

## Smartsense: Platform for ‘critical’ healthcare in India



A delivery of an affordable point-of-care critical care analyser completely tested on physiological controls and physiological and pathological samples which will be able to sense sodium, potassium, bicarbonate, glucose and urea, within a Turn-Around-Time (TAT) of 15-20 minutes. Our solution would impact hugely on patient's disease management by reducing TAT and thus reducing the need for repeated tests. India's headcount is 17.5% of world population and shares 20% of the global disease burden. 28% of population (urban) receives 66% of Healthcare. It is an alarmingly skewed healthcare distribution. Government healthcare consumption is merely ~ 30% in rural and ~ 22% in urban areas, rest private practices. Critical care diagnostics is absent in tier 3 and most tier 2 cities.

Sensor	Principle	Range (mM/L)	Target Coefficient Variation (%)	Responsivity (%/mM)
Glucose	Fluorescence	0 - 50	< 7.7	-
Urea	Fluorescence	2.5 - 7.1	< 5	-
Sodium	Absorbance	100 - 180	< 5	0.2 - 0.3
Potassium	Absorbance	1 - 10	< 5	<5
Bicarbonate	Absorbance	-	<5	2-3

Presently, a critically ill patient, if prescribed these tests has to wait for a substantial period of time, as the TAT for these tests is around 3 hours. This changes the course of management after 3 hours and thus affects overall judgement of the situation. The overall aim of the work is to deliver a viable solution for the critically ill patients having electrolyte imbalance, such as diabetic ketoacidosis (DKA).

We intend to do so by delivering point-of-care multianalyte sensing device, which is able to sense serum sodium, potassium, bicarbonate along with glucose and urea.

The overall objective of the work is to solve two major hurdles in a developing country like India: large TAT for tests like serum electrolytes, and secondly, high cost of management of critical diseases like DKA. The major goals involve developing optical sensors (fluorescence and absorbance), which are tuned to measure serum electrolytes (sodium, potassium, and bicarbonate) along with the sensors for glucose and urea. This is followed by the goal to make a device to measure the sensor for the particular analytic, with a parallel development of a blood separation device. The penultimate stage of the grant is to validate the whole solution at the site of care followed by the final deliverable of making the device ready for commercialisation.

### **SmartSense Device**

- Point-of-critical care diagnostics makes critical care truly portable, truly affordable (can be easily installed at all tier-2 and tier-3 cities)
- It lowers footprint (that of a laptop) hence reducing the burden on already troubled infrastructure of health care. It reduces therapeutic changes due to low TAT
- Its low maintenance and ease of use improves UP time
- Accuracy (@ levels with Central Labs)
- No special training required
- Open system, spectrophotometry platform, solid phase testing and liquid phase testing
- Modular to HIS, HIPPA compliant