



AL- MUSTAQBAL UNIVERSITY COLLEGE
DEPARTMENT OF BIOMEDICAL ENGINEERING

Bio-Electronics Design Lab

BME 515

Lecture 8

- Infusion Pumps -

Dr. Zaidoon AL-Shammari

Lecturer / Researcher

zaidoon.waleed@mustaqbal-college.edu.iq

Infusion Pumps





- Infusion pump delivers measured amounts of fluids or medications into the bloodstream over a period of time.
- They supply a controlled amount of drugs very slowly into the bloodstream over a period of time.

Techniques for the pumping action



- First method is using the pulleys on the cylinder to compress the fluid tubing in a controlled manner to force the fluid down the tubing.
- A second method is obtained by using a chamber that fills with fluid, then emptied out by the pumping mechanism in a controlled manner.



- The Infusion Pump uses a combination of these two techniques described.
- The user can set the rate of fluid delivery in milliliters per hour (ml/hr) together with the volume of fluid that should be delivered in milliliters (ml).
- The pump will not deliver fluid beyond a certain delivery pressure to prevent harm to the patient.
- This is achieved by monitoring the pressure in the giving set and ensuring that it does not exceed a certain level.



- If the pressure is exceeded, pumping is stopped and an alarm sounded to alert the user.
- This alarm is called an occlusion alarm flow.
- Monitoring of the function of the pump occurs continuously and alarm sound will prevent any possible danger to the patient such as failure of delivering fluid in the manner expected .
- The Infusion Pump has battery back up so that it can continue operating even when mains failure occurs.

Components of Infusion Pump



The drug infusion systems basically consist of two components:

- Open Loop System:
 - The art of delivery is set by the nurse on the basis of past experience, mathematical computation, or by trial & error.

 - The fluid is delivered at the set rate until the setting is changed.



- Closed Loop System:
 - The effect of drugs are monitored by appropriate transducers.
 - The desired delivery rate is computed and set automatically.

Types of Infusion



The user interface of pumps usually requests details on the type of infusion from the technician or nurse that sets them up:

- Continuous Infusion.
- Intermittent Infusion.
- Patient Controlled Infusion.



- Consists of small pulses of infusion, usually between 20 Nano liters and 100 micro liters depending on the pump's design.
- The rate of pulses depending on the programmed infusion speed.

Intermittent Infusion



- Has a "high" infusion rate.
- Alternating with a low programmable infusion rate to keep the cannula open.
- The timings are programmable.



- Infusion on-demand, usually with a preprogrammed ceiling to avoid intoxication.
- The rate is controlled by a pressure pad or button that can be activated by the patient.
- It is the method of choice for patient analgesia.

Types of Pump



There are two basic classes of pumps.

- Large volume pumps can pump nutrient solutions large enough to feed a patient.
- Small-volume pumps infuse hormones, such as insulin, or other medicines, such as opiates.

