Management of Finger Pulse using Oximeter – A Case Study in Scientific and Marketing Viability

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Abstract: The original purpose of this device was to create a lightweight, simple, and easy-to-use pulse oximeter for seniors and others who wanted to check their oxygen saturation at home. A portable pulse oximeter has become a must-have for all Covid-19 patients, particularly those who are quarantined at home, since the virus's effects on the body require them to constantly track their oxygen saturation levels. The pulse oximeter's design may be more advantageous to the average hospital patient

Keywords: Anti-movement, Algorithm, pulse oximetry, Marketing Plan

1. Uniqueness of the Study:

The oximeter's unique technology is its highly ergonomic and simplistic nature, as well as its wireless display. Since the monitor is wireless, the measuring unit may be much smaller and less obstructive to the consumer. The user would also benefit from easier placement of digital readouts and improved audio and visual alerts. Other advances on both sides are also possible as a result. The purpose of pulse oximetry is to check how well your heart is pumping oxygen through your body. To decide whether anyone needs breathing assistance. To determine how effective supplemental oxygen therapy is, especially when treatment is new and to assess someone’s ability to tolerate increased physical activity to evaluate whether someone momentarily stops breathing while sleeping — like in cases of sleep apnea — during a sleep study.-to see how effective a ventilator is. To control oxygen levels during or after sedation-inducing surgical procedures. It may be used to monitor the health of individuals with any type of condition that can affect blood oxygen levels, especially while they’re in the hospital.

1.1. Technical Feasibility of the Study:

Product Features

The AHS product will design a much smaller and more ergonomic measuring device as well as a wireless display system. The product will fit on one’s finger. Some of the other feature that include are

- Humanized Design
- Light and Compact
Pulse oximetry is a test that determines how efficiently the heart pumps oxygen across the body. It can be used to track the health of people with any condition that affects blood oxygen levels, particularly when they're in the hospital. These conditions include: determining how effective a new lung drug is to determine if anyone needs assistance with breathing.

The theory behind pulse oximetry is that O2Hb and HHb absorb red and near-infrared (IR) light differently. Since red and near-IR light penetrate tissues well, but blue, green, yellow, and far-IR light is heavily absorbed by non-vascular tissues and water, it's lucky that O2Hb and HHb absorb light at these wavelengths differently. O2Hb has a higher absorption rate. The light that passes through the finger is detected by a photodiode on the probe's opposite arm; in other words, the pulse oximeter measures the amount of red and IR light absorbed to determine the proportion of Hb bound to oxygen. The ability of pulse oximetry to detect SpO2 in only arterial blood is based on the concept that the amount of red and infrared light absorbed varies.

The red-blue ratio is measured in pulse oximeters using the amplitude of absorbances. Where A is absorbance and R is the ratio of pulsatile and non-pulsatile red light absorption to IR light absorption, \( R = \frac{A_{\text{red,AC}}/A_{\text{red,DC}}}{A_{\text{IR,AC}}/A_{\text{IR,DC}}} \), where A is absorbance and R is the ratio of pulsatile and non-pulsatile red light absorption to IR light absorption. A microprocessor in a pulse oximeter uses this ratio (calculated over a series of pulses) to calculate SpO2 based on an empirical calibration curve created by measuring R in healthy volunteers whose saturations were reduced from 100% to around 70% (Fig. 1C). SpO2 readings below 70% should not be deemed dangerous because clinical decompensation is impossible.

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ratio of pulsatile and non-pulsatile red light absorption to IR light absorption. A microprocessor in a pulse oximeter uses this ratio (calculated over a series of pulses) to calculate SpO2 based on an empirical calibration curve created by measuring R in healthy volunteers whose saturations were reduced from 100% to around 70% (Fig. 1C). SpO2 readings below 70% should not be deemed dangerous because clinical decompensation is impossible. The Beer–Lambert Law of Absorbance can be used to demonstrate how pulse oximeters overlook the effects of venous and capillary blood, as well as other stationary tissues, when measuring SpO2. Because it has a much higher vascular density than the skin on the chest wall, pulse oximeter probes look at the skin on the finger, nose, earlobe, and forehead. Reusable clip probes (forefinger)

2. Marketing Strategy

Target market

The primary market that we are targeting is the vital parameter device market, where we are targeting a portion of the consumer oximeter market where an oximeter is used at homes and old age homes. Additionally, we are targeting the healthcare sectors, especially emergency response.

Major Customer Groups

Senior Citizens/ General Users

The initial purpose of AHS is to create a portable, simple, user friendly pulse oximeter for senior citizens and the general user who would like to check their oxygen saturation at the comfort of their homes.

Covid-19 Effected Patients

A portable pulse oximeter has become a necessity for all Covid-19 effected patients, especially those who are quarantined at home as they need to constantly check their oxygen saturation levels because of the effects of the virus in the body.

Medical

The design of the AHS pulse oximeter could prove to be more beneficial to the everyday hospital patient. The smaller device would cause less discomfort than the bulky finger ones used today, as well as giving more important information to the nurses and doctors. Once again, the need for a high-end product would put some pressure on the quality control of the devices sold to the medical field.

Emergency Response Units

The smaller design as well as the wireless display will prove to be much simpler for medical teams in ambulances to use. Quicker and easier is the whole goal of these units, so the AHS product will be a clear advantage.
Customer’s motivation to buy

Customers will be motivated to buy our product as it will be the only comfortable and easy to use portable finger pulse oximeter with good display along with this the pandemic situation has created a need for pulse oximeters in every single house due to the increase awareness of patient monitoring. Due to Covid-19, this product is become more familiar. Hospitals are usually going for checking Co-morbidities when they admitted with the complain of Covid-19 infected disease.

Market size and trends

During the forecast period, the pulse oximeter market in India is expected to expand at a rapid pace. The sudden outbreak and spread of pandemic COVID-19 in India has prompted the development of a pulse oximeter in the region. Due to a lack of hospital beds for COVID-19 patients in most parts of the country, various governments across the country have adopted home quarantine options.

3. Conclusion:

This paper primarily focuses on various methods for automated detection of acute lymphoblastic leukemia using image processing techniques. An automated system can significantly reduce the time required for the analysis and also reduces the human errors which might occur in a manual examination as it depends completely on the examiner’s experience, attentiveness and state of mind. Automated systems provide a simple, robust and precise technique with minimal time and errors. However, as promising as all these techniques may seem, further research is required for a practical application of these techniques so that examiner can easily diagnose the disorder and classify ALL. Techniques need to be more accurate and precise for a practical application. There is a lot of areas yet to be covered like technique to properly classify all the subtypes of ALL, which is still a major challenge. Further research into this may reveal more efficient methods to identify ALL and it’s subtypes to better help the medical practitioners so that ALL could be identified at an early stage and help people with their fast recovery.

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