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# MONASH HEALTHCARE INNOVATION SUMMER SCHOLARSHIPS

## Project EBoard



**Monash Partners**  
Academic Health Science Centre



**MONASH  
YOUNG  
MEDTECH  
INNOVATORS**

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# Executive Summary

Hospital medical teams in Australia are becoming increasingly overwhelmed and burdened - a consequence of increased workload and resource scarcity.

Currently, clinicians and nurses rely on static whiteboards or two-way verbal communication to update patients on their schedule and preemptively answer questions patients may have. However, time constraints and the inability to locate a whiteboard marker poses an inconvenience for already busy treating teams - resulting in whiteboards in the emergency department being either empty or incomplete. Creating a system that can automatically present information to patients, without the need for clinicians to be present, may play a role in improving workplace cohesiveness and patient satisfaction.

Project EBoard aims to create a patient journey QR code system, drawing health information from the EMR and displaying this on a secure webpage, to improve communication of information between clinicians and patients in the emergency department. A QR code system will increase the efficiency of communication between patients and clinicians without the need for clinicians to manually input relevant information onto these static whiteboard, updating patients regularly with relevant information about their schedule and clinical goals.

## Acceptance Criteria

1. **Improves patient satisfaction**, given that patients will be **better informed** of their stay in the hospital;
2. **Improves clinician satisfaction**, both as a byproduct of patient satisfaction increasing and **workflow cohesiveness** improving;
3. Indirectly **reduces expenses** for hospitals, given that sound doctor-patient communication can lead to **less medical errors**, which can **incur a cost** for hospitals.

# Gaps Analysis

## Gold Standard

When a patient is admitted to a hospital, their medical history is taken by the clinician - this information is then stored on the EMR. Further information may then be added to the EMR, including the treatment plan and clinical goals for the patient. The most commonly used method of communication with patients is two-way communication, but important pieces of information may be stored on a whiteboard if information communication is incomplete or forgotten. The nurse locates a whiteboard marker and they may write on the whiteboard (a hardware product) key points such as patient's name and/or dietary requirements and/or staff member names. If the patient is discharged or moves rooms, the whiteboard is updated by erasing notes (using a hand, tissue or eraser).

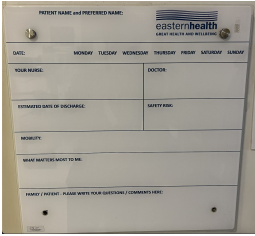
The primary **pain points** in this workflow include:

- The inconvenience of locating a whiteboard marker
- The inconvenience of manually writing information onto the whiteboard
- The inconvenience of updating the whiteboard with new information once the patient moves rooms or is discharged

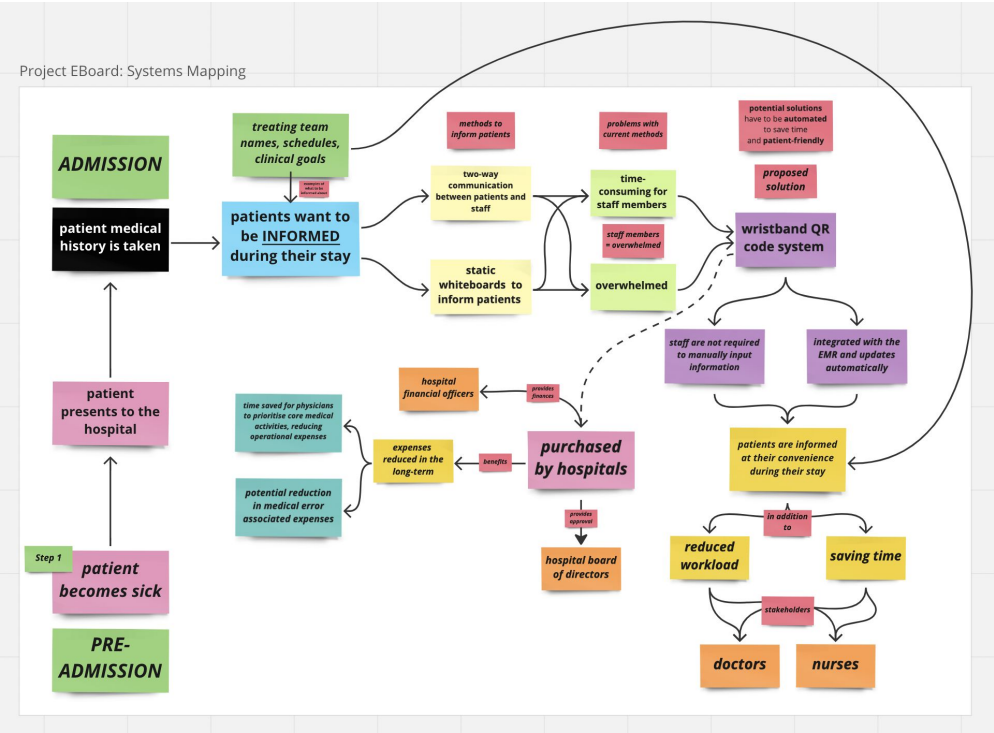
These pain points support the need for novel alternative solutions.

# Gaps Analysis

## Existing Solutions Analysis

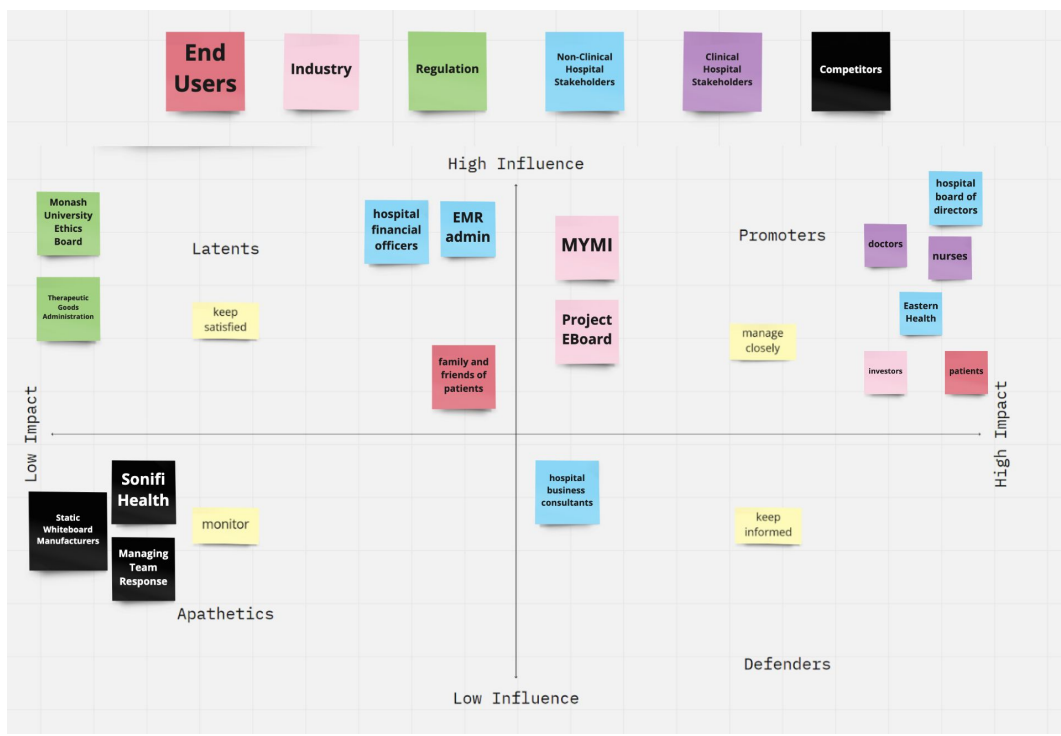
| Solution                                                                                                                     | Overview                                                                                                                                                                                                                                                                           | Solution Alignment                                                                                                                                                                                                                                                                                                                                                                                                                                | Gaps In Solution                                                                                                                                                                                                                                                                                                                                                                                              |
|------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Static Whiteboards With Divisions</b>    | <p>These static whiteboards can act as a source of pertinent information for staff and patients. Staff can benefit from knowing dietary requirements and the patient's name, whereas patients can benefit from knowing the treating team's names and their treatment goals.</p>    | <p>This is a relatively easy and straightforward way to communicate pieces of information to other clinicians and patients; however, it often only contains <b>key words</b> as opposed to large pieces of information.</p> <p>They are also a cheap solution given that the whiteboards can be repeatedly used (by simply erasing previous information); meaning they don't need to be continually purchased and replaced.</p>                   | <ul style="list-style-type: none"> <li>* Whiteboards are required to be erased of previous information and constantly updated given the unpredictable nature of the ED where room changes are continuous.</li> <li>* It may be exhausting and inconvenient for ED staff to manually input information onto these static whiteboards whilst also balancing the strenuous environment of an ED ward.</li> </ul> |
| <b>Managing Team Response Whiteboard</b>  | <p>An electronic patient room whiteboard that digitally displays important information for clinicians and patients in the ED ward. This whiteboard can connect to existing hospital EMR's (electronic medical records) for easy communication between clinicians and patients.</p> | <p>This whiteboard aligns with both the goals of clinicians and patients - patients can be aware of who their treating team is and their goals, whereas the treating team can be aware of any dietary requirements (or restrictions) as well as their clinical timeline.</p> <p>Furthermore, ED staff do not have to manually input this information on a whiteboard - instead, this information is drawn from the electronic medical record.</p> | <ul style="list-style-type: none"> <li>* There is no way for patients to interact with the digital whiteboard (such as through the use of scannable QR codes or forms to ask questions)</li> <li>* there is no reason for admission, which could be important in cases of medical emergencies where medical records are not on hand</li> </ul>                                                                |
| <b>Sonifi Health's Whiteboard</b>         | <p>Along with QR codes for patients and clinicians to access the particular patient's medical charts.</p>                                                                                                                                                                          | <p>This solution aligns well with the unique needs of patients who may want the treating team to better know the patient personally (such that the patient is treated and not their disease) - this is found in the "My Story" section and the "preferred name" section. The whiteboard is interactive, with the addition of scannable QR codes for patients to access their medical charts (lab test values).</p>                                | <ul style="list-style-type: none"> <li>* there is no reason for admission, which could be important in cases of medical emergencies where medical records are not on hand</li> </ul>                                                                                                                                                                                                                          |

# Systems Map



**Figure 1:** A systems map displaying the clinical problem, the current gold standard and the QR code system as a potential solution.

# Stakeholder Map



**Figure 2: Stakeholder Map**  
This stakeholder analysis map highlights the range of stakeholders and the position they have involving the influence they have (either directly or indirectly) on Project EBoard. The six major stakeholder categories include: end users, industry, regulation, non-clinical hospital stakeholders and competitors. The most significant stakeholder in this stakeholder map are patients, given that they are the primary end user of the QR code solution.

# Outcomes of Qualitative and Quantitative Research

Interviews were conducted with patients, clinicians and nurses at Boxhill Hospital - the primary stakeholders who will be impacted by the proposed wristband QR code solution.

The responses to questions asked during the interview varied - of particular note, patients who were recently admitted to the hospital or who were admitted to the hospital for the first-time were most likely to see merit in having more access to their EMR information (regardless of the method of displaying this information). However, patients who have been admitted to the hospital multiple times or were close to being discharged from the hospital were not interested in knowing about the medical notes stored on the EMR.

Two possible conclusions can be drawn from these findings, including:

- Patients whose health is compromised are more likely to appreciate their EMR information (a patient who is just admitted to hospital is likely to have a 'better' health status compared to those that are about to be discharged);
- Patients who have been admitted to hospitals multiple times perhaps have a greater understanding of expectations regarding hospital experience and so may have greater 'trust' in the level of care the hospital system will provide.

Studies have been conducted to assess the usefulness of electronic whiteboard systems in the surgical operating room, which concluded this novel solution can play a role in improving pre-incision safety standards [1].

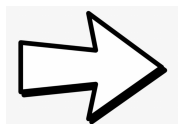
Another study, investigating the usefulness of static whiteboards, found that the use of whiteboards meant patients were better informed [2] of who their treating team was and their clinical goals - leading to improved patient satisfaction [2]. However, given that the whiteboards were compulsory to use as part of the 3 week study, this perhaps suggests that the benefits of static whiteboards may be seen through a hospital-wide cultural shift in adopting whiteboards - which may be infeasible in most healthcare settings.

# Solution Concept Discussion

## - Top 3

### **1. QR CODE SYSTEM**

The first solution is a patient wristband with a QR code that, upon scanning with a mobile phone, can be used to view a patient's key information. This information includes: patient admission and discharge date, today's schedule, medications timetable and notes regarding allergies or dietary restrictions. QR code solutions, generally, are relatively simple to create and are inexpensive. Any major expenses would be from the web application or the API developed that is connected to the EMR.



### **2. DIGITAL PORTABLE TABLET**

The second solution is a digital portable tablet solution that displays the patient's EMR information. This is a screen-based solution, with the tablets being situated by the bedside. From a financial point of view, the primary expenses for this solution would come from the purchasing of tablets (such as iPads) - this could pose quite expensive for hospitals; however, given this would likely be a large one-off purchase, the expenses may pay for themselves with the costs saved in the long-term.

### **3. MOBILE PHONE APPLICATION**

The third solution is a mobile phone application that connects to the hospital EMR. Patients can use this app to access their EMR and health data, using a passcode system. This would be similar to the MyGov Health Record system, but as a downloadable application to be used on mobile phones.

# Final Concept

The final concept will be a **patient wristband QR code system**. This wristband will be a different colour to the normal wristbands given to patients (for example, a distinctive yellow colour).



This QR code, upon scanning with a phone, will lead patients to a web application that displays their particular health information (stored on the EMR). An example of what this application may look like is below:



There are no particular patentable features - the code used to develop the API and web app can perhaps be a trade secret as opposed to a patentable invention.

This solution would not be considered a medical device. Therefore, a regulatory strategy would not need to be considered. However, consulting with a regulatory consultant would be useful to determine if any form of regulation may be required.

# Business Model

The proposed business model is a subscription-based model, whereby hospitals will be charged a yearly fee to use the QR code system. If the product is only being used in certain hospital departments, perhaps the payment for these products will come out of the hospital budget.

Since this solution is not a medical device, there is no reimbursement strategy or Medicare code to consider. From an economic point of view, this is advantageous as the process of going through strict and vigorous regulation is not necessary - allowing for a greater focus on product development and market penetration, compared to

Depending on the success of this product (and whether future products will be developed), there are two exit strategies which may be undertaken:

1. The business is taken publicly (the business becomes a public listed company)
2. The product is sold to a competitor or larger health tech organisation who wants to enter the digital patient experience space.

The initial market penetration strategy would be to first work with Eastern Health (specifically Box Hill Hospital) to trial this product, assess its efficacy and improve its functionality. From there, the data and feedback gathered at the initial trial in Box Hill Hospital can be used to trial and expand the product at other hospital sites.

The most important risks to take into account are those around patient confidentiality - that having a digital method of viewing patient health documentation may pose intrusive to patient confidentiality, resulting in legal (and consequent financial) ramifications for hospital systems.

The de-risking strategy that would be imposed at the beginning of product development would be to outline all possible legal considerations and build the product with these legal considerations in mind.

# Market Analysis

There were 1350 hospitals in Australia in 2017 (693 public hospitals and 657 private hospitals) [3]. If hospitals are charged \$10,000 / year to use this service, this provides a total addressable market of: \$13,500,000 / year.

Within the hospital system, there are varying speciality departments (for example, the emergency department, urology department, gynaecology department and cardiology department). These departments can be thought of as the major market segmentations, with particular departments perhaps finding more value in a patient QR code system compared to others. Initially, the emergency departments are being targeted - given that patients in the ED are less likely to be informed about their stay given its overwhelming and fast-paced nature. There is potential for this market to be expanded from a hospital setting to local GP clinics as a way for patients to track waiting times before they can be seen.

There are several market forces that are important to consider. For example, hospitals are likely to have a high amount of bargaining power to negotiate an appropriate price for themselves - particularly initial hospitals trialling out the patient QR code system. Another market force is the presence of competitors - the primary competitors within the market include those companies that have built digital whiteboard screen solutions as a means of tracking a patient's hospital journey (as opposed to a digital wristband solution). These include Sonifi Health and Managing Team.

# Proposed KPIs

| Patient Experience                                                                                                           |     |     |
|------------------------------------------------------------------------------------------------------------------------------|-----|-----|
| Victorian Healthcare Experience Survey – percentage of positive patient experience responses                                 | 95% | 95% |
| Percentage of mental health consumers reporting a 'very good' or 'excellent' experience of care in the last 3 months or less | 80% | 94% |
| Percentage of mental health consumers reporting they 'usually' or 'always' felt safe using this service                      | 90% | 92% |

**Figure 3: Relevant Eastern Health KPI’s for Project EBoard (specifically, the patient experience survey)**

Given that the primary objective of a digital patient journey display is to improve patient experiences in the hospital setting, the following KPI (for Eastern Health) would be the most relevant to consider:

**“Victorian Healthcare Experience Survey – percentage of positive patient experience responses”**

Therefore, a subscription-based product, which caters to patients, fits with Eastern Health’s KPI’s.

Furthermore, there is potential scope for this solution to play a minor role in cost reduction and patient safety - as patient safety can be improved if communication between clinicians and patients is improved and this, as a byproduct, can indirectly reduce healthcare costs associated with medical misdiagnosis.

# Ask and Next Steps



**Dr Paul Buntine**

Dr Buntine is the Director of Emergency Medicine and a practising Emergency Medicine physician at Boxhill Hospital.



**Sahil Bhatia**

Sahil is a current fourth year medical student at Monash University.

Project EBoard has two primary asks:

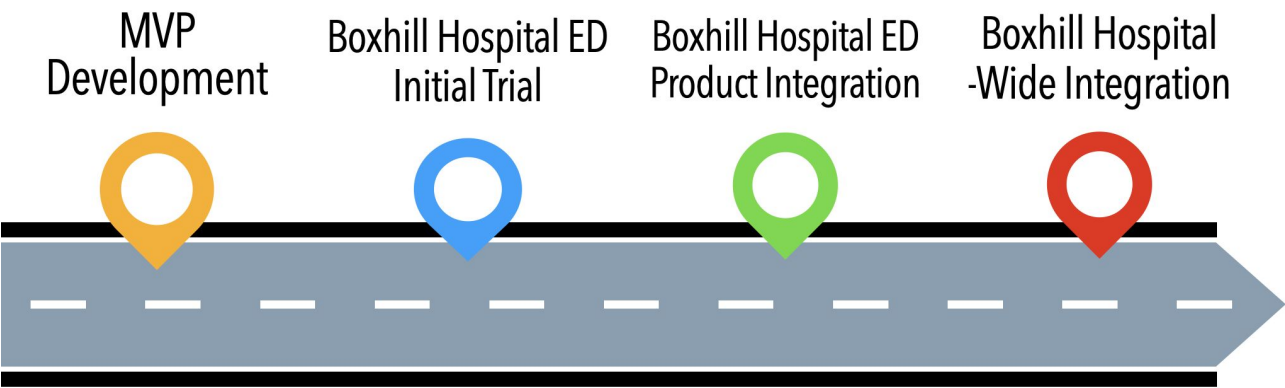
- (1) introductions to medicolegal experts, who may be able to provide greater insight into the feasibility of a digital QR code system which allows patients to directly access EMR data.
- (2) introductions to EMR specialists, who may be able to offer guidance on best practices to achieve this solution.

# Timeline

**Key milestones** in the development of this QR code patient journey system include:

- conducting a plethora of **interviews** with patients at Boxhill Hospital to determine the information that patients want to be informed on most;
- developing an **API**, linked to Boxhill Hospital’s EMR system;
- trialling the QR code system in the ED short stay unit;
- **refining** the product based on the initial trial data and results collected.

Below is a rough timeline displaying the steps leading from MVP development and initial research to hospital-wide integration.



# References

- [1] Mainthia BS et al. Novel use of electronic whiteboard in the operating room increases surgical team compliance with pre-incision safety practices [Internet]. Surgery, vol 115, issue 5. Available from: <https://www.sciencedirect.com/science/article/pii/S0039606011006878>
- [2] Tan M, Evans KH, Braddock CH, Shieh L. Patient whiteboards to improve patient-centred care in the hospital [Internet]. Stanford University. BMJ Publishing. [cited 12 Jan 2023]. Available from: <https://pmj.bmj.com/content/89/1056/604.short>.
- [3] Australian Institute of Health and Welfare. Hospital resources 2017–18: Australian hospital statistics [Internet]. Canberra: Australian Institute of Health and Welfare, 2019 [cited 2023 Jan. 15]. Available from: <https://www.aihw.gov.au/reports/hospitals/hospital-resources-2017-18-ahs>