Department of Computer Science

Individual Project - CS3IP16

Hypothyroid symptoms & fitness tracker

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# 1. ABSTRACT

# 2. ACKNOWLEDGEMENTS

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# 3. GLOSSARY OF TERMS AND ABBREVIATIONS

**Hypothyroidism** – The shortage of T3 and T4 thyroid hormone which causes the unwanted slowdown of the body’s function causing suffering and damage to the patient’s organs.

**Hyperthyroidism** – The overabundance of T3 and T4 thyroid hormone which causes the unwanted speedup of the body’s function causing suffering and damage to the patient’s organs.

**TSH –** Thyroid Stimulating Hormone. A hormone created by the pituitary gland to regulate the production of T4 and T3. Low levels of T4 cause a heighten level of TSH production whereas high levels of T4 cause a reduced level of TSH. Typical hypothyroidism has a low level of T4 which results in an extremely elevated level of TSH.

**T4 –** Thyroxine. (Four Iodine molecules) This is converted into triiodothyronine inside the cell when required. T4 is basically a stepping stone for T3.

**T3 –** Triiodothyronine. (Three Iodine molecules) The active form of the thyroid hormone which influences the bodies processes, the most important of which being the regulation of the body’s metabolism.

**Levothyroxine –** Levothyroxine Sodium. A synthetic drug that is identical biologically to T4 allowing the body to convert this into T3 for use within cells.

# 4. INTRODUCTION

By conservative estimates hypothyroidism affects two in one hundred with many doctors believing the true rate is much higher than this, with the president of the International Hormone Society believing the true number lies between twenty percent and fifty percent of the population having some level of thyroid deficiency.

Hypothyroidism as a condition is characterised by the slowing of almost all bodily functions as the body is short on the hormones primarily used in relation to your metabolism. This “slowing” affects all parts of your body, from your brain, digestive track to muscles causing memory issues and problems concentrating, digestive problems such as constipation and increased risk of other issues like Celiac disease and Crohn’s disease and Graves’ disease and frequent painful muscle cramps and decreased muscle strength.

During May 2017 the writer of this document was diagnosed with hypothyroidism after several months of suffering several of the symptoms. During the period after the diagnosis, there was an attempt to gather as much data about the symptoms as possible. To the writers surprise there was a distinct lack of apps available to aid in this pursuit which led to having to record everything on pen and paper, which was both impractical and not useful when it came to viewing trends and getting a picture of how the sufferer felt in relation to previous time periods.

When it came time to choose a project, inspired by the other app’s available for different medical issues, the writer decided to attempt to create a app that could record the data on the issues encountered and present them to the user in a useful manner allowing conclusions and issues to be raised in a timely manner rather than waiting for the symptoms to get truly bad.

Given this potentially huge section of the population who are either misdiagnosed or undiagnosed having the ability to predict if you have thyroid issues via an easily installed app seems like a useful app to exist.

A side benefit of having historical records of the symptoms is that due to memory issues associated with hypothyroidism having a record of what you feel greatly reduces the requirement to remember exactly what you felt on a day to day basis when discussing your issues with a doctor.

Given the above the overarching goal of this individual project is:

* Provide a method of easily recording your symptoms on a day to day basis.
* Reduce the memory load on the user by allowing easy reviewing of the data.
* Provide recommendations on what the users should be doing to improve their condition.
* Further reduce the memory load on users by giving reminders to user regarding taking their medication if the medication varies from day to day.

Within this document we will be covering the process from design and research to the final product.

# 5. PROBLEMS ARTICULATION

## 5.1 Situation as is.

The current problem for suffers of hypothyroidism is that if they wish to collect data on their condition there are extremely limited options which give more options than simply collecting the data.

Currently there are no solutions designed specifically with hypothyroidism in mind. Meaning if they decide to record the data digitally the data they may need to separate over multiple apps

The current situation regarding recording symptom, food and behavioural triggers for hypothyroidism is one of two different situations.

### 5.1.1 Situation A (Pen and Paper)

The first situation for the recording of data is pen and paper. This is simply carrying around a notebook or something similar with you and whenever you notice something you feel may be significant just writing it down.

This has several drawback related to its paper based nature:

* Loosing or misplacing records is easy, misplacing the notebook could result in multiple months of data being lost, which could be difficult to replace and could majorly affect the long term tracking of your symptoms.
* Examining the data visually comparing symptoms against other symptoms or other trigger factors can be difficult. As you would have to draw a graph on transfer the data into something like excel.
* There is little context to the data making consistency and quantifying the data very difficult. If you recorded a headache one day and a headache the next day, it may be difficult to tell which headache was worse a month later.
* Another issue is that it may be difficult to carry pen and paper around whereas you are likely always carrying a phone or laptop on you at all times.

In regards to pure data collection there is no issues with using pen and paper however whenever you want to do anything more with the data other than simply review it becomes significantly more difficult.

There is however one key advantage:

* Given the extremely low cost of pen and paper you’re likely to have these in your house already, meaning you can start recording almost as soon as you’d like.

### 5.1.2 Situation B (Non-specific apps)

The second situation is using any combination of non-thyroid specific apps. This could be using any number of “generic” medical apps. These can be useful however they are not designed specifically for hypothyroid suffers.

These are varied and each app contains different functionality so it’s very difficult to say what can do what however as none of them have been designed with hypothyroidism in mind it is clear that they may require additional work to make it work for a hypothyroid suffer and may need to use one or more apps to get the functionality you want.

Another issues these generic apps have is if you have been diagnosed as a sufferer of hypothyroidism it may be distressing/annoying to have these medical apps constantly tell you that you may be at risk of other diseases when you have already been diagnosed with hypothyroidism which is an additional unwanted stress on the user.

## 5.1 Problem statement and Justification.

Given the wide availability of technology, the best way of recording the data for hypothyroid suffers shouldn’t be using pen and paper. There should be a comprehensive digital solution available which allows the user to record their data for later use. Even showing just the basic information you’ve recorded chronologically when discussing the issues with a doctor would be an improvement as the current pen and paper solution means you will need to manually order all the data and cannot quickly jump to specific parts of the data you wish to look at.

The current solution lacks the ability to do anything more than just record data chronologically without the ability to go back and address previous data or do anything more impressive with the data provided.

The ideal problem solution would contain the ability to include more data than just symptoms and provide the ability to visually examine the data compared to other data sets.

This gives the problem statement as:

“*There is no simple solution for tracking symptoms, consumed medication and specific food triggers for analysis and visual investigation/inspection.*”

## 5.2 Key stakeholders and their concerns.

## 5.3 Ideal situation to be.

## 5.4 Technical specification.

# 6. LITERATURE REVIEW

## 6.1 Existing solutions

# 7. THE SOLUTION APPROACH

# 8. IMPLEMENTATION

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