Telemonitoring

- Patient management approach combining various information technologies for monitoring patients at distance
- Information technology application domains in health care include telemedicine and home telecare

- Chronic health conditions such as *pulmonary conditions, diabetes, hypertension, and cardiovascular diseases*, which are preventable or highly treatable
- These individuals account for the vast majority of all healthcare spending — funds that could be saved with better preventative care and disease management

- **Telemedicine**- direct provision of clinical care, including diagnosing, treating, or consultation, via telecommunications for a patient at a distance
- *Telepsychiatry, teleradiology, teledermatology, and teleophthalmology*

- Provides specialist consultation to distant communities, *rather than to provide a tool for self-management of chronic disease*

When to use telemonitoring?

- Remote geographical areas
- For people who may have problems attending clinics
  - Older people
  - Prisoners
  - Military

- **Home telecare-** focused on providing care in a home setting with the primary intent of supporting the patient rather than the health professionals

- Home telemonitoring is used in a more restrictive sense and encompasses the use of audio, video, and other telecommunication technologies to monitor patient status at a distance

How does it work?

- With the use of telemonitoring in the home healthcare sector, organizations can now capture previously inaccessible in-home patient data with the help of tablet-equipped home health aides

- Possible to catch an early warning sign, such as a sudden rise in blood pressure, and treat it before it becomes a bigger problem
- It also gives the physician information that is important for the ongoing care
- Blood pressure, heart rate, blood glucose level, oxygen levels, weight and health status

Who should use telemonitoring?

- Patients at high risk of events must be enrolled
- Patient is at high-risk of hospitalization or death. This might include:
  - Current or recent discharge from the hospital after an exacerbation of heart failure
  - Severe symptoms
  - Complex diuretic regimen

Typical routine of an aide's day

- The home health aides will visit patients who have chronic diseases to capture biometric data and record their observations
- They must then communicate this data with care managers, who coordinate any necessary medical intervention

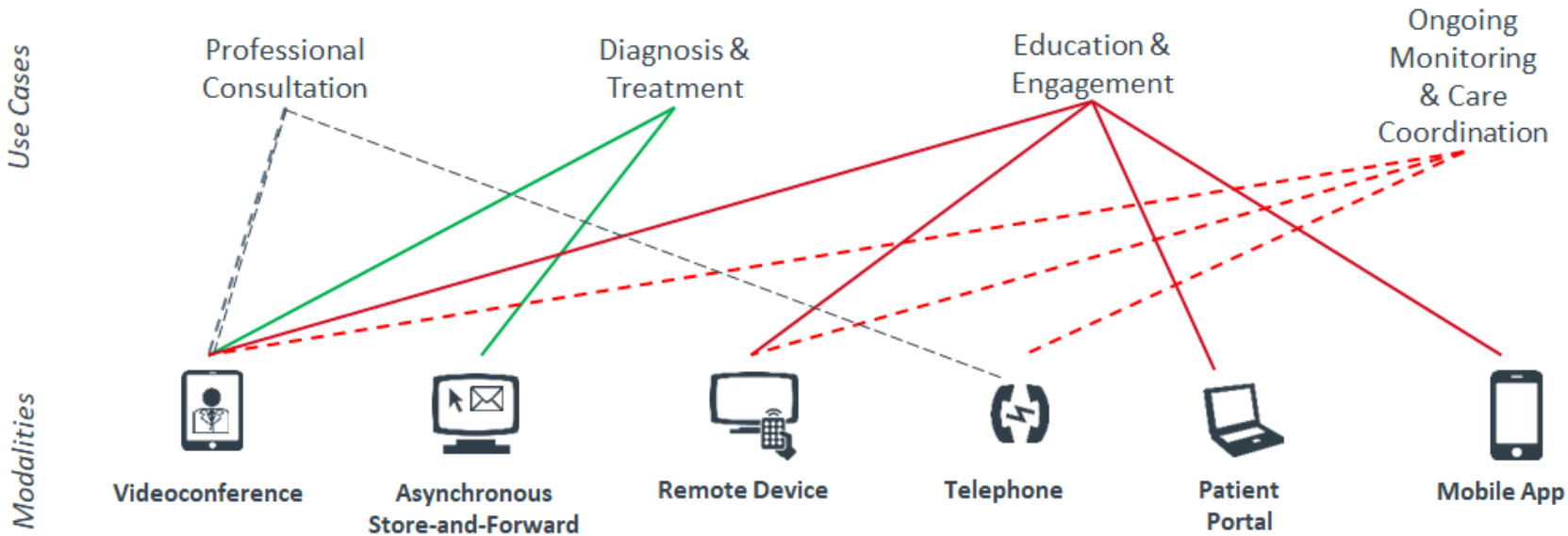
- Because each care manager remotely oversees more than 100 patients, they need **accurate and immediate information** from the health aides who interact with these individuals on a regular basis

- With the daunting task of making sure all necessary information is communicated back in a timely manner, implementing the proper program on an **easy-to-use mobile device**
- Improving patient engagement scores

What is Telemedicine?

Use Cases May Be Achieved Across Multiple Modalities

Telehealth Use Cases, Relevant Modalities, and Investment Required



- **Videoconference**
  - Need software, secure internet access for patients
  - Home and hospital-based technology
- **Asynchronous Store-and-Forward**
  - Need additional bandwidth, storage space
  - Can replace non-urgent phone calls and visits
- **Remote Device**
  - More expensive hardware investment
  - Used for high-risk patients in non-hospital site
- **Telephone**
  - Little tech investment, requires proper staffing
  - Used for pre-visit triage
- **Patient Portal**
  - High security needs require significant investment
  - Must integrate EHR
- **Mobile App**
  - Minimal hardware investment for providers
  - Complex security and data storage issues

Source: Marketing and Planning Leadership Council interviews and analysis. (Advisory Board)

Role of organizations

- Organizations need to invest in the proper software and cloud-based applications
- Facilitate communication between a patient's entire care team on the proper device that has a highly secure architecture and is also easy-to-use for consumers and employees

- Both of these items together will make it easier for aides to record patient behaviors, mental and physical state, vital signs and medication adherence in real-time
- **Examples**- eCaring (Samsung mobiles), VitTelCareTM system (cardiac program), HomeMed (Honeywell), GE Healthcare (standard PC/Tablet/Mac)

- Telemedicine can be employed in a broad range of healthcare requirements, the 3 major ones being:
  - Tele-monitoring which offers assistance in disaster management and frequent monitoring for emergency units like ICU, at district hospitals.
  - Tele-consultation where local physicians consult medical specialists on critical cases and acquire the line of management.
  - Tele-education used for training physicians and paramedics by a superior level specialty hospital.

Patients can get access to the expertise of specialist doctors without having to make a visit.

Healthcare providers can reach out to people in rural, semi-rural, and remote areas who otherwise have no access to quality healthcare facilities.

Offers timely consultations without the need to visit a hospital.

Periodic education of doctors through video conferencing.

Telemedicine facility can be availed without any referral.

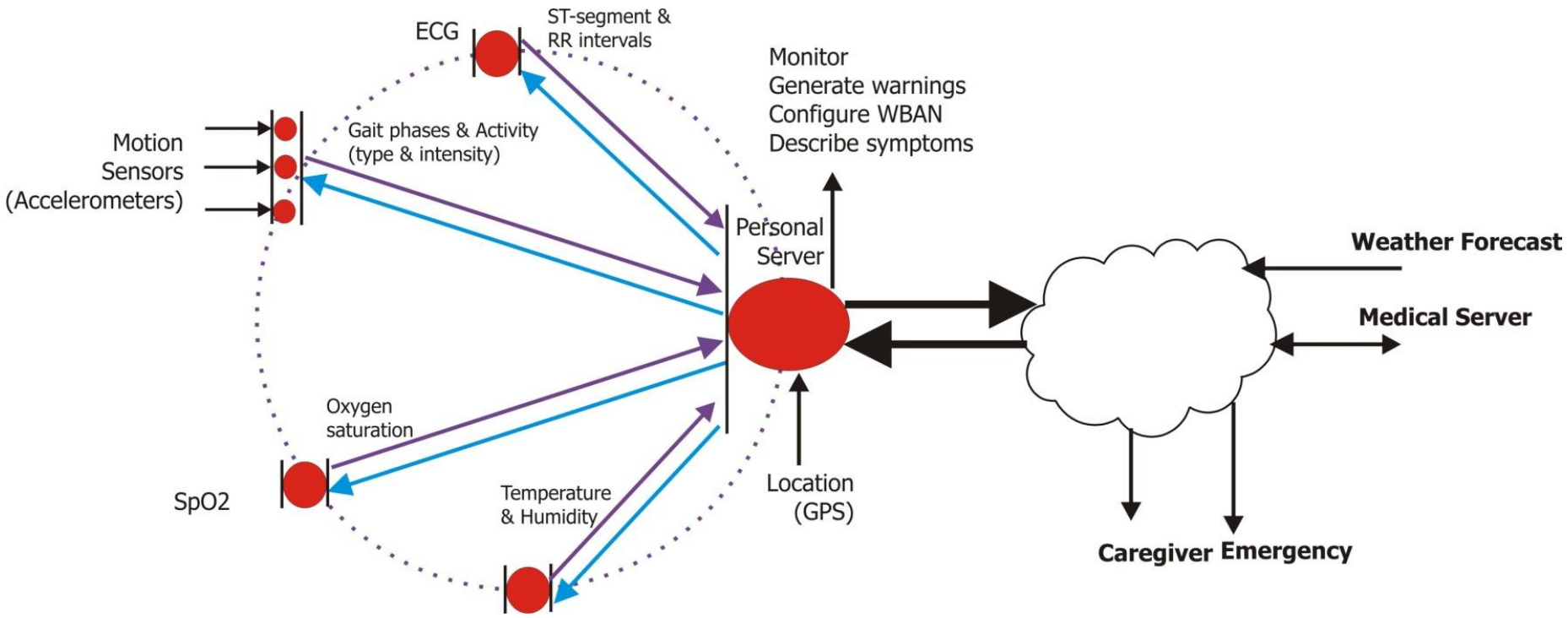
Reduced bed occupancy in hospitals since medical services can be delivered electronically.

Minimised visits of terminally ill patients to the hospitals.

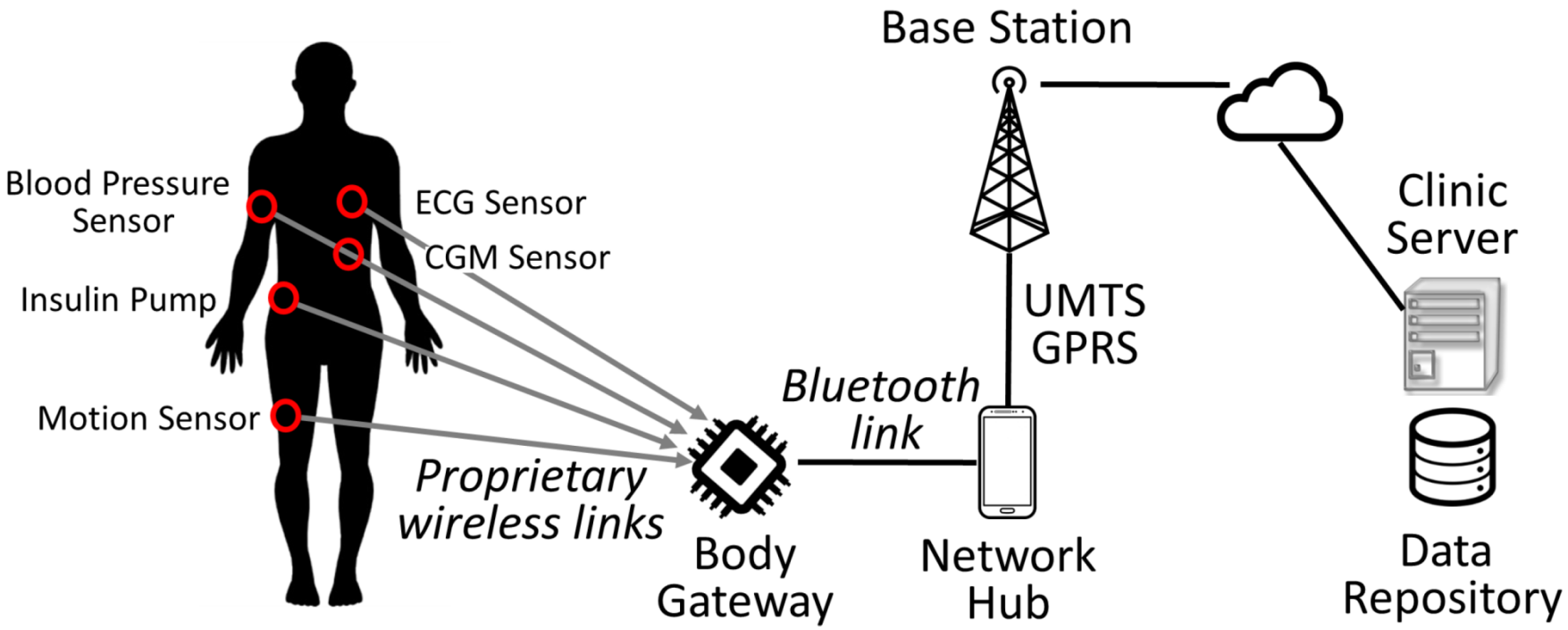
Curbs the need to create the physical infrastructure required to render superior medical services.

Telemedicine is cost-effective as patients in rural areas do not have to travel long distances to receive quality medical facilities.

Data flow in an Wireless Body Area Network



Sensor level **Personal Server Level** **Medical Service Level**


Base Station
Blood Pressure Sensor
ECG Sensor
CGM Sensor
Insulin Pump
Motion Sensor
Clinic Server
UMTS GPRS
Bluetooth link
Proprietary wireless links
Body Gateway
Network Hub
Data Repository

Telemedicine in Karnataka

- Karnataka introduced the Telemedicine Network Project in 2001 and the project was initiated by the Indian Space Research Organisation (ISRO).
- The first phase of the project was rolled out in the district hospitals of Mandya, Chitradurga, Chamarajnagar, Tumkur, Chikmagalur, Karwar, Shimoga, and Gadag.
- At the taluk level, hospitals offering telemedicine services during the first phase were Sagara, Maddur, and Yadgir.
- Expert medical advice was given by specialists from St. John's Medical College and Hospital, NIMHANS, Jayadeva Institute of Cardiology, Narayana Hrudayalaya, in Bangalore while from Mysore, it was JSS hospital that offered the service.

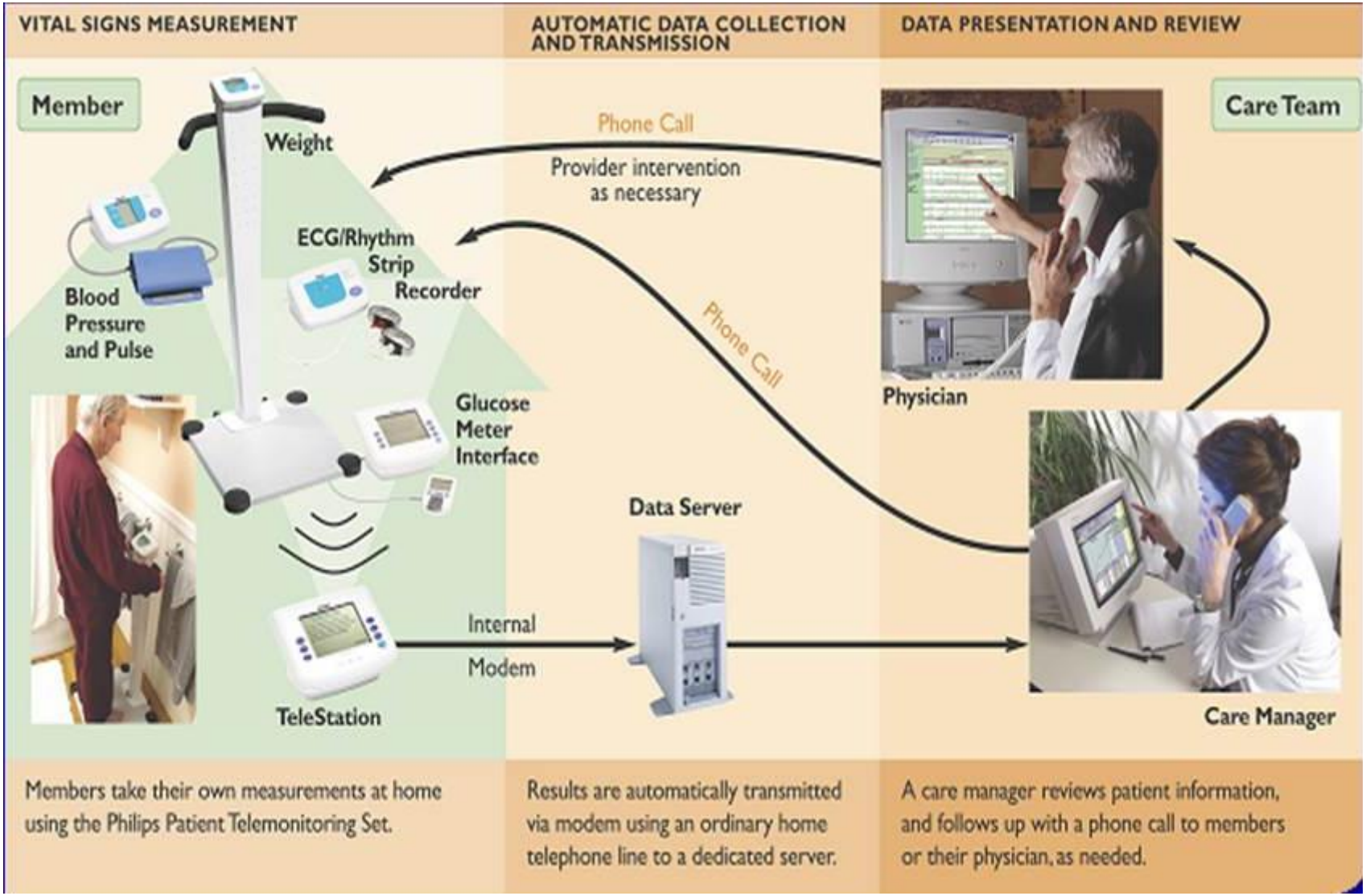
Telemedicine in Karnataka

- Under the telemedicine project, hospitals in remote locations are connected to super-speciality hospitals from major cities via INSAT satellites thereby establishing a link between the patients and the specialised medical experts.
- The telemedicine system is a customised software that is integrated with the computer hardware and diagnostic instruments which in turn is joined to the Very Small Aperture Terminal (VSAT) at every location.
- The specialist doctors are sent a copy of the patient's medical history to aid them while offering diagnosis and treatment.
- At the moment, telemedicine services are using the broadband facility to function since the VSAT provided by ISRO has failed to offer connectivity.

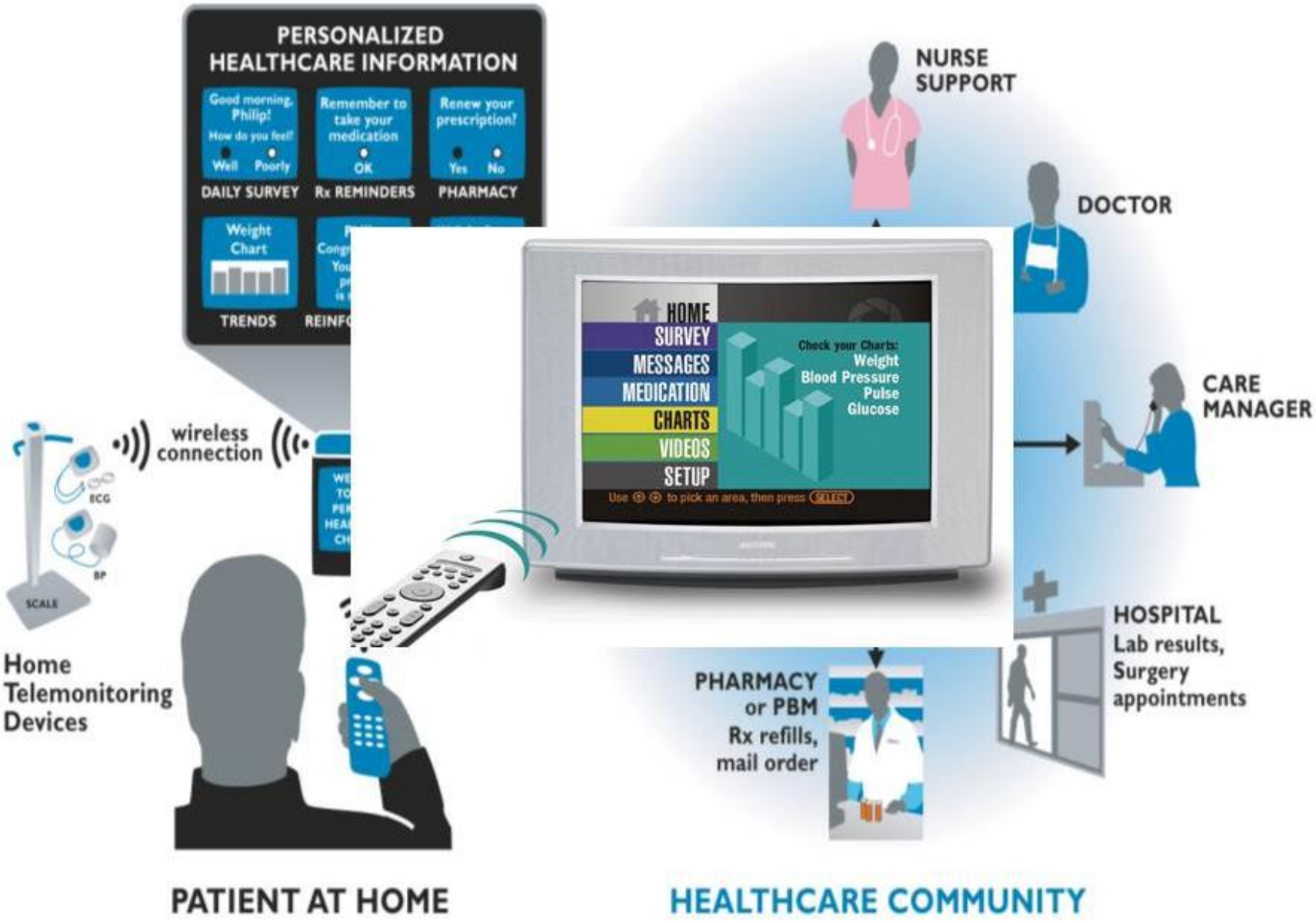
- Narayana Hrudayalaya, a heart care super-speciality hospital, has offered telemedicine consultations (tele-cardiology) to more than 2,000 patients while the total number of patients who have benefitted from the telemedicine facility was recorded at 34,624 during the year 2013-14.
- During the second phase of the project, telemedicine centres were established at the district hospitals of Belgaum, Kolar, Madikeri, Bellary, Davangere, Dharwad, Udupi, Gulbarga, Raichur, GH Lingasagur, and Bijapura. Currently, telemedicine services are offered by 27 government hospitals, 8 private hospitals, 14 specialist hospitals, and 2 mobile clinics.
- The major hospitals providing these services are Chamarajanagar district hospital and Vivekananda Memorial Hospital, Mysore.

- The telemedicine project in Karnataka is coordinated by the Karnataka State Remote Sensing Applications Centre (KSRSAC) which uses the Indian Remote Sensing Satellite for monitoring and managing resources.

BASIC TELEMONITORING



Home monitoring with interactive television



Advantages

- Real-time data
- Decreased hospitalizations
- Actionable alerts
- Early identifications can be reported
- Client satisfaction

Disadvantages

- Reducing the number of complications remains inconsistent across chronic illnesses
- Very few have reported resulting changes in medication regimens and quality of life
- Clinical effects reported in several cardiac studies were often minimal and inconclusive