

Sepsis Connect



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Contents

Pg 3:	Meet the team
Pg 4:	Summary/Abstract
Pg 6 :	Introduction
Pg 7 :	Background research
Pg 19 :	Experimental methods
Pg 29 :	Results
Pg 39:	Conclusions and recommendations
Pg 41 :	Acknowledgements
Pg 42 :	Appendices
Pg 48 :	References

Meet The Team



Hi, I'm Aoibheann Mangan.

I am 14 years old and I am a third-year student at Mount Saint Michael Secondary School in Claremorris, Co. Mayo.

I am a coder dojo mentor and in my spare time I love to code and hanging out with my friends.

Summary/Abstract

Sepsis is a potentially life threatening condition caused by the body's response to infection and is a serious systemic infection that can quickly lead to circulatory shock, organ failure and death if not treated. It kills more people around the world each year than many of the top illnesses including cancer and heart disease added together.

It is my hypothesis that Sepsis is a silent and deadly killer that not enough people are aware of and that through education and close monitoring, people would know how to recognise signs and symptoms and seek early treatment meaning lives could be saved.

Sepsis can infect anyone, no matter what age they are. Not many people are aware of Sepsis and how deadly it is. Because of little knowledge of the symptoms, how it is caused and how it is treated makes it even deadlier. I decided to make an app about it which explains the symptoms, how it is caused, etc. The research I found online was mainly from medical clinics and the WHO (World Health Organisation). A study by the HSE in 2018 showed that the levels of deaths from sepsis in this country dropped following an information campaign to educate people on the signs and symptoms of sepsis. I was unfamiliar with this campaign as were all my classmates, my parents and several other people I questioned. I decided to conduct a survey to see what people knew about sepsis to determine the levels of knowledge around this deadly infection. I conducted two surveys, one in my peer group in my locality and another which spread more nationwide and covered adults - parents, caregivers and teachers. From my surveys it became extremely clear that very little was known in either group on the signs and symptoms of sepsis. The adult group had more of an understanding of how important time and prompt treatment of sepsis is while in my peer group, people thought it was something you get in hospital and not something that you could get at home or school and therefore there was no understanding of how important time is in treating sepsis effectively.

From my survey, I determined that there was very little known about the signs and symptoms of sepsis or how you could get it. People mainly the adults seemed to know it was a very serious and potentially fatal condition but hadn't sought out how they could keep themselves safe. For this reason, I decided to make an app that would help inform people about the symptoms of sepsis, how it is caused, how it is treated etc.

Before I created the app, I did some research on sepsis and examined some case studies that I thought people might relate to. I focussed on the case of 12 year old Rory Staunton as it linked the seriousness of how easy it is to get sepsis as well as a campaign and a change in protocols in hospital in New York by his parents who set up a foundation in his memory. I also decided to study the apps that are already on the market as well as referred to my survey results so that I could determine what is needed for the app and what is the most important information.

I decided on the following main features for my app as the most important things that people would need on hand to help figure out if they or their loved ones have sepsis or at risk of contracting it.

- A login and sign up feature as we will be storing our users data on their own devices to keep track of their symptoms.
- Signs and symptoms of sepsis in the different categories of people
- Checklists for the different categories of people
- A symptoms input page
- A results of symptoms inputted page for you to share with medical personnel.
- A timer
- A call for help page to summon help if needed.

From there, I developed the app and tested it as I went along to ensure that it was working efficiently. I had two medical drs look over the content I had added to ensure that it was as up to date and as precise as possible (as with all medical advice, when not directly from a dr it can be risky for a patient to solely rely on information that they read and this I wanted to make clear in my app)

Introduction

“The World Health Organization’s first global report on sepsis finds that the effort to tackle millions of deaths and disabilities due to sepsis is hampered by serious gaps in knowledge, particularly in low- and middle-income countries. According to recent studies, sepsis kills 11 million people each year, many of them children. It disables millions more”.

I chose to make this project because I like many people my own age as well as many adults don't know much about sepsis and how deadly it is. The disease itself is so deadly that I felt I wanted to check how prevalent it is and how much is known about it. I decided to read some research papers and study notes from organisations like the HSE (Health and Safety Executive Ireland), NHS (National Health Service UK) and the WHO (World Health Organisation). I also researched studies and surveys undertaken around the globe as well as some case studies mainly from organisations and charities set up from losing a loved one. I concluded in my research that a lot of the studies and surveys were from a medical personnel view point and so set about at a more local level surveying people near me to see what they knew about sepsis. I then took it to a national level reaching out via teen turn and social media to people to take part in my survey.

It was my hypothesis that people did not know enough about the signs and symptoms of sepsis and that through information, education and a means of tracking their health that I could create an app that could help save lives. My survey results proved to me beyond any doubt that compiling this information in an app would be of enormous benefit and my research helped me to find the most important and accurate information to store in it.

Background Research

Sepsis, a potentially life threatening condition caused by the body's response to infection is a serious systemic infection that can quickly lead to circulatory shock, organ failure and death if inappropriately treated. It is also a serious problem in hospitals throughout the world. Over 250,000 people die of sepsis in the US alone, every year.

With sepsis, time is of the essence. Successful treatment relies on prompt recognition of symptoms, giving the correct amount and type of antibiotic(s), and hemodynamic stabilization. Lack of appropriate sepsis management knowledge by medical personnel from GP to hospital level can lead to delayed symptom recognition, thus increasing the chances of serious complications, medical errors, increased treatment costs, and avoidable morbidity and mortality.

How dangerous is Sepsis?

The World Health Organisation (WHO) states that “The global burden of sepsis is difficult to ascertain, although a recent scientific publication estimated that in 2017 there were 48.9 million cases and 11 million sepsis-related deaths worldwide, which accounted for almost 20% of all global deaths”.

Almost half of these deaths were children under 5 years of age. - 20 million cases and 2.9 million global deaths.

Furthermore, 85% of these cases were reported to be in low and Middle income countries.

Who is most at risk?

While sepsis can attack anyone at all, there are some high risk groups whom when they are affected by an infection, severe injury, or serious non-communicable disease can progress to sepsis at a higher rate those in this vulnerable group include:

- The elderly,
- pregnant or recently pregnant women,
- Newborn babies,
- Patients who are in hospitals,
- patients in intensive care units,
- people with HIV/AIDS,
- people with liver cirrhosis,
- people with cancer,
- people with kidney disease,
- people with autoimmune diseases,
- people with no spleen.

The World Health Organization's first global report on sepsis reported that sepsis frequently results from infections acquired in health care settings. Around half (49%) of patients with sepsis in intensive care units acquired the infection in the hospital. An estimated 27% of people with sepsis in hospitals and 42% of people in intensive care units will die.

Case study: Rory Staunton

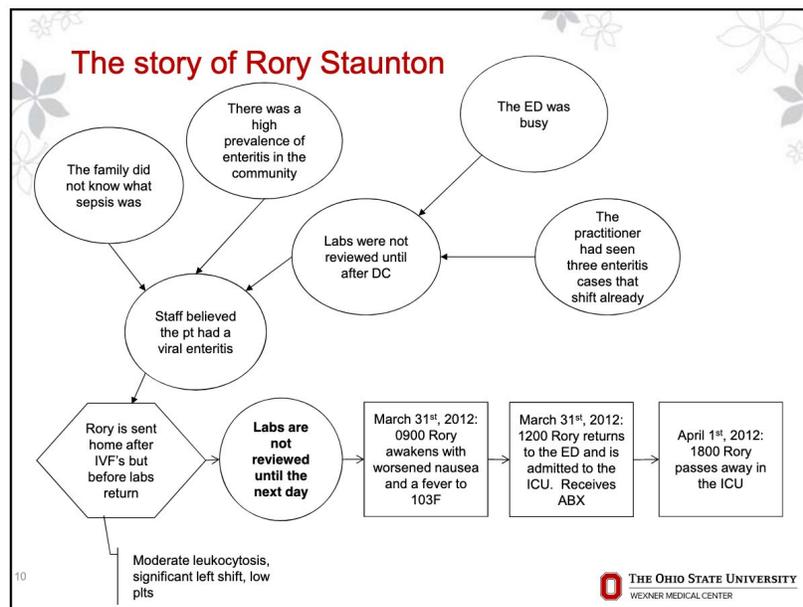
While it's clear that sepsis is especially dangerous in the vulnerable list of people as above, it can also strike anyone. I decided to study the case of Rory Staunton, a 12-year-old boy in New York who died from Sepsis.

Rory was diving for a ball in his school gym one day. He got the ball but scraped his arm. That night he awoke from sleep with pain in his leg; by the morning he had a high temperature and was vomiting. His doctor thought he had a stomach flu or a viral infection, but sent him to the emergency department to treat his dehydration from the vomiting. In the emergency department they sent blood tests, but no one followed up on the results; they agreed with the pediatrician that it was a stomach virus and sent him home after giving him intravenous fluids to improve his dehydration from being so sick.

The next day Rory's parents reported that he couldn't get off the couch, he wasn't eating, and he continued to have a high fever that couldn't be controlled. His parents got in touch with the dr, who insisted that Rory had a gastric flu despite them telling her that he seemed to get worse and that they were worried. The next time she saw Rory, he was already very ill.

The family went straight to the emergency department and Rory was admitted directly to the intensive care unit. Rory was fighting a serious infection. Bacteria had entered his blood, through the cut on his arm and he was in septic shock.

He fought to survive, but it was too late. Rory died within 48 hours of streptococcal sepsis, a complication of the simple scrape on his arm, from a bacterial skin infection that went undetected.



This infographic from the Ohio State University highlights the areas where education on the signs and symptoms of sepsis could have saved Rory's life. Key to it were the family not knowing what sepsis was and the Dr at his gp as well as that in the hospital had already seen several cases of viral gastric bugs which the symptoms he presented with overlapped with. A busy ED and no one examining his blood results were two other factors

that lead to the delay in identifying sepsis and getting time critical treatment started.

Signs and symptoms of Sepsis

Sepsis can initially look like any mild infection such as flu, gastroenteritis (Gastro), urinary or skin infection, or a chest infection. There is no one sign, and symptoms present differently between adults and children.

Sepsis can progress very rapidly, particularly in 'at risk' individuals.

Early detection and treatment is essential. Sepsis Kills!

Symptoms of sepsis include

- Rapid breathing and confusion
- Fever and chills
- Very low body temperature
- Peeing less than usual
- Fast heartbeat
- Nausea and vomiting
- Diaherra
- Fatigue or weakness
- Blotchy or discoloured skin
- Sweating or clammy skin
- Severe pain

Sepsis will be diagnosed by doctors doing tests for

- Bacteria in your blood or body fluids
- Signs of infection on an X-ray, CT scan, or ultrasound
- A high or low white blood cell count
- A low number of platelets in your blood
- Low blood pressure
- Too much acid in your blood (acidosis)
- A lack of oxygen in your blood
- Problems with how your blood clots

- Uneven levels of electrolytes
- Kidney or liver problem

Seek medical help urgently and ask the Doctor or Nurse: **“Could this be Sepsis”?**



Sepsis can present differently in adults and children.

The following posters highlight the different symptoms to watch out for urgently if sepsis is suspected.

HOW TO SPOT SEPSIS IN ADULTS

Seek medical help urgently if you (or another adult) develop any of these signs:

- S**lurred speech or confusion
- E**xtrême shivering or muscle pain
- P**assing no urine (in a day)
- S**evere breathlessness
- I**t feels like you're going to die
- S**kin mottled or discoloured

HOW TO SPOT SEPSIS IN CHILDREN

A child may have sepsis if he or she:

1. Is breathing very fast
2. Has a 'fit' or convulsion
3. Looks mottled, bluish, or pale
4. Has a rash that does not fade when you press it
5. Is very lethargic or difficult to wake
6. Feels abnormally cold to touch

If you spot any of these signs, call 999 or go straight to A&E and Just ask: "could it be sepsis?"

A child under 5 may have sepsis if he or she:

1. Is not feeding
2. Is vomiting repeatedly
3. Has not passed urine for 12 hours

If you spot any of these signs, call 111 or see your GP and Just ask: "could it be sepsis?"

Sepsis in Ireland - HSE report 2018

The Health Service Executive or Ireland (the HSE) conducted a report into sepsis which was released in 2018. It showed that in 2018 there were 16,578 deaths recorded, equivalent to a mortality rate of 18.5%.

The following relate to the adult, non-maternity patient:

Number of cases of SIRS of Infectious Origin, Sepsis, Septic shock	15,379
In-hospital mortality SIRS of Infectious Origin, Sepsis, Septic Shock	19.7%
Number of cases of Sepsis & Septic Shock	14,639
In-hospital mortality rate: Sepsis & Septic Shock	20.3%
Average length of stay	21.9 days

Specialty based data:

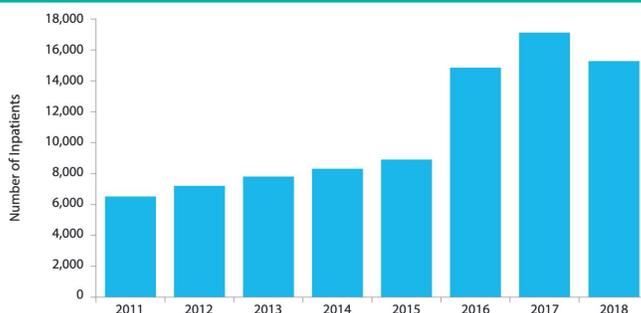
Paediatric sepsis-associated hospital mortality rate	4.5%
Maternal sepsis-associated hospital mortality rate	0.5%
Surgical DRG sepsis-associated hospital mortality rate	24.8%
Medical DRG sepsis-associated hospital mortality rate	19.4%

Can Education help?

According to the HSE study in 2018, an education campaign had a significant impact on the recognition of sepsis between 2015 and 2018 see table below from the report.

The Epidemiology of Sepsis in Ireland

FIGURE 1: The number of adult patients with a diagnosis of SIRS of Infectious Origin, Sepsis & Septic Shock, 2011- 2018 (excludes maternity).



Between 2011 and 2015 sepsis cases were increasing by approximately 7% per annum. In 2015, there was a nationwide education campaign as part of the implementation programme of the 2014 National Clinical Guideline No.6: Sepsis Management. This resulted in a 67% increase in the recognition and documentation of sepsis cases. The effect of ongoing sepsis awareness education is reflected in the increase in cases documented between 2015 and 2018.

Education on signs and symptoms of sepsis can help patients, family members, co-workers or in the case of children their teachers, protect a patient against sepsis by knowing how to recognise these signs and symptoms as well as the importance of prompt and early treatment. Sepsis in school-aged children can be triggered by any number of infections, from infected cuts and scrapes sustained on the playground, to infections, such as pneumonia, influenza, and meningitis. Many of these infections can be prevented or treated effectively if caught in the earliest stages, thus reducing the risk of sepsis. Sepsis is a medical emergency. A person with sepsis should look ill and should seek immediate care for worsening infection and signs and symptoms. Time matters.

Infection prevention is a critical part of preventing sepsis. During the covid 19 pandemic we have all been alerted to the ways to prevent the spread of the virus, a similar response is required to prevent the development of sepsis. This includes proper hand hygiene, wound care, and vaccination. Being aware too that like with covid 19, children and the elderly, as well as immunocompromised people and those with chronic illnesses, are at higher risk for contracting sepsis than the general population.

In the case study I mentioned earlier, on 12 year old Rory Staunton, his parents set up the “End Sepsis Foundation - The Legacy of Rory Staunton”. His parents said “**Never Again:** Those two words sum up our overwhelming feelings following Rory’s death. We had not heard of sepsis before his death. We discovered after his death that sepsis is the leading pediatric killer worldwide. It also kills more Americans than breast cancer, lung cancer and stroke combined. Death from sepsis is preventable. If Rory’s pediatrician had recognized the symptoms of sepsis he clearly presented, he would be alive. If the ER doctors had read the blood work they ordered, which showed he was fighting a serious infection, he would be alive. If the public had been educated about sepsis our son would be alive.”

Since Rory’s death they have worked to raise awareness of this devastating killer and to improve procedures in medical personnel and in emergency rooms to ensure that no other family suffers this devastating loss. Early in 2013, New York Governor Andrew Cuomo announced that all hospitals in New York State would be required to adopt evidence-based protocols, known as “Rory’s Regulations” for the early diagnosis and treatment of sepsis. The New York State Experience in the changes to protocols in their hospitals together with education of medical staff resulted in the documented Case fatality rate for the state going from 30.2% to 25.4% between 2013 to 2016.

The Journal of the American Medical Association has released the findings of a sepsis study conducted by the Pittsburgh School of Medicine and the findings show that Rory’s Regulations, protocols which are applied across the board in New York State medical facilities, are increasing survival rates for children with sepsis by a “staggering 40%.”

It is clear to see that education has played a major role in improving the diagnosis and treatment of sepsis in the area. There are two clear areas that need addressing in terms of education. Firstly the general public need to be more aware of the signs and symptoms and how easy it is to get sepsis while secondly, the medical field too need to learn from these cases and this area is most invested in and has seen the WHO call for a

worldwide response and things like the three hour rule in sepsis treatment being developed.

What apps are out there already?

There are several apps out there catering for Sepsis - all I found, were apps aimed at doctors and clinical leads rather than at the general public.

They were difficult to understand and offered little to no guidance to the person using the app who would not have a medical background or access to vital medications.

Here are a few examples I studied in order to see what sort of information I could use in my app - and how I might address information in a manner that anyone could understand it.

Sepsis Clinical Guide (IOS and Android)



Sepsis clinical guide was made for medical personnel, it features search, annotation, bookmarking functions and calculator support. All content is extensively referenced and footnoted where appropriate, and periodically updated. Clinical topics covered in the Sepsis app include:

- **The latest definitions and clinical guidelines**
- **Epidemiology, risk factors**
- **Common differentials and etiology**
- **Management of common causes**
- **Sepsis management bundles**
- **Antibiotic therapy**
- **Diagnosis and management of pediatric and neonatal sepsis**
- **Important calculators**

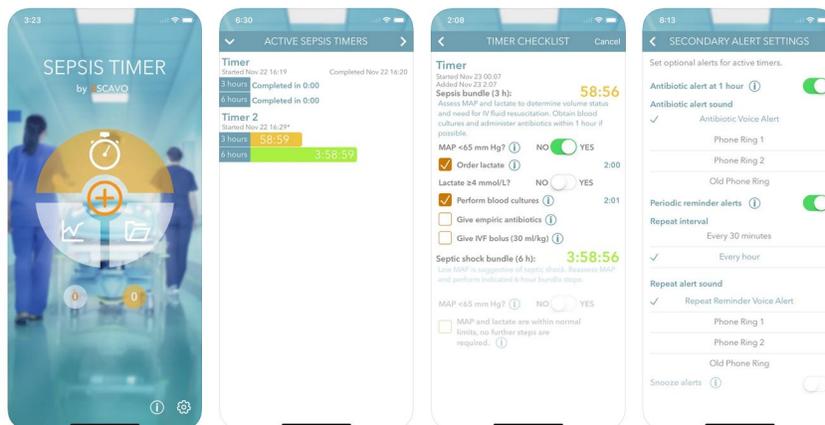
- **Drug administration information**

Sepsis Timer (IOS)

Sepsis Timer again, is aimed at medical professionals in hospitals. The doctors/nurses simply start a timer when a patient is diagnosed with sepsis and the app lists the necessary treatment steps and alerts them to when these steps are due.



iPhone Screenshots



Sepsis Timer features include:

Compliance with SSC sepsis bundles, and IHI and CMS SEP-1 Core Measure sepsis treatment guidelines

- Simple and intuitive user interface
- Configurable alert options include periodic and snooze alerts with customizable sounds
- Response time tracking records time to completion of treatment steps and bundles

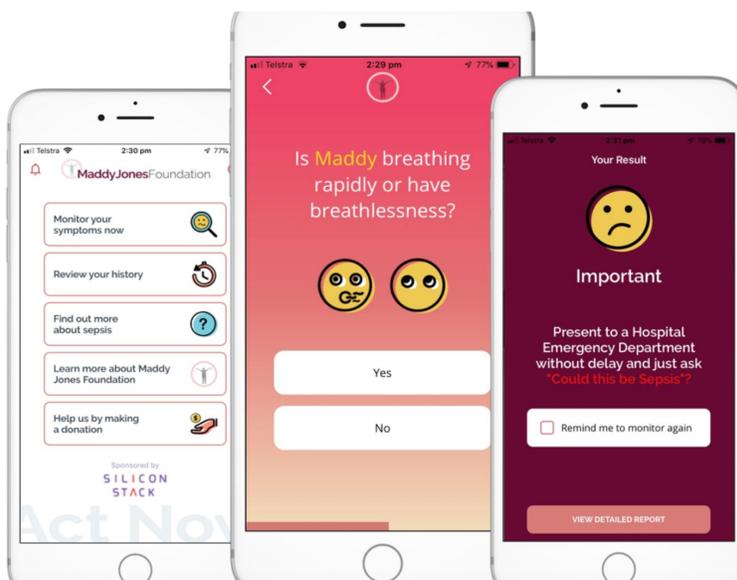
- Simple statistical report shows average response times for completed timers over time
- Thorough user manual and explanations for all treatment steps and app functions

Could this be a Sepsis App?

This app is only available in Australia, it was set up by the Maddy Jones Foundation which was established after Maddy's death from Sepsis in October 2017. Maddy was an 18 year old fit and healthy law student. Her family says had they known about Sepsis, Maddy's symptoms would have been recognised by both family and healthcare professionals and her death was preventable. This is the only app I came across that was like what I wanted to create, as I couldn't access it, I had to contact the Maddy Jones foundation to seek more information on its content, usage and success. The full transcript of the interview I conducted is in the appendices.

Could this be Sepsis App

by Damian | Oct 18, 2019 | Sepsis Awareness | 0 comments



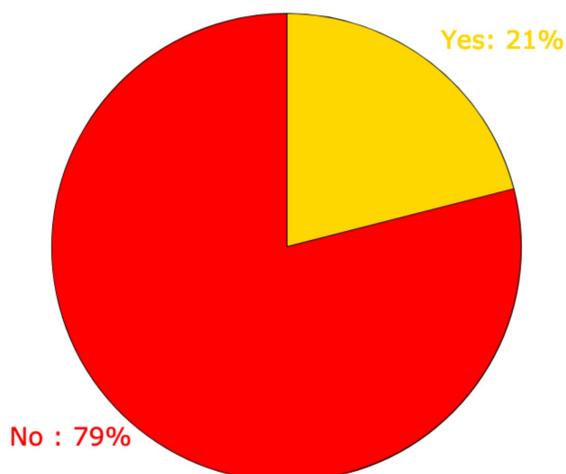
Experimental Methods

My Surveys:

The first thing after concluding a lot of my background information was that I wanted to discover what the knowledge of sepsis was in people in Ireland, starting with those around me. I conducted a survey of 60 14-16 year olds in my locality to discover what they knew about Sepsis. The results were a little alarming.

Question 1: To discover - How many people my age know what sepsis is?

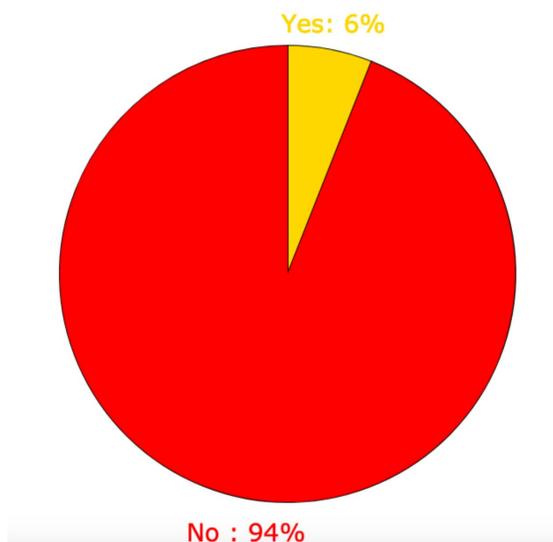
Do you know what Sepsis is?



As you can see a clear majority 79% said that they did not know what sepsis is.

Question 2 - Can you develop Sepsis from a cut? - with this question, I wanted to determine if young people knew how easy it can be to contract sepsis.

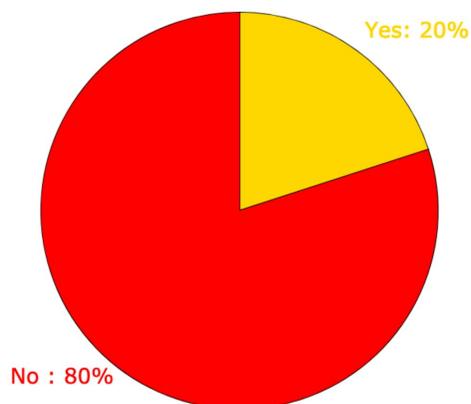
Can you develop Sepsis from a cut?



Most people my age didn't believe that you can get sepsis from a cut.

Question 3 - If you have a high temperature is it possible you could have sepsis? I wanted to determine with this question if people my age could identify a high temperature as one of the warning signals of sepsis.

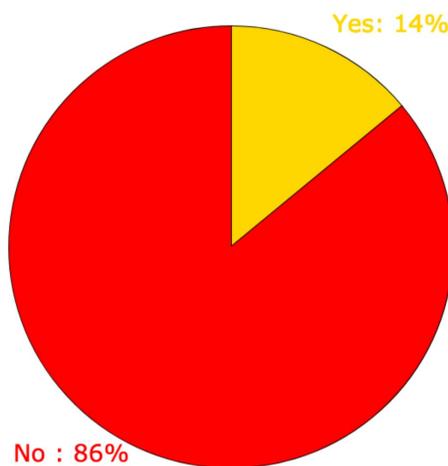
If you have a high temperature, is it possible you might have sepsis?



80% of people my age, would not recognise having a high temperature as a risk factor of having sepsis. This is worrying as they may not seek help if they or a loved one have a high temperature.

Question 4 - Can you die from Sepsis quickly? - I wanted to learn from this question if people my age could tell if you needed to act fast when you have sepsis. From my background research I learned that one of the most important things to save someone from sepsis is fast action and treatment.

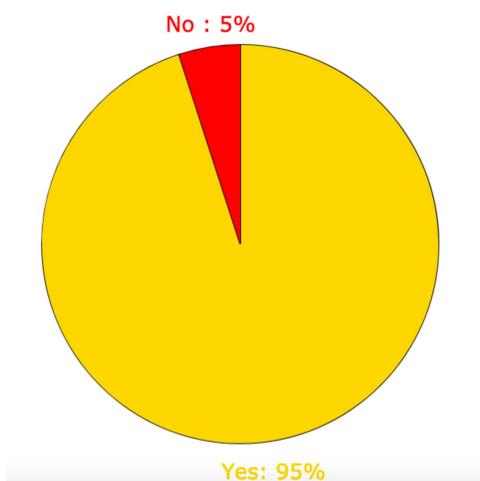
Can you die from Sepsis quickly?



I was shocked to learn that 86% of people my age don't think that time is a critical factor in the treatment of sepsis.

Question 5 - Can you treat sepsis at home? With this question I wanted to learn if people my age think sepsis is something that you can treat at home or if it requires hospitalisation.

Can you treat sepsis at home?



Sepsis is an extremely serious illness and needs to be treated as such and medical attention is an urgent requirement to the survival from sepsis.

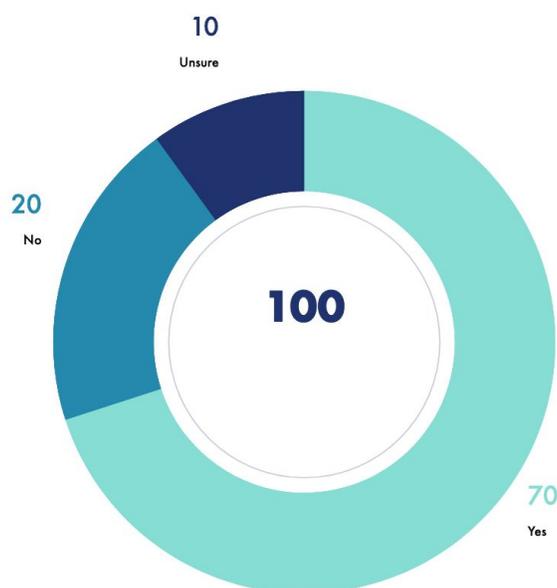
After conducting research among people my own age and in my locality I realised there was very little known about sepsis in my age range. I then thought it would be very important to see if this would be the case among the wider community, including parents, care givers, teachers and adults whom a lot would rely on to look after them when they are ill.

The adult Survey results:

This is the results of a survey that I asked to adults, 218 adults took this survey for me when I shared it online. I asked some similar questions in this group in order to see if age and education over time have factored into the way adults think about Sepsis.

Question 1:

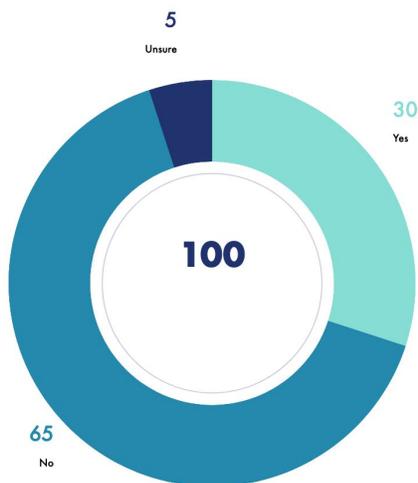
Do you know what Sepsis is?



While in the survey of my peers hardly anyone knew about Sepsis, it appears from the adults survey that most of them have heard of Sepsis and feel that they know what it is. 70% of those asked said they knew what Sepsis is while only 20% said they did not!

Question 2:

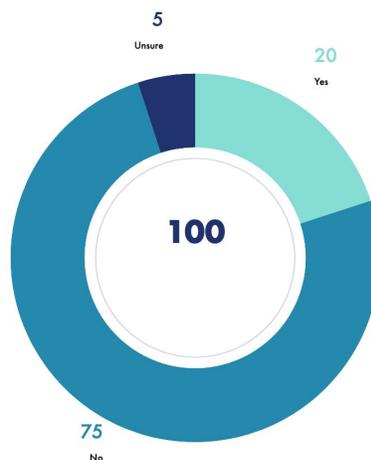
Do you know how you can contract Sepsis?



While 70% of adults say that they knew what sepsis was only 30% of them reported to know how you can contract it. This alerted me to a serious issue in terms of education on sepsis and having a true knowledge of it.

Question 3

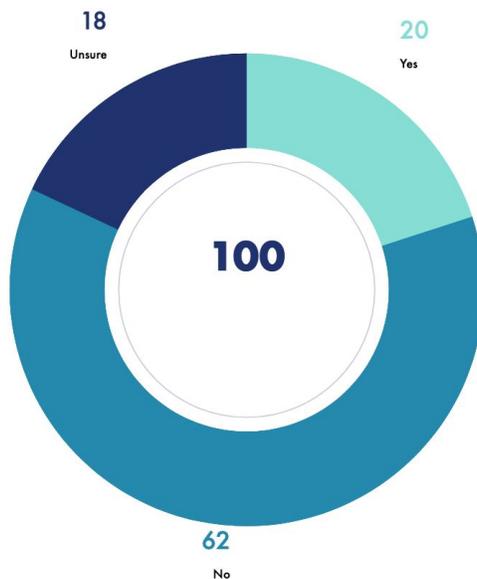
Can you name the signs/symptoms of Sepsis?



A follow on from knowing how you contract it, I wanted to ask if adults knew the signs and symptoms and how you would identify sepsis if you caught it. Shockingly 75% of those surveyed said they wouldn't know what to be on the lookout for with a further 5% unsure.

Question 4

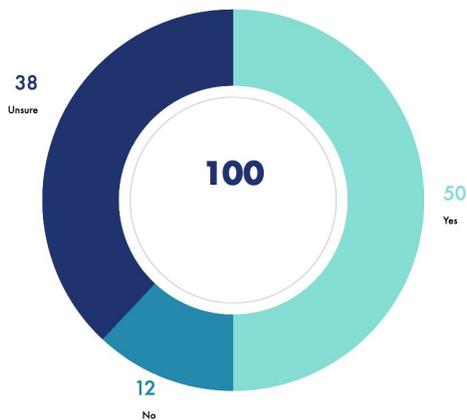
Is Sepsis fatal?



Not being aware of the signs and symptoms or how you contract sepsis I wanted to know if even though 70% said they knew what sepsis was if they knew how potentially dangerous it is. While sepsis is not always fatal, the answer to this question can be interpreted differently.

Question 5

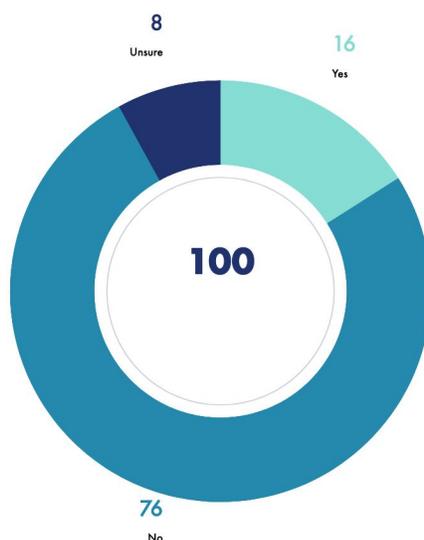
Do you need to be very ill to get sepsis?



This question was to see if adults thought you would only get sepsis if you were already ill and perhaps even in a hospital setting. Already not knowing how you contract it or what the signs and symptoms are, I was worried. 50% of those surveyed thought you need to be very ill to get sepsis.

Question 6

Can you get sepsis from a cut?



When people thought you had to be very ill to get sepsis I wanted to see how many might suspect an infected cut as a cause of sepsis especially after reading my case study on Rory Stanton and knowing his story had featured heavily in the news over here. Shockingly 76% of adults did not think you could get sepsis from a cut!

After conducting two surveys both of which very clearly indicated that not much is actually known about sepsis, I worked out what I would need to do to make an app and a website about sepsis. The app needed to start with a clear logo and be filled with content populated from the results of my surveys and background research into sepsis.

My Logo

The next thing I wanted to do was to design a logo for my app. I decided to focus on the elements of speed and health so incorporated a heart, a heart beat and a clock in an effort to have people recognise them as important things when they hear the word sepsis. I decided to call it sepsis connect as I hope that my app will connect the patient and the caregiver/medical personnel with vital information on arrival for treatment.

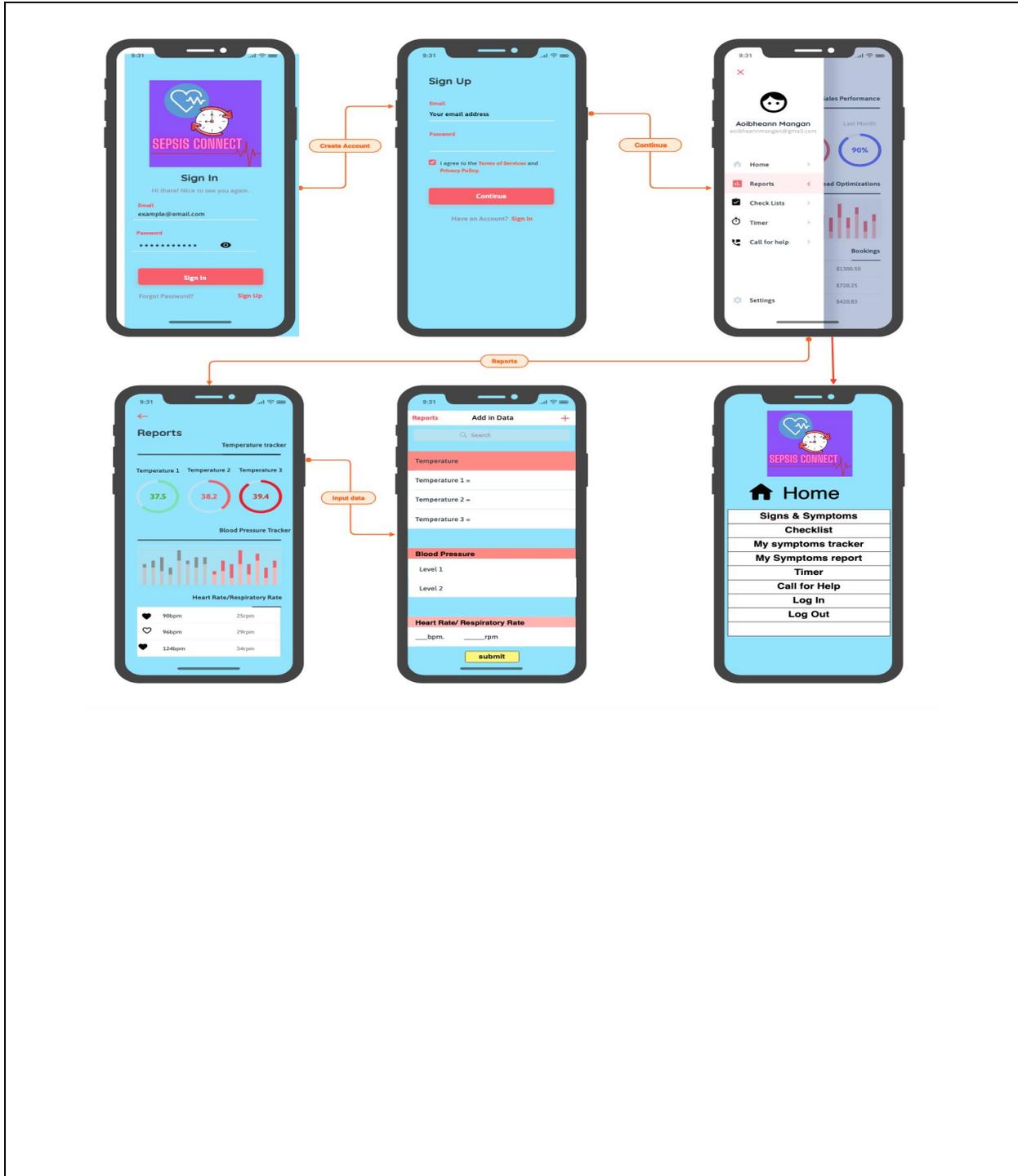


The Contents for the app:

From my background research, I have decided on the criteria I want to have in my app. I will feature the following:

- A login and sign up feature as we will be storing our users data on their own devices to keep track of their symptoms.
- Signs and symptoms of sepsis in the different categories of people
- Checklists for the different categories of people
- A symptoms input page
- A results of symptoms inputted page for you to share with medical personnel.
- A timer
- A call for help page to summon help if needed.

Some of my wireframe:

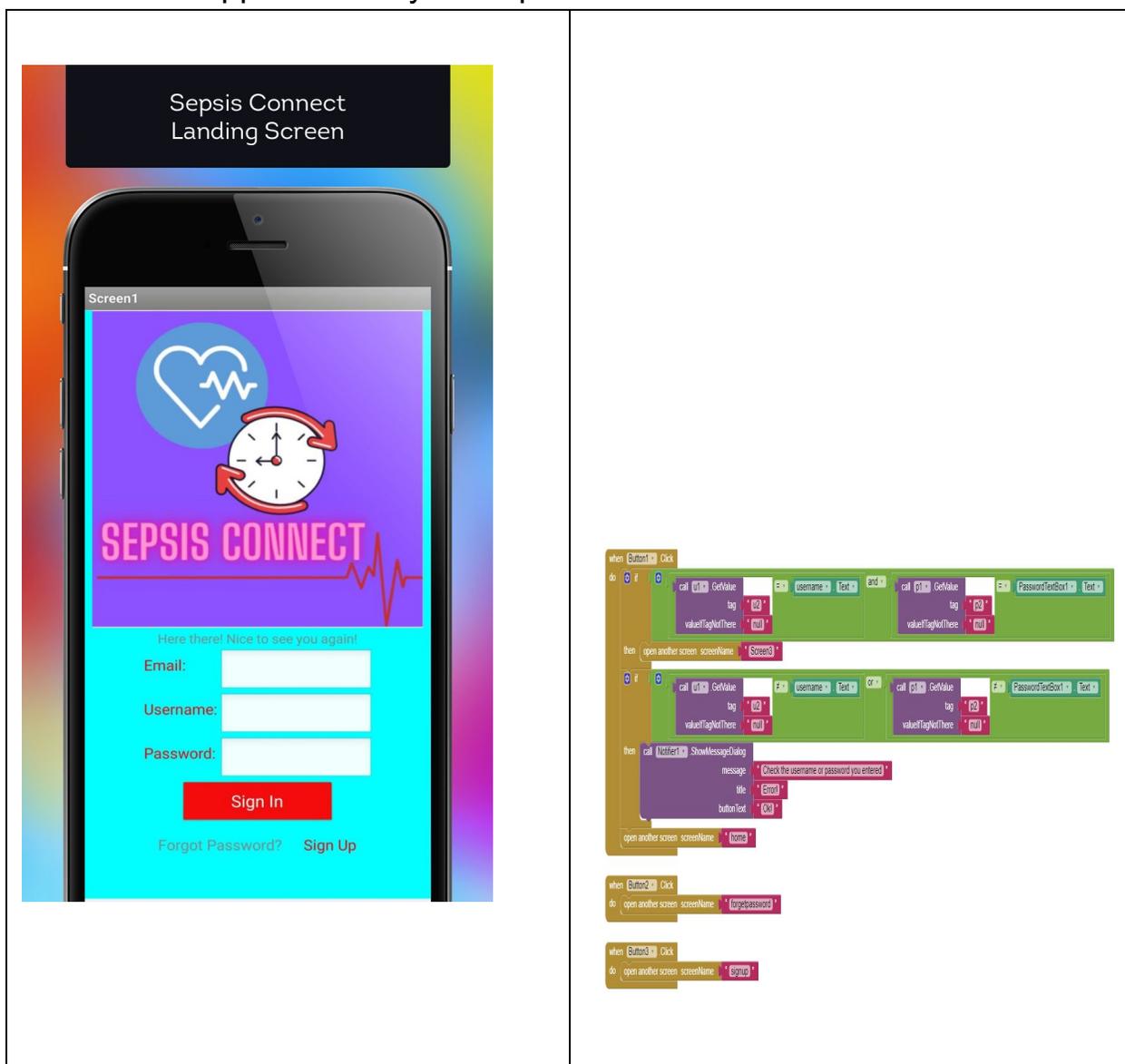


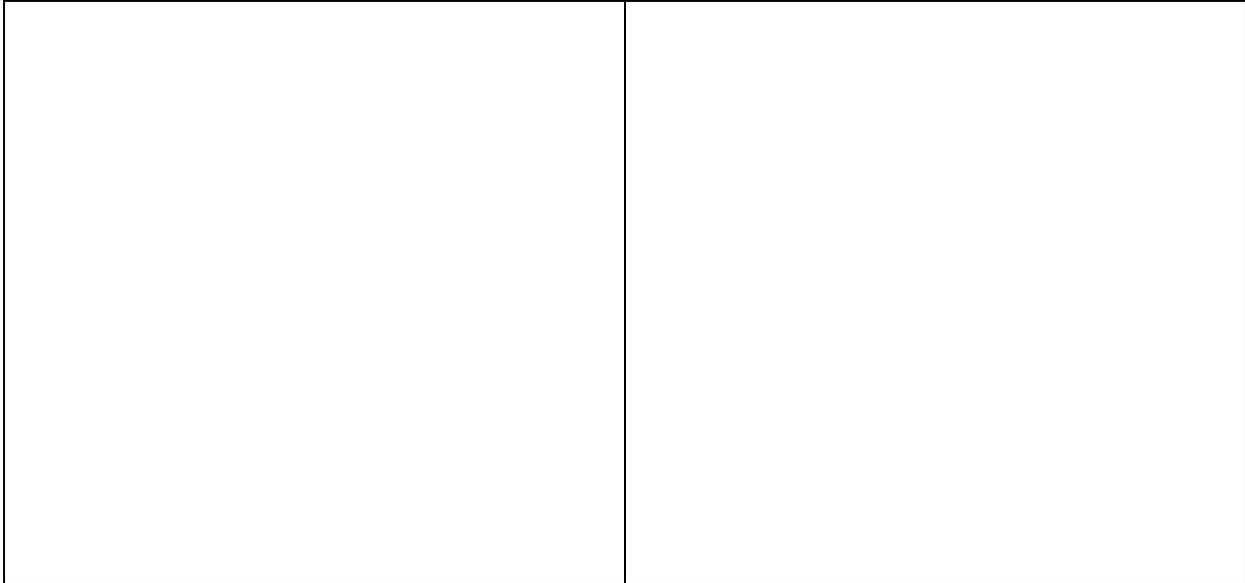
Results

I have already run through the results of my surveys and analysis in the previous section as these were used to guide the building of the app and final prototype.

After lots of coding and testing, my final app looks like this.

As you turn on the app, you can log in or register, this is important as this app will store your important medical information.





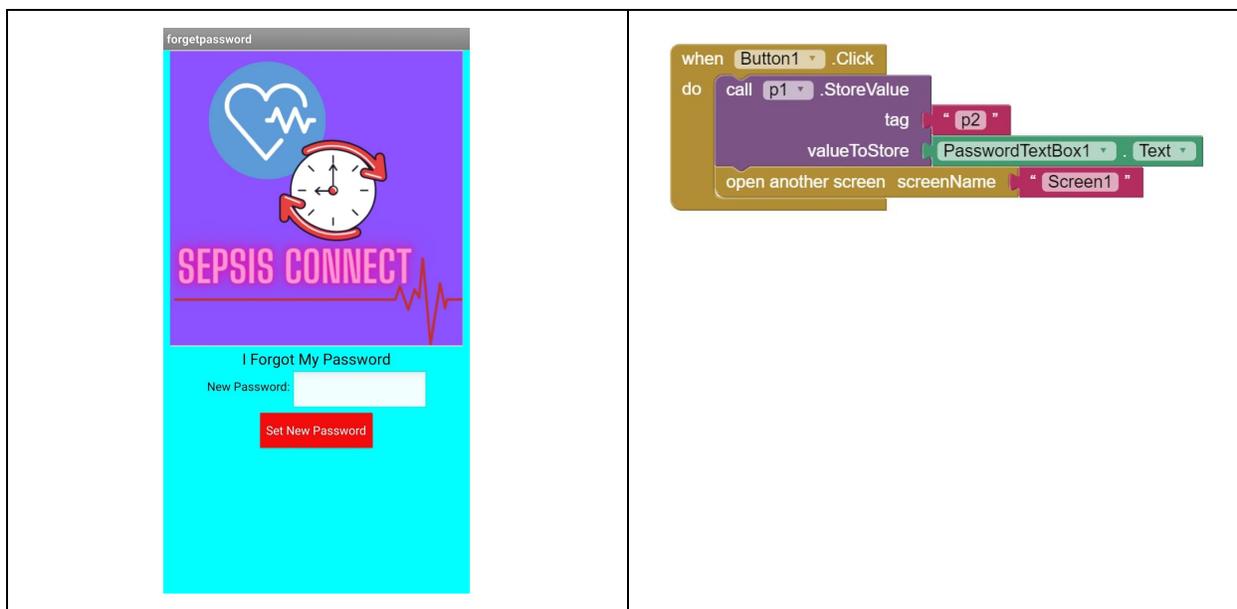
If you are new to the app you will need to register your user name and password to keep all this information private to you the user and those whom you chose to share it with. It will also allow the information to be stored on your device and to be opened the next time you use the app.

```

when Button1 .Click
do
  call u1 .StoreValue
  tag "u2"
  valueToStore TextBox3 . Text
  call p1 .StoreValue
  tag "p2"
  valueToStore PasswordTextBox1 . Text
  call emailb .StoreValue
  tag "email2"
  valueToStore TextBox2 . Text
  call name .StoreValue
  tag "name2"
  valueToStore TextBox1 . Text
  open another screen screenName "Screen1"

```

And if you forget your password there is an option to reset it.



Once you are registered and logged in, you will be brought to the main home screen for the app. It features all the buttons that you would need to use the app. Clicking on any of the buttons will bring you to the pages you require with options to view signs and symptoms or to view and check off symptoms on a checklist format. It also allows you to track your symptoms as well as view a record of those you have recorded previously. There is a timer on the app to keep people on track with the amount of time that they will have to get their symptoms checked out and for medical professionals to track how long people have been getting treatment. Then you also have the call for help button, sepsis can take hold and make you very unwell very quickly so having an emergency type button to summon help is something I deemed vitally important to have in the app.

Sepsis Connect
Home Screen



```

when Record .Click
do open another screen screenName "record"

when Timer .Click
do open another screen screenName "timer"

when signs .Click
do open another screen screenName "Signs and Symptoms"

when Tracker .Click
do open another screen screenName "results"

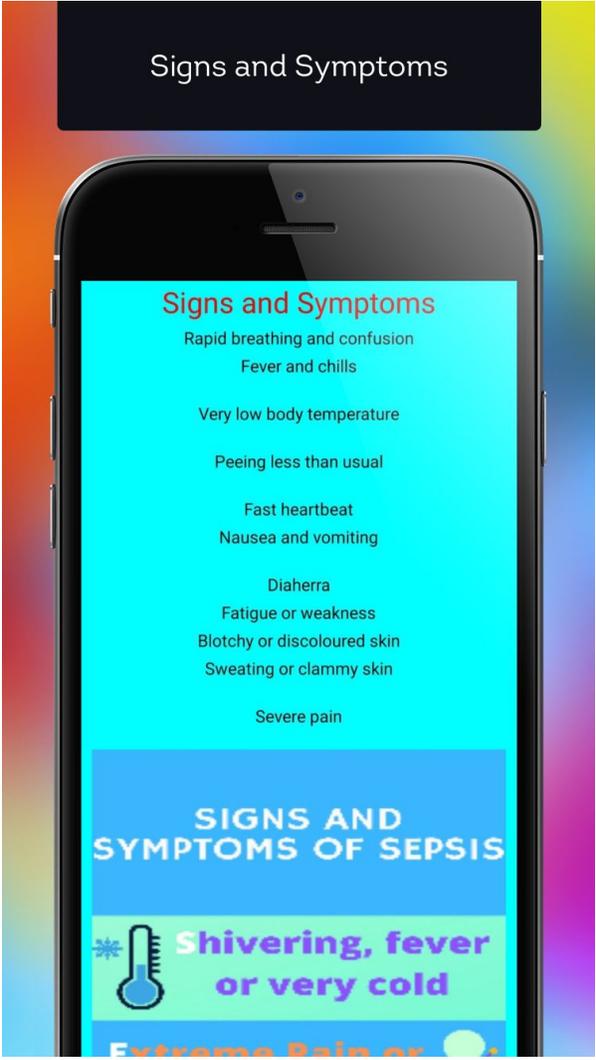
when logout .Click
do open another screen screenName "Screen1"

when callforhelp .Click
do open another screen screenName "help"

when checklist .Click
do open another screen screenName "Checklist"

```

Signs and Symptoms



The screenshot shows a mobile application interface. At the top, a dark blue header contains the text "Signs and Symptoms". Below this, a smartphone displays a screen with the same title. The screen lists the following symptoms:

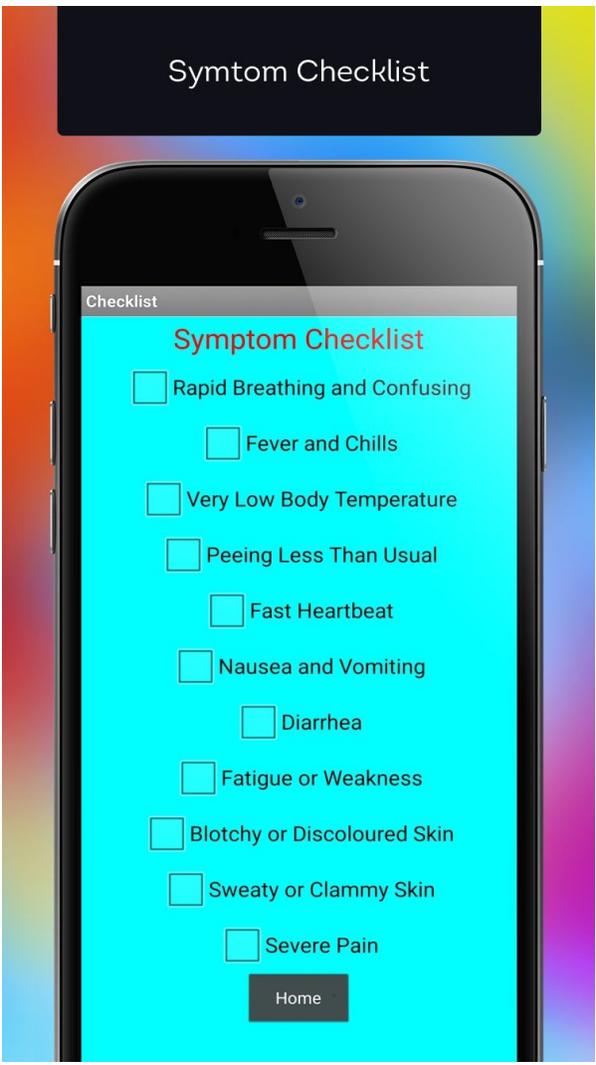
- Rapid breathing and confusion
- Fever and chills
- Very low body temperature
- Peeing less than usual
- Fast heartbeat
- Nausea and vomiting
- Diaherria
- Fatigue or weakness
- Blotchy or discoloured skin
- Sweating or clammy skin
- Severe pain

Below the list, there is a blue banner with the text "SIGNS AND SYMPTOMS OF SEPSIS". Underneath the banner, there is a green box with a thermometer icon and the text "Shivering, fever or very cold". At the bottom, there is a red box with the text "Extreme Pain or".

```
when Button1 .Click
do open another screen screenName "home"
```

This screen says what the symptoms are and there is also an infographic saying a more simplified version of the signs and symptoms

Checklist



Symptom Checklist

- Rapid Breathing and Confusing
- Fever and Chills
- Very Low Body Temperature
- Peeing Less Than Usual
- Fast Heartbeat
- Nausea and Vomiting
- Diarrhea
- Fatigue or Weakness
- Blotchy or Discoloured Skin
- Sweaty or Clammy Skin
- Severe Pain

Home

```

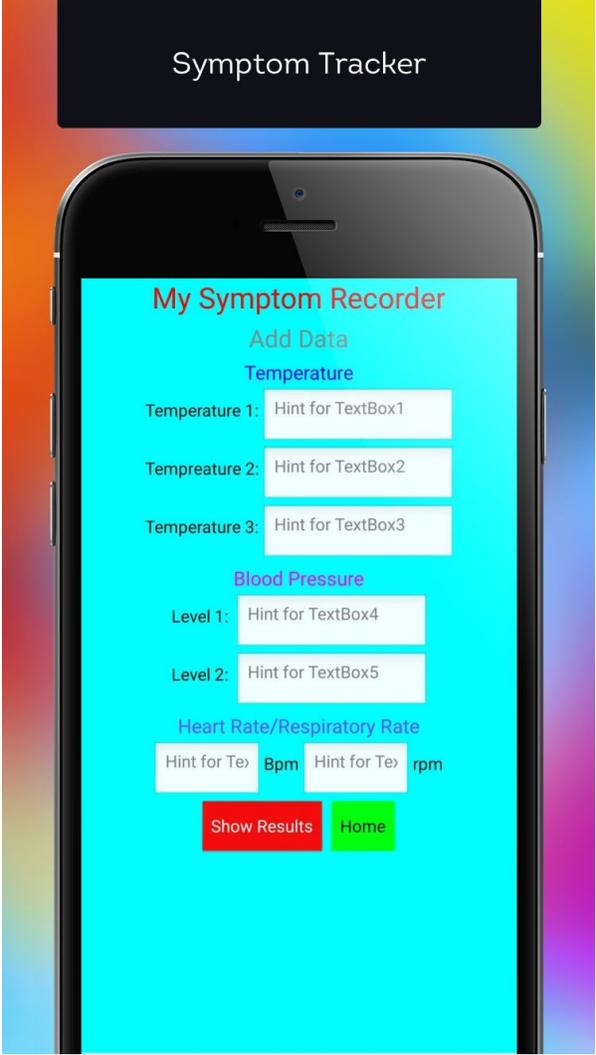
when fh.Changed
do
  if fh.Checked
  then
    call heart1.StoreValue
      tag "heart2"
      valueToStore "Fast Heartbeat"
  else
    call heart1.StoreValue
      tag "heart2"
      valueToStore "Normal Heartbeat"

when nav.Changed
do
  if nav.Checked
  then
    call nausea1.StoreValue
      tag "nausea2"
      valueToStore "Nausea and Vomiting"
  else
    call nausea1.StoreValue
      tag "nausea2"
      valueToStore "No Nausea or Vomiting"

```

On this screen, you can check the boxes of each of the symptoms of Sepsis you may be experiencing if any.

My Symptom Tracker



```

when Button1 .Click
do
  call temp1 .StoreValue
  tag "temp12"
  valueToStore TextBox1 .Text
  call temp2 .StoreValue
  tag "temp22"
  valueToStore TextBox2 .Text
  call temp3 .StoreValue
  tag "temp32"
  valueToStore TextBox3 .Text
  call level1 .StoreValue
  tag "level12"
  valueToStore TextBox4 .Text
  call level2 .StoreValue
  tag "level22"
  valueToStore TextBox5 .Text
  call bmp1 .StoreValue
  tag "bmp2"
  valueToStore TextBox6 .Text
  call rpm1 .StoreValue
  tag "rpm2"
  valueToStore TextBox7 .Text
  open another screen screenName "record2"

```

On this screen, you input your temperature 3 times over a period of time as well as your blood pressure and heart rate

My Symptoms record

record2

Sepsis Record

Temperature
62 87 60

Blood Pressure
56 120

Heart Rate
12 6

Refresh Home

```

when Button1 .Click
do
  set temperature1 .Text to call temp1 .GetValue
  set temperature2 .Text to call temp2 .GetValue
  set temperature3 .Text to call temp3 .GetValue
  set bplevel .Text to call level1 .GetValue
  set bplevel2 .Text to call level2 .GetValue
  set bpm .Text to call bpm1 .GetValue
  set rpm .Text to call rpm1 .GetValue
  if temperature1 .Text > 36.8
  then set temperature1 .TextColor to red
  if temperature1 .Text = 36.8
  then set temperature1 .TextColor to green

```

This screen displays the results from your inputted record when you press refresh. It can also show you if your temperature is above, below or average using colours (Red is above average, Orange is below average and Green is average temperature)

Timer:



The screenshot shows a mobile application interface with a black header containing the text "Sepsis Connect Timer". Below the header is a smartphone displaying a timer application. The timer shows "0:0:2" in white text on a pink background. Below the timer are four buttons: "Start" (green), "Pause" (yellow), "Reset" (red), and "home" (grey). The smartphone status bar shows the time "21:08" and various icons.

```

when startBtn Click
do set Clock1.TimerEnabled to true

when pauseBtn Click
do set Clock1.TimerEnabled to false

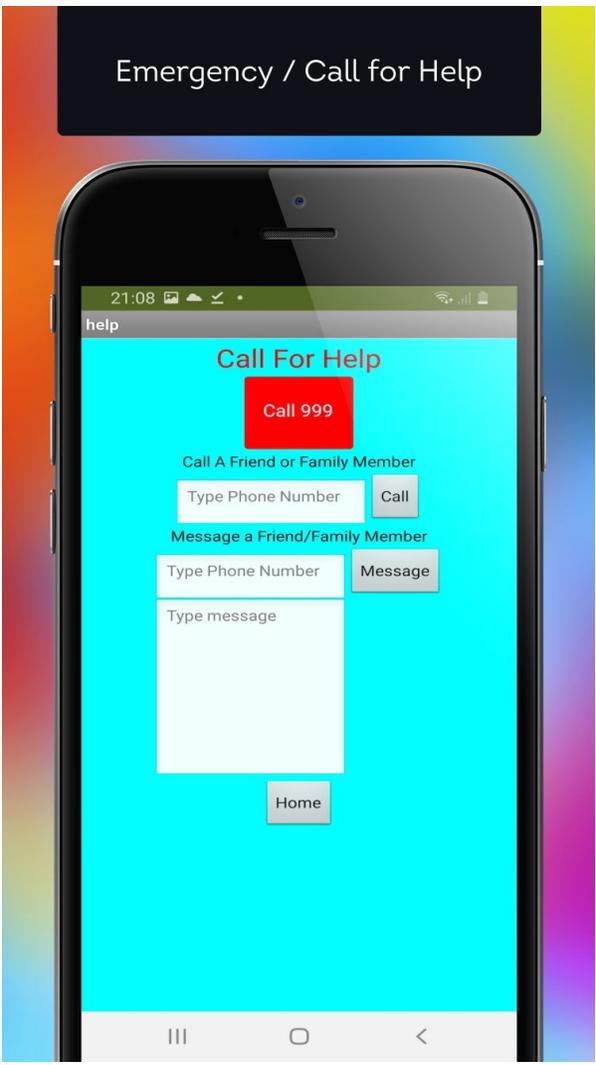
when Clock1.Timer
do set sec.Text to sec.Text + 1
if sec.Text = 59
then set sec.Text to 0
set min.Text to min.Text + 1
if min.Text = 59
then set min.Text to 0
set hr.Text to hr.Text + 1

when resetBtn Click
do set Clock1.TimerEnabled to false
set sec.Text to 0
set min.Text to 0
set hr.Text to 0

```

This screen is a timer. When you press start, the timer starts, when you press pause, the timer paused and when you press reset, the timer rests

Call for help/Emergency Screen



```

when Button4 .Click
do open another screen screenName " home "

when Button1 .Click
do call PhoneCall1 .MakePhoneCall

when Button2 .Click
do set PhoneCall2 . PhoneNumber to TextBox1 . Text
call PhoneCall2 .MakePhoneCallDirect

when Button3 .Click
do set Texting1 . PhoneNumber to no . Text
set Texting1 . Message to msg . Text
call Texting1 .SendMessage

```

This screen allows you to either call 999, call a friend or family member or message a friend/family member

Conclusions and Recommendations

After completing my background research and surveys, I was shocked to discover my hypothesis was more valid than I initially thought. Firstly, I believed that people knew more about sepsis than it proved. Teenagers my own age had very little concept as to what sepsis was and how serious it could be. Very little was known by my peer group of the signs and symptoms of sepsis and what to look out for in order to save our own lives (or someone we may be taking care of a younger sibling or sick parent/grandparent at home). When I extended the survey out to adults, I was further surprised by how little was known about sepsis and its dangers. Case studies were chilling in their findings and how hindsight could easily have saved lives.

This made the next part of my hypothesis to design a tool that would help educate people and hopefully save lives all the more important. I achieved an app that does that and am very pleased with the results. I have included screens for the most important factors that arose in the recognition of, identification of and education on signs and symptoms of sepsis. When my background research showed that the HSE education campaign had made a difference to people recognising sepsis in the past, it made me more determined to check if knowing these signs and symptoms now through the use of my app would make a difference. I questioned a sample group of my peers and a sample group of family members as to how they found the app and all agreed that it was clear from using it what the signs and symptoms of sepsis were, the importance of tracking the symptoms over time and the speed at which to seek help. I also had drs and nurses examine my app and their feedback was excellent saying how easy to follow it is and how they would love an app targeted at the medical field that would be as easy to use as this one. I would love to release the app and conduct a before and after survey with a wider spread of users to see the true impact that it could have.

The next stage I would like to develop for my app is to make another “connect” section that would connect two users of the app with one set of data. So for example I as a patient would have a monitor on me that I could connect to my app to read data but also that a doctor/paramedic or other medical professional would use to connect to their app giving important information like a temperature record, heart rate monitor and pulse oxygen levels. I think I got this idea from the drs and nurses who viewed my app for me and stated how they would like their own app - well the word connect in my app logo struck me there that there should be parity between the two apps. I’d like to build one for medical personnel to use as well but first, or next, I would like to build a wearable device that would monitor and have the capacity to store that information and it be readable as a graph for the medical personnel. This I think could be critical in the care of a patient with sepsis especially in the time critical phase of treatment taking and recording measures is very important and often currently requires one to one nursing care in an intensive care setting - with staff shortages a monitor like this would live read this data and if it could alert staff to dangers, it would be amazing.

Acknowledgements

I would like to thank the following people for helping me while I was doing my project

My Teen turn Mentors; Iseult and Atalliah

My teachers Stephanie Hogan and Paula Campbell

Dr Orla Tuohy

Dr Aidan Ryan

Nurse: Joanna Fahey

My family

Appendices

Further information on APPS I STUDIED:

Sepsis Clinical Guide



Sepsis Clinical Guide
Escavo Inc. Medical
★★★★★ 981
Everyone
Contains ads
This app is compatible with your device.
You can share this with your family. [Learn more about Family Library](#)
[Add to wishlist](#) [Install](#)



Sepsis Clinical Guide
A comprehensive sepsis treatment manual

Overview
Key Points in Sepsis Management
Evidence based guidelines

Diagnosis
In depth diagnostic and treatment information

Calculators
Key clinical calculators

Sepsis clinical guide was made for medical personnel, it features search, annotation, bookmarking functions and calculator support. All content is extensively referenced and footnoted where appropriate, and periodically updated. Clinical topics covered in the Sepsis app include:

- **The latest definitions and clinical guidelines** including Sepsis-3 and the 2016 Surviving Sepsis Campaign (SSC) guidelines
- **Epidemiology, risk factors** and pathophysiology of sepsis and septic shock
- **Common differentials and etiology**, guidelines on performing appropriate H&P and workups
- **Management of common causes** including hospital-acquired pneumonia (HAP), ventilator-acquired pneumonia (VAP) and intra-abdominal infections

- **Sepsis management bundles**, early goal-directed therapy, hemodynamic management, adjunctive therapies, mechanical ventilation of sepsis-induced ARDS, and other essential management guidelines from the SSC and the American Thoracic Society (ATS)
- **Antibiotic therapy** including specific guidelines for the treatment of HAP from ATS and the Infectious Diseases Society of America (IDSA)
- **Diagnosis and management of pediatric and neonatal sepsis** including the management of pediatric fever, important differences from management of sepsis in adults, management of sepsis-induced persistent pulmonary hypertension of the newborn (PPHN), empiric antibiotic treatment recommendations for GBS infections, interventions in pediatric septic shock, and other pediatric-specific information
- **Important calculators** including the Sequential Organ Failure Assessment (SOFA), quick-SOFA, APACHE II, Multiple Organ Dysfunction Score (MODS), the Simplified Acute Physiology Score (SAPS) II, the National Early Warning Score (NEWS), the Clinical Pulmonary Infection (CPI) score, the Inferior Vena Cava Collapsibility Index, and others
- **Drug administration information** including antibacterial and antifungal antibiotics, adrenergic and other vasoactive agents, corticosteroids and diuretics

Sepsis Timer (IOS)

Sepsis Timer again, is aimed at medical professionals in hospitals. The doctors/nurses simply start a timer when a patient is diagnosed with sepsis and the app lists the necessary treatment steps and alerts them to when these steps are due.



Sepsis Timer features include:

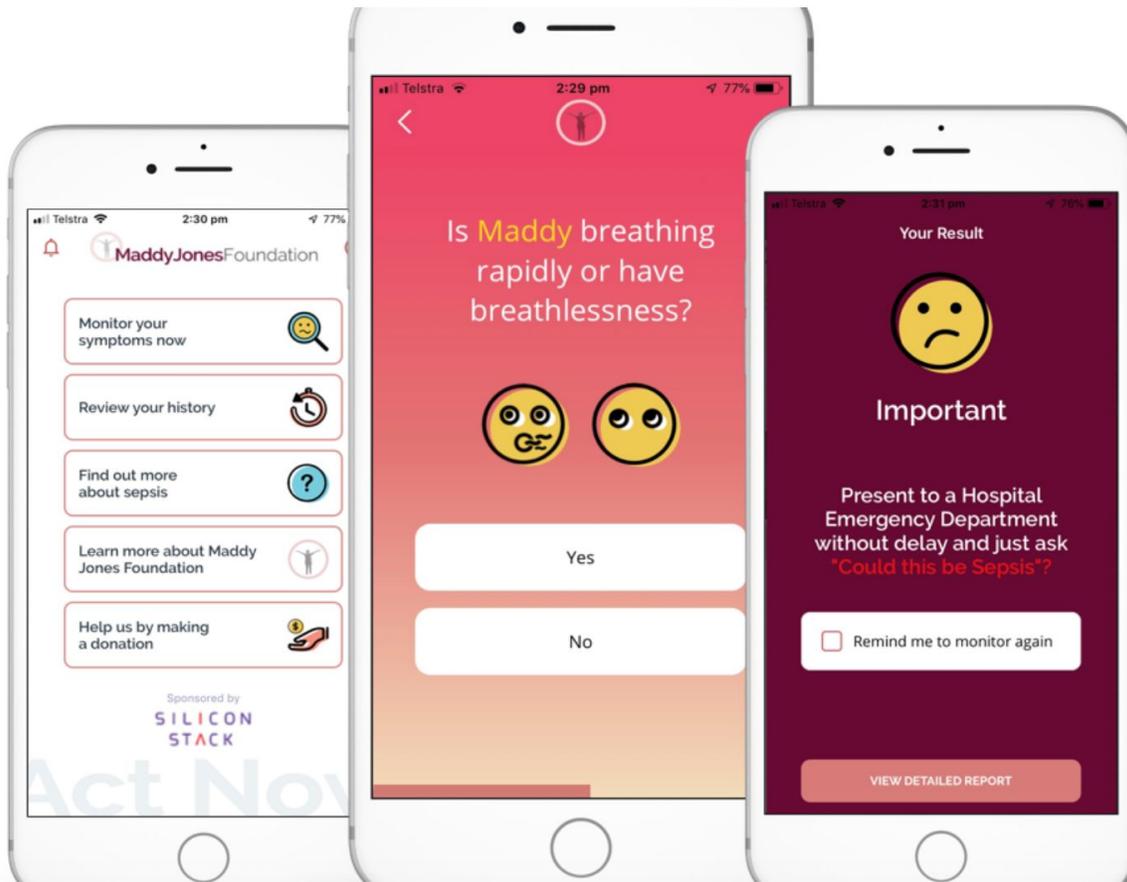
Compliance with SSC sepsis bundles, and IHI and CMS SEP-1 Core Measure sepsis treatment guidelines

- Simple and intuitive user interface
- Configurable alert options include periodic and snooze alerts with customizable sounds
- Response time tracking records time to completion of treatment steps and bundles
- Simple statistical report shows average response times for completed timers over time
- Thorough user manual and explanations for all treatment steps and app functions

Could this be sepsis app?

Could this be Sepsis App

by Damian | Oct 18, 2019 | Sepsis Awareness | 0 comments



Interviews:

Interview with the Maddy Jones foundation creators or the Could this be Sepsis app.

1. My initial email:

Hi there,

My name is Aoibheann Mangan, I am a 14 year old student who is undertaking a STEM project on Sepsis. I have decided to create an app based on the lack here in Ireland of apps for the general public to do with Sepsis and the prevalence of it and numbers who sadly die from it each year. All the apps in the background research of my project have been for doctors or hospital staff - yours was the first I came across which is like what I wish to create. Firstly my deepest sympathies on the loss of your daughter. Secondly well done to you for making such a legacy for her. As I am in Ireland, I cannot download the app to see what's in it. All I can see are the screenshots on your website. I was hoping if you wouldn't mind I could ask you a few questions? And I wonder if you would be able to send me some images of the content on your app.

1. What made you create this app?

2. Did you have medical input in the making of this app or is it all information sourced online?

3. Do you know how many people download and use your app?

4. Have you any success stories you could share from people who have benefited from your app?

5. Do you think that you would have looked for an app on sepsis when your daughter got sick?

6. Had you had the information how soon do you think you would have questioned the medical personnel on the possibility of sepsis?

7. What are the most critical parts of understanding sepsis as a parent?
8. Your app description says you can read and email your answers to the screening history test, do you know how many people use these?
9. It may be very different in Australia to here, but did you need to regularly state that nothing could replace a drs diagnosis and to go to hospital if you were in any way unsure?

Thank you for taking the time to answer my questions,

Aoibheann

References

Apps:

Could this be Sepsis - by the Maddy Jones Foundation.

Sepsis Clinical Guide - by Escado

Surviving Sepsis App by SCCM.

Papers and Reports:

The World Health Organisation GLOBAL REPORT ON THE EPIDEMIOLOGY AND BURDEN OF SEPSIS 2020.

<https://apps.who.int/iris/bitstream/handle/10665/334216/9789240010789-eng.pdf>

The HSE National Sepsis report 2018.

<https://www.hse.ie/eng/about/who/cspd/ncps/sepsis/resources/national-sepsis-report-2018.pdf>



Ohio University Mandated Emergency care in Sepsis report:
<https://ccme.osu.edu/ConferenceBrochure/1945-Ali%20-%20Mandated%20Emergency%20Department%20Care%20for%20Sepsis.pdf>

Leaflets:

<https://www.hse.ie/eng/about/who/cspd/ncps/sepsis/resources/patient-information-paediatric-leaflet.pdf>

What to do if you think your child might have sepsis ...

- Watch for early symptoms (see inside this leaflet)
- Get urgent medical assistance
- Call 999 or 112
- Go to your local GP (doctor) or your nearest Emergency Department

For further information on sepsis please visit www.hse.ie/sepsis

Childhood Infection

Don't be afraid to ask ...
Could this be sepsis?

Sepsis is the most common avoidable cause of death in children

Sepsis
Know the symptoms, save lives

What is sepsis?
Sepsis occurs in children when they get an infection and their immune system doesn't respond as it should. This abnormal immune response can damage their organs which can be life-threatening.

Who can it affect?
Sepsis can affect anyone but is more likely to occur in older people or very young children because their immune systems are weaker and it is important to watch for symptoms (see Symptoms on the next page).

How does a child get sepsis?
We can treat and resolve most infections but any infection could become sepsis. Children with existing medical conditions are most at risk of getting sepsis.

The most common infections in children are chest infections, urinary tract infections, urinary infections or infections after a recent surgery.

How can I help prevent sepsis?

- Talk to your doctor to make sure your child has had all the recommended vaccinations
- Keep any cuts or scratches clean and covered
- Keep general areas and your child's bed or cot clean

It can be hard to diagnose sepsis as its symptoms can vary and they can also seem like symptoms of less serious conditions.

Watch to see if your child has any of the following common symptoms of sepsis:

- Very fast breathing
- Having fits or convulsions
- Skin looks mottled (patchy, irregular colour), bluish or pale
- Has a rash that does not fade when you press it
- Is unusually sleepy and difficult to wake
- Feels unusually cold when you touch them

If your child is under 5, watch in particular if they are:

- not feeding
- vomiting repeatedly
- dry when you change them and have not had a wet nappy for the last 12 hours.

**If you see any of the above symptoms in your child, ask your doctor:
Could my child have sepsis?**

<https://www.hse.ie/eng/services/publications/clinical-strategy-and-programmes/patient-information-maternity-leaflet-sept-17.pdf>

What is SEPSIS?

Whilst most women do not suffer from infection or sepsis during or after pregnancy, sepsis, if it occurs, is best treated when recognised early.

Sepsis is a condition that is triggered by an infection that causes the different organs of the body to start to malfunction (see the sepsis checklist for symptoms and signs of malfunction).

These symptoms can be caused by other conditions too, so while sepsis can be suspected it requires a medical review and blood tests with other investigations to be confirmed.

How common is SEPSIS?

In 2015, there were 65,904 pregnancies in Ireland, of these 8,336 women were either admitted with infection or diagnosed with infection as an inpatient, that is 12 in every 100 pregnancies. Only 308 were diagnosed with sepsis, so the incidence of sepsis was 1 in 214 pregnancies.

Where are the common places to get infections?

- Genital tract (sexual organs)
- Urinary tract (kidneys & bladder)
- Respiratory system
- Skin
- Intra-abdominal
- Catheter/device-related (medical tubes, devices and materials)
- Meningitis/encephalitis (the brain and its lining)
- Bones/joints
- Unknown (sometimes the site of infection, even when successfully treated, is never found)



Tús Áite do Shábháilteacht 1 Othar
Patient Safety 1 First



Sepsis Checklist:

Early identification and treatment saves lives in SEPSIS. If your loved one has an infection do the following checklist.

Part of the body affected	Consider	Concerning behaviour
Brain	Are they acting themselves?	Are they excessively sleepy, difficult to wake? Altered mental status can range from new mild agitation or confusion all the way to a coma. Are they too sick to communicate?
Breathing	Is their breathing pattern very fast and laboured? Count over a minute if you can. If it is more than 30 tell the doctor or nurse.	Can they finish a sentence without a pause? Are their lips blue-tinged?
Circulation	Is their heart rate very fast or faster than usual? Count over one minute if you can. If it is more than 110 tell the doctor or nurse.	Is there good blood flow to their hands and feet or are they cold, clammy and pale? Do they get very dizzy when they try and stand or even sit up?
Kidney	Have they passed urine in the past 12 hours?	Do they need to go? If they have passed urine was it a normal colour or very dark and only a dribble. Are they too sick to tell you? (Review brain)
Clotting	Do they have a new rash that does not disappear when pressed on by your finger or when a glass is rolled over it?	Use the glass test. If the red rash does not disappear when pressed on tell your doctor or nurse
Functional status	Do they have a change in behaviour? In some people with intellectual and/or physical disabilities it can be difficult to assess their wellbeing if you do not know them well.	Are they themselves? Are they performing all of their usual tasks? Is there anything in particular that is different from usual?
Exposure	Has anyone else been very sick recently with similar symptoms?	Has your loved one had a recent operation or infection or have they had a multi-resistant bug or recent travel? Has a household contact been sick recently?

What to do

If your loved one has an infection that is getting worse, look for the signs of sepsis and do the checklist.

If they have any of the signs or you are worried they are getting worse seek urgent medical assistance (GP, Maternity Unit, Local Emergency Department). Report the features that are abnormal from your checklist and ask.

COULD THIS BE SEPSIS?

www.mchisgpi.ie

<https://www.hse.ie/eng/services/publications/clinical-strategy-and-programmes/patient-information-adult-leaflet.pdf>

Sepsis Information Leaflet

Sepsis is a life-threatening condition triggered by infection that affects the function of the organs. It is treated most effectively if recognised early.

Signs & symptoms of infection:

Infections are often suspected when a person develops a temperature and feels unwell.

A high temperature is > 38°C. A low temperature, ≤ 35.5°C, is also of concern but do check your technique.

Watch out for loved ones who have taken paracetamol as while it may lower the temperature it does not treat any underlying infection. Look for the other signs and symptoms of infection listed in the table.

Rigors	These are involuntary movements of the body that look a bit like seizures but are not associated with loss of consciousness. Rigors occur when the body temperature rapidly changes.
'Flu-like' illness	Many infections present with non-specific signs and symptoms including a high temperature, aches and pains, severe fatigue, and loss of appetite.
Respiratory Tract infection	Cough/green sputum and/or breathlessness
Intra-abdominal infection	Unexplained abdominal pain/distension associated with some 'flu-like' symptoms
Womb infection	Lower abdominal pain/discomfort that is constant, with or without unpleasant discharge and some 'flu-like' symptoms
Septicaemia or blood poisoning	Feeling very unwell often with vomiting and/or diarrhea and/or some 'flu-like' symptoms. Agitation and/or confusion are often present particularly in the older person. Young adults often complain of severe leg pain and are unable to stand or walk properly.
Cellulitis/skin or wound infection	Painful, red, and swollen skin. The affected area is hot to touch compared with unaffected areas. There may or may not be pus. Recent onset exquisitely painful skin that does not look infected but is associated with feeling unwell often with vomiting and diarrhea and 'flu-like' symptoms needs to be urgently investigated.
Meningitis	Severe headache, neck stiffness, intolerance of bright lights. This may or may not be associated with a rash. Acute confusion or agitation may also occur.
Urinary tract infection	New onset frequent passing of small amounts of urine associated with burning discomfort. Flank pain may also occur.



Sepsis Checklist:

Early identification and treatment saves lives in SEPSIS.

If your loved one has an infection or you suspect one, do the following checklist. If any one is newly abnormal and it is due to infection it could be sepsis.

Part of the body affected	Consider	Concerning behaviour
Brain	Are they acting themselves?	Are they excessively sleepy, difficult to wake? Altered mental status can range from new mild agitation or confusion all the way to a coma. Are they too sick to communicate?
Breathing	Is their breathing pattern very fast and labored? Count over a minute if you can. If it is more than 30 tell the doctor or nurse.	Can they finish a sentence without a pause? Are their lips blue-tinged?
Circulation	Is their heart rate very fast or faster than usual? Count over one minute if you can. If it is more than 110 tell the doctor or nurse.	Is there good blood flow to their hands and feet or are they cold, clammy and pale? Do they get very dizzy when they try and stand or even sit up?
Kidney	Have they passed urine in the past 12 hours?	Do they need to go? If they have passed urine was it a normal colour or very dark and only a dribble. Are they too sick to tell you? (Review brain)
Clotting	Do they have a new rash that does not disappear when pressed on by your finger or when a glass is rolled over it?	Use the glass test. If the red rash does not disappear when pressed on tell your doctor or nurse
Functional status	Do they have a change in behavior? In some people with intellectual and/or physical disabilities it can be difficult to assess their wellbeing if you do not know them well.	Are they themselves? Are they performing all of their usual tasks? Is there anything in particular that is different from usual?
Exposure	Has anyone else been very sick recently with similar symptoms?	Has your loved one had a recent operation or infection or have they had a multi-resistant bug or recent travel? Has a household contact been sick recently?

What to do

If signs of organ abnormality is present, even if the temperature is improved, **seek urgent medical review** (GP, GP out of hours or Local Emergency Department). Inform healthcare professionals what treatment, has been given and let them what's new from your checklist.

Ask COULD THIS BE SEPSIS?

www.mchshq.org.au

Websites:

End Sepsis - The Legacy of Rory Staunton

<https://www.endsepsis.org/>

The Maddy Jones Foundation Australia -

<https://maddyjonesfoundation.com.au/>

The World Health Organisation Sepsis

<https://www.who.int/news-room/fact-sheets/detail/sepsis>