

Monitoring in Anesthesia





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Dr. Rabeya Begum. DA, FCPS

Associate professor

Department of Anaesthesia , Intensive Care and Pain Medicine.

Dhaka Medical College.

Dhaka , Bangladesh.



Patient for patient's safety

- ❖ Patient task
- ❖ HCP task
- ❖ Task of the anaesthesiologist ?????



Monitoring

Definition

... interpret available clinical data to help recognize present or future mishaps or unfavorable system conditions



What is monitoring?



to
monitor

- ❖ Physiologic parameter & Patient safety parameter
- ❖ Clinical skills & Monitoring equipment
- ❖ Data collection, interpretation, evaluation, decision
- ❖ Problem seeking, Severity assessment, Therapeutic assessment, Evaluation of Anesthetic interventions



Introduction



The most primitive method of monitoring the patient **25 years ago** was continuous palpation of the **radial pulsations** throughout the operation!!

Monitoring in the Past



Finger on the pulse



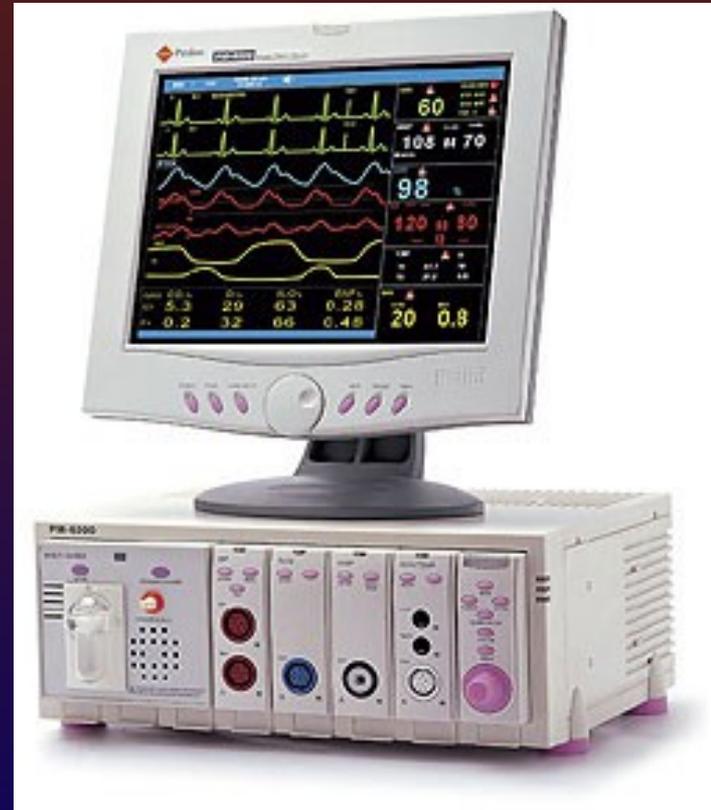
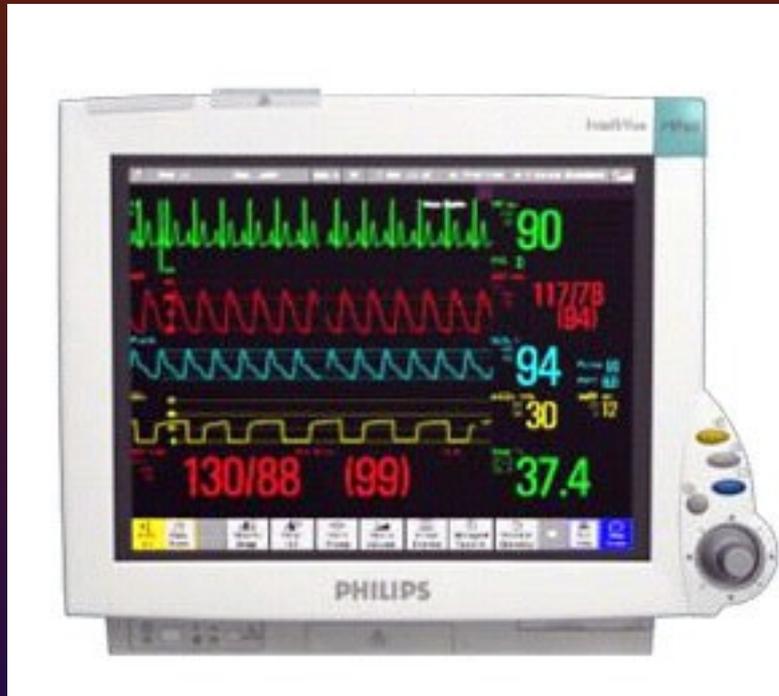


Harvey Cushing

*Not just a famous neurosurgeon ...
but the father of anesthesia monitoring*

- ❖ **Invented and popularized the anesthetic chart**
- ❖ **Recorded both BP and HR**
- ❖ **Emphasized the relationship between vital signs and neurosurgical events**
(increased intracranial pressure leads to hypertension and bradycardia)

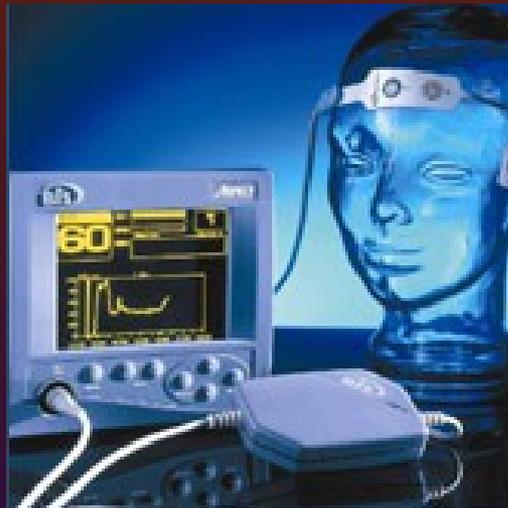




Examples of Multiparameter Patient Monitors



Transesophageal
Echocardiography



Depth of Anesthesia Monitor



Evoked Potential Monitor

Some Specialized Patient Monitors



Patient Monitoring and Management

Involves ...

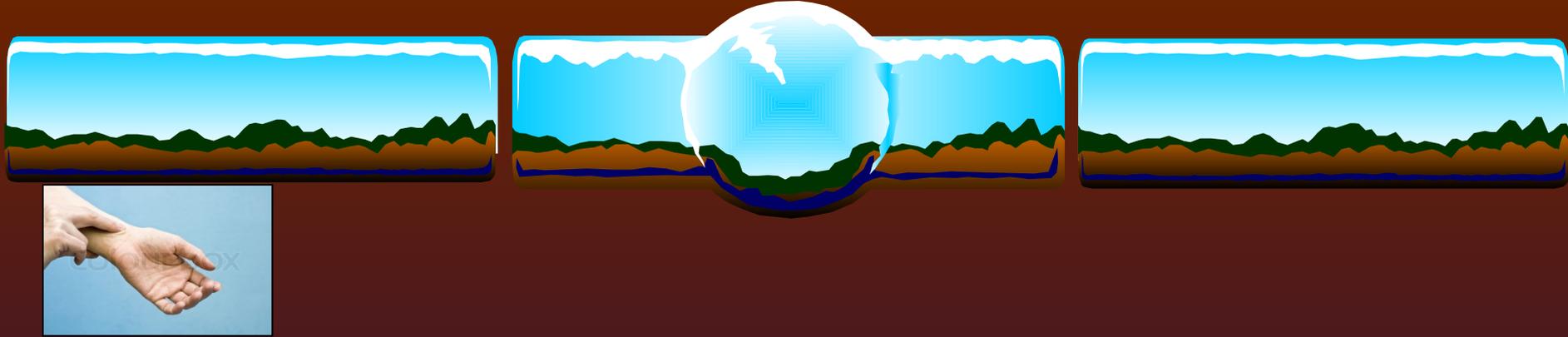
- ❖ Things you measure (*physiological measurement, such as BP or HR*)
- ❖ Things you observe (*e.g. observation of pupils*)
- ❖ Planning to avoid trouble (*e.g. planning induction of anesthesia or planning extubation*)
- ❖ Inferring diagnoses (*e.g. unilateral air entry may mean endobronchial intubation*)
- ❖ Planning to get out of trouble (*e.g. differential diagnosis and response algorithm formulation*)



Intraoperative monitoring

Why do we need intraoperative monitoring???

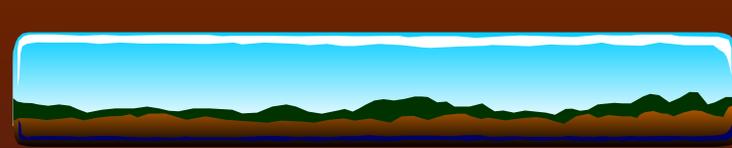
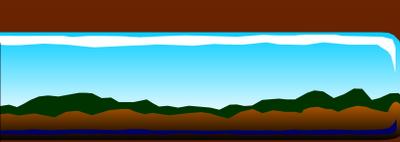
- 
- ❖ To maintain the normal pt physiology & homeostasis throughout anesthesia and surgery: induction, maintenance & recovery as much as possible.
 - ❖ To ensure the well being of the pt.
 - ❖ Surgery is a very stressful condition → severe sympathetic stimulation, HTN, tachycardia, arrhythmias.
 - ❖ Most drugs used for general & regional anesthesia cause hemodynamic instability, myocardial depression, hypotension & arrhythmias.



Under GA

- pt may be **hypo** or **hyperventilated**
- may develop **hypothermia**
- Blood loss → anemia, hypotension.

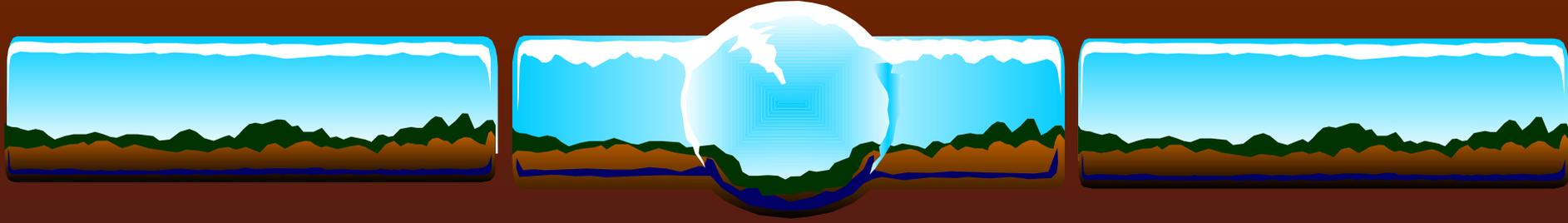
- So it is necessary to recognise when the pt is in need of blood transfusion (**transfusion point**).



Intraoperative monitoring:

The FOUR BASIC Monitors:

- ❖ We are NOT authorised to start a surgery in the absence of any of these monitors:
 - ❖ Cardiac rhythm.
 - ❖ SpO₂: arterial O₂ saturation.
 - ❖ Blood Pressure: NIBP (non-invasive), IBP (invasive).
 - ❖ ± [Capnography].



The most critical 2 times during anesthesia are:
INDUCTION - RECOVERY.

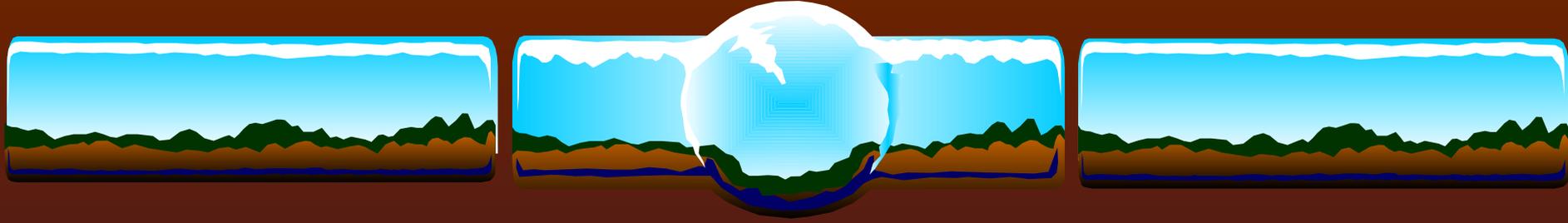
Exactly like “*flying a plane*” induction (= take off)
& recovery (= landing).

- The aim is to achieve a smooth induction & a smooth recovery & a smooth intraoperative course.



What is the value of knowing this???

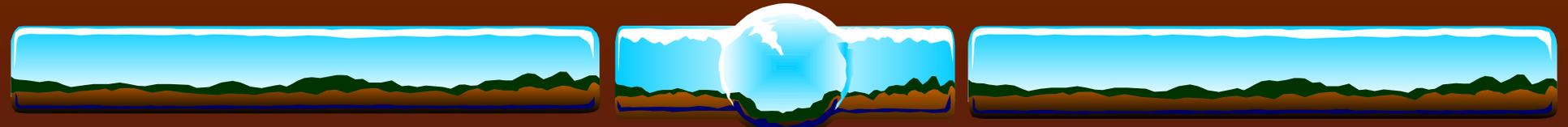
- ❖ To understand & appreciate the value of clinical monitoring.



RULE:

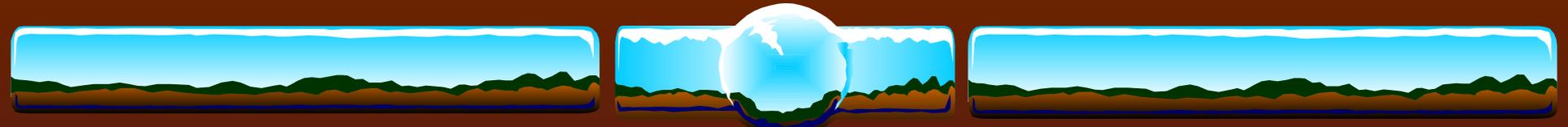
your **clinical judgement/assessment** is much **BETTER** & much more **VALUABLE** than the digital monitor.

- To appreciate that modern monitors have made life much easier for us.
 - They are present to make monitoring easier for us
- Anaesthetists presence
- NOT to be omitted or ignored.**



Level of monitoring

- ❖ Routine / Specialize / Extensive
- ❖ Non-equipment / Non-invasive / Minimally invasive
/ Penetrating / Invasive / Highly invasive
- ❖ Systematic
 - ❖ Respiratory / Cardiovascular / Temperature/Fetal
 - ❖ Neurological / Neuro-muscular / Volume status & Renal
- ❖ Standards for basic intraoperative monitoring
(ASA)



Standards for basic intraoperative monitoring (ASA : American Society of Anesthesiologists)

Standard I

- ❖ Qualified anesthesia personnel shall be present in the room throughout the conduct of all GA, RA, MAC

Standard II

- ❖ During all anesthetics, the patient's respiratory (ventilation, oxygenation), circulation and temperature shall be continually evaluated



Conclusion





LISTEN

- ❖ **Listen** to the monitor the whole time:
 - ❖ To the **pulse oximeter** tone to identify: **1-Heart rate** **2- O2 saturation** from the tone (pitch) of pulse oximeter.
 - ❖ To the sound of the ventilator, to any abnormal sounds, any alarms.
- ❖ **RULE**: **NO** silent monitors.
- ❖ **ALWAYS** keep the **HR** sound on. If ur monitor is silent (sound is not working) u have to look at your monitor the **WHOLE** time.

XX NEVER XX



Löök



- ❖ Every 5 minutes to note the new BP reading.
- ❖ If there is any change in the tone of the pulse oximeter.
- ❖ If there is any irregularity in heart rate & during the use of diathermy.

Clinical Check / 10 minutes

1) Chest inflation.

2) Ventilator bellows: descend and return to become fully inflated.



3) Airway pressure.

4) Palpate peripheral pulsations (radial A, or dorsalis pedis A, or superficial temporal A):

- ❖ For pulse volume.
- ❖ During the use of cautery.
- ❖ In doubt of ECG rhythm (arrhythmias).
- ❖ In case monitor or ECG disconnected.



5) Pt colour (nails): cyanosis, pallor.



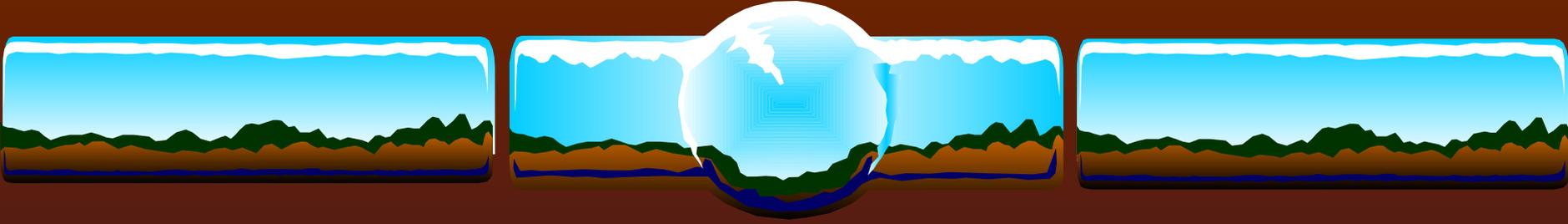
6) Vaporizer:

- a) Check **concentration** opened.
- b) **Level** of the volatile agent (if needs to be filled).



RULES NEVER to FORGET:

- ❖ Never start induction with a missing monitor: ECG, BP, SpO2.
- ❖ Never remove any monitors before extubation & recovery.
- ❖ NEVER ignore an alarm by the ventilator.
- ❖ ALWAYS remember that ur **clinical sense** & judgement is better than & superior to any monitor.
- ❖ U are a doctor u are not a robot.
- ❖ The monitor is present to help u not to be ignored and not to cancel ur **brain**.



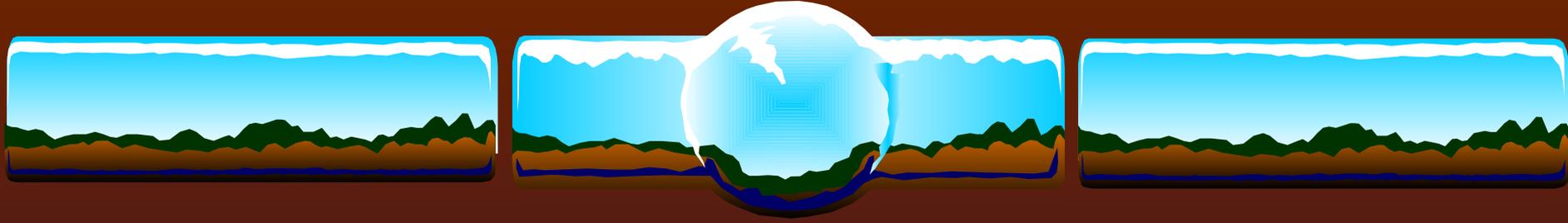
Last but by no means least:

ALWAYS remember that there is NO such thing as “*all monitors disconnected*” → check that ur pt is **ALIVE!!** Immediately check **peripheral & carotid pulsations** to make sure that ur pt is not **ARRESTED!!** Once u have ensured pt safety reattach ur monitors once again.



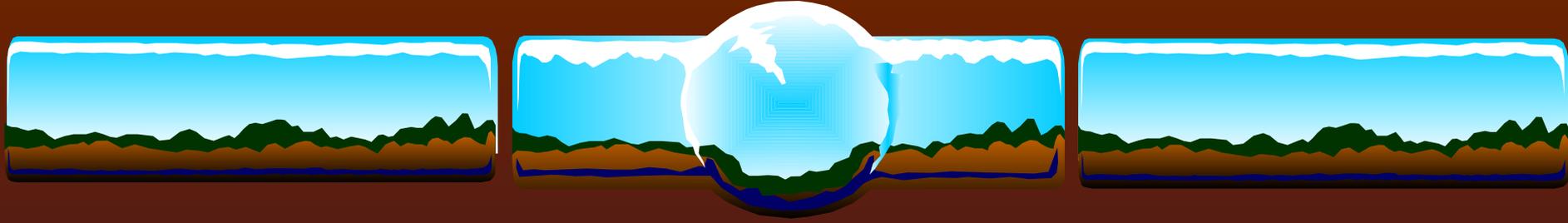
So Best Monitor

- 
- ❖ Any biomedical engineer can design more monitors.
 - ❖ The list is potentially endless.
 - ❖ **BUT** nothing replaces the presence of a **Vigilant** anesthesia provider.
 - ❖ **You are the Best Monitor** of a patients condition .
 - Through the use of
 - ❖ visualization, palpation and auscultation the anesthetist can monitor the adequacy of circulation, ventilation and temperature.



The use of technology increases your ability to do this monitoring quickly and efficiently but none of these advances replace

YOU



Be watchful. Pay attention. **Look at
the Patient.!**

So what's the best monitor
????



Thank You