver oxygen with the continuous flow. This can decrease the work of breathing for an unstable patient who has low oxygen saturation.

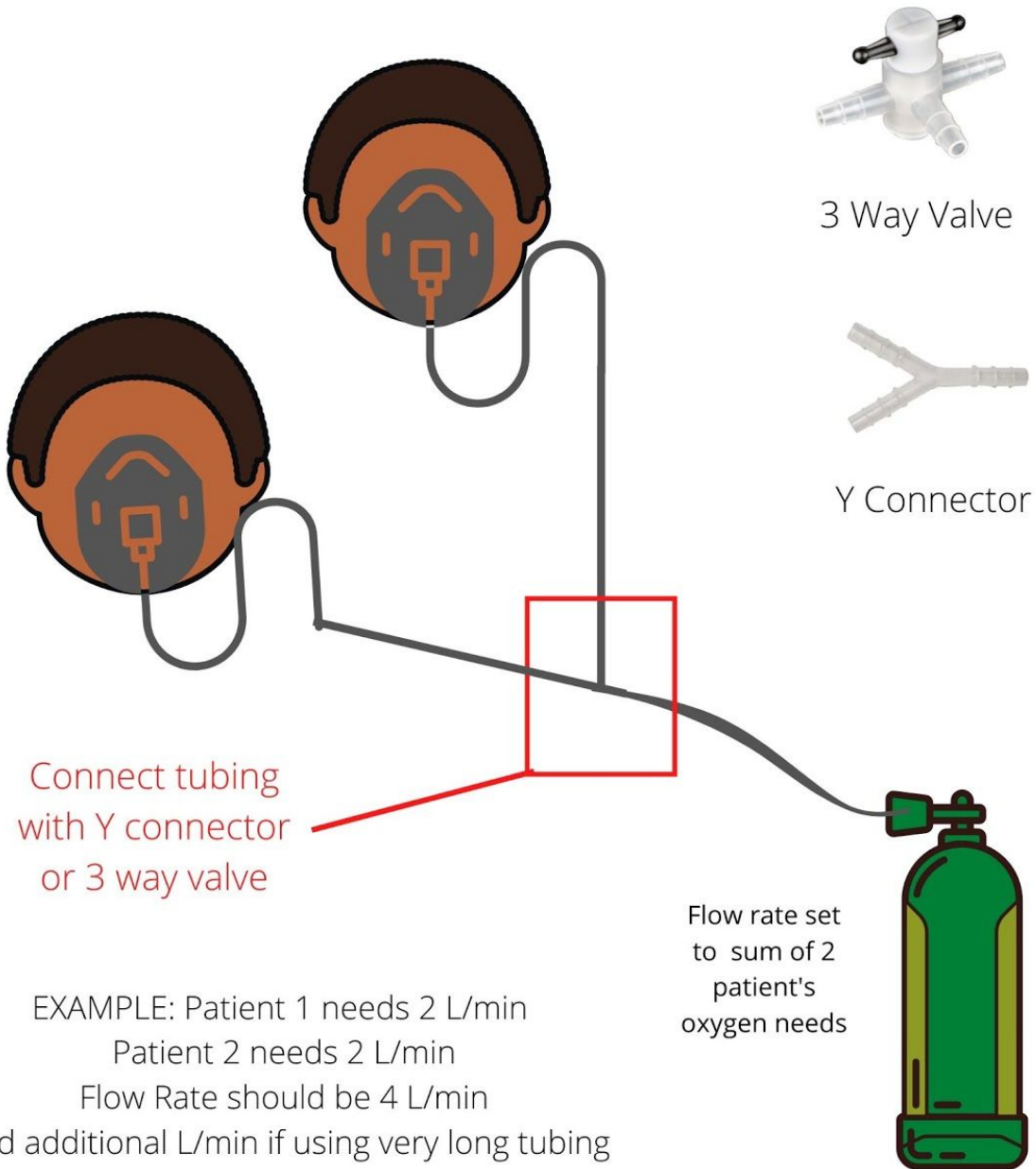
- Always plug CPAP into a surge protector.
- Use head straps to create a good seal to the face. There are masks that go over the patient's mouth and nose and masks that only go over the nose. Masks that cover both nose and mouth are preferred.
- Patients who are unable to remove their own mask should not be left alone in order to ensure the mask is removed quickly if the patient vomits or if power goes out.
- Always have a backup oxygen tank with an oxygen mask near patients who are on CPAP to quickly change them to if power is lost.
- Use caution when placing or removing CPAP mask on patient's face as this can spread the virus more easily.

Using 1 Tank For 2 Patients

Why?

RESOURCE MANAGEMENT- allows 1 tank to treat 2 patients who have similar oxygen needs.

FOR STABLE PATIENTS ONLY



Using 2 Tanks For One Patient (STABLE PATIENTS)

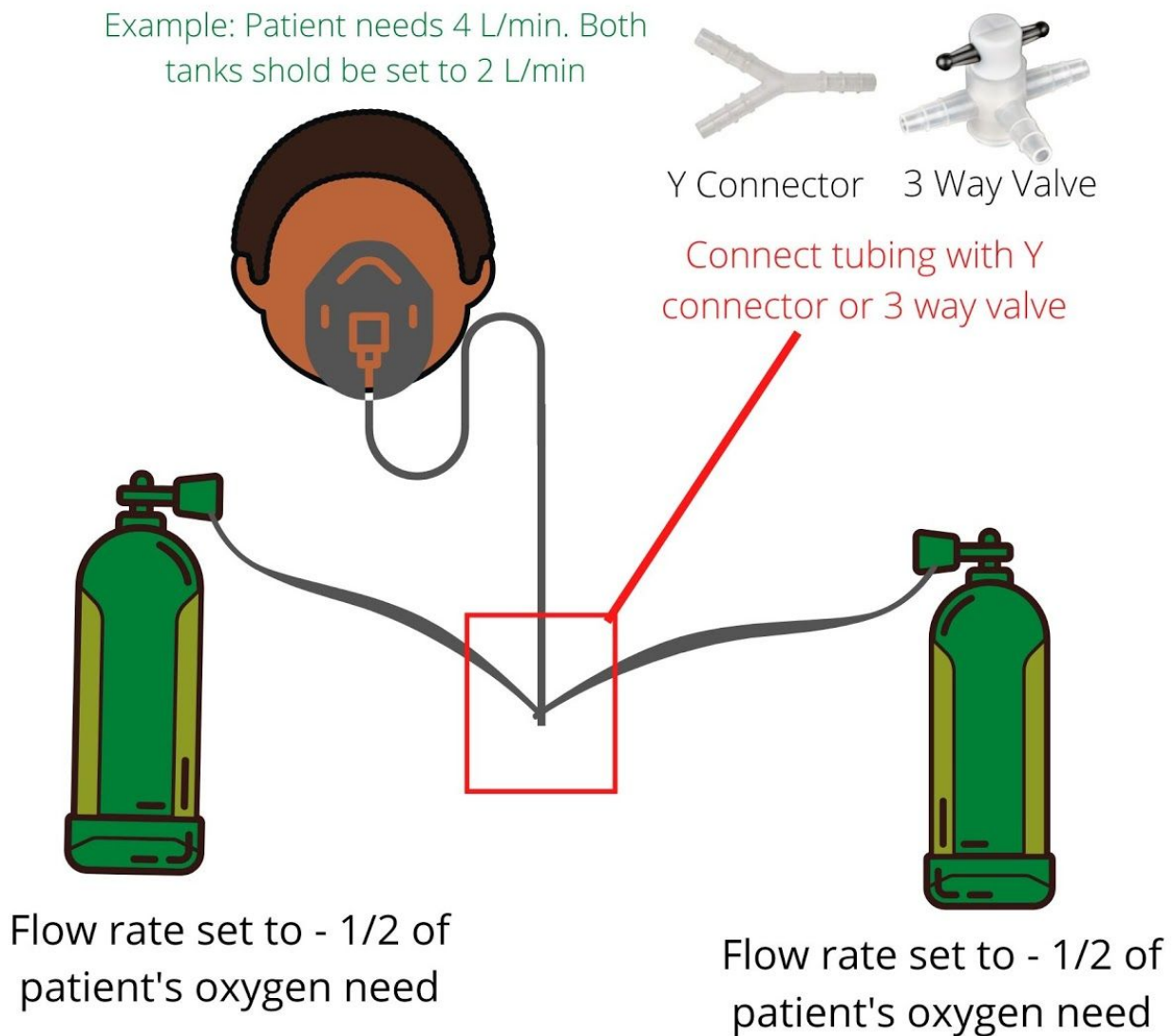
Why?

TO ENSURE A TANK DOES NOT RUN OUT OVERNIGHT (tanks last longer at lower rates, use each tank for half of the patients oxygen requirement)_

RESOURCE MANAGEMENT- allows the tanks to be emptied completely, avoiding waste in your oxygen supply.

ALLOW TANKS TO RUN TO ZERO ON STABLE PATIENTS ONLY

Example: Patient needs 4 L/min. Both tanks should be set to 2 L/min



Using 2 Tanks For One Patient (UNSTABLE PATIENTS)

Why?

TO CREATE REDUNDANCY FOR UNSTABLE PATIENTS

For patients who are critically ill, who also may be confused due to illness, it is recommended to have a built-in backup oxygen source on the patient. Use both nasal cannula and mask on one patient to deliver oxygen from 2 separate tanks so that if a mask falls off or the patient removes their mask while unattended they still have another oxygen source to prevent a swift drop in their oxygen levels.

