Problems to be solved

#1: Early infectious disease detection in residential aged care facilities (floor 2)

Problem owner: David Stretch, Telstra Health

Sector / subject area: Aged care

What is the problem?

COVID-19 is an obvious current example of infectious disease spreading rapidly within residential aged care facilities with serious health risks to residents. Influenza is a similar infectious disease that poses ongoing risks to residents of residential facilities.

We want to be able to detect early symptoms of infectious disease within the facility for prompt action in a way that doesn't impose more workload on already busy staff and is safe for both staff and residents.

Additional resource.

Why do you want to solve this problem? What are some benefits it would have?

Improved health outcomes and improved quality of life for residents. Catching something like a COVID-19 outbreak in an aged care facility early is the difference between bad and horrific outcomes

Staff are already pushed to the limit and easing the burden placed on them will not only improve the level of care they can provide to residents but will also improve their own physical and mental health.

What do you envision as the ideal solution for this problem?

The ability for a resident to take clinical reading themselves and submit these readings for review may assist.

Machine learning / statistical methods may be able to provide a "second set of eyes on the observations". More info here.

There are likely to be other benefits gained outside the focus on infectious disease through regular health surveillance of the residents. (e.g. anomaly detection)

Some alternative methods of monitoring the residents for infectious disease, include, for example:

- Thermal cameras
- Changes in voice tone / sleeping sounds.

#2: Assessing infectious disease (e.g. COVID-19) threat levels to aged care facilities (floor 2)

Problem owner: David Stretch, Telstra Health

Sector / subject area: Aged care, infectious disease

What is the problem?

COVID-19 is an obvious current example of infectious disease spreading rapidly within residential aged care facilities with serious health risks to residents. Influenza is a similar infectious disease that poses ongoing risks to residents of residential facilities.

We want to be able to determine if an aged care facility is at an increased risk of seeing an outbreak by using data on the surrounding infection rates and the exposure risk of staff and visitors to infection.

Additional resource.

Why do you want to solve this problem? What are some benefits it would have?

We know that an outbreak of any infectious disease causes severe outcomes for the residents, whether it be direct infection of residents or the decreased care brought about by staff being absent with illness.

There are major benefits to stopping outbreaks before they happen WITHOUT having to have every care facility go into high alert once an outbreak is declared in a state/country.

What do you envision as the ideal solution for this problem?

Maybe a machine learning model based on publicly available prevalence of disease within the surrounding community to allow suitable infection control mechanisms to be used.

- More info here.
- More info here.

Another idea: anonymous data collection from staff and visitors to ascertain threat level based on regions outside of the one surrounding the facility and build this into the predictions.

#3: Post-consultation patient summaries (floor 3)

Problem owner: Ross Hadfield, WeKo

Sector / subject area: GP and specialist clinics – patient doctor consultations

What is the problem?

After leaving a medical consultation, I often forget or have misunderstood what my doctor has said and recommended I do for my healthcare.

In a perfect world, a doctor would spend 10 minutes at the end of each appointment writing out a summary of everything they had spoken to the patient about. Or the entire consultation would be recorded and made available to the patient afterwards (like you would a presentation at a conference).

We do not live in that perfect world as there are real time and security issues standing in the way.

Why do you want to solve this problem? What are some benefits it would have?

As a patient you often are receiving quite detailed and complex information from your doctor that you do not want to forget once you've arrived home.

It is a massive problem globally, and with an aging population, it is only going to grow. As a doctor, you often don't have a lot of time with each patient (especially in the case of GPs) and you want to make sure that the information you've given your patient is able to be retained after the appointment.

Increasing transparency will reduce miscommunication and misunderstanding during medical consultations leading to better outcomes.

What do you envision as the ideal solution for this problem?

Effective information capture is a solved problem in other industries with well-known technologies. Potential solutions we have considered are:

- Natural Language Processing from audio recordings e.g. Microsoft voice to text services
- Integrating existing appointment and patient history to construct a template that a doctor could add to, e.g. Telstra Health practice management systems
- Algorithms to enable smart pre-fills/ predictive text based on existing patient information to speed up doctor note taking
- SMS services for notes delivery, e.g. Telstra Messaging API

#4: MedBook (floor 4)

Problem owner: Dr Shahed Kamal

Sector / subject area: Hospitals, communication tools

What is the problem?

Due to the restrictions COVID-19 has placed on people being able to visit their family members in hospital we've seen a dramatic surge in the amount of time hospital staff are spending fielding phone calls for updates about patients. For those patients who don't have access to other communication methods (e.g. own smartphone) visits were the only way their family members could check in on them. Calling the ward is now the only option left for many people and that is placing huge time demands on staff who were already time poor to begin with.

On the other hand, it can be difficult for anxiety-stricken families of patients admitted in the hospital to receive regular updates, especially with the introduction of restricted visiting hours.

Why do you want to solve this problem? What are some benefits it would have?

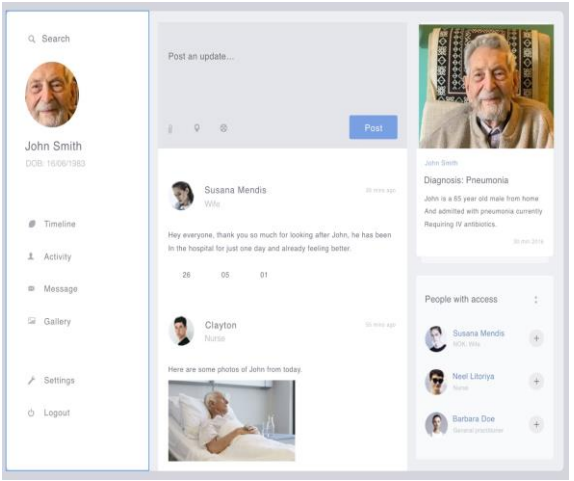
While working as a junior doctor, I have seen family members constantly calling the wards for updates about their loved ones. I also observe the amount of pressure this creates for the hospital staff. I believe having a platform that enables the staff to given regular update at a timely manner to family members, will make the experience better for both parties, by reducing the energy and time spent on the communication.

The information that family members receive as visitor isn't actually sensitive nor are family member looking for detailed medical information when they call up to check in on a patient. The information they are looking for is more of a general status update. For that reason I think it's actually not a hard problem to solve as the security aspects are quite minimal.

Whilst COVID-19 has brought this problem into sharp focus, the ability for family members to check up on patients in hospital has been a long standing issue and will continue to be so after COVID-19 has passed. There is undoubtedly an unrecognised demand from friends and family to be able to check in on patients with more frequency than they are currently able to.

What do you envision as the ideal solution for this problem?

A social media like web and mobile platform which provides a patient profile and feed with the patients progress and updates during the hospital stay. A secure feed with access to the patient, their chosen family member and healthcare staff looking after the patient. The feed will include non-medical updates and include a feature of requesting medical update from the medical team when the patient or the family members wishes for one. Below is a preliminary design of how I envision the patient feed.



#5: Caredevo – Chain of Care (floor 5)

Problem owner: Dr Reno Riandito, MD

Sector / subject area: Primary care, patient-centred medical home, Collaborative care and community aged care

What is the problem?

As a GP, we are still chasing and being chased for documents by other service providers, e.g. specialists, allied health, pharmacists, etc. Document sharing is still manual. Service to patient is delayed and disturbed due to data discrepancy. Some services, e.g. Emergency Department, ambulance service, and after-hour service do not have access to a patient's current health information.

In summary, the issue is information silos and different service providers have different sets of patient data.

Why do you want to solve this problem? What are some benefits it would have?

Patients with complex care needs – e.g. elderly living in community – rely heavily on their GP and Aged Care Service Provider. They do not access electronic health records. Therefore, the GP needs to work as a team with other service providers: the Aged Care Service Provider, allied health, specialists, community pharmacist, hospital, ambulance service, palliative care team, psychologist, district nurse service, etc.

Data synchronization between services is needed, to ensure continuity of care and unity of service. Data sharing also needs to meet privacy requirements for the patient.

What do you envision as the ideal solution for this problem?

Private Permissioned Blockchain with patient, GP and other health service providers connected to create a private network and share the same documents related to the patient's health. Any updated documents will be shared within this network only. Private data within the document can only be seen by selected professionals with patient permission. Acute care service has access to patient information as well, only within a specified time frame. Patients get to set and view who has access to their medical information.

#6: Optimising care and planning in aged care – an IOT solution (floor 6)

Problem owner: Nitha Prakash, Psych Press

Sector / subject area: Aged care

What is the problem?

Within aged care we are seeing an expansion of the deployment of smart devices (wearables, room-based monitoring systems, etc.) to help monitor patients. Individually these devices are good, but we do not yet have good ways of making individual or combined data streams available to healthcare staff in order to improve the quality of care that patients receive. We would like to use this data to improve the standard of care, which dramatically increase the rollout of smart devices to aged care as people would see the clear benefits of doing so. The technology is available and affordable, we just need the right incentives to see its uptake increase.

Why do you want to solve this problem? What are some benefits it would have?

Triangulating data like this will provide useful real-time information that can help all health professionals and agencies that are interacting with elderly clients. It's also a means in which family can help plan care and engage with data in a meaningful way. It will empower government and other health agencies and providers to also map availability of services based on need.

What do you envision as the ideal solution for this problem?

Creating an app that integrates data from all wearables and smart devices that exist in an aged care client home and tabulates data to then triangulate with healthcare worker data to start running prediction models. This would provide alerts to the patient, family, health care professionals and any third party service providers to assist in care planning.

#7: Improving skin lesion diagnosis (floor 7)

Problem owner: Ivan Chua, Lecturer in Emerging Technologies

Sector / subject area: Dermatology, skin cancer clinics and skin cancer research

What is the problem?

Existing methods for skin lesion analysis are either invasive or not accurate due to the complexity and variability of skin lesions.

Why do you want to solve this problem? What are some benefits it would have?

This project could potentially improve the diagnosis confidence and accuracy for the dermatologists by providing a second opinion and indicating the malignancy and the changes over time. This project will also potentially increase clinical efficiency, improve patient awareness and provide a cost-effective solution for Australia.

What do you envision as the ideal solution for this problem?

We will leverage state-of-the-art artificial intelligence techniques on ~10,000 pathology confirmed skin lesion images to progressively learn the most important visual characteristics for identifying melanoma and segmenting the skin lesions (for tracking changes over time).


#H4DH