Health problem addressed

Anaemia affects nearly 1.62 billion people globally. It is responsible for nearly a million maternal and child deaths annually, mostly related to complications during pregnancy. Half of these are due to nutritional deficiencies and can be prevented by providing supplements, but blood transfusion is indispensable for the severely affected.

Product description

The proposed solution is a needle-free hand held device that can be used by a doorstep healthcare worker or a midwife to screen people for anaemia in low resource settings. With a negligible recurrent battery cost, it can scan for hemoglobin in less than a minute, classify the severity of anaemia that can be read out by even a low skilled personal.

Product functionality

Near infrared light scatters and penetrates the soft tissue well, making hemoglobin a good absorber. Using photo plethysmography and reflectance spectroscopy in a process similar to scanning, we establish the Hb absorption pattern for the patient that is mapped against a reference set and the corresponding value displayed as an objective reading.

Developer’s claims of product benefits

Being non-invasive is the biggest advantage. No blood, no pain, no infections and instant results suggest better patient compliance, compliments anaemia surveillance and door-to-door screening. It is cost effective since it eliminates the need of consumables, processes like sterilization, lab and skilled human resource. Moreover, a hand crank and rechargeable battery system almost eliminate recurrent costs. It simplifies reporting by having an objective read-out that is easily comprehensible also by a mid-wife, to determine the severity of anaemia. Empowers the healthcare worker by reducing dependency on experts. A projected efficacy of 80% ensures its potential.

Operating steps

The patient sits in an upright position resting the hand close to the heart level. The finger is clean, dried and placed in the finger probe covering the base of light emitters and receiver. The patient is asked not to move or talk. The device is switched on and scans for a few seconds. Within a minute, the result is displayed on a screen.

Development stage

The device is in form of a testing kit that is plugged into a laptop. Data acquired through the device is transferred to the laptop for processing. In January 2011, we concluded pre-clinical testing; the initial results were encouraging but demand another sensor design iteration before entering clinical trials. Our next step is to introduce computational capacity within the device and make it independent of a PC. Prior to entering the recently concluded development cycle, validation studies were performed to demonstrate a proof of concept.

Future work and challenges

We need to generate sufficient funds to support a plethora of activities like clinical trials, furthering IP protection, manufacturing and testing. Finding partners who can collaborate with us, support us for pilot programs is a challenge along with in-house team expansion. Distribution of the technology is another challenge that we foresee.

Use and maintenance

User: Nurse, midwife, physician
Training: Training can be done in less than 30 minutes with introductions to use and handling of the device, which can be administered through a graphical brochure.
Maintenance: Technician, engineer, manufacturer

Environment of use

Requirements: Our experience tells us that the device does not perform well in air-conditioned or environments with significantly low ambient temperatures. We are working to improve upon it. Effects of humidity are yet to be studied.

Other features: Portable and reusable. Runs on batteries and is compatible with telemedicine systems.
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