# MSc Digital Transformation for the Health and Care Professions BMDS7005

*The development of criteria and the subsequent evaluation of the available digital solutions for pharmaceutical care planning across ABUHB*

Dissertation submitted in partial fulfilment of the award of
Master of Science in Digital Transformation for the Health and Care Professions

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## Declaration

This work has not previously been accepted in substance for any degree and is not being concurrently submitted in candidature for any degree.

Signed……

Date……24th May 2024……...

## Abstract

Hospital pharmacists are routinely involved in patient care. Part of their work is to assess, monitor and advise on drug management during a patient's hospital stay. Documentation of these interventions has historically been done via a paper Pharmaceutical Care Plan (PCP), kept separately to the patient's medical records, and used by pharmacy staff to prioritise patients. Transfer of paper PCPs limits their effectiveness; therefore, a digital solution is required. While there have been studies that have looked at implementation and adoption of electronic patient records (EPRs), risk assessments, and prioritisation tools, there are no direct studies that define the requirements of a digital PCP.

This study sought to define a set of requirements for a digital PCP, through a combination of a questionnaire and semi-structured interviews with pharmacy staff, before undertaking an options appraisal of available solutions. Digital literacy of pharmacy staff was also assessed through the questionnaire.

Digital literacy of pharmacy staff was found to be below the level set by the UK Government with regards to basic digital literacy skills. This was linked to age, where older staff had lower levels of digital literacy, and lack of training on the specific systems used. Several training needs were identified to address the gaps.

From the options appraisal, it was found that there are currently no solutions that meet the full requirements for a digital PCP, as defined during the study. While each requirement was achievable within at least one of the solutions appraised, all solutions require a degree of development to achieve the full specification.

To meet the needs of a digital PCP, investment is required for its development as part of an EPR solution which is integrated with both an electronic prescription and medicines administration (ePMA) system and primary care systems. A locally developed solution, rather than a commercial solution or national development, allows for improved control over development timescales without the risks associated with commercial contracts or national engagement.

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# 1.0 Introduction

## 1.1 The role of the hospital pharmacist

One of the main roles associated with hospital pharmacists is to provide a “clinical pharmacy” service, sometimes also referred to as “pharmaceutical care” (Abousheishaa *et al*. 2020). Broadly speaking, “clinical pharmacy” or “pharmaceutical care” consists of the application of specialist knowledge and evidence-based medicine to ensure patient outcomes are optimised. The Royal Pharmaceutical Society (RPS) has produced guidance for the standards for a hospital pharmacy service (RSP, 2022) which includes activities such as: advising on medications to improve both acute illness and chronic conditions; identifying and resolving medication compliance issues and drug related adverse effects; monitoring of medications that have a narrow therapeutic window of action (known as therapeutic drug monitoring (TDM)).

## 1.2 What is pharmaceutical care planning?

Hospital-based clinical pharmacists in the UK are introduced to the concept of “pharmaceutical care plans” (PCPs) as part of their structured post-graduate training. To date, these have taken the form of paper PCPs, completed, and retained by pharmacists as a summary record of the patient and their individual pharmaceutical needs. They are kept intentionally separate from the patient's paper medical records, to allow for patient prioritisation without the need to review the patient’s paper records every day. The patient medical record constitutes the legal record of the patient’s care and is used to document actions and outcomes. While pharmacy do annotate actions (usually requiring a medical review) and outcomes within the patient medical record, the PCP is used to document tasks that need to be completed (usually by pharmacy) along with follow-up actions. These pharmacy-based tasks don’t usually sit within the medical record. The act of physically flagging up a patient’s PCP in a separate pharmacy folder, allows patients with the greatest need to be seen first. However, by keeping PCPs separate, any actions undertaken by pharmacy staff are not automatically recorded in the patients’ medical records.

The single most significant limitation with paper PCPs is a lack of information sharing, not only between hospital sites but also the wider healthcare team. Paper PCPs are generally only seen by the pharmacy team, they aren’t transferred if the patient moves, and can’t be accessed by other healthcare professionals.

Within Aneurin Bevan University Health Board (ABUHB) pharmacy departments, the historic compliance with the use of paper PCPs has been varied. Some pharmacists complete and update PCPs for every patient on a regular (if not daily) basis during their in-patient stay. However, others find them of less benefit, especially in high turnover areas where in-patient episodes are short (such as elective surgery).

Prior to the opening of the Grange University Hospital (GUH), patients would routinely spend the duration of an admission episode on a single hospital site within ABUHB. While transfers between wards within a site were relatively common, transfers between the two main acute sites of the Royal Gwent Hospital (RGH) and Nevill Hall Hospital (NHH) were rare. For internal ward to ward transfers within a hospital site, the handover of a paper PCP could be managed using assigned ward pigeonholes within pharmacy. Each morning, a member of the pharmacy team would check the ward lists and remove PCPs from the associated pharmacy folder. For patients who had been transferred to another ward within the same hospital bed base, their PCP was transferred to the corresponding ward slot. This was undertaken as the first activity of the day, to minimise duplication of effort in generating PCPs for patients moved to a ward since the last pharmacy visit.

In November 2020, during the COVID-19 pandemic, ABUHB opened its new critical care centre (GUH). This dramatically changed the flow of patients through the ABUHB hospital system.

The new structure, post the opening of GUH, is that all critically unwell patients are initially treated at GUH, and then “stepped down” to one of the three local general hospitals (LGHs). During this restructure, Ysbyty Ystrad Fawr Hospital (YYF) was reclassified, from a rehabilitation hospital to an LGH. It is now commonplace for a patient to spend time at more than one hospital site within ABUHB during a single admission episode. Patients can be “stepped down” from GUH when they become medically stable but can also be “stepped up” to GUH if they become critically unwell. It is also common for patients that have been “stepped up” to GUH to be “stepped down” to a different site from where they were admitted, as patient flow is primarily dependent on bed availability rather than home address.

This change in patient flow has challenged the use paper PCPs, as it is not possible to transfer the paper documents between hospital sites in a timely manner. Attempts were made by pharmacy within ABUHB to find a resolution to the transfer issue. One solution that was tried was to locate the PCPs within the patient medical notes. However, this was not successful, as the ability to use the PCPs to prioritise patients was then lost. This was due to the new requirement for all the patient notes to be reviewed every day to locate and review the PCP. The lack of an effective and timely transfer system for paper PCPs has resulted in a new PCP being required each time the patient is transferred between hospital sites. This increased workload resulting from this new patient flow saw the use of PCPs decrease significantly, due to the time taken to complete them being seen as an inefficient use of resources. There is therefore a need to improve the communication of pharmaceutical issues between pharmacy staff at different hospitals within ABUHB.

The problems associated with paper PCPs ultimately triggered the request for a digital solution. Additional benefits of changing to a digital PCP include improved integration within the digital aspect of the patients’ medical record and wider access to information around unresolved pharmaceutical issues (both beyond the hospital admission and to a wider range of healthcare professionals). However, before we

make the move to a digital solution, we first need to consider our workforce: their readiness to adopt new digital solutions, and what digital skills they have and need.

### 1.3 Digital readiness of staff within healthcare

With the ever-increasing pace of digital improvements with healthcare, consideration must be given to the digital skills of the current workforce. Healthcare is behind in comparison to the private sector when it comes to digital maturity (Phiri *et al,* 2023), and an investment in staff training in digital competence is also required (Welsh Government, 2023a). It is therefore important to establish the baseline digital skills of the pharmacy workforce, prior to pushing out further digital approaches and solutions. But how do we measure baseline digital skills? There are no set tests for measuring digital skills. However, the UK government have set out an essential digital skills framework, which breaks down digital foundation skills into 6 digital skills areas (Gov.uk, 2019). These skills areas are:

- General digital skills
- Communicating
- Handling information and content
- Transacting
- Problem solving
- Being safe and legal online

Within the framework each skills area has a set of example activities, based on what are considered to be everyday digital interactions. These examples could be used as the basis for the development of a digital skills questionnaire.

## 2.0 Aims and Objectives

### 2.1 Aim

To evaluate possible digital solutions and identify the challenges of implementing a digital pharmaceutical care planning across ABUHB.

### 2.2 Objectives

1. To define the functional and non-functional requirements needed for a digital pharmaceutical care plan.
2. To assess the requirements against functionality within available solutions.
3. To investigate the readiness and engagement of pharmacy staff within ABUHB to digital adoption of pharmaceutical care planning.

## 3.0 Literature Review

A literature review was undertaken in January 2024, to establish what information was already available regarding key requirements of a digital care planning solution. The researcher was looking for articles relating to both the core functionality and implementation. Where functionality was not a direct component of the article, the researcher was looking to identify barriers and facilitators to the optimal use of a digital care planning solution. Therefore, identifying areas that could be used to develop a set of requirements to overcome issues or facilitate good practice as identified within the existing research.

The following data bases were used for the review:

- AMED (Allied and Complementary Medicine) <1985 to October 2023>
- Embase <1974 to 2024 January 17>
- Books@Ovid <January 16, 2024>
- Ovid Journals Database
- NHS Wales Full Text Journals
- HMIC Health Management Information Consortium <1979 to November 2023>
- Ovid MEDLINE(R) ALL <1946 to January 17, 2024>

Search terms used for the database search are details in table 3.1 below.

**Table 3.1. Search terms used for database literature search**

| Search number | Search term(s) | Number of results |
|---|---|---|
| 1 | | 18 |
| 2 | Pharmaceutical care plan | 370 |
| 3 | Electronic care plan | 118 |
| 4 | Digital care plan | 12 |
| 5 | Care planning | 241,458 |
| 6 | Pharmacist care plan or Pharmaceutical care plan | 380 |
| 7 | Electronic care plan or Digital care plan | 131 |
| 8 | Search 6 and 7 | 2 |
| 9 | Search 5 and 6 and 7 | 0 |
| 10 | Care planning and 7 | 54 |

Many of the pharmacy-based journals are not included on the above databases, so an additional grey literature search was undertaken on Google using the search term: electronic pharmaceutical care plan. This yielded an array of articles, product literature and marketing information. The 21 results of the grey literature search were then filtered, along with the data base results, using the PRISMA methodology (Page *et al,* 2021) as shown in figure 3.1 below.

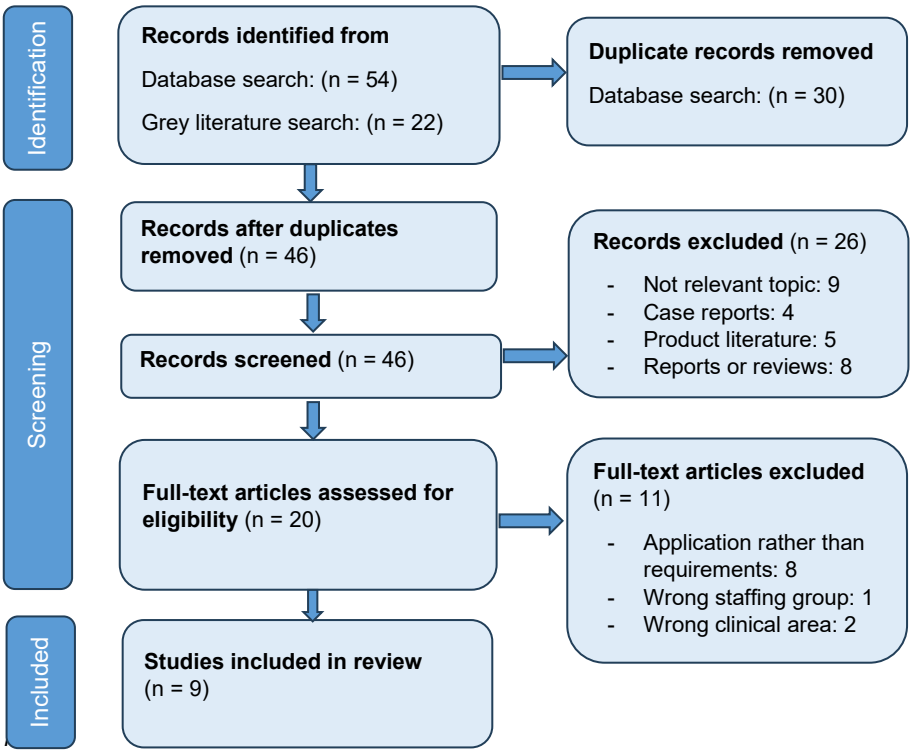


**Figure 3.1. PRISMA chart of literature review**

### Discussion of findings from the literature review

Articles selected for the literature review included: studies, original papers, reviews, reports, and articles.

Nine articles were identified. Article 1 from the Nursing Times (Edwards, 2011) looked at whether electronic records could improve care planning. This was a UK project, and while it was being undertaken within nursing the principles of care planning and the issues raised are applicable across professions. The principal areas identified in this article were streamlining processes, training, and access to the digital solution.

Streamlining, specifically of content, related to duplication of work. If a system could pull or auto populate information for other systems, then this should be utilised. This would result in reduced duplication, saving time, and possible reduction in associated transcription errors. The use of a mix of structured (coded information)

alongside unstructured (narrative text boxes) was identified as facilitating better outcomes.

Training and the importance of ensuring staff understand both the system and the task were also highlighted within this article.

Access was stated as needing to be available within the current workflow. Ideally the system should sit within an existing system that is already being used by staff for daily activities. Hardware availability was also commented on by participants as a limiting factor in system uptake.

Article 2 (Paterson et al. 2011) from Australia, discusses the medicolegal aspects of electronic care plans. The key findings were standardisation of content, to ensure best practice is followed by all staff for consistency of patient outcomes and staff understanding of the task, ensuring staff undertake the task correctly. The article also advises that an electronic care plan should form part of the patient's legal digital medical records.

In the 2016 report by Rotenstein *et al*, undertaken in the USA, the focus is on the critical components of an electronic care plan. The requirements here are split into two types: patient information and task management functions. The patient information that was deemed critical to include within a care plan included past medical history (PMH), demographic information (such as name, address, date of birth, health identification number i.e., NHS number) and social issues (such as if the patient has a package of care).

The second area of focus was generating, monitoring, and assigning tasks or actions. Here, the key requirements were the ability to communicate and assign tasks to other team members, and having an interactive task list that allows for tasks to be prioritized. An example of this would be using a dashboard that shows task dates and progress. Alerts for upcoming and overdue tasks were also deemed of high importance.

Article 4 was also nursing based and was undertaken in Norway (Meum, 2013). This article looks at the use of an electronic module to support nursing care in a post-operative surgical ward. It discusses the use of "redundancy" and "correlated information". These terms are used to describe non-integrated information from within the system that is either identical (for redundancy) (Gillis, 2021) or related (for correlated). An example of redundancy within a PCP would be the patient's demographic data (which should always be visible); an example of correlated information would be the patient's weight or an associated blood result that is needed to assess a medication dose or frequency.

The article also describes the need to address information gaps, to ensure the goal of the "right information, at the right place, at the right time" is achieved. This is critical for decision making and is heavily linked to the principles of pharmaceutical care planning.

While there is no direct mention of the use of standardised nomenclature there is comment around the need for data to be transferable, both within and out to other systems, requiring appropriate coding.

The article also looks at usability of an electronic system. It highlights the need for supplementary modules to be linked to the patient's digital record, as well as having the functionality to be varied based on the clinical areas in which they are being used.

In the 2022 scoping review of shared electronic care plans conducted by Norton, *et al* in America, eight care plan projects were reviewed. These covered a range of healthcare professionals, including pharmacy. The main findings of the review were around multi-disciplinary access to the records (via the patient's digital record), access across all sectors of healthcare, and having the ability to search for entries based on roles. The underlying standard of using Fast Healthcare Interoperability Resources (FHIR) messaging (or similar) to share information was a key component of seven of the eight projects reviewed. The eighth project referred to clinical terminology rather than messaging standards.

Similarly to Norton et al (2022), Matney et al (2016) from America also looks at coding information within a digital care plan. However, Matney discussed the use of coded data using Systematized Nomenclature of Medicine Clinical Terms (SNOMED-CT) to provide standardised clinical terminology, and Health Level Seven Consolidated Clinical Document Architecture (HL7 C-CDA) as the structure for communication. When the research was undertaken, HL7 C-CDA was the latest iteration of the HL7 product. This was later superseded in the UK in 2018, when HL7 released FHIR (NHS England Digital, 2024). Which according to the NHS Data Standards Directory (2023) has now become the recognised standard within the UK. The use of coded tasks in also highlighted within this article.

Article 7 (Doran et al. 2010) was also a nursing-based project, conducted in America and consisting of a pilot study of an electronic interprofessional care planning tool within mental health. While this study did not go into detail about the functional requirements of the system, it did discuss non-functional requirements such as interoperability with other systems, remote access, and multidisciplinary access.

Barriers to adoption quoted in the results included: digital literacy of staff, training on how to use the system, and general usability of the system. Within system usability, the use of keyword search functionality to select pre-populated intervention types was also highlighted.

The only solely pharmacy-based article, a peer reviewed paper by Blackburn-Smith, *et al,* published 2021 discusses the development of a clinical prioritization tool (and subsequent digital dashboard) for pharmacy staff triaging patients in an emergency department in Northern Ireland. While the tool that was developed was not a PCP, it did have elements that mimic aspects of the paper PCP process, with regards to prioritisation of patients with the greatest pharmaceutical care needs. To prioritise patients within the study, certain information was needed for a red, amber, green

(RAG) rating to be applied. This information included the patient's PMH, current medications, active diagnosis, and current observations (e.g. renal function).

The final article to be reviewed was by Bugnon *et al,* conducted in Switzerland and published in 2021. This original paper looked at lessons learnt from studying the pilot use of a share electronic medication plan, aimed at improving primary care medication processes. Again, there were no direct links to functional requirements of a system, but there were some key principles identified from this article that could be adopted by a digital PCP. These are the need for shared ownership / access across sectors (improving communication and information), the need for the system to sit within the current workflow (to improve use), and security of access.

The literature review showed two distinct time periods around the development of digital healthcare technology and care planning. Most of the selected articles were published in the early 2010s. After this time, there is little new literature until the early 2020s and even then, there is a limited amount of new research within this topic area. It seems that despite the findings and suggestions from the early 2010s, limited progress has been made within this area in general. Pharmaceutical care planning is an even smaller area within electronic care planning as a whole and there seems to have been little to no research on this topic area specifically. While the grey literature search did identify products designed to provide a digital PCP, there was no research to evaluate these solutions.

A summary of the findings for each article and how these can be associated with potential requirements for a digital PCP can be found below in table 3.2.

**Table 3.2. Summary of findings from literature review**

| Article details | | Findings and associated requirements |
|---|---|---|
| 1 | | Need to reduce duplication and transcription by pulling through of available information from other systems |
| | | Dependant on access to hardware |
| | | Training is essential |
| | | Access linked to a current system used as part of normal workflow |
| | | There is a need to have unstructured narrative text in the form of free text boxes |
| | | Coded information should be used where possible |
| | | A single care plan that is constantly updated |
| | | Linked to the patients' digital records |
| 2 | **Electronic care plans and medicolegal liability** *Australian family physician* 2011 | Should be linked to part of the patient's digital record, already in use |
| | | Use of a standard template to ensure best practice |
| | | Ensuring staff understand their role and the benefits of the task being undertaken |
| 3 | **The critical components of an electronic care** | Details that should be included in a PCP:<br>• Demographics |

| | | |
|---|---|---|
| | | • PMH |
| | | Functionality to manage tasks including:<br>• Assigning tasks to others<br>• Task list for tracking<br>• Alerts for upcoming or overdue tasks<br>• Notes for other health care professionals |
| | | Suggested care plans should be integrated with EPR or part of the patient's electronic records |
| 4 | **"Lost in translation": The challenges of seamless integration in nursing practise**<br>*International Journal of Medical Informatics*<br>2013 | Need to use coded information to allow for data transfer between systems, reducing duplication of effort |
| | | Access to a care plan should be broader than just the professional group it is designed for |
| | | Standardisation of documentation and processes |
| | | The use of templates for set diagnosis to guide actions and tasks |
| | | Multiple users of the system simultaneously |
| | | Needs to be viewable alongside the medication administration record |
| | | Linked view of patient measurements such as:<br>• Weight<br>• Heart rate<br>• Temperature<br>• Observation |
| | | Different priorities in different care settings within the hospital |
| | | Needs to be accessible at the patient's bedside and as part of the current workflow |
| 5 | **Assessing progress**<br><br>**comprehensive shared electronic care plan: scoping review** | A multi-disciplinary document accessible to all health care involved in the care of the patient |
| | | Shared between sectors |
| | | Viewable by role-specific information |
| | | Uses data standards such as FHIR to allow transfer of information |
| | | Should include health and social information |
| | | Linked to the patient's digital record |
| 6 | **Communicating nursing care using the health**<br><br>**care plan** | Use of SNOMED-CT for coding terminology |
| | | Use of HL7 C-CDA for communication of data |
| | | Care plan should be linked to the patient's digital record |
| | | Should allow for intervention identification and monitoring of progress towards goals |
| | | Contains information from multiple disciplines and settings |
| | | Having a section for interventions or tasks where these can be tracked and updated |
| 7 | **A pilot study of an electronic interprofessional** | Digital literacy and the need for staff training |
| | | Issues linked to access to equipment when needed and requirements to log in to the system |

| | | |
|---|---|---|
| | **planning toll for clients**<br><br>**problems and**<br><br>*Based Nursing* | Updates in real time |
| | | Keyword search function to select intervention type for a prepopulated list |
| | | Free text box associated with an intervention to allow a narrative to be documented |
| | | Interoperability with current systems |
| | | Must be easy to use |
| | | Web-based application allowing for remote access |
| | | Multi-disciplinary access |
| 8 | **Development and reliability of a clinical pharmacy triage tool in the emergency department**<br>*Pharmaceutical Journal*<br>2021<br>Peer reviewed | Electronic whiteboard to show the patients with the highest clinical need |
| | | Components required included:<br>• PMH<br>• Current medications<br>• Active diagnosis<br>• Patient observations (such as blood results)<br>• Social issues |
| | | Use of RAG rated colour coding |
| 9 | **Improving Primary care medication processes by using shared electronic plans in Switzerland:**<br><br>**participatory action research study** | Shared ownership across sectors |
| | | Must be part of the current workflow |
| | | Web-based with two-factor authentication |

## 4.0 Methodology


**Figure 4.1. Flowchart of methodology**

### 4.2 Approvals

Approvals for the study were sought and gained from the following:

1 The University of Wales Trinity St Davids – approved November 2023 (Appendix 1)

2 The ABUHB risk review committee – approved November 2023 (Appendix 2)

### 4.3 Overview of study

The project was divided into 3 studies. Study 1 aimed to gather baseline information from ABUHB pharmacy staff on their general digital skills, as well as establishing staff experience of using all types of PCPs. This was gathered via a digital questionnaire sent out to all pharmacy staff in November 2023. From study 1, self-identified staff were invited to participate in study 2, during January 2024. Study 2 consisted of a recorded one-to-one discussion around the content of a PCP and thoughts around barriers and enablers to PCP use. Themes identified in study 2 were then used, along with literature review results, to establish initial functional and non-functional requirements for a digital PCP. These requirements were then reviewed as part of a stakeholder workshop, for inclusion into study 3. This consisted of an options appraisal of possible digital solutions that could house a digital PCP. Study 3 was conducted between March and April of 2024.

In addition, outcome data around digital skills from study 1 was used to establish additional training needs for pharmacy staff across ABUHB, prior to future digital adoptions.

### 4.4 Inclusion / exclusion criteria

#### Study 1 - Questionnaire

Inclusion criteria

- Directly employed pharmacy staff member within secondary care for ABUHB
- Locum pharmacy staff member currently working within secondary care for ABUHB

Exclusion criteria

- ABUHB pharmacy secondary care staff member whose role does not include use of a computer
- ABUHB pharmacy staff member not working within secondary care

**Study 2 – Recorded interviews**

Inclusion criteria

- Directly employed pharmacy staff member within secondary care for ABUHB
- Locum pharmacy staff member currently working within secondary care for ABUHB
- Experience of using a PCP (paper, digital or both)
- Consented to participate in is a recorded discussion

Exclusion criteria

- Not available during January to undertake a recorded discussion

**Study 2 – Stakeholder workshop**

Inclusion criteria

- Directly employed pharmacy staff member within secondary care for ABUHB
- Locum pharmacy staff member currently working within secondary care for ABUHB
- Future user of a digital PCP or responsible for staff using a PCP
- Consented to participate in is a recorded workshop

Exclusion criteria

- Is not available during February to participate in a recorded workshop

**4.5 Outcome measure / objectives**

The primary outcome was to identify a digital solution, with the best actual / potential fit against a set of newly defined functional and non-functional requirements, for use across all pharmacy departments within ABUHB.

The first secondary outcome was to define the functional and non-functional requirements for a digital PCP.

The second secondary outcome was to establish baseline digital skills for all ABUHB pharmacy staff. This information could then be used to identify potential gaps in skills and inform future training needs.

### 4.6 Study 1

#### Study setting

The researcher is primarily based at RGH in Newport. Pilots (where needed) were therefore undertaken with staff from RGH, as it allowed the researcher to discuss the reason for the pilot(s) in-person. The remaining research was undertaken remotely.

All staff working within pharmacy departments within ABUHB were included, via the use of an existing email distribution list. Ensuring all staff with computer access were included.

The data was collected digitally, to improve completion rates and to ensure pharmacy staff at all sites could be included.

#### Study design

All staff that met the inclusion criteria were included in the recruitment process, which took place between 16th of November 2023 and 14th of December 2023. The aim was to recruit all 244 members of ABUHB pharmacy staff. A recruitment window of approximately four weeks was chosen to take into consideration staff working part-time, short-term sickness, and annual leave.

#### Data collection

For study 1, data was collected through self-completion of a MS Form (Appendix 3). The questionnaire form was specifically formatted for ease of completion by respondents. Branching was added so that only the relevant sections would be presented to the respondent. The questionnaire was divided into three sections: respondent information, general digital skills, and pharmaceutical care planning. The results of the questionnaire were collected in MS forms, where an Excel spreadsheet is autogenerated. The purpose of each questionnaire section is detailed as follows.

#### Section 1 - Socio-demographic details:

The information that was obtained in this section included the respondents: age, current job details (job role, pay banding), and hospital base site. This allowed these factors to be compared with the digital literacy scores, to see if trends could be identified.

**Section 2 - Baseline digital skills:**

This section comprised the six topic areas for digital skills, as identified by the UK Government 2019. These were sorted to ascertain the respondent's confidence in undertaking example tasks relating to each of the following topics:

1 General digital skills
2 Communicating
3 Handling information and content
4 Transacting
5 Problem solving
6 Being safe and legal online

An additional question was added that allowed respondents to highlight any individual digital based training needs. This was included so that further targeted training could be developed, in addition to overarching needs identified in the questionnaire response.

**Section 3 – Pharmaceutical care planning:**

There were two areas of focus within this section: the first was to identify respondents that had previous experience of using a digital PCP; while the second was to identify which parts of the ABUHB existing paper PCP (Appendix 6) were of value in the care planning process. The ABUHB paper PCP was also compared to the Cardiff University paper PCP, which is used during post-registration training for hospital pharmacists (Appendix 7). Relevant elements were then included in the questionnaire.

Section 3 also includes a consent question for respondents to self-identify for inclusion in study 2.

**Pilot**

A draft questionnaire was developed and sent to a cross section of pharmacy staff at RGH, at the start of November 2023. The 10 staff who received the questionnaire included: four pharmacists (bands 6, 7, 8a and 8c), three technicians (band 5, 6 and 7), two assistant technical officers (band 3 and 4) and a member of clerical staff (band 3). Staff were selected from the RGH site as they were known to the researcher, who could therefore ensure a cross section of ages, job roles, pay bands, and probable digital abilities was represented. The pilot draft questionnaire was intended for usability assessment only (data from these responses were not included in the analysis). The aims of the draft questionnaire were:

- to assess the overall usability of the questionnaire and clarity of the questions,
- how long it took (on average) to complete the questionnaire,
- whether the data generated from the questionnaire was in a suitable format.

Feedback was received (either via email, or in person) from all ten staff that were selected to complete the questionnaire.

Following feedback a few spelling errors were corrected. The third statement in question 5 was amended to simplify the wording. Question 16 was adjusted, with the additional option for “somewhat useful” added to the possible answers and “smoking status” changed to “Lifestyle factors (such as smoking status and alcohol use)”. The option to add comments pertaining to additional information that would be beneficial was also added to question 17.

Additional alterations were made to ensure all aspects of the current ABUHB paper PCP were included in question 17. At the end of section 2, a free text response question was included to allow all staff to comment on additional digital training needs. As the questionnaire was designed to be anonymous, following the consent question a free text response was added for those that had consented to a recorded interview to add their name and work email address. This ensured staff were able to submit anonymous responses.

Before the final version of the questionnaire was disseminated, the researchers looked at the artificial intelligence (AI) generated styles available within MS Forms, which are used to create a more immersive experience and to attract more responses. Styles were reviewed and any that resulted in the responder needing to scroll right to see all the possible answers, were excluded. Some that contained background animations were deemed to be too distracting and were also excluded. The final style selected had minimal animation on the opening screen, then continued without animation. The aim was to encourage respondents to complete the questionnaire rather than to distract them with complex layouts. Care was also taken to style the questions in a way that made them easy to answer. Multiple choice grids, or Likert question layouts have been found to generate better responses in questionnaires (Peng *et al*, 2023).

**Method of identification and recruitment**

All pharmacy staff within ABUHB are added to a security group that grants access to the pharmacy SharePoint library, as part of appointment. The security group forms a secondary care pharmacy distribution list. This distribution list was used to send an email to all secondary care pharmacy staff within ABUHB. The email detailed the background to the study and a link to the MS form, for staff to directly submit responses. A follow-up email was sent 11 days after the original email. Details of the study and a link to the MS form were also added to the all-sites communication meeting notes, for two consecutive weeks, starting from the day the original email was sent.  Posters were printed and displayed in all four pharmacy departments,

containing a brief description of the study and a QR code for staff to access the MS form directly from personal mobile devices.

It was highlighted by one site lead that some of their staff were struggling with digital skills, to the extent that they were having difficulties even logging on to a computer. A request was made for the questionnaire to be distributed on paper; this was rejected as it would impact on the data analysis. Instead, during the third week of data collection either the researcher, or a nominated champion at the site, engaged with staff that had not yet responded to the questionnaire. These staff were supported to respond to the questionnaire using a mobile device (such as a tablet) with the live MS form pre-loaded and ready for completion. A direct link to the questionnaire was also added to the main pharmacy pages on SharePoint, which is the central access point for other pharmacy activities, removing the need to log into personal email accounts to locate the questionnaire link.

**Data analysis**

The quantitative data collected for study one was transferred from the autogenerated MS Excel spreadsheet of responses to the MS Forms questionnaire, into a separate MS Excel spreadsheet, to allow for data manipulation. The data was cleansed to ensure that responses entered under the option of “other” were appropriate. The data was also reviewed for discrepancies in overall responses, such as whether the number of responses from a given staffing group exceeded the current number of staff in that group. The data was then reviewed and divided into sections for analysis.

### 4.7 Study 2

**Study setting**

Semi-structured Interviews were conducted via MS Teams. This allowed for equal access to all pharmacy staff across all sites within the health board, while also reducing the time needed to undertake the interviews (as there were no requirements to travel to an interview venue). Interviewees were asked to ensure that during the interview they were in a private area so that all responses provided could be kept confidential.

Care was taken during the interviews to allow participants time to answer questions fully before moving on the next question and not to lead participants in their answers (Adeoye-Olatunde and Olenik, 2021).

### Study design

All staff that met the inclusion criteria were included in the recruitment process, which took place between January and February 2024. Staff that had consented to be interviewed were sent an email detailing the study, including some background to the overall aims of the study and what would be expected of them during the interview (Appendix 4). The email was sent collectively to all participants using the blind carbon copy (BCC) function within MS Outlook, to ensure to confidentiality of study participants.

### Data collection

The interviews were recorded via MS Teams, with the transcription function turned on. Within a few days of the interview, the researcher screened the transcription and with the aid of the recording made any necessary adjustments to ensure accuracy. A copy of the transcription was sent to the interviewee. The interviewee was able to provide comments on the transcription if they wished to do so.

### Pilot

In line with the grounded theory approach to semi-structured interviews (Adeoye-Olatunde and Olenik, 2021), to ensure the questions for study 2 elicited the anticipated topic responses a focus group was undertaken at the beginning of January 2024. Three senior pharmacists from the RGH pharmacy site were included. The selection of these pharmacists was opportunistic, as all three worked in the same office as the researcher and had consented to undertake a 1-2-1 interview as part of study 2. The initial question set was discussed to ascertain the types of responses, followed by a discussion around wording of the questions. As a result, the original question set was amended to focus the questions more on barriers and facilitators to PCP use, and the differences between paper and digital PCPs. One of the participants of the focus group was then selected to be the first interviewee. Following this initial interview three additional questions were added to the revised interview script (Appendix 5).

### Method of identification and recruitment

Participants for study 2 were identified through questionnaire responses from study 1, where they had indicated their willingness and consented to participate. An email was then sent out to the selected participants inviting them to either indicate their availability for an interview, or for staff with a primary clinical responsibility (who don’t manage their own timetables), to request support in arranging an interview timeslot that did not compromise their daily work commitments (Appendix 4).

### Consent

Initial consent for the interview was given by the participant as part of their questionnaire response in study 1. The email sent to participants prior to arranging interviews (Appendix 4), included details of the process for withdrawing consent and stated that this could be done at any point during or post the interview.

### Participation retention & withdrawal criteria

If a participant chose to withdraw from study 2, then all information provided as part of study 2 would be removed and deleted. Their responses to study 1 would remain but their name would be removed to anonymise their study 1 data.

### Data analysis

The reviewed interview transcriptions generated by MS teams were anonymised and converted into MS Word documents, before being thematically analysed by the researcher.

### Requirement development

Following thematic analysis of responses from study 2 interviews, themes were reviewed and used to generate both functional and non-functional requirements for study 3. Themes and requirements from the literature review and components of the PCP as assessed in the study 1 questionnaire were all considered during the requirement development.

## 4.8 Study 3

### Study design

The options appraisal was conducted using a combination of; self-assessment of the system (where the researcher had access to, and experience of, using the system), written system specifications and product experts. Each system was assessed against the requirement list and given a score per requirement. The detail of this requirement scoring can be seen below in table 4.1.

**Table 4.1. Requirement scoring matrix**

| Score | Definition |
|---|---|
| 10 | Functionality meet in full, and where applicable, already in use within the system for a PCP |
| 8 | |
| 5 | |
| 2 | |
| 0 | Functionality not possible within the system |

Scores were then tallied to give an overall score per system, before reviewing features against critical components and development opportunities.

## 5.0 Results

### 5.1 Study 1

At the time of the research, there were 244 members of pharmacy staff within ABUHB, split across the four main hospital sites: GUH, NHH, RGH, YYF. Some staff worked across the health board as a whole and some worked as part of the community resource team (CRT). The CRT team bridge intermediate and secondary care and are considered secondary care pharmacy staff.

Questionnaire responses were received from 164 members of pharmacy staff, giving an overall response rate of 67% (164 / 244). Analysis of the data showed that responses were received across all grades of staff; job roles; age categories; and work areas.

### Digital skill questionnaire response grading

To grade the responses to the digital skills questionnaire each of the response options was given a points allocation as detailed below in table 5.1 as follows:

**Table 5.1. Point allocation for questionnaire results**

| Response | Points allocation for grading of confidence in undertaking digital skill |
|---|---|
| Not confident | **0** |
| Somewhat confident | **1** |
| Confident | **2** |
| Never tried | **0** |
| Not applicable to my job (N/A) | **0** |

The points allocation for each response was decided so that confidence levels could be graded in more detail, rather than just a positive or negative response. Responses of “somewhat confident” implied a degree of clarification or training was needed for the respondent to become fully “confident” to undertake the task / action. All three negative responses: “not confident”, “never tried” and “N/A”, were given a score of zero, as all three outcomes result in the respondent not achieving the required digital skill.

### Questionnaire section breakdown

The questionnaire consisted of 39 questions, divided into 6 topic areas, as detailed below in Table 5.2. The maximum overall score achievable for the questionnaire was 78.

**Table 5.2. Breakdown of question numbers and maximum scores per section**

| Topic area | Number of questions | Maximum score achievable |
|---|---|---|
| General digital skills | | 14 |
| Communication activities | 9 | 18 |
| Handling information and content | 4 | 8 |
| Transaction activities | 9 | 18 |
| Problem-solving activities | 6 | 12 |
| Staying safe and legal | 4 | 8 |
| **Totals** | 39 | 78 |

### Overall digital literacy scores

The scores were converted to show an overall percentage compliance with digital literacy. Respondents" scores ranged from 10.3% - 100% compliance, w with an average score of 84.6%. Figure 5.1 below shows the distribution of scores compared to the average score.

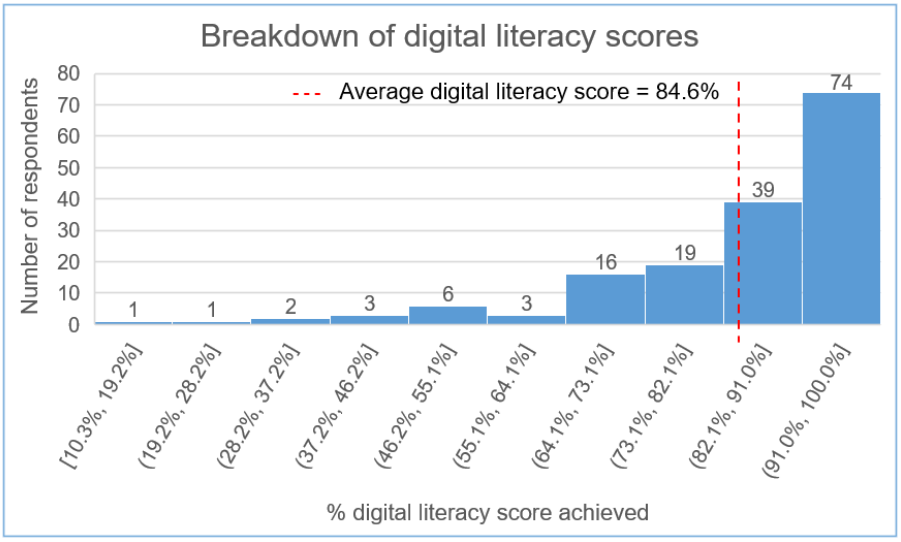


**Figure 5.1. Distribution of overall digital literacy scores compared to the average score**

### The impact of age on digital literacy

When looking at age in relation to digital literacy, there is a correlation whereby digital literacy decreases with age. This can be seen in figure 5.2 below.

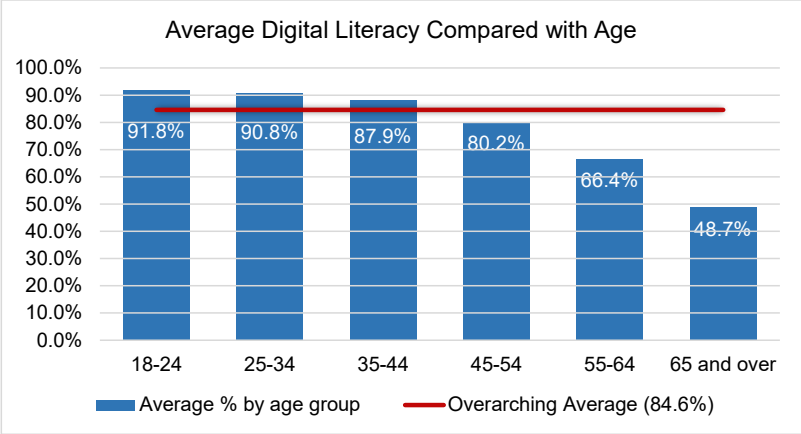


**Figure 5.2. Average staff digital literacy scores compared with age**

**Digital literacy scores by questionnaire section**

The digital skills questionnaire comprised six sections, each focusing on a different set of activities linked to an overarching topic area. The six topic areas were:

1 General digital skills
2 Communication skills
3 Handling information
4 Transaction skills
5 Problem-solving
6 Staying safe and legal on-line

The responses to each question were analysed based on sections, so that specific areas of difficulty could be identified. Figure 5.3 below shows the average digital skills competency, broken down by sub-sections of the digital skills questionnaire.

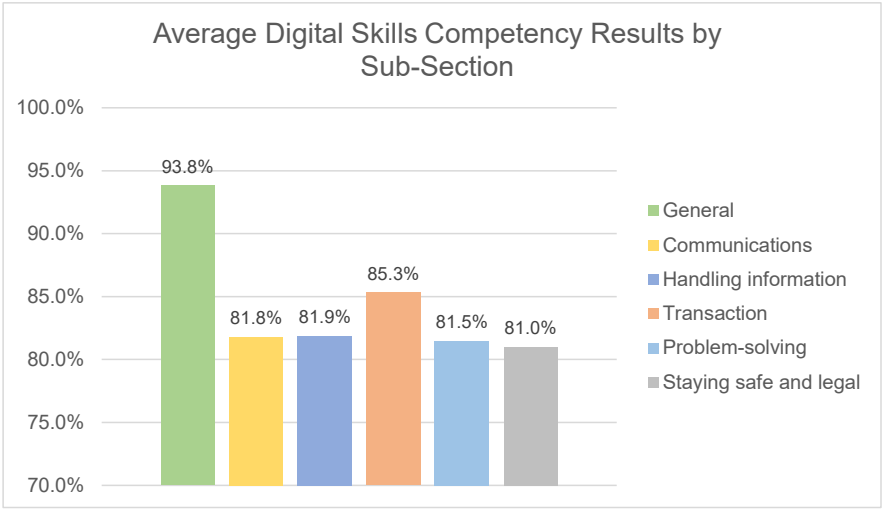


**Figure 5.3. Average digital skills scores broken down by questionnaire sub-sections**

### Digital literacy scores for general digital skills

The section encompassing general digital literacy skills had the highest average score = 93.8%. Figure 5.4 below shows the breakdown by question, and the average scores achieved. The question with the lowest average score related to changing device settings.

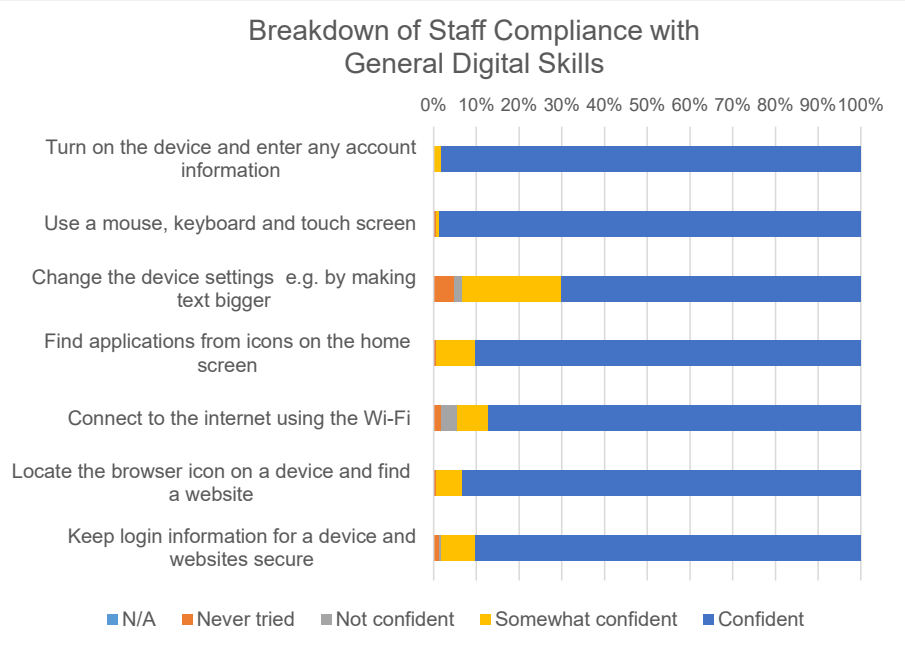


**Figure 5.4. Breakdown of staff compliance with general digital skills section**

**Digital literacy scores for communication skills**

Within the section relating to communication skills, there were 3 questions where the percentage of responses received indicating a lack of confidence were between 10% & 25% higher than the remaining questions in the section. These questions linked to:

1 Authentication via VPN for remote working

2 Using different document formats to make document sharing easier

3 Document sharing via applications such as MS Teams and MS SharePoint.

Figure 5.5 below shows the response breakdown, by question, for the communications section.

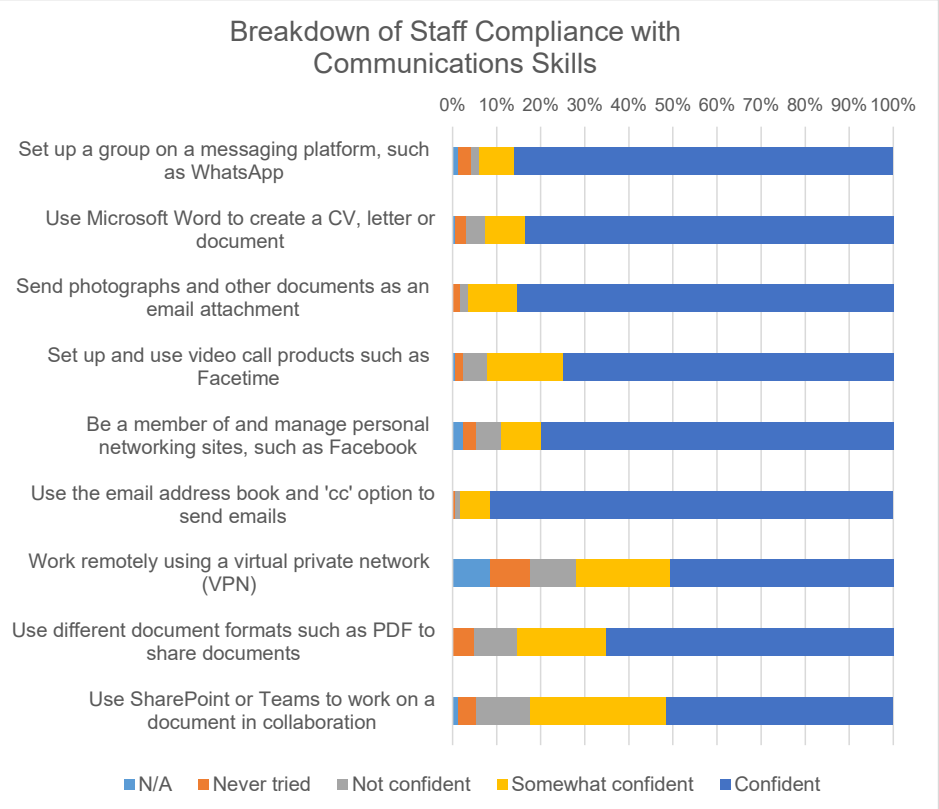


**Figure 5.5. Breakdown of staff compliance with communication skills section**

### Digital literacy scores for handling information skills

The third section of the digital skills questions covered handling information skills. All four questions in this section demonstrated a deficiency in digital skills. The questions relating to accessibility across multiple devices yielded the lowest compliance. Figure 5.6 below shows the breakdown of responses, by question, for the handling information section.

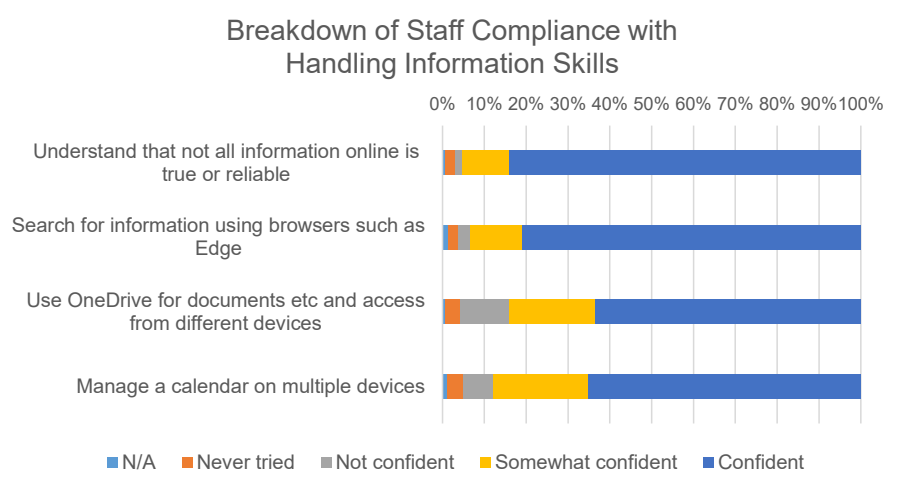


**Figure 5.6. Breakdown of staff compliance with handling information section**

### Digital literacy scores for transaction skills

The transaction skills section of the questionnaire covered activities linked to setting up and processing requests on-line. There were two questions within this section that indicated a lower percentage of confidence in the required skill compared to the rest of the section. Scoring between ~55%-65% rather than the 80%+ elicited by the other questions. These were linked to setting up an account on-line with a local authority and making a GP appointment. Figure 5.7 below shows the breakdown of responses, by question, to the transaction skills section.

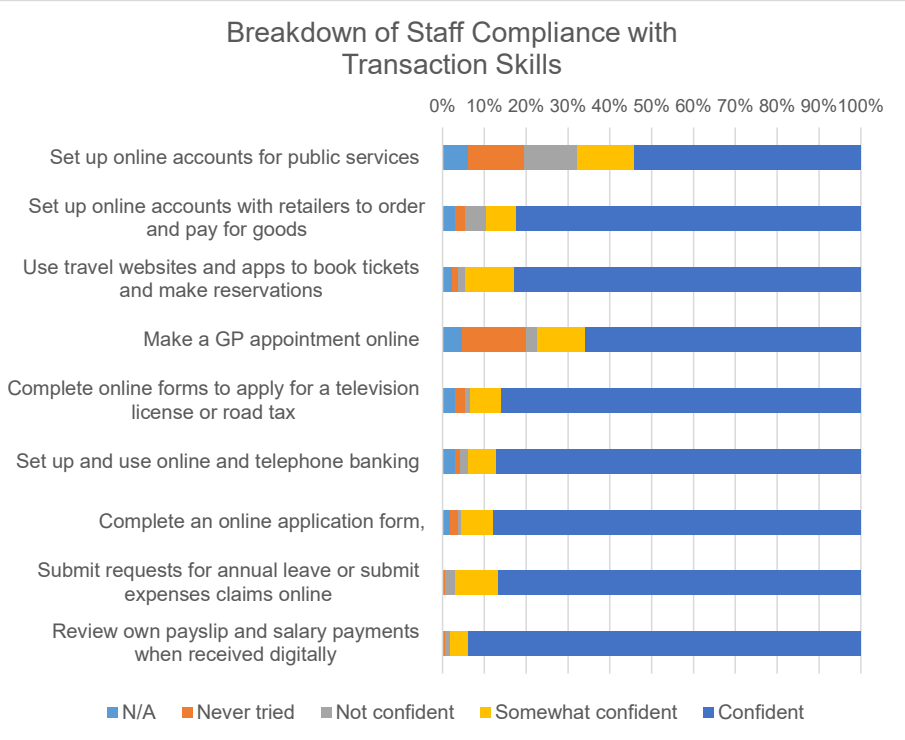


**Figure 5.7. Breakdown of staff compliance with transaction skills section**

### Digital literacy scores for problem-solving skills

When looking at the responses relating to problem-solving skills, there were two significant outliers where scores were near or below 50% compliance. These related to using a spreadsheet (such as MS Excel) to collect and examine data and creating a questionnaire or form for other to complete (such as in MS Forms). Figure 5.8 below shows the breakdown of responses, by question, to the problem-solving section.

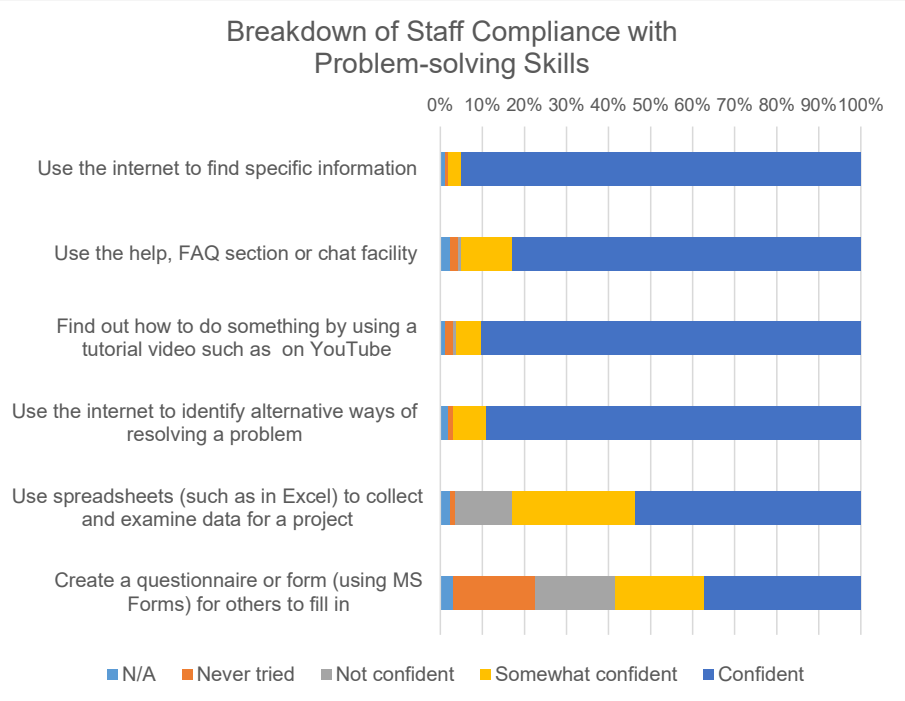


**Figure 5.8. Breakdown of staff compliance with problem-solving section**

### Digital literacy scores for staying safe and legal on-line

The final section on digital literacy skills covered staying safe and legal on-line. While most were confident around selection of login details and changing passwords, all three of the remaining questions elicited much lower scores. These questions were around reporting suspicious emails, organisational social media policies, and finding images and content on-line that can be used by others. Figure 5.9 below shows the breakdown of responses, by question, to the staying safe and legal on-line section.

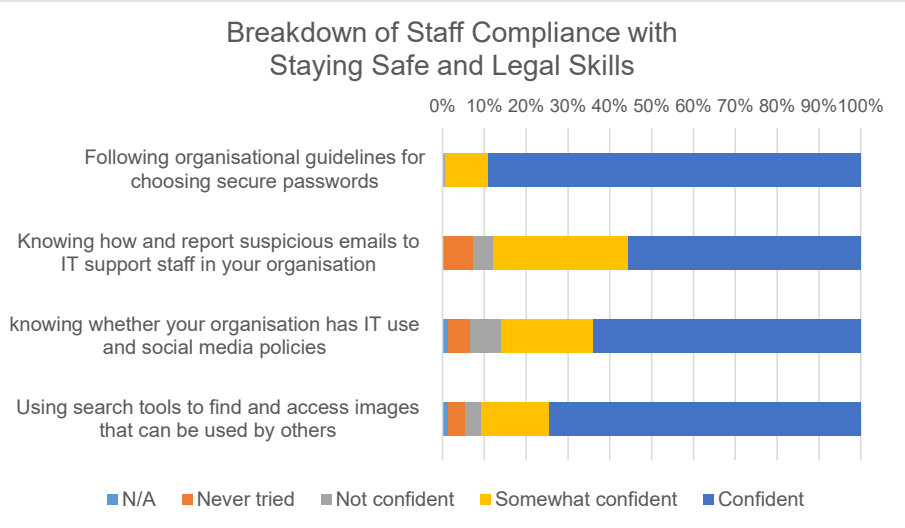


**Figure 5.9. Breakdown of staff compliance with staying safe and legal on-line section**

### Pharmaceutical care planning

### Usage and experience with PCPs

Of the 164 respondents to the questionnaire, only 71 had experience of using any form of a PCP. PCPs are primarily used by pharmacists, with some use by technicians, therefore not all staff who responded to the questionnaire would have been required to have used a PCP as part of their job roles. Of the 62 pharmacists that responded, 10 stated that they had no experience using a PCP in any form. This was split between senior pharmacists that don't routinely undertake a clinical ward-based role and junior pharmacists that are new to the clinical ward-based role and therefore have not yet been exposed to PCPs, as they are not currently in use within ABUHB. Figure 5.10 below shows the breakdown of staff experience of using a PCP, and which types of PCP they have used.

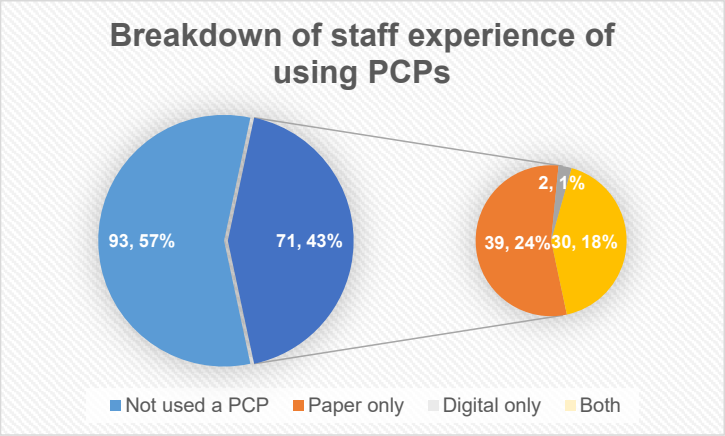


**Figure 5.10. Breakdown of staff experience of using PCPs**

Of the 71 respondents that had experience of using PCPs, 29 consented to take part in the interview section of this project. The self-selected group contained both pharmacists and technicians, with most working at a senior level. A variety of clinical and specialist areas of work were also represented in the self-selected cohort. Thirty four percent had experience of using a PCP in a health board other than ABUHB, and 62% had experience of using both digital and paper PCPs.

**Paper PCP content review**

Results were analysed to establish which elements of the ABUHB paper PCP users felt added value to the care planning process. Figure 5.11 below shows, in ascending order, the elements rated as “essential” by respondents. Information was also gathered as to elements where respondents thought the information would be reviewed somewhere else, such as the medication administration record or via the patients’ medical notes.

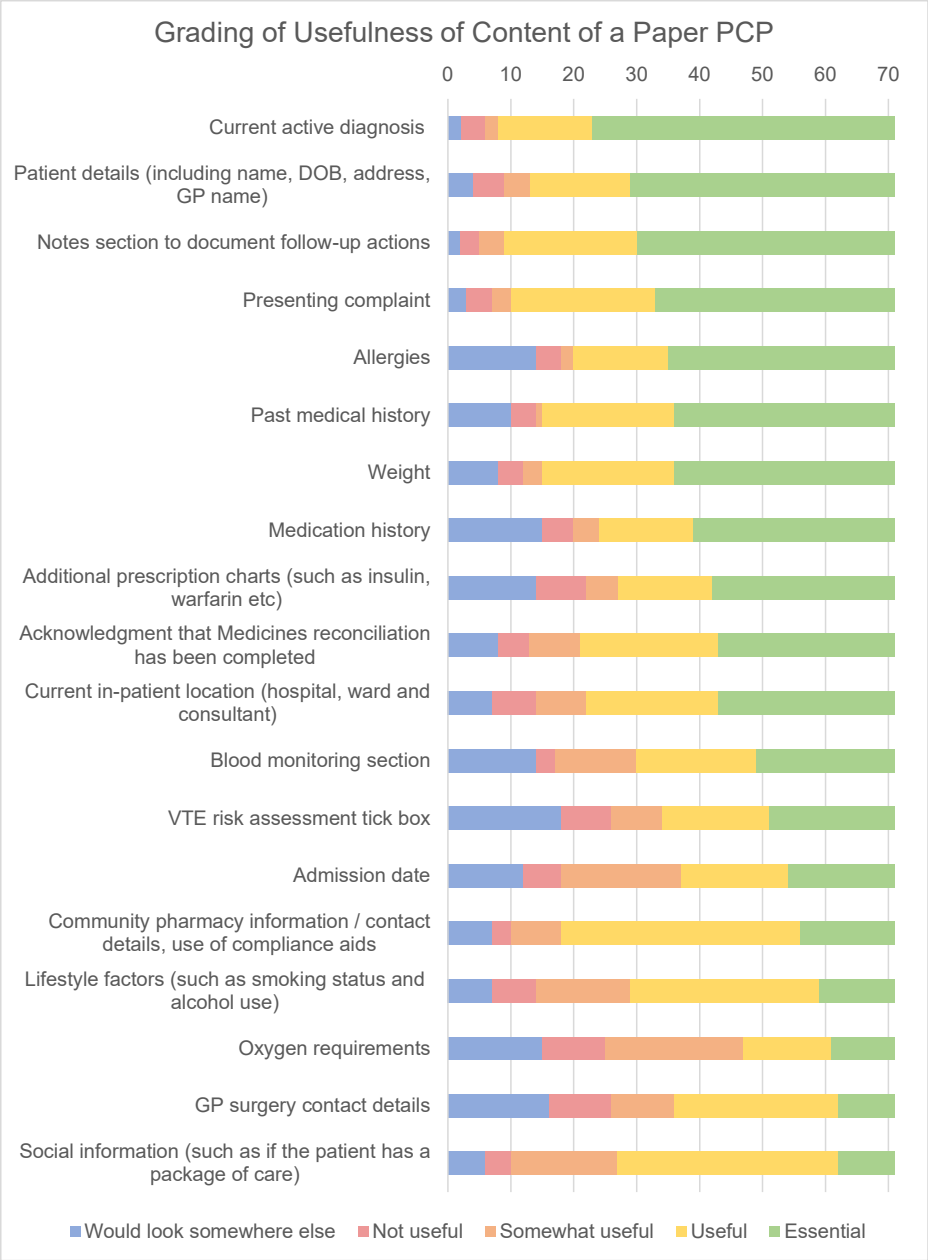


**Figure 5.11. Ranking of elements from a paper PCP in order of importance**

### 5.2 Study 2

The selection process for inclusion in the semi-structured interviews started with staff members that responded to the interview invitation email. Once these interviews had been conducted the researcher then reviewed the list of remaining potential interviewees and contacted staff members directly to arrange interview sessions. Part of the selection process for undertaking the interviews was to ensure that a cross section of staff, with regards to job banding, job role and experience of using a paper / digital PCPs were included. Pharmacists from across a range of senior roles were including. Such as medical, surgical, patient safety, education and training and specialist clinical areas. When selecting technicians for interview, those with enhance roles or additional clinical qualifications were included.

Of the 29 staff members who consented as part of study 1 to undertake the semi-structured interview, only twenty interviews were undertaken. This was based on saturation. When no new themes were being identified, the researcher stopped undertaking interviews.

The 20 participants of study 3 were broken down into the following groups: 12 senior pharmacists, 5 pharmacists and 3 technicians. The specific bands and job roles of the participants were not included in the write-up of the results, as this would have compromised their anonymity. Instead, an overarching description of their current role was used. Short codes were assigned to make it easier to assess which topic areas were highlighted by which staff groups. Table 5.3 below shows the breakdown of participant for study 3 by participant number, with an overarching job role, short code for job role, and their experience with types of PCP.

**Table 5.3. Breakdown of interview participants and their experience with PCPs**

| Participate number | Job role | Short code | Use of paper PCP, digital or both |
|---|---|---|---|
| 1 | | | Both |
| 2 | Senior Pharmacist | (SP) | Paper |
| 3 | Pharmacist | (P) | Both |
| 4 | Senior Pharmacist | (SP) | Both |
| 5 | Senior Pharmacist | (SP) | Paper |
| 6 | Senior Pharmacist | (SP) | Both |
| 7 | Pharmacist | (P) | Both |
| 8 | Technician | (T) | Both |
| 9 | Technician | (T) | Both |
| 10 | Senior Pharmacist | (SP) | Paper |
| 11 | Senior Pharmacist | (SP) | Both |
| 12 | Pharmacist | (P) | Paper |
| 13 | Senior Pharmacist | (SP) | Both |
| 14 | Senior Pharmacist | (SP) | Both |
| 15 | Senior Pharmacist | (SP) | Paper |
| 16 | Technician | (T) | Both |
| 17 | Pharmacist | (P) | Paper |
| 18 | Pharmacist | (P) | Paper |
| 19 | Senior Pharmacist | (SP) | Both |
| 20 | Senior Pharmacist | (SP) | Both |

The results of the thematic analyses were broken down into overarching themes linked to either barriers and facilitators to PCP use (digital or paper), or a general topic. From here sub-themes were identified, which were used to develop either a requirement statement, a dependency, or a training need. Table 5.4 below shows the themes, sub-themes, and statements, linked to the participant numbers from whom they originated. A total number, to denote the number of participants expressing the same views, was added to show which views were the most common.

**Table 5.4. Thematic analysis of interviews with linked basic requirements and occurrence rates**

| Themes | Sub themes | Requirements and Training needs | Number of participant expression the theme |
|---|---|---|---|
| **Paper isn't transferable in a timely manner (BARRIER)** | | **Requirement** – must | Total = 16 (SPx12, Px3, Tx1) |
| | Take time to complete | | Total = 11 (SPx8, Px2, Tx1) |
| | Lack of retention of information | | Total = 10 (SPx6, Px3, Tx1) |
| | Paper goes missing between wards and sites or is not transferred at all | | Total = 11 (SPx5, Px4, Tx2) |
| | Not attached to the patient record in any way | | Total = 5 (SPx3, Px2) |
| | Risk of transcription errors | | Total = 5 (SPx4, Px1) |
| | Unable to see what others have done | **Requirement** – All entries to be marked with time, date, and user<br>**Requirement** – Role based access | Total = 5 (SP) |
| **Paper PCPs are of poor quality (BARRIER)** | Illegible handwriting | | Total = 9 (SPx4, Px4, Tx1) |
| | If you do something wrong, you can't delete it you need to start again | | Total = 1 (P) |
| | Poor quality of content or insufficient detail, not used everywhere | **Training need** identified to ensure consistency of content. Need to set workplace expectations<br>**Requirement** – standard template for content regardless of setting<br>**Requirement** – sectioned so specific areas can add related information<br>**Requirement** – Notifications to users that a task has been created | Total = 12 (SPx10, Px1, Tx1) |
| | Information is not targeted or concise | | Total = 4 (SPx3, Px1) |
| | Completed differently by different staff | | Total = 12 (SPx9, Px2, Tx1) |
| | Different versions for different areas | | Total = 1 (P) |
| | Limited space, they can break and become tatty, requires you to have the physical paperwork with you | | Total = 9 (SPx5, Px3, Tx1) |
| | Perceived by some as extra work | **Training need** identified for staff to | Total = 6 (SP) |

| | | | |
|---|---|---|---|
| | | | |
| | Requires too much detail for high turnover areas | **Requirement** – automatic pull through of standard information from other systems (such as demographic, allergies and DHx from ePMA. Possibly PMH from GP system) | Total = 6 (SPx3, Px3) |
| **Carbon footprint of paper PCP** | | | Total = 1 (SP) |
| **Information Governance** | Paper isn't a secure format for storage of information. Paper PCPs can be left lying around | | Total = 1 (SP) |
| | Cyber security issues associated with digital records | **Requirement** – must meet ABUHB cyber security requirements | Total = 1 (SP) |
| | Data encryption | | Total = 1 (SP) |
| **New PCP for each episode of care (BARRIER)** | Not able to look back at previous information | **Requirement** – continuous single document | Total = 8 (SPx6, Px1, Tx1) |
| | Duplication of effort for patient with repeat admissions | **Requirement** – search functionality; by date, users, intervention, medication | Total = 3 (SPx2, Px1) |
| **Digital helps to prioritise patients with the greatest clinical need (FACILITATOR)** | Improved communication between pharmacy staff | **Requirement** – to be able to generate a new task | Total = 17 (SPx12, Px3 , Tx2) |
| | Improved communication with primary care | **Requirement** – that a task can be annotated when completed | Total = 8 (SPx7, Px1) |
| | Ease of transfer of information between wards/sites/sectors | **Requirement** – to be able to assign a date or priority rating to a task | Total = 15 (SPx11, Px3, Tx1) |
| | More time to spend on clinical activity | | Total = 5 (SPx4, Px1) |
| | Improved documentation of decision making | **Requirement** – flagging / highlighting of incomplete tasks or where a target date is reached or missed | Total = 6 (SPx5, Px1) |
| | Provides a summary of the patient without the need to go back to the medical notes (saving time) | **Requirement** – must be visible while reviewing the patients' medications | Total = 9 (SPx5, Px3, Tx1) |
| | Increased efficiency if you can filter the | **Requirement** – filterable entries, | Total = 8 (SPx6, Px1, Tx1) |

| | | | |
|---|---|---|---|
| | information to what is relevant to the user | definable by local configuration | |
| | Data collection and oversight of workloads | **Requirement** – Dashboard view of patients with outstanding tasks | Total = 7 (SPx6, Px1) |
| | Ability to use output data for future improvements | **Requirement** – ability to pull reports based on actions, workloads etc | Total = 1 (SP) |
| **Improved Access to digital PCP (FACILITATOR)** | Visible be everyone at the same time form different locations | **Requirement** – must allow for multiple concurrent users to edit and view | Total = 10 (SPx7, Px3) |
| | Easy to update | | Total = 5 (SPx4, Px1) |
| **Not limited by physical space on a paper PCP (FACILITATOR)** | Ability to write what is needed without being limited by the size of a box | **Requirement** – free text boxes expand with text | Total = 2 (P) |
| **Overall use of a digital PCP (BARRIER)** | Digital literacy | **Training need** identified to ensure staff are upskilled and any rollout has the appropriate level of associated training on why the task must be completed and how | Total = 14 (Spx10, Px2, Tx2) |
| | Staff ability to switch between software interfaces (e.g., iOS and Android) | | Total = 1 (SP) |
| | Fear of information within a digital PCP being tagged to the individual | | Total = 3 (SP) |
| | Confidence in using a digital PCP and fear of doing it wrong | | Total = 6 (SPx4, Px2) |
| | Staff resistance to change | | Total = 2 (SP, T) |
| | Limited access to ward computers | **Dependency** – Hardware availability | Total = 17 (SPx11, Px4, Tx2) |
| | No personal devices available | | |
| | Cost of procuring devices | | Total = 1 (SP) |
| | Wi-Fi infrastructure insufficient to ensure constant access | **Dependency** – Infrastructure | Total = (SPx3, Px1) |
| | System needs to be reliable (minimal downtime, doesn't crash and isn't slow) | **Requirement** – system reliability and usability aren't compromised by concurrent users | Total = 7 (SPx3, Px4) |
| | Patient perception of health care professionals using devices at the bedside | | Total = 1 (SP) |
| **Implication of moving information to a** | Patients seeing what has been written by a professional | **Training need** identified on how to | Total = 3 (SP) |

| | | | |
|---|---|---|---|
| **permanent digital record (BARRIER)** | | | |
| | Loss of the cognitive process of handwriting | | Total = 1 (P) |
| | Unable to transfer data if systems aren't connected | **Dependency** – interoperability of multiple systems<br>**Requirement** – use of SNOMED-CT and dm+d codes | Total = 5 (SPx3, Px2) |
| **How and where the digital PCP should be accessed (FACILITATOR)** | If we are linking to the SMR for medication, then the digital PCP should also sit with the SMR | **Requirement** – accessible via the SMR | Total = 1 (SP) |
| | Accessed from a central location that everyone is already using | | Total = 10 (SPx5, Px4, Tx1) |
| | Is part of our daily routine as need to be in accessed within our current workflow | | Total = 8 (SPx4, Px3, Tx1) |
| | Not needing to log in and out of multiple systems with the same login details | **Requirement** – uses NADEX as login detail<br>**Requirement** - where accessed via another system where you are already logged in, uses current log in credentials (no additional login required) | Total = 4 (SPx2, Px1, Tx1) |
| | Anyone the has access to the SMR should also be able to see the digital PCP | **Requirement** – access linked to SMR access | Total = 8 (SPx6, Px2) |
| | All entries should be auditable | **Requirement** – all entries / amendments to be date, time and user stamped<br>**Requirement** – must be able to revoke an entry<br>**Requirement** – when revoking an entry, a reason must be given | Total = 6 (SPx2, Px3, Tx1) |
| **General functionality required (FACILITATOR)** | Should be able to revoke incorrect information | **Requirement** – all entries / amendments to be date, time and user stamped<br>**Requirement** – must be able to revoke an entry | Total = 1 (P) |
| | Should not be able to detail data without an audit trail | | Total = 2 (SP, P) |
| | To be able to find information such as the | | Total = 2 (SP) |

| | | | |
|---|---|---|---|
| | community pharmacy and if they have an MDS | | |
| | Should be able to flag a DMR to community pharmacy | | Total = 1 (SP) |
| | Should include PMH information as a key component and be pulled automatically if possible | **Requirement** – this should be prepopulated for the GP system | Total = 2 (SP) |
| | Able to pull or show pathology results in context | **Requirement** – to link to and display pathology results on screen (in a separate window) in designated sections | Total = 3 (SP) |
| | Information divided into sections to allow information to be found easier | **Requirement** – sections / tabs for specific information<br>**Requirement** – RAG rating of sections / tabs based on outstanding tasks<br>**Requirement** – task can be assigned a location such as primary, secondary, both or other | Total = 7 (SPx5, Px2) |
| | New or confirmation of details notification triggered on each new admission episode. | **Requirement** – each new episode of care should trigger a review of information such as PMH and a reset of information such as PC and diagnosis | Total = 2 (SP) |
| | Tab for contact details such as social worker, carer, or CPN | **Requirement** – to be able to add a new tab to a PCP with a drop-down list of coded headings for less standard entries that come under a specific category | Total = 1 (T) |
| | Allergies should be pulled from SMR | **Requirement** – prepopulated allergies linked to SMR | Total = 1 (SP) |

| | | | |
|---|---|---|---|
| | | completion | Total = 1 (SP) |
| | Ability to autogenerate a set of standardised tasked based on a PC or active diagnosis | **Requirement** – configurable tasks to be autogenerated based on a coded diagnosis | Total = 1 (SP) |
| | Could be used to record pharmacy interventions continuously, rather than being done in a separate system as snapshot audits. | **Requirement** – intervention grading data entry, linked to tasks | Total = 3 (SP) |
| | Must not enforce all sections are completed as not all always apply | **Requirement** – configurable required fields based on location | Total = 2 (SP) |
| | Should be clearly identifiable as Pharmacy | **Requirement** – should be clearly identifiable as pharmacy generated information | Total = 1 (SP) |

### 5.3 Study 3

The themes identified in table 5.4 in study 2 were assessed against themes identified through the literature review and study 1 questionnaire results, to formulate a final list of requirements. A cross check of PCP requirements from the All Wales ePMA requirements was also undertaken, as this was a peer reviewed list for Wales, written in a requirement format. The format of the ePMA requirements was used for the final options appraisal requirements.

Requirements were split into functional and non-functional. A selection of functional requirements was then further divided to provide more detail. Each requirement was assigned a requirement reference number.

#### Functional Requirements

#### Authentication levels requirements

These are requirements linked to users of the systems, their set roles within it, and what should be configurable at a local level.

**AL1** - The system must allow a user with a suitable role to define role-based access for viewing and editing a PCP.

**AL2** - The system should provide a user with a suitable role with a facility to define the users to whom care plans that are past their review date should be highlighted.

**AL3** - It shall be possible within the system for a user with a suitable role to configure risk assessments, that can be completed with a tick box.

**AL4** - The system should be configurable by a user with a suitable role, to autogenerate tasks based on a coded diagnosis.

**Authentication requirement**

This requirement is linked to how users will access the system.

**AU1** - Log in to the system should use NADEX credentials.

**Data processing requirements**

These requirements are linked to data within the system, what should be generated, when it should be generated, and how it should be logged.

**DP1** - It should be possible to revoke an entry from the PCP.

**DP2** - When an entry is revoked the appropriate audit trail should be logged and a reason must be given.

**DP3** - For each new episode of care (defined as a new admission to hospital), the system should generate a PCP or trigger a review of defined information within the existing PCP, such as PMH. The PC and diagnosis should also be reset at this point.

**DP4** - The point in time at which the system generates or triggers a review of an existing PCP should be configurable by a user with a suitable role to be based on clinical area.

**DP5** - The system should ensure that each entry into the PCP is date and time stamped with the user's electronic signature.

General functional requirements

These are general requirements that don’t sit in a specific sub-section.

**FR1** - The system should allow multiple users to access the system at the same time without a negative impact on performance.

**FR2** - In addition to the requirement on multiple users, the system shall prevent or precisely manage users amending the same PCP simultaneously.

**FR3** - Where a user is already logged in to a separate system linked to the PCP, further log in should not be required to access the PCP.

**Reporting requirement**

This requirement allows users of the system to be able to interrogate data from which the system for monitoring and improvement of processes.

**RE1** - The system should allow users with a suitable role to generate reports from within the system.

**System integration requirements**

These requirements are critical for integration with other health care systems already in use of in development.

**SI1** - Relevant coded information within the system should be linked bi-directionally with an operational data store (ODS) using HL7 FHIR standards for communication.

**SI2** - The system should allow a user with a suitable role to export the PCP to other systems as a commonly used file type, for example HL7 FHIR.

**System requirements**

These requirements define the configurability of the system.

**SR1** - The system should allow the RAG rating to be configurable by a user with a suitable role for importance and time frames for completion.

**SR2** - It should be possible to configure which elements of the PCP are visible and require completion based on location within the hospital, such as clinical speciality.

**User interface requirements**

These requirements detail how users will interact with the system.

**UI1** - The system should provide a facility to allow users with a suitable role to define a list of standard care plan issues that can be selected for the PCP.

**UI2** - The system should provide a facility to allow a user with a suitable role to create:
- standard care issues; and/or
- actions to be taken; and/or
- desired/actual outputs to be inserted into the PCP to streamline the creation of PCPs by users.

**UI3** - The system should highlight any PCPs past the review date to defined users, when accessing the individual patient, until the PCP has been reviewed.

**UI4** - It shall be possible within the system to add a new tab or section to a patient's PCP, based on a pre-defined list of coded headings.

**UI5** - When a task is created within the system, it should be possible to RAG rate the task.

**UI6** - The system's ward list view should show pharmacy users where there is a PCP with an outstanding action that has either reached its review date or is outstanding and due for review.

**UI7** - The system should highlight any care plan issues flagged with RAG rating to all users with a suitable role, for example pharmacy users, when accessing the individual patient, until the PCP issue has been addressed. For example, this could be via a dashboard.

**UI8** - The system should allow for tasks to be RAG rated at the point of creation.

**UI9** - The system should allow for RAG rated tasked to be altered.

**UI10** - The system should highlight tabs / sections based on the outstanding RAG rated tasks within them.

**UI11** - The system should allow a user to assign the location(s) where a task can be completed. E.g., Secondary care, Primary care, or both.

**UI12** - The system should display information in a clear format, with only useful information shown, and without displaying too much information, but providing functionality for users to easily find information if it is not displayed.

**UI13** - The system should have a user-friendly design, be intuitive, with a minimum number of clicks or finger dabs/swipes and actions between functions.

**UI14** - The system's PCP for each patient should include:
- Presenting complaint
- Active diagnosis
- PMH
- Note section for Individual care issues
- Section for community pharmacy information
- Any tasks / actions to be taken
- Urgency status, for example a prioritisation tool
- The desired outcome
- The actual outcome
- The completion date for each task / action
- The review date for each PCP.

**User experience requirements**

These requirements are linked to users' satisfaction and usability of the system.

**UX1** - The system should allow for free text boxes for details to be added to the PCP. These boxes should expand with the text, so that entries are not limited.

**UX2** - The system should be able to accommodate tabs or sections for specific information types, such as renal, compliance issues etc.

**UX3** - The system should allow a user to search for an entry in a PCP by date, user, intervention, or medication.

**UX4** - The system should allow a user to filter the entries visible in the PCP, and the list of filterable entries should be configurable locally by a user with a suitable role.

**UX5** - The system should be able to create tasks.

**UX6** - The system should be able to generate a notification when a new task is created.

**UX7** - The system should allow for completed tasks to be annotated.

**UX8** - The system should have tabs / sections within the PCP so that information can be divided up, allowing for ease of location of specific topics.

**UX9** - The system should allow the PCP to be configurable by clinical area, to format the display the information based on importance.

**Non-functional requirements**

These requirements are linked to the quality of the system rather than specific functionality.

**NF1** - The system shall support remote and off-site working.

**NF2** - The system must meet NHS and ABUHB cyber security requirements.

**NF3** - The system should be able to automatically pull through coded information to pre-populate sections of the PCP, such as allergies, demographics, DHx, and PMH.

**NF4** - The system should support dm+d classifications for recording interventions and tasks linked to medication in the pharmaceutical care plan.

**NF5** - The system should support SNOMED-CT classifications for recording diagnosis and/or treatment in the pharmaceutical care plan, if documenting diagnosis is used.

**NF6** - The system should link to the ABUHB pathology system and observation system, to allow users to view (opened in a separate window) results linked to designated sections. For example, to be able to view U&E results from a button in the renal tab / section of the PCP.

**NF7** - The system should be capable of sending the PCP to other systems in document form, for example, Choose Pharmacy.

**NF8** - Access to the system should be linked to SMR access, allowing all users of the SMR access to the PCP.

**NF9** - The system must link the PCP to a part of the patient's digital record.

**NF10** - The PCP should be clearly identifiable as pharmacy specific information.

**NF11** - The system must maintain the PCP as a live on-going document.

Table 5.5 below shows the final requirements and the appraisal scores for the six systems identified for review. During the project, the ABUHB ePMA tender was undertaken and a preferred supplier (Better Meds) was chosen. As a result, only the Better Meds ePMA system was reviewed for study 3.

**Table 5.5. Options appraisal results for all systems identified**

| | Requirement Source | | | | | Systems for appraisal | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Requirement Number | HEPMA | Study 1 | Study 2 | Lit review | Lit review ref numbers | CWS | CareFlow Connect | Better Meds | WCP | WCP (WNCR) | SMR |
| AL1 | | | | | 3, 5, 6, 7, 8 | 10 | 0 | 8 | 5 | 8 | 0 |
| AL2 | | | | | | 10 | 0 | 8 | 5 | 8 | 0 |
| AL3 | | | | | | 8 | 0 | 10 | 5 | 0 | 0 |
| AL4 | | | | | 3 | 0 | 0 | 2 | 2 | 0 | 0 |
| AU1 | | | | | 9 | 10 | 0 | 10 | 10 | 10 | 10 |
| DP1 | | | | | | 2 | 10 | 8 | 10 | 2 | 0 |
| DP2 | | | | | | 2 | 10 | 10 | 2 | 2 | 2 |
| DP3 | | | | | | 2 | 0 | 5 | 2 | 2 | 0 |
| DP4 | | | | | | 2 | 0 | 8 | 2 | 2 | 0 |
| DP5 | | | | | | 2 | 8 | 8 | 2 | 2 | 0 |
| FR1 | | | | | 1, 3 | 10 | 10 | 10 | 10 | 10 | 10 |
| FR2 | | | | | 3 | 2 | 10 | 8 | 5 | 2 | 0 |
| FR3 | | | | | 7 | 2 | 0 | 8 | 5 | 2 | 0 |
| RE1 | | | | | | 2 | 2 | 2 | 2 | 0 | 0 |
| SI1 | | | | | 3, 5, 6, 7 | 0 | 0 | 8 | 0 | 0 | 2 |
| SI2 | | | | | | 0 | 0 | 8 | 0 | 0 | 2 |
| SR1 | | | | | | 0 | 0 | 5 | 2 | 2 | 0 |
| SR2 | | | | | | 0 | 0 | 5 | 2 | 2 | 0 |
| UI1 | | | | | 2 | 2 | 0 | 8 | 2 | 0 | 0 |
| UI2 | | | | | 2, 5 | 2 | 0 | 8 | 5 | 0 | 0 |
| UI3 | | | | | | 2 | 8 | 8 | 8 | 0 | 0 |
| UI4 | | | | | | 2 | 2 | 5 | 2 | 0 | 0 |
| UI5 | | | | | 2, 6 | 2 | 10 | 5 | 2 | 2 | 0 |
| UI6 | | | | | 2, 6 | 2 | 10 | 8 | 5 | 2 | 0 |
| UI7 | | | | | 2, 6, 8 | 2 | 10 | 8 | 2 | 2 | 0 |
| UI8 | | | | | 2 | 2 | 10 | 5 | 2 | 0 | 0 |
| UI9 | | | | | 1 | 2 | 10 | 5 | 2 | 0 | 0 |
| UI10 | | | | | 1, 2, 6 | 0 | 10 | 5 | 2 | 2 | 0 |
| UI11 | | | | | 2, 3 | 0 | 0 | 2 | 2 | 0 | 0 |
| UI12 | | | | | 7 | 10 | 10 | 10 | 10 | 10 | 10 |
| UI13 | | | | | 7 | 10 | 10 | 10 | 10 | 10 | 10 |
| UI14 | | | | | 2, 5, 8 | 2 | 0 | 8 | 8 | 2 | 0 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| UX1 | | | | | | | | | | | | |
| UX2 | | | | | | 2 | 0 | 5 | 2 | 2 | 0 |
| UX3 | | | | | 5, 7 | 2 | 0 | 5 | 2 | 2 | 0 |
| UX4 | | | | | 5 | 2 | 0 | 5 | 2 | 2 | 0 |
| UX5 | | | | | 2 | 2 | 10 | 10 | 10 | 0 | 0 |
| UX6 | | | | | 2 | 2 | 10 | 10 | 0 | 0 | 0 |
| UX7 | | | | | 2 | 2 | 10 | 10 | 10 | 0 | 0 |
| UX8 | | | | | | 2 | 0 | 5 | 2 | 2 | 0 |
| UX9 | | | | | 3 | 2 | 0 | 5 | 2 | 0 | 0 |
| NF1 | | | | | 7 | 10 | 10 | 10 | 10 | 10 | 10 |
| NF2 | | | | | | 10 | 10 | 10 | 10 | 10 | 10 |
| NF3 | | | | | 1, 3 | 0 | 0 | 5 | 8 | 2 | 2 |
| NF4 | | | | | 1 | 0 | 0 | 8 | 2 | 0 | 2 |
| NF5 | | | | | 1, 6 | 0 | 0 | 8 | 2 | 0 | 2 |
| NF6 | | | | | 3, 7 | 2 | 0 | 5 | 5 | 0 | 0 |
| NF7 | | | | | | 5 | 0 | 5 | 8 | 2 | 2 |
| NF8 | | | | | 4 | 0 | 0 | 8 | 8 | 8 | 8 |
| NF9 | | | | | 1, 2 | 2 | 10 | 8 | 10 | 5 | 2 |
| NF10 | | | | | | 8 | 2 | 8 | 10 | 8 | 0 |
| NF11 | | | | | 1, 7 | 2 | 2 | 5 | 10 | 5 | 2 |
| | | | | | Total system score | 161 | 214 | 369 | 256 | 144 | 86 |

In addition to the requirements in table 5.5, other issues were highlighted during studies 1, 2 and the literature review. These were not directly linked to requirements and have been classified as either a training need or a dependency; details of these can be seen below in table 5.6. The topic source columns have been filled green to show the source where a corresponding topic was highlighted, and the literature ref numbers column denotes the corresponding article numbers from table 4.2.

**Table 5.6. Other topic areas identified during study**

| | | Topic Source | | | | |
|---|---|---|---|---|---|---|
| **Other topics** | **Full details** | **HEPMA** | **Study 1** | **Study 2** | **Lit review** | **Lit review ref numbers** |
| **Training need** | Consistence of content of the PCP. Need to set workplace expectations | | | | | **1** |
| **Training need** | Staff to understand the benefit of PCP's and they contribution to patient care | | | | | **1** |
| **Training need** | Ensure staff digital literacy and that any rollout has the appropriate level of associated training on why the task must be completed and how | | | | | **1, 7** |
| **Training need** | Refresher for staff on how to write appropriately in medical notes | | | | | |
| **Dependency** | Usage is linked directly to hardware availability | | | | | **1, 3, 7** |
| **Dependency** | Infrastructure such as Wi-Fi needs to be able to cope | | | | | |
| **Dependency** | Interoperability is required with other systems to maximise functionality | | | | | |

### Outcome of options appraisal

After completing the options appraisal, the system with the highest score was the Better Meds ePMA system. A summary of all six systems, in descending order, is displayed in table 5.7 below.

**Table 5.7. Options appraisal final scores**

| Ranking | System | Final score |
|---|---|---|
| 1 | | 369 |
| 2 | Welsh Clinical Portal (WCP) | 256 |
| 3 | CareFlow Connect® | 214 |
| 4 | Clinical WorkStation (CWS) | 161 |
| 5 | Welsh Nursing Care Record (WNCR) | 144 |
| 6 | Shared Medicine Record (SMR) | 86 |

## 6.0 Discussion

### 6.1 Limitations of digital literacy assessment

While the response rate to the digital questionnaire was relatively good at 67% overall, there were variable response rates across the hospitals within ABUHB. These ranged from 35% at YYF up to 82.9% at GUH. This made it difficult to truly understand the digital needs of the workforce across the different sites.

### 6.2 Digital literacy of staff

From the results of the digital questionnaire several areas were highlighted.

- Age as a factor
- Variations across sites
- Variations based on job roles
- Specific skills and
- Overall themes for training

Looking at each of these areas in more detail, firstly, age and digital literacy, the results of study 1 showed a negative correlation between increased staff age and baseline digital literacy. Vercruyssen, Schirmer, and Mortelmans (2023) discussed how the level of digital exposure while growing up contributes to the digital literacy of older adults now. Those who grew up in the 1950s had very little exposure to hardware and technology compared to those who grew up in the 1980s, where home computers were becoming more accessible. Today's generation have open access to devices, applications, and the internet as part of everyday life from a very young age. This poses a question around the equality of current baseline digital skills criteria. What is considered "basic" for day-to-day life now may not be "basic" for older generations, where there overall exposure to digital has been less. The link between increasing age and lower digital literacy skills is also echoed by Welsh Government in their information on digital inclusion in Wales (Welsh Government, 2023b).

When the digital skills data was examined in more detail at a site level, variation could be seen between the four hospital sites, which correlated with staff age. Where a sites' average age was greater, the overall digital literacy score for staff was lower.

Variation was also associated with job roles. There are a few possible reasons to explore here. Some lower banded roles have a wider age range of staff, therefore contributing to the age-related digital literacy correlation already discussed. However, there are also lower education entry levels required for some of these roles. While general technology use is required day-to-day, the use of some items

included in the UK Government list of basic digital literacy skills are not necessarily activities that are required routinely within these roles. This means that staff exposure to these skills may be limited. The Welsh Government digital inclusion information (2023b) also picked up on this point, stating that those without degree level qualifications have a lower overall digital literacy. This is likely linked to the use of technology during higher education courses. Lack of exposure to activities is demonstrated in the responses seen in figure 5.8, which refers to problem-solving skills. Questions 5 and 6, around the use of Microsoft Excel and Forms, show two of the lowest confidence results at 46% and 62% respectively, for confidence levels at "somewhat confident" or below. The use of these applications is limited within some of the lower banded roles so it would correlate that these staff would respond with "not confident", "never tried", and "N/A" options. Similar response rates were also seen for other Microsoft 365 applications, such as Teams and SharePoint (in figure 5.5) and OneDrive (figure 5.6).

There were two interesting sets of responses highlighted within figure 5.7, the transaction questions. These were linked to setting up on-line accounts for public services and making a GP appointment on-line. Here responses of "never tried" and "N/A" were reported as 19.5% and 20% respectively. Much of this can be attributed to a lower digital maturity within Wales for such services. This is currently being addressed, to an extent, through the Welsh digital medicines transformation portfolio (DHCW, 2024a), which will help the public to access prescription ordering through the NHS Wales app. What this doesn't address is the lack of GP digital systems for making appointments, with many GP surgeries having no system in place for such activities. Similar is true for local council services, where the digital systems either don't exist or have a low usability experience (UX). Where systems are either not yet in place, or are not used due to poor usability, it is impossible for staff to achieve 100% basic digital literacy, through no fault of their own.

As a result of the digital literacy questionnaire, several training needs have been highlighted. Many of these relate to the use of Microsoft 365 applications, which were widely rolled out across the NHS during the COVID-19 pandemic. Training was available at the time of roll-out, however, it was very generic. When training can't be applied by the individual to their job role, within a specific department, it is difficult to get staff onboard with utilising these newly available applications. In addition to this, there was an up-grade to the ABUHB resources pages in early 2024 where access to the original training was removed. Specific training is needed within pharmacy to demonstrate to staff how each Microsoft 365 application can be used within their day-to-day roles, and the benefits to them and the department of utilising them.

The question here will be who is going to deliver this training and how? As the roll-out of Microsoft 365 was considered by ABUHB as having been "completed" in the later part of 2023, the ABUHB network of digital champions (a self-selected group of

highly motivated non-digital department-based individuals supported by digital product specialists) has been disbanded. This has resulted in many of the staff who supported the digital champions moving on to other projects and therefore leaving a gap within the digital workforce to support the ongoing unmet need within departments. While digital champions were able to develop and progress their own digital literacy during this time (developing clinical informatics solutions at a departmental level), what the program did not achieve was a general improvement in digital skills across all staff. None of the training around Microsoft 365 application was compulsory. So, staff that were engaged and wanted to use these new applications actively sought out the training materials, while those that were less confident did not. If anything, we now have a greater deviation of digital skills within the workforce than we did before, with those who were less digitally literate even further behind.

With a decreasing amount of resource available within the digital team to support on-going upskilling of individual departments, it is likely that departments will need to support this training internally. This is particularly relevant if training needs to be tailored to the departmental use of specific Microsoft 365 applications. The difficulty here will be around the release of time within department for trainers and staff. There are also likely to be different needs within the same department but at different hospital sites, as shown in the breakdown of responses to the study 1 questionnaire. While the results highlighted some areas where training is required, not all staff responded to the questionnaire, so this may not be the whole picture. Consideration should be given to re-assessing the specific work-related training needs of pharmacy staff with a focus on the systems they are using day-to-day before a training plan is developed.

In addition to the issues highlighted through direct responses received to the study 1 questionnaire, the study 2 interviews also highlighted another potential issue linked to staff digital literacy. The concern raised here was around staff with lower digital confidence “hiding” behind staff with better digital skills. Observations have been made within pharmacy that show some staff are relying on other, more digitally confident, staff to enter data or undertake tasks, either on their behalf or instead of them. This means that the perceived level of digital adoption for a system or solution is not a true representation. While staff may not be directly bypassing the use of the system or solution, they are finding ways to limit their engagement.

### 6.3 Pharmaceutical care planning use

Within study 2, issues were raised by interviewees around inconsistency in how pharmacy staff approach the use of a PCP- both from the perspective of information added and utilisation. Where PCPs are or were used (prior to the opening of GUH), the generic PCP format for the “care plan and outcomes” section does not lend itself to standardisation of content (Appendix 6), and instead allows staff to document

information based on what they feel is important when reviewing the patient. This variation in documented information sometimes results in transferred PCPs not being as useful to the recipient as they should be, as what is considered important to the first person reviewing that patient may not add value later in the patient journey to subsequent staff reviewing the patient. Some of this is also linked to legibility of handwriting (something that would be fully resolved within a digital PCP).

Within ABUHB there are also areas where alterations made to the original ABUHB paper PCP (Appendix 6), such as the elderly frail unit (EFU) where extra social information has been added, and the intensive care unit (ITU) where more detail is noted around monitoring of patient observations. This also means that transferred information from the paper PCP was not as valuable to the receiving ward. This is mainly because the specific information from the starting location had taken up much of the space on the paper PCP, resulting in the need for a second paper PCP. Through the requirements that have been created, these issues have been addressed, e.g. though having area specific tabs which will allow sub-areas of information to be captured and viewed when needed. As a digital document, the limitations on physical space on the paper are also removed.

The issue of standardisation can be further addressed through a digital PCP solution which allows for defined set information to be required and (where possible) prepopulated from other systems. Coded information linked to the patient's current diagnosis could be used to trigger a set of standardised tasks to be created for the patient within the PCP on admission to hospital. This would lead to better equality of care for patients, irrespective of where they are admitted. The pharmacy structure within ABUHB has most of the clinical specialist pharmacists based at GUH. When a patient is stepped down, or admitted directly, to an LGH site they are usually reviewed by a more generalist clinical pharmacist, who may not be the clinical specialist for the condition for which the patient was admitted. Having the clinical specialist pharmacists input to develop standardised task lists for clinical indications, could help to ensure all appropriate interventions are highlighted for actioning, irrespective of which pharmacy staff review the patient, or at which hospital site they are admitted.

A lack of a standardised approach to the completion and information added to a PCP highlights the need for training of all pharmacy staff. This should cover not only how to complete a PCP, but why they add value and how they should be utilised to help prioritised patients with the greatest clinical needs.

### 6.4 Limitations of the options appraisal

There are several considerations linked to the options appraisal. Firstly, while each of the systems scores were assigned by the researcher (using product specialists where possible), the researcher themselves is not a product specialist for any of the

systems and therefore, may not be fully informed of system functionalities and future developments. Secondly, while the overall score obtained by each system shows a level of synchronicity with the requirements, there are limitations to how accurate these scores are in deciding which of the systems is best suited for a digital PCP for use across ABUHB. Consideration must also be given as to which requirements are more critical to produce a minimal viable product (MVP). For the purposes of this project, requirements were not graded on importance.

### 6.5 Outcome of the options appraisal

Before looking in more detail at each of the systems, it is notable that for each of the 52 requirements at least one system was either already able to meet the requirement fully or could be developed to accommodate the requirement. This is a useful validation that the requirements were set at an achievable level.

To understand which sets of functionalities each system was able to deliver on; could be developed; and which are unlikely to ever be delivered on, each systems result will be looked at in more detail.

The SMR scored the lowest of the six systems. When looking at the results of the options appraisal in more details, the aspects where the SMR scored highly were linked to general usability, access, and cyber security. However, requirements linked directly to PCP functionalities resulted in little to no scores. This is partly because the main purpose of the SMR is to store medication related information and not interventions or narrative. The SMR also lacks task and notification functionality, which are key functions of a digital PCP, aimed at transforming communication and prioritisation from the current paper process.

Given that DHCW managed the SMR, WCP and WNCR, and that WCP already contains a pharmacy care plan module, it is unlikely the DHCW would invest time and resources to develop a pharmacy care plan module in another one of its national systems. It is more likely that development would take place to improve on the current functionality within WCP. For these reasons the SMR can be ruled out as a possible digital solution of pharmaceutical care planning.

While CareFlow Connect® came third in the post appraisal ranking, when we look at this system as a possible solution many of the requirements are either scored as fully met or not possible, with very little in the development scoring options. Ultimately the system either delivers what is needed already, or it won't be able to meet the requirement. This is due to the system being a commercial software as a service (SaaS) solution, rather than something that is owned and developed either nationally or locally. This therefore limits the development opportunities, which are commercially driven by the service needs of all users rather than specific health

boards or areas. When we look specifically at the scores, many of the “not possible” requirements were focused on integration and the use of standard coding / messaging, such as dm+d, SNOMED-CT and FHIR all of which are going to be critical for communication and sharing of information doing forward. As this is not the primary function of CareFlow Connect® it is therefore also ruled out as a development option for a digital PCP.

The next system for a detailed assessment is WNCR. While this is a nationally developed system, what lets it down as a possible development for a digital PCP is lack of functionality for the transfer and sharing of information from other systems- something that would be classified as MVP for any digital PCP that is developed. Similarly to the discussion above around the SMR, it is unlikely that DHCW development resources would be allocated to WNCR when WCP is closer to meeting the requirements, with its pre-existing PCP module. WNCR is therefore ruled out as a development option for a digital PCP. This leaves WCP, CWS and Better Meds for assessment as a possible solution.

To assess these remaining solutions, we need to look in more detail at each systems requirement scores. Figure 6.1 below shows the breakdown of the requirement scores for each of the three remaining systems, based on the scoring matrix in table 3.1.

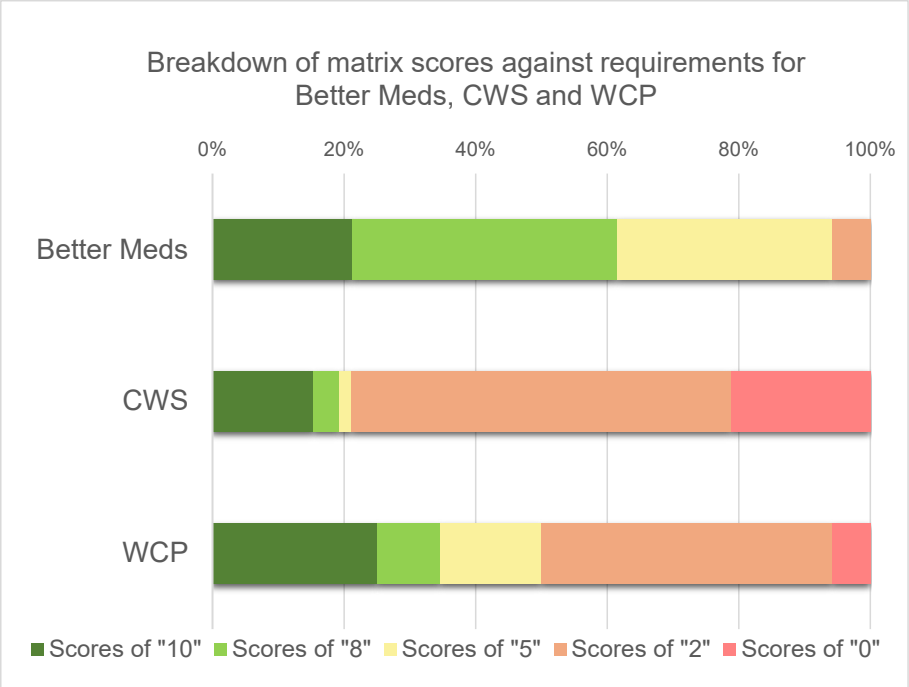


**Figure 6.1. Cumulative number of matric scores for Better Meds, CWS and WCP**

From figure 6.1, both CWS and WCP have requirements which scored a zero. This indicates that these requirements cannot be met by the systems. CWS had 11 requirements with a score of zero and WCP had 3. In order to = establish how significant these are in the context of the wider appraisal, we need to look at the requirements with a zero score. Table 6.1 below compares all scoring groups for Better Meds, CWS and WCP with regards to each of the sub-groups of requirements. Scores of zero have been highlighted in red.

**Table 6.1. Comparison of scores by requirement sub-group for Better Meds, CWS and WCP**

| Requirement sub group | System Scores | | |
|---|---|---|---|
| | Better Meds | Clinical WorkStation (CWS) | Welsh Clinical Portal (WCP) |
| AL | | 10,10, 8, 0 | |
| AU | 10 | 10 | 10 |
| DP | 8, 10, 5, 8, 8 | 2, 2, 2, 2, 2 | 10, 2, 2, 2, 2 |
| FR | 10, 8, 8 | 10, 2, 2 | 10, 5, 5 |
| NF | 10, 10, 5, 8, 8, 5, 5, 8, 8, 8, 5 | 10, 10, 0, 0, 0, 2, 5, 0, 2, 8, 2 | 10, 10, 8, 2, 2, 5, 8, 8, 10, 10, 10 |
| RE | 2 | 2 | 2 |
| SI | 8, 8 | 0, 0 | 0, 0 |
| SR | 5, 5 | 0, 0 | 2, 2 |
| UI | 8, 8, 8, 5, 5, 8, 8, 5, 5, 5, 2, 10, 10, 8 | 2, 2, 2, 2, 2, 2, 2, 2, 2, 0, 0, 10, 10, 2 | 2, 5, 8, 2, 2, 5, 2, 2, 2, 2, 2, 10, 10, 8 |
| UX | 8, 5, 5, 5, 10, 10, 10, 5, 5 | 2, 2, 2, 2, 2, 2, 2, 2, 2 | 10, 2, 2, 2, 10, 0, 10, 2, 2 |

Both CWS and WCP scored zeros for the two system integration (SI) requirements. These requirements are linked to the use of FHIR messaging standards for communication of bi-directional information between other systems and for the generation of a summary PCP documents. While neither system is currently able to deliver on these requirements and product specialists have stated that they are not a development option, it seems unlikely that either system can continue to have a place within the suite of digital solutions without the development and inclusion of FHIR standards. There is therefore a need to investigate this further as part as a more detailed second options appraisal.

A further four of the zero scores obtained by CWS were also attributed to the use of coding. Requirement AL4 is linked to the generation of a task based on a coded

diagnosis, and three of the non-functional requirements (NF3, NF4 & NF5) are also linked to coded patient information, dm+d and SNOMED-CT respectively.

During the appraisal there were discussions with a member of the technical team, working on CWS for ABUHB, which highlighted current work proposing a significant upgrade plan to CWS. A section of this proposed plan is shown below in figure 6.2., which outlines the target architecture for the communication between systems.

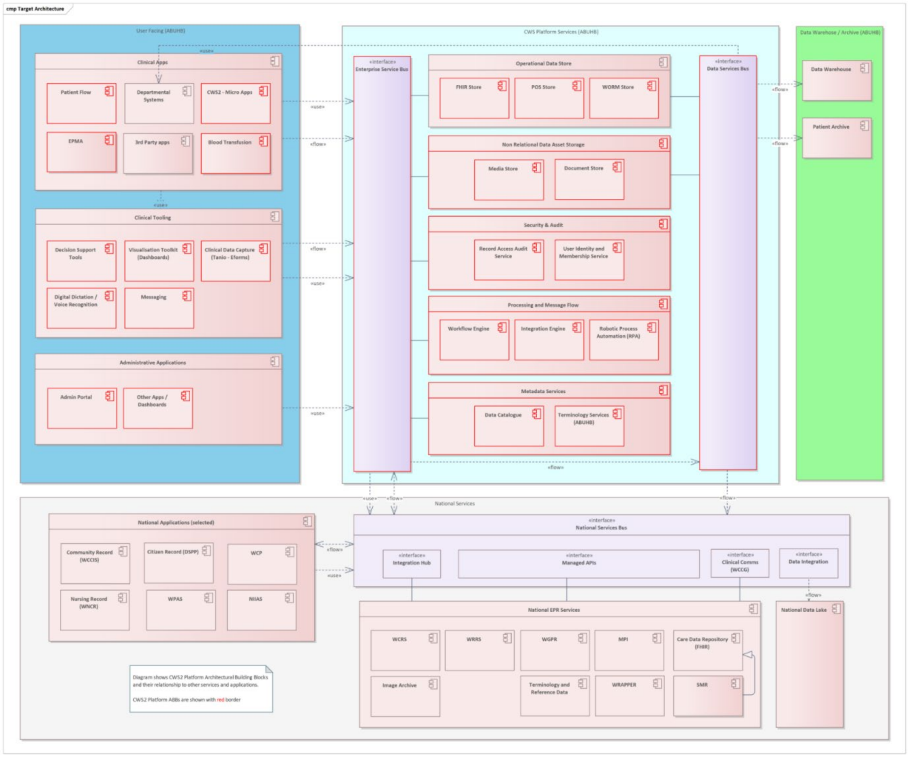


**Figure 6.2. ABUHB generated target architecture for proposed communications between digital systems**

A simplified version of this is demonstrated in figure 6.3, which focuses on where each of the appraised systems fits into the process and where standards such as FHIR are utilised.

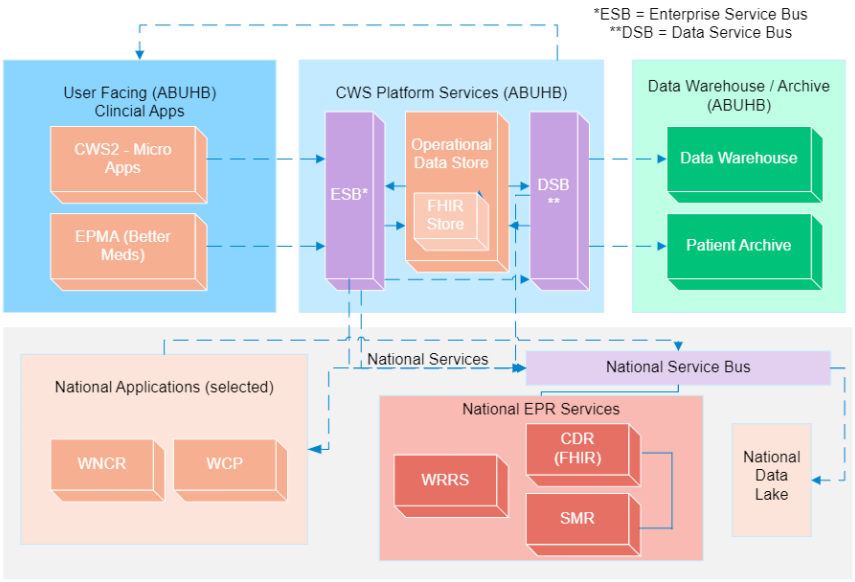


**Figure 6.3. Simplified ABUHB target architecture diagram for communication with selected systems**

Key features within figure 6.3 are the inclusion of the SMR and the Welsh Results Reports Service (WRRS) (which houses pathology results) as part of the national electronic patient record (EPR) service. The SMR is linked to the Care Data Repository (CDS) using FHIR standards. The CDS is a national system which aims to act as a Welsh hub for patient clinical data (DHCW, 2024b). National applications include WNCR and WCP, with CWS and Better Meds shown as user facing ABUHB clinical applications. The proposed target architecture shows how data from each of these systems could be connected via an ABUHB hosted platform with an operational data store (ODS) and FHIR messaging. If this target architecture were to be achieved, then the requirements where CWS scored a zero, linked to FHIR messaging and interoperability between other systems could be overcome.

But what is an ODS? An ODS is defined as a single central database for the collection of a variety of different types of data from different systems. It constantly updates to allowing accurate time-sensitive information to be requested for use as part of decision support (Snowflake, 2023). For example, allergy status or patient observations such as weight.

The remaining five "zero" scores within CWS were:

- NF8 - Access to the system should be linked to SMR access, allowing all users of the SMR access to the PCP.
- SR1 - The system should allow the RAG rating to be configurable by a user with a suitable role for importance and time frames for completion.
- SR2 - It should be possible to configure which elements of the PCP are visible and require completion based on location within the hospital. Such as clinical speciality.
- UI10 - The system should highlight tabs / sections based on the outstanding RAG rated tasks within them.
- UI11 - The system should allow a user to assign the location(s) where a task can be completed. E.g., Secondary care, Primary care, or both.

If plans go ahead within ABUHB to develop a new version of CWS, then these requirements could be considered within the development work, which would increase the scores from zero.

The remaining zero score within WCP was.

- UX6 - The system should be able to generate a notification when a new task is created.

While there is some notification functionality within WCP, there would need to be further investigation with product specialists as to whether this is truly something that isn't a development option.

When reviewing the overall scores for Better Meds, all requirements were either already met or could be developed. Most requirements fell into the met of minor development categories (= 61.5%). However, the functionalities demonstrated within Better Meds were not part of the ePMA module. To obtain access to these functions a business case would be required for the procurement of the Better Meds risk assessment module, to run alongside the ePMA module.

### 6.6 Implications for a digital solution

Before a conclusion can be reached as to which solution is the most viable option for a digital PCP, there are a few other considerations to be addressed. These are:

1. Contracts with external solution providers
2. National versus local solution development

Contracts with external solutions providers are fixed term, usually 5-7 years. There is therefore a degree of risk associated with developing a digital PCP with an external solutions provider. It takes time to develop solutions, which cannot be started until there is a contract in place. Business cases also take time to develop and approve, which could result in the roll-out of a digital PCP with Better Meds close to a contract renewal date. If the contract is not renewed, access to the newly developed digital PCP is then lost. This is a significant risk and one that must be taken into consideration.

When looking at development of a digital solution either on a national or local level, there are pros and cons to both approaches. National development allows for an All-Wales solution to be available for adoption, resolving issues around inter health board communication. However, national development can take longer, due to pressure on resources and concurrent projects and priorities. National development will also need national engagement, with all health boards across Wales, around requirements for a digital PCP. Anecdotally, agreeing All-Wales standards and requirements has always been a rate limiting step, adding a significant time component to the process.

Local development affords a greater degree of control over a project, both with regards to time and requirement settings.

### 6.7 Digital adoption and the FITTE assessment

Regardless of which solution is used for a digital PCP, there needs to be some consideration and review of ABUHB's readiness for such a digital adoption. The results from study 2 and the resulting requirements generated from the options appraisal in study 3 highlight several possible risks associated with the future adoption of a digital PCP within ABUHB. To look at these in context, the FITTE framework can be used. The FITTE framework was proposed by Prgomet et al in 2019 and adds the extension of environment (E), (referring to hardware and infrastructure) to the existing framework which considered the "Fit" between "Individual", "Tasks" and "Technology" (FITT). Each of these elements are linked to the others and the fit between each pair is assessed for risks. Where risks are identified prior to implementation of a digital solution, they can be circumvented to

improve overall adoption. The environment extension to the FITT framework then also considers risks associated with access to hardware and the digital solution as an overarching element. Figure 6.4 below depicts how the elements of the FITTE framework are interlinked (Prgomet *et al*, 2019).

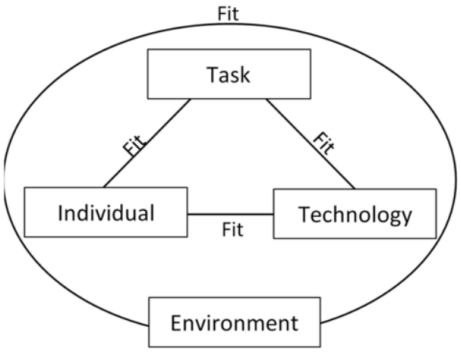


**Figure 6.4. FITTE framework showing the fit between individuals, tasks, technology, and environment.**

For the future adoption of a digital PCP within ABUHB, the fit can be assessed as follows:

**Task to technology**: This is ensuring that the technology is capable of undertaking the task. If all the requirements developed during this project are met, then the fit between task and technology will be met. However, none of systems that were appraised was able to meet all the requirements. So, for now, there is a risk associated with adoption of any of the proposed systems in their current format. Development would be needed for a nominated system to meet the full requirement.

**Technology to individual.** This refers to the individual's ability to use the technology and is linked to two main areas: training and system usability. Staff that are required to use the system must receive adequate training on the system, both at an appropriate time prior to roll-out and when there are system upgrades. The system itself should be intuitive to use and not a hindrance to the flow of an individual's work. When considering training of staff, it is important to also consider individual staff learning styles. Not all staff learn in the same way, so training needs to be available in a variety of formats. Examples of this include:

- On-line interactive training, where the staff member can "have a go" within a training environment.
- Handbooks and guides that staff can access and read at any time, either on-line or as hard copies.

- Face-to-face sessions which allow for staff to ask questions about specific functionality or scenarios within the system.

There is a risk here, as whichever system is used will be new to staff and so training will be required.

**Individual to Task**: This pairing looks at whether the individual understands the task they have been asked to undertake. From study 2 results, it has been highlighted that there is likely to be a risk here of a disconnect between the task and the individual's understanding of it. The training needs have been flagged around ensuring all pharmacy staff understand what information should be included in a PCP.

**Environment:** This overarches everything and is linked to the dependencies that were highlighted during study 2 and the literature review. These include infrastructure (such as wi-fi coverage) and availability of hardware. Pharmacy staff don't currently have personal devices where they could access a digital PCP, so this is a risk that will also need to be addressed prior to any roll-out. With new hardware there is also a training need to ensure staff can use the devices provided.

**Commented [SC(BUP1]:** Is the "official" way of writing this Wi-Fi? If not then ignore me

With these considerations in mind, figure 6.5 below shows the outcome of a FITTE assessment for the adoption of a digital PCP within ABUHB.

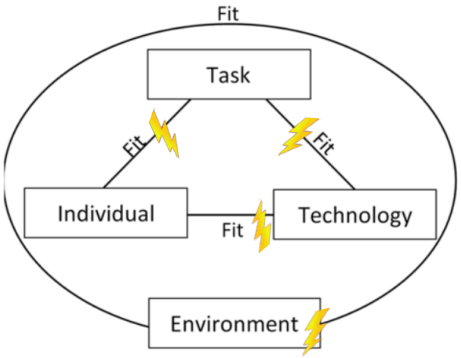


**Figure 6.5. FITTE framework assessment for the possible adoption of a digital PCP**

Figure 6.5 below shows that there are currently risk or breakpoints to all aspects of the fit for the adoption of a digital PCP. All these risks would need to be addressed to ensure successful adoption.

## 7.0 Conclusion

From the results of the options appraisal, and an investigation into development opportunities for each of the possible digital solutions, it was decided that the best option would be to integrate the derived requirement list into the proposed development plan for the next iteration of CWS. This option allows for local ownership of the solution and its future development.

### 7.1 Further requirement work

The requirement list needs the addition of ranking, to allow for additional weighting for critical requirements. Application of the MoSCoW method of prioritizing requirements can be used to aid this weighting. MoSCoW is an acronym where the main letters denote:

- M = Must have,
- S = Should have,
- C = Could have and
- W = Won't have.

The o's are added to form a pronounceable word (Wikipedia, 2023).

By adding these rankings to the requirements, systems that provide more of what is required of an MVP, but with less of the "nice to have" functionality, can be more usefully scored in comparison to systems that have all the "bells and whistles" functionality without the essentials, for example integration.

Should a decision be made to re-score a selection of systems, a wider field of stakeholders needs to be included. With particular attention paid to the involvement of technical colleagues for each of the systems. It is likely that the initial scoring is seen as a pre-scoring exercise, from which a shortlist of system can then be scored in more detail. The Shortlist in this case would consist of Better Meds, CWS and WCP.

### 7.2 Digital maturity of the pharmacy workforce

There is a variation of digital literacy skills amongst the pharmacy workforce of ABUHB, some of which has a positive correlation with age. While in departments where there is a normal distribution of age this is of less concern. However, some departments within ABUHB have a larger proportion of staff at the higher end of the age curve and it is within these departments that the adoption of digital solutions possess a greater challenge. Before we push too hard with new digital innovations, it is crucial to first address the discrepancies in digital literacy, ensuring all staff have

the basic skills needed for the digital systems they are being asked to use for day-to-day activities.

### 7.3 Training needs

Outcomes from both the study 1 questionnaire and the study 2 interviews, highlight training needs amongst pharmacy staff within several topic areas:

- Basic digital literacy, linked to day-to-day occupationally related activities such as using application within the Microsoft 365 suite. With a focus on Excel, Forms, OneDrive, SharePoint, and Teams.
- The content and function of pharmaceutical care planning.
- How to write appropriately and succinctly in patients' medical records.
- Engagement and training on any new system for digital PCPs when it is introduced.

To fulfil each of these training needs, careful consideration is needed as to how best these can be delivered within the current departmental pressures and structures. A separate questionnaire for all staff around the specific systems they use day-to-day (including Microsoft 365 applications) and their confidence and training needs, may help focus resources when developing a training plan.

When looking at training around PCP use, this should be done centrally to ensure all staff have the same information. This should be done through a small stakeholder group that has representation across all sites and areas.

Work has already been undertaken within NHH pharmacy to train staff how to write appropriately in medical notes. To reduce duplication and resource requirement, this session could be undertaken as a recorded learning @ lunch session. Allowing all staff that undertake this activity (including future new staff to ABUHB pharmacy) to view and refresh their training, at a time convenient to both them and the individual departments. There is a dedicated learning @ lunch resource page on the pharmacy SharePoint library, where all learning @ lunch sessions are stored and accessible to pharmacy staff.

The deployment of any new digital solution or system must come with staff specific training. This should be done at a time close enough to the deployment and is a variety of ways, ensuring all staff have received training is a way that is conducive to their own learning style.

## 8.0 References


Abousheishaa, A.A., Sulaiman, A.H., Huri, H.Z., Zaini, S., Othman, N.A., bin Aladdin, Z. and Guan, N.C. (2020) 'Global scope of hospital pharmacy practice: A scoping review', *Healthcare.* (Vol. 8, No. 2). Multidisciplinary Digital Publishing Institute (MDPI). Available at: https://doi.org/10.3390%2Fhealthcare8020143

Adeoye-Olatunde, O.A. and Olenik, N.L. (2021) 'Research and scholarly methods: Semi-structured interviews', *Journal of the american college of clinical pharmacy*, *4*(10), pp.1358-1367. Available at: https://doi.org/10.1002/jac5.1441

Backman, K. and Kyngäs, H.A., 1999. Challenges of the grounded theory approach to a novice researcher. *Nursing & health sciences*, *1*(3), pp.147-153. Available at: https://doi.org/10.1046/j.1442-2018.1999.00019.x

Blackburn-Smith, J., Brownrigg, E., Hodson, K., Lawther, A. and Macintyre, J., (2021) 'Development and reliability of a clinical pharmacy triage tool in the emergency department', *The Pharmaceutical Journal*, 306(7949). Available at: https://pharmaceutical-journal.com/article/research/development-and-reliability-of-a-clinical-pharmacy-triage-tool-in-the-emergency-department (Accessed: 23 January 2024).

Blin, M., Cherel, A., Bouglé, C. and Piriou, G., 2022, June. Definition and evaluation of a multidisciplinary patient's pharmacotherapy management method: the pharmaceutical care plan. In *Annales Pharmaceutiques Francaises* (pp. S0003-4509). Available at: https://doi.org/10.1016/j.pharma.2022.06.006

Borges, L.C. and Revez, J. (2019) 'Pragmatic paradigm in information science research: a literature review', *Qualitative and Quantitative Methods in Libraries*. *8*(2), pp.179-188. Available at: Available at: https://qqml-journal.net/index.php/qqml/article/view/485 (Accessed 11 May 2023).

Bugnon, B., Geissbuhler, A., Bischoff, T., Bonnabry, P. and von Plessen, C. (2021) 'Improving primary care medication processes by using shared electronic medication plans in Switzerland: lessons learned from a participatory action research study', *JMIR Formative Research*, *5*(1), p.e22319. Available at: https://doi.org/10.2196/22319

Bunniss, S. and Kelly, D.R. (2010) 'Research paradigms in medical education research', *Medical education*. *44*(4), pp.358-366.

Digital Health and Care Wales (DHCW). (2024a) *Digital Medicines Transformation Portfolio*. Available at: https://dhcw.nhs.wales/systems-and-services/digital-medicines-transformation-portfolio/ (Accessed: 28 March 2024).

Digital Health and Care Wales (DHCW). (2024b) *Care Dat Repository (CDR)*. Available at: https://dhcw.nhs.wales/national-data-resource/care-data-repository-cdr/ (Accessed: 24 April 2024).

Doran, D., Paterson, J., Clark, C., Srivastava, R., Goering, P.N., Kushniruk, A.W., Bajnok, I., Nagle, L., Almost, J. and Carryer, J. (2010) 'A pilot study of an electronic interprofessional evidence-based care planning tool for clients with mental health problems and addictions', *Worldviews on Evidence-Based Nursing*, *7*(3), pp.174-184. Available at: https://doi.org/10.1111/j.1741-6787.2010.00191.x

Edwards, K. (2011) 'Assessing the value of electronic records', *Nursing Times*, 107(40), early online publication. Available at: Assessing the value of electronic records | Nursing Times (Accessed: 23 January 2024).

Gillis, A.L. (2021) *What is data redundancy?*. Available at: https://www.techtarget.com/searchstorage/definition/redundant (Accessed 2 April 2024).

Gov.uk (2019) *Guidance: Essential digital skills framework*. Available at: https://www.gov.uk/government/publications/essential-digital-skills-framework/essential-digital-skills-framework (Accessed 5 October 2023).

Graphnet (2023) *Careflow Connect: Healthcare Workflow Software*. Available at: https://www.graphnethealth.com/solutions/shared-care-records/careflow-connect/ (Accessed 27 April 2023).

HRA-decisiontools.org. (no date) 'Does my project require review by a Research Ethics Committee?'. Available at: Algorithm - Does my project require REC review v2.0 20200304.pdf (hra-decisiontools.org.uk) (Accessed 21 May 2023).

Lo Iacono, V., Symonds, P. and Brown, D.H. (2016) 'Skype as a tool for qualitative research interviews', *Sociological research online*, *21*(2), pp.103-117. Available at: www.socresonline.org.uk/21/2/12.html (Accessed 11 May 2023).

Matney, S.A., Dolin, G., Buhl, L. and Sheide, A. (2016) 'Communicating nursing care using the health level seven consolidated clinical document architecture release 2 care plan', *CIN: Computers, Informatics, Nursing*, *34*(3), pp.128-136. Available at: https://doi.org/10.1097/cin.0000000000000214

Meum, T. (2013) '"Lost in translation": The challenges of seamless integration in nursing practices', *International journal of medical informatics*, *82*(5), pp.e200-e208. Available at: https://doi.org/10.1016/j.ijmedinf.2012.11.012

Miller, T. and Bell, L. (2002) 'Consenting to what? Issues of access, gate-keeping and 'informed' consent', *Ethics in qualitative research*, *53*, p.69. Available at: Ethics in Qualitative Research - Google Books (Accessed 11 May 2023).

NHS England Digital (2024) *FHIR UK Core.* Available at: https://digital.nhs.uk/services/fhir-uk-core (Accessed: 28 March 2024).

NHS Data Standards Directory (2023) *HL7 FHIR UK Core*. Available at: https://data.standards.nhs.uk/published-standards/hl7-fhir-uk-core (Accessed: 28 March 2024).

Norton, J.M., Ip, A., Ruggiano, N., Abidogun, T., Camara, D.S., Fu, H., Hose, B.Z., Miran, S., Hsiao, C.J., Wang, J. and Bierman, A.S. (2022) 'Assessing progress toward the vision of a comprehensive, shared electronic care plan: Scoping review', *Journal of medical Internet research*, *24*(6), p.e36569. Available at: https://doi.org/10.2196/36569

Page, M.J., McKenzie, J.E., Bossuyt, P.M., Boutron, I., Hoffmann, T.C., Mulrow, C.D., Shamseer, L., Tetzlaff, J.M., Akl, E.A., Brennan, S.E. and Chou, R. (2021) 'The PRISMA 2020 statement: an updated guideline for reporting systematic reviews', *BMJ*, *372*. Available at: https://doi.org/10.1136/bmj.n71

Paterson, M., Jones, K., Schattner, P., Adaji, A. and Piterman, L. (2011) 'Electronic care plans and medicolegal liability', *Australian family physician*, *40*(6), pp.432-434. Available at: Electronic_care_plans_and_medicolegal_li20211005-347-1me9lpo.pdf (d1wqtxts1xzle7.cloudfront.net) (Accessed: 23 January 2024).

Peng, X., Zhang, R., Marantika, T., Deinum, M., Van, J., Touw, X.L. and Van Turnhout, K.O.E.N. (2023) 'Improving completion rate of digital skill self-assessment survey: An empirical study'. *36th Bled eConference Digital Economy and Society: The Balancing Act for Digital Innovation in Times of Instability*, p.457. Available at: http://dx.doi.org/10.18690/um.fov.6.2023.29

Phiri, P., Cavalini, H., Shetty, S. and Delanerolle, G. (2023) 'Digital Maturity Consulting and Strategizing to Optimize Services: Overview'. *Journal of Medical Internet Research*, *25*, p.e37545. https://doi.org/10.2196/37545 (Accessed 17 November 2023).

Prgomet M, Georgiou A, Callen J, Westbrook J. (2019) 'Fit Between Individuals, Tasks, Technology, and Environment (FITTE) Framework: A Proposed Extension of FITT to Evaluate and Optimise Health Information Technology Use'. *Stud Health Technol Inform.* 21;264:744-748. Available at: https://doi.org/10.3233/shti190322

Rice, R and Edwards, P. (2023) Microsoft Teams conversation with Victoria Richards-Green, 28 March.

Rotenstein, L.S., Tucker, S.K., Kakoza, R.M., Tishler, L.W., Zai, A.H. and Wu, C.A., (2016) 'The critical components of an electronic care plan tool for primary care: an exploratory qualitative study', *BMJ Health & Care Informatics*, 23(2). Available at: https://doi.org/10.14236/jhi.v23i2.836

Royal Pharmaceutical Society (2022) 'The Standards for Hospital Pharmacy Services'. *Hospital Pharmacy Professional Standards*. Available at: https://www.rpharms.com/recognition/setting-professional-standards/hospital-pharmacy-professional-standards/the-standards - s1 (Accessed 21 May 2023).

Siedlecki, S.L. (2022) 'Conducting Interviews for Qualitative Research Studies', *Clinical Nurse Specialist*. *36*(2), pp.78-80. Available at: https://journals.lww.com/cns-journal/Fulltext/2022/03000/Conducting_Interviews_for_Qualitative_Research.5.aspx (Accessed 21 May 2023).

Snowflake (2023) *A modern approach to the operations data store.* Available at: https://www.snowflake.com/guides/modern-approach-operational-data-store/ (Accessed 14 April 2023).

System C (2023) *Solutions: e-Observations*. Available at: https://www.systemc.com/solutions/epr/e-observations/ (Accessed 21 May 2023).

Tenny, S. and Abdelgawad, I. (2017) 'Statistical significance'. Available at: https://europepmc.org/article/NBK/nbk459346 (Accessed 24 May 2023).

Trowler, P. (2011) 'Researching your own institution: Higher education', *British Educational Research Association online resource*.

Vercruyssen, A., Schirmer, W. and Mortelmans, D. (2023) 'How" basic" is basic digital literacy for older adults? Insights from digital skills instructors', *Frontiers in Education* (Vol. 8, pp. 1-11). Available at: https://doi.org/10.3389/FEDUC.2023.1231701

Welsh Government (2023a) *Digital and data strategy for health and social care in Wales.* Available at: https://www.gov.wales/digital-and-data-strategy-health-and-social-care-wales-html (Accessed 5 January 2023).

Welsh Government (2023b) *Digital inclusion in Wales.* Available at: https://www.digitalcommunities.gov.wales/digital-inclusion-in-wales-2/ (Accessed 5 January 2023).

Welsh Government (2023c). *Written Statement: Digital Medicines Transformation Portfolio: Digital Primary Care Prescriptions in Wales.* Available at: https://www.gov.wales/written-statement-digital-medicines-transformation-portfolio-digital-primary-care-prescriptions (Accessed: 15 January 2024).

Wikipedia (2023) *MoSCow method.* Available at: https://en.wikipedia.org/wiki/MoSCoW_method -:~:text=The%20term%20MOSCOW%20itself%20is,to%20make%20the%20word%20pronounceable. (Accessed 2 April 2024).

## 9.0 Appendices

### 9.1 Appendix 1 – UWTSD APPLICATION FOR ETHICAL APPROVAL

| |
|---|
| **RESEARCH STUDENTS**<br>This form is to be completed by the student within **SIX** months for full-time students and **TWELVE** months for part time students, after the commencement of the research degree or following progression to Part Two of your course.<br><br>Once complete, submit this form via the ***MyTSD Doctoral College Portal*** at (https://mytsd.uwtsd.ac.uk).<br><br>This document is also available in Welsh. |
| **RESEARCH STAFF ONLY**<br>All communications relating to this application during its processing must be in writing and emailed to pgresearch@uwtsd.ac.uk , with the title 'Ethical Approval' followed by your name. |
| **STUDENTS ON UNDERGRADUATE OR TAUGHT MASTERS PROGRAMMES** should submit this form (and receive the outcome) via systems explained to you by the supervisor/module leader. |

**In order for research to result in benefit and minimise risk of harm, it must be conducted ethically. A researcher may not be covered by the University's insurance if ethical approval has not been obtained prior to commencement.**

The University follows the OECD Frascati manual definition of **research activity**: "creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this stock of knowledge to devise new applications". As such this covers activities undertaken by members of staff, postgraduate research students, and both taught postgraduate and undergraduate students working on dissertations/projects.

The individual undertaking the research activity is known as the "principal researcher".

Ethical approval is not required for routine audits, performance reviews, quality assurance studies, testing within normal educational requirements, and literary or artistic criticism.

**Please read the notes for guidance before completing ALL sections of the form.**

**This form must be completed and approved prior to undertaking any research activity.** Please see Checklist for details of process for different categories of application.

**SECTION A: About You (Principal Researcher)**

| | | | | | | |
|---|---|---|---|---|---|---|
| 1 | Full Name: | | Victoria Richards-Green | | | |
| 2 | Tick all boxes that apply: | | Member of staff: | ☐ | Honorary research fellow: | ☐ |
| | Undergraduate Student | ☐ | Taught Postgraduate Student | X | Postgraduate Research Student | ☐ |

| | | |
|---|---|---|
| 3 | Institute/Academic Discipline/Centre: | University of Wales Trinity St David |
| 4 | Campus: | Lampeter |
| 5 | E-mail address: | 2110533@student.uwtsd.ac.uk |
| 6 | Contact Telephone Number: | |
| | ***For students:*** | |
| 7 | Student Number: | 2110533 |
| 8 | Programme of Study: | MSc in Digital Transformation for Health and Social Care |
| 9 | Director of Studies/Supervisor: | Dr Philip Scott / Andrew Griffiths |

**SECTION B: Approval for Research Activity**

| | | | | | |
|---|---|---|---|---|---|
| 1 | Has the research activity received approval in principle?<br>(please check the Guidance Notes as to the appropriate approval process for different levels of research by different categories of individual) | **YES** | X | **NO** | |
| | | | | ***Date*** | |
| 2 | If Yes, please indicate source of approval (and date where known): ***Approval in principle must be obtained from the relevant source prior to seeking ethical approval*** | Research Degrees Committee | ☐ | | |
| | | Institute Research Committee | ☐ | | |
| | | Other (write in)<br>**MSc supervisor and course director** | x | 18/10/2023 | |

**SECTION C: Internal and External Ethical Guidance Materials**

| | | |
|---|---|---|
| | Please list the core ethical guidance documents that have been referred to during the completion of this form (including any discipline-specific codes of research ethics, location-specific codes of research ethics, and also any specific ethical guidance relating to the proposed methodology). Please tick to confirm that your research proposal adheres to these codes and guidelines. You may add rows to this table if needed. | |
| 1 | **UWTSD Research Ethics & Integrity Code of Practice** | X |
| 2 | **UWTSD Research Data Management Policy** | X |
| 3 | *[List any other relevant documents here]* | ☐ |

**SECTION D: External Collaborative Research Activity**

If there are external collaborators then you should gain consent from the contact persons to share their personal data with the university. If there are no external collaborators then leave this section blank and continue to section E.

| | | |
|---|---|---|
| 1 | Institution | |
| 2 | Contact person name | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | | |
| 3 | Contact person e-mail address | | | | | |
| 4 | Is your research externally funded? | | **YES** | ☐ | **NO** | ☐ |
| 5 | Are you in receipt of a KESS scholarship? | | **YES** | ☐ | **NO** | ☐ |
| 6 | Are you specifically employed to undertake this research in either a paid or voluntary capacity? | Voluntary | **YES** | ☐ | **NO** | ☐ |
| 7 | | Employed | **YES** | ☐ | **NO** | ☐ |
| 8 | Is the research being undertaken within an existing UWTSD Athrofa Professional Learning Partnership (APLP)? | If YES then the permission question below does not need to be answered. | **YES** | ☐ | **NO** | ☐ |
| 9 | Has permission to undertake the research has been provided by the partner organisation? | (If YES attach copy) If NO the application cannot continue | **YES** | ☐ | **NO** | ☐ |

**Where research activity is carried out in collaboration with an external organisation**

| | | | | | |
|---|---|---|---|---|---|
| 10 | Does this organisation have its own ethics approval system? | **YES** | ☐ | **NO** | ☐ |
| | If Yes, please attach a copy of any final approval (or interim approval) from the organisation (this may be a copy of an email if appropriate). | | | | |

**SECTION E: Details of Research Activity**

| | | | | |
|---|---|---|---|---|
| 1 | Indicative title: | The development of criteria and the subsequent evaluation of the suitability of available digital solutions for pharmaceutical care planning across Aneurin Bevan University Health Board (ABUHB). | | |
| 2 | Proposed start date: | November 2023 | Proposed end date: | May 2024 |
| | **Introduction to the Research (maximum 300 words per section)**<br>**Ensure that you write for a <u>Non-Specialist Audience</u> when outlining your response to the points below:**<br>• *Purpose of Research Activity*<br>• *Proposed Research Question*<br>• *Aims of Research Activity*<br>• *Objectives of Research Activity*<br>Demonstrate, briefly, how **<u>Existing Research</u>** has informed the proposed activity and explain<br>• *What the research activity will add to the body of knowledge*<br>• *How it addresses an area of importance.* | | | |
| 3 | **Purpose of Research Activity**<br><br>Due to fundamental changes in the flow of patients through acute hospital sites within ABUHB, because of the opening of a new critical care hospital in November 2020, current pharmacy practise of using a paper pharmaceutical care plan to document pharmacy related activities is no longer fit for purpose. The high transfer rate between sites now means that paper notes are not a suitable form of communication between pharmacy professionals. Therefore, a digital solution linked to the patient digital hospital record is required. | | | |

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| | Pharmaceutical care plans are intentionally separate from the patient main paper medical records, as they are used as a tool to prioritise pharmacy activity. Ensuring the patient with the greatest need is seen first. Therefore, any digital solution proposed should also allow for a workload prioritisation list to be generated from within the solution.<br><br>In addition to the requirements above, any prospective digital solution should also include the ability to maintain a record, within the patients' digital medical record, of actions highlighted and completed by pharmacy staff. This would be an improved to current practice, where records are destroyed, via the confidential waste procedure, at the end of a patients' admission episode.<br><br>There is no funding available within the health board to procure a new solution that fits the purpose proposed, so only systems and solutions accessible for use within ABUHB can be considered.<br><br>Part of the proposed activity will be to review current use of paper pharmaceutical care plans to ensure only the sections that add value are incorporated into a digital solution. In addition, the readiness of pharmacy staff across ABUHB to adopt a digital solution will be ascertained.<br><br>(this box should expand as you type) |
| 4 | **Research Question**<br><br>What is the most suitable digital solution to replace the current paper pharmaceutical care plans used across all pharmacy departments within ABUHB?<br><br>(this box should expand as you type) |
| 5 | **Aims of Research Activity**<br><br>To evaluate the suitability and challenges of using a digital solution for pharmaceutical care planning across ABUHB.<br><br>(this box should expand as you type) |
| 6 | **Objectives of Research Activity**<br><br>1. To define the functional and non-functional requirements needed for a digital pharmaceutical care plan.<br>2. To assess the requirements against functionality available within available solutions.<br>3. To investigate the readiness and engagement of pharmacy staff within ABUHB to digital adoption of pharmaceutical care planning.<br><br>(this box should expand as you type) |
| | **Proposed methods (maximum 600 words)**<br>Provide a brief summary of all the methods that **may** be used in the research activity, making it clear what specific techniques may be used. If methods other than those listed in this section are deemed appropriate later, additional ethical approval for those methods will be needed. You do not need to justify the methods here but should |

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| | instead describe how you intend to collect the data necessary for you to complete your project. |
| 7 | Before defining the requirements of a system for a digital pharmaceutical care plan (PCP), user acceptance must be gained regarding the existing paper PCP. It is proposed that this data will be obtained through a digital questionnaire, designed within Microsoft (MS) Forms and set out via an email link, to all pharmacy staff across the four main pharmacy departments within ABUHB. Approximately 200 staff in total. It will include questions around staff engagement and experiences with the existing paper PCP.<br><br>Sampling method:<br>Staff responding to the questionnaire will be asked to consent to be contacted, either for inclusion in a focus group or one-to-one discussion (semi-structured interview). Staff will be selected based on their previous experience of using a paper PCP and will cover both those that had a positive experience and a negative experience. These discussions will take place over videoconferencing on MS Teams. Allowing for the sessions to be records and transcribed. The aim of these focus-groups and one-to-one sessions will be to collect qualitative data around what should and shouldn't be included within a digital PCP. Therefore, informing some of the functional and non-functional requirement of any proposed digital system, housing a PCP. Thematic analyses will be used and focus groups and one-to-one sessions run until saturation is reached and no further themes are identified.<br><br>The quantitative data output from the questionnaire will be used to assess the general usage of the paper PCP and help highlight some potential training needs for the digital PCP. This data will be entered into an SPSS database so that it can be analyses.<br><br>A secondary out-put of the MS Form will be to establish the digital readiness of the pharmacy workforce. This will be done through the inclusion of questions around current use of technology both in and out of work. Age and job band will also be chelated, so that possible trends can be highlighted, when analysed via SPSS. This information will used to feed into the training and roll-out plan once a digital PCP becomes available.<br><br>The final section of data will be an assessment of the functionality within available digital solutions, against the functional and non-functional requirements established via the qualitative data collection. This will take the form of an artifact design and options appraisal.<br><br>(this box should expand as you type) |
| | **Location of research activity**<br>Identify all locations where research activity will take place. |
| 8 | The four main pharmacy departments within ABUHB. Royal Gwent Hospital (RGH), Grange University Hospital (GUH), Ysbyty Ystrad Fawr Hospital (YYF) and Nevill Hall Hospital (NHH).<br><br>(this box should expand as you type) |
| | **Research activity outside of the UK**<br>If research activity will take place overseas, you are responsible for ensuring that local ethical considerations are complied with and that the relevant permissions are sought. Specify any local guidelines (e.g., from local professional associations/learned societies/universities) that exist and whether these involve any ethical stipulations beyond those usual in the UK (provide details of any licenses or permissions required). Also specify whether there are any specific ethical issues raised by the local context in |

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| | which the research activity is taking place, for example, cultural and/or legal sensitivities or vulnerabilities of participants. If you live in the country where you will do the research, then please state this. |
| 9 | *(this box should expand as you type)* |

| | | | |
|---|---|---|---|
| 10 | Use of documentation not in the public domain: Are any documents **NOT** publicly available? | **NO** | X |
| | | **YES** | ☐ |
| 11 | If Yes, please provide details here of how you will gain access to specific documentation that is not in the public domain and that this is in accordance with the current data protection law of the country in question and that of England and Wales.<br>*(this box should expand as you type)* | | |

| | **Does your research relate to one or more of the seven aims of the Well-being of Future Generations (Wales) Act 2015?** | **YES** | **NO** |
|---|---|---|---|
| 12 | A prosperous Wales | ☐ | x |
| 13 | A resilient Wales | ☐ | x |
| 14 | A healthier Wales | ☐ | x |
| 15 | A more equal Wales | ☐ | x |
| 16 | A Wales of cohesive communities | ☐ | x |
| 17 | A Wales of vibrant culture and thriving Welsh language | ☐ | x |
| 18 | A globally responsible Wales | ☐ | x |
| 19 | If YES to any of the above, please give details: | | |
| | (this box should expand as you type) | | |

**SECTION F: Scope of Research Activity**

| | **Will the research activity include:** | **YES** | **NO** |
|---|---|---|---|
| 1 | Use of a questionnaire or similar research instrument? | X | ☐ |
| 2 | Use of interviews? | X | ☐ |
| 3 | Use of focus groups? | X | ☐ |
| 4 | Use of participant diaries? | ☐ | X |
| 5 | Use of video or audio recording? | X | ☐ |
| 6 | Use of computer-generated log files? | X | ☐ |
| 7 | Participant observation with their knowledge? | ☐ | X |

| | | | |
|---|---|---|---|
| 8 | Participant observation without their knowledge? | ☐ | X |
| 9 | Access to personal or confidential information without the participants' specific consent? | ☐ | X |
| 10 | Administration of any questions, test stimuli, presentation that may be experienced as physically, mentally or emotionally harmful / offensive? | ☐ | X |
| 11 | Performance of any acts which may cause embarrassment or affect self-esteem? | ☐ | X |
| 12 | Investigation of participants involved in illegal activities? | ☐ | X |
| 13 | Use of procedures that involve deception? | ☐ | X |
| 14 | Administration of any substance, agent or placebo? | ☐ | X |
| 15 | Working with live vertebrate animals? | ☐ | X |
| 16 | Procedures that may have a negative impact on the environment? | ☐ | X |
| 17 | Other primary data collection methods. Please indicate the type of data collection method(s) below. | ☐ | ☐ |
| | Details of any other primary data collection method:<br><br>(this box should expand as you type) | | |

If NO to every question, then the research activity is (ethically) low risk and **may** be exempt from **some** of the following sections (please refer to Guidance Notes).

If YES to any question, then no research activity should be undertaken until full ethical approval has been obtained.

**SECTION G: Intended Participants**

If there are no participants then do not complete this section, but go directly to section H.

| | **Who are the intended participants:** | **YES** | **NO** |
|---|---|---|---|
| 1 | Students or staff at the University? | ☐ | X |
| 2 | Adults (over the age of 18 and competent to give consent)? | X | ☐ |
| 3 | Vulnerable adults? | ☐ | X |
| 4 | Children and Young People under the age of 18? (Consent from Parent, Carer or Guardian will be required) | ☐ | X |
| 5 | Prisoners? | ☐ | X |
| 6 | Young offenders? | ☐ | X |
| 7 | Those who could be considered to have a particularly dependent relationship with the investigator or a gatekeeper? | ☐ | X |
| 8 | People engaged in illegal activities? | ☐ | X |
| 9 | Others. Please indicate the participants below, and specifically any group who may be unable to give consent. | X | ☐ |
| | Details of any other participant groups: | | |

| | | | |
|---|---|---|---|
| | Pharmacy staff form within ABUHB.<br><br>*(this box should expand as you type)* | | |

| | **Participant numbers and source**<br>Provide an estimate of the expected number of participants. How will you identify participants and how will they be recruited? | |
|---|---|---|
| 10 | How many participants are expected? | Around 200<br><br>*(this box should expand as you type)* |
| 11 | Who will the participants be? | Pharmacy staff from across ABUHB<br><br>*(this box should expand as you type)* |
| 12 | How will you identify the participants? | There is a staff list available within the department which lists all staff, by job role and hospital site. The research has access to the list as part of their regular duties. This list will form the basis of the initial data collection. From which interested participants can be identified based on expressions of interest or responses.<br><br>*(this box should expand as you type)* |

| | **Information for participants:** | **YES** | **NO** | **N/A** |
|---|---|---|---|---|
| 13 | Will you describe the main research procedures to participants in advance, so that they are informed about what to expect? | X | ☐ | ☐ |
| 14 | Will you tell participants that their participation is voluntary? | X | ☐ | ☐ |
| 15 | Will you obtain written consent for participation? | ☐ | X | ☐ |
| 16 | Will you explain to participants that refusal to participate in the research will not affect their treatment or education (if relevant)? | ☐ | ☐ | X |
| 17 | If the research is observational, will you ask participants for their consent to being observed? | ☐ | ☐ | X |
| 18 | Will you tell participants that they may withdraw from the research at any time and for any reason? | X | ☐ | ☐ |
| 19 | With questionnaires, will you give participants the option of omitting questions they do not want to answer? | X | ☐ | ☐ |
| 20 | Will you tell participants that their data will be treated with full confidentiality and that, if published, it will not be identifiable as theirs? | X | ☐ | ☐ |
| 21 | Will you debrief participants at the end of their participation, in a way appropriate to the type of research undertaken? | X | ☐ | ☐ |
| 22 | If NO to any of above questions, please give an explanation | | | |
| | Consent will be initially obtained via the questionnaire and then again at the point of agreeing to participation in any subsequent semi-structured interviews or focus groups.<br><br>*(this box should expand as you type)* | | | |

| | Information for participants: | YES | NO | N/A |
|---|---|---|---|---|
| 24 | Will participants be paid? | ☐ | X | ☐ |
| 25 | Is specialist electrical or other equipment to be used with participants? | ☐ | X | ☐ |
| 26 | Are there any financial or other interests to the investigator or University arising from this study? | ☐ | X | ☐ |
| 27 | Will the research activity involve deliberately misleading participants in any way, or the partial or full concealment of the specific study aims? | ☐ | X | ☐ |
| 28 | If YES to any question, please provide full details | | | |
| | There will be a description of the project at the start of the digital questionnaire and also some background on the project including in the invitation email, which will also detail what is involved in any additional participation (such as interviews etc).<br><br>*(this box should expand as you type)* | | | |

**SECTION H: Anticipated Risks**

| | | | |
|---|---|---|---|
| | **Outline any anticipated risks that may adversely affect any of the participants, the researchers and/or the University, and the steps that will be taken to address them.**<br><br>If you have completed a full risk assessment (for example as required by a laboratory, or external research collaborator) you may append that to this form. | | |
| 1 | **Full risk assessment completed and appended?** | **Yes** | ☐ |
| | | **No** | X |
| 2 | **Risks to participants**<br>For example: sector-specific health & safety, emotional distress, financial disclosure, physical harm, transfer of personal data, sensitive organisational information | | |
| | Risk to participants:<br><br>The main burden to staff will be the inconvenience in taking up time during their working day, when stress levels are already high due to staff shortages.<br><br>*(this box should expand as you type)* | *How you will mitigate the risk to participants:*<br><br>This will be mitigated through undertaking meeting via MS Teams, so that disruption in minimised and travel time and parking stress is removed. The researcher will also obtain permission from senior clinical staff for participating staff to be removed from the main rota for the period of any interviews or focus groups. All sessions will be planned to avoid days where staff leave, or sickness is higher.<br><br>*(this box should expand as you type)* | |
| 3 | If research activity may include sensitive, embarrassing or upsetting topics (e.g. sexual activity, drug use) or issues likely to disclose information requiring further action (e.g. criminal activity), give details of the procedures to deal with these issues, including any support/advice (e.g. helpline numbers) to be offered to participants. Note that where applicable, consent procedures should make it clear that if something potentially or actually illegal is discovered in the course of a project, it may need to be disclosed to the proper authorities | | |
| | N/A | | |

| | | |
|---|---|---|
| | *(this box should expand as you type)* | |
| 4 | **Risks to the investigator**<br>For example: personal health & safety, physical harm, emotional distress, risk of accusation of harm/impropriety, conflict of interest | |
| | Risk to the investigator:<br><br>No risks have been identified as all research will take place in the work environment and during regular working hours.<br><br>*(this box should expand as you type)* | *How you will mitigate the risk to the investigator:*<br><br>N/A<br><br>*(this box should expand as you type)* |
| 5 | **University/institutional risks**<br>For example: adverse publicity, financial loss, data protection | |
| | Risk to the University:<br><br>All data will be housed within the hospital data environments, therefore removing any university risks.<br><br>*(this box should expand as you type)* | *How you will mitigate the risk to the University:*<br><br>N/A<br><br>*(this box should expand as you type)* |
| 6 | **Environmental risks**<br>For example: accidental spillage of pollutants, damage to local ecosystems | |
| | Risk to the environment:<br><br>No risks identified.<br><br>*(this box should expand as you type)* | *How you will mitigate the risk to environment:*<br><br>N/A<br><br>*(this box should expand as you type)* |

| | **Disclosure and Barring Service** | | | |
|---|---|---|---|---|
| | If the research activity involves children or vulnerable adults, a Disclosure and Barring Service (DBS) certificate must be obtained before any contact with such participants. | **YES** | **NO** | **N/A** |
| 7 | Does your research require you to hold a current DBS Certificate? | ☐ | X | ☐ |
| 8 | If YES, please give the certificate number. If the certificate number is not available please write “Pending”; in this case any ethical approval will be subject to providing the appropriate certificate number. | | | |

**SECTION I: Feedback, Consent and Confidentiality**

| | |
|---|---|
| 1 | **Feedback**<br>What de-briefing and feedback will be provided to participants, how will this be done and when? |
| | Following completion of the project there will be a session for all staff to share the findings. This will be done via the shared communications meetings that happen at each of the four pharmacy sites within ABUHB. The session will also be recorded and housed on the main pharmacy SharePoint library pages, therefore allowing all staff to review the sessions.<br><br>It is also anticipated that the results will be feedback to the senior pharmacy management team, in the form of a presentation by the researcher. |

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| | A poster of the project will also be developed to allow the research to communicate the outcomes to other interested parties, both within ABUHB and externally.<br><br>*(this box should expand as you type)* |
| 2 | **Informed consent**<br>Describe the arrangements to inform potential participants, before providing consent, of what is involved in participating. Describe the arrangements for participants to provide full consent before data collection begins. If gaining consent in this way is inappropriate, explain how consent will be obtained and recorded in accordance with prevailing data protection legislation. |
| | As the invitation to complete the digital questionnaire will be sent out via email, the details of the project, what data will be collected and how it will be used will be included in the email. This will replace the need for a separate information sheet on the project.<br><br>The collection of initial data via a digital questionnaire means that a statement can be included around consent to use data. E.g., "completion of this questionnaire indicated that consent has given for data entered in the responses can be used for research purposes".<br><br>Those that do not consent, can chose to not complete the digital questionnaire and by doing, will so be excluded from any further participation.<br><br>*(this box should expand as you type)* |
| 3 | **Confidentiality / Anonymity**<br>Set out how anonymity of participants and confidentiality will be ensured in any outputs. If anonymity is not being offered, explain why this is the case. |
| | All responses from both the digital questionnaire will be anonymised prior to inclusion in the write-up. The transcriptions of any focus groups or semi-structured interviews will also be anonymised prior to data analysis and inclusion in the main write-up.<br><br>*(this box should expand as you type)* |

**SECTION J: Data Protection and Storage**

| | Does the research activity involve personal data (as defined by the General Data Protection Regulation 2016 "GDPR" and the Data Protection Act 2018 "DPA")? | **YES** | **NO** |
|---|---|---|---|
| 1 | ***"Personal data"*** *means any information relating to an identified or identifiable natural person ('data subject'). An identifiable natural person is one who can be identified, directly or indirectly, in particular by reference to an identifier such as a name, an identification number, location data, an online identifier or to one or more factors specific to the physical, physiological, genetic, mental, economic, cultural or social identity of that natural person. Any video or audio recordings of participants is considered to be personal data.* | X | ☐ |
| | If YES, provide a description of the data and explain why this data needs to be collected: | | |
| 2 | The only data that could link a person to a set of responses will be around staff age and cross referencing this to job role / banding. This data will be anonymised before writing up. | | |

| | | | |
|---|---|---|---|
| | *(this box should expand as you type)* | | |
| | Does it involve special category data (as defined by the GDPR)? | **YES** | **NO** |
| 3 | ***"Special category data"*** *means sensitive personal data consisting of information as to the data subjects' –*<br>*(a) racial or ethnic origin,*<br>*(b) political opinions,*<br>*(c ) religious beliefs or other beliefs of a similar nature,*<br>*(d) membership of a trade union (within the meaning of the Trade Union and Labour Relations (Consolidation) Act 1992),*<br>*(e) physical or mental health or condition,*<br>*(f) sexual life,*<br>*(g) genetics,*<br>*(h) biometric data (as used for ID purposes),* | ☐ | X |
| | If YES, provide a description of the special category data and explain why this data needs to be collected: | | |
| 4 | *(this box should expand as you type)* | | |

| | **Will data from the research activity (collected data, drafts of the thesis, or materials for publication) be stored in any of the following ways?** | **YES** | **NO** |
|---|---|---|---|
| 5 | Manual files (i.e. in paper form)? | ☐ | X |
| 6 | University computers? | ☐ | X |
| 7 | Private company computers? | ☐ | X |
| 8 | Home or other personal computers? | ☐ | X |
| 9 | Laptop computers/ CDs/ Portable disk-drives/ memory sticks? | ☐ | X |
| 10 | "Cloud" storage or websites? | X | ☐ |
| 11 | Other – specify: | ☐ | ☐ |
| 12 | For all stored data, explain the measures in place to ensure the security of the data collected, data confidentiality, including details of backup procedures, password protection, encryption, anonymisation and pseudonymisation: | | |
| | All data will be stored in the researchers NHS OneDrive. This is only accessible by the researcher and only on NHS computers. Access is password protected and downloading restricted, as per NHS policy.<br>*(this box should expand as you type)* | | |

| | **Data Protection** | | |
|---|---|---|---|
| | Will the research activity involve any of the following activities: | **YES** | **NO** |
| 13 | Electronic transfer of data in any form? | X | ☐ |
| 14 | Sharing of data with others at the University outside of the immediate research team? | ☐ | X |
| 15 | Sharing of data with other organisations? | ☐ | X |

| | | | |
|---|---|---|---|
| 16 | Export of data outside the UK or importing of data from outside the UK? | ☐ | X |
| 17 | Use of personal addresses, postcodes, faxes, emails or telephone numbers? | ☐ | X |
| 18 | Publication of data that might allow identification of individuals? | ☐ | X |
| 19 | Use of data management system? | X | ☐ |
| 20 | Data archiving? | ☐ | X |
| 21 | If YES to any question, please provide full details, explaining how this will be conducted in accordance with the GDPR and Data Protection Act (2018) (and any international equivalents, where appropriate): | | |
| | *(this box should expand as you type)* | | |
| 22 | List all who will have access to the data generated by the research activity: | | |
| | The raw data will only be accessible by the primary researcher.<br>*(this box should expand as you type)* | | |
| 23 | List who will have control of, and act as custodian(s) for, data generated by the research activity: | | |
| | *(this box should expand as you type)* | | |
| 24 | Give details of data storage arrangements, including security measures in place to protect the data, where data will be stored, how long for, and in what form. Will data be archived – if so how and if not why not. | | |
| | *(this box should expand as you type)* | | |
| 25 | Please indicate if your data will be stored in the UWTSD Research Data Repository (see https://researchdata.uwtsd.ac.uk/ ). If so please explain. (*Most relevant to academic staff)* | | |
| | *(this box should expand as you type)* | | |
| 26 | Confirm that you have read the UWTSD guidance on data management (see https://www.uwtsd.ac.uk/library/research-data-management/) | **YES** | ☐ |
| 27 | Confirm that you are aware that you need to keep all data until after your research has completed or the end of your funding | **YES** | ☐ |

**SECTION K: Declaration**

| | | | |
|---|---|---|---|
| | | | |
| | | Victoria Richards-Green | **Date:** 18/10/23 |

***For STUDENT Submissions:***

| | | | |
|---|---|---|---|
| | | Andrew Griffiths | **Date:** |
| | | | 10/11/2023 |

***For STAFF Submissions:***

| | | | |
|---|---|---|---|
| | | | **Date:** |
| | | | |

**Checklist:** Please complete the checklist below to ensure that you have completed the form according to the guidelines and attached any required documentation:

| | |
|---|---|
| | I have read the guidance notes supplied before completing the form. |
| | I have completed **ALL RELEVANT** sections of the form in full. |
| | I confirm that the research activity has received approval in principle |
| | I have attached a copy of final/interim approval from external organisation (**where appropriate**) |
| | I have attached a full risk assessment (where appropriate) *ONLY TICK IF YOU HAVE **ATTACHED A FULL RISK ASSESSMENT*** |
| | I understand that it is my responsibility to ensure that the above named research activity will meet the University's Research Ethics and Integrity Code of Practice. |
| | I understand that before commencing data collection all documents aimed at respondents (including information sheets, consent forms, questionnaires, interview schedules etc.) must be confirmed by the DoS/Supervisor, module tutor or Academic Director. |

**RESEARCH STUDENTS ONLY**
Once complete, submit this form via the **MyTSD Doctoral College Portal** at (https://mytsd.uwtsd.ac.uk).

| |
|---|
| **RESEARCH STAFF ONLY**<br>All communications relating to this application during its processing must be in writing and emailed to pgresearch@uwtsd.ac.uk , with the title 'Ethical Approval' followed by your name. |
| **STUDENTS ON UNDERGRADUATE OR TAUGHT MASTERS PROGRAMMES** should submit this form (and receive the outcome) via systems explained to you by the supervisor/module leader. |

**9.3 Appendix 3 – Data collection form**

# Digital Skills and Pharmaceutical Care Planning

Please could all staff complete, even if you have never used a pharmaceutical care plan. It will help us to identify digital training needs.

Section 1

## Background information

1. Which age bracket do you fall into? *
    - Under 18
    - 18-24
    - 25-34
    - 35-44
    - 45-54
    - 55-65
    - 65 and over

2. What is current your job role? *
    - Pharmacist
    - Trainee Pharmacist
    - Technician
    - Trainee Technician
    - ATO (Assistant Technical Officer)
    - Pharmacy support staff (clerical)
    - Other (free text box for response)

3. What is your current band? *
    - 2
    - 3
    - 4
    - 5
    - 6
    - 7
    - 8a

- 8b
- 8c
- Other (free text box for response)

4. Which site do you currently work at? *

- GUH
- NHH
- RGH
- YYF
- Other (free text box for response)

Section 2

## General digital skills

This section will ask questions about your current digital skills, so we can look at training requirements.

5. Please indicate how confident you are to undertake the following digital activities *

*Select N/A if you are not required to do an action as part of your job.*

| | Not confident | Somewhat confident | Confident | Never tried | N/A |
|---|---|---|---|---|---|
| Turn on the device and enter any account information as required. | ○ | ○ | ○ | ○ | ○ |
| Use a mouse and keyboard on a computer, use a touch screen on a smart phone or tablet. | ○ | ○ | ○ | ○ | ○ |
| Change the device settings to make it easier to read things, e.g. by making text bigger | ○ | ○ | ○ | ○ | ○ |
| Find applications by choosing the correct icons on the home screen. | ○ | ○ | ○ | ○ | ○ |
| Connect a device (such as your phone) to the internet using the Wi-Fi settings and insert the password when required. | ○ | ○ | ○ | ○ | ○ |
| Locate the browser icon on a device and find a website. | ○ | ○ | ○ | ○ | ○ |
| Keep login information for a device and any websites secure, not shared with anyone or written down and left prominently near my device. | ○ | ○ | ○ | ○ | ○ |

6. Please indicate how confident you are to undertake the following digital communication activities *

*Select N/A if you are not required to do an action as part of your job.*

| | Not confident | Somewhat confident | Confident | Never tried | N/A |
|---|---|---|---|---|---|
| Set up a group on messaging platforms, such as WhatsApp or Messenger, to talk to friends, family members or colleagues. | ◯ | ◯ | ◯ | ◯ | ◯ |
| Use Microsoft Word to create a CV, letter, or document. | ◯ | ◯ | ◯ | ◯ | ◯ |
| Send photographs and other documents as an email attachment. | ◯ | ◯ | ◯ | ◯ | ◯ |
| Set up and use video call products such as Facetime or Skype for video communications with friends and family. | ◯ | ◯ | ◯ | ◯ | ◯ |
| Be a member of and manage personal networking sites, such as Facebook. | ◯ | ◯ | ◯ | ◯ | ◯ |
| Use the email address book of my organisation to send emails to colleagues and use the 'cc' option when requested. | ◯ | ◯ | ◯ | ◯ | ◯ |
| Work remotely using a virtual private network (VPN) when provided by my employer and use the requested authentication to connect. | ◯ | ◯ | ◯ | ◯ | ◯ |
| Use different document formats such as PDF to make it easier to share documents with colleagues. | ◯ | ◯ | ◯ | ◯ | ◯ |
| Use document sharing through web-based applications such as SharePoint or Teams to work on a document in collaboration with colleagues. | ◯ | ◯ | ◯ | ◯ | ◯ |

7. Please indicate how confident you are to undertake the following digital activities around handling information and content *

*Select N/A if you are not required to do an action as part of your job.*

| | Not confident | Somewhat confident | Confident | Never tried | N/A |
|---|---|---|---|---|---|
| Understand that not all entries in online encyclopaedias, such as Wikipedia, are true or reliable. | ◯ | ◯ | ◯ | ◯ | ◯ |
| Search for information requested by a supervisor using browsers such as Edge. | ◯ | ◯ | ◯ | ◯ | ◯ |
| Use a cloud storage account (such as OneDrive) for document, recordings, and files etc and access the collections from different devices, such as a laptop or a smartphone. | ◯ | ◯ | ◯ | ◯ | ◯ |
| Manage a calendar or appointments system on multiple devices, including work computer, and phone or tablet. | ◯ | ◯ | ◯ | ◯ | ◯ |

8. Please indicate how confident you are to undertake the following digital transaction activities *

*Select N/A if you are not required to do an action as part of your job.*

| | Not confident | Somewhat confident | Confident | Never tried | N/A |
|---|---|---|---|---|---|
| Set up online accounts for public services such as with your local council or a government department. | ◯ | ◯ | ◯ | ◯ | ◯ |
| Set up online accounts with retailers to order and pay for goods online such as through Amazon or eBay. | ◯ | ◯ | ◯ | ◯ | ◯ |
| Use travel websites and apps to book tickets and make reservations. | ◯ | ◯ | ◯ | ◯ | ◯ |
| Make a GP appointment online. | ◯ | ◯ | ◯ | ◯ | ◯ |
| Complete online forms to apply for a television license or road tax. | ◯ | ◯ | ◯ | ◯ | ◯ |
| Set up and use online and telephone banking through websites or apps, keeping access information secure. | ◯ | ◯ | ◯ | ◯ | ◯ |
| Complete an online application form, for example for a job. | ◯ | ◯ | ◯ | ◯ | ◯ |
| Submit requests for annual leave, record absence from work or submit expenses claims online. | ◯ | ◯ | ◯ | ◯ | ◯ |
| Review own payslip and salary payments when received digitally. | ◯ | ◯ | ◯ | ◯ | ◯ |

9. Please indicate how confident you are to undertake the following digital problem-solving activities *

*Select N/A if you are not required to do an action as part of your job.*

| | Not confident | Somewhat confident | Confident | Never tried | N/A |
|---|---|---|---|---|---|
| Use the internet to find specific information related to Life tasks that need to be carried out, for example finding a recipe, or finding information that helps plan travel. | ◯ | ◯ | ◯ | ◯ | ◯ |
| Use the help, FAQ section or chat facility of a manufacturer's website or other related content to work out how to fix an issue with a device. | ◯ | ◯ | ◯ | ◯ | ◯ |
| Find out how to do something by using a tutorial video such as those found on YouTube. | ◯ | ◯ | ◯ | ◯ | ◯ |
| Use the internet to identify alternative ways of resolving a problem encountered at work such as what a drug could be used for. | ◯ | ◯ | ◯ | ◯ | ◯ |
| Use spreadsheets (such as in Excel) to collect and examine data for a project. | ◯ | ◯ | ◯ | ◯ | ◯ |
| Create a questionnaire or form (using MS Forms) for others to fill in. | ◯ | ◯ | ◯ | ◯ | ◯ |

10. Please indicate how confident you are that you can be safe and legal when you undertake activities online *

*Select N/A if you are not required to do an action as part of your job.*

| | Not confident | Somewhat confident | Confident | Never tried | N/A |
|---|---|---|---|---|---|
| Following organisational guidelines and policies for choosing login information including choosing secure passwords and changing them when prompted. | ◯ | ◯ | ◯ | ◯ | ◯ |
| Knowing and using specific procedures to report suspicious emails to IT support staff in your organisation. | ◯ | ◯ | ◯ | ◯ | ◯ |
| knowing whether your organisation has IT use and social media policies and be able to apply them. | ◯ | ◯ | ◯ | ◯ | ◯ |
| Using search tools to find and access images and other online content that can be used by others. | ◯ | ◯ | ◯ | ◯ | ◯ |

11. Are there any areas of digital skills within work, where you feel you would like some support or additional training?

Section 3

## Pharmaceutical care planning

11. Have you ever used a pharmaceutical care plan? (Paper or digital) *

- ○ Yes
- ○ No

*Branching - No answers take the respondent to the end of the questionnaire.*

12. Which types of pharmaceutical care plan have you used? (Select all that apply) *

- ❑ Paper
- ❑ Digital
- ❑ Other (free text box for response)

13. Was your experience of using a pharmaceutical care plan in this health board? *

- ○ Yes
- ○ Yes, but also somewhere else
- ○ No

*Branching - Yes takes the respondent to questions 15. All other responses go to question 14.*

14. Which health board(s) have you worked in where you have used a pharmaceutical care plan? (Select all that apply) *

- ❑ Betsi Cadwaladr
- ❑ Cardiff & Vale
- ❑ Cwm Taff
- ❑ Hywel Dda
- ❑ Swansea Bay
- ❑ Powys
- ❑ Velindre NHS trust
- ❑ Somewhere outside of Wales
- ❑ Other (free text box for response)

15. In general have you found the pharmaceutical care plans useful? *

- ○ Yes
- ○ No
- ○ Other (free text box for response)

16. Which aspects of a pharmaceutical care plan have you found useful? *

| | Not useful | Somewhat useful | Useful | Essential | Would look somewhere else for this information |
|---|---|---|---|---|---|
| Patient details (including name, DOB, address, GP name) | ◯ | ◯ | ◯ | ◯ | ◯ |
| Presenting complaint | ◯ | ◯ | ◯ | ◯ | ◯ |
| Current active diagnosis | ◯ | ◯ | ◯ | ◯ | ◯ |
| Past medical history | ◯ | ◯ | ◯ | ◯ | ◯ |
| Medication history | ◯ | ◯ | ◯ | ◯ | ◯ |
| Allergies | ◯ | ◯ | ◯ | ◯ | ◯ |
| Community pharmacy information / contact details, use of compliance aids | ◯ | ◯ | ◯ | ◯ | ◯ |
| GP surgery contact details | ◯ | ◯ | ◯ | ◯ | ◯ |
| Social information (such as if the patient has a package of care) | ◯ | ◯ | ◯ | ◯ | ◯ |
| Lifestyle factors (such as smoking status and alcohol use) | ◯ | ◯ | ◯ | ◯ | ◯ |
| Oxygen requirements | ◯ | ◯ | ◯ | ◯ | ◯ |
| Weight | ◯ | ◯ | ◯ | ◯ | ◯ |
| Admission date | ◯ | ◯ | ◯ | ◯ | ◯ |
| Current in-patient location (hospital, ward and consultant) | ◯ | ◯ | ◯ | ◯ | ◯ |
| Additional prescription charts (such as insulin, warfarin etc) | ◯ | ◯ | ◯ | ◯ | ◯ |
| VTE risk assessment tick box | ◯ | ◯ | ◯ | ◯ | ◯ |
| Acknowledgment that Medicines reconciliation has been completed | ◯ | ◯ | ◯ | ◯ | ◯ |
| Blood monitoring section | ◯ | ◯ | ◯ | ◯ | ◯ |
| Notes section to document follow-up actions | ◯ | ◯ | ◯ | ◯ | ◯ |

17. Please add any additional information you found (or would find) beneficial as part of a pharmaceutical care plan.

18. Do you consent to being contacted to take part in a recorded 1-2-1 or group discussion about pharmaceutical care planning? *

- Yes
- No

18. Please entre your name and work email address below? *

**END OF QUESTIONAIRE**

*N.B. All required questions are marked with an * but branching has been applied to some questions so that the responder is only asked to complete questions that apply to them.*

### 9.4 Appendix 4 – Study 2 participant information email

Dear All,

Thank you for completing the digital skills questionnaire and for agreeing to be part of the second phase of the project, looking at pharmaceutical care planning.

As part of the questionnaire, you were asked to comment on the value of each of the elements of the original ABUHB paper pharmaceutical care plan. In the 1-2-1 sessions I want to understand what you feel the facilitators and barriers to using pharmaceutical care plans, both in a paper and digital format (even if you have not used a digital care plan before).

These facilitators and barriers will then be used to formulate some baseline requirements for a future digital pharmaceutical care plan solution.

Once the baseline requirements have been established, a review of currently available digital options can be undertaken, with an aim of developing a business case for a future digital solution that can be used across the health board.

Your consent for a 1-2-1 recorded interview was provided in your questionnaire response, but you are free to withdraw your consent at any time. If you wish to withdraw your consent, then any information you have provided as part of the interview process will be deleted and withdrawn from the project data analysis. To withdraw your consent please contact me via email or teams.

The interview should take around 15-20 mins and consists of around a dozen short questions, where you will have the opportunity to express your views. The interview will take place via teams, so that it can be recorded and transcribed automatically. Using teams also means interviews can be conducted without the need to leave your base site. Therefore, minimising the impact on clinical work to sites. To ensure your comments remain confidential it is advised that when taking part in the interview you are in a private area. Following the interview, you will be sent a copy of the transcription, so that you can review it and ensure you are happy that it is a true representation of your comments. All transcriptions will be anonymised prior to data analysis.

I hope to start the interviews the second week of January. Please could you let me know your availability, so that I can start to book meetings in via teams. If you need to be released to attend a meeting, let me know so that I can link in with senior staff to arrange a time slot on the rota.

Kind regards

Vicki

**Victoria Richards-Green** MRPharmS

**Lead Pharmacist Clinical Informatics and Prescribing Support**

**Respiratory Lead Pharmacist**

**9.5 Appendix 5 – Post-focus group semi-structured interview script**

# Semi structured pharmaceutical care planning interview script

*A few general questions to start with*

1. Which types of pharmaceutical care plan have you used? Paper, digital or both?

2. Do you still use a PCP in some form?

3. If yes could you expand on your answer to question 2 please?

4. What are your views positive and negative on PCP's in general (paper or digital)?

*Looking at paper PCP's specifically*

5. What do you feel the barriers are to staff using a paper PCP?

6. What do you feel are the main benefits of using a paper PCP?

*Now looking at digital PCP's (even if you haven't used one)*

7. What do you feel the barriers are to staff using a digital PCP?

8. What do you feel are the main benefits of using a digital PCP?

9. Would you prefer to use a paper PCP or a digital PCP?

10. Could you expand on your answer to question 9 please?

11. What are your thoughts about the PCP being part of the legal medical notes?

12. Are you comfortable with writing in medical notes and if not, what concerns you?

13. If we had a digital PCP, who outside of pharmacy secondary care do you think should have access to edit or view the PCP?

14. Do think a digital PCP should be distinct for each admission or live as an ongoing document?

15. Any other comments?

### 9.6 Appendix 6 – ABUHB paper pharmaceutical care plan

## Royal Gwent Hospital - Pharmaceutical Care Plan

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| MDS yes / no | Pharmacy name and tel: For MDS | | | | | | Additional MDS info | | | | |
| Addressograph | | | Ward | | Consultant | | | | | | |
| | | | Bed no. | | TTH Completed | | | | | | |
| | | | Allergies (state drug and reaction) | | | | Weight (kg) | | | | |
| | | | | | | | Admission date | | | | |
| Presenting complaint | | | Diagnosis | | | | Relevant PMH | | | | |
| Smoking status<br>Alcohol status | | | | | | | | | | | |
| (Initial and date)<br>Drug history ..... Meds Rec ..... VTE ☐ ☐<br>Oxygen | | | | | | | | | | | |
| Drug History | | | | | | | | | | | |
| Warfarin chart<br>Insulin chart<br>Other additional charts | | | | | | | | | | | |
| Biochemical Results | | | | | | | | | | | |
| Date | Na | K | Ur | Cr | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |

| Date | Care Plan and Outcomes |
| --- | --- |
| | |

## 9.7 Appendix 7 – Cardiff university clinical diploma paper pharmaceutical care plan

**CARDIFF UNIVERSITY POSTGRADUATE DIPLOMA IN CLINICAL PHARMACY**

| | | |
|---|---|---|
| Patient | Age | Height |
| Ward | Actual weight<br>Ideal body weight | Surface area |

**Patient Details**

| | |
|---|---|
| Presenting complaint | Previous relevant medical history |
| Diagnosis | Social/Family history |

| |
|---|
| Relevant drug history (including allergies) |

**CURRENT MEDICATION**

| Day | Drug | Route | Dose | Freq | Stopped | Desired Outcome | Indicators |
|---|---|---|---|---|---|---|---|
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

**LEARNING POINTS**

## PHARMACEUTICAL MONITORING

| Day ___ ®<br>Monitoring parameter<br>(& range) | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

**PHARMACEUTICAL CARE PLAN**

| Day | Issue | Action & Outcome |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

**PROGRESS NOTES**

**9.8 Appendix 8 – Dissertation project brief**

# Dissertation Project Brief

Victoria Richards-Green 2110533

## Title

The development of criteria and the subsequent evaluation of the available digital solutions for pharmaceutical care planning across ABUHB (Aneurin Bevan University Health Board).

## Introduction

Part of the work of a hospital pharmacist is to develop a pharmaceutical care plan (PCP) for each patient under their care, during an hospital admission. The formulation and completion of paper pharmaceutical care plans (PCPs) are part of the post graduate training for hospital pharmacists. These paper documents usually sit separately to the patient's paper medical notes, acting as a summary record of information obtained from the patient's medical notes. They are stored within the pharmacy department, in allocated ward folders. When a patient is moved to a new ward within a hospital, the paper PCP is transferred with them. Through manual transfer of the paper document from pharmacist to pharmacist. When the patient's episode of care within the hospital is complete, the paper PCP is disposed of via the Aneurin Bevan University Health Board (ABUHB) confidential waste procedure.
By keeping these documents separate to the paper medical notes, they can be physically "flagged" in a folder. This forms a priority list of patients who have a pharmaceutical need.
Within ABUHB the flow of patients through the hospital system changed dramatically in November 2020, when the new specialist and critical care centre, the Grange University Hospital (GUH) opened. Before the opening of GUH patient transfers between hospital sites within ABUHB was rare. On these occasions a new PCP would be started by the pharmacist at the receiving hospital, as the timely transfer of the paper PCP through the hospital internal post was not feasible. Post the opening of GUH, the patient transfer rate has significantly increased. One of the main aims of GUH is to only treat patients during their acute illness. Once stable, patients should be stepped down to a local district general hospital (LGH). Patient may also be stepped up to GUH if they become critically ill.
As a direct result of the change to patient flow resulting from the opening of GUH, paper PCPs are no longer fit for purpose. A digital solution is therefore being sort. However, before seeking a digital solution it is important to firstly establish which parts of the PCP added value to the patient's treatment. In addition, it is important to consider staff engagement with digital and how such a solution may be best adopted.

## Aim

To evaluate the possible digital solutions and identify the challenges of implementing a digital pharmaceutical care planning across ABUHB.

## Scope

When looking at possible digital solutions to evaluate, it is important to consider software that is already available within ABUHB (even if not currently utilised by pharmacy), as well as solutions that may become available within ABUHB in the future.
The options for digital solutions include:

1. Clinical Workstation, (CWS), an in-house ABUHB system that currently holds digital patient documents, test results and communication forms, linked to the individual patient's digital record.
2. CareFlow Connect, an external commercial solution which is currently active within ABUHB but not used by pharmacy staff. CareFlow Connect is a web-based workflow and communication tool. An off the shelf product that has the functionality to produce a document that allows for continuous updating.
3. An electronic prescribing and medicines administration system (ePMA). Some of the ePMA systems, within the current All-Wales framework, have separate modules designed for care planning. ABUHB is currently in the process of procuring an ePMA system, to be used across all is hospital bed base. Requirements around pharmaceutical care planning have been developed as part of the All-Wales tender process, but for ABUHB these were removed from the tender process, as this was seen as a future development and not a go-live requirement.
4. Welsh Clinical Portal (WCP) is national software, designed to hold the patient's digital health records. This is available and utilised by ABUHB staff to access the patient primary care health records, it also has some existing links with CWS. Current use of WCP is limited within ABUHB and many of our records are accessed via CWS.
5. Shared Medicines Record (SMR). This is currently in development at an All-Wales level and aims to act as a single source of truth for all digital information relating to a patient's medications.
6. Welsh Nursing Care Record (WNCR) is also national software, designed to hold risk assessment and patient demographics, captured by nursing staff from the point a patient is admitted until they are discharged.

To evaluate each solution, functional and non-functional requirements must first be defined. To define these requirements feedback is needed from ABUHB pharmacy staff, including those that have used paper PCPs and those who have not. In addition to functional and non-functional requirements, information can be obtained on the digital readiness of pharmacy staff. Which can then be used to formulate a training plan for any future roll-out.
While considering the problem of inter-hospital transfer of the information contained within a PCP, the issue of sharing this information more widely with primary care health care professionals has also been raised. Paper PCPs did not allow for sharing of information outside of secondary care. However, with a digital solution sharing becomes possible. Allowing for increased continuity of care for patients. This should therefore be considered as part of the requirements.

## Objectives

1. To define the functional and non-functional requirements needed for a digital pharmaceutical care plan.
2. To assess the requirements against functionality within available solutions.
3. To investigate the readiness and engagement of pharmacy staff within ABUHB to digital adoption of pharmaceutical care planning.

## Methods

Initial digital collection (using a Microsoft Form) of quantitative data on numbers of pharmacy staff with experience of using PCPs, paper or digital. This will then be used to identify participants for qualitative data, collected via 1-2-1 interview (held over Microsoft Teams) on engagement and value of paper PCPs.

Quantitative data from the above can be analysed using MS Excel, with qualitative data analysed for themes.
Once functional and non-functional requirements have been defined from the data collected for objective 1, these can be reviewed against each of the solutions.
For the final objective, around digital engagement, and digital readiness of staff. Data we be collected via a digital questionnaire (using Microsoft Forms) to pharmacy staff. Depending on the results of the questionnaire, there may be a need to undertake some additional exploratory interviews.

# Outline Plan

## Indicative timeline

| **Period** | **Activities** |
|---|---|
| September to October | Project brief<br>Literature review<br>Methods selection and justification<br>Ethics application<br>Initial draft data collection form for study 1 |
| November to December | Start study 1 data collection (subject to favourable ethical opinion)<br>Complete draft Literature Review and Methods chapters<br>Draft incomplete Introduction chapter |
| January to February | Progress review meeting with supervisor and moderator<br>Start study 1 data analysis and study 2 data collection<br>Draft Results chapter |
| March to April | Continue Results chapter including study 2 data analysis<br>Update Literature Review and Methods chapters<br>Undertake study 3 and analysis data<br>Draft Discussion chapter<br>Outline Conclusions chapter |
| May | Complete dissertation and final revisions<br>Final student presentation to supervisor<br>Submit dissertation |