Asthma Watch

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Abstract- The Asthma Watch™ device is designed to detect and treat pending asthma attacks in sleeping children without any human assistance. The symptom detection points will include blood pressure, heart rate, body temperature (wrist band), sound sensor and exhaled breath temperature (thermal camera). The intelligent wrist band will deliver a controlled dose of medication to the patient via an absorption / iontophoresis method which is instructed by the software in the mainframe computer. Asthma Watch™ allows effective dose control and ensures a good night sleep for everybody.

Index Terms— Asthma Watch™,(thermal camera), (wrist band), intelligent

I. INTRODUCTION

This report was prepared to showcase the innovative idea of AsthmaWatch™. The device is designed to detect and treat pending asthma attacks in sleeping children without any human assistance. The research draws attention to the fact that in addition to the medically related benefits for the patient AsthmaWatch™ has significant health, social and financial benefits for families. The Australian government spent $693 million on asthma related health expenditure in 2005. While the average family is spending $4,912 annually on associated asthma costs per person. Using AsthmaWatch™ technology would contribute to a reduction of government and family expenditures on the treatment of asthma by utilising controlled doses and using this smart, inexpensive technology to detect and treat pending asthma attacks. The overall Asthma market is currently $15billion annually.

> "In Australia, 416 people died of Asthma in 2010 and research has shown that 60% of Asthma deaths are preventable." www.kidswithasthma.com.au

A. *Mission*

The mission of AsthmaWatch™ is to design, develop, and market new patented technologies in the medical device field. The technologies will fill market niches that each account for a minimum of $$ dollars in potential sales. Each technology will fill a current need by improving upon an existing technologies and devices. Each product shall be priced to appeal to a managed-care market that stresses lowest cost of total treatment parameters. Keys to Success

The keys to success for Asthma Watch™ are as follows:

1. Initial capitalization obtained.
2. All patent applications filed.
3. The ability to generate early revenue. Licensing at least one technology and application to a major medical device corporation. Getting low interest loans and/or grants to fully fund product development and prototype manufacture.
4. Recruiting top-notch CFO prior to second round financing and market roll-out.
5. Successful approval from TGA to market and FDA in the U.S.
6. Successful implementation of sales and marketing plan. Obtaining a minimum 2% market share in the first full year to generate $$ million in revenue.
7. Increased product development and continued market share gains to produce a $$ million revenue company by year five.

B. *Objectives*

The principal objectives of AsthmaWatch™ are as follows:

1. To achieve a 5% market penetration in the Asthma market by year three.
2. To achieve $1.8 billion in revenue by year three.
3. To raise $5 million in private seed capital in the first six months.
4. To win low interest loans and grants from the government Australia totalling $1.2 million in year one.
5. To license our technology for the datamining market for $5 million dollars in year three.

C. *Technology*

D. *Strategy*

Asthma Watch™ will pursue specific, definable, market segments with a multi-tiered, multi-channel approach. We will leverage our technologies with a licensing agreement in one key area and a direct sales and distribution strategy in the other using established distributors.

We will look to foreign markets first with established distributors for initial revenue. Domestic revenue will follow.

E. *Major Milestones*

The following are the key milestones for the first year of operations.

1. All patents will be applied for by the May 1st 2013. The total legal fees are expected to be less than the $500k allocated.
2. Start-up capital was successfully raised.
3. Completion of strategic business plan.
4. All other first year milestones are currently on target time wise and budget wise.
5. Successful second round funding.

F. *Competitive Advantage*

The AsthmaWatch™ device is effective and user-friendly with multiple home and healthcare applications. All the competing devices currently on the market are awkward to use for the recommended therapeutic treatment. Asthma Watch™ will use its patented designs to fill the need in the market for an easier to use, unmanned, more effective night ventolin instrument.

G. *Financial*

Seed funding of $5 million dollars was raised in 2012. This initial funding allowed for clinical trials and prototype development. An additional $20 million is required in two tranches for production, distribution and working capital. Current cash on hand is $1.9 million.

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Based on detailed financial projections, if the company receives the $20 million in funding, it will operate profitably by Year 3. The company projects $?? million in sales with a formidable net profit in Year 3, with projections based on penetration of less than 10% in any market segment.

H. Exit Strategy

The most likely exit afforded investors will be through acquisition. If the company's actual operational and financial results are in any reasonable range of the projected results herein, the company will become an attractive asset to an acquisitive competitor or larger medical device company. No particular competitor or medical device company is thought to be more likely than another to be interested in Asthma Watch™ technology.

To the extent that actual operational results materially exceed those projected herein, the probability of an IPO exit increases. Exceptional results would enhance the Asthma Watch™ brand name and financial position, making new product development and the likelihood of new product success more plausible. In this scenario, the opportunity to raise capital and provide an investment exit to shareholders becomes more likely.

A third exit possibility for investors may be an acquisition after IPO. This strategy would allow an investor to delay exit until after capital from an IPO is invested in successful projects, further raising the value of the firm.

II. Background

Asthma is a chronic inflammatory disorder of the airways most commonly caused by allergic triggers. In sensitised individuals this results in inflammation and swelling of the lining of the airways, increased mucus secretion and constriction of airway smooth muscle (McMurray 2010, Kaufman 2011). These reactions cause the airways to become narrow and irritated which makes it difficult to breathe and causes one or more of the following symptoms:

- Wheeze
- Breathlessness
- Chest tightness
- Cough (especially at night)
- Variable airflow obstruction

People with asthma have airways that are inflamed and more sensitive than normal. Anything that causes a reaction can set off asthma symptoms.

Triggers differ between individuals. Common triggers include:

- respiratory infections (such as the common cold)
- cold weather or weather changes
- cigarette smoke
- house dust mites, pollens or moulds
- animal fur
- work-related triggers (e.g. wood dust, chemicals, metal salts)
- irritating substances breathed in the air, such as cigarette smoke
- some food additives
- certain medicines (e.g. aspirin, some blood pressure drugs)
- exercise

III. Company Summary

AsthmaWatch™ will develop and market asthma medical devices through multiple distribution channels both foreign and domestic. The company is currently developing its patent-applied technologies to final product and approval stage. It is also seeking to establish its corporate identity in the medical products field. AsthmaWatch™ calls for one joint venture license as well as the following objectives:

1. Complete the patent process.
2. Establish corporate identity, brand names, trademarks.
3. Establish a medical advisory board.
4. Build staff, infrastructure, and retain consultants for trial and compliance issues.
5. Conduct animal trials.
6. Prepare for TGA & FDA clinical trials.
7. Continue R & D and product development.
8. Explore options for 2nd round financing (venture capital, corporate alliance, licensing, public offering) to maximize value to shareholders.

A. Start-up Summary

The key elements in the Start-up plan for AsthmaWatch™ are:

1. The legal expense for filing all patent applications.
2. The establishment of corporate identity.
3. The location and place of doing business.
4. Funding of additional capital raising alternatives.
5. Salary for the two key managers and founders.
6. Formulation of strategic plan.
7. Costs of raising capital through private placement.

$5 million was raised from the CEO for these purposes. This funding came in early 2012 and these tasks have either been completed successfully or are in the final process of completion. These are treated purely as start-up expenses by this plan. $5,000,000 is treated as cash-on-hand as of the start of this plan on January 1, 2013.

B. Name and Logo

This logo was chosen from a selection. The criterion was a logo that was unique, adaptable and appropriate. This logo represents the exhaled breath.

IV. Products

AsthmaWatch™ will initially market two distinct products.

1. The AsthmaWatch™ intelligent wristband and associated consumables.
2. The AsthmaWatch™ datamining software.

The technology used in these products is the subject patents in the application process.

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A. Technology

This device consists of;

1. Intelligent wristband
2. Thermal infrared camera
3. Sound sensor
4. Mainframe computer (software)

Each component will communicate through Wi-Fi technologies.

- **Intelligent wristband**

  This device is designed to detect through wireless sensors human body activities like blood pressure, temperature and heart rate. The wrist band controls the medication dose that will be administered when instructed using iontophoreses technique through the skin.

  Iontophoreses

  Iontophoreses is a technique to enhance the transport of drug ions across the tissue barriers (Gazelius, 2000). This movement of ions across a membrane will be done under the influence of an externally applied small electrical potential difference (DC current). "It is one of the most promising novel drug delivery system, which has proved to enhance the skin penetration and the release rate of a number of drugs having poor absorption according to him" (Gazelius, 2000). It's a localized, non-invasive, convenient and rapid method of delivering water soluble, ionized medication into the skin.

  Wireless sensors

  The wristband sensors detect human functions such as heart rate, blood pressure, and temperature. These sensors will send the collected data to the mainframe computer/PDA or smartphone where it will be saved with the data collected from the infrared thermal camera and sound sensor. The overall data will be processed and the instructions initiated to give the right dose of medication to the patient.

  The signal from the main frame computer or PDA will be given to the intelligent wristband wirelessly to activate the DC current through the iontophoreses and to release the drug ions through the skin.

- **Thermal infrared camera**

  The thermal imaging camera will detect elevated human body temperatures. Infrared cameras thermography is a technology that allows cameras and other equipment to pick up infrared light emitted by an object in the form of heat. It is especially useful in determining the temperature of images. This camera will send the data about patient temperature to the mainframe computer or PDA to make the right action.

- **Mainframe PC/PDA (personal digital assistant)**

  The PC/PDA is programmed to collect the data from the wristband, thermal camera and sound sensor processing them simultaneously, enabling accurate action with the patient's medical state by sending a signal wirelessly to trigger the intelligent wristband to release the correct dose. The mainframe computer contributes to the patient's overall treatment management program by collecting historical data and saving for future medical purposes. Also it will help prevent common manual data entry errors. Specifically written Asthma Watch™ software will be designed.

- **Sound sensor**

  This device assists in detecting the symptoms of an asthma attack. Sounds that would be detected could be wheezing, shortness of breath and coughing. The sound sensor is connected to the mainframe PC where software is installed to classify the sound signals collected from the patient. Our design will implement an artificial neural network using Matlab software to classify the sound coming from the patient, identifying it as coughing, wheezing or normal breathing then take correct action.

B. The Benefits of AsthmaWatch™ Technology

- Cost benefits
- Societal benefits
- Health related benefits

Reduces the costs of asthma treatment

For the government: Asthma is an important health problem in Australia and is a costly disease. In the 2004–2005 financial year, health expenditures on asthma were $693 million, or 1.2% of all health-related expenditures. Per capita asthma expenditures were highest for children ages 0–4 years, and an average of $76 was spent per boy and $66 per girl. Using AsthmaWatch™ technology would contribute to a reduction of government expenditures on the treatment of asthma by controlled doses and using this smart, inexpensive technology to detect and treat pending asthma attacks (Australian Institute of Health and Welfare, Canberra).

For families: In a study of children with persistent asthma and their caregivers, approximately 33% of the caregivers had missed work during the 12-month study because of their child's asthma. Similarly, the 2005 Health Costs Survey found that 44% of all people with asthma tried to save money by not taking their medicines or skipping doctor visits. The total average annual cost of asthma per person was $4,912, of which 65% ($3,180) was direct costs and 35% ($1,732) indirect costs. The main components of direct costs included pharmaceuticals ($1,605 per person per year), hospital admissions ($463), and non- emergency department ambulatory visits ($342). The main components of indirect costs included cessation of work ($1,062 per person per year) and loss of work-days among those remaining employed ($486). Therefore, using AsthmaWatch™ provides a financial solution to families by effectively manage asthma attacks.

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Societal: When one family member has asthma, the disease affects the entire family, not just the person with the illness.

Parents: Parents of children with asthma are more apt to suffer from fatigue, headaches, insomnia, and depression. The main aim of AsthmaWatch™ technology is to provide a good night's sleep for parents because it dispenses medicine without any parental assistance and without any warning about their children having an asthma attack, especially during the night.

Children: Children with asthma may be more likely to get involved in fights, be less cooperative, or be embarrassed when using a metered dose inhaler in front of friends. AsthmaWatch™ allows the asthma medicine to be absorbed into the skin as needed without any notice. Among preschool children, asthma is a leading cause of activity limitations. Previously, only speech problems and mental retardation were associated with greater activity limitation. Voice impairment happened with traditional methods of asthma treatment, but not with AsthmaWatch™. Among children who likely to be tired since they did not get a good night's sleep, many children increasingly miss school days. In the 2002 National Health Interview Survey, asthma was responsible for 14.7 million missed school days in children five to 17 years old. Therefore, using AsthmaWatch™ leads to a good night's sleep for children, resulting in a decrease in missed school days.

Health related benefits

With AsthmaWatch™, controlled doses are given at the right time. Parents prefer to give their children some relief via a ventolin puffer before going to sleep to avoid an attack during sleep or sometimes before doing any physical activities.

The software in the AsthmaWatch™ technology can record and store all information about patients and provide their doctors with insights into long-term medical care. This information can be sent directly and instantly to doctors.

"An estimated 1 in 8 children under the age of 14 have been diagnosed with Asthma."
www.kidswithasthma.com.au

Children can wear wristbands that check the majority of asthma symptoms without the need for a doctor's supervision. This situation results in saving doctors' time and decreasing the use of medical devices.

AsthmaWatch™ is easy to use as most children do not like the asthma treatment mask. In contrast, the wristbands can be made into beautiful shapes that will be loved by children and still provide medicine without any feelings, which makes it effective and painless for children.

When comparing AsthmaWatch™ with other asthma medical treatment methods, we can state that AsthmaWatch™ is convenient to carry; it does not require a deep, fast breath; no medication is needed on the back of throat and/or tongue; and it does not require shaking and priming prior to each use.

V. Competition

A. Competitive Advantage

While the AsthmaWatch™ device is effective and user-friendly, with multiple home and healthcare applications. All the competing devices currently on the market are awkward to use for the recommended therapeutic treatment. AsthmaWatch™ will use its patented designs to fill the need in the market for an easier to use, more effective night ventolin instrument.

B. Main Competitor

The most important competitor to be considered is the pressurized metered dose inhalers (MDIs). Its strengths are its reputation, current market position, and its entrenched loyalty among physicians using its products. Its weakness is that children usually require adult assistance and supervision. This makes it vulnerable to a new, improved entry.

C. The Competition Environment

D. SWOT Analysis

VI. Marketing Analysis

A. Target Market

Asthma Watch™ will be a device used worldwide since approximately 300 million people currently have asthma, with estimates suggesting that asthma prevalence increases globally by 50% every decade.

There are several target markets for AsthmaWatch™, including children with asthma, doctors, and hospitals.

Children

Asthma is currently the most common childhood chronic illness, affecting more than 6% of children. According to The American Academy of Allergy, Asthma & Immunology, about 1 in 10 children (10%) and 1 in 12 adults (8%) had asthma in 2009; in 2010, 3 out of 5 children with asthma had suffered one or more asthma attacks in the previous 12 months, Therefore, AsthmaWatch™'s main target market is children ages 0–14 of both genders.

AsthmaWatch™ is suitable for families with different incomes and education levels since one of its benefits is reducing the cost of asthma treatment for families.

Doctors

Doctors are a good target audience for AsthmaWatch™, which provides long-term medical care to doctors and results in saving doctors' time.

Public and Private Hospitals

More than 300 million people suffer from asthma, which translates to a drug market worth more than $15 billion. The asthma market is projected to reach $17 billion by 2013.

Since there has been a sharp increase in global prevalence, morbidity, mortality, and economic burden associated with asthma over the last 40 years, particularly in children, use of this smart device will lessen the burden of asthma treatment.

B. Market Segmentation

There are two main markets for our multi-component device: healthcare applications for the prevention and treatment of asthma and alternative medicine applications in which the device will be used for the potentially therapeutic benefits.

The potential customers of AsthmaWatch™ are both domestic and foreign.

Domestic customers include managed care groups, hospital buying groups, physician groups, independent physicians, and other (catalogues) and medical supply houses.

The foreign market includes many of the above segments but also includes key distributors. For example, only four distributors are required to penetrate the European, Middle Eastern, African, Central and South American and Japanese markets. These distributors have already been identified.

C. Target market segment strategy

D. Distribution

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Distribution patterns in the healthcare industry are such that the large buying groups dictate what products are used for certain conditions throughout their sphere of influence. Thus, our products could be mandated or forced out for thousands of patients due to endorsements by their health plan or hospital group. Others recommend several alternatives which require physician education and intervention, similar to pharmaceuticals.

In the alternative medicine industry, patients frequently choose their own therapy and method of treatment. Due to this fact, this industry will require a much more intensive advertising campaign than would be recommended for the healthcare industry. In addition, the company expects to penetrate this market through direct marketing of our products on our proprietary website.

E. Competition and Buying Patterns

The effectiveness of the device is a major consideration for medical practitioners. The product must deliver performance as promised in order to effectively treat the patient with the desired results. It will be imperative to have data showing the cost-effectiveness of the AsthmaWatch™. More rapid recovery, and thus less missed work, and reduced physical therapy costs are the key economic parameters.

In the alternative medicine arena, more emphasis is placed on anecdotal accounts, and advertising will be crucial for the AsthmaWatch™. Beneficial trial results, though, will also prove highly favorable for AsthmaWatch™.

AsthmaWatch™ will succeed based upon the capability of its product in the healthcare industry and the positioning of its product in the alternative medicine industry. After initial market resistance to any new product, AsthmaWatch™ product can grow to dominate two market segments: the market for prevention and treatment of asthma and the market for alternative medicine. Both are large and growing markets.

VII. STRATEGY AND IMPLEMENTATION SUMMARY

AsthmaWatch™ will pursue specific, definable, market segments with a multi-tiered, multi-channel approach. We will leverage our technologies with a licensing agreement in one key area and a direct sales and distribution strategy in the other using established distributors.

We will look to foreign markets first with established distributors for initial revenue. Domestic revenue will follow. Large groups and plans will be targeted first.

A. Marketing Strategy

Marketing will follow from industry and trade and physician awareness campaigns to specific executions directed at specific customer segments. AsthmaWatch™ will achieve its initial sales goals from direct and distributed sales. Worldwide sales through distributors will provide needed cash flow.

B. Price

Promotion

Conferences

Conferences will be used to promote and demonstrate AsthmaWatch™ to professionals and specialists in the field. AsthmaWatch™ will get a better understanding and appreciation among the professionals these will result in the professionals advising their clients/patients to buy and use AsthmaWatch™. The more professionals that will use and recommend AsthmaWatch™ to their patients, this will result in an increase in brand awareness and brand value.

Electronic Media

The Internet enables your customers to learn about your products with the touch of a finger right from their own homes. Establishing a website is key to providing information about AsthmaWatch™ and its products to consumers. The website provides ordering information so a buyer can make a purchase quickly and conveniently. Shipping options can deliver AsthmaWatch™ directly to the consumer within days. Building an online blog and a presence on the most popular social networking websites provides ongoing information about our industry in general and AsthmaWatch™ in particular, establishing us as an expert in the field. Use video distribution websites to provide a product demonstration to increase interest in AsthmaWatch™. Furthermore social-websites can be used to promote AsthmaWatch™ and make its brand name stronger. One of every nine people on earth log on to social media channels every day – and spend 700 billion minutes a day sharing content on social media.

Innovative Marketing Tools

QR barcodes are being used more and more to market products. Space-saving logo-like graphics that can be placed on a wide range of materials like advertisements, tee shirts, brochures and business cards are "read" by scanning them with a smartphone. Once the barcode is scanned, your website will open up and provide product information to the consumer.

C. Place

To keep the authenticity and to protect the integrity of the product, the distribution will only be done via the internet in the first year. This enables monitoring analytics for future distribution channels.

D. Future products

AsthmaWatch™ is not only a company that just focuses on the problem solving of Asthma. AsthmaWatch™ will re-use certain amounts of money to further development and research on the product. Plans are that after 5 years the AsthmaWatch™-software will also recognise the health characteristics for 3 other major diseases like; diabetes, lung cancer, respiratory tract infections etc. Another 5 years after that AsthmaWatch™ will recognise 10 major diseases and will be common tool in every household to monitor the health of the whole family.

E. Company Locations and Facilities

AsthmaWatch™ business offices are at 1 Martin Place, Sydney, Australia. These offices are leased month-to-month on a temporary basis. This business plan calls for the establishment of corporate offices, R&D facilities, and small-run manufacturing facilities. These facilities are to be located in Asia with 10,000 m². initially expandable to 30,000 m². Rental costs in Asia range from $175 to $400 per m².

F. Sales Literature

Sales literature for AsthmaWatch™ remains to be developed.

G. Sourcing

Primary raw materials needed for AsthmaWatch™ products are as follows:

1. Molded plastic parts.
2. The tooling and molds (capital expenditure).

All of these components are easily sourced and multiple suppliers have been identified. In addition, injection molders have been identified to manufacture the molded components for AsthmaWatch™ products. There are multiple potential sources.

AsthmaWatch™ will perform final assembly and distribution from its own facility in Asia or utilising contract

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manufacturing depending on the extent of financial support from local government.

VIII. Milestones

The following are the key milestones for the first year of operations.

1. All patents will be applied for by the May 1st 2013. The total legal fees are expected to be less than the $500k allocated.
2. Start-up capital was successfully raised.
3. Completion of strategic business plan.
4. All other first year milestones are currently on target time wise and budget wise.

Table: Milestones

IX. Proof of Concept

AsthmaWatch™ created and developed a prototype to be tested in a real world scenario Figure (AsthmaWatch™). The project done focused on the effectiveness of the AsthmaWatch™ and her by expanding the average sleep time of kids with Asthma. The project investigated the efficiency of the monitoring devices and their communication with the main computer for finding the right critical point for the release of the medication to the patients. The goal was to observe the patients exhaled breath temperature, heart rate, body temperature, wheezing/couching and blood pressure, a change in a single or a combination of one of these should then result in the right dose of medication given to the patients.

The experimental design for the proof of concept for AsthmaWatch™ consisted of 4 groups:

1. Kids **with asthma** monitored using existing devices and given medication manually.
2. Kids **without asthma** monitored using existing devices.
3. Kids **with asthma** using AsthmaWatch™.
4. Kids **without asthma** using AsthmaWatch™

Each experimental group consisted of 12 kids between the age of 2-6 years old male and female. They were treated in the same hospital using random allocation of the rooms. The time of the experiment proposed was 2 weeks and was in a time when asthma attacks are more common, during change of season (winter → spring).

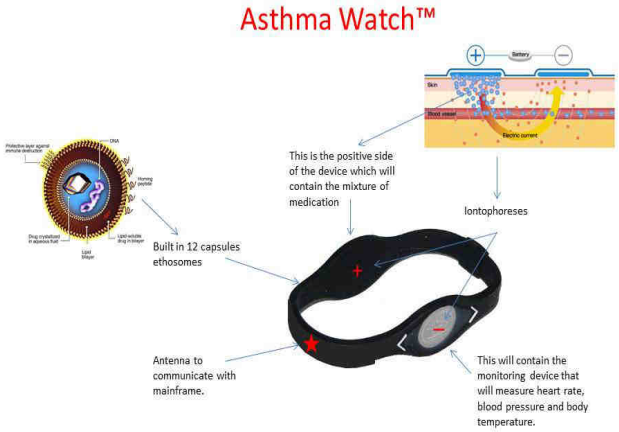
Experimental group 1 was monitored using existing devices to determine what the critical point are which result in an asthma attack in kids during sleep, while group 2 was monitored using existing devices to determine what the 'normal' values are for kids during sleep.

Experimental group 3 was monitored using the intelligent wristband and the camera of AsthmaWatch™, all connected to the mainframe computer using AsthmaWatch™ software. AsthmaWatch™ did monitor similar values of group 1 but the communication with the AsthmaWatch™ software will recognise the critical values that will result in a release of the right dose of medication.

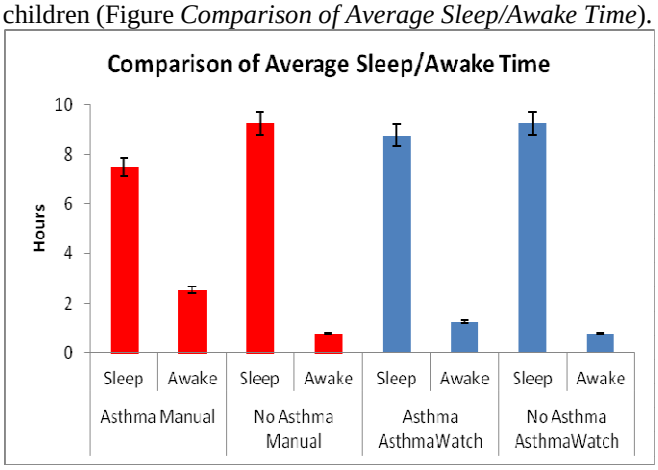
Experimental group 4 was monitored the same as group 4 but this time AsthmaWatch™ recognized that the critical values aren't reached and no release of medication was needed.

All experimental groups were monitored for the full 2 weeks 24 hours a day. This will gave us a better insight in the effectiveness of both the manual giving of the medication and the AsthmaWatch™ medication. The findings of this project did give us a better insight to the possible critical points in kids both male and female and the dose and timing of the release of the medication.

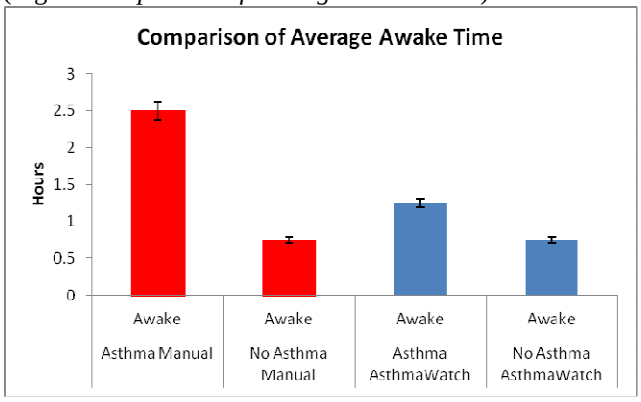
Each group consisted of 2 male and 2 female of each age group; 2-3, 4-5, and 6 years old.



The results of the experiment show that AsthmaWatch™ has a significant impact on the average sleep time for kids with Asthma (Figure Comparison of Average Sleep/Awake Time). Kids using AsthmaWatch™ sleep on average 1 hour and 45 minutes more than the patients with Asthma that were monitored manually. The results also show that wearing the AsthmaWatch™ at night doesn't affect the sleeping time for children (Figure *Comparison of Average Sleep/Awake Time*).



AsthmaWatch™ shows that it decreases the time awake by 50% on a night with 10 hours of sleep from 2.5 hours to 1.25 hours. The time children spend awake, during the night, using AsthmaWatch™ is similar to children who don't have Asthma (Figure *Comparison of Average Awake Time*).



The main reason for kids with Astham to be awake is a pending Asthma Attack, the intake of medication and the time taken for the medication to work. AsthmaWatch™ shows that it decreases the time, from detection of a pending Asthma attack till effective dose of medication absorption resulting in

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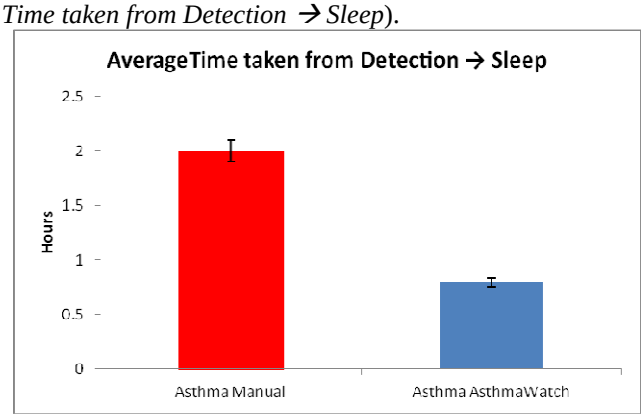
sleep, by 60% compared to the manual way (Figure *Average Time taken from Detection → Sleep*).



This extensive research shows that with AsthmaWatch™ the 'Detection→Sleep' time is decreased by 60%. This results in significant longer sleep for kids with Asthma using AsthmaWatch™ and therefore a longer sleep for the whole family.

X. PATENTS

The AsthmaWatch™ is a design containing multiple technologies and complex intellectual property. The device-required technologies that already existed and patented, such as thermal infrared camera detection, sound sensor and the iontophoresis technology, were applied for licenses from these authors. In addition, the exclusive and non-exclusive of the license agreements were noticed.

The potential patents for AsthmaWatch™ are;

- Software
- Drug mixture of cationic liposomes
- Design of intelligent wristband
- Company name and logo

Software

AsthmaWatch software will revolutionize the medical world not only by recognizing a pending asthmatic attack and trigger a specific dose of medication, but also through visualizing the disease to the patient and data-mining. This could increase the detecting of a larger attack by a greater timescale, abnormalities in the daily detections and a better understanding of the disease by the patient and doctors. Furthermore all the data will be directly uploaded into a main database via Wi-Fi technology (mining); this database will be available for further research into Asthma.

The software will be written and designed by our team and it will be novel. This include designing an artificial neural network using matlab codes in a unique way where it can be trained by samples of sound from different asthma patients, when the training of the neural network completed then it will be able to detect and classify any sound from any asthma patient with a high level of accuracy in a real time and then it says that sound is coughing and wheezing or a normal sound. The mainframe computer will send a signal wirelessly to wristband which contains the iontophoreses band which hold the medication to trigger the DC current between the +ve and -ve points to speed up the dose absorption through patient skin. The technique our team is using is also novel and unique where the iontophoreses bands in the market are triggered manually.

Drug mixture of cationic liposomes

A mixture of cationic Salbutamol needs to be developed so that via Iontophoreses the Salbutomal can be absorbed faster through the skin. This mixture will be specially developed for AsthmaWatch™. The smart way of connecting the devices, detecting asthma symptoms, responding and giving a controlled dose to the patient are some the characteristics that make our product unique, novel and distinguishable from other products in the current market.

Design of intelligent wristband

This revolutionary design uses the newest of the newest silicon wrist band which create a light weight, flexible, thin. Research has proven it does not affect the sleeping patterns; this product has been tested for toxicity. The design will incorporate and come in a range of primary colours.

Existing technologies

- Thermal camera
- Sound sensor
- Iontophoresis technology

Thermal camera

The camera used for AsthmaWatch™ is different from the ones already on the market. This camera will be focusing on the temperature differences in exhaled breath temperature and therefore has to be able to detect very small variances in temperature. This camera will also be able to stay focused on the mouth area even though the children have a rough night of sleep with lots of tossing and turning at night.

Sound sensor

The sound sensor in collaboration with the AsthmaWatch™ software will not only detect a sound it will specifically distinguish a cough or a wheeze from any other sound.

Iontophoresis Technology

The Iontropheses technology already exists, but in AsthmaWatch™ this technology will be modified so the mixture of cationic liposomes will be absorbed faster through the skin. This is done by putting both sides of the system directly across from each other instead of next to each other. The effect it will have is that the cationic Salbutamol is forced through the whole part of the wrist instead of just the top layer, this will increase the absorption.

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