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Assigement-1

FIRST SEMESTER, BIO MEDICAL ENGINEERING

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Contents

1 Telemedicine:New Horizon In Public Health

1.1 Introduction

Telemedicine means"healing by wire".Delivery of healthcare services by using of information and communication technologies to reduce the distance as a critical factor by all healthcare professionals for treatment and prevention of disease,injuries,research,etc. Telemedicine system consist of an interface between hardware and software and a communication channel to eventually bridge two geographical location to exchange information between two location.Hardware consist of computer, printing,videocomputing,etc.Software consist of patient information (image,report,etc)

1.2 Advantage Of Telemedicine

Easy access to remote area-In rural areas people suffer more difficulty because specialists physician mainly open their clinic in urban areas.But now telemedicine makes its possible in rural areas also.

Reduce Time And Cost-Telemedicine save the transportation charge .Because of telemedicine patients has no need to travel a mile . Also patient have to be wait for their chances because at that time doctor treat other patients which is time consuming.

c) Comfortable- Patients want to stay at home.They avoid long distance travelling.Some patient also have pain issue.So they faced difficulty to travel.Telemedicine solve this problem of patients.

d) Emergency treatment-Telemedicine helps mainly to chronic disease patients like diabetic,BP patients and more,they need doctor every time at every place.In some cases patient require doctor quickly at that time telemedicine techniques helped them.

e) Medication Management- Sometimes patients are forget to to take their medication.Now,a day proffessional used telemedicine techniques to monitoring when thier patient took medicine.Rasult of these the chances of rehospitalized is reduced.

f) ICU- Using HD webcam,high risk infants can be seen by a specialist at other hospital simply by sharing video with second opinion.It decreases the shifting of infants on other hospital and it also saved the infant live.

g) Second Opinion- Earlier for second opinion patient have to change their hospital or some time seniors have to travel miles for treating a patient. But

now by telemedicine a doctor took care of their patient by staying at a place.

h) Disaster Relief- When disaster occurred local healthcare resources are immediately pulled it into provide both emergent and non-emergent care.This usually result in shortage as demand for service is much high what can be supplied.

1.3 Disadvantages of Telemedicine

- a)Implementing a new system required training and sometimes staff members find its difficult to welcome this change.

b) Inadequate primary record- Primary case of providers may not be aware of records from other resources.Shuffling of the service provide raises the the likelihood of a doctor not understanding a a patient background on their treatment routines.

c)Internet Connection Issue- Telemedicine is a telecommunication technology where internet is basic needs.Adverse weather on other annoyances can cause a poor outage or internet an internet connection,complicating a doctor's online consultation.

1.4 Conclusion

Telemedicine play a very important role in healthcare.It makes doctor easily accessible anytime anywhere.Its saved the time of both patient and doctor.Patient took their appointment on comfort zone.

2 NEEDLE FREE INJECTION

2.1 Introduction

- Particularly we use injection for prevention of disease but sometimes it cause rashes and tissue damaging. Injection can be source of disease transmission specially when it is reused or not be correctly used. Disadvantage of injection was the reason of introducing a needle free injection technologies.

These technologies are meant for injecting liquid formulation as well as injecting drugs and vaccine in solid form. Because of its no harkness it used very commonly now a day. The needle technologies was firstly introduced by Marshall Lockhart in 1936later it was come on used by Robert.A.Hingson an Americian scientist . In1986 it was really helpful when outbreak of Hepatitis.B among patients receiving injection from a needle free injection.

2.2 Three Components of Needle Free Device

- Component 1- Injections device It consist of drug chamber and is designated such that self administration is possible. It is made up of a plastic.It also has a needle free syringe which is made up of plastic.

Component 2- It is serves as passage for drugs as skin contracting surface .Drugs enter through orifice(hole or opening).Diameter of orifice is about 100micrometer.Most common orifice size is 0.127micrometer. Therefore this needle is painless.

Component 3- It will be a mechanical method in which energy is stored in spring and is released by passing a plunger to provide necessary pressure.It may also be a pressure storage method in which compressed gas is used.

2.3 Types Of Needle Free Injection System

1.Powder injection- It is consist of chamber filled with solid drugs and nozzles for injecting drugs particle into skin by powdered source which is typically a compressible gas .It is accomplished by light gas gun . Particle leave piston by means of deaccleration which slows down the piston.

2. Liquid injection- If a enough pressure applied by a fliud which is intimate contact with skin the liquid will punch a hole and entered to skin .In these system gas or spring piston drugs loaded compartmnt and nozzles. Nozzle has an orifice size(150-300micrometer.

Depot or projectile injection- It is highly advance compared to other the drugs is proccessed into a long thin depot having sufficient mechanical strength into al long thin depot having sufficient mechanical strength strong enough to transmit a driving force to pointed tip which may be formed either of an inert material or medicament itself.

A depot is in form of cylinder measuring around 1mm diameter and few millimeter in length. This diameter may be small enough to limit the payload but the quantity of payload is sufficient enough for many new thearaupatic protein antibodies and other small molecules.The depot ois strong enough to puncture the skin when punched with sharp tripped punch by applying a pressure of order of 3-8MPa.

2.4 Advantage

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1.Needle free injection can be dangerous due to adverstent needle sticks or cut.

2. Worker may forget to change needle when drawing from a bottle it may cause disease transmission.Needle free injection take needle out of equation due to high powdered dosing mechanism,there is a little no chance of cross contamination.

3.If needle are disposed incorrectly or dropped after use there is always of a possibility of an animal ingesting needle or being stuck in unasuming place. Needle free injection system residual needle and needle fragments from carcasses.

4. Emerging needle free technologies may also embed features to aid in technologies may also embed featured to aid in injecting quality and accuracy.

2.5 Disadvantages

Needle free ingection are designed for high force due to be administered very quickly and should only be used with proper fairly.The high pressure delivered of drugs on damage fragile molecules beneath the skin layer especially in administration of monoclonal antibodies.

2.6 Conclusion

Needle free technology are capable of delivering a wide spectrum of medicinal formulation into the body with same bioequivalance as that which could have been achieved by drugs administration by a two piece syringe system without unnecessary pain. These devices are very easily be used,don't require any expert super supervision on handling easy to store and despose

3 AIR PURIFIER RESPIRATOR

3.1 Introduction

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Air purifier respirator use filter to remove harmful contaminate from inhaled air and they range from simple dust mask to complex mask that filter a wide variety of harmful chemicals contaminate.Respirator as a form of face mask design to provide against hostlie environment.Respirator can range from simple filter that cover the nose and mouth and provide home on workplace protection against dust and and pollen to complex device that provide protection against very dangerousdust,microbes, fumes and chemical vapour.

Gas mask also known as air purifier respirator are defined by regulat device designed for use during entry into atmosphere not immediately dangerous to life or health on escape only from hazardous atmosphere containing adequate oxygen to support life.

3.2 Working

Gas masks include a cartlidge or consist activated carbon and/or chemical to remove dangerous gas and vapour contaminant.A particulate filter may be attached to the cartridge or canister. Mechanical filter work by physically trapping particulate matter.Unlike chemical filter,mechanical filter become more efficient with use but make it harder to breathe.

3.3 Advantage

1.A gas mask is designed to protect the face and lungs against a noxious gases and fumes , chemical agents and biological substance as in welfare terror attack or in certain industrial environment.

2. As we seen in COVID mask was a main tool in fight against corona virus.

3. In city like Delhi there was a huge amount of air polluted ,air purifier respirator helps to breathe safely and efficiently.

4. Air purifier respirator help to those people who were allergic to dust and smog.

3.4 Disadvantages

1.Air purifier respiratory don't provide oxygen. If it is used in environment with low oxygen level such as in a fire or a confined space,you are in a danger of asphyxiation.

2. It provide no eye protection.
3. Provide no protection against irritant gases such as ammonia.

3.5 Limitations

1.Never use air purifier respirator at that place oxygen supply is weak These respirator only purifier air not supply the oxygen.

2.Present contaminate don't have warning properties. Many contaminate have warning properties at high concentration.Detection of contaminant that don't have warning properties can be difficult and therefore contaminate can be difficult and therefore can leak through or around a respirator and you won't know it.

3.The contaminate has a skin designation.Unless other PPE is also used contaminant still result through dermal absorption can with an approved respirator.

4.Air purifying respirator can only protect at or below specific concentration of contaminant.

3.6 Conclusion

Air purifier respirator work by removing gas vapour, aerosol, or a combination of contaminant from air through the use of filter,cartlidge or canister. These respirator don't supply oxygen and therfore cannot be used in an atmosphere that is oxygen deficient or immediately dangerous to health. clearpage

4 PULSE OXIMETER

4.1 Introduction

Pulse oximeter is a test used to measure the oxygen level of the blood.It is an easy,painless measure of how well oxygen is being set to past of your body furthest fr your heart,such as arms and legs.

A clip like devices called a probe is placed on a body part such as finger or ear lobe.The probe use to measure the depth how much oxygen is in blood.This information helps the health care to provide decide if a person needs extra oxygen.

4.2 Working principle

Pulse oximeter based on principle of Photo-ptethysmography. It is one of non invasive method used to measure proportional quantity of blood change using light absorption phenomenon in biological tissue.When fingerstrip is illuminated by red and infrared light depending on the oxygenated blood content either red or infrared light is detected by photodetector.

Oxygenated haemoglobin absorbs more infrared light while deoygenatef haemoglobin abosrb more red light Because of their different absorption coefficient spectra at 660nm red light absorption coefficient and at 940nm.Infrared light cofficient can be obtained.Ultimately the amount of oxygen bounded with haemoglobin can be decided based on absorption coefficient.

4.3 Advantage

Medical professionals may use pulse oximeter to monitor the health of people with condition that affect blood oxygen levels,especially while they're in the hospital. These can include: 1-Asthma 2-Pneumonia 3-Lung cancer 4-Anemia 5-Heart failure 6-Congential heart disease

Doctor use pulse oximitry for a number of different reasons,including

1-To assess how well a new lung medication is working.

2-To evaluate whether someone needs help breathing.

3-To evaluate how helpful a ventilator is

4-To monitor oxygen levels during or after surgical procedure that requires sedation.

5-To determine whether someone needs supplemental oxygen therapy.

6-To determine how effective supplemental oxygen therapy is specially when treatment is new.

Pulse oximitry may be useful in both inpatient and outpatient seeting.In some cases your doctor may recommend that you have a pulse oximeter for home .

4.4 Conclusion

Pulse oximeter formed to be one of the important respiratory monitoring methods.In this method it is possible to determine the percentage of oxygen saturated with heamoglobin but when other possible factor like carboxyhaemoglobin and methameoglobin are present ,then to detect those factors need to use four wavelength to determine the fractional Sp02. Oxeter has number of limitations whichay lead to in accurate reading carboxyhaemoglobin,methameoglobin,ania ,dyes,nailpolish, ambient light, false alarm,motion astifact, skin pigmentation,low perfusion state are the different factors which effect the reading in oximeter.

5 NEUROMUSCULAR ELECTRICAL STIMULATION

5.1 Introduction

Neuromuscular electrical stimulation of paralyzed muscules can be used to replace monitor function in individual who have upper motor neuron damage from cause such as strok or spinal cord injury. In some conditions such as stroke or incomplete spinal cord injury.NMES may be part of a therapy regimen that help restore volutionalized movement and functions.In other conditions such as severe stroke or complete spinal cord injury, permanent NMES application are needed to replace the lost neuromuscular function.

Neuromuscular electrical stimulation or NMES use a device that send electrical impulses to nerves. This input causes muscule to contract.The electrical stimulation can increase strength and range of motion and offset the effect of disuse.It is often used to "re-train" or "re-educate" a muscule to function and to bulid strength after a surgery or period of disuse.

Neuromuscular electrical stimulation is used to stimulate nerve and muscule to achieve a theraupatic response.It is used in management of urinary stress incontinence unstable bladder urge Pascal incontinence and passive faical incontinence.It is recommended that NMES should be combined with biofeedback and pelvic floor muscule exercise for muscule strengthening and with bladder drill and medication for detrussor hyperactivity and hypactivity.

5.2 How NMES work

It is safe, low frequency current that excited the nerve that innervate desired muscules causing contracting,block pain pathway and reduce swelling and edma.

NMES strengthen muscules in a different way than active muscules movement.It is reserved for animal that cannot be actively exercise such as neurologic patient with paralysis.

5.3 Key Benefits

1.Muscular disuse atrophy- For someone who had hip replacement surger of a limb placed in a cast the muscule stiffon and weaken due to nonuse. With stimulation performed on the skin over the targeted area the current

that passes through electrode placed on body fridge contraction This help to strengthen otherwise weaken muscule or musule groups.

2.Neuromuscular Condition- Using a type of NMES called a functional electrical stimulation (FES) works to enhance activity in patients with neurological impairment.

3.Eliminate pain- A chiropactor might also use NMES along with other eliminate pain . For this electrical stimulation sends a signal normally to the central nervous system via nerve fibre.

5.4 Conclusion

NMES can help when the client is either unable to volatility elicit strong muscule contraction.NMES has been shown to accelerate functions recovery after surgery prevent discuss atrophy,reduce ROM deficit and improve motor control in patients with strength deficit of various ethologists.The electrical stimulation cause a slight hingling in stimulated muscule.This helps you child to know what muscule to used and when to use them.They are no known risks or side effects of NMES.