PATIENT MONITORING SYSTEM

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Vaaraahi Embedded
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1. What is Patient Monitoring?

“Repeated or continuous observations or measurements of the patient, his or her physiological function, and the function of life support equipment, for the purpose of guiding management decisions, including when to make therapeutic interventions, and assessment of those interventions” [Hudson, 1985, p. 630].

2. Why is it Required?

A patient monitor may not only alert caregivers to potentially life-threatening events; many provide physiologic input data used to control directly connected life-support devices.
3. Where it is required?

Categories of patients who need physiologic monitoring:

1. Patients with unstable physiologic regulatory systems;
   Example: a patient whose respiratory system is suppressed by a drug overdose or anesthesia.

2. Patients with a suspected life-threatening condition;
   Example: a patient who has findings indicating an acute myocardial infarction (heart attack).

3. Patients at high risk of developing a life-threatening condition;
   Example: patients immediately post open-heart surgery, or a premature infant whose heart and lungs are not fully developed.

4. Patients in a critical physiological state;
   Example: patients with multiple trauma or septic shock.
4. Present Parameters in Patient Monitoring System

- ECG 3/5/10 leads
- Respiration
- Invasive Blood Pressure (IBP)
- Non Invasive Blood Pressure (NIBP)
- Dual Temperature
- End Tital Co$_2$
- Pulse Oxy Meter (SpO$_2$)
**ECG**

**ECG Front End**

- **Electrodes**: Protection circuit
- **Gain**: 12, 40, 16
- **Amplifier**
- **50 Hz lowpass filter** (3rd order)

Common-mode signal from inputs = (positive input + negative input) / 2

(The CM-signal from several channels can be averaged.)

Right-leg driver reduces common-mode noise by cancelling it out.
Non Invasive Blood Pressure Monitor (NIBP)
Principles of NIBP

Heart Beat Signal

Heart Beat Over Time

Heart Beat Vs Diastolic Pressure
End Tital CO$_2$

Respiration Pattern in Ventilated Patient
End Tidal CO2 based on NDIR Spectroscopy
Integrating technology….

Pulse Oximeter (SpO₂)
5. 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
- Wireless Smart Patch
- Telemetry / Telemedicine
Blood Gas Analyzer
Integrating technology…

RFID in PMS

- Patient identification
- Making newborns more secure
- Reduce drug & blood administration errors
- RFID tags can Provide
  1. Better Patient care
  2. Records Management
  3. Portability
- Patient Location Monitoring / Tracking

Advantages of RFID in PMS

- Identification & Verification
- Tracking
- Sensing
- Interventions
- Alerts & Triggers
Real Time Patient Location System (RTPLS)

Based on Ti’s proprietary ZigBee Loc. Engine
Real Time Patient Location System (RTPLS) Contd...

InTouch Scalable, patient tracking

- User-friendly software
  Visual indication of tag and alarm location.

- Medical equipment protection and location
  Protect medical items such as IV pumps and multimedia equipment with Asset Tags.

- Patient location
  Real-time location of infants and patients.

- One-touch staff distress alerts
  Also provides hands-free access through protected exits.

Based on Centrak’s proprietary in touch - Dual Trak Technology
Wearable PMS
Wireless Smart Patch

- Low power MCU
- Printed Battery
- RF Transmitter
- Antenna

This are disposable wireless smart patches that can be used for 3 to 4 days on continuous usage.

Main Advantages of Wireless Smart Patches;

- Mobility & Comfort to the patient
Telemetry / Telemedicine

1. Patient
2. Wi-fi (or) Ethernet Connectivity
3. PC (or) Central Nursing Station
4. Internet
5. PDA, Cell Phone, PC

Patient side implementation

Client side consumption
Thank You!

For Further Clarifications

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