

Problem 1 – Fall Prevention

Approximately 28-35% of people aged of 65 and over fall each year increasing to 32-42% for those over 70 years of age. The frequency of falls increases with age and frailty level.

Mild to serious falls can lead to hip fracture, traumatic brain injuries and upper limb injuries. Most of the patients that fall; do not receive immediate medical treatment.

It usually goes unnoticed, as the patient might not be able to be in a condition to inform someone else or the patient might be unconscious. If immediate action is taken it is easier to save the patient's life.

Between 2015 and 2030, the number of people in the world aged 60 years or over is projected to grow by 56 per cent, from 901 million to 1.4 billion, and by 2050, the global population of older persons is projected to more than double its size in 2015, reaching nearly 2.1 billion.

This problem can lead in lots of care related issues and many medical bankruptcy cases.

Dr. Dominic Benjamin, Age Well Clinic, Baptist Hospital

Problem 2 - Intubation Device using Video feedback (Laryngoscope)

Airway management is critical to the care of patients who are undergoing anesthesia during surgery, or who appear in trauma centres for acute myocardial infarction, respiratory distress or removal of foreign bodies. Difficult airway management has been a focus in medical school curriculum and many clinical organizations have addressed this issue in the form of guidelines and clinical statements. The American Society of Anesthesiologists define difficult airway as "the clinical situation in which a conventionally trained anesthesiologist experiences difficulty with face mask ventilation of the upper airway, difficulty with tracheal intubation, or both."

Tracheal intubation is the most common procedure for airway management. The American Society of Anesthesiologists defines tracheal intubation as when an experienced practitioner with a rigid laryngoscope experience:

- Difficulty in visualizing any part of the vocal chords after multiple attempts.
- Tracheal intubation that requires multiple attempts in the presence or absence of tracheal pathology.
- Placement of endotracheal tube fails after multiple attempts.

For more details: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3387773/>

Dr M Radhakrishnan, Anesthesiologist, Neurosurgery

Problem 3 – Assistive tool for Knee Replacement Surgery

Total knee arthroplasty (TKA) in patients with skeletal dysplasias is particularly challenging as a result of the anatomic variances and substantial bony deformities.

Incorrect positioning of the implant and improper alignment of the limb following total knee arthroplasty (TKA) can lead to rapid implant wear, loosening, and suboptimal function. [i] A balanced knee contributes to improved alignment and stability. Ligament balancing helps reduce wear and loosening of the joint. A patient with a balanced knee is more likely to have increased range of motion and proprioception, and decreased pain. All these factors help minimize the need for revision surgery. [ii]

There are existing techniques with which we can achieve correct alignment but they have their own drawbacks and increases the cost.

Can we design a low cost and efficient system which aids in positioning, alignment and balancing of the limb focussing it for the low-resource settings like India?

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3601240/>

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3143981/>

More Details:

<https://www.ncbi.nlm.nih.gov/pubmed/20706808>

<https://www.ncbi.nlm.nih.gov/pubmed/23132502>

Video:

<https://drive.google.com/file/d/0B3uEQHUb1G9cGhPbjlhCFNNY28/view?usp=sharing>

Dr. Venkatdeep Mohan, Orthopedics, Apollo Hospitals

Problem 4 - An effective solution for detection and rehabilitation of Patients with Hearing Impairments.

Children with hearing impairment need expensive hearing aid and 3-4 years of therapy, making the current solution very expensive. Similarly, early detection of hearing impairment of these children is a challenge as well.

Early detection of hearing impairment in the children will help in better psychological development in the child and thereby help in improving the abilities of the hearing-impaired child to compete with the normal children of the same age.

Therapy plays the most important role after the child is given with a Hearing Aid or Hearing Implant. 3-4 Years is the average time required for therapy and only after that the child gets adapted to the sense of hearing. These therapies thus become expensive due to the longevity and a lot of time w.r.t hospital visits and waiting period affects the patient as well as the person accompanying the patient.

If the therapy is not properly administered the child may have problems with respect to balancing, learning disabilities apart from other social stigmas.

Can there be an affordable solution which can impact the lives of many patients suffering from Hearing Impairment.

Dr. Ramesh – Unit of Hope, ENT, St. Johns Medical College

Problem 5 – Fluid Infusion Device

Infusion of balancing fluids, electrolytes and nutrients is a critical process especially in cases of elderly as well as infants. Similarly, arterial infusions are equally critical in all age groups. The various problems seen are related to controlled flow rate, measuring the infusion dose, back flows, maintaining pressure etc.

Currently, we have infusion pumps which can do some of this task effectively but there are some adverse effects reported in the recent years. Manual methods of delivering infusions has its own challenges right from lack of control to issues such as blood clot and back flow of blood.

Can we design an efficient infusion system which can be adapted to be used/re-used in low resource settings like India?

Dr. Sanjay Bhalerao, Paediatric Cardiology Intensivist

Problem 6 – Disease Management in Elderly

Lots of medicines. Many times, in the day. It's hard to keep track of what is to be taken and when. Mistakes or slips in taking medicines for high BP/diabetes can be fatal. Overdose is also a problem. Mistake in one drug can affect other drugs too.

Prescription and over-the-counter purchased medication can cause a confusion and mix-ups.

60 million Indians suffer from diabetes and it's growing at 7 million a year. 180 million hypertension patients in India. Set to be 214 million by 2025.

Can there be a good system which can help in managing chronic diseases in elderly??

<http://ccebdm.org/news.php>

<http://www.ibtimes.co.in/number-diabetes-patients-doubles-13-years-india-who-672983>

<http://www.cadiresearch.org/topic/hypertension/hypertension-india>

Video:

<http://myfox8.com/2016/02/23/prescription-drug-misuse-among-seniors-a-concern-in-the-piedmont/#ooid=1vZHc4MTE67dkCk9bz49vrIFZAgC57Gs>

Dr. Dominic Benjamin, Age Well Clinic, Baptist Hospital

Problem 7 – Remote Assessment solution for Psychological Wellness

In today's world, the stress has increased leading to various issues psychologically. The symptoms of various psychological disorders are similar and hence difficult to diagnose and treat. Moreover, the stigma of visiting a doctor to seek timely help adds on to the problem. The condition thereby being ignored leading to poor quality of life for the patient.

Can we develop an effective solution for remotely assessing the psychological wellness of a person especially in telemedicine/teleconsultation setup?

Dr. J. Mahesh – Neurophysiologist, National Design Research Forum

Dr. Manjunath – Psychiatrist, NIMHANS