

INTRODUCTION OF PATIENT MONITORING SYSTEMS

- The Patient Monitoring System (PMS) is a very critical monitoring systems, it is used for monitoring physiological signals including Electrocardiograph (ECG), Respiration , Invasive and Non-Invasive Blood Pressure, Oxygen Saturation in Human Blood (SpO₂), Body Temperature and other Gases etc.
- In PMS, the multiple sensor and electrodes is used for receiving physiological signals like as ECG Electrodes, SpO₂Finger Sensor, Blood Pressure Cuff and Temperature Probe to measure the physiological signals.

INTRODUCTION OF PATIENT MONITORING SYSTEMS... .

- During treatment, it is highly important to continuously monitor the vital physiological signs of the patient. Therefore, patient monitoring systems has always been occupying a very important position in the field of medical devices.
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- The continuous improvement of technologies not only helps us transmit the vital physiological signs to the medical personnel but also simplifies the measurement and as a result raises the monitoring efficiency of patients

CLASSES OF PATIENT MONITORING SYSTEM

- In the past, the dominant products manufactured by medical device manufacturers are mainly those for single parameter measurement. Nowadays however, a multi-parameter patient monitor is commonly used.
- **1. Single-Parameters Monitoring Systems**
- **2. Multi-Parameter Patient Monitoring Systems**

SINGLE-PARAMETERS MONITORING SYSTEMS

The single parameter monitoring system is available for measuring blood pressure of a human body, ECG (Electrocardiograph) monitor, SpO₂ (Oxygen Saturation in Blood) monitor et..

MULTI-PARAMETER PATIENT MONITORING SYSTEM

- A multi-parameter Patient Monitoring System (PMS) is used for multiple critical physiological signs of the patient to transmit the vital information like Electro cardiograph , Respiration Rate, Blood pressure etc. Therefore, multi parameter PMS has always been occupying a very significant position in the field of medical devices.

- Most diseases of the heart and of the circulatory system, referred to as cardiovascular diseases, strike without warning and prompt treatment is required if death is to be averted.
- Such treatment is best provided in a specialized area of hospital referred to as "intensive care unit." (ICU).
- These specialized hospital units provide constant observation of the subject, constant monitoring of the
- subject's physiological condition and provide immediate emergency treatment whenever it is required.

THREE IMPORTANT INTENSIVE CARE UNITS

- 1. Coronary intensive care units used for treatment of diseases of the heart such as the heart attacks
- 2. Stroke intensive care Units used for treatment of diseases of the circulatory system such as stroke.
- 3. Pulmonary intensive care units Pulmonary intensive care unit s are used for treatment of respiratory diseases



PHYSIOLOGICAL FUNCTIONS TO BE MONITORED DURING INTENSIVE CARE UNIT

- 1. ECG Monitoring
- 2. Blood pressure Monitoring
- 3. Respiration
- 4. Body temperature

ECG MONITORING



ECG MONITORING

- The principal physiological signal monitored in an intensive care unit is often the electrocardiogram. The electrocardiogram is usually monitored in the lead-II configuration with two active electrodes.
- These two electrodes are placed approximately 12 inches apart along the maximum potential axis of the subject's heart.
- A third electrode (ground) should be located elsewhere on the chest. This electrocardiogram monitoring configuration is referred to as three-lead chest cluster.
- The electrodes used for ECG monitoring during intensive care must be suited for long term monitoring applications.
- The set of leads used for monitoring purpose is called 'rhythm'
- strip and its purpose is just to note the heart beat and not for analyzing it.

Blood Pressure Monitoring

- The second physiological parameter often of prime importance in intensive care monitoring is blood pressure.
- **Korotkoff system-Riva-Rocci Method**
- Blood pressure can be monitored using the automatic cuff pump and Korotkoff microphone blood- pressure measurement system this system is occasionally used in intensive care units. ,
- It also possesses the disadvantage of it does not provide a continuous record of the subject's blood pressure.
- Thus, if for some reason the subjects blood pressure were to suddenly drop, this system may take some minutes or so to detect this pressure drop.
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Blood Pressure Monitoring.....

- **PLETHYSMOGRAPH**
- Blood pressure monitoring with plethysmograph offers the least discomfort to the subject; however, it provides only a relative indication of the well being of the circulatory system rather than providing absolute values for diastolic and systolic pressure.
- Digital blood pressure monitors are now-a-days often used in many intensive care units. Any intensive care unit may employ one or more of these techniques and indeed all three may be available if required.

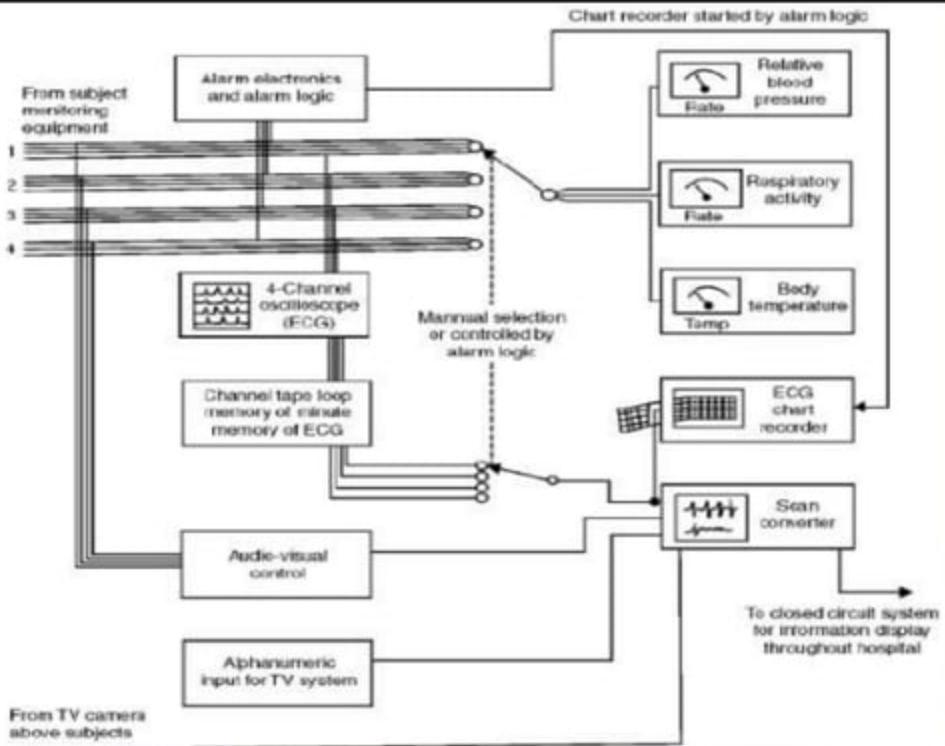
BLOOD PRESSURE MONITORING



RESPIRATION MONITORING

- It is often desirable to monitor the subject's respiratory activity during intensive care ;
- this may be accomplished with thermistor pneumograph placed in the subject's nostril.
- **BODY TEMPERATURE**
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- It is often also desirable to monitor body temperature in intensive care subjects via a rectal or armpit thermistor probe

CENTRAL NURSE'S STATION



CENTRAL NURSE'S STATION....

- Multi connector cable connects the output from the four subject- monitoring sites located beside each intensive care bed to the central nurse's station.
- Each subject's *ECG* is continuously displayed via a four channel CRT display. And also these signals are being recorded continuously on a memory loop tape recorder.
- This tape recorder contains the previous one-minute *ECG* history for each subject by recording the *ECG* on a tape loop "one minute" in length

CENTRAL NURSE'S STATION....

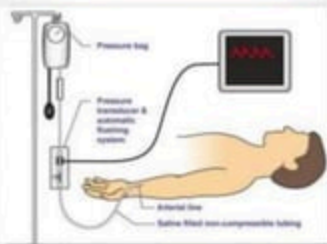
- Some central stations duplicate physiological indicators for relative blood pressure, respiratory activity and body temperature.
- These indicators can be manually switched between the four beds or the switching may be activated by the alarm system with the monitors being automatically switched to the bed providing the alarm signal.
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- **When an alarm is received at the central nurse's station, it**
- may also be used to connect the appropriate ECG signal to an as can converter and ECG chart recorder and to start the chart recorder.



Present Parameters in Patient Monitoring System

- ECG 3/5/10 leads
- Respiration
- Invasive Blood Pressure (IBP)
- Non Invasive Blood Pressure(NIBP)
- Pulse Oxy Meter (SpO₂)

Invasive method



Non invasive
Blood pressure



ECG
MONITOR



PULSE
OXYMETER



FUTURE TRENDS IN PATIENT MONITORING SYSTEM

- • Blood Gas Analyzer
- • Drug Dosage calculator
- • Drug Management System
- • RFID in PMS
- • Real Time Patient Location System
- • Wearable PMS
- • Telemetry / Telemedicine

WEARABLE PMS

