Assignment

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1 AAMBULANCE

An ambulance is a medically equipped vehicle which transports patients to treatment facilities, such as hospitals. Typically, out-of-hospital medical care is provided to the patient.

Ambulances are used to respond to medical emergencies by emergency medical services (EMS). For this purpose, they are generally equipped with flashing warning lights and sirens. They can rapidly transport paramedics and other first responders to the scene, carry equipment for administering emergency care and transport patients to hospital or other definitive care. Most ambulances use a design based on vans or pickup trucks. Others take the form of motorcycles, buses, limousines, aircraft and boats. Generally, vehicles count as an ambulance if they can transport patients. However, it varies by jurisdiction as to whether a non-emergency patient transport vehicle (also called an ambulette) is counted as an ambulance.

These vehicles are not usually (although there are exceptions) equipped with life-support equipment, and are usually crewed by staff with fewer qualifications than the crew of emergency ambulances. Conversely, EMS agencies may also have emergency response vehicles that cannot transport patients.These are known by names such as nontransporting EMS vehicles, fly-cars or response vehicles.

The term ambulance comes from the Latin word "ambulare" as meaning "to walk or move about" which is a reference to early medical care where patients were moved by lifting or wheeling. The word originally meant a moving hospital, which follows an army in its movements. Ambulances (Ambulancias in Spanish) were first used for emergency transport in 1487 by the Spanish forces during the siege of Málaga by the Catholic Monarchs against the Emirate of Granada. During the American Civil War vehicles for conveying the wounded off the field of battle were called ambulance wagons. Field hospitals were still called ambulances during the Franco-Prussian War of 1870 and in the Serbo-Turkish war of 1876 even though the wagons were first referred to as ambulances about 1854 during the Crimean War.

Ambulances can be grouped into types depending on whether or not they transport patients, and under what conditions. In some cases, ambulances may fulfill more than one function (such as combining emergency ambulance care with patient transport:

Emergency ambulance – The most common type of ambulance, which provides care to patients with an acute illness or injury. These can be road-going vans, boats, helicopters, fixed-wing aircraft (known as air ambulances), or even converted vehicles such as golf carts.

Patient transport ambulance – A vehicle, which has the job of transporting patients to, from or between places of medical treatment, such as hospital
or dialysis center, for non-urgent care. These can be vans, buses, or other vehicles.

Ambulance bus – A large ambulance, usually based upon a bus chassis, that can evacuate and transport a large number of patients.

Charity ambulance – A special type of patient transport ambulance is provided by a charity for the purpose of taking sick children or adults on trips or vacations away from hospitals, hospices, or care homes where they are in long-term care. Examples include the United Kingdom's 'Jumbulance' project. These are usually based on a bus.

2 TREADMILL

A treadmill is a device generally used for walking, running, or climbing while staying in the same place. Treadmills were introduced before the development of powered machines to harness the power of animals or humans to do work, often a type of mill operated by a person or animal treading the steps of a treadwheel to grind grain. In later times, treadmills were used as punishment devices for people sentenced to hard labor in prisons. The terms treadmill and treadwheel were used interchangeably for the power and punishment mechanisms.

More recently, treadmills have instead been used as exercise machines for running or walking in one place. Rather than the user powering a mill, the device provides a moving platform with a wide conveyor belt driven by an electric motor or a flywheel. The belt moves to the rear, requiring the user to walk or run at a speed matching the belt. The rate at which the belt moves is the rate of walking or running. Thus, the speed of running may be controlled and measured. The more expensive, heavy-duty versions are motor-driven (usually by an electric motor). The simpler, lighter, and less expensive versions passively resist the motion, moving only when walkers push the belt with their feet. The latter are known as manual treadmills.

Treadmills continue to be the biggest selling exercise equipment category by a large margin. As a result, the treadmill industry has hundreds of manufacturers throughout the world.

Treadmills as power sources originated in antiquity.These ancient machines had three major types of design.The first was a horizontal bar jutting out of a vertical shaft. It rotated around a vertical axis, driven by an ox or other animal walking in a circle and pushing the bar. Humans were also used to power these. The second design was a vertical wheel, a treadwheel, that was powered by climbing in place instead of walking in circles. This is similar to what we know today as the hamster wheel. The third design also required climbing but used a sloped, moving platform instead. Treadmills as muscle powered engines originated roughly 4000 years ago.[citation needed] Their primary use was to lift buckets of water. This same technology was later adapted to create rotary grain mills and the treadwheel crane. It was also used to pump water and power dough-kneading machines and bellows. Among users of treadmills today are medical facilities (hospitals, rehabilitation centers, medical and physiotherapy clinics, institutes of higher education), sports clubs, biomechanics institutes, orthopedic shoe shops, running shops, Olympic training centers, universities, fire-training centers, NASA, test facilities, police forces and armies, gyms and even home users. A medical treadmill which is also used for ergometry and cardiopulmonary stress test as well as performance diagnostics is always a class IIb medical device either when used as stand-alone device in a medical environment or when used in connection with an ECG, EMG, ergospirometry, or blood pressure monitoring device.

3 PACEMAKER

A pacemaker is a medical device that generates electrical impulses delivered by electrodes to cause the heart muscle chambers (the upper, or atria and/or the lower, or ventricles) to contract and therefore pump blood; by doing so this device replaces and/or regulates the function of the electrical conduction system of the

heart.
The primary purpose of a pacemaker is to maintain an adequate heart rate, either because the heart's natural pacemaker is not fast enough, or because there is a block in the heart's electrical conduction system. Modern pacemakers are externally programmable and allow a cardiologist, particularly a cardiac electrophysiologist to select the optimal pacing modes for individual patients. Modern devices are demand pacemakers, in which the stimulation of the heart is based on the dynamic demand of the circulatory system A specific type of pacemaker called a defibrillator combines pacemaker and defibrillator functions in a single implantable device, which should be called a defibrillator, for clarity. Others, called biventricular pacemakers have multiple electrodes stimulating differing positions within the lower heart chambers to improve synchronization of the ventricles, the lower chambers of the heart. Modern pacemakers usually have multiple functions. The most basic form monitors the heart's native electrical rhythm. When the pacemaker wire or "lead" does not detect heart electrical activity in the chamber - atrium or ventricle - within a normal beat-to-beat time period - most commonly one second - it will stimulate either the atrium or the ventricle with a short low voltage pulse. If it does sense electrical activity, it will hold off stimulating. This sensing and stimulating activity continues on a beat by beat basis and is called "demand pacing". In the case of a dual-chamber device, when the upper chambers have a spontaneous

or stimulated activation, the device starts a countdown to ensure that in an acceptable - and programmable - interval, there is an activation of the ventricle, otherwise again an impulse will be delivered.

4 OXYGEN CONCENTRATOR

An oxygen concentrator is a device that concentrates the oxygen from a gas supply (typically ambient air) by selectively removing nitrogen to supply an oxygen-enriched product gas stream. They are used industrially and as medical devices for oxygen therapy. Two methods in common use are pressure swing adsorption and membrane gas separation. Pressure swing adsorption (PSA) concentrators utilize multiple molecular sieves consisting of zeolite minerals that adsorbs pressurized nitrogen in fast cycles. Medical oxygen concentrators are used in hospitals or at home to concentrate oxygen for patients. PSA generators provide a cost-efficient source of oxygen. They are a safer,less expensive,and more convenient alternative to tanks of cryogenic oxygen or pressurised cylinders. They can be used in various industries including medical, pharmaceutical production, water treatment and glass manufacture. The FAA has approved the use of portable oxygen concentrators on commercial airlines. However, users of these devices should check in advance as to whether a particular brand or model is permitted on a particular airline.Unlike in commercial airlines, users of aircraft without cabin pressurization need oxygen concentrators which are able to deliver enough flowrate even at high altitudes.

Usually, "demand" or pulse-flow oxygen concentrators are not used by patients while they sleep. There have been problems with the oxygen concentrators not being able to detect when the sleeping patient is inhaling. Some larger portable oxygen concentrators are designed to operate in a continuous-flow mode in addition to pulse-flow mode. Continuous-flow mode is considered safe for night use when coupled with a CPAP machine. Common models retail at around 600−3,000. Leasing arrangements may be available through various medical-supply companies and/or insurance agencies. Alternate applications Edit Repurposed medical oxygen concentrators or specialized industrial oxygen concentrators can be made to operate small oxyacetylene or other fuel gas cutting, welding and lampworking torches. In both clinical and emergency-care situations, oxygen concentrators have the advantage of not being as dangerous as oxygen cylinders, which can, if ruptured or leaking, greatly increase the combustion rate of fire. As such, oxygen concentrators are particularly advantageous in military or disaster situations, where oxygen tanks may be dangerous or unfeasible.

Oxygen concentrators are considered sufficiently foolproof to be supplied to individual patients as a prescription item for use in their homes. Typically they are used as an adjunct to CPAP treatment of severe sleep apnea. There also are other medical uses for oxygen concentrators, including COPD and other

respiratory diseases.
People who depend upon oxygen concentrators for home care may have life-threatening emergencies if the electricity fails during a natural disaster

5 SPIROMETER

A spirometer is an apparatus for measuring the volume of air inspired and expired by the lungs. A spirometer measures ventilation, the movement of air into and out of the lungs. The spirogram will identify two different types of abnormal ventilation patterns, obstructive and restrictive. There are various types of spirometers that use a number of different methods for measurement (pressure transducers, ultrasonic, water gauge).
A spirometer is the main piece of equipment used for basic Pulmonary Function Tests (PFTs). Lung diseases such as asthma, bronchitis, and emphysema may be ruled out from the tests. In addition, a spirometer often is used for finding the cause of shortness of breath, assessing the effect of contaminants on lung function, the effect of medication, and evaluating progress for disease treatment. Reasons for testing Diagnose certain types of lung disease (such as COVID-19, bronchitis, and emphysema) Find the cause of shortness of breath Measure whether exposure to chemicals at work affects lung function Check lung function before someone has surgery Assess the effect of medication Measure progress in disease treatment
Types of spirometer
Whole body plethysmograph This type of spirometer

gives a more accurate measurement for the components of lung volumes as compared to other conventional spirometers. A person is enclosed in a small space when the measurement is taken.

Pneumotachometer This spirometer measures the flow rate of gases by detecting pressure differences across fine mesh. One advantage of this spirometer is that the subject can breathe fresh air during the experiment

Fully electronic spirometer Electronic spirometers have been developed that compute airflow rates in a channel without the need for fine meshes or moving parts. They operate by measuring the speed of the airflow with techniques such as ultrasonic transducers, or by measuring pressure difference in the channel. These spirometers have greater accuracy by eliminating the momentum and resistance errors associated with moving parts such as windmills or flow valves for flow measurement. They also allow improved hygiene by allowing fully disposable air flow channels

Even with the numerical precision that a spirometer can provide, determining pulmonary function relies on differentiating the abnormal from the normal. Measurements of lung function can vary both within and among groups of people, individuals, and spirometer devices. Lung capacity, for instance, may vary temporally, increasing and then decreasing in one person's lifetime. As a result, ideas about what constitutes "normal" are based on one's understanding about the sources of variabilities and can be left to interpretation.

Traditionally, sources of variation have been understood in discrete categories, such as age, height, weight, gender, geographical region (altitude), and race or ethnicity. Global efforts were made in the early twentieth century to standardize these sources to enable proper diagnosis and accurate evaluation of pulmonary function. However, rather than further aiming to understand the causes of such variations, the primary approach for dealing with observed differences in lung capacity has been to "correct for" them. Using results from comparative population studies, attributes are empirically factored together into a "correction factor". This number is then used to form a personalized 'reference value' that defines what is considered normal for one individual. Practitioners may thereby find the percent deviation from this predicted value, known as 'percent of predicted,' and determine whether someone's lung function is abnormally poor or excellent