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Outline

• 1. Who is an intensivist?
• 2. Why is there a need for a teleICU solution in India?
• 3. How does teleICU work?
• 4. The challenge of teleICU in the Indian Scenario
Who is an intensivist?

- A specialist who is trained in monitoring and management of critically ill patients.

- Intensivists can have a background of medicine, anesthesia, pulmonology or rarely even surgery or cardiology.

- Works to keep patients alive by providing support to organ systems.

- Critical Care is a relatively new field but demand has increased so much in the last few years that it greatly outstrips the supply of trained intensivists.
Background

- Mortality rates in ICU are very high - typically 10-20%

- About 200,000 patients die in ICUs in USA every year

- LEAPFROG group recommendations - Mortality rates are significantly lower in hospitals with ICUs managed exclusively by board-certified intensivists

- Research has shown that in ICUs where intensivists manage or co-manage all patients versus low intensity there is a 30% reduction in hospital mortality and a 40% reduction in ICU mortality.

- Data suggests that over 54,133 deaths that occur in the ICU could be avoided if The Leapfrog Group IPS Safety Standard were implemented in all urban hospitals with ICUs across the US
Intensivists Supply/Demand 2006 - 2022

Committee on Manpower for Pulmonary and Critical Care Societies (COMPACCS) JAMA.2000
Indian scenario

* 70,000 ICU beds available including all types and across all hospitals and small time nursing homes in India that cater to five million patients requiring ICU admission every year

* Almost 80 per cent of investment will have to come from the for-profit private and charitable sector where Critical Care accounts for 20 to 30 per cent of a hospital's budget

* Upto 50% of ICU costs may go for hiring trained professionals (in western studies)
**Health Care Scenario**

**India**
- Doctor-Patient Ratio - 1:2000
- Nurse-Patient Ratio - 1:2950
- Number of ICU Specialist Doctors ≤ 100
- Total Hospital Beds (2009) - 8,75,000
- Total ICU Beds (2009) - 180,000
- 67th Rank in Health Care amongst Developing Nations
- Registered allopathic Doctors 5.5 Lakhs and Nurses is 3,72,000 (MoH, GOI)

**Rest of the World**
- USA Doctor Patient Ratio - 1:390
- USA Doctors 954,000 (2010) and Nurses 3,100,000 (2009)
- UK (GB) Doctor Patient Ratio - 1:440
- UK Doctors 253,000 (2012) and Nurses 375,000 (2010)
- Australia Doctor Patient Ratio - 1:400

**India Healthcare**
- Population 1,180.17 million

- Hospital Beds 0.88 Million
- ICU Beds 0.18 Million
- Doctors 0.70 Million
Critical Care Shortfalls in India

• Lack of standards/laws/regulations
• Need for structured training and formal certification for physicians and nurses
• ICU care is primitive or non-existent at district hospitals in rural India
• Lack of grading of ICU’s in Critical Care
• The number of available beds is disproportionately low, both in private and public hospitals
• Low doctor density ratio of 0.5 doctors per 1000 population
Critical Care Challenges

Most hospitals today have difficulty in meeting the demand for quality Critical Care due to the following factors:

- Lack of trained Intensivists and Nursing staff.
- Round the clock coverage
- Unavailability of concrete statistics/data relating Medical Errors, Length of Stay, etc.
- Lack of use of technology and available knowledge
Tele-ICU

Assists hospitals by providing 24 x 7 coverage remote monitoring assistance to the bed side teams

Provides great value to hospitals providing secondary level and tertiary level care in Urban, Semi Urban and Rural areas
Typical telemedicine system
Tele ICU Model

- Urban, Large Private Sector, Medium Size & Government Hospitals
  - Remote linked ICUs
  - Trained medical staff monitoring ICU's under the supervision of a specialist doctor

- Central Server

- InteleICU Command Center

- Direct Link

- Razal, Public Sector & District Hospitals
  - Remote linked ICUs

- Nurses's workstation
  - In-room videoconferencing

- Bedside monitor
  - ICU=intensive care unit
Tele- ICU Operational structure
Monitoring center intensivist
Remote ICU
Communication
Data needed

- Video
- Continuous monitoring
- Lab data
- Intake/ Output data
- Ventilator data
- H&P and progress notes
- Ability to place notes
- Placing orders
- Radiology
- Others - EKG etc
Video

- Ability to move the camera - PTZ
- Can look at patients respiratory excursions to see if patient is in distress
- Look at patients chest, abdomen and ventilator graphics to see if there is dyssynchrony
- Talk to patients (if awake)
- Talk to patients families - even end of life discussion
- Talk to the staff - nurses, respiratory therapists, physicians
Challenges

• Language barrier- problem in India when monitoring center is located in a different state
• Getting patients and families to be comfortable with tele ICU
• Delay in transmission of data can be dangerous in ICU setting- especially in an emergency setting
• Always have back up plan
Mon sourced

ECG II
ECG V1
ART
SPO2

NBP mm[Hg]
AR1-R /min
PVC /min
Temp °C
O2-IN %
O2-EX %

117/96
100
0
37
--
--

21:30:39
199
118/95
98

Monitoring

• Continuous monitoring
  – ECG
  – Arterial pressure tracing waveforms
  – CVP
  – ICP
  – oxygen saturation
  – blood pressure
Challenges

• Not all ICU’s have central monitoring
• Some have single channel monitoring
• Central monitoring facility available but not used /upgraded due to financial considerations
• Delay in data acquisition
• Need continuous monitoring and trending
Lab data

- HIS and EMRs not available in many hospitals
- Data can be scanned and then entered into the monitoring centers EMR by monitoring center staff
- Direct capture of data from the HIS
- Allow remote access to HIS for the monitoring center physician
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<th>Time</th>
<th>Test</th>
<th>Result</th>
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</thead>
<tbody>
<tr>
<td>08:00</td>
<td>WBC (x1000)</td>
<td>6</td>
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<tr>
<td></td>
<td>Differential Count</td>
<td>41,21,3,2,1 .5</td>
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<tr>
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<td>Platelets</td>
<td>150001</td>
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<td></td>
<td>Hgb</td>
<td>14.7</td>
</tr>
<tr>
<td></td>
<td>Hct (PCV)</td>
<td>36.9</td>
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<tr>
<td></td>
<td>PT</td>
<td>8.1</td>
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<tr>
<td>12:00</td>
<td>PTT</td>
<td>30.2</td>
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<tr>
<td></td>
<td>D-Dimer</td>
<td>102</td>
</tr>
<tr>
<td></td>
<td>Fibrinogen</td>
<td>202</td>
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<tr>
<td></td>
<td>Bleeding Time</td>
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<td></td>
<td>Clotting Time</td>
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<td></td>
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<td>Potassium</td>
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<td>HCO3</td>
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<td></td>
<td>Glucose</td>
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<tr>
<td></td>
<td>Blood Urea</td>
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<td></td>
<td>Creatinine</td>
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<td>CK-MB Index</td>
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<td>Troponin T</td>
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<td>Labs Sent</td>
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<td></td>
<td>Arterial pH</td>
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<td></td>
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<td></td>
<td>Arterial pO2</td>
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<td></td>
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<td>Base Excess</td>
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<tr>
<td></td>
<td>Labs Sent</td>
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</table>
Intake / output - flowsheets

- Usually entered by nurse
- Most Indian hospitals - still paper entry
- Needs to be entered into monitoring center EMR
- Data- scanned and faxed over every shifts
- Modern syringe pumps can feed data directly to the computer but very expensive
<table>
<thead>
<tr>
<th>Time</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
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<tr>
<td>Temperature</td>
<td>Axilla (A)</td>
<td>37.2</td>
<td>38.0</td>
<td>38.5</td>
<td>39.1</td>
<td>39.3</td>
</tr>
<tr>
<td>Oral (O) Rectal (R) Core (C)</td>
<td>A</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Heart Rhythm</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

![Graph showing temperature changes over time with lines for Systolic, Mean, Diastolic, and Heart rate.](image)

| Respirations | |
| Pain Scale q4h & PRN | KCL |
| PAP | |
| RAP/CVP | |
| LAP/PCWP | |
| CO/Cl | |
| SVR/PVR | |
| MAP | |
| AUG Diastolic | |
| (UEDP-AEDP)/(USR-PASBP) | |
Ventilator data

- Ventilator settings
- Ventilator waveforms
- Ability to look at waveforms and patient in real time
- Ventilator data can be acquired directly to the EMR but expensive and
Patient data and order entry

• Most hospitals don’t have EMR’s
• Even if EMRs are present - different EMR’s may not share data well with the command center EMR
• Remote access required to the hospital EMR from command center
• Data crucial for making decisions- also important for documentation as their are now two different sets of physicians managing the patient
• Orders from the command center physician should be stored at remote ICU for documentation and legal purposes
• Closed loop communication required- to ensure orders carried out
• Majority of ICU’s have multi “specialist” approach - need to give a cohesive plan involving key decision makers
### Infection Assessment

#### VAP Assessment

- Ventilator Associated Pneumonia

**NOTE:** Consider VAP only if Continuous Ventilation time \(\geq\) 48 hours

- Culture Results

#### BSI Assessment

- Catheter-related Bloodstream Infection

#### Sepsis Assessment

- History and Symptoms of new infection
- Presentation

**NOTE:** Please see Bundles Worksheet / Sepsis Graph for a trend representation of supporting data

#### Temperature (C)

- Temperature Max
- Heart Rate
- Arterial BP
- Non-Invasive BP
  - Respiration rate (Latest)
  - PaO2/FIO2 ratio
  - SpO2
  - SvO2
  - ScvO2
- **WBC \((x1000/ml)\)**
- Platelets
- Lactic Acid (Serum Lactate)
- Glucose
- Creatinine
- Total Bilirubin
- APTT
- INR
• PACS not available in many hospitals
• Medical grade scanners too expensive
Venkataeswara Hospitals
A Multi Speciality Hospital
Nungambakkam, Chennai - 600025.
An ISO 9001: 2000 Certified Institution

KINDLY TAKE XEROX COPY

ID: ___________________________ Name: Dr. Sallapati
Reference No: 260120073160528.
Dr. Thillaiyedhuri C.P.D.M.

Date: 5/3/06 Time: at 6:2000

[Diagram of an EKG trace]
Additional benefits of Tele ICU

- Implementation of protocols - to ensure standard of care is implemented
- Ensuring best practices are followed such as DVT prophylaxis and low tidal volume for ARDS
- A sense of security to patients, families and bedside staff
- Early recognition of problems
What TeleICU cannot solve

- Doctor needed for procedures, emergencies
- Over confidence because staff feels that doctors are always present
- The initial costs of setting up - especially in Indian ICU's which are offline
References
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Thank you for your attention!