

CYFARFOD BWRDD PRIFYSGOL IECHYD UNIVERSITY HEALTH BOARD MEETING

DYDDIAD Y CYFARFOD: DATE OF MEETING:	30 March 2023
TEITL YR ADRODDIAD: TITLE OF REPORT:	Electronic Patient Flow and Electronic Observations Outline Business Case
CYFARWYDDWR ARWEINIOL: LEAD DIRECTOR:	Huw Thomas, Executive Director of Finance
SWYDDOG ADRODD: REPORTING OFFICER:	Rhian Matthews, Senior Responsible Owner (SRO), Transforming Urgent & Emergency Care Anthony Tracey, Digital Director

Pwrpas yr Adroddiad (dewiswch fel yn addas)

Purpose of the Report (select as appropriate)

Ar Gyfer Penderfyniad/For Decision

ADRODDIAD SCAA SBAR REPORT

Sefyllfa / Situation

The purpose of this paper is to introduce the Outline Business Case (OBC) for investment in an Electronic Observations (eObs) and a Patient Flow system for Hywel Dda University Health Board (HDdUHB). The aim of the business case (Attachment 1) is to articulate the strategic rationale for the programme, outline its scope and breadth, and provide an indication of the likely benefits and costs associated with delivery. The document has been prepared in accordance with HM Treasury Green Book guidance for the five-case model.

In summary:

- Current processes and digital solutions within the Health Board are not optimised for patient flow, with an over reliance on paper systems
- There is no electronic observations system available which could add value to the implementation of the Welsh Nurse Care Record
- Optimising patient flow management can help best utilise limited resources
- The adoption of an eObs and Patient Flow system aligns with the strategic direction of the Health Board and progresses the digital maturity towards our aim of Healthcare Information and Management Systems Society (HIMMS) Level 5
- Progresses the Transforming Urgent & Emergency Care agenda, supporting handover, patient flow and discharge management

Cefndir / Background

Patient flow is the movement of patients through a healthcare facility, which involves the medical care, physical resources and internal systems needed from admission to discharge¹. When patient flow is not well managed in hospitals, this is associated with long wait-times and

¹ <https://catalyst.nejm.org/doi/full/10.1056/CAT.18.0289>

overcrowding in A&E, as well as inefficient scheduling in surgical departments. Poorly managed patient flow can lead to adverse health outcomes, including increased re-admissions and mortality rates². Optimising patient flow management can help best utilise limited resources, ensure patients move through care pathways efficiently, and reduce the length of hospital stays.

eObs technologies can automatically capture and analyse patients' vital signs and notify clinicians when required. This automation of routine tasks can free up time to enable better patient care, increase accuracy in capture and transmission of information and improve decision-making. Patient flow technologies encompass a range of functionality to help with better patient flow, including patient handover, bed capacity management and task management. More streamlined patient flow results in reduced wait-times, an improved staff and patient experience, and increased patient safety.

Current processes in HDdUHB are not optimised, as most of the information is recorded manually on paper records, and communication channels are slow and time-consuming (e.g. phone calls). Some digital systems have been introduced in previous years, but feedback suggests that information remains 'siloes', and staff do not feel that they can access the correct information easily and in a timely manner when they need it. This poses a significant risk to patient safety. This combined with ongoing workforce challenges makes it even more crucial to increase efficiencies, so that limited resources are utilised in the best way.

The deployment of new technologies to support patient observations and patient flow aligns with the strategic goals of the Health Board, both locally and nationally. It focuses on improvements towards a more digitally mature healthcare system in Wales, with the aim of enhancing patient safety. Furthermore, these technologies will support the Health Board's plan for a new Urgent and Planned Care Hospital by enabling HDdUHB to integrate them into current ways of working.

eObs and Patient Flow technologies have previously been implemented by the NHS across the UK, and their clinical value has been established. Evidence from case studies suggests that patient flow technology can significantly increase efficiencies in hospitals, providing a better experience for both staff and patients. They have been shown to reduce the length of hospital stays, reduce patient harm, including a reduction in the number of cardiac arrests, and increase time for care. Ultimately, these improvements lead to better experiences for patients and staff, and enable the provision of high quality, safe care. The development of this OBC has included direct engagement with several reference sites to validate the benefits and clinical value of this technology.

Asesiad / Assessment

Electronic patient flow management is the application of digital technology to provide the information needed to deliver patient flow. Patient flow technology joins up clinical and operational data in daily use to provide real time data for immediate clinical and operational decision making. This can significantly improve patient flow management in acute settings. It is important to note that patient flow does not end with discharge from hospital. To deliver truly integrated care which enables the best outcomes for patients, we need to create systems that provide seamless integration across all healthcare services, including community and at-home care.

Strategic Landscape in Wales and Hywel Dda

- **Health & Care Strategy, 'A Healthier Mid and West Wales: Our future generations living well'**

The Health Board strategy sets out the long-term plan for health and social care within Hywel Dda. Fundamentally, it advocates for a shift from reactive hospital-based care and treatment to proactive community-based, person-centred care focused on health, wellbeing and prevention.³ Improving patient flow is a first step to ensuring that patients receive the best care and spend only the time needed in hospital. In the long-term, eObs can then enable remote monitoring in communities, supporting the shift in care from hospitals.

- **Value Based Healthcare**

Enabling person-centred, preventative care requires health and care services to make better use of existing resources and leverage available data and information to improve decision making. Staff need to be able to have access to real-time data and share it to enable collaboration across the whole system. Key Welsh Government sponsored report recommendations seek improvements in the domains of patient safety, flow management and a person's experience in hospital.⁴ Digital technologies, such as eObs and technologies that support patient flow, play a key role in making this possible.

- **Transforming Urgent Emergency Care - Six Goals for Urgent and Emergency Care**

Specifically, the introduction of a patient flow system will have a direct impact on Goal 5 and Goal 6 of the programme. Optimising the hospital flow will assist with the focus on significantly reducing the numbers of people staying longer in hospital than 21 days, to reduce risk of harm. Goal 6 which enables optimal discharge practice and delivery of Home First principles will be facilitated through the implementation of the advanced workflow and data sharing incorporated within the solutions. In essence, the solution will improve the management of patient flow through the right services, enabled by streamlined operations, and information technology across locations.

- **HDdUHB's Digital Response**

Making patient observations available digitally, so that staff can access them anytime, anywhere, as required, is a first step towards a more digitally enabled workforce. This data can then, for example, be used in conjunction with information from location tracking technologies to provide key insights for clinical and operational management. Furthermore, introducing patient flow technology will support the Health Board in its aim to operate its acute and community hospitals as one by providing a system which ultimately enables the management of beds across the entire organisation. It will also remove inefficiencies, increasing capacity and therefore realising the strategic aim to provide more timely access to acute secondary care treatments.

- **Whole System Health & Care Strategic Digital Readiness**

The recent work commissioned with an external provider, noted that adopting a whole-system approach will enable our people and communities to care for themselves, prevent ill health, improve well-being, promote independence and interconnectedness, and access specialist care and support when required. As part of the whole system approach, the 4 pillars noted within the report, namely:

² <https://catalyst.nejm.org/doi/full/10.1056/CAT.18.0289>

³ <https://gov.wales/sites/default/files/publications/2021-09/a-healthier-wales-our-plan-for-health-and-social-care.pdf>

⁴ National ePatient Flow Management Outline Business Case (Dec 2018)

- Ensuring Citizen engagement
- Health and Care co-ordination and collaboration
- Situational awareness via a command and control approach
- Data fabric to allow sharing of information safely

The adoption and implementation of an eObs and patient flow system will contribute towards answering the latter 3 areas above, and also improve the digital maturity of the organisation.

Benefits

In line with the value-based healthcare programme⁵, this project is expected to improve the patient experience and lead to better patient outcomes. The key benefits that are expected to be realised by eObs and Patient Flow solutions are set out below.



Further benefits work has been completed and supplements this report. The digital benefits manager has worked with services to provide a benefits timeline, which illustrates the benefits, the reporting metric for baseline measurement, and the timeline for when the benefit will be realised (Attachment 2).

A document spotlighting several benefits (Attachment 3) has been prepared, to provide the Board with greater detail of the proposed benefit, the challenges to achieving the benefit, the current process, and the proposed process and how this will translate in cash or productivity releasing benefits.

Clinical Value

There are several national strategies and programmes aimed at improving clinical care and patient safety. The Health and Care Standards framework provided by NHS Wales establish a basis for improving the quality and safety of healthcare services.⁶ There is specific reference to safety and dignified care for older patients, in response to the recommendations made through the Andrews report, the Older People's Commissioner report 'Dignified Care'

⁵ <https://vbhc.nhs.wales/>

⁶ <https://nwssp.nhs.wales/a-wp/governance-e-manual/putting-the-citizen-first/health-care-standards/>

and the provisions of the Nurse Staffing Act 2016. The NHS Wales Delivery Framework and Reporting Guidance 2021-22⁷ lays out the aim to ensure that people in Wales “have better quality and more accessible health and social care services, enabled by digital and supported by engagement”. Similarly, the six goals for urgent and emergency care published by the Welsh Government call for optimal hospital care following admission.⁸ Furthermore, the NICE 50 guidance ‘Acutely Ill Patients in Hospital’⁹ and the Public Ombudsman Wales report ‘Out of hours: Time to Care’¹⁰ highlight the need to improve care of deteriorating patients. As outlined below, the introduction of eObs and patient flow technology can lead to improved and safer care for patients.

eObs technology enables:

- Remote monitoring, allowing doctors and nurses to access data from anywhere without the need to physically see the patient. This can save time and reduce the risk of cross-infection.
- Automation of routine tasks, such as calculating the NEWS2 (National Early Warning Score), frees up time for staff to look after the patient and reduces the risk for errors.
- Automated alerts, which remind staff to take actions when patients are deteriorating, supporting early intervention.
- Better communication with the patient by creating visuals that can be shared. For example, staff can share how treatment has impacted an individual’s vital signs over time.
- The provision of real-time data, which can help improve clinical decision-making and reduce the risk of harm, while providing patients and their families with confidence that they are monitored appropriately.

Similarly, patient flow technology is associated with increased patient safety, time savings and efficiency benefits by optimising the use of existing resources and facilitating holistic oversight and coordination:

- Such technology prevents the same information from being recorded multiple times in different locations (e.g. whiteboards, spreadsheets, ward books, site manager records etc.) and repeatedly across wards.
- It can improve cross-department communication.
- It makes operational and management information available in real-time. For example, by enabling staff to remotely access information on current bed status, and estimated discharge dates, “dead bed” time can be reduced.

A 2019 study found that roll-out of eObs was associated with approximately 10% reduction in total unplanned admission to critical care units from eObs-equipped wards and patient contact time as more than doubled (2.9% to 7.3%).¹¹ In line with the significant clinical value of these systems, Digital Health Intelligence research shows 71% of England’s acute trusts (100 out of 141) now have an electronic observations system in place.¹²

Similarly, evidence from case studies suggests that patient flow technology can significantly increase efficiencies in hospitals, providing a better experience for both staff and patients:

⁷<https://hduhb.nhs.wales/about-us/performance-targets/performance-documents/2021-22-nhs-wales-delivery-framework-amp-guidance-pdf/>

⁸ <https://gov.wales/written-statement-six-goals-urgent-and-emergency-care-and-expectations-system>

⁹ <https://www.nice.org.uk/guidance/cg50>

¹⁰ <https://www.ombudsman.wales/wp-content/uploads/2018/03/Out-of-Hours-Time-to-Care.pdf>

¹¹ <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6425312/>

¹² <https://www.digitalhealth.net/2020/08/special-report-electronic-observations-and-vital-signs/>

- **Reduction in the length of hospital stays** by 12-30%^{13,14} and NHS Lothian have reported an increase in the number of patients discharged by 11am by 40%¹⁵
- **Reduction in patient harm:** 50-70%^{16,17} reduction in hospital cardiac arrests, 16% reduction in unplanned critical care bed days¹⁸ and 90% reduction in norovirus incidence¹⁹
- **Increased time for care** by reducing time spent on administrative tasks. Using a mobile device can release up to 66 minutes of nursing time per 12-hour shift. Similarly, organisations have seen a 50% time saving in Multi-Disciplinary Team meetings²⁰

Economic Appraisal

Implementing both eObs and Patient Flow (Option 4) received the highest weighted benefit score, reflecting that introducing both solutions would result in the biggest efficiency increases and improvements in staff and patient experience. This is in line with user needs identified during research sessions.

Table 1: Total Economic Cost by Option

Cost Line	Option 2: eObs Only	Option 3: Patient Flow Only	Option 4: eObs + Patient Flow
Non-Recurring Capital (NRC) Total	£ 994,408	£ 1,367,908	£ 1,817,908
Non-Recurring Revenue (NRR) Total	£ 1,293,270	£ 1,518,270	£ 1,984,361
Recurring Revenue (RR) Total	£ 713,171	£ 884,541	£ 1,362,644
Optimism Bias	£ 336,375	£ 505,747	£ 704,532
Total with Contingency	£ 3,337,224	£ 4,276,466	£ 5,869,444

Given the resources and time required to build a bespoke solution from scratch, the decision was made to procure an existing, 'tried and tested' solution that can be configured to meet local needs for both the eObs and Patient Flow solution. The aim is to implement these solutions incrementally. The full scope will be finalised during detailed requirement capture in the next phase of procurement.

HDdUHB's preferred option is to procure a software-only solution hosted on our own local Cloud environment. This will need to be discussed further during the procurement process, as some suppliers only offer their Patient Flow solutions as Software as a Service (SaaS).

The recommendation is to procure the software solutions via an existing framework and several suitable frameworks have been identified. These will need to be assessed against the detailed requirements by the Procurement team once these have been established. Procuring both solutions from the same supplier would be advantageous, as it would streamline integration and simplify the procurement process.

Stakeholder Engagement

¹³ Nervecentre. October 2016. A Whole-Hospital Mobile Solution-Nervecentre Support for Efficient Patient Flow

¹⁴ Allocate Software - NHS Wales ePatient Flow Management programme PIN (Presentation)

¹⁵ National ePatient Flow Management Programme OBC (Dec 2018)

¹⁶ <https://www.alcidion.com/success-stories/central-manchester-university-hospitals-nhs-foundation-trust/>

¹⁷ <https://www.digitalhealth.net/2015/11/vitalpac-helps-croydon-cut-cardiac-arrests/>

¹⁸ Nervecentre. October 2016. A Whole-Hospital Mobile Solution-Nervecentre Support for Efficient Patient Flow

¹⁹ National ePatient Flow Management Programme OBC (Dec 2018) – Appendix 11

²⁰ National ePatient Flow Management Programme OBC (Dec 2018) – Appendix 11

To develop the Outline Business Case for implementing eObs and Patient Flow, staff across the Health Board were engaged in the consultation. The aim was to understand the as-is processes and current issues, as well as their needs with regards to the new technology, to ensure that the Health Board learns from previous digital project implementation. Stakeholder engagement also helps to build trust and transparency between the project team and the stakeholders, which will be critical in ensuring a smooth adoption. By involving all stakeholders, the mistakes noted above, lack of buy-in, clinical support, and ‘siloes’ data will be mitigated. Establishing stakeholder support will make it easier to secure the necessary resources, address challenges and obtain feedback throughout the lifecycle of the project. It will also ensure that the project meets the needs and expectations of all parties involved, leading to better outcomes, high adoption, and greater success.

Across all sites, clinical and operational staff conveyed some key needs that should underpin the implementation of any new technology. Given the current resourcing constraints, it is clear that the Health Board could benefit significantly from technology, which supports ways of working by increasing efficiency and improves how patient flow is managed across the Health Board.

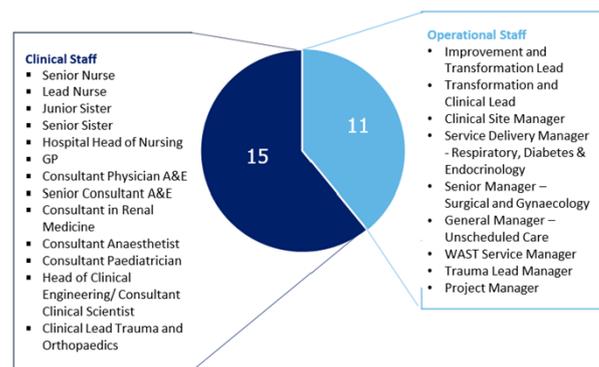
Some of the key themes that came out from the stakeholder engagement were:

- **Keeping the patient at the centre** - While staff felt that technology could help improve ways of working, they highlighted the importance of maintaining the human element of care. Regardless of the solution, the patient needs to remain at the centre.
- **Technology must not add to existing workloads** - Due to resourcing constraints, staff are already extremely busy. They do not have capacity to complete additional administrative tasks and new technology should make things faster and easier.
- **Interoperability is key** - There are a number of systems currently in use across HDdUHB. To ensure efficient working and avoid adding to staff administrative workload, any new systems need to be interoperable with existing solutions.

During the development of the business case, the team spoke to the following:

- 49 people from across the Health Board were invited to take part in the consultation
- 26 staff members were available to join 1-1 sessions

For the next iteration of the business case, we will look to undertake more stakeholder sessions to discuss implementation of the solution.



During the stakeholder engagement, a number of “pain points” or issues currently being faced by staff were highlighted to the project team. Whilst none of these are new issues, colleagues felt it important that the following were expressed as they feel that the introduction of a digital solution could address the following:

- **A lack of available beds limits patient flow across the Health Board.** There are a number of reasons why there are not enough beds available, including:

- 'Medically fit' patients cannot be discharged as there is significant pressure on community services
- workforce challenges mean that in some areas not all beds can be used
- Inefficiencies in patient transfers/ handovers lead to delays in admitting patients

This has a significant negative impact on the services, examples of the impact are below:

- Normally, GP referrals should be assessed in the Clinical Decision Unit (CDU) to determine next steps, however, the CDU is used as an additional ward and GP referrals are assessed in the Emergency Department (ED) instead. This impacts ED capacity
 - When there is no space on wards, patients stay in the ED as in-patients. Welsh Patient Administration System (WPAS) doesn't enable admission into the ED and as a result there can be confusion around who has been admitted
 - When patients are admitted, they tend to be admitted to any bed that becomes available without consideration for the speciality they may be overseen by. This leads to lots of outliers, making it challenging for clinicians to identify their patients
 - Surge beds are opened, which are difficult to staff
 - Ambulances are unable to transfer their patients. Welsh Ambulance Service NHS Trust (WAST) estimates at the acute hospitals in the Health Board 70 to 85 hours are lost every day per site. This means ambulances cannot respond to calls in time. It also leads to difficulties when ambulance crews change over, as the new crew may not have the PIN used by the previous crew, which means the screens in hospitals cannot be updated
 - When the Same Day Emergency Care (SDEC) unit cannot admit patients, staff have to stay overtime to ensure patients' safety
- **Ineffective communication is one of the biggest issues faced by staff across all sites**
 - Lack of shared patient record: There is no single system to view all the information about a patient across the acute and community setting. Often different services/ specialities do not have access to each other's systems. This causes problems for example when managing flow from primary to secondary care for children and mothers
 - Bed capacity management: Site managers find out about available beds during three daily meetings or by walking around wards. At Bronglais Hospital a dashboard has been set up to manage admissions and discharge, which is updated by the site manager. However, information about available beds is not available in real-time and involves a lot of administrative work for the site management team
 - Working in isolation: Staff have very little sight of what is happening across other areas
 - Slow communication methods: Staff spend lots of time calling wards or services to arrange handovers/ referrals. In particular for moving patients from A&E into wards
 - Audit trails: There is a lack of audit trails for escalation
 - Duplication of effort: In many cases staff have to record information in multiple places, including both online systems and paper records. This leads to duplication of effort and can make it difficult for staff to know where to look for relevant information
 - Up-to-date records: Staff lack the time to keep electronic records up-to-date due to both staffing issues and the need to replicate information
 - **Handovers, transfers and discharges are slow, negatively impacting patient flow.** There is a lack of real-time information:

- Due to resourcing difficulties– this can cause delays for example when a patient is medically fit and ready for discharge but certain tasks are yet to be completed, e.g. preparing prescription medication
- When there are lots of patients who are outliers, it is difficult for doctors to know where their patients are due to the lack of real-time information
- When a bed does become available, deep cleaning (required for infectious patients, e.g. COVID) takes a long time, and beds are not always declared available immediately
- Staff have no visibility of what is happening in other areas
- When a child is transferred from another hospital to Glangwili, staff don't have any information about how they are doing for 30-40 minutes (while in transfer)
- The lack of a single, shared electronic record means that clinicians often don't have access to a patient's full history and information is duplicated
- Handovers are completed on paper – this is seen as a patient safety risk
- With handwritten notes, legibility can be a problem
- Because triage notes and observations are not available electronically (e.g. on WPAS), staff working in the SDEC unit in Glangwili Hospital often have to go to A&E to identify patients that may be suitable for the unit
- When a patient leaves A&E and is transferred to a ward, nurses need to scan the paper notes, which can take up to 20 minutes

- **Observations are not always completed fully or on time, and there can be inappropriate escalation.** A key driver for issues with observations are resourcing problems:

- Observations are sometimes delayed as staff are busy with other activities. For example, at times in South Pembrokeshire Community Hospital, ward round timings determine observation timings
- Health Care Support Workers are responsible for taking observations. They escalate abnormal measurements, but at times the NEWS score is calculated incorrectly, or they may not be aware that the parameters need to be adjusted for a particular patient. For example, COPD patients may have observations that look abnormal but are normal for that particular type of patient. This leads to inappropriate escalation
- There can be issues with the frequencies of observations, where staff may not be aware that patients require more or less regular observations. For example, in the SDEC Unit in Glangwili Hospital, observations are completed every hour. When staff from other wards fill in to support the unit, they may be used to carrying out observations every four hours

Following the stakeholder engagement, a playback session for the user research was held on 9 June 2022. 94 staff from across the Health Board were invited to attend the session. The aim was to present back the findings from the research and provide staff with an opportunity to provide feedback and ask questions. The staff that were invited to stakeholder engagement and also the user playback sessions are included within the outline business case, in Appendix A (page 55) and Appendix B (page 58).

Timescales

An indicative timeline for the procurement process of the software solutions is outlined in the table below:

Table 2: Proposed Procurement Timeline

Milestone	Estimated Timeline
Final OBC Draft Ready for submission	July 2022
Submitted to Executive Team for comment	September 2022
Submission to Sustainable Resources Committee	December 2022
Consideration and Approval by Board to proceed to procurement	March 2023
Select relevant framework(s)	April 2023
Mini competition via framework: Prepare and Issue ITT, Evaluate Responses	May 2023
Preferred supplier selected	June 2023
Governance and Approvals (incl. FBC Sign Off)	July / September 2023
Implementation Starts (18m implementation)	November 2023

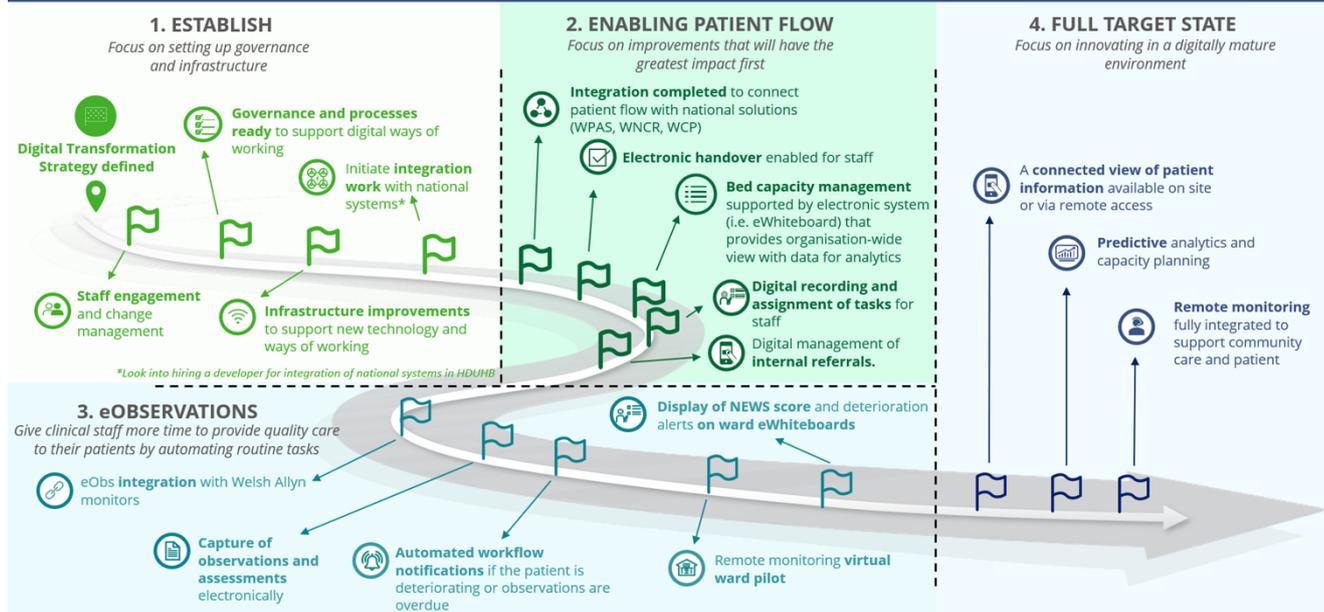
All required hardware will be procured separately on a rolling basis via an existing hardware framework. The contract duration will depend on the framework selected, however due to implementation timeline it is preferable to have a duration of more than 3 years.

The Digital Delivery Roadmap sets out four phases to ensure successful implementation:

- **Phase 1 - Establish:** Setting up governance processes and infrastructure (incl. integration) to ensure solutions can be successfully adopted
- **Phase 2 - Enabling Patient flow:** Rollout of patient flow functionality to increase efficiencies, starting with electronic patient handover and bed capacity management
- **Phase 3 - Electronic Observations:** Introducing eObs capture across sites, followed by escalation and alerts functionality
- **Phase 4 - Target state:** Building on phases 2 and 3 to roll out remote monitoring across all sites, as well as predictive capacity planning

The Digital Roadmap (below) visualises the rollout of the Patient Flow and eObs solutions across four phases. The first phase focuses on setting up governance and processes, preparing the local infrastructure, and engaging staff on all levels, with communication and training. During phase 2, technology to support patient flow are introduced. Patient flow is being improved with digital tools, and their integration with existing systems. The third phase introduces improvements that build on existing capabilities. The focus is on giving clinical staff more time to provide quality care to their patients by automating routine tasks. The fourth and final phase enables HDdUHB to reach their full target state for this project. It builds on the technology set up in previous phases. This phase is about innovating with digitally mature eObs and patient flow technologies. Learnings from phases 2 and 3 will influence the vision of the full target state. An agile approach will enable HDdUHB to make changes as required.

HIGH-LEVEL DIGITAL ROADMAP OVERVIEW



Summary

eObs and Patient Flow technologies have previously been implemented by the NHS across the UK, and their clinical value has been established. Evidence from case studies suggests that patient flow technology can significantly increase efficiencies in hospitals, providing a better experience for both staff and patients. They have been shown to reduce the length of hospital stays, reduce patient harm, including a reduction in the number of cardiac arrests, and increase time for care. Ultimately, these improvements lead to better experiences for patients and staff, and enable the provision of high quality, safe care. The development of this OBC has included direct engagement with several reference sites to validate the benefits and clinical value of this technology.

Argymhellid / Recommendation

The Board is requested to:

- **NOTE** that the Outline Business Case has been scrutinised by the Agile Digital Business Case Group and the Sustainable Resources Committee in December 2022
- **AGREE** to proceed to a Full Business Case, with the identification of a preferred supplier
- **AGREE** that no commitment to a specific supplier will be made until a further review to confirm that the recommended investment decision is appropriate is conducted; before the contract is placed with a supplier or partner (or a work order placed with an existing supplier or other delivery partner) and **AGREE** due to the financial investment required this will need to be brought back to the Board for final approval.

Amcanion: (rhaid cwblhau)

Objectives: (must be completed)

Committee ToR Reference:

Cyfeirnod Cylich Gorchwyl y Pwyllgor:

Not Applicable

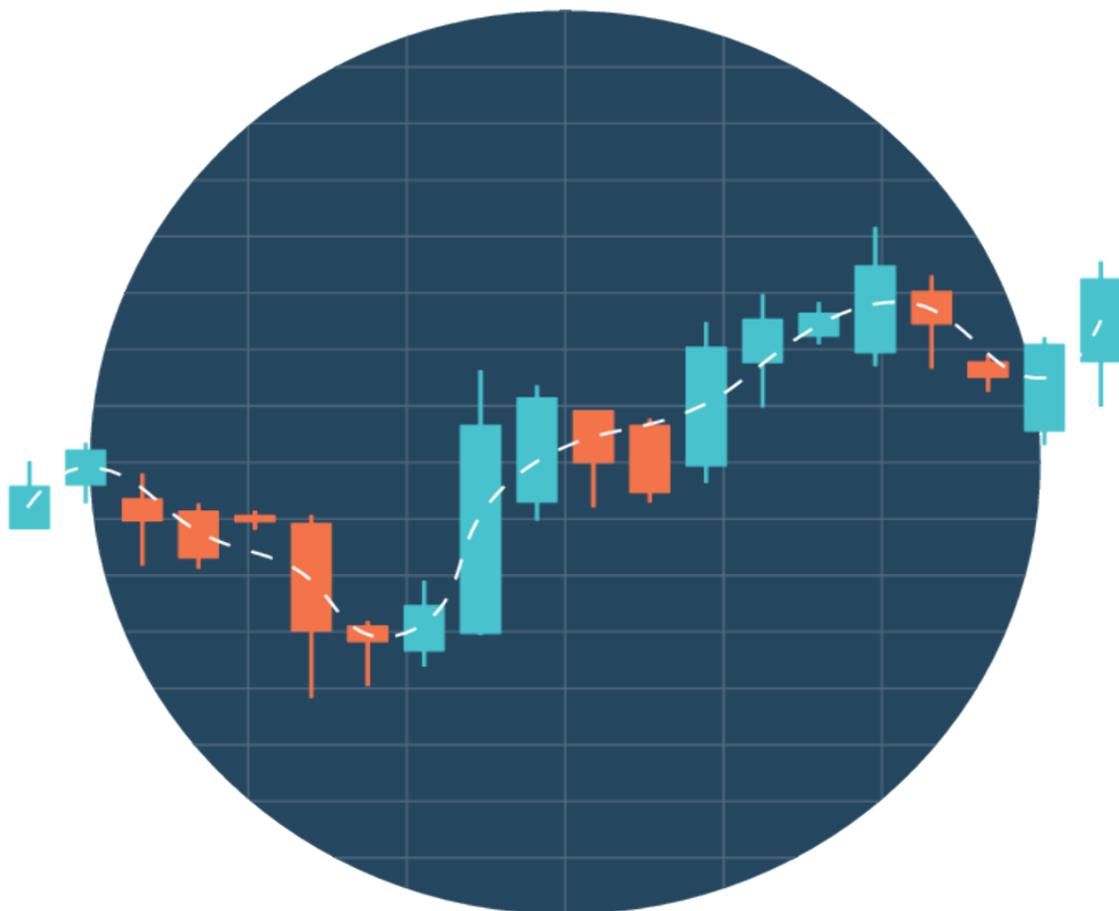
Cyfeirnod Cofrestr Risg Datix a Sgôr Cyfredol: Datix Risk Register Reference and Score:	Not Applicable
Safon(au) Gofal ac Iechyd: Health and Care Standard(s):	All Health & Care Standards Apply
Amcanion Strategol y BIP: UHB Strategic Objectives:	All Strategic Objectives are applicable
Amcanion Cynllunio Planning Objectives	All Planning Objectives Apply
Amcanion Llesiant BIP: UHB Well-being Objectives: Hyperlink to HDdUHB Well-being Objectives Annual Report 2018-2019	10. Not Applicable

Gwybodaeth Ychwanegol: Further Information:	
Ar sail tystiolaeth: Evidence Base:	Contained within the report
Rhestr Termau: Glossary of Terms:	Contained within the report
Partïon / Pwyllgorau â ymgynhorwyd ymlaen llaw y Cyfarfod Bwrdd Iechyd Prifysgol: Parties / Committees consulted prior to University Health Board:	Agile Digital Business Group Sustainable Resources Committee

Effaith: (rhaid cwblhau) Impact: (must be completed)	
Ariannol / Gwerth am Arian: Financial / Service:	The introduction of the patient flow system will have benefits not only the staff, patients, but will improve efficiencies of the wards and staff. Releasing more time for staff to treat patients
Ansawdd / Gofal Claf: Quality / Patient Care:	The lack of a patient flow system presents a significant risk to patient safety and negatively impacts staff, who are working under extreme pressures. There is a clear need to improve efficiencies, particularly with regards to managing patient flow, and introducing technologies to support staff are a first important step in this journey

Gweithlu: Workforce:	The improvement in digital solutions will provide efficiencies for staff, who will be able to see the right information at the right time when treating the patient. The combination of approaches and system will also reduce the effort required to transcribe as system will be fully integrated.
Risg: Risk:	The patient safety risk from that lack of Automation of routine tasks, such as calculating the NEWS2 score, frees up time for staff to look after the patient and reduces the risk for errors. The provision of real-time data, which can help improve clinical decision-making and reduce the risk of harm, while providing patients and their families with confidence that they are monitored appropriately.
Cyfreithiol: Legal:	The introduction of both systems could lead to a reduction in legal claims due to the reduction errors.
Enw Da: Reputational:	Having resilient and robust systems for the treatment of patients will enhance the reputation of the Health Board and will also improve opportunities to recruit.
Gyfrinachedd: Privacy:	Not applicable
Cydraddoldeb: Equality:	If the system is approved to progress a full equality approach will be adopted

Electronic Patient Flow and Electronic Observations Outline Business Case



July 2022

Contents

Contents	2
Executive Summary	3
Introduction	8
1. Strategic Case	9
2. Economic Case	18
3. Financial Case	37
4. Commercial Case	39
5. Management Case	44
Appendix A: Stakeholder engagement	55
Appendix B: Benefits and Risks Assessment	59
Appendix C: Financial Model Assumptions	62
Appendix D: Optimism Bias Calculation	63
Appendix E: Sensitivity Analysis Preferred Option	66
Appendix F: Digital Roadmap	68

Executive Summary

This document sets out the Outline Business Case (OBC) for the investment in an Electronic Observations (eObs) and a Patient Flow system for Hywel Dda University Health Board (HDUHB). The purpose of this business case is to articulate the strategic rationale for the programme, outline its scope and breadth, and provide an indication of the likely benefits and costs associated with delivery. The document has been prepared in accordance with HM Treasury Green Book guidance for the five-case model.

Strategic Case

Introduction

eObs technologies can automatically capture and analyse patient's vital signs and notify clinicians when required. This automation of routine tasks can free up time to enable better patient care, increase accuracy in capture and transmission of information and improve decision-making. Patient flow technologies encompass a range of functionality to help with a better patient flow, including patient handover, bed capacity management and task management. More streamlined patient flow results in reduced wait-times, an improved staff and patient experience, and increased patient safety.

Case for Change

Current processes in HDUHB are not optimised, as most of the information is recorded manually on paper records, and communication channels are slow and time-consuming (e.g. phone calls). Some digital systems have been introduced in previous years, but the feedback is that information remains siloed, and staff do not feel like they can access the correct information easily and in a timely manner when they need it. This poses a significant risk to patient safety. A lack of clinical staff makes it even more crucial to increase efficiencies, so that limited resources are utilised in the best way.

The deployment of new technologies to support patient observations and patient flow aligns with the strategic goals of the Health Board, both locally and nationally. It focuses on improvements towards a more digitally mature healthcare system in Wales, with the aim of enhancing patient safety. Furthermore, these technologies will support the Health Board's plan for a new Urgent and Planned Care Hospital by enabling HDUHB to integrate them into current ways of working.

eObs and Patient Flow technologies have previously been implemented by the NHS across the UK, and their clinical value has been established. Evidence from case studies suggests that patient flow technology can significantly increase efficiencies in hospitals, providing a better experience for both staff and patients. They have been shown to reduce the length of hospital stays, reduce patient harm, including a reduction in the number of cardiac arrests, and increase time for care. Ultimately, these improvements lead to better experiences for patients and staff, and enable the provision of high quality, safe care. The development of this OBC has included direct engagement with several reference sites to validate the benefits and clinical value of this technology.

Economic Case

The options, benefits, and risks were developed collaboratively through workshops and engagement with stakeholders from across the Health Board (Appendix A). These sessions considered a range of options for the implementation of eObs and Patient Flow technologies. The short-listed options were taken forward for further analysis.

Option Short-listing

Below are the options that were taken forward:

- **Option 1 - Do nothing:** Existing paper-based systems are not replaced

- **Option 2** - *Incrementally implement eObs solution only across all sites*: A configurable “off the shelf” solution for eObs is procured and implemented across acute and community hospitals, as well as supporting patients at home.
- **Option 3** - *Incrementally implement patient flow solutions only across all sites*: Configurable “off the shelf” patient flow solutions are procured and implemented across acute and community hospitals.
- **Option 4** - *Incrementally implement both eObs and patient flow solutions across all sites*: Configurable “off the shelf” eObs and patient flow solutions are procured and implemented across acute and community hospitals. These will also support patients at home.

Benefits and Risks Assessment

In line with the value-based healthcare programme¹, this project is expected to improve the patient experience and lead to better patient outcomes. The key benefits that are expected to be realised by eObs and Patient Flow solutions are set out below in Figure 1.

Figure 1: Key benefits

Key benefits



A weighting and scoring exercise was undertaken to rank each of the shortlisted options in terms of its relative non-financial benefit. The purpose of this assessment was to understand any differential between shortlisted options in non-monetary terms.

A similar exercise was undertaken for the risks identified across six areas: change management, implementation, information governance, infrastructure, interoperability and funding. As with the identified benefits, the above risks were scored to distinguish between the shortlisted options. The objective of the scoring exercise was to assess the level of new or additional risk that each option may introduce.

¹ <https://vbhc.nhs.wales/>

The risk scores for all three Options were relatively close, indicating that there are similar levels of risk associated with implementing new solutions. However, implementing both eObs and patient flow solutions received the highest weighted risk score, reflecting the increased level of risk with introducing additional solutions.

Total Economic Cost

The full economic cost of each shortlisted option has been calculated for a full 5-year period for HDUHB and is based on a number of principles and assumptions detailed within the main body of the OBC (Section 2.5).

Table 1: Total Economic Cost by Option

Cost Line	Option 2: eObs Only	Option 3: Patient Flow Only	Option 4: eObs + Patient Flow
Non-Recurring Capital (NRC) Total	994,408	1,367,908	1,817,908
Non-Recurring Revenue (NRR) Total	1,293,270	1,518,270	1,984,361
Recurring Revenue (RR) Total	713,171	884,541	1,362,644
Optimism Bias	336,375	505,747	704,532
Total with Contingency	3,337,224	4,276,466	5,869,444

Implementing both eObs and Patient Flow (Option 4) has a Total Economic Cost of c£5.9m while Option 2 (eObs Only) and Option 3 (Patient Flow Only) have Total Economic Costs of c£3.3m and c£4.3m, respectively. This is not surprising as a reduction of scope directly translates to a reduction in cost. Based on the assumptions set out in Section 2.3.1 it is expected that combined implementation of these solutions (Option 4) could deliver a total economic benefit of ~£5m over the 5 years by reducing patient's length of hospital stay and thus reducing bed days. Implementing each option on its own is expected to deliver a reduced economic benefit.

Option Appraisal and Preferred Option

Although Option 1, 'doing nothing', was not scored against introducing additional risk from an implementation perspective, not taking any action does present a significant risk for HDUHB. Due to challenges with resourcing, a growing elderly population and additional pressures introduced by COVID, the health service is struggling to meet demand. Staff we spoke to described overflowing Emergency Departments with patients spending up to 5 days in A&E, because they could not be admitted to a ward. The Welsh Ambulance Service (WAST) is currently losing between 70 and 85 hours per day per acute hospital in HDUHB, as ambulances wait outside, unable to admit patients. In turn, the ambulance service is unable to respond to emergency calls. This presents a significant risk to patient safety and negatively impacts staff, who are working under extreme pressures. There is a clear need to improve efficiencies, particularly with regards to managing patient flow, and introducing technologies to support staff are a first important step in this journey.

Implementing both eObs and Patient Flow (Option 4) received the highest weighted benefit score, reflecting that introducing both solutions would result in the biggest efficiency increases and improvements in staff and patient experience. This is in line with user needs identified during research sessions.

While procuring both solutions presents the highest cost, both systems are required to meet an increasing demand with a reduced workforce and to ensure staff can work effectively and safely care for patients.

Financial Case

A financial appraisal based on a number of assumptions outlined in Section 3.1. has been undertaken to illustrate the estimated affordability of the preferred option.

The table below illustrates that the total financial cost to HDUHB, when allowing for costs associated with VAT, capital charges and CPI indexation. These bring the total estimated cost to £6.3m over a 5-year period.

Table 2: Consolidated Financial Considerations

Cost Line	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Consolidated Financial Considerations						
NRC (incl. VAT and Indexation)	2,120,816	685,347	-	-	-	2,806,163
NRR (incl. VAT and Indexation)	489,181	831,120	428,965	-	-	1,749,266
RR (incl. VAT and Indexation)	-	113,479	385,351	598,208	598,208	1,695,245
Total (incl. VAT and indexation)	2,609,997	1,629,946	814,316	598,208	598,208	6,250,674
Annual Depreciation (Capital Costs)	-271,791	-658,320	-658,320	-658,320	-658,320	
Existing Local Implementation Resources	143,052	143,052	143,052	-	-	
Existing Local BAU Resources	-	-	-	70,486	70,486	

Commercial Case

For the Commercial Case a range of approaches was considered and discussed with the HDUHB Procurement Team. Given the resources and time required to build a bespoke solution from scratch, the decision was made to procure an existing, 'tried and tested' solution that can be configured to meet local needs for both the eObs and Patient Flow solution. The aim is to implement these solutions incrementally. The full scope will be finalised during detailed requirement capture in the next phase of procurement.

HDUHB's preferred option is to procure a software-only solution hosted on their own local Cloud environment. This will need to be discussed further during the procurement process, as some suppliers only offer their Patient Flow solutions as Software as a Service (SaaS).

The recommendation is to procure the software solutions via an existing framework and several suitable frameworks have been identified. These will need to be assessed against the detailed requirements by the Procurement team once these have been established.

Procuring both solutions from the same supplier would be advantageous, as it would streamline integration and simplify the procurement process.

An indicative timeline for the procurement process of the software solutions is outlined in the table below:

Table 3: Procurement Timeline

Milestone	Estimated Timeline
Final OBC Draft Ready for submission	July 2022
OBC Governance and Approvals	September 2022
Define detailed requirements	November 2022
Select relevant framework(s)	November 2022
Mini competition via framework: Prepare and Issue ITT, Evaluate Responses	December 2022
Preferred supplier selected	End of January 2023

Governance and Approvals (incl. FBC Sign Off)	March 2023
Implementation Starts	April 2023

All required hardware will be procured separately on a rolling basis via an existing hardware framework.

The contract duration will depend on the framework selected, however due to implementation timeline it is preferable to have a duration of more than 3 years.

Management Case

The Management Case addresses whether the preferred option is 'achievable'. Its purpose is to set out in more detail the actions that will be required for successful delivery in accordance with good practice.

To realise the benefits of these solutions, HDUHB needs strong governance and processes in place. The overall project will be managed by a Programme Lead, who will lead the implementation team during the first three years. The local implementation team will work closely with the supplier to implement the solution incrementally across all sites. The roles for both the implementation and Business As Usual (BAU) teams are detailed in the main body of the OBC (Section 5.1.1). It is expected that some of these roles will be absorbed by existing staff. Furthermore, different versions of the teams have been developed based on funding availability.

The recommendation is to set up an Evaluation User Group, consisting of representatives from all clinical departments, to ensure the requirements of the solution meet the needs of the users. Furthermore, the rollout will be supported by Digital Champions, clinical staff who will support their colleagues in adopting the new technologies.

Implementation will start with a pilot (the pilot site will be confirmed in due course through discussions with clinical and operational leads), followed by incremental implementation across HDUHB (site by site, ward by ward), prioritising acute hospitals before moving to the community. The Digital Roadmap sets out four phases to ensure successful implementation:

- **Phase 1 – Establish:** Setting up governance processes and infrastructure (incl. integration) to ensure solutions can be successfully adopted.
- **Phase 2 - Enabling Patient flow:** Rollout of patient flow functionality to increase efficiencies, starting with electronic patient handover and bed capacity management.
- **Phase 3 - Electronic Observations:** Introducing eObs capture across sites, followed by escalation and alerts functionality.
- **Phase 4 - Target state:** Building on phases 2 and 3 to roll out remote monitoring across all sites, as well as predictive capacity planning.

Introduction

This document sets out a high-level Outline Business Case (OBC) for investment in electronic Observations (eObs) and Patient Flow Technology for Hywel Dda University Health Board (HDUHB).

The document has been prepared in accordance with HM Treasury Green Book guidance and is structured into five main sections as set out below with further information provided in appendices:

- the **Strategic Case** considers the key strategic drivers and the case for change;
- the **Economic case** sets out the options and option short-listing process, benefits and risks, cost assumptions, and the total economic cost of the preferred option;
- the **Financial Case** sets out the financial appraisal and funding options for the preferred option;
- the **Commercial Case** provides an overview of the recommended procurement process; and
- the **Management Case** describes the governance structure, project plan, risk management arrangements and benefit realisation approach.

1. Strategic Case

1.1. Introduction

In this section the background to the project is set out alongside the strategic drivers and the case for change.

1.1.1. Background

Patient flow is the movement of patients through a healthcare facility, which involves the medical care, physical resources and internal systems needed from admission to discharge². When patient flow is not well managed in hospitals, this is associated with long wait-times and overcrowding in A&E, as well as inefficient scheduling in surgical departments. Poorly managed patient flow can lead to adverse health outcomes, including increased re-admissions and mortality rates³. Optimising patient flow management can help best utilise limited resources, ensure patients move through care pathways efficiently, and reduce the length of hospital stays.

Electronic patient flow management is the application of digital technology to provide the information needed to deliver patient flow. Patient flow technology joins up clinical and operational data in daily use to provide real time data for immediate clinical and operational decision making. This can significantly improve patient flow management in acute settings. It is important to note that patient flow does not end with discharge from hospital. To deliver truly integrated care that enables the best outcomes for patients, we need to create systems that provide seamless integration across all healthcare services, including community and at-home care.

There are a variety of digital capabilities to consider for electronic patient flow management, which include:

- **Workflow solutions** that provide a real-time overview of bed capacity and facilitate communication;
- **Electronic whiteboards** that capture key patient data made available through connected devices (e.g. tablets, PCs, smartphones);
- A **Control Centre**, which provides a clear view of timeframes for beds becoming available and provides the hospital's dashboard;
- **Mobile apps** that visualise key information and help staff communicate with colleagues;
- **Analytics solutions** to increase operational understanding, pinpoint bottlenecks and improve performance; and
- **Real Time Locating Systems (RTLS)** using RFID technology to optimise asset management and help track patients through the system.

When patients are admitted to hospital, clinical staff record patient observations that help them assess whether a patient is improving or deteriorating, such as vital signs (e.g. temperature, blood pressure, Oxygen saturation) or assessments (e.g. falls risk, dementia etc.). Without digital systems in place, this data is captured manually and cannot be easily shared, negatively impacting workflow efficiencies and patient safety.

An eObs system allows clinical staff to record their patient observations digitally. In an acute setting, staff can use mobile devices to record data, which can be accessed remotely by other clinicians. Such systems automatically calculate the National Early Warning System (NEWS2)

² <https://catalyst.nejm.org/doi/full/10.1056/CAT.18.0289>

³ <https://catalyst.nejm.org/doi/full/10.1056/CAT.18.0289>

score, which reflects whether a patient's condition is improving or deteriorating and provide clinicians with relevant alerts. According to Digital Health Intelligence, 71% of acute trusts in England have an eObs system in place⁴. This data feeds into the patient flow system and can "travel" with the patient through the care system, supporting clinical decision making. Furthermore, in a community setting, eObs can provide the ability to remotely monitor patients, allowing clinicians to discharge patients and safely provide care at home.

There is evidence from Health Boards across the UK that the introduction of electronic capture of patient observations and other digital systems for electronic patient flow management can be hugely beneficial to healthcare systems. However, it is important to note that in order to succeed, introducing such technology will require the appropriate support and training for staff, as well as change management to enable the switch from paper-based systems.

1.1.2. Current challenges

HDUHB is facing several key challenges:

- There is a **shortage of skilled health and social care staff** – this is currently the biggest limitation;
- An **increase in demand** for healthcare services and concurrently cost is being driven by a large and growing ageing population, an increased incidence of chronic disease, and the demand for more costly, complex and advanced procedures. This has been exacerbated by COVID, which has reduced routine care appointments and increased wait times significantly, resulting in increased hospital admissions.
- There is a **lack of sustainable IT infrastructure** with networks systems in hospitals that require upgrading and a lack of equipment to access systems on some wards;
- A lack of knowledge, training and system problems has resulted in a **low uptake of digital solutions** to-date;
- There are over 130 Information and Communications Technology (ICT) systems in use across the Health Board. However, many of the **existing systems do not support patient flow** across the organisation, and some ICT systems are unsuitable as they are unsupported or lack key functionality;
- There is **no single, shared patient record**;
- HDUHB remains largely paper based and as a result **information is duplicated, kept in silos** and there is a **lack of real-time data**;
- It remains challenging to ensure service delivery across a **rural geography**, with services having to cover large areas, and a lack of mobile phone signal in some rural areas; and
- There are significant **differences in health outcomes** between advantaged and disadvantaged groups within the Health Board.

1.2. Case for Change

1.2.1. Strategic Landscape in Wales

⁴ <https://www.digitalhealth.net/2020/08/special-report-electronic-observations-and-vital-signs/>

A Healthier Wales

'A Healthier Wales' sets out the long-term plan for health and social care in Wales. Fundamentally, it advocates for a shift from reactive hospital-based care and treatment to proactive community-based, person-centred care focused on health, wellbeing and prevention.⁵ This is aligned to the principles of prudent healthcare, which shape the work of the NHS in Wales and call for changing the model of outpatients by shifting care to the community and improving digital connectivity.⁶ Improving patient flow is a first step to ensuring that patients receive the best care and spend only the time needed in hospital. In the long-term, eObs can then enable remote monitoring in communities, supporting to shift care from hospitals.



Figure 2: A Healthier Wales Vision

The Value in Health Programme

The Value in Health programme's strategy highlights the importance of achieving this in a financially sustainable way, ensuring that interventions maximise the outcomes that matter to people.⁷ To achieve this we are proposing an incremental roadmap that takes an agile approach and starts by focusing on areas where technology can have the highest impact.

Enabling person-centred, preventative care requires health and care services to make better use of existing resources and leverage available data and information to improve decision making. Staff need to be able to have access to real-time data and share it to enable collaboration across the whole system. Key Welsh Government sponsored report recommendations seek improvements in the domains of patient safety, flow management and a person's experience in hospital.⁸ Digital technologies, such as eObs and technologies that support patient flow, play a key role in making this possible.

Once For Wales

The 'Once for Wales' approach sets standards and expectations that promote interoperability between systems, and access to structured electronic records in all care systems.⁹ It is important to note that the Welsh Government is currently refreshing the strategy for Wales and while the 'Once for Wales' approach will not be carried forward, HDUHB currently use many of these national systems. Therefore, any technology introduced in the future needs to be interoperable with the existing solutions.

HDUHB's Digital Response and Digital Operational Plan

HDUHB's vision is "to become the most digitally integrated care organisation in NHS Wales" while empowering "patients and staff to securely access information anytime,



⁵<https://gov.wales/sites/default/files/publications/2021-09/a-healthier-wales-our-plan-for-health-and-social-care.pdf>

⁶<https://gov.wales/sites/default/files/publications/2019-04/securing-health-and-well-being-for-future-generations.pdf>

⁷ <https://vbhc.nhs.wales/files/our-strategy-to-2024/>

⁸ National ePatient Flow Management Outline Business Case (Dec 2018)

⁹ <https://dhcw.nhs.wales/systems-and-services/>

anyplace and on any device”.¹⁰ The strategy to achieve this vision is outlined in the Digital Response, and further supported by the Digital Operational Plan, which provides detailed, annual plans.

In line with this, four key themes underpin the future vision of the digital response:

Figure 3: HDUHB Patient Vision (Digital Response)

- **Digitally connected patients:** Empower patients to actively manage their health and care;
- **Digitally enabled workforce:** Enable staff to access shared health and care records;
- **Business Intelligence & Analytics:** Insight driven culture to improve quality, outcome and research
- **Digital Infrastructure:** Provide secure access and interoperability;

Making patient observations available digitally, so that staff can access them anytime, anywhere as required is a first step towards a more digitally enabled workforce. This data can then for example be used in conjunction with information from location tracking technologies to provide key insights for clinical and operational management. Furthermore, introducing patient flow technology will support the Health Board in its aim to operate its four acute hospitals as one by providing a system that ultimately enables the management of beds across the entire organisation. It will also remove inefficiencies, increasing capacity and therefore realising the strategic aim to provide more timely access to acute secondary care treatments.

Ultimately, introducing these technologies will allow HDUHB to align with key strategic aims for health and social care in Wales, and provide better outcomes for patients and staff. It will also support the Health Board’s plan for a new Urgent and Planned Care Hospital, which is part of the Board’s journey to achieve its long-term strategy and improvement in population health.¹¹ Digital technologies such as eObs and patient flow will be a key component of this new hospital, and these will have to be tried and tested to enable successful implementation.

1.2.2. Clinical Value

There are several national strategies and programmes aimed at improving clinical care and patient safety. The Health and Care Standards framework provided by NHS Wales establish a basis for improving the quality and safety of healthcare services.¹² There is specific reference to safety and dignified care for older patients in response to the recommendations made through the Andrew’s report, the Older People’s commissioner report ‘Dignified Care’ and the provisions of the Nurse Staffing Act 2016. The NHS Wales Delivery Framework and Reporting Guidance 2021-22¹³ lays out the aim to ensure that people in Wales “have better quality and more accessible health and social care services, enabled by digital and supported by engagement”. Similarly, the six goals for urgent and emergency care published by the Welsh Government call for optimal hospital care following admission.¹⁴ Furthermore, the NICE 50 guidance ‘Acutely Ill Patients in Hospital’¹⁵ and the Public Ombudsman Wales report ‘Out of hours: Time to Care’¹⁶ highlight the need to improve care of deteriorating patients. As outlined

¹⁰ <https://hduhb.nhs.wales/about-us/your-health-board/board-meetings-2021/board-agenda-and-papers-27-january-2022/agenda-and-papers-27-january-2022/appendix-11-digital-strategy/>

¹¹ <https://hduhb.nhs.wales/news/press-releases/once-in-a-lifetime-bid-for-health-and-care-investment-in-mid-and-west-wales/>

¹² <https://nwssp.nhs.wales/a-wp/governance-e-manual/putting-the-citizen-first/health-care-standards/>

¹³ <https://hduhb.nhs.wales/about-us/performance-targets/performance-documents/2021-22-nhs-wales-delivery-framework-amp-guidance-pdf/>

¹⁴ <https://gov.wales/written-statement-six-goals-urgent-and-emergency-care-and-expectations-system>

¹⁵ <https://www.nice.org.uk/guidance/cg50>

¹⁶ <https://www.ombudsman.wales/wp-content/uploads/2018/03/Out-of-Hours-Time-to-Care.pdf>

below, the introduction of eObs and patient flow technology can lead to improved and safer care for patients.

eObs technology enables:

- Remote monitoring, allowing doctors and nurses to access data from anywhere without the need to physically see the patient. This can save time and reduce the risk of cross-infection.
- Automation of routine tasks, such as calculating the NEWS2 score, frees up time for staff to look after the patient and reduces the risk for errors.
- Automated alerts remind staff to take actions when patients are deteriorating, supporting early intervention.
- Better communication with the patient by creating visuals that can be shared. For example, staff can share how treatment has impacted an individual's vital signs over time.
- The provision of real-time data, which can help improve clinical decision-making and reduce the risk of harm, while providing patients and their families with confidence that they are monitored appropriately.

Similarly, patient flow technology is associated with increased patient safety, time savings and efficiency benefits by optimising the use of existing resources and facilitating holistic oversight and coordination:

- Such technology prevents the same information from being recorded multiple times in different locations (e.g. whiteboards, spreadsheets, ward books, site manager records etc.) and repeatedly across wards.
- It can improve cross-department communication.
- It makes operational and management information available in real-time. For example, by enabling staff to remotely access information on current bed status, and estimated discharge dates, "dead bed" time can be reduced.

Reference Site Evidence

A 2019 study found that roll-out of eObs was associated with approximately 10% reduction in total unplanned admission to critical care units from eObs-equipped wards and patient contact time as more than doubled (2.9% to 7.3%).¹⁷ In line with the significant clinical value of these systems, Digital Health Intelligence research shows 71% of England's acute trusts (100 out of 104) now have an electronic observations system in place.¹⁸

Similarly, evidence from case studies suggests that patient flow technology can significantly increase efficiencies in hospitals, providing a better experience for both staff and patients:

- **Reduction the length of hospital stays** by 12-30%^{19,20} and NHS Lothian have reported an increase the number of patients discharged by 11am by 40%²¹;

¹⁷ <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6425312/>

¹⁸ <https://www.digitalhealth.net/2020/08/special-report-electronic-observations-and-vital-signs/>

¹⁹ Nervecentre. October 2016. A Whole-Hospital Mobile Solution-Nervecentre Support for Efficient Patient Flow

²⁰ Allocate Software - NHS Wales ePatient Flow Management programme PIN (Presentation)

²¹ National ePatient Flow Management Programme OBC (Dec 2018)

- **Reduction in patient harm:** 50-70%^{22,23} reduction in hospital cardiac arrests, 16% reduction in unplanned critical care bed days²⁴ and 90% reduction in norovirus incidence²⁵; and
- **Increased time for care:** By reducing time spent on administrative tasks using a mobile device can release up to 66 minutes of nursing time per 12-hour shift. Similarly, organisations have seen a 50% time saving in Multi-Disciplinary Team meetings.²⁶

The development of this OBC has included direct engagement with a number of reference sites in order to validate the benefits and clinical value of this technology. At Aneurin Bevan University Health Board, System C's eObs module was introduced in 2017 and is now live across ninety wards at seven hospital sites. The Health Board has benefited from a reduced time for observations, a quicker identification of deteriorating patients and a reduced likelihood of errors, improving patient safety overall. Similarly, NHS Lanarkshire benefitted from introducing Alcidion's Patientrack eObs module, which has contributed to improved patient safety and increased the number of complete observations from 31% to 100%. *"We surveyed staff and the majority agreed that ease of use was a strength of the system. The survey also revealed that staff perceived an improvement in patient safety due to the availability of timely and accurate vital signs, which would suggest an increased likelihood of earlier identification of those patients who are deteriorating."*²⁷

Ultimately, these improvements lead to better experiences for patients and staff, and enable the provision of high quality, safe care. These clinical benefits are further explored in the Economic case.

1.2.3. User need

To develop this OBC, staff across the Health Board were engaged in the consultation: Out of 49 staff members that were invited, 26 took part in the user research session (see Appendix A for a detailed list). The aim was to understand the as-is processes and current issues, as well as their needs with regards to the new technology.

Across all sites, clinical and operational staff conveyed some key needs that should underpin the implementation of any new technology. They also highlighted key issues that they are currently facing:

- **A lack of available beds** limits patient flow across the Health Board. This is partly driven by a lack of staffing, which means not all beds can be used, and by inefficiencies in patient transfers/ handovers, which lead to delays. This has a significant negative impact on health services with ambulances waiting outside Emergency Departments, patients spending up to 5 days in A&E without being admitted to a ward, and surge beds opened regularly. Furthermore, when there are not enough acute beds this can impact planned care with beds being re-allocated, which increases waiting times even more.
- **Ineffective communication**, in particular with regards to sharing patient records and bed capacity management, is a key issue.
- **A lack of real-time information** leads to slow handovers, transfers and discharges. This also presents a key risk to patient safety. *"You feel as a clinician that you are working blind... We're making life and death decisions without all the information."*

²² <https://www.alcidion.com/success-stories/central-manchester-university-hospitals-nhs-foundation-trust/>

²³ <https://www.digitalhealth.net/2015/11/vitalpac-helps-croydon-cut-cardiac-arrests/>

²⁴ Nervecentre. October 2016. A Whole-Hospital Mobile Solution-Nervecentre Support for Efficient Patient Flow

²⁵ National ePatient Flow Management Programme OBC (Dec 2018) – Appendix 11

²⁶ National ePatient Flow Management Programme OBC (Dec 2018) – Appendix 11

²⁷ <https://www.nhslanarkshire.scot.nhs.uk/success-of-hi-tech-system-to-spot-when-hospital-patients-are-getting-sicker/>

- **Patient observations are not always completed fully or on time** and there can be inappropriate escalation.
- **The local infrastructure requires improvements** as current systems lack interoperability, lack key functionality and are often slow.

The full report of findings is available in Appendix A. Given the current resourcing constraints, it is clear that HDUHB could benefit significantly from technology that supports ways of working by increasing efficiencies. There seems to be a particular need for technology that improves how patient flow is managed across the Health Board.

1.2.4. Responding to Brexit

As the UK adapts to its recent exit of the European Union, it means the healthcare industry needs to adapt. The impact of the end of free movement of labour is likely to make it more difficult for the NHS and social care to access the growing number of workers they need.²⁸ Additional supply challenges mean that optimising existing resources is more important than ever, as services try to recover. HDUHB has started to address this issue by developing apprenticeship programmes and student nurse cohorts.

1.2.5. Recovery from the COVID-19 pandemic

The COVID-19 pandemic has demonstrated the limitations of the current system and Wales' healthcare capacity. At HDUHB the COVID-19 pandemic had a significant impact on health and care services. While non-urgent care was cancelled and waiting times have increased, virtual outpatient clinics were introduced, and the health board trialled virtual wards with remote monitoring to enable discharge. Going forward, we must learn from the effective response to the pandemic and what has been achieved since 2020. One such learning is that it is more important than ever to strengthen the partnership working between the NHS, social care and wider public services to create a whole system approach.²⁹ To work as one, services need to be able to collaborate and communicate seamlessly, sharing patient data as appropriate to manage patient flow effectively. At the same time, we need to introduce systems that can support new patient care models, such as virtual wards. This includes eObs and patient flow technology, which can provide an important digital building block towards data flow across an integrated health and care system.

1.2.6. Becoming more carbon efficient

Finally, the Welsh Government has committed to a NetZero target by 2050.³⁰ In February 2022, HDUHB issued a statement highlighting that decarbonisation and establishing energy efficient systems is a priority for the Board.³¹ In healthcare, the use of digital technology provides many opportunities to reduce the carbon impact of health and care services. For example, in the 12 months to June 2021 virtual appointments are estimated to have the saved carbon equivalent to taking 40,000 cars off the road for a year, and remote monitoring technologies are estimated, over the next 3 years to reduce patient travel by 28 million miles.³² Introducing eObs and other systems that enable electronic patient flow are a first step towards building more efficient health and care services that can support these net zero targets.

1.2.7. Conclusion

²⁸ <https://www.nuffieldtrust.org.uk/research/understanding-the-impact-of-brexit-on-health-in-the-uk>

²⁹ https://gov.wales/sites/default/files/publications/2021-03/health-and-social-care-in-wales--covid-19-looking-forward_0.pdf

³⁰ <https://gov.wales/net-zero-wales>

³¹ <https://hduhb.nhs.wales/news/press-releases/our-commitment-to-carbon-reduction-and-environmental-sustainability/>

³² <https://www.nhsx.nhs.uk/blogs/the-role-of-digital-technologies-in-meeting-nhs-net-zero-targets/>

This strategic case builds on existing work conducted as part of the national OBC for electronic Patient flow for NHS Wales. The national OBC, released in December 2018, advocated for a large investment for developing a national patient flow system in line with the 'Once for Wales' approach. The investment was considered too high at the time, and it has since been highlighted that a 'Once for Wales' approach does not meet the needs of local Health Boards. Instead, developing national standards and frameworks that can then be locally applied is seen as the most appropriate approach.

This OBC sets out a template for Health Board in Wales to introduce eObs and Patient flow systems. As outlined in the Management Case, HDUHB will capture the benefits of introducing these systems, which Welsh Health Boards can build upon. Ultimately, it is expected that patient flow technology in particular will help healthcare staff effectively manage resources and free up time for patient care, enabling the Welsh Government to meet key national targets, such as the 4-hour A&E waiting time target.

Whilst significant progress has been made to introduce digital systems, the NHS in Wales remains a long way from reaching its full potential and ensuring equal service provision across the country. Patients are currently experiencing the longest wait times for treatments seen in decades³³ and patient flow management is critical in releasing capacity to treat patients and protect beds for non-acute care. In February 2022 there were nearly 700,000 patients waiting for planned care in Wales, a 50% increase since February 2020.³⁴ Issues with patient flow impact bed availability for planned care, creating further delays. We are currently presented with a unique opportunity to drive change across NHS organisations: A move to digital working during the COVID-19 pandemic has set a unique starting point with strong clinical support on the ground. The user research conducted as part of this work shows unilateral clinical buy-in and a clearly defined user need for implementing eObs and digital Patient Flow solutions. These key strategic drivers are summarised in Figure 4 below.

³³ <https://www.bma.org.uk/advice-and-support/nhs-delivery-and-workforce/pressures/nhs-backlog-data-analysis>

³⁴ <https://www.audit.wales/news/concerted-action-needed-nhs-wales-tackle-waiting-times-backlog-planned-care>

Figure 4: Summary of strategic drivers

Key Strategic Drivers

The need for change

Leveraging digital to provide safe patient care

Current resourcing constraints mean that healthcare services are operating at capacity, posing a significant risk to patient safety.

eObs and Patient flow technologies support early intervention and enable remote monitoring of patients in their own homes. They have been shown to result in better experiences for patients and staff, and enable the provision of high quality, safe care.

Increased demand on healthcare services & long wait times

The ageing population in Wales is growing significantly. The recent reduction in non-essential healthcare due to the mobilisation of resources for the pandemic has increased the demand for appointments, and the waiting time is at a record-high. This negatively impacts the ability to provide preventative services.

Furthermore, wait times in the NHS are the longest they have been in decades.

Brexit

The recent exit of the UK from the European Union has led to difficulties in recruiting staff, the health and social care industries are particularly impacted.

Becoming carbon efficient

The Welsh government is committed to becoming more sustainable, with a pledge to reach NetZero by 2050.

Covid-19 Pandemic

The recent Covid-19 pandemic put an unprecedented amount of pressure on healthcare services, highlighting gaps and increasing the speed of adoption for digital solutions. It has become clear that the industry needs to implement changes to be able to recover and grow.

Unsustainable approach

A report on the Digital Architecture of the healthcare system in Wales conducted in 2019 exposed the unsustainability of the current approach. The report also highlighted the opportunities that could come from re-building the digital systems.

In summary, introducing eObs and Patient Flow technologies aligns to all key digital and national strategies and will support COVID recovery as NHS organisations work to meet the increasing demand.

1.3. Investment Objectives

Based on the strategic context and the national business case, the following investment objectives have been identified:

- **Timeliness/ Efficiency:** To use integrated digital technology to capture, present and use real-time patient pathway information to improve the timeliness of care and reduce the length of stay.
- **Effectiveness and Patient Safety:** To achieve measurable improvement of patient outcomes by using mobile digital technology to standardise and reduce variation in the management of acute patient deterioration (e.g. Sepsis, Acute Kidney Injury, Hospital Acquired Thrombosis), patient nutrition and hydration, tissue viability, continence and falls.
- **Equity of care:** To measurably improve admitted patient experience of care by ensuring patients are in the right bed at the right time to meet their needs.
- **Patient Experience:** To improve admitted patient experience by freeing staff time to care using mobile technology.
- **Economy:** To avoid unnecessary hospital inpatient costs by improving local ability to match acute bed capacity with unscheduled care demand.
- **Staff experience:** To improve staff satisfaction by providing them with the digital tools and technology they need to undertake their work more effectively.

2. Economic Case

2.1. Approach

This section summarises the value for money assessment of the short-listed options, including an appraisal of the benefits, risks and associated costs.

The Economic Case, particularly the options, benefits and risks, were developed working closely with key stakeholders throughout workshops and 1-1 user research sessions. A number of workshops and research sessions were held during April and May 2022 as outlined below:

- *Workshop 1: Tech and Strategy Review* – A workshop to review the As-Is technology and agree the strategic case for the OBC.
- *Workshop 2: Options Discussion* – A workshop to discuss the available options for introducing the new solutions, including the procurement approach.
- *Workshop 3: Benefits & Risks Identification* – A workshop to validate the relevant benefits and risks identified previously and review a draft digital roadmap.
- *Workshop 4: Assessing the solution options* – A workshop to review the implementation approach, validate the shortlist of options, and assess each option against the benefits and risks.
- *User Research Sessions*: 1-1 user research sessions with 26 clinical and operational staff to better understand the As-Is processes, identify relevant pain points and user needs for implementing the new solution.

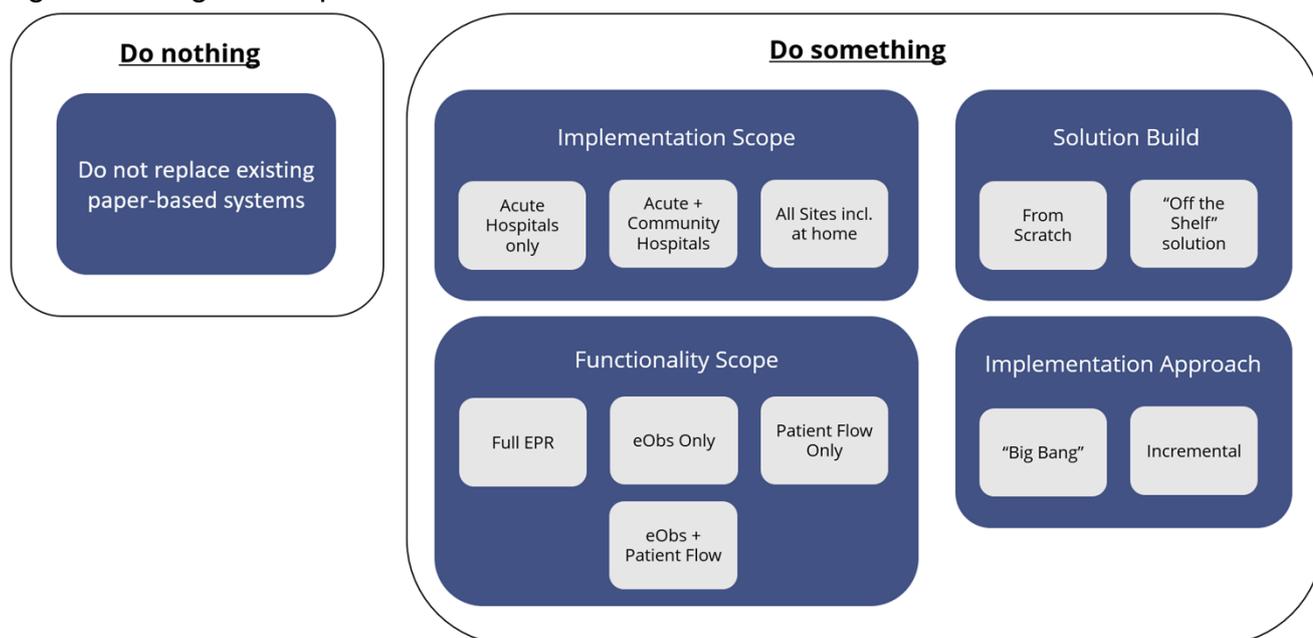
See Appendix A for a list of the stakeholders that were engaged in this consultation.

2.2. Shortlisted Options

To determine the options to be taken forward (shortlisted) for detailed evaluation, a long list of options was drawn up describing possible options with regards to the implementation approach and type of solution.

Figure 5 shows the long list of options identified for initial review.

Figure 5: Long list of options



During the options workshop the long list of options was discussed, and a decision was made on whether it should be taken forward.

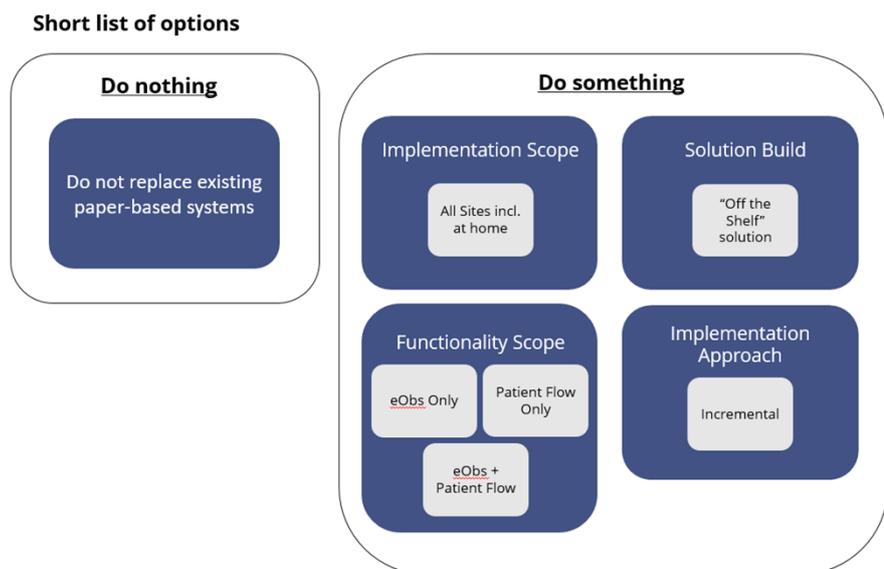
Table 4: Long list of options

Principle	Description	Action	Rationale
Do nothing.	Existing paper-based systems are not replaced.	Taken forward	<ul style="list-style-type: none"> ✓ This option represents no further action. ✓ This option serves as baseline case for comparison. ✗ This approach does not align to HDUHB's strategy or wider strategies.
Do something.	Existing paper-based systems are replaced with digital solutions.	Taken forward	<ul style="list-style-type: none"> ✓ Paper-based systems present significant risks to patient safety and are inefficient. ✓ HDUHB need to better manage existing resources and reduce admin time for clinical staff. ✗ Funding will be required to implement new solutions.
Implementation Scope	Description	Action	Rationale
Acute Hospitals Only.	Implement the solution(s) at the four acute hospitals only.	Not taken forward.	<ul style="list-style-type: none"> ✗ Does not align with HDUHB's strategic goal to move from hospital-based responsive care to community-based preventative care. ✗ Impact in terms of improving patient flow would be reduced.
Community Hospitals Only.	Implement the solution(s) at the five community hospitals only.	Not taken forward.	<ul style="list-style-type: none"> ✗ Impact would be minimal.
All Sites incl. at home.	Implement the solution(s) across both acute and community hospitals, as well as enabling at home remote monitoring. Create wider link in with social care.	Taken forward.	<ul style="list-style-type: none"> ✓ Aligns with HDUHB's strategic goal to move from hospital-based responsive care to community-based preventative care. ✓ Maximises impact by introducing a shared system across all sites.
Solution Build	Description	Action	Rationale
From Scratch	Custom-build a solution.	Not taken forward.	<ul style="list-style-type: none"> ✗ HDUHB does not have the resources to build the system from scratch. ✗ Too time-consuming. ✗ The commercial off-the-shelf (COTS) market is well established for this functionality.
"Off the Shelf" Solution	Buy an existing solution from an established supplier.	Taken forward.	<ul style="list-style-type: none"> ✓ The technology is well established and has successfully been implemented by NHS organisations across the UK. ✓ Existing solutions meet the requirements of HDUHB.
Implementation Approach	Description	Action	Rationale
"Big Bang".	Implement the solution at all sites at once.	Not taken forward.	<ul style="list-style-type: none"> ✗ Does not align with an agile implementation approach, which enables the Board to introduce the systems as funding becomes available. ✗ Could be overwhelming for staff. ✗ Adds additional risk to implementation. <p>Lack of required implementation resources on the ground to support (i.e. implementation team staff resourcing)</p>

Incremental.	Implement the solution incrementally, starting with one site and rolling it out ward by ward, site by site.	Taken forward.	<ul style="list-style-type: none"> ✓ Aligns with agile implementation approach. ✓ This has been shown to work well previously with implementation of WNCR. <p>Does not overwhelm staff who can move from paper-based to digital ways of working incrementally.</p>
Functionality Scope	Description	Action	Rationale
Full EPR.	Implement a full Electronic Patient Record (EPR) system for HDUHB, e.g. EPIC.	Not taken forward.	<ul style="list-style-type: none"> × Solution would be too expensive. × National strategy for Wales means that there would be a lack of support to move away from WPAS. ✓ Would meet needs of clinical staff by providing a shared record system.
eObs Only.	Implement an eOb system.	Taken forward.	<ul style="list-style-type: none"> ✓ 257 Welsh Allyn monitors have been purchased and are being implemented across HDUHB. To maximise patient safety and other clinical benefit, an eObs system is required. ✓ eObs are expected to reduce errors and admin time for staff. ✓ eObs are expected to increase patient safety by enabling early intervention. × Not the highest priority needs of clinical staff.
Patient Flow Only.	Implement a patient flow system.	Taken forward.	<ul style="list-style-type: none"> ✓ Patient flow affects all clinicians. HDUHB faces serious patient flow constraints that impact negatively on patient safety. ✓ Improvements through digital technologies can have significant positive impact on bed capacity management and managing patient handovers and transfers. This ultimately reduces length of patient stays and improves care. ✓ HDUHB currently face a lack of clinical staff and more efficient processes enable clinical staff to focus on patient care instead of administrative tasks.
eObs + Patient Flow.	Implement both eObs and patient flow technology.	Taken forward.	<ul style="list-style-type: none"> ✓ Addresses all needs (such as increasing efficiencies, improving communication and automating tasks where possible) highlighted by staff. ✓ Implementing both provides a seamless journey of digital information, removing need for time consuming manual input, and giving a more complete view of the patient's health history. ✓ Maximises benefit.

For the shortlisted options, both 'doing nothing' and 'doing something' were taken forward as shown in the figure below:

Figure 6: Short list of options overview



This resulted in the shortlist of option outlined in Table 5.

Table 5: Short list of options

Option	Description
Option 1: Do nothing	Existing paper-based systems are not replaced
Option 2: Incrementally implement eObs solution only across all sites	A configurable "off the shelf" solution for eObs is procured and implemented across acute and community hospitals, as well as supporting patients at home.
Option 3: Incrementally implement patient flow solutions only across all sites	Configurable "off the shelf" patient flow solutions are procured and implemented across acute and community hospitals.
Option 4: Incrementally implement both eObs and patient flow solutions across all sites	Configurable "off the shelf" eObs and patient flow solutions are procured and implemented across acute and community hospitals. These will also support patients at home.

2.3. Benefit Assessment

This section describes the appraisal of the shortlisted options in relation to non-financial benefits. It describes the benefits framework employed and presents the results of the appraisal of the shortlisted options against this framework.

The key benefits identified that are expected to be realised by eObs and electronic patient flow solutions are described in Table 6 below. These benefits outline how replacing the current paper-based processes will provide improved clinical value, improved and sustainable operations and help management teams effectively manage demand. Discussions during the workshop highlighted the importance of retaining a focus on people-centred communication, where technology does not seek to replace in-person interactions.

Table 6: Qualitative Benefits

Category	Benefit Description
Increased efficiencies	

Category	Benefit Description
	<ul style="list-style-type: none"> • Bed and patient data is available at ward, hospital and organisation-wide level to better manage capacity, ensuring the right person is at the right place at the right time and reducing wait times. • Data is readily available for audits in a structured format. • Easy access to up-to-date data on patient status leads to improved handovers and quicker discharges. • Quicker response times for ambulances due to reduced time waiting at the hospital. • Time savings due to reduced admin time and improved decision-making. • Time savings due to remote monitoring and automation of tasks.
Organisational	<ul style="list-style-type: none"> • Increase in compliance due to more accurate, up-to-date data and increased efficiencies. • Reduced complaints and improved brand image due to better patient care. • Improved transfer of reliable information.
Patient experience	<ul style="list-style-type: none"> • Patients are no longer asked for the same information multiple times. • Staff have increased time to care and feeling less stressed. • Patients and families are aware of next steps and feel more informed.
Patient Outcomes	<ul style="list-style-type: none"> • Accurate information leads to reduced risk of patient harm, improving patient safety. • Timely access to information enables early intervention.
Staff experience	<ul style="list-style-type: none"> • Clinicians feel increased confidence due to access to more accurate information. • Improved decision-making due to access to timely and accurate information. • Reduced admin time releases time to care for patients, reducing stress levels. • Remote and easy access to up-to-date information.

Any quantitative savings will likely be the result of reduction in administrative activities, increased clinical capacity through more efficient processes and ultimately better outcomes for patients. Specific benefits that may result in cost savings include:

- Early identification of sepsis;
- Reduced litigation;
- Reduced number of falls;
- Using skills of staff in the best possible way (instead of spending lots of time on administrative tasks).

However, at this stage, it is not anticipated the introduction of electronic observations and patient flow solutions will enable significant monetary benefits. Given the current level of demand faced by healthcare staff in Hywel Dda University Health Board, any released capacity is highly likely to be required to be reinvested in addressing existing constraints in provision of care for patients. Therefore, while monetary savings are not explicitly included in the economic or financial appraisal elements of this business case, the equivalent monetary value of non-cash efficiency savings has been provided as an additional indicator of the impact of introducing patient flow and eObs solutions. Once the solution is more fully understood following the procurement it will be possible to further quantify efficiencies at FBC stage.

A weighting and scoring exercise was undertaken to rank each of the shortlisted options in terms of their relative non-financial benefit. The purpose of this assessment was to understand any differential between shortlisted options in non-monetary terms.

It should be noted that the status quo option was not scored against either benefit or risk. The key factor to consider was whether any of the options introduced additional benefits in comparison to benefits already delivered under existing arrangements. As such, the status quo option would be judged to score zero across all benefit categories.

The scoring of the short-listed options using the benefits evaluation criteria is presented in Table 7. A detailed explanation of how the total weighed benefit score has been calculated can be found in Appendix B.

Table 7: Benefits Assessment

Benefit Type	Benefit	Weighting (%)	Average Score		
			Option 2: eObs Only	Option 3: Patient Flow Only	Option 4: eObs + Patient Flow
Increased efficiencies	Access to electronic patient information that is synchronised across systems leads to reduced manual admin work.*(1)	5.6%			
	Access to real-time data leads to faster bed turnover.	5.2%			
	Bed and patient data is available at ward, hospital and organisation-wide level to better manage capacity and reduce wait times.	5.2%			
	Data is readily available for audits in a structured format.*(1)	4.1%			
	Easy access to up-to-date data on patient status leads to improved handovers and quicker discharges.*(2)	5.2%			
	Quicker response times for ambulances due to reduced time waiting at the hospital.	5.2%			
	Time savings due to reduced admin time and improved decision-making.*(1)	4.9%			
	Time savings due to remote monitoring and automation of tasks.*(1)	4.9%			
Organisational	Increase in compliance due to more accurate, up-to-date data and increased efficiencies.	5.2%			
	Reduced complaints and improved brand image due to better patient care.*(4)	4.1%			
	Improved transfer of reliable information.*(3)	5.2%			
Patient Experience (PREMs)	Patients are no longer asked for the same information multiple times.*(1)	5.2%			
	Staff have increased time to care and feel less stressed, resulting in a better care experience.	4.9%			
	Patients and families are aware of next steps and feel more informed.	5.2%			
Patient Outcomes	Accurate information leads to reduced risk of patient harm, improving patient safety.*(4)	5.2%			
	Timely access to information enables early intervention.*(2,3)	4.9%			
Staff Experience	Doctors, AHPs. etc. feel increased confidence due to access to more accurate information.	4.1%			
	Improved decision-making due to access to timely and accurate information.*(4)	5.2%			
	Reduced admin time releases time to care for patients, reducing stress levels.	5.2%			
	Remote and easy access to up-to-date information.*(1)	4.9%			
Total Weighted Benefits Points			221.4	292.2	325.6

*(1), (2), (3) and (4) Economic Benefits described in more detail in Section 2.3.1

Option 4, implementing both eObs and Patient Flow, received the highest benefit score for non-financial benefits, reflecting that introducing both solutions would result in the biggest efficiency increases and improvements in staff and patient experience. Table 7 highlights that the perceived potential benefits of Options 2 and 3 are not as high. As mentioned above, Option 1, doing nothing, is expected to introduce no additional benefits to HDUHB.

2.3.1. Economic Benefit

As outlined in the strategic case, evidence from case studies suggests that eObs and Patient Flow solutions can result in improved efficiencies, better patient care and ultimately economic

benefit. These economic benefits are outlined in Table 8 below. It is important to highlight that we believe these benefits will not result in cash-releasing financial benefit. Instead, they represent the possibility of reinvesting resources into the Health Board.

Table 8: Potential Economic Benefit Impact

Relevant benefit(s)	Evidence and assumptions	Potential impact
(1)	By reducing time spent on administrative tasks using a mobile device can release up to 66 minutes of nursing time per 12-hour shift. ³⁵	Current systems are slow and there is a limited number of desktop devices. Furthermore, as most processes are paper based with significant duplication of effort, staff spend lots of time on administrative tasks. For example, doctors have difficulty knowing where their patients are as there is no clear overview for bed management and spend lots of time walking around between wards to see patients. Similarly, to view a patient's observations, clinical staff have to go to a patient's bed and view the physical chart at the end of the bed. Being able to access such data on a mobile device would allow staff to easily review relevant data without spending time to physically find the information.
(2)	<p>Evidence from case studies suggests that the length of hospital stays for patients can be reduced by 12-30%.^{36,37}</p> <ul style="list-style-type: none"> • Mean Length of Stay for Patients in HDUHB in 2020/21: 6.9 days³⁸ • Number of admissions in HDUHB in 2020/21: 69,761³⁹ • Estimated bed day cost (acute): £250 • Assume that hospital stays are reduced for 10% of the population. • Assume reduction in length of stay is 12%. 	By enabling early detection of issues through automated, regular capture of patient observations, clinicians can intervene and prevent deterioration and incidents, such as heart attacks or sepsis. Furthermore, if remote monitoring is implemented, this not only provides significant benefit for patient safety ⁴⁰ but may also allow clinicians to discharge people earlier and continue to monitor them in their own homes. At the same time technologies that support patient flow help clinical staff manage handovers and transfers more effectively, which results in reducing the time it takes until a patient is ready for discharge. Based on the assumptions outlined in this table, it is estimated that if mean Length of Stay could be reduced to 6.1 days for 10% of the target patient population, the efficiency saving would be the equivalent of ~£1.44m in bed day costs annually, by reducing patient's length of stay, and as such the number of hospital bed days. Note that this assumes that both eObs and Patient Flow solutions are implemented.
(3)	A study has shown that eObs and Patient flow technology (handover systems) can lead to a 10% ⁴¹ reduction in total unplanned admissions to critical care units from eObs-equipped wards. Similarly, following eObs implementation Nottingham University Hospital experienced a 16% ⁴² reduction in unplanned critical bed care days in ICU/ITU.	<p>eObs enables automated escalation when patients deteriorate by calculating a risk score (e.g. NEWS) and assessing patients for their risk of sepsis (and other potential issues). This means clinicians intervene early and are able to prevent significant incidents. Similarly, electronic patient handover systems ensure that errors are minimised (e.g. due to illegible handwriting). As a result, fewer patients are admitted to intensive care units, where beds carry a significantly higher cost.</p> <p>Once eObs is rolled out into the community for effective Remote Patient Monitoring, it is likely that this will also contribute to reducing acute care use. Research has shown that Remote Monitoring can reduce acute care use for patients with cardiovascular disease and COPD.⁴³ However, it is important to</p>

³⁵ National ePatient Flow Management Programme OBC (Dec 2018) – Appendix 11

³⁶ Nervecentre. October 2016. A Whole-Hospital Mobile Solution-Nervecentre Support for Efficient Patient Flow

³⁷ Allocate Software - NHS Wales ePatient Flow Management programme PIN (Presentation)

³⁸ PEDW data 202/21 <https://dhcw.nhs.wales/information-services/health-intelligence/annual-pedw-data-tables/>

³⁹ PEDW data 202/21 <https://dhcw.nhs.wales/information-services/health-intelligence/annual-pedw-data-tables/>

⁴⁰ <https://jamanetwork.com/journals/jama/article-abstract/2789635>

⁴¹ <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6425312/>

⁴² Nervecentre. October 2016. A Whole-Hospital Mobile Solution-Nervecentre Support for Efficient Patient Flow

⁴³ <https://bmjopen.bmj.com/content/11/3/e040232>

Relevant benefit(s)	Evidence and assumptions	Potential impact
		note that a systematic literature review found that effectiveness varies within and between populations, as well as conditions.
(4)	Avoided risk of sepsis and related litigation.	The Sepsis Trust estimates that sepsis costs 48,000 lives in the UK annually. If a patient presenting symptoms of sepsis is not properly examined, misdiagnosed, or not treated in a timely manner if properly diagnosed, there may be a case of negligence caused by medical malpractice. This can lead to significant litigation cost for NHS organisation. According to the Sepsis Trust earlier identification and treatment across the UK would save 14,000 lives and result in 400,000 fewer days in hospital for patients every year. ⁴⁴ eObs systems provide automated sepsis assessments that can help alert clinicians if a patient may be suffering from sepsis and thus enable early identification and treatment.

2.4. Risk Assessment

A benefits and risks workshop focused on identifying the risks and potential mitigations. Table 9 details the risks identified.

Table 9: Risks and Mitigations

Risk	Description	Mitigations
Change Management: Staff adoption	Implementing eObs and patient flow technology will require significant change management, whereby clinicians and nurses will be required to change existing processes and adapt to new processes and technology. Staff may lack of willingness to adopt new systems and processes	<ul style="list-style-type: none"> • Prior to implementation of the technology assess the staff needs at each site and determine what changes in processes and policies are required; • Engage staff in the procurement process; • Identify local champions
Change Management: Training	There is a risk that inadequate training for the new systems will be provided and staff lack the digital skills to use the technology. This would result in low adoption of the tools, which means benefits would not be realised.	<ul style="list-style-type: none"> • Make adequate training available to staff - ensure that suppliers provide training materials and embed this as part of existing training processes (nurse induction training); • Ensure staff have time to attend training sessions by considering this when preparing rotas; • Provide access to ongoing support as required. During implementation ensure support staff is available on site; • Ensure that usability is a key requirement during the procurement process; • Identify local digital champions and enable clinicians training other clinicians;
Change Management: Meeting local needs	The acute and community hospitals at HDUHB have different processes and systems and there is a risk that the solution will not meet the needs of local sites.	<ul style="list-style-type: none"> • Ensure that the technology can be configured to meet local needs; • Provide adequate time and resource for change management processes; • Involve representatives from all sites in the procurement process

⁴⁴ <https://sepsistrust.org/wp-content/uploads/2019/01/UKST-volunteer-speaker-notes-2019.pdf>

Risk	Description	Mitigations
Change Management: Lack of Ownership	A lack of ownership leads to delays in implementation.	<ul style="list-style-type: none"> Involve key stakeholders in the procurement process; Provide clear ownership of workstreams to individuals; Ensure stakeholders outside of the digital team are involved throughout the process
Funding: Implementation	Lack of funding to support implementation of technology.	<ul style="list-style-type: none"> Ensure that the project is supported by the Director of Finance;
Funding: Rollout	Lack of funding to support rollout, including training, and additional time required by digital nurses.	<ul style="list-style-type: none"> Include additional rollout costs into the financial model;
Funding: Ongoing costs	Lack of funding to support ongoing revenue costs associated with the technology	<ul style="list-style-type: none"> Ensure that the project is supported by the Director of Finance; Get the business case approved by the agile business group and ensure they are supportive; Consider external sources of local funding (e.g. DPIF funding); Include in the Integrated medium term plan (IMTP)
Funding: Integration	Additional funding to integrate eObs technology with monitors/ devices may be required.	<ul style="list-style-type: none"> Ensure funding for integration is included in financial model
Implementation: Staff resourcing	There is a risk that the staff required to support these new processes will not be available due to challenges with recruitment.	<ul style="list-style-type: none"> Clearly identify staff requirements for implementation and rollout; Identify digital nurses/ local champions from existing staff
Implementation: Dual-running site	There is a risk that as the solution is implemented a site may be dual-running with some wards using the new digital technologies and some using traditional manual approaches. This can result in problems during handovers and when managing patient flow through the hospital.	<ul style="list-style-type: none"> Quick rollout of eObs to minimise the dual-running time at sites; Trial implementation during pilot to identify best way to implement and roll out technology; Liaise with site management teams to identify roll-out plans across services and wards that minimise the impact on dual-running
Implementation: Supplier delivery	The supplier is unable to deliver a fit for purpose solution within the required timescales.	<ul style="list-style-type: none"> Work with the supplier to develop a realistic timescale for the implementation; Carefully assess supplier capabilities, including site visits where possible
Implementation: Delay	System implementation takes longer than planned due to lack of resources.	<ul style="list-style-type: none"> Work with the supplier to develop a realistic timescale for the implementation; Ensure NHS resources are available as required; Identify digital nurse champions to support rollout
Implementation: Inappropriate solution	The system does not meet the needs of the users.	<ul style="list-style-type: none"> Ensure requirements are defined with clinical staff from relevant disciplines; Involve staff from all sites in the procurement process; Build on requirements identified in the national OBC as these were developed in conjunction with staff
Implementation: Estates Capability	Lack of estate capabilities to install any required hardware e.g. whiteboards.	<ul style="list-style-type: none"> Involve estates team early on in development of implementation plan
Infrastructure: Lack of space	There is a lack of space for electronic whiteboards on wards.	<ul style="list-style-type: none"> Assess wards to determine what space is available to install new technology; Consider utilising an electronic whiteboard as a noticeboard, too, so that both types of boards use the same space; Empower staff to identify where they could install this technology on their wards;

Risk	Description	Mitigations
Infrastructure: Disruption to BAU	Any disruption to the ward operations when power and cooling are being provisioned.	<ul style="list-style-type: none"> Minimise time of disruption as much as possible; Develop implementation plan in conjunction with wards
Infrastructure: Number of devices	There may not be enough devices available for staff to use the technology.	<ul style="list-style-type: none"> Assess current situation on wards to understand what is available and what is needed; Enable staff to use their own devices; Consider ipads on lanyards for clinicians
Infrastructure: Cyber incident	There is risk that the technology fails, for example due to a national cyber incident.	<ul style="list-style-type: none"> Develop robust disaster recovery plan; Develop robust business continuity plan
Infrastructure: Network coverage	Lack of wireless network on some wards means there will be a coverage gap and mobile devices may not be accessible.	<ul style="list-style-type: none"> Assess infrastructure needs for each site; Consider technology that can work offline; Install network/ WiFi as required on all wards; Command rooms updated at Withybush hospital
Information Governance: Patient confidentiality	There is a risk to information governance with patient data made available via a whiteboard in the ward.	<ul style="list-style-type: none"> Switch off whiteboard when not in use; Enable proximity login using ID badges
Interoperability: National systems	Difficulties of two way interfaces with WPAS means that some data may have to be re-keyed into WPAS at discharge by the ward clerk.	<ul style="list-style-type: none"> Identify integration opportunities for both pushing and pulling data; Work with suppliers to ensure integration is possible
Interoperability: Delay in integrations	Digital Health and Care Wales (DHCW) lack capacity to enable integration with national systems.	<ul style="list-style-type: none"> Ensure support of national teams, which can lobby to prioritise work completed by Digital Health and Care Wales; Escalation through SITREP meetings; Submit integration requests as early as possible. Engage with DHCW during the procurement process; Consider possibility of funding local interface support that work within DHCW but are focused on HDUHB
Interoperability: Connectivity to monitors/ devices	There is a risk that the eObs technology does not link in with monitors/ devices.	<ul style="list-style-type: none"> Ensure any system purchased can link in with Welsh Allyn monitors; Review integration requirements with the Clinical Engineering Team to ensure the system is future-proofed; Ensure devices that are purchased in the future are compatible
Interoperability: Future-proofing	The Welsh Intensive Care Information System (WICIS) delivered by ASCOM, which connects diagnostics and medical devices, is to be implemented at HDUHB in 2024. This implementation will have dependencies on eObs and patient flow.	<ul style="list-style-type: none"> Involve WICIS team in procurement process; WICIS will integrate with Welsh Clinical Portal - ensure eObs integrates with Welsh Clinical Portal so full information available in clinical portal

The above risks were scored by the workshop attendees to assess any differences between the options. The objective of the scoring exercise was to assess the level of risk that each option may introduce. Details of how the scores were calculated are available in Appendix B.

It should be noted that the status quo option was not scored against either benefit or risk. The key factor to consider was whether any of the options introduced additional or new risks in comparison to risk that already exist under existing arrangements. As such, the status quo option would be judged to score zero across all risk categories.

The scoring of the options using the risk evaluation criteria is presented below in Table 10.

Table 10: Risk Assessment

Risk	Option 2: eObs Only		Option 3: Patient Flow Only		Option 4: eObs + Patient Flow	
	Impact	Likelihood	Impact	Likelihood	Impact	Likelihood
Staff may lack of willingness to adopt new systems and processes	H	M	H	H	H	H
Inadequate training and lack of digital skills results in low adoption of the tools	H	H	H	M	H	H
The solution will not meet the needs of local sites.	L	M	M	M	M	M
A lack of ownership leads to delays in implementation.	H	M	H	M	H	M
Lack of funding to support implementation of technology.	M	H	H	M	H	H
Lack of funding to support rollout, including training, and additional time required by digital nurses.	H	M	M	M	H	M
Lack of funding to support ongoing revenue costs associated with the technology	M	M	M	M	M	M
Additional funding to integrate eObs technology with monitors/ devices may be required.	H	M	M	L	M	M
There is a risk that the staff required to support these new processes will not be available due to challenges with recruitment.	M	M	M	M	M	M
As the solution is implemented a site may be dual-running (technology & paper), which can result in problems during handovers.	M	M	M	M	M	M
The supplier is unable to deliver a fit for purpose solution within the required timescales.	H	L	H	L	H	L
System implementation takes longer than planned due to lack of resources.	M	M	M	M	M	M
The system does not meet the needs of the users.	H	M	H	M	H	M
Lack of estate capabilities to install any required hardware e.g. whiteboards.	M	M	M	M	M	M
There is a risk to information governance with patient data made available (via a whiteboard) in the ward.	L	L	M	L	M	L
There is a lack of space for electronic whiteboards on wards.	L	L	M	M	L	L
Any disruption to the ward operations when power and cooling are being provisioned.	M	M	M	L	M	L
There may not be enough devices available for staff to use the technology.	H	M	M	M	H	M
There is risk that the technology fails, for example due to a national cyber incident.	M	L	M	L	M	L
Lack of wireless network on some wards means there will be a coverage gap and mobile devices may not be accessible.	H	M	M	L	H	M
Difficulties of two way interfaces with WPAS means that some data may have to be re-keyed into WPAS at discharge by the ward clerk.	L	M	M	M	M	M

Risk	Option 2: eObs Only		Option 3: Patient Flow Only		Option 4: eObs + Patient Flow	
	Impact	Likelihood	Impact	Likelihood	Impact	Likelihood
DHCW lack capacity to enable interoperability with national systems.	H	M	H	M	H	M
There is a risk that the eObs technology does not link in with monitors/ devices.	M	M	L	L	M	M
eObs and Patient Flow technology will need to be integrated with WICIS, which is to be implemented in 2024.	M	M	M	L	M	M
Total Weighted Risks Points	472.2		442.1		512.6	

The risk scores for all three options were relatively close, indicating that there are similar levels of risk associated with implementing new solutions. However, implementing both eObs and patient flow solutions received the highest weighted risk score, reflecting the increased level of risk with introducing additional solutions. Given that introducing both solutions would require more resources, and would impact frontline staff the most, this makes sense. Mitigations for these risks are presented in Table 9 and further proposed in the Management Case.

Although Option 1, doing nothing, was not scored against introducing additional risk from an implementation perspective, not taking any action does present a significant risk for HDUHB. Due to challenges with resourcing, a growing elderly population and additional pressures introduced by COVID, the health service is struggling to meet demand. Staff we spoke to described overflowing Emergency Departments with patients spending up to 5 days in A&E, because they could not be admitted to a ward. The Welsh Ambulance Service (WAST) is currently losing between 70 and 85 hours per day per acute hospital in HDUHB, as ambulances wait outside, unable to admit patients. In turn, the ambulance service is unable to respond to emergency calls. This presents a significant risk to patient safety and negatively impacts staff, who are working under extreme pressures. There is a clear need to improve efficiencies, particularly with regards to managing patient flow, and introducing technologies to support staff are a first important step in this journey.

2.5. Assumptions

The assumptions that underpin the cost model are outlined below.

2.5.1. Implementation Timeline

The full draft implementation plan and approach is set out in Section 5.2. Implementation will follow an incremental approach with the technology being rolled out site by site and ward by ward in the following order:

- Pilot:
 1. South Pembrokeshire Hospital
- Acute Hospitals
 2. Prince Philip Hospital
 3. Glangwili Hospital
 4. Bronglais Hospital
 5. Wlithybush Hospital
- Community Hospitals
 6. Amman Valley Hospital
 7. Ty Bryngwyn Mawr
 8. Llandovery Hospital

- 9. Tregaron Hospital
- 10. Park House Court Hospice
- Mental Health
- 11. Mental Health Wards

Note that while the above timeline was used to calculate costs, this is currently a draft version and subject to change. The pilot site still has to be confirmed and it is possible that the first acute hospital will be a site that has an A&E department (for example WGH, GGH or BGH).

2.5.2. Hardware

The below hardware costs were included in the model. However, note that these are not considered core costs for the business case and are indicative costs that may be covered by separate funding. The assumption was made that devices would be purchased on a rolling programme over the first 2 years (equal split). This is because a one of capital investment is risky given that implementation is happening over a period of 3 years, devices are upgraded regularly, and hardware can be procured when required.

Portable Devices

To calculate the number of portable devices, the assumption was made that the existing number of portable devices (8,206) would be increased by 10%. This number is based on the assumption that staff will be able to use their own smartphones. The costs for laptops, tablets, smartphones and carts are based on an existing hardware framework used by HDUHB. The costs for charging stations have been estimated based on online pricing. Details of the underlying assumptions are outlined in Appendix C.

Electronic Whiteboards

The following assumptions were made to calculate the cost of electronic whiteboards:

- Each ward will require one electronic whiteboard.
- There are 83 wards in total across all acute, community and mental health sites.
- Currently there are no electronic whiteboards in HDUHB.
- The cost per whiteboard (based on market analysis and assumed touch screen functionality) is **£4,500**.
- These would not be purchased for an eObs only solution.

2.5.3. Network Upgrade

Network upgrades are currently being carried out across all acute sites in HDUHB. In order for the proposed solutions to function, these will be essential. We have therefore included a cost estimate for network upgrades. However, these are not considered part of the core costing for this business case and may be covered by separate funding.

Wifi Access Points

- There are currently an estimated 3 access points per ward.
- An additional 2 access points per ward are required.
- There are 83 wards.
- The cost per access point is £190.

2.5.4. Integration

We identified that three key interfaces with existing national systems would need to be developed to enable integration with the eObs/ Patient flow solutions:

- Welsh Nursing Care Record (WNCR)
- Welsh Clinical Portal (WCP)
- Welsh Patient Administration System (WPAS)

Based on previous costs provided by Digital Health and Care Wales for building these interfaces, the costs were estimated as follows:

- Cost per interface: £15,000
- Annual recurring cost per interface: £3,000

2.5.5. Supplier Costs

Based on a short market sounding exercise, three suppliers provided cost estimates for the implementation of eObs and Patient Flow technology. For each solution, a range of capabilities can be deployed, and costs vary depending on which capabilities are selected. A range of costs is provided depending on the selected capabilities.

For eObs the lower range of the costs include eObs capture, warning score calculation and bedside assessments. The high range of the costs includes alerts and remote monitoring/virtual ward functionality (from the supplier side, assuming straightforward integration).

For Patient Flow the lower range of the costs include patient handover, bed capacity management, and task management. The higher end costs include command centre capabilities, predictive capacity planning and remote monitoring/virtual ward functionality.

License

- Separate license costs were provided for eObs and Patient Flow.
- The license costs are for an upfront enterprise-wide license model.
- A range of license costs was provided to reflect the fact that the costs will vary depending on functionality selected.

Implementation

- Separate implementation costs were provided for eObs and Patient Flow.
- The implementation costs include integration and configuration.
- The costs are added on across the three-year implementation period based on the implementation timeline.
- Implementation costs are estimated per site based on the size of the site, which was calculated on the relative number of wards. Details for this calculation are set out in Appendix C.

Annual Support and Hosting

- This assumes cloud hosting by the supplier.
- Annual Support and Hosting costs are assumed to start once a site goes live.
- The costs are added in as each site goes live according to the implementation timeline.
- Annual support and hosting costs are estimated per site based on the size of the site, which was calculated on the relative number of wards. Details for this calculation are set out in Appendix C.

2.5.6. NHS Resourcing

Implementation Team

The table below shows all roles required for implementing the eObs and Patient Flow solutions. It is assumed that some of these roles will be absorbed in existing functions. The cost for the full team has been included in the Economic Case, however, the Financial Case reflects only the expected additional cost.

The below implementation team is required to implement both eObs and Patient Flow (Option 3). To represent the costs for Options 2 (eObs only) and Option 3 (Patient Flow only), it was assumed that the cost for the implementation team would be reduced by 25%.

Table 11: Implementation Team Costs for implementing both eObs and Patient Flow

Role	Band	WTE	Annual Salary	Duration (Months)	Absorbed by Existing Role?	Total Cost
Product Specialist*	7	0.25	£59,290	24	Y	£0
Senior Responsible Owner*	9	0.1	£122,486	36	Y	£0
Programme Lead	8A	1	£60,988	36	N	£182,964
CNIO*	8A	0.4	£60,988	36	Y	£0
CCIO*	N/A	0.4	£100,000**	36	Y	£0
Project Manager	7	2	£59,290	36	N	£355,740
Change Design Officer	6	1	£50,302	30	N	£125,755
Benefits Lead*	7	0.35	£50,302	36	Y	£0
Clinical Safety*	7	0.1	£59,290	36	Y	£0
Config and Implementation - Clinical Lead*	6	0.6	£50,302	36	Y	£0
Technical Implementation Lead	6	0.5	£50,302	24	N	£100,604
Test Lead*	6	0.5	£50,302	30	Y	£0
Application Support Trainers	5	2	£40,416	30	N	£202,080
Project Support Officer	5	1	£40,416	36	N	£121,248
				Total over 3 years		£1,088,391

*Role to be absorbed by existing staff.

**Estimated midpoint salary for consultant in the NHS

BAU Team

The table below shows all roles required for BAU running of the eObs and Patient Flow solutions. It is assumed that some of these roles will be absorbed in existing functions. The cost for the full team has been included in the Economic Case, however, the Financial Case reflects only the expected additional cost.

The below BAU team is required to implement both eObs and Patient Flow (Option 3). To represent the costs for Options 2 (eObs only) and Option 3 (Patient Flow only), it was assumed that the cost for the BAU team would be reduced by 25%.

Table 12: BAU Team Costs for implementing both eObs and Patient Flow

Role	Band	WTE	Annual Salary	Duration (Months)	Absorbed by Existing Role?	Total Cost
Product Specialist*	7	0.25	£59,290	24	Y	£0
Application Support	5	1.5	£40,416	24	N	£121,248
Clinical Safety Representative*	8A	0.25	£60,988	24	Y	£0
Trainers*	5	1	£40,416	24	Y	£0

Role	Band	WTE	Annual Salary	Duration (Months)	Absorbed by Existing Role?	Total Cost
Digital Senior Support Technician	5	1	£40,416	24	N	£80,832
*Role to be absorbed by existing staff.		1	£27,542	24	N	£55,084
2.5.7. Optimism Bias and Contingency				Total over 2 years		£257,164

The Treasury Green Book published in 2003 introduced a requirement for an adjustment to be made for optimism bias in all business cases. This refers to the known tendency for the costs of projects to be underestimated, particularly in the early stages of developing and costing projects. The adjustment for optimism bias and contingency is a requirement to make explicit, upward adjustments to the costs to counteract this known tendency.

In this business case contingency adjustments have been applied across all cost lines as follows:

- **An optimism bias figure of 22%** has been applied to all hardware, infrastructure, integration, and supplier costs.
- **An optimism bias figure of 0%** has been applied to the Implementation and BAU teams, as these reflect the highest level of resourcing that is expected to implement the solution.

This equates to an additional c£100k to £700k over the 5-year period depending on the scenario selected. The level of optimism bias applied has been influenced by a number of factors, including:

- The contract structure being defined as an existing framework will be used for procurement.
- Project management team requirements and structure identified and defined.
- The technology being well established across NHS organisations.
- The limited supplier involvement in developing the implementation approach.
- The need to develop detailed requirements.

Further detail behind the optimism bias calculation can be found in Appendix D.

2.6. Total Economic Cost

The estimated economic cost of each implementation option has been calculated based on the assumptions outlined in the previous section. These are the full costs for a 5-year period.

The table below represents the total economic costs for the following scenario:

- **Hardware and infrastructure:** Includes hardware and infrastructure costs
- **NHS resourcing:** Shows full economic costs for the BAU and implementation teams
- **Solution options:** Includes both eObs and Patient Flow solutions
- **Capabilities:** Represents the cost for purchasing the full functionality for both eObs and Patient Flow solutions.

The table below illustrates that the five-year Total Economic Cost (incl. Optimism Bias) for HDUHB will be between £3.3m (Option 2) and £5.9m (Option 4) including the costs for existing local NHS resources. Upfront licence costs account for £0.45m (Option 2 and 3) to £0.9m (Option 4), with the HDUHB Implementation Team fee being the largest cost at £1.5m. Recurring revenue costs will be in the region of £0.51m per annum for Option 4. As expected, implementing both eObs and Patient Flow (Option 4) represents the highest total economic cost. However, based on the assumptions set out in Section 2.3.1 it is expected that combined implementation of these solutions (Option 4) could deliver a total economic benefit of ~£5m over the 5 years by reducing patient's length of hospital stay and thus reducing bed days. The

assumption is that the majority of this benefit would be delivered from patient flow technology improving bed capacity management and movement of patients through the system.

Table 13: Total Economic Cost Comparison

Cost Line	Cost type	Option 2: eObs Only	Option 3: Patient Flow Only	Option 4: eObs + Patient Flow
Device Purchases	NRC	512,868	886,368	886,368
Network Upgrades	NRC	31,540	31,540	31,540
HDUHB Implementation Team	NRR	1,173,270	1,173,270	1,564,361
HDHUB BAU Team	RR	298,601	298,601	398,135
National integration – Interface Build	NRR	45,000	45,000	45,000
National integration - Annual support	RR	36,000	36,000	36,000
eObs - Licence	NRC	450,000	-	450,000
eObs - Implementation	NRR	75,000	-	75,000
eObs - Annual support and hosting	RR	378,569	-	378,569
Patient Flow - Licence	NRC	-	450,000	450,000
Patient Flow - Implementation	NRR	-	300,000	300,000
Patient Flow - Annual support and hosting	RR	-	549,940	549,940
	Total	3,000,849	3,770,719	5,164,913
<i>Breakdown by cost type</i>				
	Non-Recurring Capital (NRC) TOTAL	994,408	1,367,908	1,817,908
	Non-Recurring Revenue (NRR) TOTAL	1,293,270	1,518,270	1,984,361
	Recurring Revenue (RR) TOTAL	713,171	884,541	1,362,644
	Optimism Bias	336,375	505,747	704,532
	Total with Contingency	3,337,224	4,276,466	5,869,444

2.7. Preferred Option

Based on the expected benefits and needs expressed by staff across HDUHB, the preferred option is to implement both eObs and Patient Flow technology. This is because an eObs solution is expected to maximise benefit to be realised from introducing Welsh Allyn monitors across all wards by automatically capturing patient observations and enabling appropriate escalation. It is expected that an eObs solution will save staff time and improve patient safety by ensuring observations are captured regularly and enabling early intervention. From the perspective of clinical and operational staff, patient flow technology represents a key need to help improve current inefficiencies in processes that rely on paper and phone calls. A patient flow system will create visibility of capacity across the Health Board, and capabilities such as electronic patient handover will save time and reduce errors.

The total Economic Cost for the preferred option is presented in Table 14. The costs are outlined for the following scenario:

- **Hardware and infrastructure:** Includes hardware and infrastructure costs
- **NHS Resourcing:** Shows full economic costs for the BAU and implementation teams
- **Solution options:** Includes both eObs and Patient Flow solutions

- **Capabilities:** Represents the cost for purchasing the full functionality for both eObs and Patient Flow solutions.

Table 14: Total Economic Costs - Scenario 1

Cost Line	Cost type	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Device Purchases	NRC	443,184	443,184	-	-	-	886,368
Network Upgrades	NRC	15,770	15,770	-	-	-	31,540
HDUHB Implementation Team	NRR	519,661	560,077	484,624	-	-	1,564,361
HDHUB BAU Team	RR	-	-	-	199,068	199,068	398,135
National integration – Interface Build	NRR	45,000	-	-	-	-	45,000
National integration - Annual support	RR	-	9,000	9,000	9,000	9,000	36,000
e-Obs - Licence	NRC	450,000	-	-	-	-	450,000
e-Obs - Implementation	NRR	904	54,669	19,428	-	-	75,000
e-Obs - Annual support and hosting	RR	-	11,386	97,184	135,000	135,000	378,569
Patient Flow - Licence	NRC	450,000	-	-	-	-	450,000
Patient Flow - Implementation	NRR	27,108	227,711	45,181	-	-	300,000
Patient Flow - Annual support and hosting	RR	-	56,837	153,102	170,000	170,000	549,940
	Total	1,951,627	1,378,633	808,518	513,068	513,068	5,164,913
	NRC TOTAL	1,358,954	458,954	-	-	-	1,817,908
	NRR TOTAL	592,673	842,456	549,232	-	-	1,984,361
	RR TOTAL	-	77,223	259,286	513,068	513,068	1,362,644
	Optimism Bias	315,033	180,082	71,257	69,080	69,080	704,532
	Total with Contingency	2,266,659	1,558,715	879,775	582,148	582,148	5,869,444
	Potential Economic Benefit*	-	-730,690	-1,444,052	-1,444,052	-1,444,052	-5,062,846

*Note that it has been assumed that the Economic Benefit would only be delivered once implementation is complete at each site. South Pembrokeshire, Prince Philip and Glangwili (50.6% of capacity) are expected to have implementation completed in Year 2.

The Total Economic Cost of implementing both eObs and Patient Flow is calculated at £5.9m including Optimism Bias. Costs for additional scenarios are presented in Appendix E.

3. Financial Case

3.1. Financial Assumptions

A number of additional financial assumptions have been included in the business case as outlined below.

Accounting Treatment. It has been assumed that the initial purchase devices, network upgrades, and license for eObs and Patient Flow will be a capital expenditure. Additional services provided by the supplier, as well as the annual support, maintenance and hosting fees and costs for the implementation and BAU team have been treated as revenue expenditure.

VAT Position. It has been assumed in the cost model that VAT will be payable at the standard rate of 20% on all hardware and infrastructure costs (device purchases and network upgrades), as well as all supplier costs (licence costs, supplier implementation support, and ongoing support). Given that HDUHB will be purchasing existing software, the assumption has been made that VAT is not recoverable. It is possible that VAT could be recovered on the ongoing service provision, although this is subject to the service being considered a fully managed service that has been sufficiently customised by HMRC, and a decision will need to be sought to determine whether VAT can be recovered.

Indexation. Per Office of Budget Responsibility (OBR), inflation is set to rise in the short term before returning to target levels. Assuming a modelling term beginning in 2023 (base year), we have used the OBR's estimate of inflation for Year 1 (6.6% - OBR estimate rate for March 2023) and the Bank of England target rate of 2% from Year 2 onwards.

Capital Depreciation. Capital expenditure has been depreciated using the straight-line method over five years. Depreciation will start in the year of purchase, depreciating the full Capital costs until being fully written down at the end of year five. This is accounted for as Non-Core costs, and as such is shown as a separate line item below the Total Financial Cost.

It is recommended that these issues are considered further as part of the development of subsequent local business cases.

3.2. Financial Cost

All financial costs have been calculated for the preferred option based on the following scenario:

- **Hardware and infrastructure:** Includes hardware and infrastructure costs
- **NHS Resourcing:** Includes additional costs only for the BAU and implementation teams
- **Solution options:** Includes both eObs and Patient Flow solutions
- **Capabilities:** Represents the cost for purchasing the full functionality for both eObs and Patient Flow solutions.

The table below illustrates that the total financial cost to HDUHB, when allowing for costs associated with VAT, capital charges and CPI indexation. These bring the total estimated cost to £6.3m over a 5-year period.

Table 15: Total Financial Cost

Cost Line	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Total with Contingency	2,108,003	1,400,059	721,118	511,662	511,662	5,252,504
NRC VAT	331,585	111,985	-	-	-	443,570
NRR VAT	8,815	68,901	15,764	-	-	93,480
RR VAT	-	17,042	61,466	74,816	74,816	228,140
Total VAT	340,400	197,928	77,230	74,816	74,816	765,190

Cost Line	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Indexation Rate	<i>1.07</i>	<i>1.02</i>	<i>1.02</i>	<i>1.02</i>	<i>1.02</i>	
NRC (incl. VAT and Indexation)	2,120,816	685,347	-	-	-	2,806,163
NRR (incl. VAT and Indexation)	489,181	831,120	428,965	-	-	1,749,266
RR (incl. VAT and Indexation)	-	113,479	385,351	598,208	598,208	1,695,245
Total (incl. VAT and indexation)	2,609,997	1,629,946	814,316	598,208	598,208	6,250,674
Annual Depreciation	-271,791	-658,320	-658,320	-658,320	-658,320	
Existing Local Implementation Resources	143,052	143,052	143,052	-	-	
Existing Local BAU Resources	-	-	-	70,486	70,486	

3.3. Affordability

HDUHB will seek 50% of the funding for this project locally and seek match funding from Welsh Government for the remaining 50%.

4. Commercial Case

4.1. Introduction

The Commercial Case outlines the proposed procurement in relation to the preferred option outlined in Section 2.2. It considers a range of procurement elements required to deliver eObs and Patient Flow solutions, including scope, procurement procedure, approach and timetable. Following approval of this OBC these considerations should be further developed and detailed in the procurement strategy.

4.2. Required Services

At time of drafting this OBC a detailed specification is under development. At this stage the procurement scope is envisaged to include the following key components:

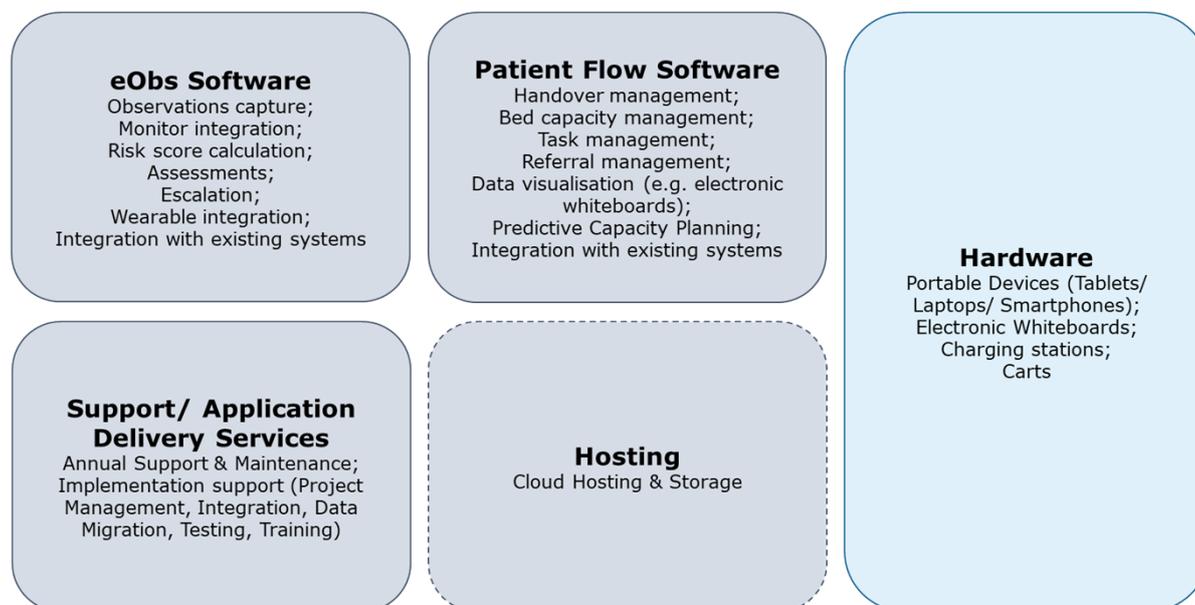
- eObs software
- Patient Flow software
- Support/ Application Delivery Services
- Hosting (Note that the preferred option is to host the solution on the HDUHB own Cloud system)
- Hardware

If the chosen solution, includes supplier hosting as well as annual support and maintenance (i.e. Software as a Service (SaaS), this may be considered a managed service. This will be confirmed during the procurement process.

The diagram below lays out the various functions, capabilities, devices and services that would be required in each of these areas.

Figure 7: Procurement Scope

Components to be procured



All new systems will need to integrate with the existing, national systems currently in use at HDUHB. It is also important to note that the eObs system will need to have MHRA accreditation if it performs functionality that classifies it as 'software as a medical device'.⁴⁵

The scope set out above was developed based on user research carried out with 26 clinical and operational staff from across HDUHB. The full user research report is available in Appendix A. The scope will be finalised during detailed requirement capture in the next phase of the procurement. These detailed requirements will be based on the user research carried out as part of this OBC, the requirements identified for the national OBC, and requirements previously captured when developing the TechFund application (e.g. a mock-up of an Electronic Whiteboard was developed at the time). The requirements will be refined by working with operational and clinical staff across the Health Board.

4.3. Procurement Approach

4.3.1. Hardware

The required hardware will be procured separately using existing hardware frameworks that HDUHB is currently utilising. To mitigate the risk of devices requiring upgrading, these will be procured on a rolling basis as implementation is carried out across the Health Board.

4.3.2. Software, Support/ Application Delivery Services & Hosting

A number of factors were considered in developing the procurement approach for the software and support/ application delivery services.

Existing vs Build Your Own solution

HDUHB are looking to implement a tried and tested existing solution rather than developing their own solution. This is because there is significant risk associated with being responsible for your own solution, and there are potential issues with getting the required software registered as a medical device.

The aim is to procure an existing solution that can be configured to meet local needs and enables Health Boards to incrementally add additional functionality as required.

Hosting

Cloud hosting has a number of benefits, such as enabling services to scale up and down to meet changing demand, and as such is the preferred approach. HDUHB's preferred option is to procure a software-only solution that can be hosted on their own local Cloud environment. This is because it makes it easier to manage integration with existing systems. As some suppliers only offer their patient flow solutions as Software as a Service (SaaS), this will need to be discussed with the suppliers in the next phase of the procurement.

Single vs Multiple Suppliers

While the patient observations and patient flow solutions could be procured from separate suppliers, procuring the solutions from the same supplier makes integration easier, and simplifies the procurement process. The main driver to procure together would be a seamless integration between eObs and the flow boards, as well as richer command centre views across the organisation, combining bed availability and flow with a view of deteriorating patients. This would be the recommended approach.

⁴⁵https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/99990/8/Software_flow_chart_Ed_1-08b-IVD.pdf

Procurement Routes

There are a number of procurement routes available, when seeking to procure and award contracts:

- **Open Procedure:** The Open procedure is a one-stage procurement process which covers exclusion grounds, selection criteria and award criteria. This is typically used where requirements are straightforward, and it is anticipated that only a small number of organisations will respond.
- **Restricted Procedure:** The Restricted procedure is a two-stage process: During the selection stage suppliers express their interest and are shortlisted via a Selection Questionnaire. Shortlisted suppliers are then invited to tender. This procedure is best used when it is anticipated that a large number of suppliers will respond or requirements are typically complex.
- **Competitive Procedure with Negotiation:** Procurement procedure under which contracting authorities may award a contract following evaluation of the bidders' initial tenders. Negotiations can take place on all aspects of the tenders other than minimum requirements. Not suitable for 'off the shelf' requirements.
- **Competitive Dialogue:** Enter into dialogue with suppliers until you find a solution that meets the needs of the organisation. Ideal for complex and high-risk solutions where there are gaps in the requirements, outcomes, contract or commercials.
- **Single Tender Action (STA):** STA is a procedure that could be used if it can be demonstrated that only one supplier can fulfil the requirements.
- **Innovation Partnership:** Enables organisations to develop innovative products, works or services where no suitable solution exists in the market and then to purchase the resulting products or services.
- **Framework Agreements:** Previously compliantly competed and awarded frameworks setting out the terms available for names authorities to award call off contracts. The frameworks are either *Single Supplier*, where an authority can direct award based on the guidance notes, or *Multi-Supplier*, where buyers will normally undertake a mini competition to select the appropriate service or product within the guidance of the framework. It should be noted that that a framework agreement is not a commitment contract; a 'call off' from a framework agreement is a commitment contract.

Given that the Health Board are aiming to procure well-established digital solutions and HDUHB's desire to move at pace, framework agreements were considered the most appropriate procurement route.

Existing vs New Framework

When exploring whether to set up a new framework or utilise an existing framework to procure the relevant software (incl. hosting and support/ application delivery services), the following considerations were made:

Table 16: Existing vs New Framework

	Using an existing framework	Setting up a new framework
Pros	<ul style="list-style-type: none"> • Quicker and easier process • A call off contract could include a clause to say that other Welsh Health Boards are in scope but there is no commitment required from them 	<ul style="list-style-type: none"> • Can set up framework that meets needs exactly • Can add other Health Boards in Wales as named parties
Cons	<ul style="list-style-type: none"> • Not all suppliers may be on the same framework • Lose opportunity for harmonising across Health Boards in Wales 	<ul style="list-style-type: none"> • Longer process as need to run full competition and negotiate T&Cs (6-12 months) • Additional cost due to extended process

	<ul style="list-style-type: none"> Different Health Boards may end up paying different prices for the same service 	
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The discussions concluded that given that the software is established and in use across NHS organisations, and that HDUHB are looking to implement as soon as possible, using an existing framework would provide the better option. It is important to note that when using an existing framework, HDUHB would only procure a solution for its own Health Board. There is the option to extend the scope to cover other Welsh Health Boards, however, the requirements would need to be specified carefully to make this feasible.

Working with HDUHB’s procurement team, several existing frameworks have been identified as potentially suitable for procuring the relevant software, including the frameworks set out in the below table:

Table 17: Potentially suitable frameworks

Framework	Considerations
The Health Systems Support Framework	<ul style="list-style-type: none"> A wide range of suppliers are on this framework, including Nervecentre, System C Healthcare and Cerner. The scope of the HSSF includes the following relevant service categories: enterprise-wide EPR systems, tools and applications that support direct patient care and system optimisation.
Healthcare Clinical Information Systems - NHS SBS	<ul style="list-style-type: none"> A wide range of suppliers are on this framework, including Alcidion, Servelec, and System C Healthcare. Direct award or mini competition possible Call off for a maximum of 5 years with extension of 2 years possible. Relevant lots: Core Healthcare Clinical Information Systems (Lot 1) and Integrated Emergency Care Systems (Lot 2)
Clinical Digital Solutions Framework (CDS)	<ul style="list-style-type: none"> 50 suppliers are on this framework, including Cerner, Servelec, Epic Systems Corporation and System C Healthcare. Allows for a Direct Award. Relevant solution type: Electronic Health and Care Record Solutions, patient Support System Solutions and Specialist Clinical System Solutions.
Clinical communications procurement framework	<ul style="list-style-type: none"> 24 suppliers are on this framework, including Alcidion, Nervecentre and System C Healthcare. This framework is specific to communication tools and would not cover the entire range of functionality covered within this business case.
G-Cloud 12 Framework	<ul style="list-style-type: none"> A wide range of suppliers are on this framework, including Alcidion and System C Healthcare. Relevant lots: Cloud Hosting (Lot 1), Cloud Software (Lot 2), Cloud Support (Lot 3).

Recommendation and timeline

Based on the scope and timescales, the recommended approach is to procure existing software solutions (including support/ application delivery services) using one of the existing frameworks. How the solution will be hosted will need to be agreed with the supplier. Procuring both eObs and Patient Flow from the same supplier would be the preferred option. However, to ensure that HDUHB procure the best possible solution, the approach will be to issue the requirements and allow suppliers to respond. Either option is feasible, and timescales will be similar. Further analysis should be undertaken, and a defined framework selected once the requirements have been clearly identified.

The indicative procurement timeline for the software is outlined below. The expectation is that the OBC will be ready for submission by early July. It will then have to go through HDUHB’s governance processes and gain approval from the Agile Digital Business Group and the Sustainable Resources Committee. If the Health Board moves forward with procurement, the final contract will need to be approved by the Welsh Government due to the expected value.

Table 18: Indicative procurement timeline

Milestone	Timeline
Final OBC Draft Ready for submission	July 2022
OBC Governance and Approvals	September 2022
Define detailed requirements	November 2022
Select relevant framework(s)	November 2022
Mini competition via framework: Prepare and Issue ITT, Evaluate Responses	December 2022
Preferred supplier selected	End of January 2023
Governance and Approvals (incl. FBC Sign Off)	March 2023
Implementation Starts	April 2023

A mini competition will involve the following steps:

1. **Prepare your Invitation To Tender (ITT):** Although HDUHB cannot change the basic terms or specification set out in the Framework (the scope of the agreement cannot substantially change), it can refine the requirements for eObs/ Patient Flow implementation. An output-based specification should be developed that sets-out what suppliers/the product need to achieve rather than how to achieve it. Selection criteria already evaluated during the Framework procurement (such as supplier experience, technical capability and accreditations etc.) cannot be included again at this stage in line with procurement regulations.
2. **Supplier Briefing and issue your ITT:** Brief suppliers. Issue all ITT documentation to suppliers on the Framework capable of meeting the requirements. The documentation should include clear instructions on how suppliers are expected to respond to the ITT and how they will be evaluated.
3. **Orals, Evaluate Responses and select Supplier:** Suppliers on the Framework agreement will be awarded a tender on the MEAT basis (Most Economically Advantageous Tender). HDUHB cannot use award criteria included in the Framework agreement. Each Tender will be subjected to a technical, commercial and financial analysis. The technical analysis will assess how well each Tender has met the criteria set down in the technical proposal, whilst the commercial and financial analysis will assess how each Tender has met the price criteria. HDUHB is not bound to accept the lowest quote, or any Tender.
4. **Award Contract:** Once the evaluation is complete the contract can be awarded. Award of the contract will be presented to the organisation which provides the closest match to HDUHB's expectations, and suppliers on the Framework should be notified of the award decision. The standstill period does not need to be applied at mini-competition, however, HDUHB should debrief suppliers if this is requested.

Note that the contract should clearly state that other Health Boards in Wales are included in the scope.

Contract Duration

The contract duration will depend on the framework selected, with different frameworks offering different extension periods. The maximum duration of a framework agreement is typically four years. Given that it is estimated that implementation across HDUHB will take 3 years, a longer contract duration is preferable, and HDUHB are ideally looking for a contract duration of 3+2+2.

5. Management Case

This section outlines the proposed governance approach, digital roadmap and high-level implementation plan for the project.

5.1. Governance

The overall project will be managed by a Programme Lead, who will lead the project team set up in Section 5.1.1 below. The project team will work closely with clinical and operational staff from all sites to ensure that requirements of the solutions meet the needs of users.

5.1.1. Project Team

During the first three years of the project, the project will be run by an Implementation team. Once implementation is complete, the Business As Usual (BAU) team will take over.

During the first three years, the implementation period, there will be two Project Managers: one to lead the Patient Flow rollout and one to lead the eObs rollout. Both will report to the Programme Lead, who reports to the Senior Responsible Officer. The table below outlines the full Implementation team. Note that some roles will be absorbed by existing staff.

Table 19: Implementation Team

Role	Description	Existing Role?
Senior Responsible Owner	To represent the project at an executive level. To advise on how project needs to meet strategic goals of the organisation. Final escalation point within project governance.	Y
Programme Lead	Overall day-to-day responsibility for project. Managing project managers. Engage and communicate at executive level within Health Board.	N
Chief Nursing Information Officer (CNIO)	To act as a point of reference across all aspects of the programme.	Y
Chief Clinical Information Officer (CCIO)	To act as a point of reference across all aspects of the programme.	Y
Project Manager	Manage daily project activities. Provide Trust wide project co-ordination. Communicate project status issues and events to Trust leadership. Provider Leadership to Project Team.	N
Change Design Officer	Oversee change requirements of the project and assess impact on change plan within the organisation. Support gap analysis, 'as is' process capture and future state process mapping. Deliver Change Action Plan. Support Benefits workstream as appropriate.	N
Benefits Lead	Involved in outputs of Business Change Gap Analysis undertaken for current state processes. Baseline all identified benefits and measure pre-go-live. Production of a clear benefits strategy and detailed plan. Establish working groups to focus on benefits. Pre and post go-live case study tasks to be completed and documented.	Y
Clinical Safety	Validate clinical risks and issues.	Y
Configuration and Implementation - Clinical Lead	Responsible for providing input into solution design and configuration from a clinical perspective.	Y
Technical Implementation Lead	Responsible for providing input into solution design and configuration from a system administration perspective.	N

Role	Description	Existing Role?
Test Lead	Responsible for testing strategy and approach.	Y
Application Support Trainers	Responsible for training strategy and approach. Management of trainers. Engagement with operational managers to coordinate and schedule training for operational staff to support business requirements. Sign-off training collateral and localised environment	N
Project Support Officer	Project support for project team, PMO duties	N

Three versions of the implementation team (Gold, Silver and Bronze) have been developed based on funding availability. The Gold team, outlined in the table above, has the highest number of resources to support an expected implementation period of three years. Given that this technology will be used by frontline staff and directly impact patient care, this is the recommended team size. Using a reduced staffing profile would add to the risk profile by extending timescales and possibly compromising the quality of the delivery.

Once implementation is complete, the BAU team will take over.

Role	Description	Existing Role?
Product Specialist	BAU point of contact. Representing the Health Board at regular Service and Performance Review meetings and ensuring ensure involvement of appropriate Health Board staff. To review and approve the supplier's Performance Monitoring System and Performance Reports. To provide all resources required to progress resolution of significant issues. To manage any third-party services not included as part of supplier's solution. To liaise with Supplier on Major Incidents (to cover any Major Incidents should they arise).	Y
Application Support	Setting up new users and their Role Based Access Control (RBAC) access rights, including the periodic synchronisation of Active Directory staff lists with solution staff registers. Updates of national and organisational reference files (e.g. Postcode, GP). Data quality activities such as Master Patient Index (MPI) duplicate checking and management of patient merges. Maintenance of print queues. support of any reports and dashboards created by the Health Board using the tools provided by the Supplier. Raise tickets/manage all issues as follow on from the issues raised with the Health Board service desk. Technical analyst for the management of iPads/iPads for solution and all front-end PCs. Carry out any ongoing testing required.	N
Clinical Safety Representative	Whilst not a requirement for the support and maintenance of the system, the Health Board nonetheless will be undertaking an ongoing programme of clinical content design, capture, and maintenance, including Clinical Narrative forms, care pathways and tasks. As part of this, the Health Board must conduct its own patient safety risk management process to manage and mitigate the clinical risk and ensure that the clinical content is being used in accordance with the requirements of ISB 0129 (DSCN 14/2009) and ISB 0160 (DSCN 18/2009). Reviewing Clinical Safety certificates when new versions are released	Y
Trainers	Carry out any refresher training or training of new users as part of BAU.	Y
Digital Senior Support Technician	Support and maintenance of systems, including software and hardware.	N

Service Desk	The service desk team are responsible for logging incidents, service requests and provide first line technical support.	N
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5.1.2. Evaluation User Group

To ensure that the requirements of the solution meet the needs of users, clinical and operational staff should be involved throughout the procurement and implementation process. The proposal is to set up an Evaluation User Group, which would consist of representatives from all clinical departments and all sites to ensure local needs are met.

5.1.3. Digital Champions

The rollout will be supported by local Digital Champions. Clinical staff within each site will be identified to act as a Digital Champion, and support engagement and rollout of staff.

5.2. Implementation Plan

This section sets out the digital roadmap and architecture map for the eObs and Patient Flow solutions. It also describes the implementation approach and provides a suggested timeline.

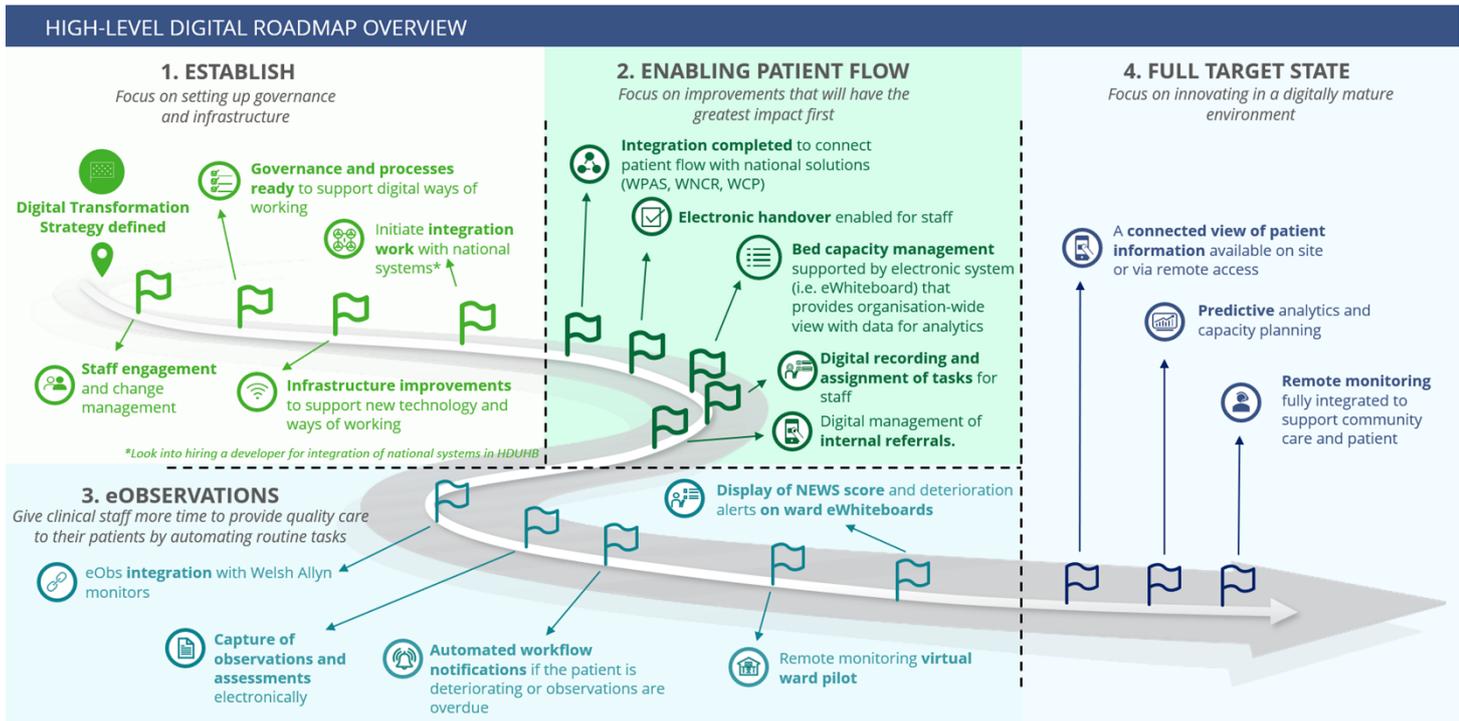
As per the preferred option Implementation will follow an incremental approach with the technology being rolled out site by site and ward by ward. The plan is to pilot the technology at South Pembrokeshire Community Hospital. Before starting implementation, work to enable integrations will need to be carried out.

Implementation will be prioritised at acute sites before moving into community hospitals and then covering mental health wards. The reason for prioritising acute sites is that they are currently facing the biggest challenges with regards to patient flow with ambulances waiting outside emergency departments, unable to admit patients to hospitals.

5.2.1. Digital Roadmap and Architecture Map

The Digital Roadmap (Figure 5) visualises the rollout of the Patient Flow and eObs solutions across four phases. The first phase focuses on setting up governance and processes, preparing the local infrastructure, and engaging staff on all levels, with communication and training. During phase 2 technology to support patient flow are introduced. Patient flow is being improved with digital tools, and their integration with existing systems. The third phase introduces improvements that build on existing capabilities. The focus is on giving clinical staff more time to provide quality care to their patients by automating routine tasks. The fourth and final phase makes HDUHB reach their full target state for this project. It builds on the technology set up in previous phases. This phase is about innovating with digitally mature eObs and patient flow technologies. Learnings from phases 2 and 3 will influence the vision of the full target state. An agile approach will enable HDUHB to make changes as required.

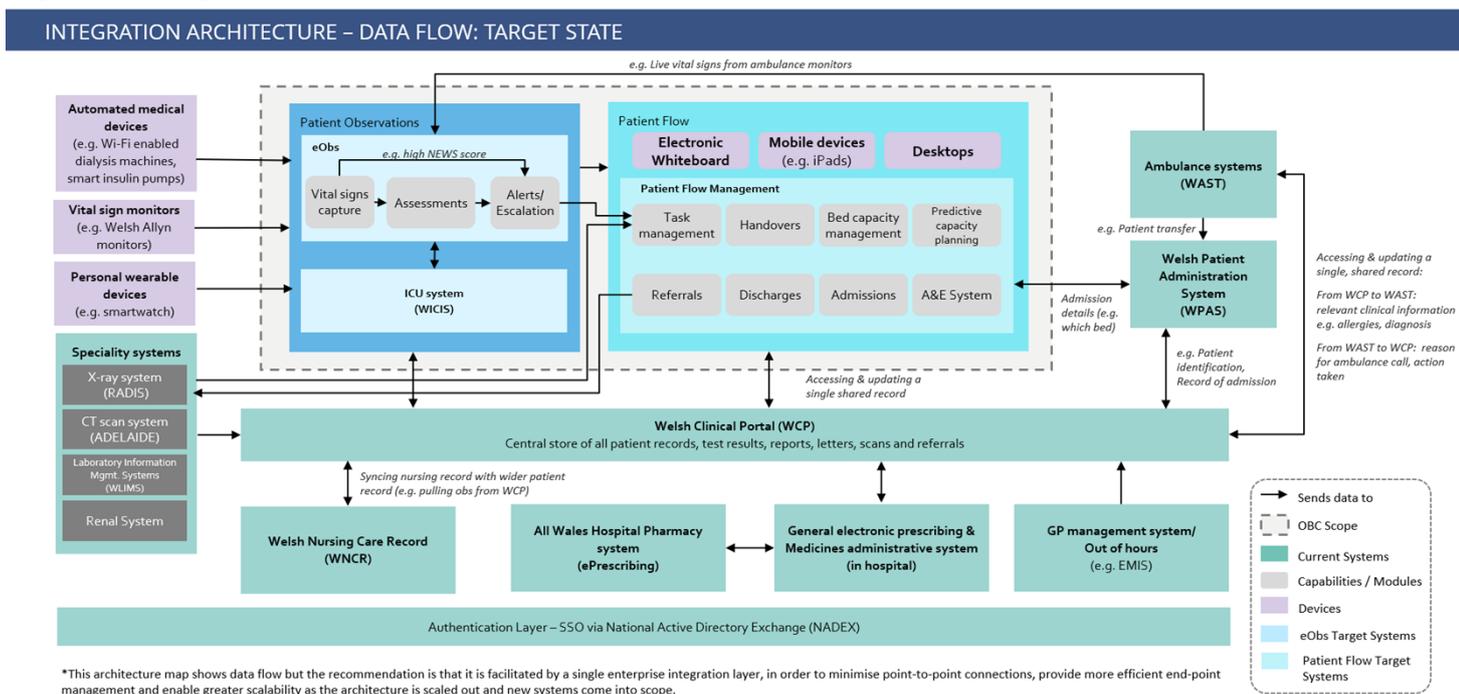
Figure 8: High Level Digital Roadmap



Detailed descriptions of each phase, as well as a capability map, are available in Appendix F.

To understand how the Patient Flow and eObs solutions will interact with existing local and national systems in use across HDUHB, an architecture map was developed. The map in Figure 9 below shows the future vision of how data will flow across some of the Board's foundation systems. This architecture map shows data flow but the recommendation is that it is facilitated by a single enterprise integration layer, in order to minimise point-to-point connections, provide more efficient end-point management and enable greater scalability as the architecture is scaled out and new systems come into scope.

Figure 9: Integration Architecture Map - Data Flow



5.2.2. Implementation Approach

Phase 1: Establish

During this phase the processes, governance and infrastructure to enable a successful implementation of patient observations and flow technology will be established. The workstreams in this phase include:

- **Staff engagement:** Communicate with clinical and operational staff to inform them of the planned changes via email or staff meetings. Run a Q&A session prior to implementing changes at local sites. Identify and establish local champions.
- **Staff training:** Offer IT basics training to staff, where digital literacy is low, to set a baseline of knowledge and make staff feel comfortable with the thought of introducing new systems. Educate staff on the benefits of new systems and how they will help improve patient care.
- **Infrastructure assessment and set up:** Assess the WiFi network, and existing hardware (number of available devices, speed of PCs etc). Ensure Welsh Allyn monitors are available for eObs. Upgrade existing infrastructure as required.
- **Governance assessment and set up:** Review current ways of working and assess existing processes, such as ADT (admission, discharges, transfers) compliance and policies support the introduction of new technology. Set up governance if required.
- **Integrations:** Prepare for integration of eObs and patient flow systems with existing systems, including WPAS, WNCR, Welsh Clinical Portal and Welsh Allyn Monitors. As required submit requests to DHCW. Plan for integration of future systems, such as the paging app for eObs alerts and WICIS.

Phases 2-4: Solution Rollout

- *Phase 2 – Enabling Patient Flow:* In this phase, technology to support patient flow will be implemented. This includes electronic whiteboards that will display key information from several systems. The implementation will start with a pilot at South Pembrokeshire Community Hospital. Initially, electronic handovers are enabled, followed by bed capacity management, task management and electronic referrals.
- *Phase 3 – eObs:* In this phase electronic capturing of observations, assessments and alerts will be rolled out across the acute and community sites. Initially, the solution will be piloted at South Pembrokeshire Community Hospital to develop a detailed implementation plan for sites. There is an opportunity to pilot remote monitoring at home with a small cohort of patients.
- *Phase 4 - Full Target State:* Technology to enable remote monitoring of patients in their own homes will be implemented, as well as more advanced data analytics to enable predictive capacity planning.

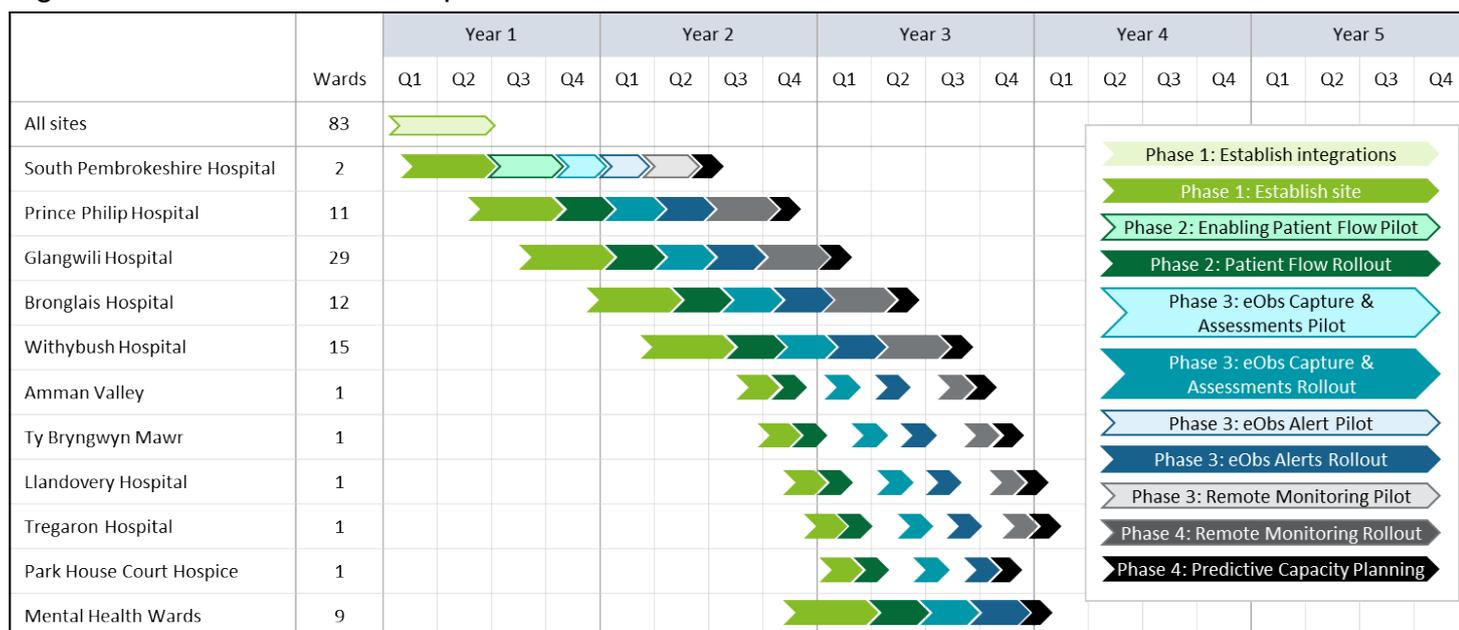
The solution rollout phases 2-4 will involve the following:

- **Finalise integrations:** Prior to rollout, all key integrations should be enabled. User research has highlighted the need for systems to integrate in order to deliver the expected benefits.
- **Configure solution:** Configure the solution to meet local needs (site and service needs) as appropriate.
- **Staff training:** Train staff on use of new solution.
- **Implement solution:** Implement technology.
- **Post Go-Live support:** Provide on-site support for staff following implementation.

5.2.3. Draft Implementation Timeline

The figure below sets out the suggested implementation timeline, which sees the rollout and eObs completed by Year 3:

Figure 10: Provisional Draft Implementation Timeline



The following assumptions were made when developing this timeline:

- **Phase 1: Establish Integrations** – Engagement with DHCW and may involve recruitment of a software engineer. It is expected that this will take up to 6 months.
- **Phase 1: Establish site** – This is estimated to take between 3 and 6 months for all sites other than Withybush. The infrastructure improvements currently underway at Withybush hospital are expected to take between 18 and 24 months. We have assumed that as the rollout progresses across HDUHB this will take less time, as governance/processes required are established at initial sites.
- **Phase 2: Enabling Patient Flow Pilot** – Based on work at NHS Lanarkshire and the capabilities included, we have assumed that the pilot will take between 4 and 6 months.
- **Phase 2: Patient Flow Rollout** – This will vary depending on the capabilities rolled out. We have assumed this include patient handover, bed capacity management, task management and referrals. Based on information provided by suppliers this is estimated to take 3 to 4 months per site. This includes on-site support of 2-3 weeks based on the WNCR Rollout.
- **Phase 3: eObs Pilot** – The eObs Pilot is split into ‘eObs Capture and Assessments’ and ‘Alerts’. This is based on experience captured from the NHS Lanarkshire reference site and information provided by the supplier. Each pilot phase is expected to last 2-3 months.
- **Phase 3: eObs Rollout** – Similarly to the pilot the rollout is split into ‘eObs Capture and Assessments’ and ‘Alerts’. Based on supplier and reference site information rollout at each site is expected to take 2-3 months. As the solutions are rolled out across HDUHB it is expected that speed of implementation will increase.
- **Phase 3: Remote Monitoring Pilot** – This pilot is expected to last 3-4 months to provide enough time to test the technology with citizens in the community and develop relevant governance and processes.
- **Phase 4: Remote Monitoring Rollout** – The remote monitoring rollout is expected to take between 3 and 6 months. It is expected that it may take longer initially to establish the technology with faster implementation in the community. It is likely that remote monitoring will be rolled out on a speciality basis as is considered appropriate (i.e. specialities such as respiratory, cardiology and frailty, where observations are key are likely to roll this out as part of managing patients in virtual wards). It is assumed that

remote monitoring would not be rolled out for the Hospice (Park House Court) or the mental health wards.

- **Phase 4: Predictive Capacity Planning** – Once all sites are set up and using the bed capacity management solution, predictive capacity planning can successfully be implemented.
- **Mental Health Wards** are found across all 4 acute hospitals and in St Davids Hospital. They include Morlais Ward (GGH), Bryngofal and Bryngolau wards (PPH), Enlli ward (BGH), St Caradog and St Non wards (WGH) and Cwm Seren PICU, Cwm Seren LSU and Ty Bryn (St Davids Hospital). It is assumed that rollout would happen across all mental health beds separately from rollout in the acute hospital.

A more detailed implementation plan will be developed with the preferred supplier.

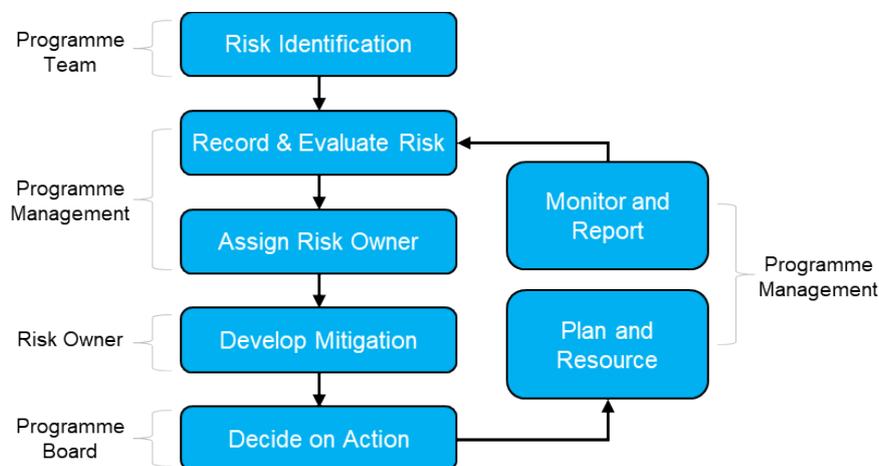
5.3. Risk Management

Risk identification and management will be a continual process in the programme to monitor the level of exposure to risk at any point and keep unwanted outcomes to a minimum, particularly given the proximity of these systems to patient care. A risk register has been developed as part of this OBC and is set out in Section 0. The Project Team will ensure that the following risk processes are in place:

- up-to-date risks register open to anyone to review. Formal updates will be made by designated individuals only;
- all risks will be reviewed regularly by the team, and key risks escalated to the Programme Lead for management by exception;
- significant risks will have mitigation plans developed and will be formally reviewed;
- a decision making process supported by a framework of risk analysis and evaluation; and
- processes in place to monitor risk.

The proposed risk management approach is outlined in Figure 11. It will be the responsibility of all team members to identify risks as and when they become aware of them, and to use the risk management processes. These processes ensure that the risks are logged and assigned to owners to manage and continually review the individual risks. The project managers will have a key role in monitoring, reviewing and managing action delivery to mitigate or resolve risks.

Figure 11: Best Practice Risk management approach



5.4. Change Management

The implementation of this technology is expected to have significant impact on frontline staff, and it will be important to minimise any negative impact during the implementation period.

Effective change management and visible leadership will be critical to the success of the project in order to:

- achieve buy-in across stakeholder groups from all sites and departments;
- gain commitment from users, recognising potential disruption to services and additional effort required during the implementation period;
- support the changes in working practices that the new arrangements will require; and
- realise the benefits of implementing eObs and Patient Flow technology, as outlined in Section 2.3.

To ensure effective change management HDUHB will develop the following:

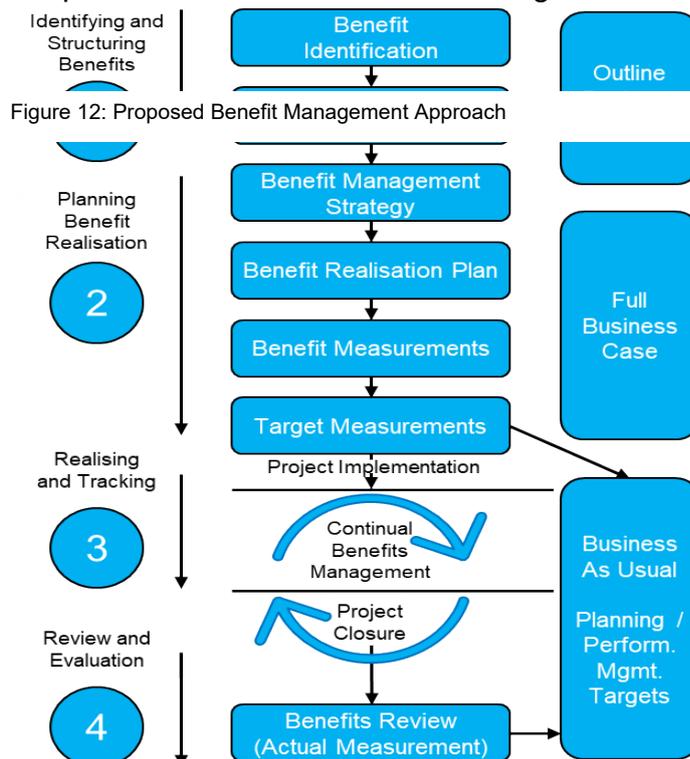
- **Change Management Strategy:** to include an assessment of the potential impact of the proposed change on the culture, systems, processes and people. An underpinning communication strategy for affected disciplines and staff will also need to be defined;
- **Change Management Framework:** this sets out the organisational structure and personnel required to direct, manage, implement and evaluate the change, along with details of roles and responsibilities, and to support staff through the change; and
- **Change Management Plans:** this defines the communication required for the implementation phase.

Furthermore, the team will include a Change Design Officer to oversee change requirements of the project and assess impact on change plan within the organisation, as well as local Digital Champions to support engagement and training of clinical and operational staff.

5.5. Benefits Realisation and Measurement

The economic section identified a number of non-financial benefits to be delivered by the implementation of eObs and electronic patient flow solutions.

Prior to implementation it is recommended that further analysis of current processes is carried out in order to develop detailed baseline measures against which to monitor and assess



benefits. These KPIs should be built into the benefits realisation strategy, where owners are assigned to each outcome. A proposed approach for benefits realisation is shown in Figure 12 below.

HDUHB has a dedicated Benefits Realisation Manager who has joined the Digital Team. They will lead on assessing whether the benefits outlined in Section 2.3 are realised, and work with local teams to manage benefit realisation. As part of their role, they will assign owners to each identified benefit. Note that the preferred supplier will also provide capability to support benefit realisation and measurement.

It is important to note that which benefits are realised is dependent on the eObs and patient flow capabilities that are implemented. A number of key metrics will need to be developed to track the delivery of benefits post implementation. These should include:

Table 20: Suggested KPIs

Suggested KPI measure	Current situation	Relevant benefits	How and when will these benefits be realised
<p>Reduced average length of stay per patient.</p> <p><i>*Note a key limiting factor is the lack of Community support.</i></p>	<p>Currently transfers of patients from A&E to wards and between wards are slow. The clinical site management team have to manually identify available beds. Sites can at times have upward of 20-30 patients who are 'medically fit' for discharge.</p>	<ul style="list-style-type: none"> • Access to real-time data leads to faster bed turnover. • Easy access to up-to-date data on patient status leads to improved handovers and quicker discharges. 	<p>How? Real-time data on bed status across sites and an electronic referral system support faster transfers and discharges. Clinical site management team can focus on solving key flow problems, such as liaising with social care. Using the system, information on why these patients cannot be discharged becomes visible and can be used to target these areas. Furthermore, eObs enable early intervention.</p> <p>When? From Year 2 onwards.</p>
<p>Reduced litigation cost.</p>	<p>In 2019-20 HDUHB paid out £51.5m in clinical negligence and personal injury charges.⁴⁶</p>	<ul style="list-style-type: none"> • Reduced complaints and improved brand image due to better patient care. 	<p>How? Reduction in errors (e.g. due to more regular, accurate observations) and earlier intervention leads to reduced litigation.</p> <p>When? Years 4 & 5.</p>
<p>Reduced number of incidents.</p>	<p>Managing handovers on paper and manually calculating the NEWS score can easily result in errors.</p>	<ul style="list-style-type: none"> • Accurate information leads to reduced risk of patient harm, improving patient safety. • Timely access to information enables early intervention. • Improved transfer of reliable information. • Improved decision-making due to access to timely and accurate information. 	<p>How? Reduced risk of errors (e.g. due to lack of handwritten notes, automatic NEWS calculation), early intervention (automated alerts), reduced risk of cross infection (remote data access) and up-to-date information for decision-making.</p> <p>When? From Year 2 onwards.</p>

⁴⁶ <https://gov.wales/sites/default/files/publications/2022-04/atn16159%20doc1.pdf>

Suggested KPI measure	Current situation	Relevant benefits	How and when will these benefits be realised
Reduced average time until seen by doctor in A&E.	The operational standard is that at least 95% of patients attending A&E should be admitted, transferred or discharged within 4 hours. Currently, a lack in resources and beds results in long wait times with some patients spending their entire stay in A&E.	<ul style="list-style-type: none"> • Access to electronic patient information that is synchronised across systems leads to reduced manual admin work and removes duplication of effort. • Time savings due to remote monitoring and automation of tasks. 	<p>How? By reducing the administrative burden for clinical staff and freeing up their time, they can attend to patients more quickly.</p> <p>When? From Year 2 onwards.</p>
Reduced ambulance turnaround time.	Ambulances currently lose between 70 and 85 hours per site at the four acute hospitals	<ul style="list-style-type: none"> • Access to real-time data leads to faster bed turnover. • Quicker response times for ambulances due to reduced time waiting at the hospital. 	<p>How? Improving patient flow should relieve A&E by enabling faster transfers of patients to wards. In turn this should allow ambulances to offload patients more quickly.</p> <p>When? From Year 2 onwards.</p>
Reduced handover time.	Every ward has a daily bullet round (20-min meeting) where every patient is discussed by key staff. Information is added to or amended on the ward whiteboard. Hywel Dda has 64 wards across 4 acute hospitals. If 15min is spent each day by a senior nurse as well as two other professionals this equates to 1920min daily.	<ul style="list-style-type: none"> • Easy access to up-to-date data on patient status leads to improved handovers and quicker discharges. • Improved transfer of reliable information. 	<p>How? Electronic Whiteboards could streamline bullet rounds and save 50% of time per day (960min). In addition, by enabling electronic handovers that pull information from relevant systems (e.g. WNCR) staff don't have to manually compile this information.</p> <p>When? From Year 2 onwards.</p>
Reduced time spent by clinical site manager to identify available beds.	There are currently three bed management meetings every day attended by the clinical site team and ward managers. Site managers spend time calling wards or walking around to gain a better understanding of capacity.	<ul style="list-style-type: none"> • Bed and patient data is available at ward, hospital and organisation-wide level to better manage capacity, ensuring the right person is at the right place at the right time. 	<p>How? Electronic bed capacity management will reduce the number of in-person meetings and time spent by clinical site managers walking around the hospital to identify free beds.</p> <p>When? From Year 2 onwards.</p>
Increased number of observations completed on time.	Staff currently don't have enough time to always complete all required observations on time.	<ul style="list-style-type: none"> • Time savings due to remote monitoring and automation of tasks. 	<p>How? Automating the process of capturing observations and/or enabling reminders for staff to take observations ensures that observations are taken on time. Evidence at Croydon Health Services NHS Trust shows observations taken on time increased from under 60% to over 85%. Sicker patients received more frequent observations and at night observations increased from 40% to 100% of those required.</p> <p>When? From Year 2 onwards</p>

eObs and Patient Flow technology are tried and tested systems. Throughout this consultation process, HDUHB have built relationships with two reference sites (NHS Lanarkshire and Aneurin Bevan University Health Board), and the Health Board will collaborate with them to

understand lessons learned with regards to benefit realisation from implementing these solutions.

Appendix A: Stakeholder engagement

Staff involved in the consultation process

Table 21: Stakeholders involved in consultation

Name	Site	Role
Alun James	Across Sites	Procurement Manager
Andrew Murray	Withybush General Hospital	Clinical Site Manager
Anna Thomas	Prince Philip General Hospital	Service Delivery Manager Unscheduled Care
Anthony Smith	Withybush General Hospital	Consultant Anaesthetist and Intensive Care Consultant
Anthony Tracey	Across Sites	Digital Director
Anwen Pearce	Across Sites	Finance Business Partner
Carolyn Williams	Across Sites	Head of Digital Innovation & Transformation
Chris Hopkins	Across Sites	Head of Clinical Engineering, Consultant Clinical Scientist
Claire Hathaway	Across Sites	Trauma Lead Manager
Clive Waft	Across Sites	Head of Digital Programmes
Dave Wilson	South Pembrokeshire Community Hospital	GP
David Harrison	Bronglais General Hospital	Clinical Site Manager
Elin Howell	Glangwili General Hospital	Senior Sister A&E
Emma Hickman	Glangwili General Hospital	Senior Sister A&E
Gareth Beynon	Across Sites	Head of Information Services
George Eltom	Glangwili General Hospital	Consultant Physician A&E (working in SDEC unit)
Helen Thomas	Across Sites	Lead Nurse Specialist for Informatics
Iona Evans	Glangwili General Hospital	Deputy Head of Nursing
Janice Cole-Williams	Withybush General Hospital	General Manager Unscheduled Care
Karen Brown	Withybush General Hospital	Consultant in Renal Medicine, Clinical Lead for Acute Medicine
Katie Stapleton	Carmarthenshire	WAST Locality Manager
Lesley Jones	Across Sites	Head of Nursing for Digital and Professional Standards
Marilize Du Preez	Across Sites	Improvement and Transformation Lead
Matthew Willis	Bronglais General Hospital	General Manager
Meinir Jones	Across Sites	Associate Medical Director for Transformation and Value Based Healthcare, National Clinical Lead MSK & Long-term Arthritis

Name	Site	Role
Nicola Drake	Withybush General Hospital	Senior Consultant A&E, Clinical Lead for Emergency Medicine
Nicola Zroud	Withybush General Hospital	Senior Nurse
Olwen Morgan	Glangwili General Hospital	Hospital Head of Nursing
Owain Ennis	Across Sites	Clinical Lead Trauma and Orthopaedics
Paul Solloway	Across Sites	Deputy Digital Director
Prem Kumar Pitchaikar	Glangwili General Hospital	Consultant Paediatrician, Clinical Director of Child and Maternal Health
Sarah Perry	Glangwili General Hospital and Prince Philip General Hospital	General Manager Unscheduled Care
Sharon Morris	Across Sites	Project Manager
Stephen Farrington	Across Sites	Medical Device Co-ordinator
Theresa Van Doorn	Across Sites	Procurement Business Manager

Some of the Clinical and Operational staff that were engaged in the consultations highlighted that they are keen to support future development.

Table 22: Staff for future engagement

Name	Site	Role
Andrew Murray	Withybush General Hospital	Clinical Site Manager
Anthony Smith	Withybush General Hospital	Consultant Anaesthetist
David Wilson	South Pembrokeshire Community Hospital	GP
Helen Thomas	Across Sites	Nurse Specialist for Informatics
Karen Brown	Withybush General Hospital	Consultant in Renal Medicine/ Clinical Lead for Acute Medicine
Lesley Jones	Across Sites	Head of Nursing for Digital and Professional Standards
Judith Bowen	Across Sites	Lead CNIO for WNCR

User Research Report

Based on the 1-1 discussions with staff a user research summary report was prepared.



User Research
Summary Report

User Research Playback Session

A playback session for the user research session was held on 9th June 2022. 94 staff from across HDUHB were invited to attend the session. The aim was to present back the findings

from the research and provide staff with an opportunity to provide feedback and ask questions. The following staff attended the session:

Table 23: Staff that attended UR playback session

Name	Site	Role
Andrew Murray	Withybush General Hospital	Clinical Site Manager
Anthony Smith	Withybush General Hospital	Consultant Anaesthetist
Catherine Burrell	Across Sites	Clinical Director/Deputy Associate Medical Director – Primary Care and community services
Catherine Nelson	Across Sites	Associate Medical Director - Dental
Catherine Rees	Across Sites	Head of Organisation Leadership Development
Chris Hopkins	Across Sites	Consultant Clinical Scientist, Head of clinical Engineering
Clive Waft	Across Sites	Head of Digital Programmes
Gail Davies	Llanbadarn Fawr - Ystwyth	GP
Iona Evans	Glangwili General Hospital	Deputy Head of Nursing
Janet Millward	Across Sites	Senior Paediatrics Manager
Judith Bowen	Across Sites	Lead CNIO for WNCR
June Picton	Across Sites	Associate Medical Director for Workforce
Nicola Drake	Withybush General Hospital	Senior Consultant – A&E
Martin Mackintosh	Tenby	GP – Local Clinical Lead
Meinir Jones	Across sites	Associate Medical Director for Transformation and Value Based Healthcare, National Clinical Lead MSK & Long-term Arthritis
Sarah Perry	Glangwili General Hospital and Prince Philip General Hospital	General Manager – Unscheduled Care
Stephen Farrington	Across Sites	Medical Device Co-ordinator
Stuart Bancroft	Carmarthenshire	Deputy General Manager

Below is the deck that was presented during the session:



User Research
Playback Session PPT

Following on from the presentation, a 25-min Q&A discussion ensued. Below is a summary of the key points from this discussion:

South Pembrokeshire as the pilot site

- It was raised that South Pembrokeshire may not be the best site for piloting the technology. It was felt that this is particularly the case for patient flow solutions, as acute sites experience much higher complexity in terms of care pathways. South Pembrokeshire is a Community Hospital and as such not representative of the acute sites.
- Carolyn highlighted that South Pembrokeshire was identified as potentially suitable as the aim was to identify a site, where new solutions could be trialled with minimal risk to patient safety and minimal impact to frontline staff. Furthermore, the aim is to trial the feasibility of remotely monitoring patients in their own homes. A Community Hospital such as South Pembrokeshire would provide the ideal test bed for this.
- A member of the RAILS group raised that for medical devices they are testing the Welsh Allyn monitors for eObs and they identified South Pembrokeshire as a suitable site to work out issues with integration etc. Before moving to an acute site.
- It was raised that acute sites are facing huge pressures at the moment, and the sooner new systems to support staff can be introduced, the better.
- The suggestion was made to pilot at the technology at South Pembrokeshire, then move to pilot at an acute site before rolling out to other acute sites. (Note that this is in line with the implementation plan.)

Integration timelines for national systems

- We are aware that Digital Health and Care Wales (DHCW), who develop integration interfaces for national systems, have limited capacity and integration has been raised as a key risk for this business case.
- To mitigate this risk, Anthony is having conversations with Digital Health and Care Wales now, and we are considering hiring a developer to work on integration interfaces for HDUHB only. Furthermore, Aneurin Bevan University Health Board have implemented eObs technology and have already developed the required interfaces with national systems. We should be able to build on their work.

Accessing records from Primary Care and vice versa

- GP highlighted the need to increase information flow from primary to secondary care records and the importance of taking a whole system approach in line with the patient journey. He highlighted that the main GP systems in use in Wales currently are EMIS and Vision, and integration with these systems should be considered.
- Agreed to meet with cluster leads to continue discussions.

Integrating with future systems

- It was raised that the procurement exercise for a new radiology system was just starting and this would need to be considered here.
- Highlighted that we are aware that there are other systems that are being procured and need to future proof any technology that is procured.

Other functionality needs

- Accessing new systems from own mobile phone
- Improving WPAS capacity so that it is possible to transfer patients from hospital to hospital (specific request made by Paediatrician)

Appendix B: Benefits and Risks Assessment

Benefit Assessment

A weighting and scoring exercise was undertaken to rank each of the shortlisted options in terms of their relative non-financial benefit. The purpose of this assessment was to understand any differential between shortlisted options in non-monetary terms.

This exercise involved distributing 100 points (100%) across the benefits with the most important benefits assigned the highest weighting. The second stage in the exercise was to score each option in terms of their relative benefit on a scale from zero to four according to the degree to which the option contributes to the realisation of the benefit. The scorings across each benefit represent an average score provided by the workshop participants. These included representation from digital and clinical staff.

Table 24: Benefit Assessment Scores

Benefit	Weighting (%)	Average Score		
		Option 2: eObs Only	Option 3: Patient Flow Only	Option 4: eObs + Patient Flow
Access to electronic patient information that is synchronised across systems leads to reduced manual admin work.	5.6%	3	4	4
Access to real-time data leads to faster bed turnover.	5.2%	1.75	3.25	3.75
Bed and patient data is available at ward, hospital and organisation-wide level to better manage capacity.	5.2%	1.25	3.25	3.75
Data is readily available for audits in a structured format.	4.1%	3.25	3.75	3.75
Easy access to up-to-date data on patient status leads to improved handovers and quicker discharges.	5.2%	2.5	3.25	3.75
Quicker response times for ambulances due to reduced time waiting at the hospital.	5.2%	1.25	3.25	3.75
Time savings due to reduced admin time and improved decision-making.	4.9%	3	3.5	3.5
Time savings due to remote monitoring and automation of tasks.	4.9%	3.25	2.5	3.75
Increase in compliance due to more accurate, up-to-date data and increased efficiencies.	5.2%	1.75	2.5	3
Reduced complaints and improved brand image due to better patient care.	4.1%	2.25	1.75	2.25
Improved transfer of reliable information	5.2%	1.5	2.75	2.75
Patients are no longer asked for the same information multiple times.	5.2%	0.75	1.50	1.75
Staff have increased time to care and feel less stressed, resulting in a better care experience.	4.9%	2.75	2.25	3.25
Patients are aware of next steps and feel more informed.	5.2%	0.50	1.75	1.50
Accurate information leads to reduced risk of patient harm, improving patient safety.	5.2%	3.00	3.25	3.75
Timely access to information enables early intervention.	4.9%	2.75	3.00	3.50
Doctors, AHPs. etc. feel increased confidence due to access to more accurate information.	4.1%	2.25	2.75	3.00
Improved decision-making due to access to timely and accurate information.	5.2%	2.25	3.75	3.50
Reduced admin time releases time to care for patients, reducing stress levels.	5.2%	2.50	3.00	3.00
Remote and easy access to up-to-date information.	4.9%	3.25	3.25	3.75

Benefit	Weighting (%)	Average Score		
		Option 2: eObs Only	Option 3: Patient Flow Only	Option 4: eObs + Patient Flow
Total Weighted Benefits Points		221.4	292.2	325.6

Worked Benefit example:

- Benefit: Access to electronic patient information that is synchronised across systems leads to reduced manual admin work.
- Option: Option 2 – eObs Only
- Benefit Weighting:
 - Total Ranking / Total People = 3.3
 - Relative score 3.3 (specific weighted benefit score) / total of 89 points (total of weighted benefits scores) = **5.6%**

Option Ability to Realise Benefit: Total Rank / Total People = **3.0**

Risk Assessment

Each option was considered against each risk in turn and assigned a score in a range of 1 – 5 for the two key factors associated with risk - likelihood and impact:

Likelihood

- 1: The option will introduce no or minimal additional or new risk in this area.
- 2: The option will introduce moderate additional or new risk in this area.
- 3: The option will introduce a high level of additional or new risk in this area.

Impact

- 1: The risk will have no or minimal negative impact if it occurs.
- 2: The risk will have moderate negative impact if it occurs.
- 3: The risk will have a high negative impact if it occurs.

The total risk score was calculated by multiplying the ‘likelihood’ score by the ‘impact’ score - once the weighting of the risk was applied.

Table 25: Risk assessment scores

Implementation Risks	Weighting (%)	Weighted Score		
		Option 2: eObs Only	Option 3: Patient Flow Only	Option 4: eObs + Patient Flow
Staff may lack of willingness to adopt new systems and processes	4.5%	27.3	40.9	40.9
Inadequate training and lack of digital skills results in low adoption of the tools	6.4%	45.4	34.0	57.3
The solution will not meet the needs of local sites.	3.2%	8.5	12.7	12.7
A lack of ownership leads to delays in implementation.	5.0%	31.1	31.1	31.1
Lack of funding to support implementation of technology.	5.9%	36.8	36.8	42.1
Lack of funding to support rollout, including training, and additional time required by digital nurses.	5.9%	36.8	27.5	36.8

Implementation Risks	Weighting (%)	Weighted Score		
		Option 2: eObs Only	Option 3: Patient Flow Only	Option 4: eObs + Patient Flow
Lack of funding to support ongoing revenue costs associated with the technology	5.5%	25.4	25.4	25.4
Additional funding to integrate eObs technology with monitors/ devices may be required.	3.2%	17.0	7.1	12.4
There is a risk that the staff required to support these new processes will not be available due to challenges with recruitment.	3.2%	17.3	8.9	12.7
As the solution is implemented a site may be dual-running (technology & paper), which can result in problems during handovers.	4.1%	16.4	13.7	16.4
The supplier is unable to deliver a fit for purpose solution within the required timescales.	3.6%	9.7	10.9	9.7
System implementation takes longer than planned due to lack of resources.	3.6%	10.1	10.1	12.1
The system does not meet the needs of the users.	5.5%	32.7	32.7	32.7
Lack of estate capabilities to install any required hardware e.g. whiteboards.	3.6%	16.9	19.7	19.7
There is a risk to information governance with patient data made available (via a whiteboard) in the ward.	1.8%	3.2	4.8	4.0
There is a lack of space for electronic whiteboards on wards.	2.3%	4.0	6.3	4.0
Any disruption to the ward operations when power and cooling are being provisioned.	1.8%	5.5	2.7	2.7
There may not be enough devices available for staff to use the technology.	3.2%	17.0	12.4	14.2
There is risk that the technology fails, for example due to a national cyber incident.	2.7%	8.5	8.5	8.5
Lack of wireless network on some wards means there will be a coverage gap and mobile devices may not be accessible.	5.0%	26.7	13.3	26.7
Difficulties of two way interfaces with WPAS means that some data may have to be re-keyed into WPAS at discharge by the ward clerk.	5.9%	13.1	27.5	23.6
DHCW lack capacity to enable interoperability with national systems.	6.8%	36.4	42.4	42.4
There is a risk that the eObs technology does not link in with monitors/ devices.	4.1%	15.9	4.1	13.7
eObs and Patient Flow technology will need to be integrated with WICIS, which is to be implemented in 2024.	3.2%	10.6	8.5	10.6
Total Weighted Risks Points		472.2	442.1	512.6

Appendix C: Financial Model Assumptions

Portable Devices

The below assumptions were made to calculate the number of additional portable devices to be purchased.

Table 26: Portable Devices Assumptions

Device	Current Number	Cost per device	Total number of additional devices to be purchased
Laptop	4,747	£740	475
Tablet/ iPad	1007	£800	101
Smartphone	2,452	£300	245
Desktop computer	5,392	£590	0 (not a portable device)
Cart	83 (assumed 1 per ward)	£450	8
Charging station	83 (assumed 1 per ward)	£450	8

Relative sizing of hospitals

Using the number of wards, the relative size of each site was calculated. These percentages were used to calculate the relative cost for implementation and annual support and hosting over the 5-year period.

Table 27: Hospital Size apportionment

Site	Apportionment
Acute	
Withybush	18%
Glangwili	35%
Bronglais	14%
Prince Philip	13%
Community	
Ty Bryngwyn Mawr	1%
Tregaron	1%
South Pembrokeshire	2%
Llandovery	1%
Amman Valley	1%
Park House Court	1%
Mental Health	
Mental Health wards	11%
TOTAL	100%

Appendix D: Optimism Bias Calculation

Background

The UK Green Book offers supplementary guidance on the calculation of contingency / optimism bias. This guidance sets the suggested upper limit starting point contingency % for various different types of projects. IT project fall under the “Equipment – Capital Expenditure” Grouping which has a suggested starting point of 200%. The guidance advises a variety of relevant factors which contribute towards that starting point % figure, including their % contribution to the total. The next step in the calculation is to evaluate how far these factors are mitigated by applying a mitigation % factor to each.

Background to each factor

The Green Book supplementary guidance offers background on each of the relevant factors which has been summarised below.

Table 28: Optimism Bias Factors

Factor	Description	Contributory Factors
Complexity of Contract Structure	A more complex and less defined contract structure is deemed to create uncertainty which adds to the contingency requirement.	<ul style="list-style-type: none"> • Details of risk transfer had to be clarified • Payment mechanism had to be defined • Unforeseen amount of negotiation required on terms of contract
Late Contractor Involvement in Design	A successful estimate is considered to be more likely when the contractor/supplier is involved from an earlier stage of the process.	<ul style="list-style-type: none"> • Value management was necessary but contractor was not involved early enough to allow for it • The design could not be built due to construction problems (e.g. access) • Contractor provided design / construction feedback at a late stage resulting in a redesign
Poor Contractor Capabilities	A successful estimate is considered to be more likely when the contractor/supplier is deemed competent and reliable.	<ul style="list-style-type: none"> • Contractor was inexperienced • Health and safety standards were not met • Implementation not carried out to the necessary standards • The contractor had insufficient resources
Information Management	A successful estimate is considered to be more likely when there is a clear flow of relevant information between stakeholders.	<ul style="list-style-type: none"> • The interfaces between the stakeholders were not managed efficiently resulting in information not being transferred effectively.
Design Complexity	Complexity of the IT system design is deemed to contribute towards a higher uncertainty.	<ul style="list-style-type: none"> • The design had to be built in difficult conditions e.g. a hydropower station
Degree of Innovation	A new and innovative IT system design is deemed to contribute towards a higher uncertainty.	<ul style="list-style-type: none"> • New generation design • Unusual site conditions requiring innovative solutions e.g. large wind forces, chemical nature of soil and soil contamination
Inadequacy of the Business Case	Poor quality business cases are deemed to contribute towards higher uncertainty. Note, this is deemed N/A as the contingency factor is being prepared for a business case.	N/A
Project Management Team	A more competent project management team is deemed to mitigate uncertainty and result in a lower required contingency.	<ul style="list-style-type: none"> • The project management team was inexperienced in delivering a project of this nature

Factor	Description	Contributory Factors
		<ul style="list-style-type: none"> Inadequate review of drawings by the project manager before implementation
Poor Project Intelligence	A lack of information and knowledge of the requirements of a successful project is deemed to increase uncertainty.	<ul style="list-style-type: none"> Insufficient ground investigation The detailed design was based on insufficient information Insufficient consideration of existing conditions
Legislation / Regulations	Required legislation/regulation considerations are deemed to add a level of complexity and increase uncertainty around the project.	<ul style="list-style-type: none"> Change in required standards
Technology	Technology is deemed a large factor in implementation of any IT project, being central to the nature of the project. Areas in which technology acquired is likely to be redundant are less likely to lead to a successful project implementation.	<ul style="list-style-type: none"> Unanticipated technological advancements Computer virus Limits in technology

Calculation

In line with Green Book guidance discussed above, each factor contributing towards the 200% starting point total for IT projects has been set out. A mitigation % factor has then been applied for each, and rationale provided for that mitigation factor. The total mitigation factor is then deducted from the full factor contribution (100%) and applied to the starting point score. In this case, a total mitigation factor of 89% leaves an unmitigated % factor of 11%, which has been applied to the starting point of 200% to result in a final contingency % of 22%.

Table 29: Optimism Bias Calculation

Mitigation Factors	% Factor Contribution	Total Score	Mitigation %	Mitigation Factor	Rationale
Complexity of Contract Structure	7%	14	85%	6%	Contract structure has been defined and mitigated by use of an existing framework that has been established and used by other NHS organisations.
Late Contractor Involvement in Design	7%	14	70%	5%	Contractors will be involved as early as possible in the next stage of the procurement and HDUHB will work closely with the preferred supplier(s) to determine requirement specification. Three of the leading, established suppliers in the UK were contacted as part of collating background data for the financial model. While HDUHB were kept anonymous, this helped gain a better understanding of the technology available and how it fits with HDUHB's requirements.
Poor Contractor Capabilities	4%	8	85%	3%	eObs and Patient flow technology has been successfully implemented across the UK, including other Health Boards in Wales. The solution to be procured will be an existing, well-established solution.
Information Management	5%	10	85%	4%	Hosting options for data are being reviewed with the aim to host the new solution in a secure cloud environment. Governance will be established to ensure secure Information management. The plan is to enable clinical staff across the Health Board to access information easily and securely. As part of the OBC conversations were had with the Clinical Engineering and Information Governance Teams.

Mitigation Factors	% Factor Contribution	Total Score	Mitigation %	Mitigation Factor	Rationale
Design Complexity	10%	20	80%	8%	The system has already been designed and implemented elsewhere. However, local requirements, such as integration with national systems in Wales, add additional complexity and will need to be considered. There is a plan to speak to Digital Health and Care Wales (DHCW) about national integration requirements as soon as possible.
Degree of Innovation	17%	34	95%	16%	The system has already been designed and implemented elsewhere - this is technology that is well proven across the NHS in the UK.
Inadequacy of the Business Case	18%	36	96%	17%	Detailed analysis undertaken for business case, according to Green Book guidance. Worked closely with team at HDUHB and involved stakeholders, including operational and clinical staff from across the board. Business Case built on national OBC for NHS Wales for patient flow.
Project Management Team	5%	10	85%	4%	Project management team requirements and structure identified and defined by NHS, which provides mitigation. However, some personnel is not yet in place. Governance structure defined and NHS resources required are known. Information gathered from established suppliers on required resources.
Poor Project Intelligence	4%	8	85%	3%	OBC was informed by national OBC. Extensive user research carried out, which involved over 20 clinical and operational staff from 5 sites across HDUHB. The implementation approach was discussed with two reference sites (NHS Lanarkshire and ABUHB), who successfully implemented this technology recently.
Legislation / Regulations	5%	10	90%	5%	Certain pieces around GDPR and personal data that will add degree of complexity.
Technology	18%	36	95%	17%	Unlikely to be technological advancements in the near future, which render the system obsolete. The technology has already been implemented in other places, including across the NHS (and in Wales), which is judged to mitigate against risk of the technology being deficient. Not fully mitigated against due to unavoidable uncertainty with technology over a 5-year period, and although NHS have appropriate anti-virus mitigations in place technology does hold an inherent risk of virus attack.
Total	100%	200	N/A	89%	

Contingency Calculation:

(Unmitigated Factor % Contribution – Mitigated Factor % Contribution) * Total Score for IT project = Applied Contingency %

$$(100\% - 89\%) * 200 = 21.64\%$$

Appendix E: Sensitivity Analysis Preferred Option

The below tables represent the total economic cost for two different scenarios for the preferred option.

Scenario 2:

- **Hardware and infrastructure:** Includes hardware and infrastructure costs
- **NHS resourcing:** Shows full economic costs for the BAU and Implementation Teams
- **Solution options:** Includes both eObs and Patient Flow solutions
- **Capabilities:** Represents the cost for purchasing **reduced functionality** for both eObs and Patient Flow solutions.

Table 30: Total Economic Cost - Scenario 2

Cost Line	Cost type	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Device Purchases	NRC	443,184	443,184	-	-	-	886,368
Network Upgrades	NRC	15,770	15,770	-	-	-	31,540
HDUHB Implementation Team	NRR	519,661	560,077	484,624	-	-	1,564,361
HDHUB BAU Team	RR	-	-	-	199,068	199,068	398,135
National integration – Interface Build	NRR	45,000	-	-	-	-	45,000
National integration - Annual support	RR	-	9,000	9,000	9,000	9,000	36,000
e-Obs - Licence	NRC	350,000	-	-	-	-	350,000
e-Obs - Implementation	NRR	783	47,380	16,837	-	-	65,000
e-Obs - Annual support and hosting	RR	-	10,542	89,985	125,000	125,000	350,527
Patient Flow - Licence	NRC	350,000	-	-	-	-	350,000
Patient Flow - Implementation	NRR	22,590	189,759	37,651	-	-	250,000
Patient Flow - Annual support and hosting	RR	-	50,151	135,090	150,000	150,000	485,241
	Total	1,746,988	1,325,862	773,187	483,068	483,068	4,812,172
<i>Breakdown by cost type</i>							
	NRC TOTAL	1,158,954	458,954	-	-	-	1,617,908
	NRR TOTAL	588,034	797,215	539,111	-	-	1,924,361
	RR TOTAL	-	69,693	234,075	483,068	483,068	1,269,903
	Optimism Bias	270,012	168,473	63,484	62,480	62,480	626,929
	Total with Contingency	2,017,000	1,494,335	836,671	545,548	545,548	5,439,100

Scenario 3

- **Hardware and infrastructure: Excludes** hardware and infrastructure costs
- **NHS resourcing:** Shows full economic costs for the BAU and Implementation Teams
- **Solution options:** Includes both eObs and Patient Flow solutions
- **Capabilities:** Represents the cost for purchasing **reduced functionality** for both eObs and Patient Flow solutions.

Table 31: Total Economic Cost - Scenario 3

Cost Line	Cost type	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Device Purchases	NRC	-	-	-	-	-	-
Network Upgrades	NRC	-	-	-	-	-	-
HDUHB Implementation Team	NRR	519,661	560,077	484,624	-	-	1,564,361
HDHUB BAU Team	RR	-	-	-	199,068	199,068	398,135
National integration – Interface Build	NRR	45,000	-	-	-	-	45,000
National integration - Annual support	RR	-	9,000	9,000	9,000	9,000	36,000
e-Obs - Licence	NRC	350,000	-	-	-	-	350,000
e-Obs - Implementation	NRR	783	47,380	16,837	-	-	65,000
e-Obs - Annual support and hosting	RR	-	10,542	89,985	125,000	125,000	350,527
Patient Flow - Licence	NRC	350,000	-	-	-	-	350,000
Patient Flow - Implementation	NRR	22,590	189,759	37,651	-	-	250,000
Patient Flow - Annual support and hosting	RR	0	50,151	135,090	150,000	150,000	485,241
	Total	1,288,034	866,908	773,187	483,068	483,068	3,894,264
<i>Breakdown by cost type</i>							
	NRC TOTAL	700,000	-	-	-	-	700,000
	NRR TOTAL	588,034	797,215	539,111	-	-	1,924,361
	RR TOTAL	-	69,693	234,075	483,068	483,068	1,269,903
	Optimism Bias	169,042	67,503	63,484	62,480	62,480	424,989
	Total with Contingency	1,457,076	934,411	836,671	545,548	545,548	4,319,253

Appendix F: Digital Roadmap

The below document includes the digital roadmap, the architecture map showing data flow across key systems and a capability map for eObs and Patient Flow functionality:



Digital Roadmap

The implementation plan details the specific phases required to rollout out in line with the digital roadmap:



Implementation Plan

eObs and Patient Flow Business Case

User Research Summary

Executive Summary

To develop the Outline Business Case for implementing eObs and Patient Flow Technology at Hywel Dda University Health Board (HDUHB), **staff across the Health Board were engaged** in the consultation. The aim was to **understand the as-is processes** and **current issues**, as well as their **needs** with regards to the new technology.

Across all sites, clinical and operational staff conveyed some key needs that should underpin the implementation of any new technology. Given the current resourcing constraints, it is clear that **HDUHB could benefit significantly from technology that supports ways of working by increasing efficiencies**. There seems to be **a particular need for technology that improves how patient flow is managed** across the Health Board.

Keeping the patient at the centre

While staff felt that technology could help improve ways of working, they highlighted the importance of maintaining the human element of care. Regardless of the solution, the patient needs to remain at the centre.

The need for appropriate infrastructure

Almost every single staff member we spoke to highlighted the need to ensure that the infrastructure (e.g. number of available devices, WiFi networks) could meet the requirements of new systems.

Interoperability is key

There are a number of systems currently in use across HDUHB. To ensure efficient working and avoid adding to staff's administrative workload, any new systems need to be interoperable with existing solution.

Technology must not add to existing workloads

Due to resourcing constraints, staff are already extremely busy. They do not have capacity to complete additional administrative tasks and new technology should make things faster and easier.

Collaboration & Co-design

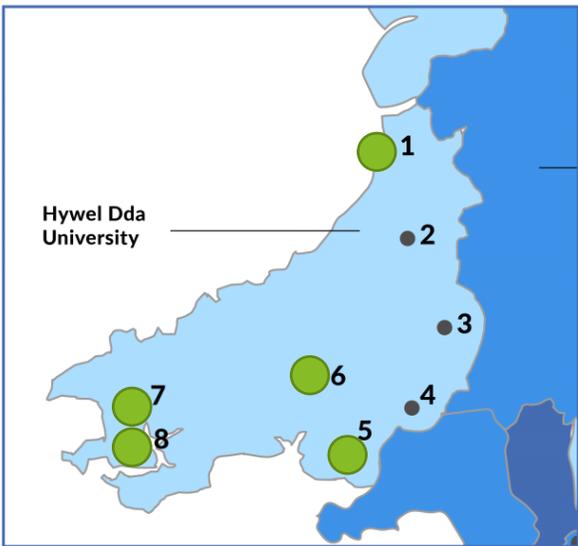
In order to ensure that solutions meet the needs of both clinical and operational staff, new solutions need to be co-designed. A collaborative approach should be taken, where staff are engaged early in the process.

A single, shared record

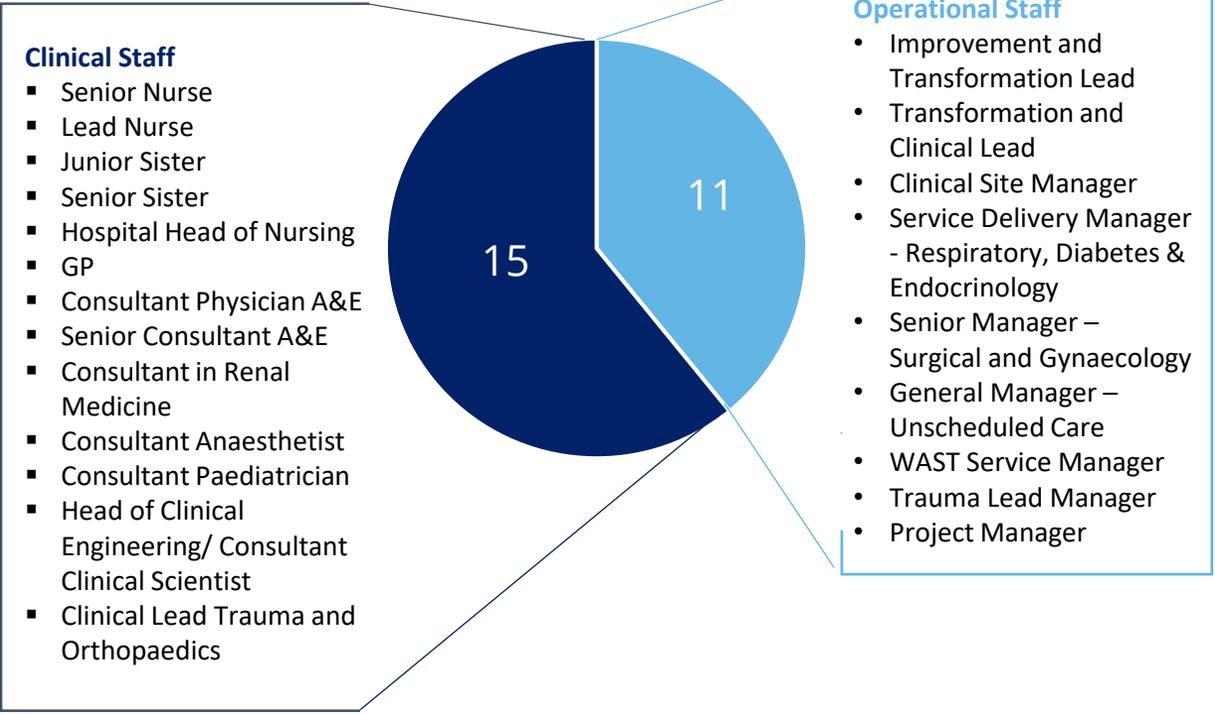
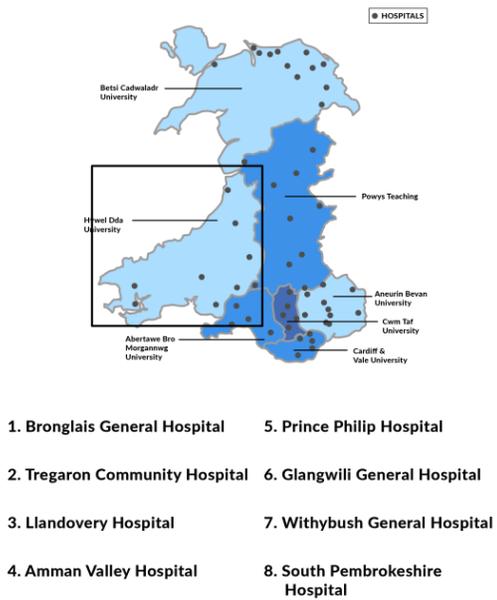
A key issue that was highlighted is the lack of a single, shared patient record. This limits communication between primary, secondary and tertiary care and negatively impacts patient care.

We spoke to **clinical and operational staff** across the Health Board.

49 people from across HDUHB were invited to take part in the consultation.
26 staff members were available to join 1-1 sessions:



● Sites covered



As Is Processes

How patient observations and patient flow currently work

Clinical systems currently used across HDUHB:

Overview

Patient Flow

WPAS

IRIS

SITREP

Excel

SharePoint

EPCR (WAST)

Clinical Patient Information

WCP

WNCR

RADIS (X-Rays)

Adelaide
(CT scans)PatientView
(Renal medicine)

T-PRO (dictation)

Electronic
prescriptionsVital Data
(Renal medicine)

Patient observations

Welsh Allyn
MonitorsPhilips CareView
(ICU)WICIS (Future ICU
System)

*Note that this is not an exhaustive list.

Systems currently used: Details 1/2

System	Description	Where is it used	Feedback
Welsh Patient Administration System (WPAS)	Patient administration system used to record admissions and discharges.	Across Wales	<ul style="list-style-type: none"> Patients can currently not be allocated to beds (wards only) - note that this functionality is being rolled out WPAS “feels clunky” and is not always updated in real-time
WPAS A&E Module	The entire A&E experience is currently managed on WPAS. This includes a triage system, bed booking (currently can only allocate to ward) and information about who the responsible clinician is.	A&E	<ul style="list-style-type: none"> WPAS does what it needs to do but it is not really fit for purpose for A&E Because of the lack of beds, staff have to admit patients to A&E. However, there is no functionality to admit someone to A&E. This causes confusion between who is an admitted patient and who is attending A&E.
Welsh Clinical Portal (WCP)	A single point of access for patient letters that provides a clinical history of patient across Wales. Can use this to access lab results, CT scans and X-ray results. For some patients it is possible to access the GP records.	Across Wales	<ul style="list-style-type: none"> The system can be very slow. It is not an EPR. Some clinicians write into the WCP but still have to print off a copy for the paper record.
Welsh Nursing Care Record (WNCR)	Electronic nursing record that covers care plans, nursing care notes and some assessments. At HDUHB it is currently used for the nursing evaluation/ in patient assessment. Once a patient is discharged a PDF is saved to WCP.	Rolled out across all sites to adult inpatient areas, but not surgical day units, A&E or Paediatrics.	<ul style="list-style-type: none"> WNCR covers 15-20% of paperwork that nurses use in HDUHB. Therefore, there is still a lot of paper-based documentation.
IRIS	System used at night to enter the number of beds available at 8am, number of patients waiting for beds at 8am, the number of surge beds open etc. The system can also be used to see ambulance information.	Clinical site management teams for patient flow	<ul style="list-style-type: none"> Information about bed availability has to be entered in multiple locations, which can be tedious
SITREP	System set up by IG team. Used to record number of discharges expected, number of people waiting in A&E etc. Used to calculate number of beds available.	Clinical site management teams for patient flow.	N/A

Systems currently used: Details 2/2

System	Description	Where is it used	Feedback
Shared Drive	A shared drive on local servers that is used to store patient data. This is used in A&E for patient notes – these are scanned when a patient is discharged or moved from A&E. The A&E notes include the A&E card, NEWS chart, intentional rounding chart, A&E nursing booklet, fluid chart, sepsis chart, surgical or medical booklet et.c	A&E	<ul style="list-style-type: none"> It can take a long time to scan paper notes to the shared drive.
Excel	Excel spreadsheets are used by clinical site managers. At Bronglais Hospital a dashboard has been set up called the “Digital Flow Hub”: this is sent out three times a day and contains key patient flow information (self-calculated bed state, medically fit list, wards and transfer lists, EDDs, Track and Trace).	Excel spreadsheets are used across all sites	<ul style="list-style-type: none"> The “Digital Flow Hub” works well for Bronglais Hospital to help manage patient flow. Existing Excel spreadsheets do not integrate with any of the other systems.
SharePoint	A SharePoint site used for Complex Discharges. This is used for intermediate care to highlight medically fit people to social care and arrange the discharges of patients.	Across sites in HDUHB	N/A
Phillips CareView	A system used to automatically display observations on a screen for nursing staff. It also shows what drugs a patient is on. The data is stored on the Cloud and can be accessed remotely.	ICU at Glangwili Hospital	<ul style="list-style-type: none"> There are plans for this system to be updated using the WICIS system by Ascom.
Electronic prescriptions	Electronic system to manage descriptions.	Used by wards for take home medication.	N/A
Welsh Allyn Monitors	Monitors that provide vital sign measurements for patients.	Across HDUHB.	<ul style="list-style-type: none"> The Health Board has purchased 257 monitors that will be introduced across all sites.

Patient observations: Current process

In the **Intensive Care Units (ICUs)** patient observations are **recorded automatically using monitors** (previously Philip now moving to Welsh Allyn Monitors) that display the data on a summary screen for clinical staff.

Observations in the **Emergency Department, the SDEC and on wards** are **recorded manually**:



- The **healthcare assistant or nurse will take the observations**, including BP, pulse, RR, temperature, O2 saturation, conscious state etc.
- Some observations can be automated but there are occasions when they have to be done manually. E.g. a manual BP for a patient with an irregular heartbeat.
- Frequency of observations depends on the circumstances. For example, in the SDEC unit a patient's observations are taken hourly, but on wards it may only be every four hours.
- Which observations are taken depends on the speciality.



- The **observations are recorded on the observations chart**, a paper document that is at the end of each patient's bed. This results in a graph of the trend over time.
 - The NEWS or PEWS score (or other EWS score) is calculated manually and recorded on an early warning chart.
 - The Glasgow Coma Score is included at the bottom of the Track & Trigger chart.
- *Key risk:* There are lot of different charts on pieces of paper. There is a risk of charts going missing.

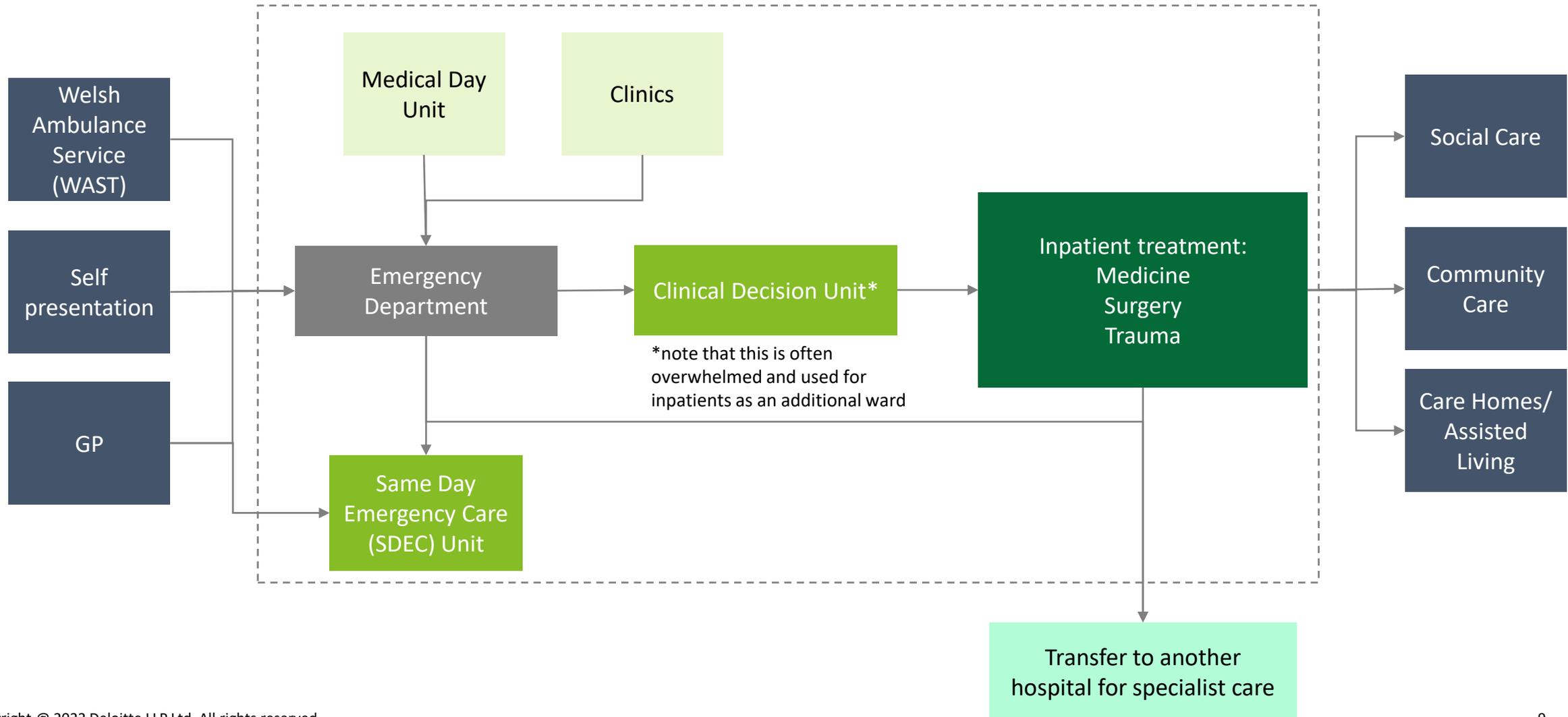


- At times the **observations are recorded electronically, e.g. on WNCR or WPAS.**
- Often this information would only be recorded electronically if the patient was deteriorating.

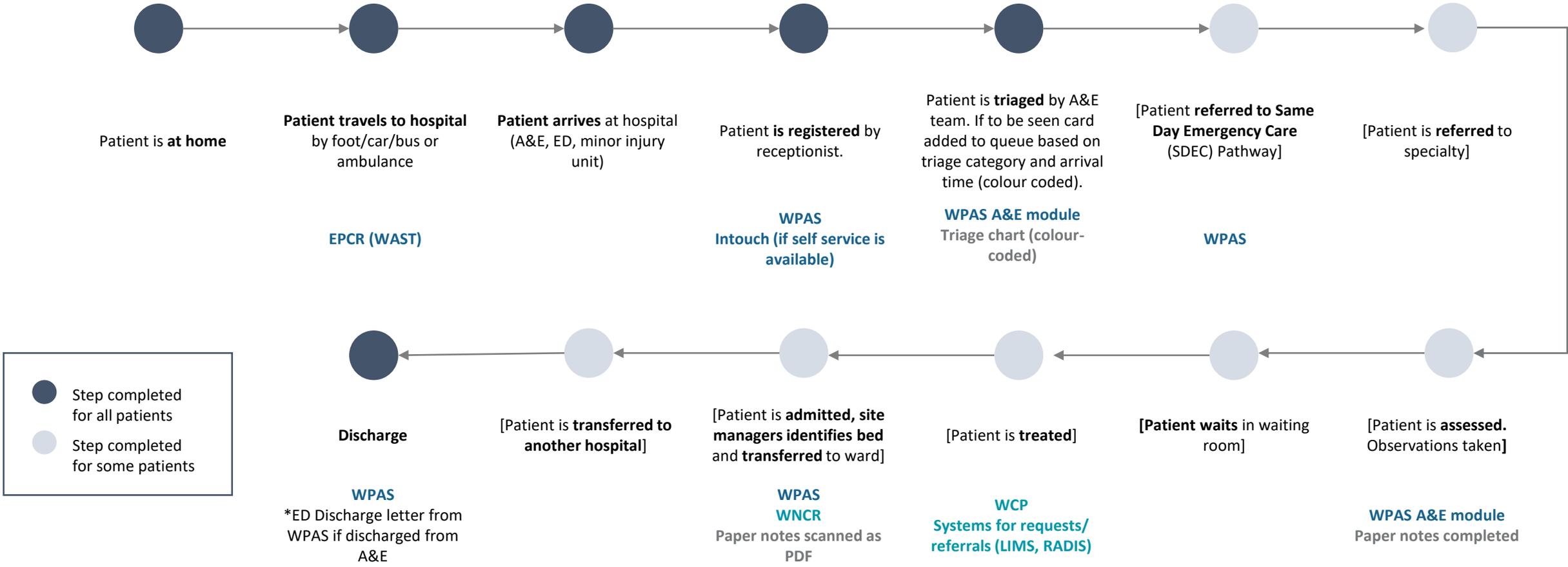


- Unregistered nurses work under the supervision of qualified staff and are required to flag any results of concern. A registered nurses signs off on observations.
- If any of the observations are abnormal for the patient or the NEWS (or other EWS) score indicates that the patient is deteriorating, a **relevant staff member is alerted** and appropriate steps are taken.

Withybush General Hospital: Emergency Care Pathway

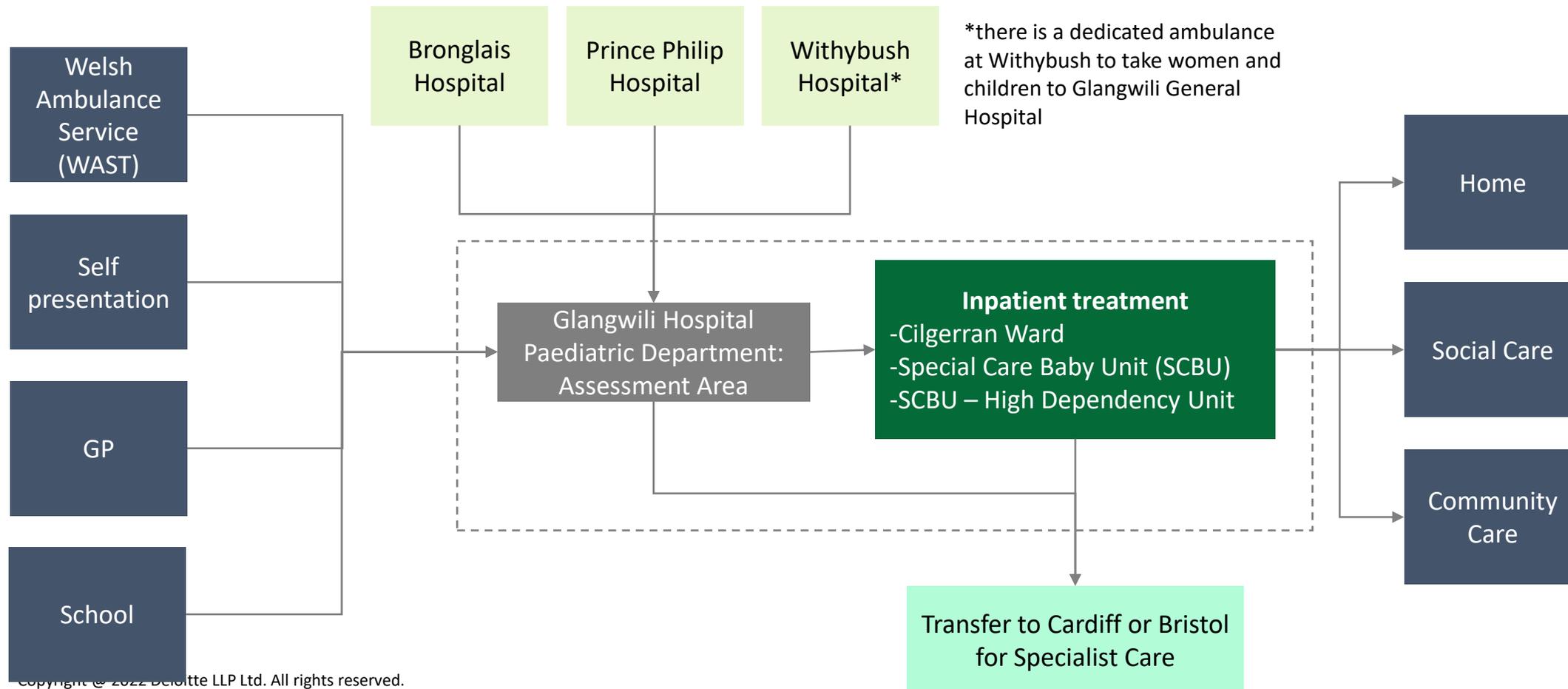


Patient Journey: Emergency arriving on their own or by ambulance



Glangwili Hospital: Paediatric Emergency Care

The **main paediatric unit for HDUHB is at Glangwili General Hospital**. In rare cases if a child needs intensive care, it will be transported to Cardiff by a specialist transport service. The paediatric unit have introduced **cardiac telemedicine**, where they are able to share live images with cardiologists in Cardiff or Bristol and discuss cases live.



Maternity and Paediatric Care

Available services

Glangwili General Hospital - Carmarthenshire

- Maternity
 - Midwife led unit for women who have straightforward pregnancies
 - Doctor led labour ward for women who need extra care
 - Special Care Baby Unit (SCBU)
- Children
 - Local Paediatric Ambulatory Care Unit (PACU) – 24/7
 - Cilgerran Ward – 24 hour paediatric inpatient care

Bronglais General Hospital - Ceredigion

- Maternity
 - Midwife led unit for women who have straightforward pregnancies
 - Doctor led labour ward for women who need extra care
 - Neonatal room for extra care before moved to specialist unit
- Children
 - Local PACU – 24/7
 - Angharad Ward – 24 hour paediatric inpatient care

Withybush General Hospital - Pembrokeshire

- Maternity
 - Midwife led unit for women who have straightforward pregnancies

Patient Flow Management in Glangwili

- **Assessment area** (9 bay areas) where a decision is made on whether a child is admitted or sent home.
- **Bed status is managed** by the nurses in charge **using a physical whiteboard**
- There is a **electronic locator system for cots** that is updated twice a day. If it is not updated then have to call hospitals to identify available beds.
- **Handover sheets are completed manually** by doctors twice a day using Microsoft Ward.
- **WPAS is used to manage discharges.** It generates a GP letter.
- Some mothers are referred to Glangwili from the community.

Issues

- To know if a ward is full and who the patients are, **a clinician has to physically go and view the whiteboard.**
- Transfers from another hospital are arranged via phone calls and **observations provided at the time may not be accurate.** As a result the treatment that is advised may not be the right one.
- **When a child is being transferred** from another hospital, the **team at the paediatric unit does not have an update for 30-40 minutes.**

Trauma and Orthopaedics (T&O)

Current trauma management

- There are **three acute sites** (Glangwili, Withybush and Bronglais) with variable trauma capacity. Each site has a consultant, a registrar and a SHO doctor (on call).
- Patients are **referred from the Emergency Department**, as well as **Virtual Fracture Clinics**.
- HDUHB is part of the **South Wales Trauma Network** and follow Pathways 1, 2 and 3 across South Wales. Policies and procedures re attached.
- Glangwili manages ~60% of caseload, Withybush 25% and Bronglais 15%.
- There is a need to communicate across sites and manage capacity accordingly. **Daily meetings are held Monday to Friday** to coordinate what is happening on each site and what the trauma capacity there is. Communication happens via phone calls or Teams across sites.
- The team have **tried to create spreadsheets** that can be shared across the Health Board to coordinate trauma. A&E system information from PAS is manually transferred
- **A number of systems are in use**, including the Clinical Portal, PAS, A&E module in PAS, theatre module, radiology system and a database for Trauma that was developed by a Junior Doctor in Bronglais.

Issues

- Despite significantly variable caseloads, **the resource to manage trauma capacity is the same at all sites**. Withybush and Bronglais have more capacity than is required.
- Meetings are held in the mornings and therefore it is possible to miss anything that comes in after. There is **no live system**.
- There is **nothing available over the weekend**, as meetings are held Monday to Friday only.
- **Information is held on pieces of paper** that can get lost.
- Staff **never know the exact number of trauma patients at each site**.
- Trauma coordinators don't always join the daily meetings.
- If the Emergency Department at Glangwili is really full, then at times **patients are sent to Withybush before being assessed**. However, the patient may not meet the requirements there and end up being transported back.
- **IT infrastructure is slow** and can wait for a long time for scans to wait.

User need

The T&O staff are looking for a way to coordinate the flow of trauma patients across all sites, where central command designates where a patient goes. For example, Bronglais would be the ambulatory trauma site and Glangwili would be for inpatient trauma. Similarly, simple cases could be redirected to sites that have less capacity to improve patient flow.

Existing Whiteboard solutions can do this effectively (e.g. Bluespier). These would integrate with existing clinical systems and include information on: demographic data, comorbidities, X-ray findings, surgical findings, implants equipment required, surgery scheduling, fracture classification, bloods etc., as well as guidelines for management.

Centralised management would also help WAST to know which types of patients go where.

Patient Flow: Emergency admissions and SDEC

Managing emergency admissions

- **Admissions are managed through WPAS.** Note that you can admit patients to a ward even if this exceeds the number of beds available in the ward.
- There is a quite a **high level of activity** in the Emergency Department.
- At times, patients are admitted to the hospital but cannot yet be transferred to a ward because no beds are available.
- However, on the WPAS system patients cannot be admitted to the ED:
 - This results in **confusion in distinguishing between patients that are attending and patients that have been admitted.**
 - As a result **admissions data is not accurate**, which makes reporting problematic.
- **WPAS does not provide the required level of detail:** Clinicians want to see when patients are seen, and what assessments have been requested when.
- There are different ways for managing ambulance patients and self presentations. Generally, ambulance patients tend to be sicker but this is not always the case, especially now that ambulance wait times are so long.
- Key admission KPIs are the 4-hour target (manage and discharge or admit 95% of patients within 4 hours) and the 12-hour wait.

Same Day Emergency Care (SDEC) Unit

- Patients are **referred to SDEC from A&E and GPs if they meet the relevant criteria.** There are ongoing discussions with WAST to trial direct attendance to SDEC to reduce attendance to emergency departments.
- If a patient is identified as suitable, they are transferred to the SDEC unit. The aim of this unit is to look after a patient and enable them to go home within the same day.

SDEC at Glangwili General Hospital

- SDEC is classified as a **ward on WPAS.** The consultant can see who is admitted but not if they have been seen, referred or for how long they have been in.
- There is currently an **inflow limitation** as not enough patients are referred from A&E to the SDEC unit. The consultant in SDEC will go to A&E and identify patients suitable for referral to SDEC.
- The team **use a whiteboard**, where they manually keep track of patients in the unit.
- Every 3 hours there is a ward round with all key staff to catch up on patients. The care plan is documented in a patient's medical notes.
- If a patient needs to be admitted to the ward, they are transferred directly if a bed is available. If no bed is available, the patient may have to return to the A&E waiting room. The lack of bed results in staff having to stay overtime to care for patients in need of admission.

Moving patients through the healthcare system

How referrals are made

While some **Internal referrals** within acute hospitals are electronic, **most are paper-based**:

- Requests for scans, such as CT scans and X-rays are made manually by contacting a radiologist.
- To make a referral to the medical team, the team are bleeped to let them know that there is a patient for them.
- On the wards referrals are written on a paper form (e.g. for OT, Physio). The form is picked up by a discharge liaison, who emails it and generates a receipt.
- For rare referrals, e.g. podiatry, a call is made.
- In urgent cases, consultants may use a Whatsapp group to make referrals.
- Twice a week there are MDT meetings, where patients and relevant referrals are discussed and can be arranged.

In some cases referrals are automatically made, e.g. for cardiac crisis cases.

Referrals from and into the community:

- **GP referrals are reviewed** to manage ED capacity. For example, GPs have two lines that they can call to discuss their patients (Care of the Elderly and Acute Medicine) to make a referral for assessment or if they need advice. In some sites **all GP referrals for medicine go through the SDEC unit**.

Key issues

- The internal referral process is ineffective and time-consuming. Some internal referrals can take up to 1 week.
- Community Hospitals are not involved in selecting patients that are referred. At times, patients are too unwell to be cared for in the Community Hospital and they end up being sent back to the acute hospitals.

“If I am on call they keep a paper list of patients with stickers – so I know which patients to see when they come in. That’s a patient safety issue if you miss a patient.”

Transferring a patient to a ward

- When a patient is ready to be transferred from A&E to a ward, the A&E navigator will bleep the clinical site team to book a bed. A paper form is completed that contains key information: Time of request, time patient arrived in A&E, patient name, patient hospital number, underlying complaint, team admitted under, infection control issues, do they require a monitored bed, ward allocated to.
- When a patient is transferred from A&E to a ward, the original paper notes move with the patient. The notes are scanned by nursing staff onto the shared drive.
- Staff try to transfer patients to relevant wards, e.g. a medical patient would be transferred to the medical ward.

Patient Flow: Managing Discharges



The **clinical site management team collate key information** on discharges: EDDs, list of wards and beds available/ expected to be available etc.

In some areas there are **afternoon huddles to prepare discharges** for the following day.



Complex Discharges are recorded on the **Complex Discharges SharePoint Site**.

This site can be accessed by social care, and enables MDT work.



Patients that are **'medically fit for discharge'** are collated on a list.

If there are no outstanding tasks, then the patient is discharged (home, to community or social care, into a care home etc). Any discharges are recorded on WPAS.



If there are no infection control issues, then the ward nursing staff can **clean the bed**.

If a patient had COVID or another infectious disease, then the bed will need deep cleaning. The ward staff need to inform the domestic teams for this.



When a **bed becomes available**, ward staff should let the clinical site management team know. This is currently done in person or via phone calls.

Key issues with discharges

- There are often patients that are ready to be discharged ('medically fit'), whose **discharge gets delayed** for various reasons. E.g. community support not in place, prescriptions not ready etc.
- Because of high workloads staff don't have time to **complete all relevant tasks the day before a patient is due to be discharged**. This delays discharges to the afternoon.
- There seems to be a **lack of clarity** for when to use the patient discharge unit.
- On a Friday, **discharges are not always captured on the system**.
- Wales has pathways for discharge (e.g. Pathway 1 – Go Home etc.) but it is **not clear from the system what discharge pathway a patient is on**.
- Estimated Discharge Dates (EDDs) are not always accurate.

"Discharges are a nightmare."

"Once a patient is discharged all of our systems at the moment are manual."

Bed capacity management

At the moment, bed capacity is **manually managed**. The information comes from different places:



In-person meetings or calls



Excel spreadsheets (in certain sites)



WPAS (which ward is the patient admitted in, bed occupancy %)

- ❖ **Flow or bed meetings:** These meetings occur 3 times a day. The clinical site manager, general manager, head of nursing, ward managers etc. meet to discuss the number of available beds, the number of patients expected to be discharged, number of expected admissions/ transfers, patient EDDs, as well as any issues (e.g. beds closed due to infection control, issues with transport etc.).
- ❖ **Board rounds:** On wards there are daily MDT meetings to discuss each patient. This is led by the sisters on the unit, who identify what needs to be done for each patient on the day. A whiteboard is used to record this information.

Assigning a bed	Patient ready to discharge
<ol style="list-style-type: none"> 1. When staff are looking for a bed, they contact the site manager (bleep or phone). 2. The site manager identifies an available bed (through in-person meetings, by walking around wards or by checking their spreadsheet/ records). 3. When they find an available bed, they call back and let them know which bed to use. 4. The staff member then has to contact the relevant ward to arrange a transfer. 	<ol style="list-style-type: none"> 1. During daily board rounds outstanding tasks for each patient are identified. 2. When a patient is ready for discharge, the site management team is informed. 3. Once a bed is free, the domestic team can be notified to clean the area if required. 4. Once clean, the bed is available for a new patient.
<p>Key issues</p> <ul style="list-style-type: none"> × The process is lengthy and requires several phone calls. × Due to the lack of available beds, patients are often assigned to whatever bed they can find. This means they may not be in the ward best suited to care for their condition and it makes it harder for doctors to track their patients. × There is no easy way to see which patient is in which bed. 	<p>Key issues</p> <ul style="list-style-type: none"> × Tasks to prepare a patient for discharge are not always completed the day before. × The site management team are not always informed immediately when a bed becomes available. × Patients can be 'medically fit' for days/weeks but are not being discharged because of the lack of capacity in community care. This means patients keep occupying beds and turnover is slowed down.

Pain Points

What are the key current issues faced by staff?

A lack of available beds limits patient flow across the Health Board.

There are a number of reasons why there are not enough beds available, including:

- **'Medically fit' patients cannot be discharged** as there is significant pressure on community services (incl. care homes, domiciliary care, social care) who lack the capacity to provide support to patients.
- **COVID restricts capacity** as infection control measures need to be implemented.
- **A lack of staff** means that in some areas not all beds can be used.
- **Inefficiencies in patient transfers/ handovers** lead to delays in admitting patients.

"It's a nightmare at the moment...It's a patient safety issue."

This has **significant negative impact** on health services in Hywel Dda:

- Normally, GP referrals should be assessed in the Clinical Decision Unit (CDU) to determine next steps, however, the **CDU is used as an additional ward** and GP referrals are assessed in the Emergency Department (ED) instead. This impacts ED capacity.
- When there is no space on wards, **patients stay in the ED as in-patients**. WPAS doesn't enable admission into the ED and as a result there can be confusion around who has been admitted.
- When patients are admitted, they tend to be admitted to any bed that becomes available without consideration for the speciality they may be overseen by. This leads to **lots of outliers**, making it difficult for clinicians to identify their patients.
- **Surge beds** are opened, which are difficult to staff.
- **Ambulances cannot offload their patients** and end up waiting outside the hospital. WAST estimates at the acute hospitals in HDUHB 70 to 85 hours are lost every day per site. This means ambulances cannot respond to calls in time. It also leads to difficulties when ambulance crews changeover, as the new crew may not have the PIN used by the previous crew, which means the screens in hospitals cannot be updated.
- When the Same Day Emergency Care (SDEC) unit cannot admit patients, **staff has to stay overtime** to ensure patients' safety.

Ineffective communication is one of the biggest issues faced by staff across all sites.

- **Lack of shared patient record:** There is no single system to view all the information about a patient. Often different services/ specialities do not have access to each other's systems. This causes problems for example when managing flow from primary to secondary care for children and mothers.
- **Bed capacity management:** Site managers find out about available beds during three daily meetings or by walking around wards. At Bronglais hospital a dashboard has been set up to manage admissions and discharge, which is updated by the site manager. However, information about available beds is not available in real-time and involves a lot of administrative work for the site management team.
- **Working in isolation:** Staff have very little sight of what is happening across other areas.
- **Slow communication methods:** Staff spends lots of time calling wards or services to arrange handovers/ referrals. In particular for moving patients from A&E into wards.
- **Audit trails:** There is a lack of audit trails for escalation.
- **Duplication of effort:** In many cases staff have to record information in multiple places, including both online systems and paper records. This leads to duplication of effort and can make it difficult for staff to know where to look for relevant information.
- **Up-to-date records:** Staff lack the time to keep electronic records up-to-date due to both staffing issues and the need to replicate information.

"If I could change one thing I would try and improve the communication between the emergency department (where most patients go out of) and the ward areas... Can we not have a direct means of communication?"

"...Communication is the biggest problem. Especially when moving between specialities."

"Overall we are operating in the 1920s – we are on paper based systems. People don't have access to each other systems."

Handovers, transfers and discharges are slow, negatively impacting patient flow

There is a **lack of real-time information**:

- Due to resourcing difficulties, there is **not enough staff** – this can cause delays for example when a patient is medically fit and ready for discharge but certain tasks are yet to be completed, e.g. preparing prescription medication.
- When there are lots of outliers, it is **difficult for doctors to know where their patients are** due to the lack of real-time information.
- When a bed does become available, **deep cleaning** (required for infectious patients, e.g. COVID) takes a long time, and **beds are not always declared immediately**.
- Staff have **no visibility of what is happening in other areas**.
- When a child is transferred from another hospital to Glangwili, staff don't have any information about how they are doing for 30-40 minutes (while in transfer).

The **lack of a single, shared electronic record** means that clinicians often don't have access to a patient's full history and information is duplicated:

- **Handovers are completed on paper** – this is seen as a patient safety risk.
- With handwritten notes, **legibility can be a problem**.
- Because triage notes and observations are not available electronically (e.g. on WPAS), staff working in the SDEC unit in Glangwili Hospital often have to go to A&E to identify patients that may be suitable for the unit.
- When a patient leaves A&E and is transferred to a ward, nurses need to **scan the paper notes**, which can take up to 20min.

"If you are on a ward you only focus on the flow in your ward. There is no situational awareness that there are ambulances outside the Emergency Department."

The local infrastructure requires improvement.

- There is a **lack of interoperability**: While some systems are connected, clinical staff feel like they are not connected *“in a way that helps how clinicians work”*. Often staff have to log into lots of different systems to view relevant patient information.
- There is **no shared patient record**: While clinicians can access limited GP information through the Welsh Clinical Portal, clinical staff highlighted the need to improve the interface between primary and secondary care. Furthermore, different specialities/ services use their own systems and these tend to be used in isolation. The importance of sharing data with social care was highlighted in particular. In some cases clinicians have to manually search through scanned PDF files to try and find information relevant to the patient (A&E).
- **WPAS can be clunky and lacks functionality**: While WPAS does have the basic functionality that is required of the system, staff consistently described it as “clunky”. In particular, WPAS was deemed to lack functionality required to effectively manage A&E admissions.
- There are **not enough devices**: While this has improved since the rollout of WNCR, most staff we spoke to highlighted the lack of devices. They also highlighted the need for adequate device management, i.e. there needs to be a way to track devices as they often go missing, as well as a way to ensure tech support is available when required. A detailed assessment of each ward is required to understand the needs regarding devices.
- In some cases **systems are too slow** and when staff try to enter information into the electronic record, they have to sit and wait for the pages to load. Note that there is an ongoing upgrade that is causing slow systems. This is due to finish in 6 weeks.
- In some areas (in particular Withybush) the **WiFi is not good** enough to support working from mobile devices at the patient bedside.
- **Giving agency staff access is time-consuming**, as accounts have to be manually created and passwords have to be reset regularly.

“It’s the system that is limiting us clinically.”

“I hate separate independent systems that don’t link together... It’s really frustrating to navigate lots of different systems.”

“There isn’t one place to put the information... We have the nursing record, the medical record, there is WPAS, the Welsh Clinical Portal Record, there is so much paper... It’s risky – you have to be looking in the right place.”

“You feel as a clinician that you are working blind... We’re making life and death decisions without all the information.”

Observations are not always completed fully or on time, and there can be inappropriate escalation.

A key driver for issues with observations are **resourcing problems**:

- Observations are sometimes delayed as **staff are busy with other activities**. For example, at times in South Pembrokeshire Community Hospital, ward round timings determine observation timings.
- As qualified nurses tend to be extremely busy, Healthcare workers are responsible for taking observations. They escalate abnormal measurements, but at times the **NEWS score is calculated incorrectly** or they may not be aware that the **parameters need to be adjusted for a particular patient**. For example, COPD patients may have observations that look abnormal but are normal for that particular type of patient. This leads to inappropriate escalation.
- There can be **issues with the frequencies of observations**, where staff may not be aware that patients require more or less regular observations. For example, in the SDEC Unit in Glangwili Hospital, observations are completed every hour. When staff from other wards fill in to support the unit, they may be used to carrying out observations every four hours.

“We are often contacted for observations that look abnormal but are normal for the patient.”

“People sometimes have difficulties adding up the NEWS score and there is incorrect scoring.”

User needs

What are the requirements that eObs and Patient flow solutions need to meet?

Overview of staff needs

I need...

...to be able to **override digital systems**.

...a system that **works with the systems I already have to use**.

...systems that **do not add to my existing workload**.

...a system that **works quickly** and is not time-consuming to use.

...**clinically relevant information** about my patient that is **easily accessible**.

...to be able to **share information easily** with colleagues and other relevant services.

...an **easy way to communicate**.

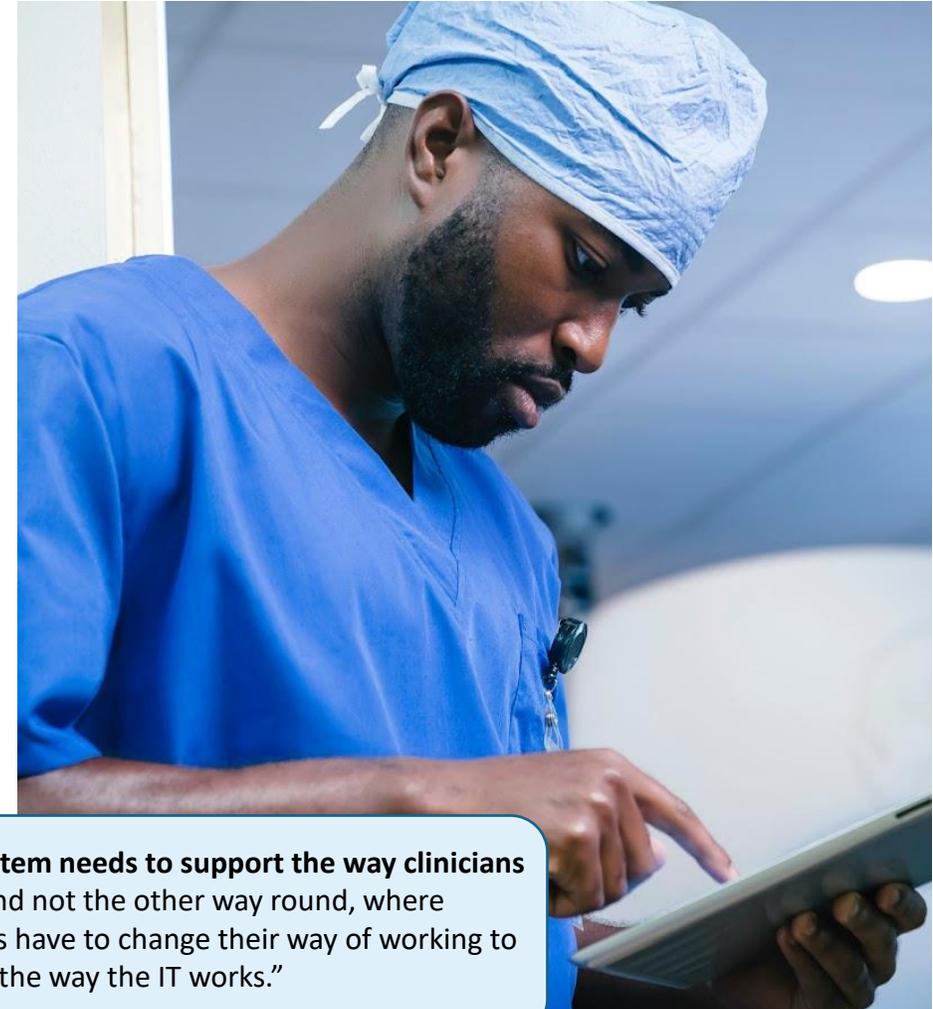
...to be able to **access information easily at the patient's bedside**.

...to be able to **see trends over time**.

...to be able to **use the device of my preference**.

...**support and training** for new systems.

...an **overview of what is happening elsewhere** in the hospital.



“The **system needs to support the way clinicians work**. And not the other way round, where clinicians have to change their way of working to support the way the IT works.”

The **patient needs to be at the centre**: Technology should support not replace care.

Clinical staff highlighted the importance of retaining the “human element” when introducing technology.

There should always be an element of professional intelligence, and clinical staff need to be able to override any system.

Technology should empower staff and patients, but it should never replace in-person interactions.

“We want something that is minimally digital, maximally patient.”

“It’s about providing high quality care for patients. And providing it at the right time.”

Local infrastructure must meet the requirements of new digital systems.

- All staff members we spoke to highlighted the need for a robust infrastructure. They described current systems as slow and some felt it would be unable to handle any new systems.
- For example, staff at Withybush hospital described that when they go to enter information into the WNCR, it takes a long time for the relevant pages to load. Some areas in Withybush hospital struggle with black spots, where no WiFi signal is available.
- Staff also felt that there were not enough devices available to enable efficient use of digital systems.
- It was clear that these problems cause frustration and make processes more inefficient.

The following is required to ensure successful implementation:

- ✓ **Robust WiFi infrastructure**
- ✓ **Appropriate number of devices**
- ✓ **Good mobile device management**
- ✓ **Regular upgrades to existing systems**

Interoperability is key.

Every single person we spoke to highlighted the importance of interoperability: Any new technology will need to **integrate with existing systems**. Staff should be able to **use their existing logins** to access systems.

eObs and Patient flow systems should integrate with:

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Welsh Clinical
Portal (WCP)

Welsh Nursing
Care Record
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New technology will also need to **integrate with future systems** that will be introduced across Wales:

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A single, shared electronic patient record.



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Collaboration & Co-design: Clinical and operational staff need to be engaged early in the process.

Co-design

Clinical staff highlighted the importance of being able to configure any solution to meet local needs: *“One size does not fit all.”*

Benefits

Staff need to have a clear understanding of what the benefits of a new system are before they use it. Improving patient care is a key concern for all clinical staff, and it is important to outline how digital systems can help improve patient safety.

Training

Staff need to be supported adequately in the use of digital technologies. While some may feel comfortable trying new systems, others require more guidance: *“A lot of people need a lot of handholding.”*

While staff need to receive training for new technologies, they should also be provided with Basic IT skill training to help people feel more comfortable and confident.

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“People don’t like change. **You have to engage staff.**”

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There is a risk that if you rely on the supplier to make changes this would take too long.

This is because national regulations may change, and while a solution may be adequate now, this will not be the case in the future. For example, the NEWS score is not standardised across all of Wales, but this may change going forward.

“We had a team for our PAS that could manage changes locally. One of the biggest problems with supplier was change requests. Sometimes it could take years. **You need to have local ability to make changes.**”

“We learned from critical care that at that initial phase **you need to be able to make changes as you are setting up.**”

“The **reporting criteria for A&E are changing.** The system would need to be able to respond to that.”



Specific functionality requirements for an eObs solution 1/2

Must Have

Solution **encompasses all observations currently available on the paper chart**, e.g. BP, Heart Rate, Oxygen Saturation, NEWS score etc.

eObs results can **easily be accessed on existing devices**.

eObs results can **easily be accessed at the patient bedside and remotely**.

Parameters can be adjusted according to patient needs. For example, COPD patients may have a different “normal” for Oxygen saturation levels.
*Note that this can be complex and will require adequate training.

Data trends are presented visually, i.e. graphs, to inform clinical decision-making.

Frequency of observations required can be adjusted.

Automatic calculation of NEWS score (or equivalent e.g. PEWS).
*Note this is currently standardised across HDUHB but not all of Wales.

Integration with WNCR: Relevant eObs, including assessments, should automatically feed into the WNCR.

Integration with WCP: eObs results should automatically be sent to WCP

Integration with WPAS: Pull data from WPAS to identify patients.

Observations are automatically captured from existing monitors/machines e.g. Welsh Allyn Monitors.

If eObs is considered software as a medical device, needs to have **MHRA accreditation**.

Integration with remote monitoring devices: eObs software should integrate seamlessly with devices used for monitoring patients at home

Specific functionality requirements for an eObs solution 2/2

Should Have

The system provides prompts to **remind staff to “look at the patient”**.

Healthcare or nursing staff on wards are **reminded to take observations**.

Data is available for audits and for analytical purposes.

Pathway recommendation: Based on NEWS score calculation and/ or assessment results, the system recommend an action to be taken.

Automated escalation:

- In A&E an initial alert for a high NEWS score should be provided.
- There should be an alert if a patient is deteriorating.
- In Community Hospitals, nursing staff should be alerted as doctors are not always on site.
- Only specific alerts (e.g. red alerts) should be sent to doctors.
- Alerts should be available for clinical staff on their device of choice.

Specific functionality requirements for **patient flow** solutions 1/2

Must Have

Integration with WPAS: Ability to pull and push ADT data and patient location data.

Integration with WCP: Automatically pull clinically relevant information to be made available through electronic whiteboard.

Integration with WNCR: Automatically pull clinically relevant information to be made available through electronic whiteboard and handover system.

Solution(s) available on mobile devices.

Handover system: Displays key information, including patient diagnosis (WPAS), patient location (WPAS), assessment information from WNCR and where the patient is in their journey.

Bed capacity management: Visual display of real-time bed status, i.e. physical space order. Can choose and assign beds to patients. Can identify empty beds. Ability to search for/order patients based on various criteria.

“At this moment in time... **I think the biggest difference would be a handover package.** A system that we could use in handover. I’ve seen it used... And they can pull it up on their handheld devices.”

Data available for audits: Structured data can easily be searched and analysed for audits for clinicians, ward managers and clinical site managers, e.g. for A&E Time to triage, time to clinician, time to referral.

Data available for analytics: Data can be analysed to understand what the key flow constraints are. Real-time data for clinical site managers to manage flow, e.g. # of people that can go home today, # of expected discharges, outstanding tasks etc.

“I would like a system, where **I can see a visual overview of beds in my department.** I can click on cubicle and it brings up patient information with observations. I click on waiting room and there is a list.”

Specific functionality requirements for **patient flow** solutions 2/2

Should Have

Visual display of information on large screen (electronic whiteboards): Editable, large screen that enables everyone in a department/ ward to see real-time information about the whole site. This displays key information, including EDD, diagnosis, outstanding tasks, and key flags (e.g. at risk of falls, patient with delirium/ dementia), key assessments (e.g. NEWS score).

Referral management: A system to manage referrals between departments within a hospital.

Task management: A system to manage tasks that are outstanding and visualise these to help staff understand what needs to be done to enable discharge of a patient.

Could Have

Workflow notifications: There should be a way to easily notify staff in real-time without having to use the phone system. This includes notifications for:

- When a bed becomes available for clinical site team
- Return attenders to A&E for A&E staff.

Benefits

What benefits do staff feel these new technologies could achieve?

Perceived Benefits



Free up time: Staff anticipates that eObs will free up time for nursing staff. Patient flow solutions are expected to release time for clinical site teams to facilitate flow in a more proactive way.



Increased capacity: A more efficient process would create capacity. It would also better the patient journey. Some staff are envisioning that transfers would run much faster and smoother when you remove the need to scan notes (~20min per patient) and wait to confirm bed allocation. For them, you can do more in other areas if you take that away



Improved decision making thanks to quick and easy access to accurate information.



Ability to identify patients for SDEC more quickly: By accessing observations remotely, it may be easier for the team to identify appropriate patients for SDEC.



Reduce duplication: Reduced duplication makes processes more efficient



Staff morale is expected to improve.



Improved communication: With remote digital access to information, and automated notifications, communication becomes easier. It is expected that this will result in a lot less phone calls, which will remove dependencies on staff being available to answer the phone for example for transfers or handovers. Digital notes are also expected to be more easily legible.



Better use of staffing resources: Qualified staff can use their skills to their full potential, because they won't have to perform the routine tasks, such as transcribing results.



Improved patient safety: eObs and patient flow solutions help provide more accurate and reliable information. Staff expect that it will be easier to pick up on trends and identify deteriorating patients earlier. It is also worth noting that an electronic system can serve as a safety net for staff with less experience. There are less errors, and you can use the information provided with confidence.

If you have any feedback or questions, please feel free to contact us

Mathilde Gent mgent@deloitte.co.uk
Giulia Melchiorre gmelchiorre@deloitte.co.uk

User Research Playback Session

9th June 2022 | Electronic Observations and Patient Flow Outline Business Case

Agenda

01

Introduction

03

Summary of Findings

05

What's Next

02

Business Case Background

04

Digital Team – Ongoing Work

06

Feedback and Q&A

Submit your questions below:
www.menti.com/2n4y9qzokp

Why are we looking at Electronic Observations and Patient Flow?

The Health Board is facing a number of challenges that pose significant risks to patient safety – several staff members have requested systems to support them in their work:



Challenges with patient handovers



Managing patient flow with limited capacity



Reducing waiting time for ambulances



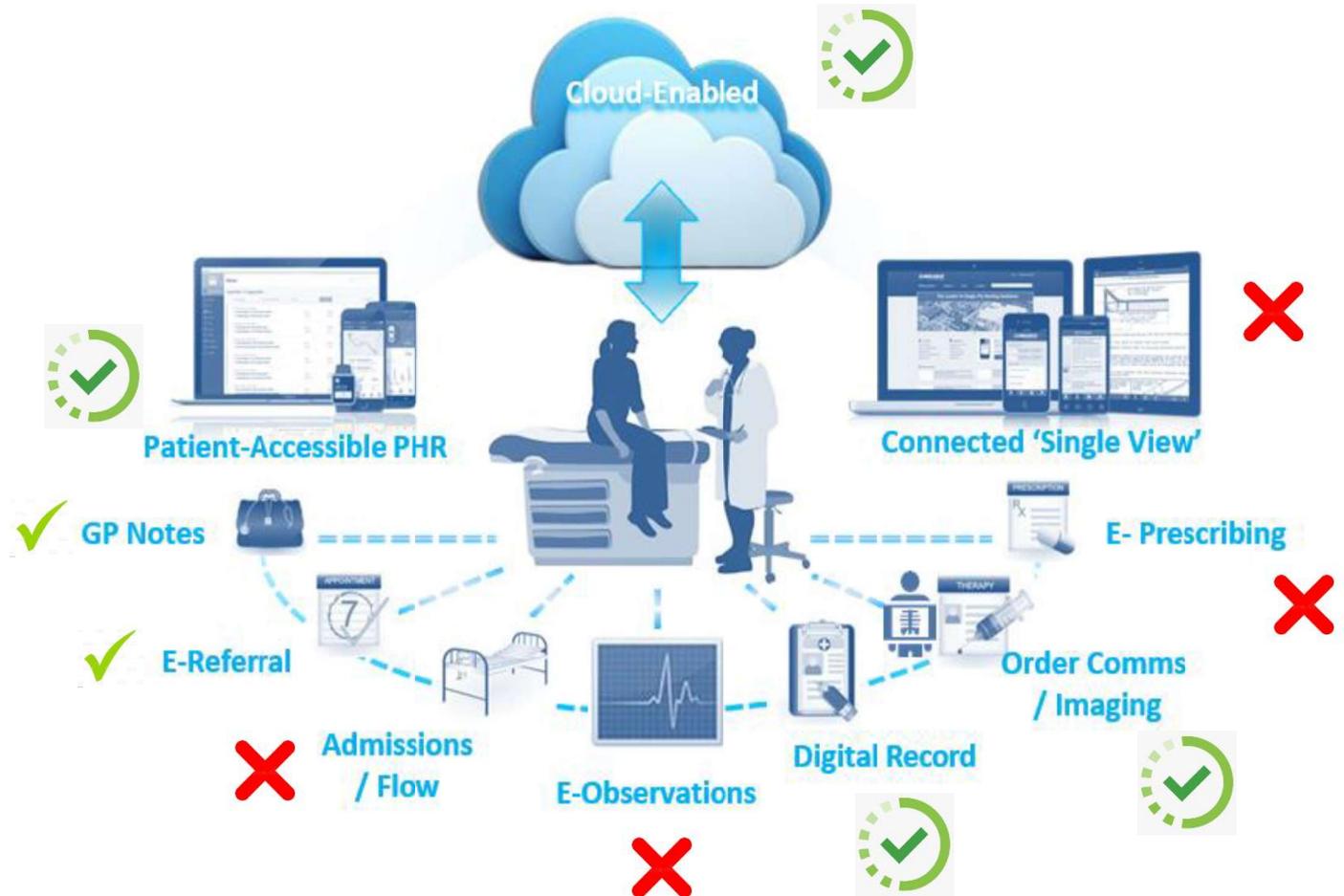
Access relevant information in a timely manner

The aim of this engagement is to develop a business case to get funding to support the introduction of these systems.

Our digitally transformed future healthcare vision...

In the future we will have digitised all of the events and information that relate to a patients care into an easily accessible data store that can be shared with our partners. Clinicians will be able to view all the requests and results relating to a patient, including images, not only from our Health Board but also our partners in primary, secondary and community care.

By digitising the complete care pathway, from admission through medicines administration and onto discharge, patients will receive better and safer care as our teams will have a clear and easily understood picture of the patient's health.



What have we been working on?

HDUHB has been working in collaboration with a team from Deloitte to develop an Outline Business Case, including a digital vision and roadmap.

Market research to understand the available solutions

User research to make sure this technology is useful and adopted by staff

Linking in with **reference sites** to understand how they implemented the technology

Digital Roadmap, Implementation Plan and Architecture Map to ensure the solution can be successfully implemented

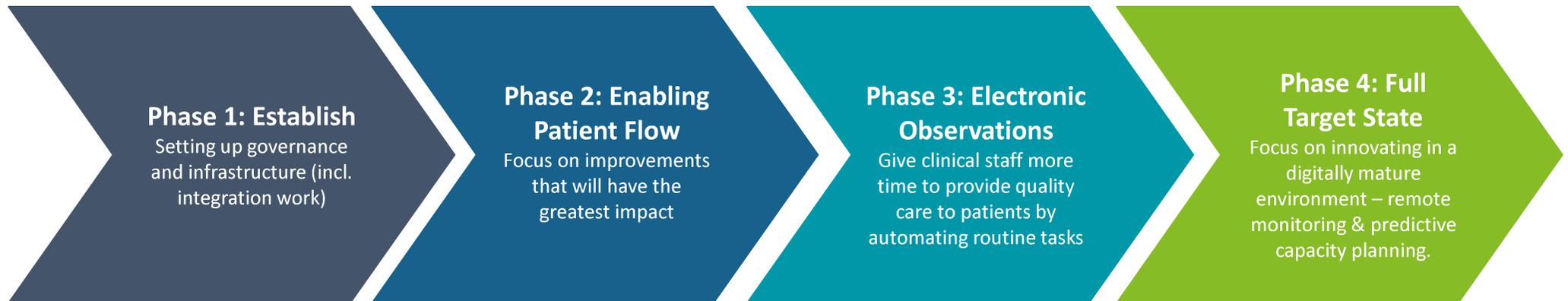
Workshops to develop solution options and assess risks and benefits

Write-up of the **Outline Business Case** for funding applications and procurement

Outline Business Case **Scope**

This Business Case outlines the benefits, risks and costs associated with implementing **Patient Flow** and **Electronic Patient Observations** technology.

Implementation will follow an **incremental approach** with the technology being rolled out site by site and ward by ward. The plan is to **pilot the technology** at South Pembrokeshire Community Hospital.





Introduction

Background

Findings

Ongoing Work

What's Next

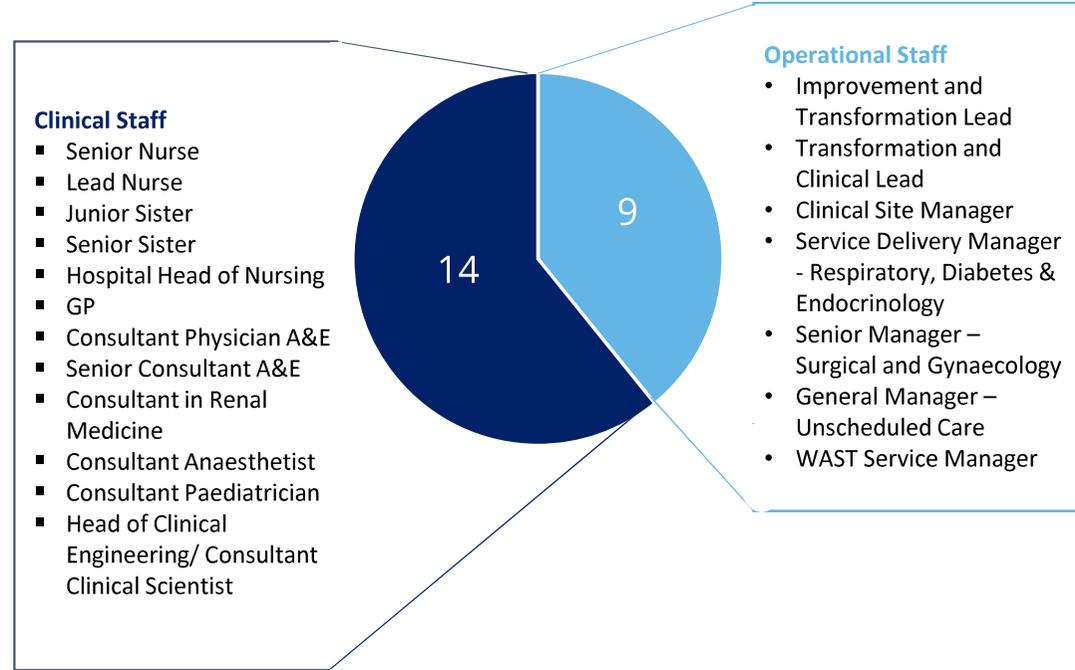
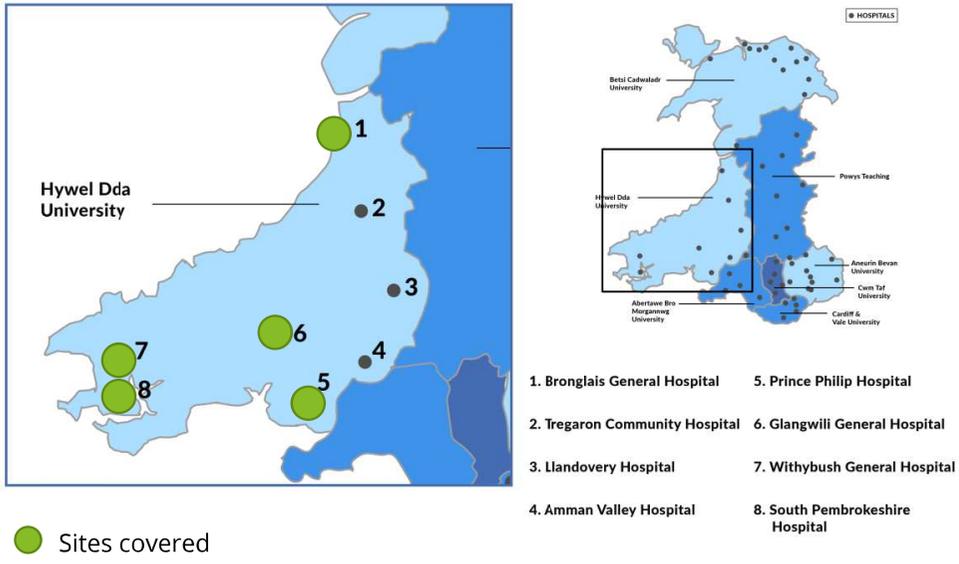
Feedback

The **purpose of the user research** was to understand current processes, issues and staff needs to inform the business case requirements.

*Note that in this session we will present high level findings. A **detailed report will be shared** after this session.

We spoke to **clinical and operational staff** across the Health Board.

49 people from across HDUHB were invited to take part in the consultation.
 23 staff members were available to join 1-1 sessions:



Key Pain Points

- A **lack of available beds** limits patient flow across the Health Board, which has a significant negative impact on health services across Hywel Dda. This is caused by a lack of capacity in social care and community services, a lack of resources, COVID-related restrictions and inefficiencies in patient transfers/ handovers.
- **Ineffective communication** is one of the biggest issues faced by staff across all sites: Lack of up-to-date, shared patient record, manual bed capacity management, working in isolation, slow communication methods and duplication of efforts.
- The **local infrastructure requires improvement**: Lack of interoperability, slow systems, lack of devices, network issues etc.
- **Observations are not always completed fully or on time**, and there can be **inappropriate escalation**. A key driver for issues with observations are likely resourcing problems.
- **Handovers, transfers and discharges** are slow, negatively impacting patient flow. This is due to a lack of real-time information and access to a single, shared patient record.

The **patient needs to be at the centre**: Technology should support not replace care.

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Perceived **benefits**



Free up time



Staff morale improved



Improved patient safety



Reduced duplication



Improved decision making



Better use of staffing resources



Ability to identify patients for
SDEC more quickly



Increased capacity
Better patient journey
Smoother transfers



Improved communication
More legible notes

Summary of **associated risks**



Change Management

- Meeting local needs
- Lack of ownership
- Inadequate training
- Lack of willingness to adapt new systems



Infrastructure

- Disruptions to ward operations
- Lack of space for electronic whiteboards
- Risk that technology fails (e.g. national cyber incident)
- Stability of wireless network
- Not enough devices



Funding

- Lack of funding to support implementation/ business as usual
- Additional funding for integration required



Interoperability

- Two-way interfaces with Welsh Patient Administration System
- Digital Health and Care Wales lack capacity
- eObs software and medical devices
- Integration with Welsh Intensive Care Information System



Implementation

- Dual-running sites
- System does not meet user needs
- Implementation takes longer than planned
- Lack of resources
- Supplier unable to deliver fit-for-purpose solution in time
- Lack of estate capabilities



Information Governance

- Management of Patient Data

Digital Team: Infrastructure Update



Network Upgrades: BGH and GGH complete, WGH and PPH ongoing



Device Rollout: There are currently 10,705 devices (tablets, desktop computers, laptops, smartphones) available across HDUHB



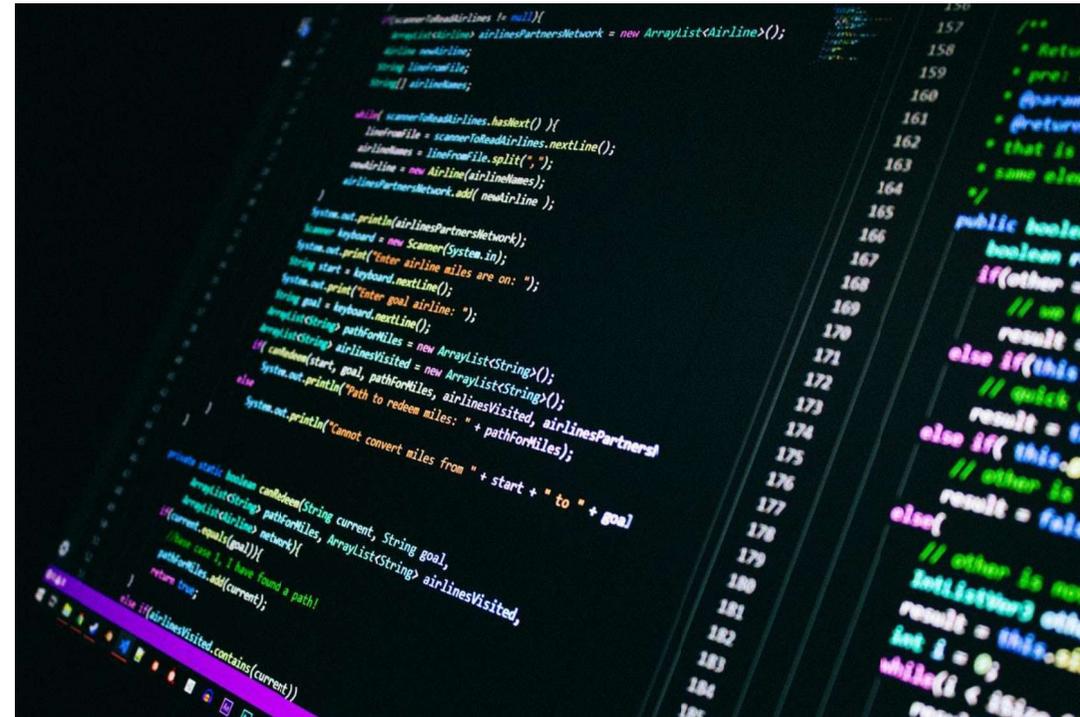
Cloud First: Adopting Cloud First strategy and moving our core infrastructure to cloud services providing improved performance and reliability



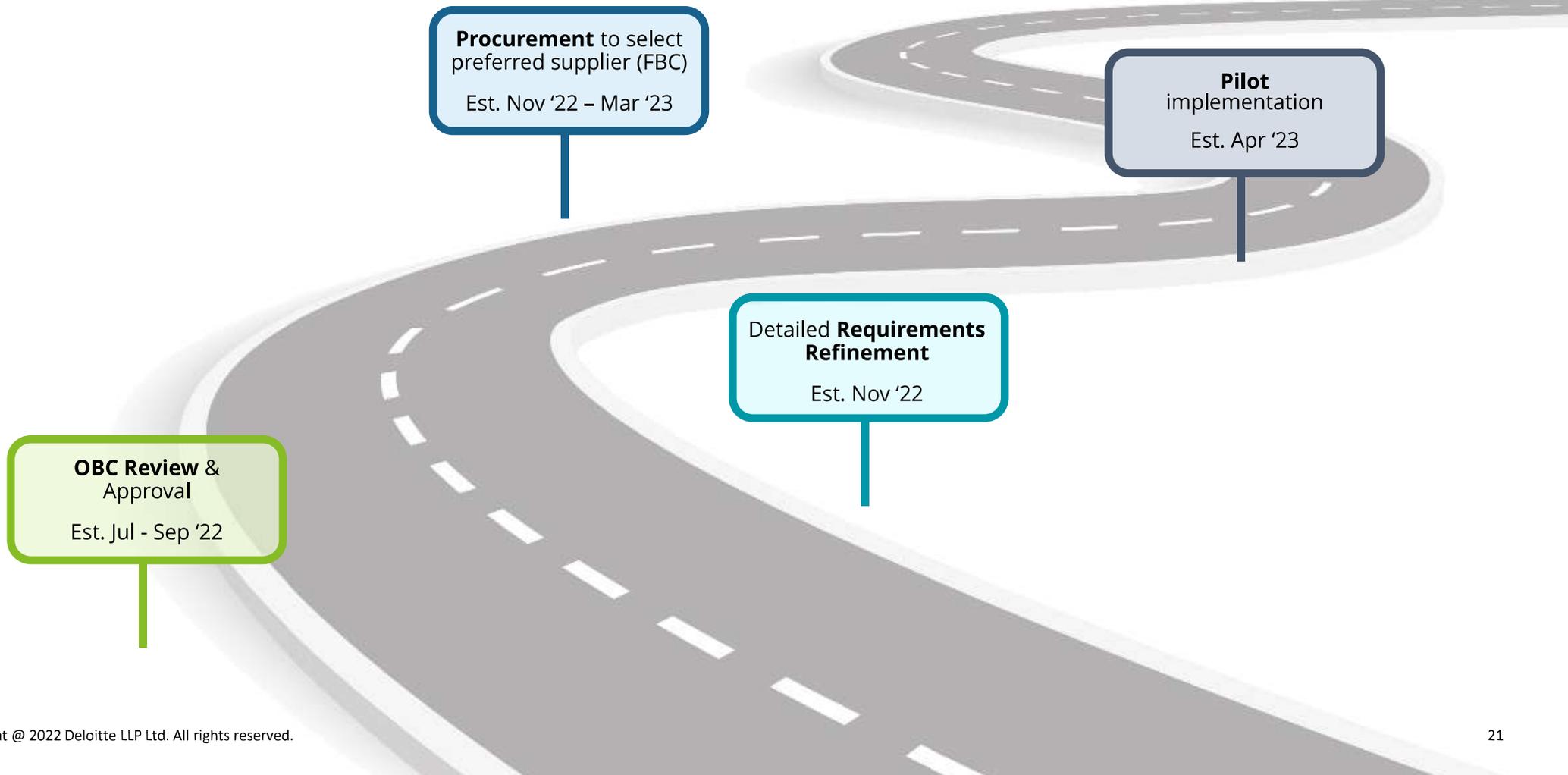
Cyber Security: Cyber Security Programme instigating a wide range of Cyber protections to comply with legislation and best practice



Single Sign On: Improvements to user logon processes with staff having fewer passwords to remember and quicker login times



What's next?



Feedback and Q&A

Submit your feedback by going to

<https://www.menti.com/jag1c5o4op>

Electronic Observations and Patient Flow Business Case

Digital Roadmap

HIGH-LEVEL DIGITAL ROADMAP OVERVIEW

1. ESTABLISH

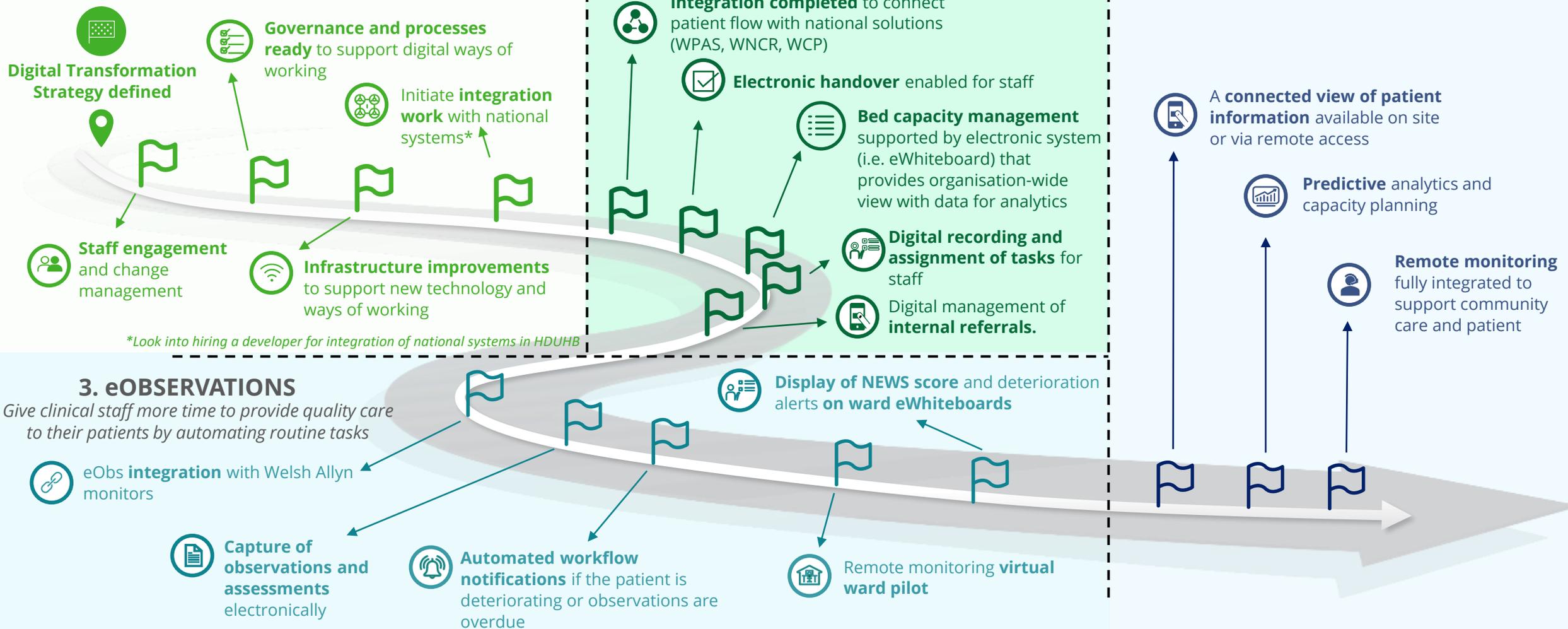
Focus on setting up governance and infrastructure

2. ENABLING PATIENT FLOW

Focus on improvements that will have the greatest impact first

4. FULL TARGET STATE

Focus on innovating in a digitally mature environment



Phase 1: Establish

Phase description

The first phase focuses on **setting up governance and processes, preparing the local infrastructure, and engaging staff** on all levels, with communication and training.

Assumptions and Constraints

Assumptions:

- An **assessment of each site** will be carried out to understand local infrastructure requirements.
- **Detailed requirements** have been established in collaboration with clinical and operational staff for new systems.
- **Infrastructure set-up times may vary greatly** between different sites.
- **Training time may vary** depending on technology literacy of different staff.

Constraints:

- Improving **infrastructure at Whitybush hospital** is expected to take 18-24 months.
- **Availability of resources** to support this phase (current staff shortages and recruitment difficulties).

Enablers



Funding

- ❖ **Secure the necessary funding** to undertake the planned work.



Digital Leadership

- ❖ **Digital strategy** defined.
- ❖ Identify **Digital Champions** on each site.
- ❖ Work with clinical leads to **support** the implementation.



Integration ground work

- ❖ Look at possibility to **hire a developer** for the HDUHB to reduce delays



Governance

- ❖ Decide on the **operating model**.
- ❖ Robust **disaster recovery plan** developed.

Workstreams

Staff **engagement and training** is a continuous focus in this phase. The first phase must start with **assessing current infrastructure and governance**, followed by **making the required changes**. In parallel, another focus throughout the first phase is going to be the **enabling of the integrations**.

Outcomes and Benefits

- ✓ Staff are **aware of planned changes** ahead of implementation. They **understand the benefits** of the new technologies for themselves and for patients. They **understand the changes** and are given the **opportunity to ask questions** they may have (e.g. Q&A session).
- ✓ Staff is **empowered to use new technologies** by being trained on basic IT skills.
- ✓ Staff are **engaged and supportive** of implementing new ways of working through a **communication plan**.
- ✓ **Criteria of readiness** for new technologies to be implemented are established
- ✓ The **local infrastructure is ready** for the new systems to be implemented
- ✓ Other planned implementations are taken into account resulting in **future proof systems** (e.g. WICIS).
- ✓ Site **meets minimum criteria for readiness** to allow for successful implementation of the technology.
- ✓ **Integration ground work is initiated**. HDUHB is working with DHCW and suppliers to plan integration work for national systems (WPAS, WNCR, WCP).
- ✓ Risk of delays due to limited integration capacity is **mitigated**.
- ✓ HDUHB is working with supplier(s) to ensure **eObs system integrates with devices for remote monitoring**
- ✓ After reviewing existing processes, the **required governance is established** (e.g. SOPs) ensuring it supports the new ways of working.
- ✓ A robust **disaster recovery plan** is developed.

Phase 2: Enabling Patient Flow

Phase description

It is during phase 2 that **technology to support patient flow are introduced**. Patient flow is being improved with **digital tools**, and their **integration** with existing systems.

Assumptions and Constraints

Assumptions:

- The implementation will start with a **pilot at South Pembrokeshire Community Hospital**.
- **Learnings from the pilot** will be used to develop a **detailed implementation plan** for other sites.
- **Assessment of space** has been conducted and the necessary changes will have been made (i.e. power socket available) to host electronic whiteboards in wards.
- **ADT integration** is available.
- **Funding** is available.

Constraints:

- Successful rollout of patient flow technologies is dependent on **complete integration** of the software and hardware with the hospital's pre-existing systems.
- Staff has access to **enough mobile devices and computers** so that there is no loss of efficiency of the systems due to waiting for a device to become available.
- **Speed of implementation has to be optimal** in order to realise the full intent of patient journey.
- Each site will need to have **established liability and risk mitigation** regarding mobile devices.
- Rollout will be dependent on **sites meeting criteria for readiness** established in Phase 1.

Enablers

- | | |
|--|--|
|  Integration <ul style="list-style-type: none"> ❖ Carry out integration between the patient flow solutions and the hospital's existing systems (WPAS, WNCR, WCP). ❖ Communication between these systems is essential to realise the benefits envisioned. |  Access to devices <ul style="list-style-type: none"> ❖ Access to electronic whiteboards ❖ Procurement/upgrade of mobile devices |
| |  Digital leadership <ul style="list-style-type: none"> ❖ IT champions support rollout through clinician-clinician training. |

Workstreams

This phase starts by **finalising integrations** and **configuring the flow solutions**. Then, patient flow technology is implemented, and **electronic Whiteboards** are installed. Initially, **electronic handovers** are enabled, followed by **bed capacity management**, **task management** and **electronic referrals**. Staff are provided with relevant training during implementation and post go-live support is available.

Outcomes and Benefits

- ✓ **Electronic whiteboards** are set-up and can serve as **dashboards** to access required information, all in one place. Clinicians have access to a **single digital view of up-to-date patient information**, that they can rely on for bed allocation, EDD, task management and ward rounds.
- ✓ **Handovers are facilitated digitally**.
- ✓ Organisations have access to **organisation-wide view of real-time bed allocation**, to facilitate the management of capacity.
- ✓ **Automation of routine tasks**, giving more time to clinical staff to focus on looking after patients.
- ✓ Staff have a **good understanding of the technologies** and use them to their **full potential**.
- ✓ Access to **real-time information** and **better communication channels** ensures **faster bed turnover** after a discharge, and **smoother care pathways** for the patient.
- ✓ Clinicians have access to real-time, accurate information, which **supports efficient decision-making**.
- ✓ The **recording of information digitally** helps with **workflow management**, **identification of pain-points** and **auditing**.
- ✓ Wider **adoption** of digital solutions with **improved access to information and support**.

Phase 3: eObservations

Phase description

The third phase introduces improvements that build on existing capabilities. The focus is on **giving clinical staff more time to provide quality care to their patients by automating routine tasks.**

Assumptions and Constraints

Assumptions:

- **Welsh Allyn monitors are available** across wards/ sites.
- Each site's **wireless signal will have been enhanced and tested** to support timely transmission of data.
- **Funding** is available.
- **WNCR roadmap has been reviewed** and it has been confirmed that WNCR does not have capabilities for all required assessments.

Constraints:

- Each site will need to have **established liability and risk mitigation** regarding mobile devices and remote monitoring technologies.

Enablers

- | | |
|---|---|
| <p> Access to mobile devices</p> <ul style="list-style-type: none"> ❖ Procurement/upgrade of mobile devices (i.e. iPads, computers on wheels etc...) | <p> Staff engagement</p> <ul style="list-style-type: none"> ❖ Staff is trained and ready to use the new system. |
| <p> Digital leadership</p> <ul style="list-style-type: none"> ❖ IT champions support rollout through clinician-clinician training. ❖ Local IT teams to respond to change requests. | <p> Integration</p> <ul style="list-style-type: none"> ❖ Interoperability between Welsh Allyn monitors, the patient flow system, mobile devices and other relevant existing hospital systems (e.g. WNCR, WCP) is enabled. |

Workstreams

This phase starts with the **configuration of the eObs solution.** Once configured and integrated, the solution is implemented before the go-live. Initially the capability to capture observations and assessments electronically is introduced. This is followed by the ability to send and receive automated alerts. Staff are provided with relevant **training** during implementation and **post-live support** is available. Phase 3 also involves a **pilot for remote monitoring** on virtual wards.

Outcomes and Benefits

- ✓ The **Welsh Allyn monitors are connected** to the eObs software and **automatic capture of observations** enabled.
- ✓ **Clinical observations are directly taken, analysed and uploaded** to the system.
- ✓ Clinicians **have access to observations electronically**, remotely or on patient bed-side.
- ✓ **Electronic Bedside assessments** are available, and staff can **view results remotely.**
- ✓ Notifications are introduced, meaning **staff receives automated workflow notifications when relevant**, if the patient is deteriorating or observations are overdue.
- ✓ Select citizen have been enrolled for remote monitoring in the community, serving as a **pilot for virtual wards.**
- ✓ Staff are **comfortable using the new technologies** and feel empowered, thanks to **appropriate training and ongoing communication.** This includes **post go-live support.**
- ✓ With the addition of **automated notifications**, eObs result in **minimised risk** due to accurate data, early detection and escalation of patient deterioration.
- ✓ **NEWS score is displayed** on the electronic whiteboards, thanks to integration of eObs with them.
- ✓ The **benefits of the technology** introduced are being **shared and highlighted.**

Phase 4: Full Target State

Phase description and Objectives

The fourth and final phase makes HDUHB reach their **full target state** for this project. It **builds on the technology** set up in previous phases. This phase is about **innovating** with **digitally mature eObs and patient flow technologies**. Learnings from phases 2 and 3 will influence the vision of the full target state. An agile approach will enable HDUHB to make changes as required.

Assumptions and Constraints

Assumptions:

- Based on the **remote monitoring pilot** an **appropriate plan** has been developed. This includes **population training** on new devices, and **contingencies** in case patients are not digitally literate.
- **Appropriate processes** are in place to **mitigate risk** and **preserve the patient's and the clinician's security**.
- **Funding** is available.

Constraints:

- All the **previous stages have been successfully implemented**, and the **necessary integrations carried out**.

Enablers



Digital management

- ❖ **Regular audit and reviews** of the processes to keep them **up to date, efficient and adapted to the current situation**.
- ❖ **Local IT support** to manage change requests.



Integration

- ❖ **Integration** of devices/ software for **home monitoring**.



Population engagement

- ❖ **Educate the population** to the benefits of home-monitoring.
- ❖ Explain to patients **how to use the devices and applications**, to make the most of them.
- ❖ **IT helpline** for virtual wards.

Workstreams

This phase delivers a **fully integrated remote monitoring at home solution**. Simultaneously, **predictive capacity planning is set-up** and becomes available. Through implementation of phases 2 and 3, electronic whiteboards provide a **connected view of relevant patient information**.

Outcomes and Benefits

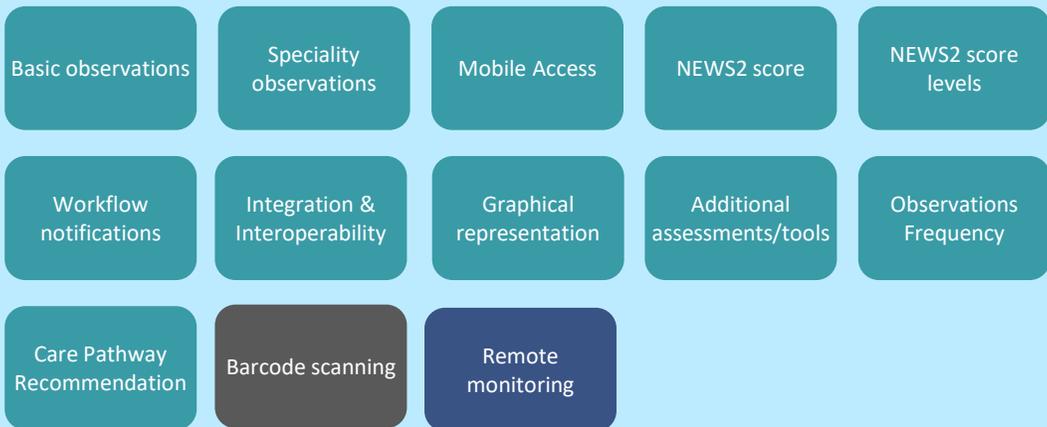
- ✓ Hospital staff has access to **predictive analytics** and **capacity planning**, meaning they get a better estimate of current and future capacity, empowering them to **make better decisions about resource allocation**, whether human or material.
- ✓ Clinicians have access to **real-time patient information anywhere, anytime**. They waste less time carrying tasks that are now automated. The **quality of care is improved**, and the **experience is better** for the patient and staff.
- ✓ **Remote monitoring devices and applications** are made available to every patient that needs it across the health board.
- ✓ Clinicians are given **access to data** about the patient's health
- ✓ Clinicians have the ability to **communicate actions** to take to patients according to these readings.
- ✓ **Generalisation of remote monitoring and virtual wards** moves care from a hospital to a **preventive, at home focus**.
- ✓ **Digital foundations are improved**, enabling the launch of **patient portal** in the future, and potentially building to a **functional EPR**.

CAPABILITY MAP

- Phase 1
- Phase 2
- Phase 3
- Phase 4
- Existing functionality
- Out of scope

Electronic Health Record

Patient Observations



Foundational Capabilities



Patient Flow

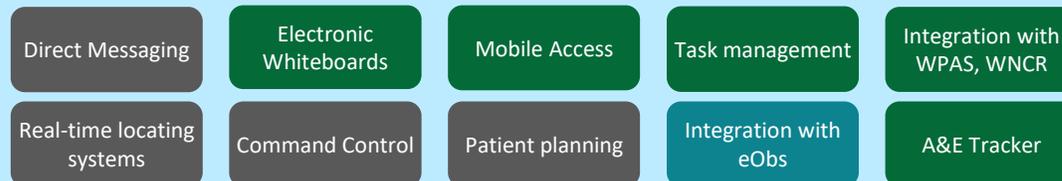
Referrals



Admission & Pre-admission



Patient Flow & Tracking



Bed management



Discharge & Transfer



DEFINITIONS

Patient Observations

- **Alerts:** Alerts on patient deterioration e.g. NEWS2 score or sepsis risk
- **Additional assessments/ tools:** Ability to record additional assessments/ tools, such as SBAR, fall risk, MUST and sepsis
- **Barcode scanning:** Scanning of barcodes to identify patients
- **Basic observations:** Captures basic observations (Blood Pressure, Heart Rate, Temperature, Respiratory Rate and Oxygen Saturation) required for NEWS2 score calculation
- **Care Pathway Recommendation:** System automatically provides recommendations for care pathways, e.g. the Sepsis Six Tool, based on observations
- **Graphical representation:** Data is represented graphically to show trends over time
- **Integration & Interoperability:** Ability to integrate with other systems (PAS, clinical portal etc.), wearable devices, and monitors for continuous monitoring of patients
- **Mobile Access:** Observations data can be accessed on mobile devices through app
- **NEWS2 score:** Automatic calculation of the NEWS2 score (or PEWS score)
- **NEWS2 score levels:** Ability to set the NEWS2 score levels depending on patient requirements
- **Observations frequency:** The ability to define the frequency of observations for each patient
- **Reminders:** Reminders for staff that observations are due
- **Speciality observations:** Ability to capture additional observations for specialities as required, e.g. neurological observations

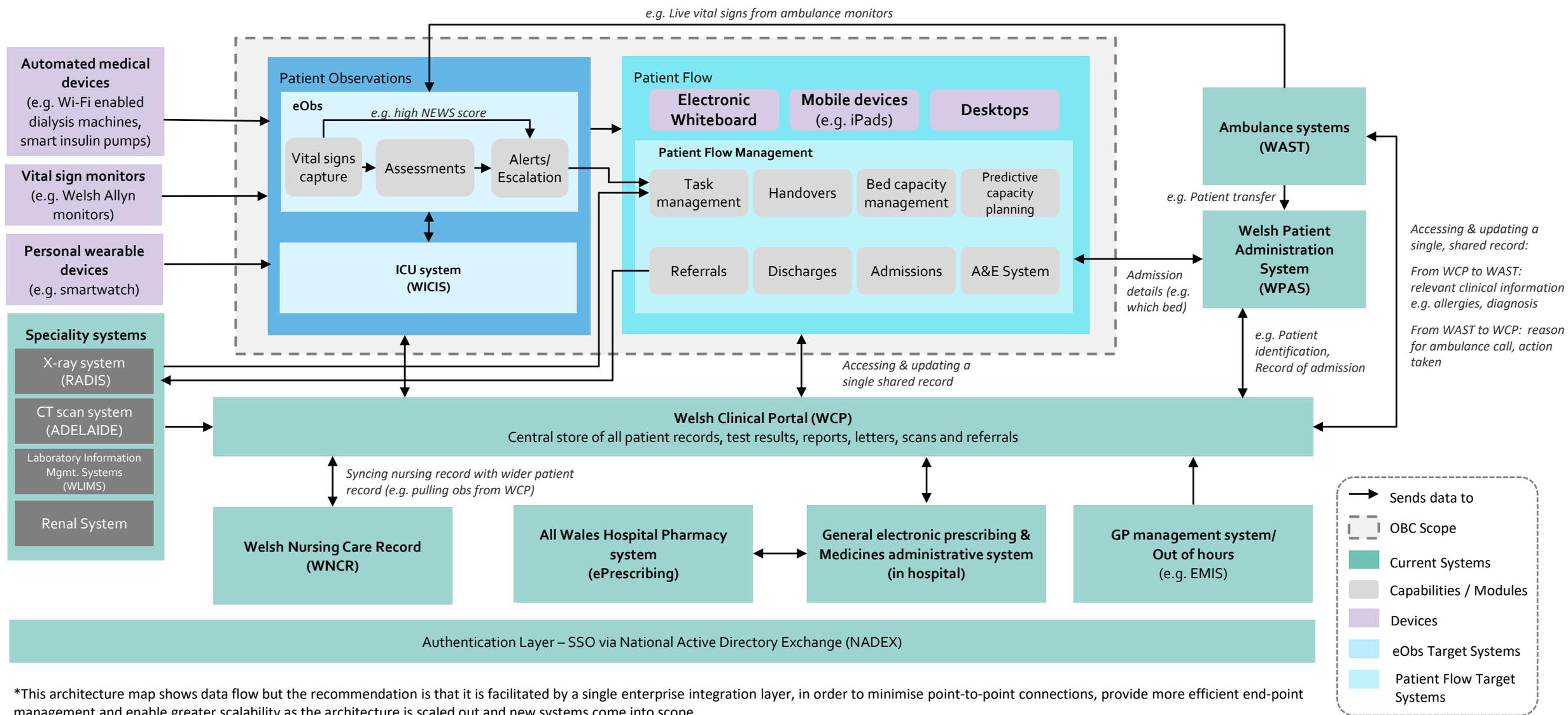
Roadmap

- **First iteration begins:** When does a particular phase kicks-off for the first time?
(e.g. infrastructure uplifts & governance improvements in Phase 1 begin right away, as early as Year 1 Q1 for South Pembrokeshire Hospital; whereas the virtual ward monitoring trial will only begin for the first time in Year 2 Q2 with Pembrokeshire Hospital)
- **First slice of value:** When can Hywel Dda first reap the benefits of a particular phase?
(e.g. South Pembrokeshire Hospital is scheduled to be the first site to achieve a mature infrastructure landscape by Year 1 Q2, based on which incremental improvements can be made in future iterations with other sites)
- **Last iteration complete:** When will all iterations of a particular phase be complete?
(e.g. By Year 3 Q1, upon Tregaron Hospital finishing up its infrastructure improvements, Hywel Dda can confidently state that, whilst other eObs and Patient Flow phases are still ongoing, all of its sites now have a mature & modern infrastructure readiness with a common set of governance best practices underpinning them)

Patient Flow

- **Admissions data:** Statistics on number of patients admitted, including details about patient status
- **A&E Tracker:** To monitor the flow of patients from A&E to inpatient beds. This is a process tracker for A&E patients for whom bed requests have been made. Displays real-time KPIs from A&E. Three panels showing patient details: awaiting allocation of a specific bed by the ward staff, bed allocated but not ready, bed allocated and ready. Updated interactively by changes made on Ward Whiteboard.
- **Check-in for appointment:** Self-check in systems for patients
- **Command Control:** Central control centre, where staff can see data for the entire organisation and use it to manage capacity planning. Includes Hospital at a Glance information to provide a real-time dynamic display of inpatient activity.
- **Direct Messaging:** Direct messaging between staff via mobile devices
- **Discharge summaries:** Automated creation of discharge summaries
- **Discharges/ Transfers data:** Statistics on number of patients discharged/ transferred, including details about patient status
- **Electronic Whiteboards:** Electronic Whiteboards used to present key patient information on wards.
- **External Referrals/ Transfer management:** System to manage external referrals and/ or transfers
- **Handover:** Handover responsibility for care of a patient to another carer. SBAR functionality.
- **Internal Referrals/ Transfer management:** System to manage internal referrals and/ or transfers
- **Integration with eObs:** Ability to integrate with electronic observations system to display NEWS2 score and other key information about patient status
- **Integration with PAS:** Integration with existing Patient Administration System (PAS) to pull and push information as required
- **Mobile Access:** Ability to access patient information on mobile devices
- **Patient Planning:** System to create and store patient plans
- **Predictive Capacity Planning:** Analytics to plan capacity
- **Real-time bed occupancy:** Real-time data to show current status of beds. This includes bed requests and bed state. A single display of all bed requests from all sources. Displayed together with the hospital and ward level summary bed state. Interactive to enable assignment of a patient to a ward.
- **Real-time locating systems:** A system to locate patients, staff, and/or assets in real-time (e.g. via wearable devices)
- **Task management:** System to manage patient level tasks that can be assigned to users. Grouped on Ward Whiteboards.

INTEGRATION ARCHITECTURE – DATA FLOW: TARGET STATE



*This architecture map shows data flow but the recommendation is that it is facilitated by a single enterprise integration layer, in order to minimise point-to-point connections, provide more efficient end-point management and enable greater scalability as the architecture is scaled out and new systems come into scope.

eObs and Patient Flow Business Case

Implementation Plan Proposal

IMPLEMENTATION APPROACH

ESTABLISH Phase 1

ENABLING PATIENT FLOW Phase 2

Electronic Observations Phase 3

FULL TARGET STATE Phase 4

Phase 1: Establish

During this phase the processes, governance and infrastructure to enable a successful implementation of patient observations and flow technology will be established. The workstreams in this phase include:

- **Staff engagement:** Communicate with clinical and operational staff to inform them of the planned changes via email or staff meetings. Run a Q&A session prior to implementing changes at local sites. Identify and establish local champions.
- **Staff training:** Offer IT basics training to staff, where digital literacy is low, to set a baseline of knowledge and make staff feel comfortable with the thought of introducing new systems. Educate staff on the benefits of new systems and how they will help improve patient care.
- **Infrastructure assessment and set up:** Assess the WiFi network, and existing hardware (number of available devices, speed of PCs etc). Ensure Welsh Allyn monitors are available for eObs. Upgrade existing infrastructure as required.
- **Governance assessment and set up:** Review current ways of working and assess existing processes, such as ADT (admission, discharges, transfers) compliance and policies support the introduction of new technology. Set up governance if required.
- **Establish Integrations:** Prepare for integration of eObs and patient flow systems with existing systems, including Welsh PAS (WPAS), Welsh Nursing Care Record (WNCR), Welsh Clinical Portal (WCP) and Welsh Allyn Monitors. As required submit requests to DHCW. Plan for integration of future systems, such as the paging app for eObs alerts and WICIS.

Phases 2-4: Solution Rollout

Phase 2 – Enabling Patient Flow:

In this phase, technology to support patient flow will be implemented. This includes electronic whiteboards that will display key information from several systems. The implementation will start with a pilot at South Pembrokeshire Community Hospital. Initially, electronic handovers are enabled, followed by bed capacity management, task management and electronic referrals.

Phase 3 – eObs:

In this phase electronic capturing of observations, assessments and alerts will be rolled out across the acute and community sites. Initially, the solution will be piloted at South Pembrokeshire Community Hospital to develop a detailed implementation plan for sites. There is an opportunity to pilot remote monitoring at home with a small cohort of patients.

Phase 4 - Full Target State:

Technology to enable remote monitoring of patients in their own homes will be implemented, as well as more advanced data analytics to enable predictive capacity planning.

Each of the solution rollout phases 2-4 will involve the following:

- **Finalise integrations:** Prior to rollout, all key integrations should be enabled. User research has highlighted the need for systems to integrate in order to deliver the expected benefits.
- **Configure solution:** Configure the solution to meet local needs (site and service needs) as appropriate.
- **Staff training:** Train staff on use of new solution.
- **Implement solution:** Implement technology and Go Live.
- **Post Go-Live support:** Provide on-site support for staff following implementation.

5-YEAR IMPLEMENTATION TIMELINE - ASSUMPTIONS

Assumptions

- **Phase 1: Establish Integrations** – Engagement with DHCW and may involve recruitment of a software engineer. It is expected that this will take up to 6 months.
- **Phase 1: Establish site** – This is estimated to take between 3 and 6 months for all sites other than Withybush. The infrastructure improvements currently underway at Withybush hospital are expected to take between 18 and 24 months. We have assumed that as the rollout progresses across HDUHB this will take less time, as governance/ processes required are established at initial sites.
- **Phase 2: Enabling Patient Flow Pilot** – Based on work at NHS Lanarkshire and the capabilities included, we have assumed that the pilot will take between 4 and 6 months.
- **Phase 2: Patient Flow Rollout**– This will vary depending on the capabilities rolled out. We have assumed this include patient handover, bed capacity management, task management and referrals. Based on information provided by suppliers this is estimated to take 3 to 4 months per site. This includes on-site support of 2-3 weeks based on the WNCR Rollout.
- **Phase 3: eObs Pilot**– The eObs Pilot is split into ‘eObs Capture and Assessments’ and ‘Alerts’. This is based on experience captured from the NHS Lanarkshire reference site and information provided by the supplier. Each pilot phase is expected to last 2-3 months.
- **Phase 3: eObs Rollout**– Similarly to the pilot the rollout is split into ‘eObs Capture and Assessments’ and ‘Alerts’. Based on supplier and reference site information rollout at each site is expected to take 2-3 months. As the solutions are rolled out across HDUHB it is expected that speed of implementation will increase.
- **Phase 3: Remote Monitoring Pilot** – This pilot is expected to last 3-4 months to provide enough time to test the technology with citizens in the community and develop relevant governance and processes.
- **Phase 4: Remote Monitoring Rollout** – The remote monitoring rollout is expected to take between 3 and 6 months. It is expected that it may take longer initially to establish the technology with faster implementation in the community. It is likely that remote monitoring will be rolled out on a speciality basis as is considered appropriate (i.e. specialities such as respiratory, cardiology and frailty, where observations are key are likely to roll this out as part of managing patients in virtual wards). It is assumed that remote monitoring would not be rolled out for the Hospice (Park House Court) or the mental health wards.
- **Phase 4: Predictive Capacity Planning** – Once all sites are set up and using the bed capacity management solution, predictive capacity planning can successfully be implemented.
- Mental Health Wards are found across all 4 acute hospitals and in St Davids Hospital. They include Morlais Ward (GGH), Bryngofal and Bryngolau wards (PPH), Enlli ward (BGH), St Caradog and St Non wards (WGH) and Cwm Seren PICU, Cwm Seren LSU and Ty Bryn (St Davids Hospital). It is assumed that rollout would happen across all mental health beds separately from rollout in the acute hospital.

NHS RESOURCING – IMPLEMENTATION TEAM

Role	Band	Description	WTE for project duration	Annual Salary	Implementation Duration (Months)	Total Cost for Project Duration	Comment
Senior Responsible Owner	9	To represent the project at an executive level. To advise on how project needs to meet strategic goals of the organisation. Final escalation point within project governance.	0.1	£122,486	36	£0	Existing Role
Programme Lead	8A	Overall day-to-day responsibility for project. Managing project managers. Engage and communicate at executive level within Health Board.	1	£60,988	36	£182,964	Expected additional cost
Chief Nursing Information Officer (CNIO)	8A	To act as a point of reference across all aspects of the programme.	0.4	£60,988	36	£0	Existing Role
Chief Clinical Information Officer (CCIO)	8A	To act as a point of reference across all aspects of the programme.	0.4	£60,988.	36	£0	Existing Role
Project Manager	7	Manage daily project activities. Provide Trust wide project co-ordination. Communicate project status issues and events to Trust leadership. Provider Leadership to Project Team.	2	£59,290	36	£355,740	Expected additional cost
Change Design Officer	6	Oversee change requirements of the project and assess impact on change plan within the organisation. Support gap analysis, 'as is' process capture and future state process mapping. Deliver Change Action Plan. Support Benefits workstream as appropriate.	1	£50,302	30	£125,755	Expected additional cost (not required last 6 months)
Benefits Lead	7	Involved in outputs of Business Change Gap Analysis undertaken for current state processes. Baseline all identified benefits and measure pre-go-live. Production of a clear benefits strategy and detailed plan. Establish working groups to focus on benefits. Pre and post go-live case study tasks to be completed and documented.	0.35	£50,302	36	£0	Existing Role
Clinical Safety	7	Validate clinical risks and issues.	0.1	£59,290	36	£0	Existing Role
Configuration and Implementation - Clinical Lead	6	Responsible for providing input into solution design and configuration from a clinical perspective.	0.6	£50,302	36	£0	Existing Role
Technical Implementation Lead	6	Responsible for providing input into solution design and configuration from a system administration perspective.	0.5	£50,302	24	£100,604	Expected additional cost (Y1 and Y2 only)
Test Lead	6	Responsible for testing strategy and approach.	0.5	£50,302	30	£0	Existing Role
Application Support Trainers	5	Responsible for training strategy and approach. Management of trainers. Engagement with operational managers to coordinate and schedule training for operational staff to support business requirements. Sign-off training collateral and localised environment	0.2	£40,416	30	£202,080	Expected additional cost (1 in Y1, 2 in Y2 and Y3)
Project Support Officer	5	Project support for project team, PMO duties	1	£40,416	36	£121,248	Expected additional cost
Total over 3 years						£1,088,391	

NHS RESOURCING – BAU TEAM

Role	Band	Description	WTE for duration of live running	Annual Cost	Duration (months)	Total Cost for Project Duration	Existing Role?
Product Specialist	7	BAU point of contact. Representing the Health Board at regular Service and Performance Review meetings and ensuring ensure involvement of appropriate Health Board staff. To review and approve the supplier's Performance Monitoring System. To ensure that the Health Board responsibilities in the Performance Monitoring System are carried out. To review supplier Performance Reports. To provide all resources required to progress resolution of significant issues. To manage any third-party services not included as part of supplier's solution. To liaise with Supplier on Major Incidents (to cover any Major Incidents should they arise).	0.25	£59,290	24	£0	Existing Role
Application Support	5	Setting up new users and their Role Based Access Control (RBAC) access rights, including the periodic synchronisation of Active Directory staff lists with solution staff registers. Updates of national and organisational reference files (e.g. Postcode, GP). Maintenance of other reference files and lookup/option tables. Data quality activities such as Master Patient Index (MPI) duplicate checking and management of patient merges. Maintenance of print queues. support of any reports and dashboards created by the Health Board using the tools provided by the Supplier. Raise tickets/manage all issues as follow on from the issues raised with the Health Board service desk. Technical analyst for the management of iPods/iPads for solution and all front-end PCs. Carry out any ongoing testing required.	1.5	£40,416	24	£121,248	Expected additional cost. There is an existing Application Support team at HDUHB that will take on this role. Best option is likely to extend the existing team led by Gareth Beynon.
Clinical Safety Representative	8A	Whilst not a requirement for the support and maintenance of the system, the Health Board nonetheless will be undertaking an ongoing programme of clinical content design, capture, and maintenance, including Clinical Narrative forms, care pathways and tasks. As part of this, the Health Board must conduct its own patient safety risk management process to manage and mitigate the clinical risk and ensure that the clinical content is being used in accordance with the requirements of ISB 0129 (DSCN 14/2009) and ISB 0160 (DSCN 18/2009).Reviewing Clinical Safety certificates when new versions are released	0.25	£60,988	24	£0	Existing Role
Trainers	5	The Health Board's trainers will carry out any refresher training or training of new users as part of BAU. For future system upgrades and fixes that impact user functionality, the Health Board will be provided with release notes, enhancement guides and user guides as appropriate. Where the change is major or complex, an on-line tutorial may be provided.	1	£40,416	24	£0	Existing Role. There is an existing team at HDUHB led by Gareth Beynon that will take on this role.
Digital Senior Support Technician	5	Support and maintenance of systems, including software and hardware.	1	£40,416	24	£80,832	Expected additional cost.
Service Desk	3	The service desk team are responsible for logging incidents, service requests and provide first line technical support.	1	£27,542	24	£55,084	Expected additional cost to add staff to existing service desk team.
Total Cost over 2 years						£257,164	
Annual Cost						£128,582	

E-Observations

Patient Outcomes

- 1. Reduced risk of patient harm and improving patient safety**
Through having access to the correct information easily and in a timely manner this will reduce the risk of harm to patients and improve their safety. It's anticipated that the number of cardiac arrests for patients will reduce by **50 - 70%**.
- 2. Reduced risk of errors (e.g. due to more regular and accurate observations)**
E-Observations will provide more accurate and regular observations that will provide early identification of risks to the patient, such as, sepsis. Automated alerts will remind staff to take actions when patients are deteriorating which supports early intervention. Automation of routine tasks, such as calculating the NEWS2 score, frees up time for staff to look after the patient and reduces the risk for errors.
- 3. Reduced unplanned admissions to critical care units from EObs-equipped wards**
The roll-out of e-observations aims to reduce the total of unplanned admissions to critical care units from e-obs equipped wards by approximately **10%**.
- 4. Increased number of observations completed on time**
E-observation technology will result in an increase in the number of observations completed on time.

Staff Experience

- 5. Increased confidence resulting in improved decision making**
E-Observations will provide clinicians with up to date and accurate information that will aid their confidence when conducting routine tasks in the workplace

Efficiencies

- 6. Reduced manual admin work and removal of duplication of effort**
Through the utilisation of remote monitoring and the automation of tasks there will be a reduction in duplication, data will be easily shareable across the health board releasing **960 minutes** back to nurses.

Organisational

- 7. Reduced complaints and improved brand image due to better patient care**
The reduction in errors due to the use of e-Observations will ultimately lead to a reduction in complaints and an improved brand image due to better patient care.
- 8. Reduced litigation**
The reduction of patient harm and the reduction in complaints due to the use of e-Observations will potentially result in the reduction of litigation for the health board potentially savings **millions of pounds** each year.

Patient Flow

Patient Experience

- 9. Increased time to care for patients**
By reducing time spent on administrative tasks using a mobile device can release up to **66 minutes** of nursing time per 12-hour shift which can be used to care for patients

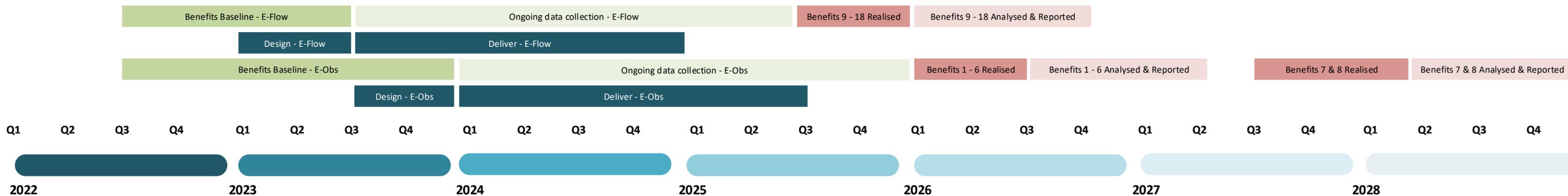
Staff Experience

- 10. Reduced stress levels**
It is anticipated that the introduction of patient flow technology will improve staff wellbeing and reduce stress levels by removing duplicate tasks and freeing up time on their shifts

- 11. Improved communication between staff members and across departments**
Patient flow technology will assist in cross-departmental communication through providing up to date information about a patient that will aid in immediate clinical and operational decision making.

Efficiencies

- 12. Reduced handover time and quicker discharges**
Patient flow will allow more efficient handovers on wards, when patients move location and assist in quicker discharges allowing more patients to be discharged before midday. Currently 15% of discharges take place before midday, the patient flow project aims to increase this by **40%**.
- 13. Reduced average time until seen by doctor in A&E**
It is expected that patient flow technology will help healthcare staff effectively manage resources and free up time for patient care, enabling the Welsh Government to meet key national targets, such as the 4-hour A&E waiting time target stating that **95% of patients** attending A&E should be admitted, transferred or discharged within 4 hours. Currently this is around **70%**.
- 14. Reduced time an ambulance waits outside of the hospital**
It is anticipated that the improvements in patient flow processes will reduce the requirement for ambulances to wait outside of A&E to handover a patient. Ambulances currently lose between **70 and 85 hours per day per site** at the four acute hospitals.
- 15. Quicker response times for ambulances**
As ambulances will be available to respond quicker to emergency calls as a result of improving patient flow and reducing the need for ambulances to wait outside A&E. Currently **41.12%** of red calls are responded to within 8 minutes.
- 16. Reduced time spent by clinical site manager to identify available beds**
Patient flow technology will aid in reducing the time required for clinical site managers to spend identifying available beds. Clinical site management teams can focus on solving key flow problems, such as liaising with social care
- 17. Reduced average length of hospital stay per patient**
Patient flow technology will aid in ensuring that patients are treating at the right time and right place which will result in a reduction in the average **length of stay per patient to 6.1 days**.
- 18. "dead bed" time can be reduced by enabling staff to remotely access information on current bed status**
It is expected that "dead bed" time will be reduced by staff being enabled to remotely access information on current bed status and estimated discharge dates



Patient Observations

Current processes in HDUHB are not optimised as most of the information is recorded manually on paper, and communication channels are slow and time-consuming which results in delays for patients stays. Staff are unable to access the correct information easily and in a timely manner when they need it which results in significant risk to patient safety. A lack of clinical staff makes it even more crucial to increase efficiencies so that limited resources are utilised in the best way to achieve positive outcomes for our patients.

An e-Obs system allows clinical staff to record their patient observations digitally. In an acute setting, staff can use mobile devices to record data, which can be accessed remotely by other clinicians. Such systems automatically calculate the (NEWS2) score, which reflects whether a patient's condition is improving or deteriorating and provide clinicians with relevant alerts. Remote monitoring will allow doctors and nurses to access data from anywhere without the need to physically see the patient which will save them time and also reduce the risk of cross-infection. The provision of real-time data will help improve clinical decision-making and reduce the risk of harm, while providing patients and their families with confidence that they are monitored appropriately.

E-Observations will provide more accurate and regular observations that will provide early identification of risks to the patient, such as, sepsis. Automated alerts will remind staff to take actions when patients are deteriorating and supports early intervention.



Current Challenges & Risks



- Risk of charts and data going missing
- Information is captured manually and cannot be shared easily
- Impact on patient safety
- Paper based
- Risk of errors being made

Current Process



Healthcare assistant or nurse will take the observations.

Including: BP, pulse, RR, temperature, O2 saturation, conscious state.



Observations are recorded on the observation chart



The NEWS or PEWS score (or other EWS score) is calculated manually and recorded on an early warning chart
The Glasgow Coma Score is included at the bottom of the Track and Trigger chart



Unregistered nurses work under the supervision of qualified staff and are required to flag any results of concern. A registered nurse signs off on the observations



Observations that are abnormal for the patient or the NEWS (or other EWS) score indicates that the patient is deteriorating then a relevant staff member is alerted, and appropriate steps are taken

Electronic Patient Observations

Reduced manual admin work and removal of duplication of effort to save

960

minutes per day across the health board

Reduced risk of errors

Reduced litigation

Increased number of observations completed on time

Reduced unplanned admissions to critical care units from e-Obs-equipped wards

Reduced complaints and improved brand image due to better patient care

Reduced risk of patient harm and improved patient safety which will result a 90% reduction in norovirus incidents and up to a

70%

reduction in the number of in hospital cardiac arrests which could mean an annual saving of up to approximately

£162,788

Increased staff confidence resulting in improved decision making



Patient observations are automatically captured, and the relevant scores are calculated and recorded

Electronic Whiteboards that capture key patient data made available through connected devices. Remote access to data as information is synchronised across systems.

Automation of routine tasks minimising risk of errors and enables early intervention.

Better communication with the patient by creating visuals that can be shared. E.g., staff can share how treatment has impacted an individuals' vital signs over time. The patient is aware of next steps and informed.

Handovers

Current process lack real-time information which leads to slow handovers, transfers and discharges. This also presents a key risk to patient safety whereas the electronic patient handover systems ensures that errors are minimised, for example, due to illegible handwriting. As a result, fewer patients are admitted to intensive care units, where beds carry a significantly higher cost. Delays caused by inefficiencies in processes, including handovers, leads to a significant negative impact on health services with ambulances waiting outside Emergency Departments, patients spending up to 5 days in A&E without being admitted to a ward, and surge beds opened regularly.



Current Challenges & Risks



- Largely paper based
- Information is duplicated and kept in silos
- There is a lack of real-time data
- Many of the existing systems do not support patient flow across the organisation
- Inconsistent between wards and sites
- Missing information
- Patients are often assigned to any available bed which means they may not be in the ward best suited to care for their condition

Current Process



Observation Chart, Skin Bundle & Intentional Rounding Adult Nursing Assessment documents are scanned and saved to SharePoint with the originals being transferred to the ward with the patient. A&E staff transfer the patient on WPAS.

Handover takes place over the phone between A&E staff and Senior Sister of the ward where the patient is being transferred to.

Senior Sister handwrites the information on a handover sheet or on a piece of paper. The handover sheet will be updated throughout

Senior Sister updates a digital version of the handover sheet at the end of their shift. Hardcopy is binned. A new handover sheet is printed off for the next shift.

Patient is moved to the new ward.

“You feel as a clinician that you are working blind... We’re making life and death decisions without all the information”

Electronic Patient Handovers



Workflow solutions that provide a **real-time overview** of bed capacity and facilitate communication. A Control Centre, which provides a clear view of timeframes for beds becoming available and provides the hospital’s dashboard.

Electronic Whiteboards that capture key patient data made available through connected devices which prevents the same information being recorded multiple times in different locations and repeatedly across wards.

Mobile apps that visualise key information and help staff communicate with colleagues

Reduced stress levels for staff

It is anticipated that the introduction of patient flow technology will improve staff wellbeing and reduce stress levels by removing duplicate tasks and freeing up time on their shifts

Improved communication between staff members and across departments

Patient flow technology will assist in cross-departmental communication through providing up to date information about a patient that will aid in immediate clinical and operational decision making.

Increased time to care for patients

66

minutes of nursing time per 12-hour shift released

Reduced handover time and quicker discharges

40%

of discharges to take place before midday



Efficiencies & Savings

A more efficient process would create capacity. It would also better the patient journey and transfers would run much faster and smoother when you remove the need to scan notes and wait to confirm bed allocation. For staff, they will be able to do more in other areas if we make processes more efficient. It is anticipated that e-Observations will free up time for nursing staff while patient flow solutions are expected to release time for clinical site teams to facilitate flow in a more efficient and proactive way. By removing duplication and digitising manual processes it is expected that staff capacity will increase which could result in a reduction of overtime spend.

Reduced time spent by clinical site manager to identify available beds

Patient flow technology will aid in reducing the time required for clinical site managers to spend identifying available beds. Clinical site management teams can focus on solving key flow problems, such as liaising with social care

"It's the system that is limiting us clinically."

Reduced litigation

The reduction of patient harm and the reduction in complaints due to the use of e-Observations will potentially result in the reduction of litigation for the health board potentially savings **millions of pounds** each year.

40%

of discharges to take place before midday

Improved handovers and quicker discharges

Patient flow will allow more efficient handovers on wards, when patients move location and assist in quicker discharges allowing more patients to be discharged before midday. Currently 15% of discharges take place before midday.

"dead bed" time reduced by enabling staff to remotely access information on current bed status

Reduced average length of hospital stay per patient

Patient flow technology will aid in ensuring that patients are treating at the right time and right place which will result in a reduction in the average **length of stay per patient to 6.1 days.**

Reduced manual admin work and removal of duplication of effort

Through the utilisation of remote monitoring and the automation of tasks there will be a reduction in duplication, data will be easily shareable across the health board



16

hours of staff capacity saved each day

Staff Perspective

Patient flow technology will assist in cross-departmental communication through providing up to date information about a patient that will aid in immediate clinical and operational decision making. With remote digital access to information, and automated notifications, communication becomes easier. It is expected that this will result in a lot less phone calls, which will remove dependencies on staff being available to answer the phone for example for transfers or handovers. Digital notes are also expected to be more easily legible. E-Observations will provide clinicians with up to date and accurate information that will aid their confidence when conducting routine tasks in the workplace.

Reduced stress levels

It is anticipated that the introduction of patient flow technology will improve staff wellbeing and reduce stress levels by removing duplicate tasks and freeing up time on their shifts



positive impact on staff morale

positive impact on staff sickness and absences

reduced staff turnover

Improved communication between staff members and across departments



Increased confidence resulting in improved decision making



Improved outcomes for patients

"...communication is the biggest problem. Especially when moving between specialities."

"If I could change one thing I would try and improve the communication between the emergency department (where most patients go out of) and the ward areas... Can we not have a direct means of communication?"





Patient Perspective

E-Obs and patient flow solutions help provide more accurate and reliable information. Staff will find that it will be easier to pick up on trends and identify deteriorating patients earlier. It is also worth noting that an electronic system can serve as a safety net for staff with less experience. There are less errors, and the information provided can be used with confidence.

"It's about providing high quality care for patients. And providing it at the right time."

Reduced risk of patient harm and improving patient safety

Through having access to the correct information easily and in a timely manner this will reduce the risk of harm to patients and improve their safety. It's anticipated that the number of cardiac arrests for patients will reduce by **50 - 70%**.

up to a

70%

reduction in the number of in hospital cardiac arrests which could mean an annual saving of up to approximately

£162,788

Reduced risk of errors (e.g. due to more regular, accurate observations)

E-Observations will provide more accurate and regular observations that will provide early identification of risks to the patient, such as, sepsis. Automated alerts will remind staff to take actions when patients are deteriorating which supports early intervention. Automation of routine tasks, such as calculating the NEWS2 score, frees up time for staff to look after the patient and reduces the risk for errors.

"People sometimes have difficulties adding up the NEWS score and there is incorrect scoring."

Reduced unplanned admissions to critical care units from e-Obs equipped wards

Increased time to care for patients

By reducing time spent on administrative tasks using a mobile device can release up to **66 minutes** of nursing time per 12-hour shift which can be used to care for patients

"You feel as a clinician that you are working blind... We're making life and death decisions without all the information"

Increased number of observations completed on time

E-observation technology will result in an increase in the number of observations completed on time.

10%

reduction in the number of unplanned admissions to critical care units from e-obs equipped wards

66

minutes of nursing time per 12-hour shift released

Reduced complaints and improved brand image due to better patient care

The reduction in errors due to the use of e-Observations will ultimately lead to a reduction in complaints and an improved brand image due to better patient care.

Reduced average time until seen by doctor in A&E

It is expected that patient flow technology will help healthcare staff effectively manage resources and free up time for patient care, enabling the Welsh Government to meet key national targets, such as the 4-hour A&E waiting time target stating that **95% of patients** attending A&E should be admitted, transferred or discharged within 4 hours. Currently this is around **70%**.

Reduced time an ambulance waits outside of the hospital

It is anticipated that the improvements in patient flow processes will reduce the requirement for ambulances to wait outside of A&E to hand-over a patient. Ambulances currently lose between **70 and 85 hours per day per site** at the four acute hospitals.

Quicker response times for ambulances

As ambulances will be available to respond quicker to emergency calls as a result of improving patient flow and reducing the need for ambulances to wait outside A&E. Currently **41.12%** of red calls are responded to within 8 minutes.