Essay on five medical device.

1 Ambulance :used in health care

1.1 introduction

The term Ambulance come from the Latin word "Ambulare". meaning to walk or move about which is a reference to early medical care where patients were moved by lifting or whealing. Ambulance where first used transport 1487 by Spanish force.

1.2 Used in health care

Ambulance is a medically equipped vehicle. It is used in transports patients to treatment facilities, such as hospitals. vehicles count as an ambulance if they can transport patients. Ambulance can be grouped into types depending on whether or not they transport patients. 1.Patient transport ambulance:- These can be road- going vans, boats, air ambulance.

2.Patient transport:- A vehicle which has the job of transporting patients to from or between places of medical treatment.

3.Ambulance Bus:- They can evacuate and transport large number of patients.

4. Charity Ambulance:- These are usually based on a bus. Transport sick children or adults on trip or vacation away from hospital.

Ambulance service provided 999 emergency ambulance , rapid response vehicle, first responders and patient transport services.Ambulance vehicle are required to carry a wide range of equipment including intravenous drips, drugs, oxygen and heart delibrillators. Ambulance invented by Dominique seen larrey. Ambulance driver today are trained as EMTS or paramedics.These EMS professional also provide crucial emergency services. An ambulance usually has two crew members.That way one can drive while the other look after the patient in the back .A paramedic will have at least year of medical training and can do fairly advance treatment .In some countries such as France, Germany, the Netherlands and Sweden ambulance may have doctors and nurses on board.

1.3 Ambulance: make better version

vehicles section depends on the child emergency needs transport team capabilities any out of ordinary staffing or equipment requirements (e.g for extracorporeal memberane oxygenation, inhaled nitric oxide or helix) facilities abilities distance terrain ; traffic patterns ; ground and air ambulance availability helicopter landing pad access . The transport vehicles must be equipped with electric power , oxygen and suction and must have sufficient space for the equipment and supplies that the team bring along - stretcher or isolette , monitor, ventilator, medication packs infusion pump and many more. An airplane may be able to fly to area when distance ¿150 miles altitude or weather preclude helicopter uses .The uses of airplane necessitates several ambulance transfer, with there attendant delay and potential complications.There are also delays when the plane must fly from a remote base to the programs jurisdiction. Ambulance service:- 1.coordination of all health services activities at the scene.

2. Saving life and relieving suffering.

3.Prevention of further injury .

4. Provision of a CCS

5. Triage.

6.Transportation of the injured.

7. Casualty documention.

8.Notification of hospitals of a potential chemical , biological, radiological etc. Emergency ambulance are highly likely to be involved in hazardous situation , including incidents such as a road traffic collision , as these emergencies create people who are likely to be in need of treatment.They are required to gain access to patients as quickly as possible , and in many countries, are given dispensation from obeying certain traffic laws.for instance, they may be able to treat a red traffic light or stop sign as a yield sign or be permitted to break the speed limit.Generally , the priority of the response to the call will be assigned by the dispatcher. Passive visual warnings are usually part of the design of the vehicle , and involve the use of high contrast pattern . The star of life is widely used and was originally designed and governed by the U.S national highway traffic safety administration . Because of red cross symbol is legally protected by both national and international law. There are several technology in use to achieve the flashing effect.These include flashing a light bulb or LED, flashing or rotating halogen and strobe lights which are usually brighter than incandescent lights .Each of these can be programmed to flash in pattern.

2 Blood mixer

2.1 Introduction

Blood mixing studies are test performed on blood plasma of patients or test subjects to distinguish factor deficiency from factor inhabitors, such as lupus anti-coagulant , or specific factor inhabitors,. such as antibodies directly against factor.usually done by mixi equal volume of patients plasma and pooled normal plasma and then reapeating the aPPT on the mixer.Red blood cell (RBC) contain haemoglobin, and supply the cell of the body with oxygen ,white blood cell (WBC) are not commonly used during transfusion ,but are part of the immune system and fight infections. Because of this, many patients died because incompatible blood was transferred to them. The basic principle is that the normal plasma contributes a sufficient concentration of clotting factors to "correct" for a factor deficiency.

2.2 Procedure:

Before a blood mixing is given ,there are many steps taken to ensure quality of the blood products , capability and safety to the recipient.In 2012 a national blood policy was in place in 70 percent of countries and 69 percent of countries had specific legislation that covers and the safety and quality of blood mixing. Blood Donation:- Blood transfusion use as sources of blood either one 's own(autologous transfusion).The latter is much more common than the former. Using another's blood must first start with donation of blood . Blood is most commonly donated as whole blood obtained intervenously and mixed with an anti-coagulant.In developed countries , donations are usually anonymous to the recipient, but the product in a blood bank are always individually traceable through the whole cycle of donation, testing, separation into components. Red cells , plasma, and platelets can also be donated individually via a more complex process called apheresis. The WHO recommend that all donated blood be tested for transfusion trasmissible infections.These include HIV , Hepatitis, syphilis and where relevant . All donated blood should also be tested for the ABO blood group system and Rh blood group system to ensure that the patient is receiving compatible blood. Leukocyte reduction is the removal of white blood cell by filtration.Leukoreduced blood products are less likely to cause HLA alloimmunization , febrile non- hemolytic transfusion reaction , cytomegalovirus infections and platelet- transfusion refractoriness.

2.3 frequency of use

Globally, around 85 million units of red blood cells are transfused in a given year . In the united states , blood transfusion were performed nearly 3 million times during hospitalization in 2011, making it the most common produre performed.The rate of hospitalization with a blood transfusion nearly doubled from 1997, from a rate of 40 stay to 95 stays per 10,000 population.It was the most common produre performed for patients 45 year of age and older in 2011, and among the top five most common for patients between the age of 1 and 44 years. According to the new york times "change in medicine have eliminated the need for millions of blood transfusion ,which is good news for patients getting new procedures like coronary bypasses and other procedures that once required a lots of blood .

2.4 Research into alternative

There are clinical situation where transfusion with red blood cells is the only clinically appropriate option , clinicians look at whether alternative are feasible. This can be due to several reason, such as patients safety , economic burden or scarcity of blood . Guidelines recommend blood transfusion should be reserved for patients with or at risk of cardiovascular instability due to the degree of their anaemia.In these cases parenteral iron is recommended. There are no available oxygen carrying blood substitutes, which is the typical objective of a blood (RBC) transfusion ; however there are widely available non-blood volume expanders for cases where only volume restoration is required. These are helping doctors and surgeons avoid the risk of disease transmission and immune suppression.

2.5 veterinary use

veterinarians also administer transfusion to other animals.various species required different levels of testing ensure a compatible match.For example , cat have 3 known blood types , cattle have 11 dogs, 13 pigs,have 16 and horses have 34 in many species.The rare and experimental practice of interspecifies blood transfusion is form of xenograft.

3 ECG

3.1 Introduction

Electrocardiography is the process of producing an electrocardiogram, a recording of the heart's electrical activity.It is an electrogram of the heart which is a graph of voltage versus time of the electrical activity of the heart using electrode placed on the skin.These electrodes detect the small electrical changes that are a consequences of cardiac muscle depolarization followed by repolarization during each cardiac cycle.change in the normal ECG pattern occur in numerous cardiac abnormalities, including cardiac rhythm disturbance, inadequate coronary artery blood flow and electrolyte distrubance and traditional ly "ECG" usually means a 12-lead ECG taken while lying down as discussed below. electrical activity of the heart such as Holter monitor but also some models of smart watch are capable of recording an ECG.ECG signals can be recorded in other contexts with other devices. During each heartbeat,a healthy heart has an orderly progression of depolarization that starts with pacemaker cell in the sinoatrial node,spreads through out the atrium ,and passes through the atrioventricular node down into the bundle of his and into the Purkinje fibres, spreading down and to the left throughout the ventricles.

3.2 medical uses

The overall goals of performing an ECG is to obtain information about the electrical function of the heart . Medical uses for this information are varied and often need to be combined with knowledge of the structure of the heart and physical examination signs to be interpreted.some indications for performing an ECG include the following:- 1.chest pain or suspected myocardial infections.

2.symptoms such as shortness of breath, murmurs , fainting, seizures, funny turns monitoring of known cardiac arrhythmias.

3.medication monitoring(e.g drugs,- induced QT, digoxin toxicity) and management of overdose.

4. Cardiac stress testing .

5.computed tomography angiography (CTA) and magnetic resonance angiography (MRA) of the heart.

6.catheter is inserted through the femoral vein and can have several electrodes along its length to record the direction of electrical activity from within the heart.

7.Electrolyte abnormalities, such as hyperkalemia.

3.3 Interpretation

Interpretation of the ECG is fundamentally about understanding the electrical conduction system of the heart. Normal conduction starts and propagates in a predictable pattern, and deviation from this pattern can be a normal variation or be pathological. An ECG does not equate with mechanical pumping activity of the heart, for example, pulseless electrical activity produces an ECG that should pump blood but no pulses are felt (and constitutes a medical emergency and CPR should be performed). Ventricular fibrillation produces an ECG but is too dysfunctional to produce a life-sustaining cardiac output. Certain rhythms are known to have good cardiac output and some are known to have bad cardiac output. Ultimately, an echocardiogram or other anatomical imaging modality is useful in assessing the mechanical function of heart. 1.depolarization of the heart towards the positive electrode produces a positive deflection 2.depolarization of the heart away from

the positive electrode produces a negative deflection 3.repolarization of the heart towards the positive electrode produces a negative deflectionrepolarization of the heart away from the positive electrode produces a positive deflection.

3.4 Diagnosis

Numerous diagnoses and findings can be made based upon electrocardiography, and many are1.Atrial fibrillation and atrial flutter without rapid ventricular response 2.Premature atrial contraction (PACs) and premature ventricular contraction (PVCs) 3.Sinus arrhythmia 4.Sinus bradycardia and sinus tachycardia 5.Sinus pause and sinoatrial arrest 6 S inus node dysfunction and bradycardia-tachycardia syndrome 7.Right and left atrial abnormality Electrolytes disturbances and intoxication: 8.Digitalis intoxication 9. Calcium: hypocalcemia and hypercalcemia 10. Potassium: hypokalemia and hyperkalemia 11. Serotonin Toxicity

Electrocardiograms are recorded by machines that consist of a set of electrodes connected to a central unit. Early ECG machines were constructed with analog electronics, where the signal drove a motor to print out the signal onto paper. Today, electrocardiographs use analog-to-digital converters to convert the electrical activity of the heart to a digital signal. Many ECG machines are now portable and commonly include a screen, keyboard, and printer on a small wheeled cart. Recent advancements in electrocardiography include developing even smaller devices for inclusion in fitness trackers and smart watches. These smaller devices often rely on only two electrodes to deliver a single lead I.Portable six-lead devices are also available.

4 Chest- X-Ray

4.1 Introduction

A chest radiograph, called a chest X-ray (CXR), or chest film, is a projection radiograph of the chest used to diagnose conditions affecting the chest, its contents, and nearby structures. Chest radiographs are the most common film taken in medicine. Chest X-rays can detect cancer, infection or air collecting in the space around a lung, which can cause the lung to collapse. They can also show chronic lung conditions, such as emphysema or cystic fibrosis, as well as complications related to these conditions. Heart-related lung problems. chest X-ray or chest film an x-ray of the chest used to diagnose diseases of the chest. X-rays are among the most common medical images. Doctors use them to diagnose problems.

Like all radiography methods, chest x-rays use ionizing radiation. The chest x-ray process makes a chest x-ray photo. The photo shows the inside of the chest.

4.2 Medical uses

Chest radiographs are used to diagnose many conditions involving the chest wall, including its bones, and also structures contained within the thoracic cavity including the lungs, heart, and great vessels. Pneumonia and congestive heart failure are very commonly diagnosed by chest radiograph. Chest radiographs are also used to screen for job-related lung disease in industries such as mining where workers are exposed to dust.

For some conditions of the chest, radiography is good for screening but poor for diagnosis. When a condition is suspected based on chest radiography, additional imaging of the chest can be obtained to definitively diagnose the condition or to provide evidence in favor of the diagnosis suggested by initial chest radiography. Unless a fractured rib is suspected of being displaced, and therefore likely to cause damage to the lungs and other tissue structures, x-ray of the chest is not necessary as it will not alter patient management. Two views are usually taken: one in which the x-rays pass through the chest from the back (posterior-anterior view), and one in which the x-rays pass through the chest from one side to the other (lateral view). You stand in front of the machine and must hold your breath when the x-ray is taken. 1 Pneumonia. 2 pneumothorax 3 Heart failure. 4 Bone fracture. 5 Hiatal hernia.

The main regions where chest -x-ray may identify problems:

1 Airways, including hilar adenopathy or enlargement

2 Breast shadows

3 Bones, e.g. rib fractures and lytic bone lesions

4 Cardiac silhouette, detecting cardiac enlargement

5 Costophrenic angles, including pleural effusions

6 Diaphragm, e.g. evidence of free air, indicative of perforation of an abdominal viscus

7 Edges, e.g. apices for fibrosis, pneumothorax, pleural thickening or plaques

8 Extrathoracic tissues

9 Fields (lung parenchyma), being evidence of alveolar flooding 10.Failure, e.g. alveolar air space disease with prominent vascularity with or without pleural effusions

4.3 Limitation

chest radiographs are a relatively cheap and safe method of investigating diseases of the chest, there are a number of serious chest conditions that may be associated with a normal chest radiograph and other means of assessment may be necessary to make the diagnosis. For example, a patient with an acute myocardial infarction may have a completely normal chest radiograph.

5 Feeding Pump

5.1 Introduction

feeding tube is a medical device used to provide nutrition to people who cannot obtain nutrition by mouth, are unable to swallow safely, or need nutritional supplementation. The state of being fed by a feeding tube is called gavage, enteral feeding or tube feeding. Placement may be temporary for the treatment of acute conditions or lifelong in the case of chronic disabilities. A variety of feeding tubes are used in medical practice. They are usually made of polyurethane or silicone. The diameter of a feeding tube is measured in French units (each French unit equals). They are classified by the site of insertion and intended use. NG-tube is passed through the nares (nostril), down the esophagus and into the stomach. This type of feeding tube is generally used for short term feeding, usually less than a month, though some infants and children may use an NG-tube longterm. Individuals who need tube feeding for a longer period of time are typically transitioned to a more permanent gastric feeding tube. The primary advantage of the NG-tube is that it is temporary and relatively non-invasive to place, meaning it can be removed or replaced at any time without surgery. NG-tubes can have complications, particularly related to accidental removal of the tube and nasal irritation. nasojejunal or NJ-tube is similar to an NG-tube except that it is threaded through the stomach and into the jejunum, the middle section of the small intestine. In some cases, a nasoduodenal or ND-tube may be placed into the duodenum, the first part of the small intestine. These types of tube are used for individuals who are unable to tolerate feeding into the stomach, due to dysfunction of the stomach, impaired gastric motility, severe reflux or vomiting. These types of tubes must be placed in a hospital setting.

5.2 Oral and Dental Complications

Adults fed by tube have previously shown a significantly higher rate and quantity of calculus deposition than adults fed orally. Even with an intensive oral hygiene program in place, adults fed by tube still demonstrate a greater quantity of supra-gingival calculus accumulation, which can be a risk factor for several oral diseases including periodontal diseases and aspiration pneumonia. Although calculus removal may be difficult for caregivers to perform and provide an unpleasant experience for patients with a feeding tube, the implications of calculus in the initiation of aspiration pneumonia make it clear that it poses a serious health risk. Research suggests that the best course of treatment for patients with a gastric tube is periodic professional cleaning, maintained with routine home use of a non-foaming anti-calculus dentifrice (toothpaste). Dental caries is a localized disease in which susceptible tooth structure is broken down by bacteria that are able to ferment carbohydrates into acid. Although it has not been extensively studied, researchers speculate that individuals fed by tube may be less prone to the development of caries as they are not exposed to carbohydrates orally. Examination of dental plaque from tube-fed individuals found that it contained fewer caries-associated microorganisms (lactobacilli and streptococcus) and had reduced ability to produce acids, suggesting an overall weaker ability to cause caries. Further, studies with animal subjects found that tube-feeding was not associated with tooth decay, even when combined with reduced salivation. Thus, tube-feeding alone does not necessarily directly promote the development of caries. child undergoes a period of tube-feeding, there is a lack of oral stimulation that can lead to the development of oral hypersensitivity. This can complicate the delivery of dental care and serve as a barrier for the child's return to oral feeding. This can also lead to dysphagia (difficulty swallowing), muscle weakness and improper airway protection, resulting in longer

periods of tube-feeding and increased risk of dental complications. A dentist may prescribe a "desensitization program", which involves routine stimulation of intra-oral and extra-oral structures, and encourage oral hygiene procedures to be performed at home.

5.3 Medical uses

Feeding tubes are used widely in children with excellent success for a wide variety of conditions. Some children use them temporarily until they are able to eat on their own, while other children require them longterm. Some children only use feeding tubes to supplement their oral diet, while others rely on them exclusively. Feeding tubes are often used in the intensive care unit (ICU) to provide nutrition to people who are critically ill while their medical conditions are addressed; as of 2016 there was no consensus as to whether nasogastric or gastric tubes led to better outcomes. People who have surgery on their throat or stomach often have a feeding tube while recovering from surgery; a tube leading through the nose and down to the middle part of the small intestine is used, or a tube is directly placed through the abdomen to the small intestine. As of 2017 it appeared that people with a tube through the nose were able to start eating normally sooner.