The Future of Electronic Prescribing in Wales

April 2021

Welsh Government

Figures

Tables

1. Executive summary

In line with the vision for healthcare services set out in A Healthier Wales[1], the pharmacy profession's vision for pharmacy in Wales, developed by the Welsh Pharmaceutical Committee, as set out in Pharmacy: Delivering a Healthier Wales[2] and the principles of the Digital Architecture Review[3] this paper sets out the recommended direction of travel for pan sectoral electronic prescribing across Wales for consideration by the Welsh Government. It has been developed with a panel of experts (representing all health sectors[4]), chaired by the Chief Pharmaceutical Officer. It provides the basis for further detailed discovery, planning and implementation including a 3 year roadmap and 3 month action plan.

Electronic Prescribing (also referred to as ePrescribing in this report) means different things to different people across different sectors within health and social care. Within this report, ePrescribing refers to the digitalisation of the whole process of the need for prescriptions by patients, the prescribing of medication by clinicians, the assurance and dispensing of prescriptions by dispensers (community pharmacists, dispensing doctors and appliance contractors) and the auditing and pricing by monitoring authorities.

Today the Welsh ePrescribing landscape is partially digitalised, but with disconnects that require paper interfaces and intervention, including by the patient in a primary care context. The penetration of secondary care ePrescribing beyond specialised services such as cancer services is very low. This has consequences for patient safety, the wider patient experience, and for the efficiency and effectiveness of the system as a whole.

The vision for ePrescribing set out in this paper is for a fully digitalised e-prescribing environment across all care settings in Wales. This means an environment in which prescriptions are electronic irrespective of care setting, and information can be shared across care settings safely and seamlessly in a way that allows the patient to be involved in the process using digital means where appropriate. This will provide an opportunity to transform the delivery of care with medicines, improving efficiency, effectiveness and safety, ensuring that information is readily available at the point of clinical decision making and facilitating the uptake of technology that will provide more 'time to care'. The vision acknowledges the complex nature of the current legislative, technical and care landscape and recommends the managed implementation of digital capabilities in four major areas:

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[1] Welsh Government. 2018. A Healthier Wales. Available at: https://gov.wales/docs/dhss/publications/180608healthier-wales-mainen.pdf

[2] Pharmacy: Delivering a Healthier Wales 2019. Available at https://www.rpharms.com/recognition/all-our-campaigns/pharmacy-delivering-a-healthier-wales/

[3] Digital Architecture Review Report 2019. Available at: https://digitalhealth.wales/events/digital-transformation-programme

[4]   The Expert Panel includes broad leadership representation from the Welsh Government, along with representatives involved in pharmacy and dispensing , GPs, NHS Wales 111, WAST, out of hours, Community, secondary care, community, the BMA, patients, and Digital Health and Care Wales (DHCW).

- Seamless Primary Care E-prescribing Capabilities - A set of capabilities for the seamless digital sharing of medicines information, prescriptions, and dispensing records, between dispensing surgery or appliance contractor), Hospital to GP)

- Secondary Care E-prescribing Capabilities - Hospital ePMA systems across Wales that build on a set of common set of open standards and principles that provide end to end e-prescribing secondary care capabilities together with interoperability with other care settings in Wales.

- Patient App - A patient app or apps that allows data sharing from GP and hospital systems to patient to allow the patient to be a full partner in their care with respect to prescribing.

- National Medicines Repository - An open and accessible medicines repository that would include all current medicines and be accessible to all with a legitimate right of access.
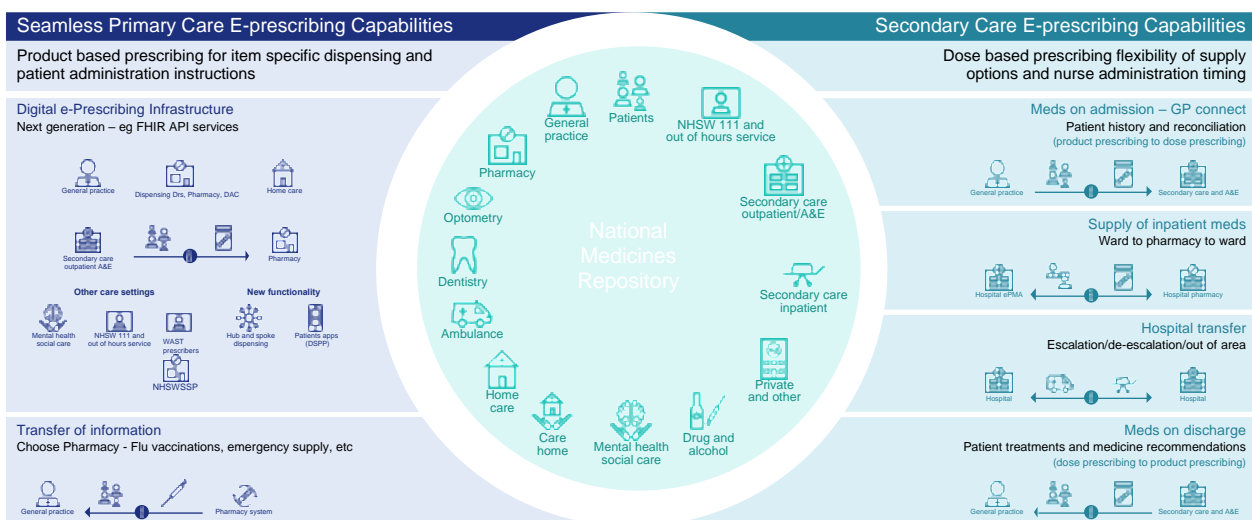
Figure 1 – The future e-prescribing landscape

These capabilities can be delivered to a large extent in parallel without hard technical dependencies between the pillars. For example, as long as open architecture principles are applied in line with the Digital Architecture Review, primary and secondary care capabilities can be delivered alongside each other.

To enable the vision and capabilities required to be delivered, the report recommends that a structured programme of delivery is established, within an overarching governance framework; and each pillar of delivery will be undertaken as a separate project within that transformation programme. It is also recommended that the current Expert Panel acts as an overall Design Authority for this programme.

The recommendations to the Welsh Government are set out below, with the next steps being:

- Agreement of overall proposed approach by Welsh Government and Welsh Ministers
- Establishment of the proposed transformation programme governance arrangements
- Detailed Programme Definition and Project Definition for each of the four main capability areas.
- Foundation steps for Primary and Secondary Care solutions specifically:
  - High level solution design
  - Outline Business Case
  - Detailed Plans and Resourcing
  - Supply Strategy

Recommendations

No	Recommendation	Ref.
R1.	Confirm the vision and scope for the transformation of e-Prescribing based on the four priorities set put in this report namely: A – Seamless e-prescribing capabilities in primary care B – Secondary care e-Prescribing capabilities C – Patient App development D – National Medicines Repository	Section 4
R2.	Consider combining the existing Expert Panel and clinical reference group – subject to Programme Board arrangements with respect to key personnel – as a Design Authority for the e-Prescribing Programme as a whole and consider interfaces with the Welsh Technical Standards Board for key aspects of design including, but not limited to, clinical workflow coherence and standard for prescribing users interfaces.	Section 5
R3.	Establish a Wales wide e-Prescribing transformation programme in line with the recommendations in this report with due consideration to how existing bodies (the WHEPPMA Board, e-Prescribing Expert Panel, and Clinical Reference Group), are adjusted or evolved in line with the recommendations of this report.	Section 5
R4.	Seek sponsorship from Health Boards for initial implementation targets for priorities A and B.	Section 5
R5.	Develop detailed plans for the transformation programme including agreeing dependencies with and from the NDR and DSPP projects.	Section 5
R6.	Establish Projects for priorities A and B from the start of FY 21/22 with a specific focus on completing the Foundation stage of delivery in the first quarter of the year and specifically deliver the following by end June 2021: • Agreed Outline Business Case • Agreed Project Definition • Agreed Project Plan • Agreed Requirements • Agreed High Level Design • Agreed resources and funding • Agreed Governance	Section 5
R7.	Conduct a detailed review of the options for delivering seamless primary care e-prescribing including the potential adoption of an existing Electronic Prescription Service solution in support of Priority A.	Section 5
R8.	Conduct a market assessment to confirm options for open systems ePrescribing technologies in support of Priority B (secondary care)	Section 5

Table 1 Recommendations

2. Background and context

In line with the vision for healthcare services set out in A Healthier Wales[5], the pharmacy profession's vision for pharmacy in Wales, developed by the Welsh Pharmaceutical Committee, as set out in Pharmacy: Delivering a Healthier Wales [6] and the principles of the Digital Architecture Review[7] this paper sets out the recommended direction of travel for pan sectoral electronic prescribing across Wales for consideration by the Welsh Government. It has been developed with a panel of experts (representing all health sectors[8]), chaired by the Chief Pharmaceutical Officer. It provides the basis for further detailed discovery, planning and implementation including a 3 year roadmap and 3 month action plan.

Electronic Prescribing (also referred to as ePrescribing in this report) means different things to different people across different sectors within health and social care. For the purpose of this report ePrescribing refers to the digitalisation of the whole process of the need for prescriptions by patients, the prescribing of medication by clinicians, the assurance and dispensing of prescriptions by pharmacists, dispensing doctors and appliance contractors and the auditing and pricing by monitoring authorities.

ePrescribing should cover the end-to-end journey for all people within the health care system considering the patient journey and new modes of accessing healthcare services, for example virtual clinics. The ability to prescribe medication has become a powerful tool for non-medical prescribers across sectors and the need for a standardised electronic prescription capable of seamless integration is increasingly important.

The rest of this section outlines the main policy, pharmacy, legislative and digital context for the review.

2.1. Policy context

A Healthier Wales sets out the Welsh Government's commitment to significantly increase investment in digital health and care to support the transformation of the health and social care system in Wales. A Healthier Wales acknowledges the significant challenge of driving digital change at pace and scale. It identifies priority areas for investment, describes a new 'open platform' approach to digital innovation, and recognises the need to strengthen national leadership and delivery arrangements. This aligns with and responds to the work of the Parliamentary Review

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[5] Welsh Government. 2018. A Healthier Wales. Available at:
https://gov.wales/docs/dhss/publications/180608healthier-wales-mainen.pdf
[6] Pharmacy: Delivering a Healthier Wales 2019. Available at https://www.rpharms.com/recognition/all-our-campaigns/pharmacy-delivering-a-healthier-wales/
[7] Digital Architecture Review Report 2019. Available at: https://digitalhealth.wales/events/digital-transformation-programme
[8] The Expert Panel includes broad leadership representation from the Welsh Government, along with representatives involved in pharmacy and dispensing , GPs, NHS Wales 111, WAST, out of hours, Community, secondary care, community, the BMA, patients, and DHCW.

of Health and Care, and with reports and recommendations by the Wales Audit Office and the Public Accounts Committee.

2.2. Pharmacy context

In 2018, the Minister for Health and Social Services invited the Welsh Pharmaceutical Committee to "work with stakeholders to develop a plan describing the future roles of pharmacy professionals in Wales and the steps to be taken by all stakeholders to maximise their use". Pharmacy: Delivering a Healthier Wales is the product of that work.

In preparing, Pharmacy: Delivering a Healthier Wales, all parts of the pharmacy profession have unified behind a consensus view of how, through the better use of the unique knowledge and skills of pharmacists and pharmacy technicians, it can make a greater contribution to improving the health and wellbeing of the citizens of Wales.

The paper envisages a pharmacy workforce with a greater focus on clinical care, supported by innovation and technology. It seeks to deliver seamless pharmaceutical care and completely digitise medicines prescribing and associated processes.

The vision is of an independent pharmacist prescriber in every pharmacy with an increased focus on prevention and early detection of illness. The aspiration is for the supply of medicines to include a clinical interaction to ensure that the patient is fully informed about their medication and is involved in decision making about their health and wellbeing. This will require access to electronic prescribing functionality within the pharmacy and possibly elsewhere if domiciliary visits were to be contemplated. The aim is to support this via a cloud based electronic prescription system alongside the introduction of electronic prescribing and medicines administration (ePMA) systems into Welsh hospitals.

The adoption of new technologies in the pharmacy will help to encourage and facilitate this interaction whilst ensuring medicines are supplied in a way that reflects patients' expectations, which will, subject to changes to UK legislation, include the use of hub and spoke arrangements and changes to requirements for the supervision for the sale and supply of medicines. Where appropriate, the supply of medicines could be automated and supported by Artificial Intelligence.

Wales also aligns fully with the UK's 5-year action plan for tackling antimicrobial resistance, which sets out to 'Ensure that all NHS hospitals have electronic prescribing systems within the electronic health record by 2025.

2.3. Legislative context

As with all prescribing activity, electronic prescribing is governed by UK medicines and other legislation. This legislative context will inform the purchase, development or use of ePrescribing systems or processes. There are some key pieces of legislation governing the delivery of ePrescribing in Wales. These include:

- Human Medicines Regulations 2012 (and subsequent amendments) which:

    - Identifies 'content' of a prescription

    - Defines an 'advanced electronic signature'

    - Sets limitations on digital transfer of certain prescription types

- Misuse of Drugs 2001 and subsequent amendments which:

  - Identifies the requirements for the 'content' of a Schedule 2 or 3 Controlled Drug Prescription

  - Authorises the use of advanced electronic signatures by certain practitioners

- National Health Service (Wales) Act 2006 which:

  - Identifies the contractual relationship with practitioners and hospitals

- Welsh Language Act 1993

- Laws on Patient Confidentiality, Data Security, General Data Protection Regulations also apply where electronic information is exchanged

In addition, primary care contractors (largely General Practitioners and Community Pharmacists) are subject to Regulations under the National Health Services (Wales) Act and amendments to these regulations may be required before any process for the digital sharing of prescription information could be introduced.

There are specific constraints introduced by the Human Medicines Regulations 2012 (and subsequent amendments), which allow the creation of electronic prescriptions under certain conditions.   These require that the prescription is:

(a) created in electronic form

(b) signed with an advanced electronic signature; and

(c) sent to the person by whom it is dispensed

　(i) as an electronic communication (whether or not through one or more intermediaries), and

　(ii) via the electronic prescription service, if it is for a substance or product for the time being specified in Schedule 2 or 3 to the Misuse of Drugs Regulations 2001(c) or in Schedule 2 or 3 to the Misuse of Drugs Regulations (Northern Ireland) 2002(d)." .

In this regulation "advanced electronic signature" means an electronic signature that is

(a) uniquely linked to the person ("P") giving the prescription.

(b) capable of identifying P;

(c) created using means that P can maintain under P's sole control; and

(d) linked to the data to which it relates in such a manner that any subsequent change of data is detectable.

2.4. Digital context

In 2018, the Welsh Government commissioned two major reviews of digital delivery in Wales looking at how digital systems are designed to work together ('the Digital Architecture Review') and at delivery structures and decision-making arrangements ('the Digital Governance Review'). These two reviews provide the context for changes to our approach and delivery, which will ensure that significant additional investment is deployed effectively and at pace.

Better data collected as part of widespread digital service delivery has significant potential to improve health and care service planning and delivery, for example through intelligent use of data insights and analysis, real-time clinical decision validation and support, and the continued application of 'big data' and 'artificial intelligence' in a health and care context. The Digital Architecture Review and the Digital Governance Review set out the roadmap for how this can be achieved. The Digital Architecture Review in particular sets out a vision for how "open systems architectures" can eventually support this ambition and provides a technical context for this review.

3. Today's e-prescribing landscape in Welsh health and social care

This section provides an assessment of the current maturity of e-prescribing across the Welsh Health and Care system and considers three broad, but interconnected domains against a capability reference model, and in terms of the extent to which information and data flows across the system are fully electronic, paper based, or hybrid. The domains considered are:

1. Primary Care – with a focus on GP prescribing and community dispensing, but considering the linkage to other care settings including, but not limited to, social care, domiciliary care, hospices and secondary care.

2. Secondary Care – with a focus on hospital dispensing but considering the links with primary care.

3. Other care settings – proving more detail on prescribing by dentists, ophthalmologists, pharmacists and medicines delivery in hospices, social care, and prisons.

The overall picture discussed and agreed with stakeholders including the Expert Panel is of an ePrescribing landscape that is partially digitalised, but with disconnects that require paper interfaces and intervention including by the patient in a primary care context, and where the penetration of secondary care ePrescribing beyond specialised services such as cancer services is very low.

The following sections describe this picture in detail.

3.1. Primary care

The primary care e-prescribing landscape in Wales is partially digitalised. It is characterised by is a mix of electronic and paper based systems and approaches, with disconnects that require paper interfaces and intervention, including by the patient.

Today in Wales, the digital prescription generated from the GP system is printed onto a paper prescription form within the practice, which must be hand-signed by the prescriber. The prescription includes a 2D barcode to facilitate data update into the dispensing system (community pharmacy, dispensing doctor or appliance contractor).

A record of the digital prescription is retained in the GP system as part of the individual patient's record and is also available through the Welsh Clinical Portal.

Prescriptions are manually transferred to community dispensers, either Pharmacists, dispensing practices, or appliance contractors (specialist suppliers of medical appliances, such as stoma care products). These dispensers use proprietary dispensing systems that support labelling and some stock control. Information from the prescription can be uploaded into the pharmacy dispensing system by scan of the 2D barcode on the paper prescription.

Submission of dispensing details for payment is electronic but continues to be supported by a paper-based process, involving sending annotated prescriptions to the NHS Wales Shared Services Partnership. Until Dec-2020, these systems also supported the capture and submission of information about the use of a product under the requirements of the Falsified Medicines

Directive (introduced Feb-2019). Some systems use this barcode to provide positive confirmation of the accuracy of dispensing and to improve stock control. The following case story illustrates what this means in practice for patients and carers.

Mrs Roberts is 81yearsold and is on regular medication for her hypertension, ischaemic heart disease and heart failure, her medicines are stable and have not changed for over 2 years. She requests a repeat prescription from her GP through My Health Online.

The prescription is generated in the surgery as a batch process, together with other repeats due that day and is passed to the GP to sign. The signed prescription is then collected by Mrs Roberts' neighbour and taken to the local pharmacy.

Once the prescription has been authorised by a pharmacist, a member of the pharmacy staff scans the 2D barcode and the prescription information is loaded into the pharmacy system. A list of labels is printed, and the dispenser selects the appropriate medicines from the shelves and affixes the labels.

The dispensed medicines are checked by the pharmacist, bagged and passed to the neighbour, who had opted to wait for the medicines to be dispensed. The neighbour delivers the medicines to Mrs Roberts.

Details of what has been dispensed is shared electronically with the Shared Services team and confirmed by the monthly delivery of all of the endorsed prescriptions from the pharmacy, sent at the end of the month. The paper prescriptions are scanned and compared with the electronic claim for audit purposes.

Figure 2 – Case story – The patient experience today in primary care

To assess the maturity of ePrescribing in Wales in more detail we have used a reference model setting out the elements of the system and reviewed the extent to which they are digitalized. The "heat map" below sets out the "out of hospital" electronic prescribing landscape in terms of the major building blocks supporting the patient. In a fully digitalised system, we would expect these building blocks to represent interconnected digital systems and capabilities. For each we have assessed the extent to which they are currently supported by digital technologies in Wales and colour coded them according where:

- Red – represents something that is entirely paper based.

- Amber – represents something that is partially digitalised – perhaps with paper hand offs or paper systems playing a major role.

- Green – represents something that is supported fully by digital systems.

- Digital capabilities in place in 'e-prescribing' in primary care in Wales
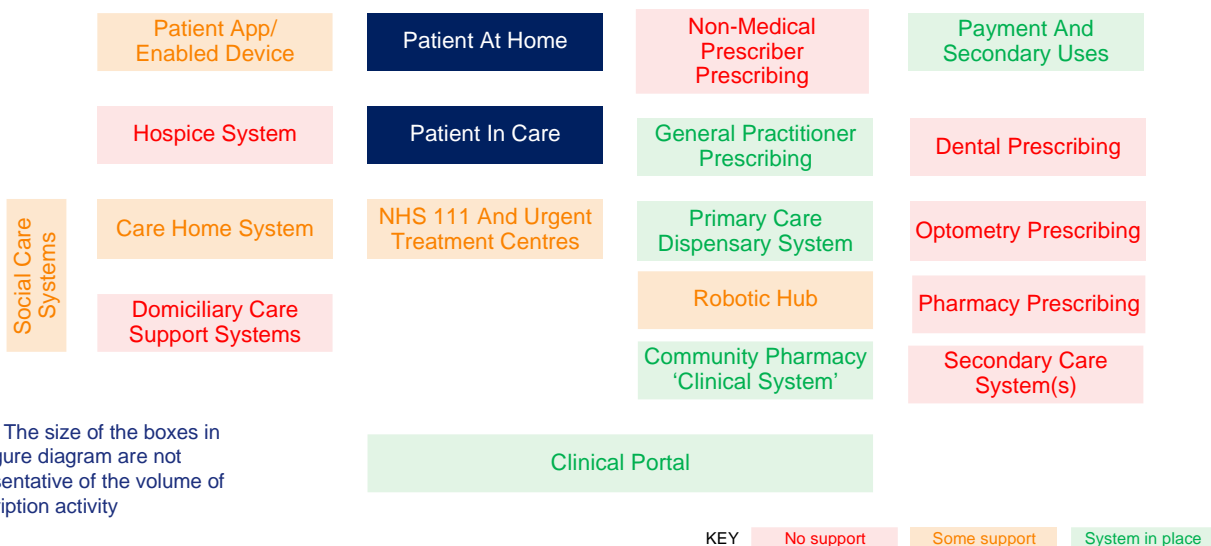
Patient App/ Enabled Device	Patient At Home	Non-Medical Prescriber Prescribing	Payment And Secondary Uses
Hospice System	Patient In Care	General Practitioner Prescribing	Dental Prescribing
Care Home System	NHS 111 And Urgent Treatment Centres	Primary Care Dispensary System	Optometry Prescribing
Domiciliary Care Support Systems		Robotic Hub	Pharmacy Prescribing
		Community Pharmacy 'Clinical System'	Secondary Care System(s)

(Social Care Systems)

Clinical Portal

Note : The size of the boxes in this figure diagram are not representative of the volume of prescription activity

KEY — No support — Some support — System in place

Figure 3 - Digital capabilities in place in 'e-prescribing' in primary care in Wales

The detailed position is described in the each of the following sections.

3.1.1. Prescribing

Electronic prescriptions in primary care are generated by prescribers (largely General Practitioners) using proprietary GP systems that include ePrescribing functionality. The aim of these prescriptions to provide the authorisation for the supply of the medicine to the patient through a dispensing process.

Prescriptions that are generated outside of a GP system, by non-medical prescribers, e.g. Dental or Optometry prescriptions or prescriptions from pharmacists working in the community, or WAST paramedics, use a paper process, involving the use of 'controlled stationery' prescription pads, as electronic prescribing functionality is not currently available within the systems they may use to document care delivery.

The digital prescription generated, in the GP surgery, is printed onto a paper prescription form within the practice, which must be hand-signed by the prescriber. The prescription includes a 2D barcode to facilitate data upload into the community pharmacy dispensing system, often known as a Patient Medication Record (PMR) System or into the systems used in a dispensing doctor practice or by an appliance contractor. Some of the information, particularly dose and frequency, may need a manual update.

The digital detail of the prescription is retained in the GP system as part of the individual patient's record and is shared with the Welsh Clinical Portal.

There was an initiative to establish an 'all Wales' system for GPs in 2018, with the contract awarded to the Microtest and Vision, proprietary GP systems. The contract with Microtest was cancelled in 2019 and most GPs currently use either the Vision or EMIS GP proprietary systems. There is an intention to retender, but the availability of suppliers in this market indicates that any successful winner would be one or more of the four current proprietary GP systems.

3.1.2. Dispensing

Prescriptions are manually transferred to community dispensers, either pharmacies, dispensing practices, or appliance contractors. These dispensers use proprietary dispensing systems that

support labelling and some stock control. Information from the prescription can be uploaded into the pharmacy dispensing system by scan of the 2D barcode on the paper prescription. The dose and frequency of administration information needs to be edited as this is currently in a text format and may involve abbreviations that need to be 'translated' for labelling purposes.

Once dispensed, medicines are either handed to the patient / representative or are delivered to the patient's home (where such a service has been developed). Delivery is not part of the NHS contractual arrangements and is normally reserved for housebound patients.

Submission of dispensing details for payment is a digital process, which is supported by a paper-based process, involving sending annotated prescriptions to the NHS Wales Shared Services Partnership, for audit and confirmation purposes and because the paper prescription is the 'legal document'. These paper prescriptions are scanned, automatically checked, or manually checked where there are queries, and used both to facilitate reimbursement and to provide data for secondary uses.

3.1.3. Automation

There are examples of the use of robotic 'assembly' of prescriptions, within an individual pharmacy, within a 'hub and spoke' model. Such assembly is currently a decision made by individual contractors and is not part of NHS contractual arrangements.

3.1.4. Pharmacy Additional Services Data

Community pharmacies also provide direct care services and a range of other clinical support services for patients. Pharmacies are being encouraged to provide more of these 'additional' clinical services and 97% of pharmacies use the 'Choose Pharmacy' product, provided by Digital Health and Care Wales (DHCW), to capture this 'additional service' information. Data from this product is available for secondary use purposes.

3.1.5. NHS Wales Shared Services Partnership

Data from dispensing systems is shared electronically the NHS Wales Shared Service Partnership (NWSSP) to facilitate reimbursement. As the paper prescription is the legal document, this must also be sent to NWSSP and this is done at the end of each month. Prescriptions are then scanned and matched to the electronic claim, where automated matches are not possible, items are flagged for operator intervention.

Data from Choose Pharmacy is also used to support pharmacy payments. Data from each source is used to support audit and research (secondary uses).

3.1.6. Border issues

The different processes in Wales and England can cause difficulties for patients living and working across the border between the two home nations. Legally patients can have any valid prescription dispensed in any pharmacy in the UK, but there are challenges based on the country of origin of the prescription. Whilst Welsh prescriptions can be dispensed in England, (as the paper prescription is the legal document), the move to complete use of EPS in England means that patients who wish to 'walk into', rather than nominate, a pharmacy, receive a 'token' that gives access to the (legal) electronic prescription. This token, whilst currently using the standard prescription print out, is unsigned and so is not the prescription. These electronic prescriptions

(accessed by barcode on the token) can only be dispensed by a pharmacy connected to the NHS Spine using an EPS enabled system.

3.1.7. Patient Support

Some patients are supported in their medicines taking by Apps which prompt when medicines are due and remind patients to reorder their supply. These Apps are often linked to a particular pharmacy chain or provider and 'tie' the patient to that pharmacy in terms of medicine supply.

3.1.8. Secondary uses

Details from the paper prescription, once dispensed, are sent to the NHS Wales Shared Services Partnership. The paper prescriptions are also submitted monthly to the NHS Welsh Shared Services Partnership to confirm the details for reimbursement.

Data obtained through the payment process is made available to support audit, research, medicines management and procurement policies, however these data have some limitations in terms of secondary uses. The patient demographic details from the pricing information cannot be used to link to patient data from other sources, restricting the ability to use these data for research purposes. Data for secondary use purposes can also be accessed from the 'Choose Pharmacy' application, which is used to capture details of the 'additional services' (other than dispensing) provided by pharmacies.

3.1.9. Data Flow

To assess the maturity of prescribing data flows in Wales in more detail we have reviewed the extent to which the major interfaces within the system are digitalized. The "heat map" focuses on those interfaces. For each we have assessed the extent to which they are currently supported by digital technologies in Wales and colour coded them according where:

- Red Cross – represents an interface something that is entirely paper based.

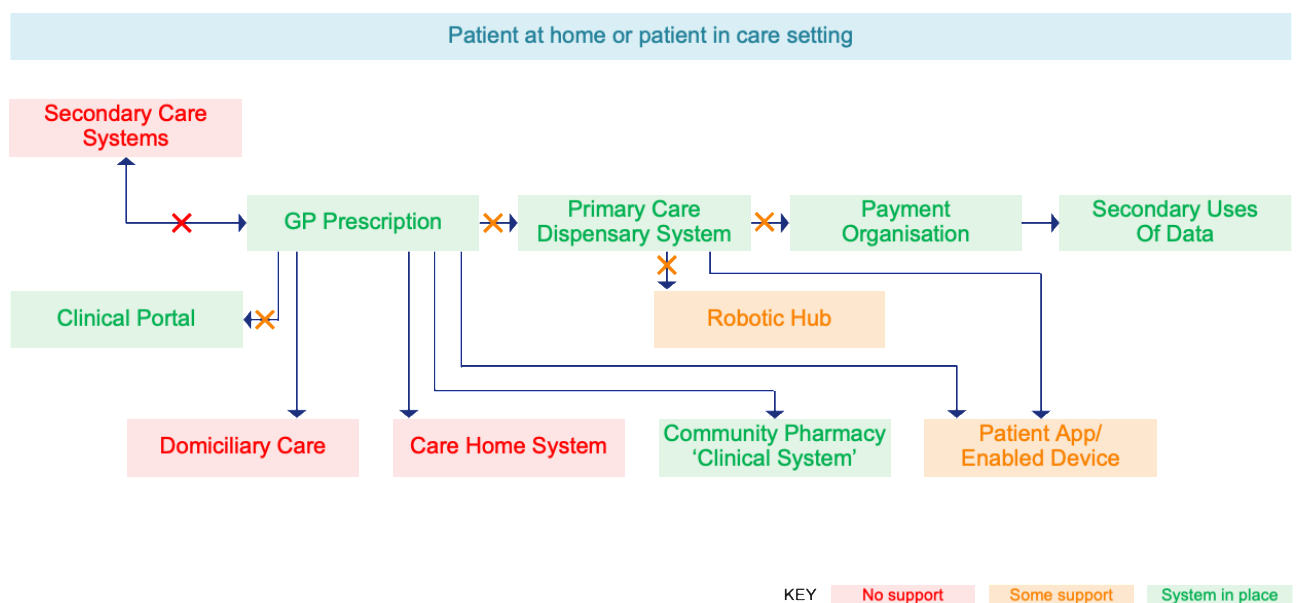- Amber Cross – represents something that is partially digitalised.

Figure 4 - Digital data flows in primary care in Wales today

As described in detail in the sections above, the digital prescription generated from the GP system is printed onto a paper prescription that includes a 2D barcode to facilitate data update into the dispensing system.

Prescriptions are manually transferred to community dispensers. Submission of dispensing details for payment is electronic but continues to be supported by a paper-based process.

3.2. Secondary care

The current process for inpatient care in Wales is a largely paper-based system, although there are systems to support Chemotherapy and a new system for Intensive Care Units (ICU) is being introduced.

There is a DHCW product to support eDischarge (MTeD), but it is not completely digital, and although the Medicines on Admission data can be accessed to inform the (paper) inpatient prescription, this involves manual transcription of the information. The MTeD system can be used to auto-populate an eDischarge for manual amendment. Not all Health Boards use this system to support discharge.

There has been progress in the acquisition of 'specialist systems'. A number of hospitals use the specialist chemotherapy system 'Chemocare' and a decision was taken recently to procure an all Wales Intensive Care Unit system (Digistat – Ascom), which was completed in Oct-2020.

There is widespread use of robotic dispensing systems in hospitals in Wales and considerable use of electronic medicines cabinets. Robotic dispensing systems will have a data flow from the dispensary system that picks the current item as the dispensing label is generated for each prescription item. There is a data flow between the current dispensary systems and the automated cabinets at ward level but the granularity and utility of this varies between deployments. Data flows between these automated systems and WellSky, the replacement dispensary system, is well established in other jurisdictions within the UK.

Currently information about medicines on admission (from the GP record) is available from the Welsh Clinical Portal. This can be imported into the eDischarge system and manually amended to support the discharge process, but the inpatient process remains paper based. Data from the eDischarge system is shared with the Welsh Clinical Portal and may be available for audit and management purposes but it is unclear if this is the case.

Data from eDischarge is not able to be incorporated directly into the GP system or the Choose Pharmacy system but is sent to GPs as a document (pdf) and can be similarly shared with the Choose Pharmacy application.

In the absence of a 'general' electronic Prescribing and Medicines Administration system in hospitals, the issue of data flows into hospital, or between hospital systems is moot. However, it is unlikely that either the Chemotherapy systems or the Intensive Care systems currently have any ability to 'share' data electronically with other systems.

The following case story illustrates what this means in practice for patients.

Mrs Roberts is admitted after a fall at home. In order to understand which medicines she is currently taking, both the admitting doctor and the pharmacist obtain a 'history' from Mrs Roberts, review the medicines she brought into hospital and consult the Welsh Clinical Portal to ensure they have a comprehensive list of the medicines she is currently taking. Had Mrs Roberts been treated for Rheumatoid Arthritis and been on etanercept from a Homecare deliver, this information would probably not have been available at the point of admission (unless volunteered by Mrs Roberts).

The medication history is then transcribed from the medical notes onto an inpatient chart. As Mrs Roberts condition fluctuates, changes are made to the inpatient chart, sometimes with a note in the medical notes about why the change has been made (but often this can be omitted).

When she is due for discharge the clinician will prepare a discharge prescription and an e- discharge summary, using the Medicines Transcribing and E-discharge (MTeD) system, within the Welsh Clinical Portal and amending this with information transcribed from the inpatient chart. It may be possible to glean the reasons for any changes from the medical record, but this may not always be possible.

The e-discharge summary is shared with the GP as a portable document format (pdf) attachment. The same discharge summary can be shared with the pharmacist, from the Welsh Clinical Portal, through the Choose Pharmacy application, if the patient consents to information sharing.

The GP must then read the document and make decisions about implementing any changes, which must then be done manually within the GP system.

Figure 5 – Case story – The patient experience today in secondary care

As for primary care above, we have used a refence model setting out the elements of the system in secondary care and reviewed the extent to which they are digitalized. The "heat map" below sets out the in hospital electronic prescribing landscape in terms of the major building blocks supporting the patient. In a fully digitalised system, we would expect these building blocks to represent interconnected digital systems and capabilities. For each, we have assessed the extent to which they are currently supported by digital technologies in Wales today, and colour coded them accordingly where:

- Red – represents something that is entirely paper based.

- Amber – represents something that is partially digitalised – perhaps with paper hand offs or paper systems playing a major role.

- Green – represents something that is supported fully by digital systems.

The overall current position is illustrated below and detailed in the following sections and reflects a position where there, whilst there is some key technology support in place in many Health Boards for the administration of medicines and pharmacy (shown in green), there is limited, if any, e-prescribing capabilities across the hospital system in Wales (shown in red reflecting limited digital support for prescribing outside of cancer care).
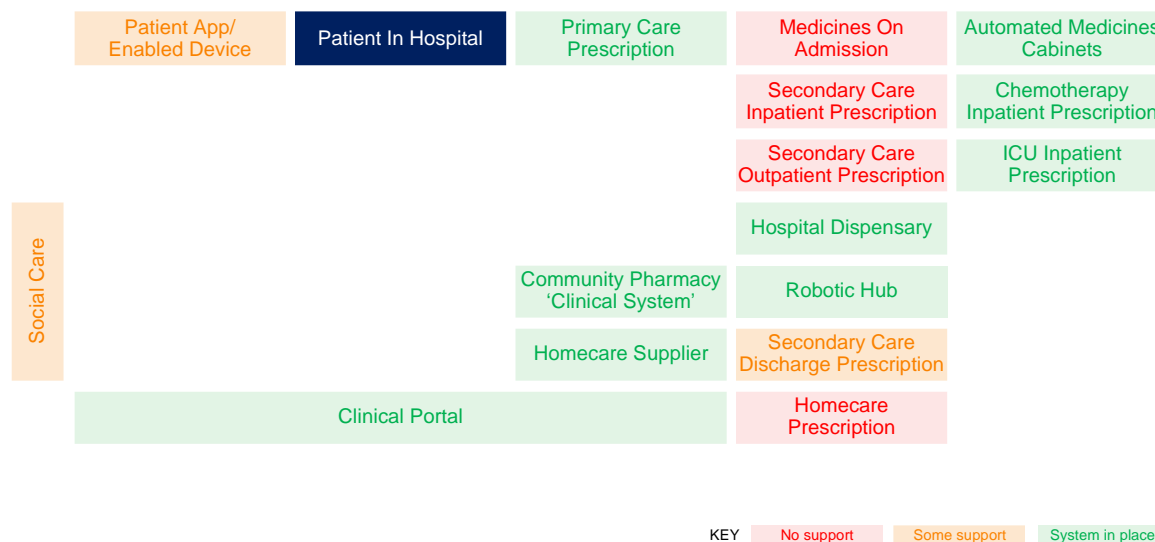
Patient App/ Enabled Device	Patient In Hospital	Primary Care Prescription	Medicines On Admission	Automated Medicines Cabinets
			Secondary Care Inpatient Prescription	Chemotherapy Inpatient Prescription
			Secondary Care Outpatient Prescription	ICU Inpatient Prescription
			Hospital Dispensary	
Social Care		Community Pharmacy 'Clinical System'	Robotic Hub	
		Homecare Supplier	Secondary Care Discharge Prescription	
	Clinical Portal		Homecare Prescription	

KEY No support Some support System in place

Figure 6 - Digital capabilities in place in 'e-prescribing' in secondary care in Wales

3.2.1. Prescribing

Prescribing within hospital has a number of facets, with different 'prescription types' having different purposes and influenced by different legislation. Currently, there is little electronic prescribing in hospitals in Wales and most medicines information is captured using a paper process.

In most processes, the list of medicines that the patient is currently taking is used to inform the ongoing care of the patient (with medicines) whilst in hospital. This list of Medicines on Admission (MoA) can be informed from a variety of sources, including the patient themselves, the medicines they may bring into hospital with them, or data from the Welsh Clinical Portal. Whilst the optimal process may be to obtain a data flow from the GP system into the hospital's electronic prescribing and medicines administration (ePMA) system, this is a 'future state' ambition, in the absence of hospital ePMA systems. There are 'challenges' in how prescription details are expressed in hospital, compared with primary care but (digitally) transforming primary care structures into hospital structures, whilst complicated, is not insurmountable.

Inpatient prescriptions provide the necessary information about what medicines need to be administered to the patient and when. Consequently, the inpatient prescription differs from a GP prescription in that the route of administration must be specified (in a GP prescription the dose form is important – but this is less so in hospital) and the frequency of administration must be clearly stated to allow the creation of an administration schedule for administration. (This would require a structured 'frequency of administration' to be available from the GP record to support scheduling in any future electronic hospital system, which is not currently the case).

It is not unusual for the route of administration for a medicine to be expressed in a way that allows discretion to the administering nurse, such as 'intravenous or oral', depending on the patient's condition or availability of intravenous access. If this flexibility is to be used, this usually requires

the medicine to be described as a chemical entity, (for example 'paracetamol'), rather than as a 'product', (paracetamol 500mg tablets). Hence a GP prescription might be, ''paracetamol 500mg tablets, 2 tablets, four times a day as required for pain''; whereas a similar hospital prescription may be ''paracetamol, 1g, IV / oral, four times a day, as required for pain''. This presents particular challenges for data sharing between medicines details captured in GP systems and is a 'potential challenge' to seamless data exchange.

Inpatient prescriptions are 'instructions to administer' and whilst these may be dually used to prompt the supply of a medicine, they are primarily focused on informing the administration of the medicine. Changes to inpatient prescriptions are made in response to the patient's changing conditions and may be alterations of an existing treatment, or discontinuation and replacement by another. Ideally in an electronic system, such changes would be captured, together with the reason for the change, to inform the GP of the reasons for change after the patient has been discharged. It is much easier to capture the reason for change from the person making the change, at the time the change is made, rather than trying to infer it at the point of discharge.

It seems that the current process for inpatient care in Wales is a paper-based system, although there are systems to support Chemotherapy and a new system for Intensive Care Units (ICU) is being introduced

Discharge prescriptions are 'prescriptions' and facilitate the supply of a medicine to the patient at discharge.

Whilst information about the details of GP prescribed medicines is available from the Welsh Clinical Portal to inform the list of 'Medicines on Admission', which are manually transcribed onto the inpatient chart, these details are also automatically added to the Medicines Transcribing and E-discharge (MTeD) system, within the Welsh Clinical Portal. Not every Health Board uses this system and so paper systems are also in use.

From here the list of medicines can be manually amended to align with the changes made during the hospital stay to form the discharge prescription and the medicines aspects of the discharge summary. This latter is shared with the GP as an embedded document and is accessible from the Welsh Clinical Portal via the Choose Pharmacy system, if the patient provides their permission.

Outpatient prescriptions are prescriptions that can be dispensed 'in-house' by the hospital dispensary or sent out to a community pharmacy (which requires the use of approved stationary, hospital WP 10 (HP) prescriptions). These prescriptions need to comply with all current medicines' legislation. Outpatient prescribing is currently a paper process and the handwritten WP 10(HP) prescriptions have no 2D barcode so are manually dispensed.

Homecare prescriptions are similar in nature to outpatient prescriptions in that they authorise the supply of medicines from a specified, external supplier (homecare supplier, who is a register community pharmacy). Unlike WP 10 (HP)-type prescriptions, the prescription is dispensed by a specific supplier and payment for these medicines is made through the hospital. This is a paper process, and this results in poor availability of data for 'secondary uses', which is important as many of these medicines are high cost.

3.2.2. 'Specialist' prescribing systems.

Electronic prescriptions for chemotherapy can require complex interdependent scheduling and medication admixtures. Consequently, such prescriptions (whether for inpatient or outpatient care) are often undertaken using bespoke chemotherapy systems. Similarly, prescriptions to support patient in intensive care often require titration against various patient observations or laboratory findings and consequently most hospitals opt to use bespoke intensive care functionality.

There has been progress in the acquisition of such 'specialist systems'. A number of hospitals use the specialist chemotherapy system 'Chemocare' and a decision was taken recently to procure an all Wales Intensive Care Unit system (Digistat – Ascom), which was completed in Oct-2020.

By their nature, specialist systems provide functionality that is not readily available in systems that have wider application. Hence, to achieve this level of functionality, it would have been necessary to procure a specialist system.

Whilst Mental Health has a range of specialist requirements, in terms of ePrescribing functionality, these will need to feature as part of any future hospital ePMA system, as these services are delivered as part of the secondary care (hospital) service.

One specialist area that is unlikely to have a specific electronic system but requires mention is sexual health. The challenge here is that patients are often anonymised and are not identifiable to allow details to be added to the patient's medical record. This can be significant when medicines are used for the treatment of HIV, which have several drug-drug interactions.

3.2.3. Dispensing systems

In Feb-2020, Digital Health and Care Wales signed a contract for an all-Wales proprietary hospital pharmacy system from WellSky. Whilst the rollout of this system has begun, it is unclear how far this has progressed and when existing systems will be replaced. Currently data entry into these pharmacy systems is manual data entry from a paper prescription, inpatient chart or requisition.

3.2.4. Automation

There are robotic dispensing systems in use in many hospitals in Wales and there is considerable use of electronic medicines cabinets. Robotic dispensing systems will have a data flow from the dispensary system that picks the current item as the dispensing label is generated for each prescription item. There is a data flow between the current dispensary systems are the automated cabinets at ward level but the granularity and utility of this varies between deployments. Data flows between these automated systems and WellSky, the replacement dispensary system, is well established in other jurisdictions within the UK.

3.2.5. Data Flows

The data flows across the Welsh secondary care system are illustrated below, together with an illustration of the extent to which they are digitally enabled. For each major interface we have assessed the extent to which they are currently supported by digital technologies in Wales and colour coded them according where:

- Red Cross – represents an interface something that is entirely paper based.
- Amber Cross – represents something that is partially digitalised.
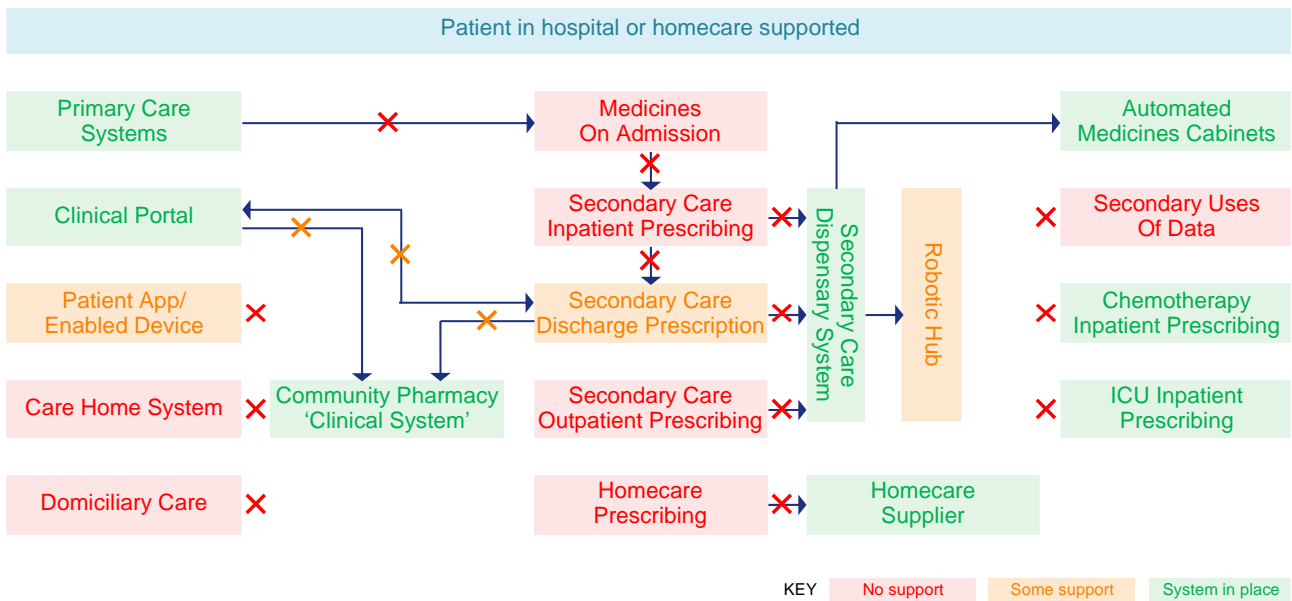
Figure 7 - Digital data flows in primary care in Wales today

Currently information about medicines on admission (from the GP record) is available from the Welsh Clinical Portal. These can be used to inform the list of medicines on admission and manually transcribed onto the inpatient chart. These details are also automatically added to the Medicines Transcribing and E-discharge (MTeD) system, within the Welsh Clinical Portal. From here the list of medicines can be manually amended to align with the changes made during the hospital stay to form the discharge prescription and the medicines aspects of the discharge summary. Data from eDischarge is not able to be incorporated directly into the GP system or the Choose Pharmacy system but is sent to GPs as a document format (pdf). The information is accessible to pharmacists from the Welsh Clinical Portal via the Choose Pharmacy system if the patient provides their permission.

In the absence of a 'general' electronic Prescribing and Medicines Administration system in hospitals, the issue of data flows into hospital, or between hospital systems is moot. However, it is unlikely that either the Chemotherapy systems or the Intensive Care systems currently have any ability to 'share' data electronically with other systems or currently be able to meet the requirements of the new interoperability standards.

Data to support audit, research or medicines management and procurement initiatives is not readily available, although some data is available from the dispensing systems.

3.3.   Other care settings

A number of other care settings are involved in both primary and secondary care as illustrated in the reference model. The current position on each is set out below.

3.3.1. NHS Wales 111, Out of Hours and Welsh Ambulance Services

Much NHS Wales 111 traffic is electronic, as are the pathways used to guide the response to patients, so these centres will have some technology support. Not all of the systems used to support NHS Wales 111 will also support prescribing, but the new system contracted by NHS Wales 111 services, Salus, includes the provision of support for electronic prescribing from the WellSky system. This ePrescribing system is, as yet, unproven in this environment. Paramedic

prescribers may need to prescribe in a variety of care settings and, if unsupported by the Salus/ WellSky system, will need access to any system introduced to support other non-medical prescribers. Ideally any such system will interface with the new Ambulance System, Terrafix, allowing navigation to the prescribing system for paramedic prescribers.

3.3.2. Dental

Capture of Dental prescriptions, although small volume, is important in terms of efforts to control Antimicrobial Resistance; but would require significant investment in dental systems. These do not currently support electronic prescribing and dental prescriptions are created by hand using a paper process.

3.3.3. Ophthalmology and other non-medical prescribers

Prescriptions generated other than by a GP prescribing system currently use paper processes. This includes prescriptions by optometrists, nurse prescribers, pharmacists and paramedics. Any systems used by these practitioners will not include support for electronic prescribing.

3.3.4. Social Care

Whilst there are more patients in beds in social care than in hospitals, the provision of information technology in this sector is scarce. There has been some deployment of electronic Medicines Administration Record (eMAR) systems into Nursing Homes (but far fewer into Residential accommodation). These are often populated manually but there is an ability to generate the electronic Medicines Administration Record from some of the dispensing (PMR) systems used to supply the medicines, often from one of the larger organisations, where there is ongoing resupply from that pharmacy. There was a planned national procurement for eMAR and there is a specification, but procurement has been delayed by the need to respond to the COVID-19 Pandemic.

3.3.5. Support for domiciliary care

Some domiciliary care is social care mediated but other care in the home is delivered by district nurses or specialist nurses. A key issue is support for terminally ill patients at home, especially in the context of pain control. Again, there was an initiative to procure an eMAR system for domiciliary care, largely aimed at the social care sector and some companies have taken the initiative to supply such systems to provide a record of the care delivered by their staff, but this process has also been paused during the pandemic.

3.3.6. Hospice

Some Hospice organisations may have made the investment in technology to support electronic medicines administration records, (eMAR), but these are unlikely to be widespread and unlikely to be populated by a data feed from the GP prescribing system, so the creation of the administration list will most likely require manual entry of the medicines details.

3.3.7. Private Care

There is a wide range in the provision of 'private' healthcare, from private hospitals, through private 'consulting rooms' and online prescribers accessed through 'internet pharmacies', to private dental care and other care provision such as physiotherapy. Not all of these activities will generate 'prescriptions' but some will, and whilst there is a facility to capture information about the private

provision of (manually written) prescriptions for Controlled Drugs, through the use of controlled stationery, other prescriptions will not be 'visible' to any central health record.

Online prescriptions have enjoyed a somewhat chequered history recently, with reports of uncontrolled access to medicines, particularly opiates, leading to reports of patient harm. Many jurisdictions are struggling with the challenge of effective governance of these activities.

3.3.8. Prisons

The provision of care in prisons, whilst often delivered by staff from the Health Boards is governed by the Department of Justice. The Department of Justice has a contract for the provision of information technology that spans both Wales and England.

The system used to support electronic prescribing is one of the 'standard' GP systems, SystmOne, from TPP. This contract includes a provision for data sharing using the Electronic Prescription Service (EPS) but this element of the contract has not yet been implemented and so prescriptions for external supply will be printed and hand signed.

Within prisons in Wales, there is a range of dispensing systems available. Whilst most are community pharmacy PMR (Patient Medication Record) systems, some dispensaries use the WellSky dispensing product, which is not yet validated to receive EPS messages. Data sharing between the SystmOne prescribing and the various dispensing systems is not yet available.

4. Blueprint for the future of e-prescribing in Wales

This section provides a blueprint for e-prescribing across the Welsh Health and Care system.

The purpose is to support transformational change in the delivery of care by the investment in digital technology that will provide seamless access to information at the point of care for healthcare professionals and their patients. The key requirements are: (A) to establish seamless digital communication of prescription information between prescribing and dispensing systems in primary care, with similar seamless communication of dispensing information on to the payment authority and; (B) to procure an electronic prescribing and medicines administration system, or systems, for hospitals that align with the key principles outlined in the Digital Architecture report of open platform, open standards, and interoperability.

The third strong theme is patient engagement, with the need to support patients in their medicines taking and provide them with information to allow them to play a full part in their own care. To this end, consideration was given to the provision of (C) patient Apps, to allow patients to understand which medicines to take and when, to record their choices not to take certain medicines, if that is their wish, or to record problems they are having with medicines and to ensure that their medicines are resupplied in a timely manner. There was a strong indication that such an App should support a range of languages (including, but not only, Welsh and English) to include all members of the Welsh population and that careful consideration is given to inclusivity to embrace all citizens, including those without access to technology, who might otherwise be 'digitally disenfranchised' from the delivery of care.

Provision of a centralised medicines repository (D), that allows access to the list of medicines the patient is currently taking, regardless of where these originated or are managed from, (GP, Homecare, Mental Health, or other source) was felt to provide a level of patient safety that would streamline the delivery of care, particularly at the interface between primary and secondary care.

There was a recognition that the 'roadmap' for delivery of a digital future must include support for social care, both in care homes and in the patient's own home and encompass the growing body of non-medical prescribers. Delivered in parallel these four major architectural building blocks would represent a step change in the digitalisation of prescribing in the Welsh system.

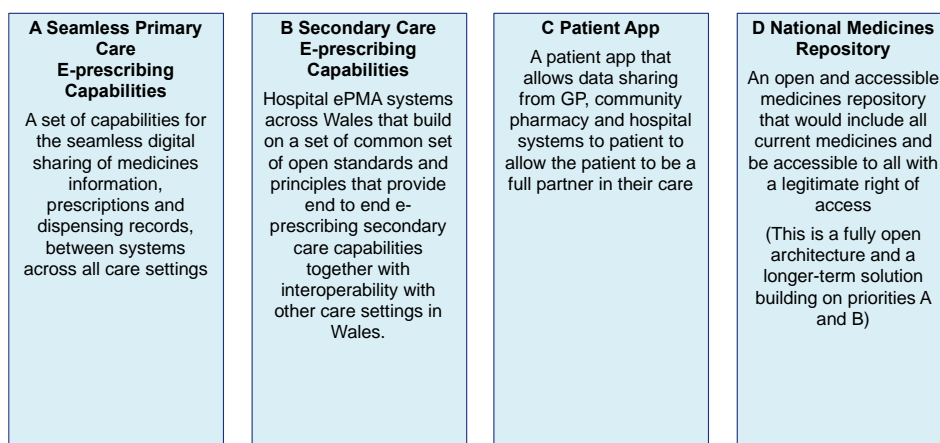| A Seamless Primary Care E-prescribing Capabilities	B Secondary Care E-prescribing Capabilities	C Patient App	D National Medicines Repository
A set of capabilities for the seamless digital sharing of medicines information, prescriptions and dispensing records, between systems across all care settings	Hospital ePMA systems across Wales that build on a set of common set of open standards and principles that provide end to end e-prescribing secondary care capabilities together with interoperability with other care settings in Wales.	A patient app that allows data sharing from GP, community pharmacy and hospital systems to patient to allow the patient to be a full partner in their care	An open and accessible medicines repository that would include all current medicines and be accessible to all with a legitimate right of access (This is a fully open architecture and a longer-term solution building on priorities A and B)

Figure 8 - Core digital priorities for pan Wales e-prescribing

These priorities are located in the future e-prescribing landscape for Wales as illustrated below:

Seamless Primary Care E-prescribing Capabilities

Product based prescribing for item specific dispensing and patient administration instructions

Digital e-Prescribing Infrastructure
Next generation – eg FHIR API services

General practice

Dispensing Drs, Pharmacy, DAC

Home care

Secondary care outpatient A&E

Pharmacy

Other care settings

Mental health social care

NHSW 111 and out of hours service

WAST prescribers

NHSWSSP

New functionality

Hub and spoke dispensing

Patients apps (DSPP)

Transfer of information
Choose Pharmacy - Flu vaccinations, emergency supply, etc

General practice

Pharmacy system

National Medicines Repository

General practice

Patients

NHSW 111 and out of hours service

Pharmacy

Secondary care outpatient/A&E

Optometry

Dentistry

Secondary care inpatient

Ambulance

Private and other

Home care

Care home

Mental health social care

Drug and alcohol

Secondary Care E-prescribing Capabilities

Dose based prescribing flexibility of supply options and nurse administration timing

Meds on admission – GP connect
Patient history and reconciliation
(product prescribing to dose prescribing)

General practice

Secondary care and A&E

Supply of inpatient meds
Ward to pharmacy to ward

Hospital ePMA

Hospital pharmacy

Hospital transfer
Escalation/de-escalation/out of area

Hospital

Hospital

Meds on discharge
Patient treatments and medicine recommendations
(dose prescribing to product prescribing)

General practice

Secondary care and A&E

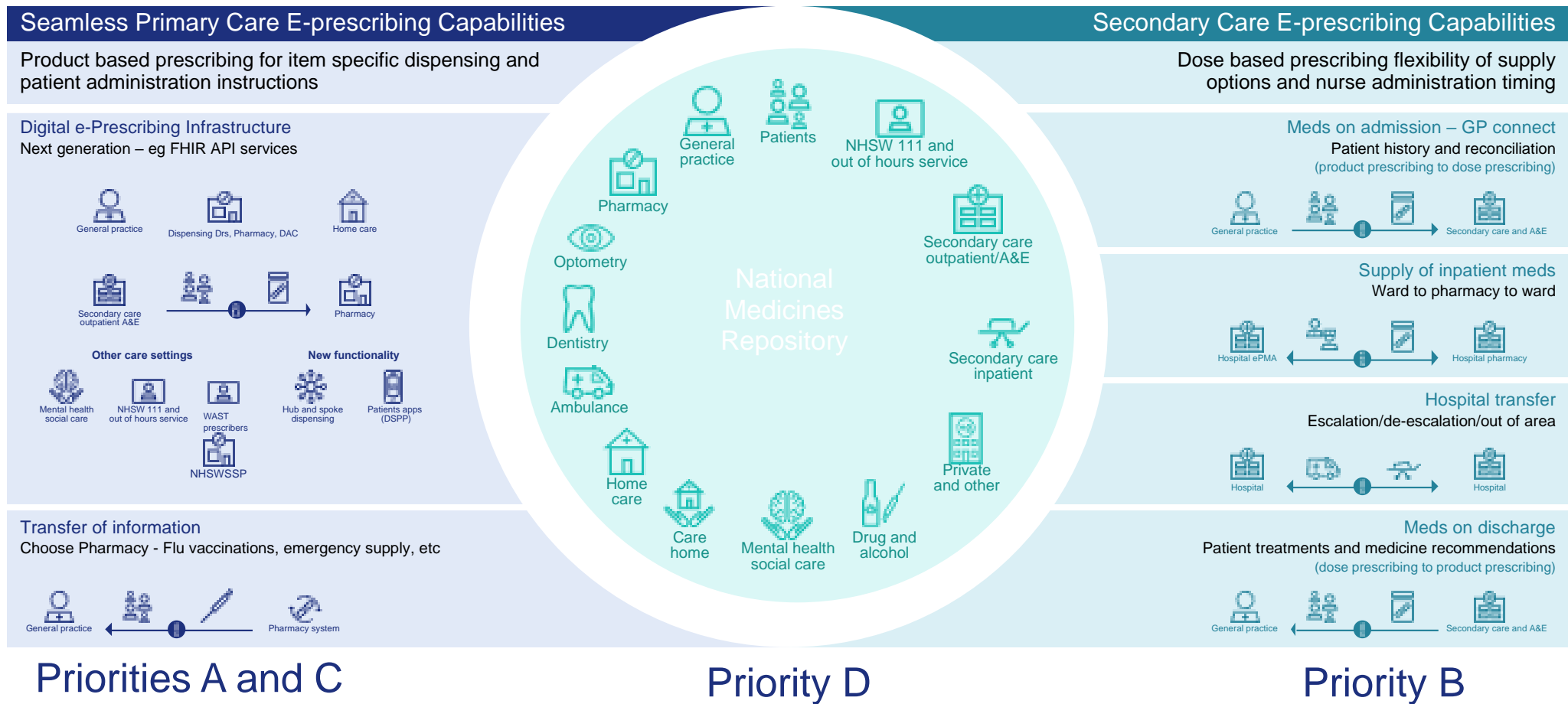**Priorities A and C**

Priority D

Priority B

Figure 9 - The future priorities for the e-prescribing landscape in Wales

For patients building these capabilities will mean a significant improvement in their experience and quality of care as illustrated below:

Mrs Roberts uses an App on her smartphone to alert her when to take her medicines, it also reminds her that her medicines are due to be replenished tomorrow. The App will normally also share information about any 'untaken' medicines, to reduce the risk of stockpiling, but Mrs Roberts has recorded that she has taken her medicines as prescribed.

The pharmacy system has identified that Mrs Roberts' prescription is due for renewal tomorrow and has 'pulled down' the authorisation to supply (prescription) from the repository. As Mrs Roberts' treatment is stable, her doctor has indicated that the medicines can be supplied, without further medical review, for 12 months.

As the prescription has not changed for over 6 months, and Mrs Roberts' App indicates she is adhering to her regime and the pharmacist did a complete review only 2 months ago (next scheduled for 4 months' time), the robotic process automation system flags this prescription as not needing a clinical (pharmacist) review.

As Mrs Roberts' medicines are part of a regular schedule, the system can order these on a 'just in time' basis. A regular background scan of the current 'medication shortages' alerts in used to ensure that any potential discrepancies are actively managed before the prescription is scheduled for resupply.

The prescription details are routed to a dispensing robot, which picks and labels the medicines. Each label contains a barcode that allows confirmation that the correct label has been applied to the correct medicine (based on the barcode on the medicines pack) the correct medication selection having been aligned to the prescription at the outset.

The medicines are packaged and scheduled for delivery to Mrs Roberts. On receipt, she scans the barcode on the bag, confirming delivery and updating the 'stock levels' for the medicines shown in her App. The App asks if she has any questions to pose to the pharmacist, allowing an interactive 'chat' facility or the scheduling of a video call, but she is quite happy.

The supply of the medicines is communicated directly to the payment authority (and to the medicines repository), with the use of the unique identifier (FMD barcode) ensuring accuracy of communication and streamlining the reimbursement process. The data on medicines use is then available for 'secondary use' purposes and, once pseudonymised, can be linked to hospital episode and death notification details for epidemiological research.

When Mrs Roberts attends an outpatient appointment for an echocardiogram the clinician can review her medicines on the medicines' repository.

Figure 10 - Case story – The future patient experience in Wales

In considering these priorities, a lot of insight can be drawn from other geographies and the approaches are briefly summarised in the next section, followed by a more detailed analysis of the priorities. Priorities A to C are considered in more detail, including an outline of the market opportunities to help expedite delivery. Priority D is s subsumed into the analysis of Priority A as a longer-term evolution of the proposed approach.

4.1. International comparisons

International comparisons reinforce the direction of travel set out above and also provide an indicator of the implementation timescales and challenges.

A core requirement for most European initiatives has been a reliable, real-time electronic transfer of prescriptions (ETP) process, where the (electronic) prescription is transmitted electronically to the dispensary (pharmacy, dispensing practice, appliance contractor, etc) over national networks and to facilitate dispensing of the prescription. The process can also include the transmission of dispensing data to national reimbursement services and sometimes dispensing records back to prescribers.

In addition to the widespread use of secondary care ePMA solutions, countries in Europe have evolved different strategies for the digital sharing of prescription information. Some of these strategies have taken many years to evolve and have required time to acquire the digital maturity to achieve their current approaches.

4.1.1. Denmark

Denmark commenced ePrescribing in 1994, using electronic data interchange (EDI) standards to support message transfer. In 2014 doctors could send an ePrescription via a message broker to a specific pharmacy or generate an 'open' prescription to be dispensed at any pharmacy, on presentation of the patient's authorisation (ID).

This has evolved to the current Shared Medication Record, where medicines are added directly to the centralised record, which pharmacists then access for dispensing. Dispensing activity is captured in the record. Patients indicate which pharmacy they wish to use when requesting a prescription and 'validate' the collection by use of their health record card. The system is 'paused' during any inpatient episode, but the information is available to the hospital staff to view.

4.1.2. Estonia

In Estonia, the e-Prescription creates an entry in the shared medication record and patients can access their medication from any pharmacy by presentation of the electronic identity care (eID).

4.1.3. Sweden

A centralised national mailbox / message handler accessed via a secure network is used in Sweden, with patients able to access medicines from any pharmacy by presentation of their ID card.

4.1.4. England

England has used an 'e-prescription exchange' message broker where the prescription is held centrally until 'claimed' by the pharmacy. Pharmacy choice is either by pre-selection (nomination) or by presentation of a barcoded 'token'.

4.2. Priority A – Seamless Primary Care ePrescribing Capabilities

The vision for the sharing of medicines data is that it will be seamless, and that prescriptions (the 'legal document') will be electronic and will be shared with the dispenser without the need to print

and sign. Once dispensed, the endorsed details will be automatically transferred to the payment authority, without the need for 'paper confirmation', at the end of the month.

Use of an electronic prescription could facilitate increased use of technology to improve the safety and efficiency of medicines supply, reducing GP time in signing prescriptions and releasing time for pharmacists to focus on pharmaceutical care, as identified in the Pharmacy Vision document.

4.2.1. Constraints and considerations

In building solutions to facilitate this from the current position in Wales, a number of constraints and pre-existing factors in the landscape need to be taken into account including:

- **Systems used by General practitioners support multiple functions, not simply prescribing and are integrated into how GPs work.** Consequently, whilst there may be an initiative to refine the number of choice of systems in use in General Practice, it is unlikely that there will be a move away from the existing choice of GP systems available in the UK market. Recognising this, any initiative should look to build on the existing infrastructure. The existing technology infrastructure (largely GP systems and Pharmacy PMR systems) would be hard to replace and the disruption to the delivery of care would be significant and avoidable.

- **Provision of ePrescribing in NHS Wales 111 is part of the new system contract but systems to support electronic prescribing for dentists, pharmacists and ophthalmologists are not yet available,** so support to these sectors, perhaps through the provision of a 'cloud-based' prescribing solution that could be 'embedded' within the clinical systems these practitioners currently use, was thought by some panel members to be a possible option.

- **Support for Care Homes and Domiciliary care, through electronic Medicines Administration Records (eMAR) is currently minimal. A specification exists and a plan for procurement is in situ** but may need investment.

- **Whilst it is likely that the existing technology, in surgeries and dispensaries, will remain in situ, the process of managing medicines data will need to change.** The paper prescription will no longer be the legal document and would be used only as a 'fall-back' at times when the prescriber has no access to the electronic system, such as during home visits with no internet access or if a patient expresses a preference for a paper prescription.

Interface with Secondary Care

Deploying an open platform ePMA system that supports published interoperability standards will mean that when a patient is admitted to hospital, their medicines will be 'visible' to the admitting clinician and able to be imported into the hospital system to avoid error-prone transcription activities. The different nature of hospital inpatient prescriptions (dose-based) compared with GP Prescriptions (product based) will need to be 'managed', as part of this interface.

On discharge, a reconciled list of medicines, with reasons for any changes, will be able to be sent to the GP system by an interoperable FHIR message. This will appear as an alert in the GP's workflow, allowing the GP to accept or decline suggested changes. Once this review is completed, the message will automatically update the patient's prescription in the GP system as appropriate.

This 'reconciled' list of medicines would be available to update the Welsh Clinical Portal or any future medicines repository.

With the patient's consent, the discharge information will also be shared with the community pharmacist to support post-discharge reviews and would update the patient's App, once the GP review is completed, so that all parties are aware of the 'current' list of medicines that the patient is to take. The medicines repository will be similarly updated once the GP review is completed.

Information about medicines use managed by other sectors, such as rheumatology treatments delivered through a homecare company or lithium or depot injections managed by the community psychiatry team, would be visible to prescribers from the existing hospital ePMA system or via the medicines repository, and included in any drug interaction or other decision support checks against new prescription items.

There are 'interfaces' that will need to be managed if Wales is to achieve a seamless digital sharing of medicines information, not least the 'internal' interfaces between different systems used within hospitals, such as specialist systems used in intensive care or to support chemotherapy, which will need to be encouraged and supported to engage with the interoperability requirements.

NHS Wales 111, Out of Hours and WAST

Increasingly, patients can access medicines through a variety of sources and medicines provided by these various means should not be 'lost' to the overall care picture. Whilst NHS Wales 111 services have procured a new system, which includes electronic prescribing functionality, it will be important for this system to align with the interoperability standards that would facilitate digital sharing of medicines information, either though digital sharing of prescription information with dispensaries, or through sharing of interoperable messages with, for example, the hospital system or via the suggested medicines repository.

The Welsh Ambulance Service, (WAST), has procured a system to support care delivered by paramedics, Terrafix, and ideally any cloud-based solution delivered to support non-medical prescribers would be integrated into this solution.

Non-medical prescribers

Several professional groups are involved in the care of patients with medicines, including dentists optometrists, advance nurse practitioners, prescribing pharmacists and paramedic prescribers, often active in settings where they have little or no access to electronic prescription support.

There was a strong sense that there must be support for such prescribers, perhaps using a 'cloud based' prescribing system, which could be 'embedded' into systems that were currently in use, such as in dental practices. Such as system should support the digital sharing of prescription information with the dispensary from which the medicines will be supplied and with and central medicines repository.

Such functionality might be available from an existing system, such as one of the GP systems, if it could be deployed independently of a GP context as a 'stand-alone' system or could be a feature of the new ePMA system if the outpatient functionality could be deployed in this manner. Any system selected to facilitate this approach would need to support the open platform and interoperability requirements outlined in the Digital Architecture Review.

There was also recognition that prescriptions written 'in the community' may be to support patients who reside in care homes or are supported by carers in their own homes. Such prescriptions

should also provide updates to any electronic system used to support the administration of medicines (eMAR) to vulnerable patients in such settings.

Border issues

The current challenges for patient living and working across the border between Wales and England which allows Welsh prescriptions to be dispensed in England, (as the paper prescription is the legal document), but constrains the dispensing of English prescriptions in Wales, as the English system provides a token, which, whilst currently using the standard prescription print out, is unsigned and so is not the prescription. These electronic prescriptions (accessed by barcode on the token) can only be dispensed by a pharmacy connected to the NHS Spine using an EPS enabled system. Such difficulties should be borne in mind when adopting a solution to the digital sharing of prescription information.

Interoperability

The NHS has commissioned work by the Public Records Standards Body (PRSB) to develop and validate a set of 'interoperability' standards to support the digital communication of healthcare messages. The PRSB is used as it is a body which developed from the group at the Royal College of Physicians that was responsible for the early development of standards around the communication between primary and secondary care 'on admission' and 'on discharge'.

The PRSB enjoys extensive support from all the key stakeholders (the regulatory authorities, the medical (and non-medical) Royal Colleges and other key institutions) such that any standards developed are widely consulted upon and comprehensively endorsed.

The published interoperability standards include the structure and content for communications between hospitals and GPs on discharge and between community pharmacy and GPs on the provision of 'advanced services', such as the administration of influenza or other vaccination or the Emergency Supply of Regularly prescribed Prescription Medicines.

These standards include the use of Fast Healthcare Interoperability Resources (FHIR) messaging. These allow the recipient system to be updated, either automatically, or once the recipient has accepted the suggested change (rejecting the change leaves the existing record unchanged), depending on the nature of the message.

The PRSB has also published standards on 'dose syntax' allowing the dose and frequency of administration details to be seamlessly shared using structured information, removing the need for 're-keying' of information in primary care dispensaries and allowing for the creation of an 'administration schedule' should the messages be shared with an electronic medicines administration (eMAR) system, for example for Care Home residents.

4.2.2. Enabling requirements

The use of electronic systems poses challenges for data protection and privacy, as well as ensuring prescriptions remain within the legislative envelope of the current legislation around the use of medicines. Any solution for the Welsh system will therefore need to meet a number of key requirements for the digital sharing of prescription information including compliance with a set of shared standards. There will need to be core infrastructure much of which is already being developed through the NDR and DSPP programmes:

- National patient identity system, to allow patients to be uniquely and accurately identified and ensure they are eligible for NHS treatment
- National registers of healthcare providers to verify identity of prescribers and dispensers
- National authentication process (to verify 'electronic' signature)
- National medicines database

4.2.3. Options analysis

The aim is for medicines information to be digitally shared between systems seamlessly, without and loss of data and without the need for any rekeying of information. Ideally a patient would have a choice about where thy get their medicine dispensed and should, in theory, be able to have different medicines dispensed at different pharmacies (for example if one pharmacy was unable to supply one or more of the items that had been prescribed). It should not be necessary for the patient (or their representative to attend the pharmacy in person to facilitate the dispensing process).

Setting aside the do-nothing option described in the current state, there are three options moving towards seamless primary care prescribing in Wales whilst meeting the constraints:

- Option 1 – Point to point transfer

- Option 2 – Transfer via message handler – the preferred option in the medium term

- Option 3 – Shared medication record – as Option 2 but building on it to incorporate a fully open architecture and priority C. This would be a longer-term solution.

4.2.4. Option 1 - Point to point transfer

This option involves the point-to-point transfer of prescribing information between the prescriber and a nominated pharmacy.

The electronic prescription is the legal document. There will need to be a facility to retain a 'paper' process for circumstances where the electronic system in unavailable. The ePrescription is generated and sent directly to the point of dispensing via a secure system. Key features are:

- The data transfer is electronic, and no paper confirmation is needed

- It requires the patient to be registered with (or to have nominated) a specific pharmacy

- There is no flexibility in where the medicines are dispensed

4.2.5. Option 2 - Transfer via message handler

This option introduces a prescription message handler introducing more flexibility into the link between prescribers and dispensers.

The electronic prescription is the legal document. The ePrescription is generated and sent directly to the message handler via a secure system. Key features are:

- The pharmacy needs to be notified that it is authorised to retrieve prescription

- The pharmacy can retrieve the prescription from the message handler

- The patient needs to have pre-chosen a specific pharmacy (nomination) or a 'token' allowing access (paper or electronic) needs to be 'shared' with the desired pharmacy, in some countries this is a patient ID card but could be facilitated by DSPP

- The claims data is electronic, and no paper confirmation is needed

This approach is illustrated below and is the preferred, immediate option for Wales. It is a stepping stone towards the final, full open architecture described under option 2.
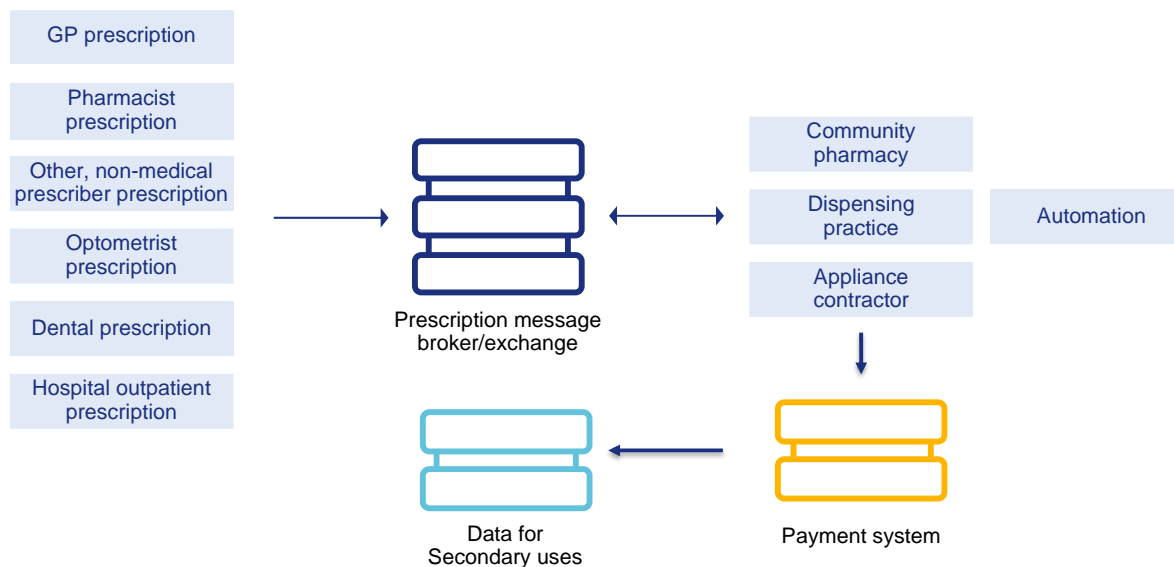

Figure 11 - Transfer via message handler – the preferred option in the medium term

4.2.6. Option 3 - Shared medication record

This option builds on option 2 but is a fully open architecture in which a central record of prescriptions is introduced to facilitate full flexibility. The level of digital and governance maturity required to support this option lends itself to an evolutionary approach to achievement from a baseline of option 2 above.

The prescriber updates a centralised shared medication record (Priority D) via a secure system. 'Authority to supply' is inferred by the dates of previous supply and 'granted' by the patient.

Pharmacy can access the prescription from the shared record with the consent of the patient.

The key feature of this option is the addition of infrastructure to meet Priority D – a shared medication record for Wales with the following features:

- The shared medication record is updated via a secure system whenever a prescription is generated

- Pharmacy can access the prescription from the shared record and update the record with dispensing details

- Long term prescriptions can be accessed whenever a resupply is required

- A process to indicate which pharmacy should dispense the medicine is required (this is often by the patient presenting to the pharmacy of their choice – but a remote or advance selection process is required, particularly during the pandemic, this could perhaps be achieved through DSPP).

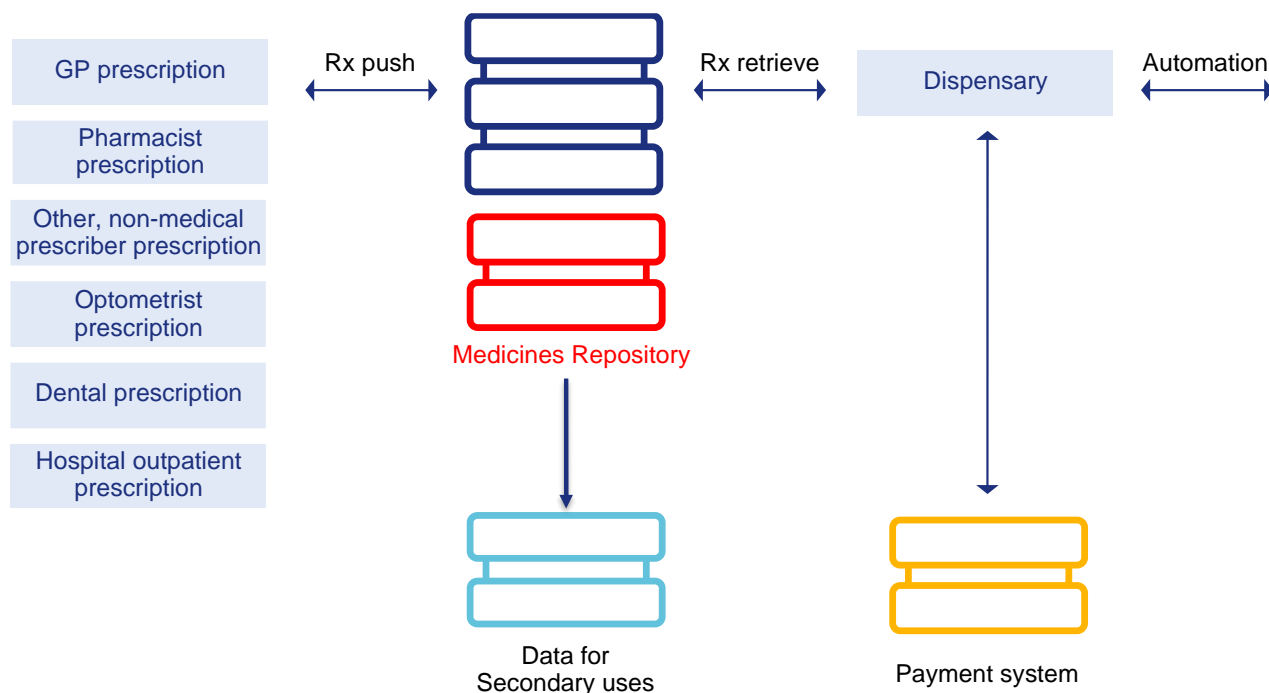This approach is illustrated below and is in line with DAR principles

Figure 12 – A shared medicines repository for Wales – the strategic vision

4.2.7. Dispensing and payment.

Once the prescription (from whichever means) is received in the pharmacy:

- The information is uploaded into the pharmacy system

- The medicines are dispensed

- The 'endorsed' prescription information is shared with the 'payor'

4.2.8. Market opportunities

One potential 'fit' for the preferred Option 2 is the use of the Electronic Prescription Service. This has the advantages of fully aligning with UK medicines legislation, being a readily available option, and being compatible with the existing infrastructure deployed in primary care in Wales. This solution will also alleviate a nu

The current EPS system allows access to medicines through advance selection of a pharmacy by the patient (nomination) or through the presentation of a token, by which the pharmacy accesses the electronic (legal) prescription. This token was an unsigned paper facsimile of the prescription, but an electronic token has been introduced in response to the need to reduce exposure during the COVID-19 pandemic.

The pharmacy uses the token to access the legal prescription from the 'message handler' (the NHS Spine). Access to the NHS Spine currently requires the use of a Role Based Access Smart Card, but the nature of this service is under review and a 'virtual smartcard' is already in use.

Whilst there are challenges to the use of the 'current version' of EPS, adoption of this system would certainly alleviate the cross-border challenges that exist for patients living in Wales and

working in England (or vice versa) who wish to avail themselves of pharmacy services near where they work.

Implementation, even of an established system, requires a good deal of work in terms of business change in surgeries and pharmacies) and other dispensing outlets) as well as enabling work to support role-based access controls or similar requirements to allow access to the system. Whilst there is a well-versed implementation process to support the roll out of EPS, there would be a need for knowledge and skills transfer to a team within Wales to support this initiative. This 'enabling' work is likely to take several months.

4.2.9. Recent evolutions

The Electronic Prescription Service is being updated to work through interoperable FHIR messaging. The first such EPS messages are due to go live in Spring 2021, with hospital or community hospital systems being the first of type implementation sites. This would require all the community pharmacy systems to have updated or to be working towards updating their systems to receive the interoperable FHIR messages. The roadmap to upgrade GP systems to the same standard extends to 2024, but some GP system suppliers are already making progress to deliver this early. This evolution would align more readily with key elements of the Digital Architecture Review and facilitate the transition to Option 3, a centralised medicines repository.

The patient's choice of pharmacy (nomination) can be altered at any time and the NHS App has developed functionality to facilitate nomination change by patients, it is possible that the DSPP could support this change to nomination and facilitate the transfer of the electronic token.

4.2.10. Affordability

The 'de novo' development of a medicines' repository or any other digital sharing of prescription information is likely to take time (measured in years) and be costly. Selection of an already proven system, developed and paid for by another Home Nation, is a quicker (and probably much cheaper) solution. The existing system is migrating towards an interoperable message structure, which would align well with the Digital Architecture Review.

The current (paper) process involves steps associated with an avoidable (and recoverable) cost. These include, printing of controlled stationary, printing of prescriptions in GP surgeries, posting of prescriptions from pharmacies to the NHS Wales Shared Services Partnership (NWSSP) and scanning of paper prescriptions within the NWSSP. The value of the (recoverable) cost has not been assessed but even if it was as little as 50p per prescription, this becomes a substantial sum when multiplied by the 81 million prescriptions written by GPs in Wales each year.

4.3. Priority B - Secondary Care E-prescribing Capabilities

Whilst Wales is somewhat 'behind the curve' in terms of the implementation of hospital electronic prescribing and medicines administration (ePMA) systems, this, paradoxically, presents an opportunity, with the current state indicating that the hospital sector is almost a 'green field' site, without the impediment of disparate legacy systems. This allows Wales to embrace the principles outlined in the Digital Architecture Review and procure a system or systems that align fully with the principles of open architecture and open standards, without the problems of having to deal with a backlog of 'legacy' systems that do not meet the challenges of a future open platform environment. As there is no 'legacy system' and no 'history' to be overcome, selection of appropriate systems

that are 'open platform', in line with the Digital Architecture Review will ensure that Wales can create a future looking system that would provide the driver for greater digital sharing of information.

This section sets out the core capabilities and characteristics that any ePMA solutions introduced into the Welsh secondary care system would need to have.

Medicines on admission

To align with this strategy, it must be possible to digitally 'share' information about relevant medicines from a 'host' system (in which the medicine was originated) to the system being used to actively care for the patient, using published standards for interoperable messaging. The current GP systems all have the necessary functionality (developed under the GP Connect programme) to digitally share information on admission. Whilst the delivery is still at an early stage, hospitals have been using this functionality to streamline access to data on admission but any ePMA system would need to support the receipt of interoperable messages, or access through open APIs.

Information will need to be imported into the ePMA system from the GP system, with any additional information (such as Homecare prescriptions, ongoing care managed by the Community Psychiatric team, medicines prescribed for sexual health conditions, etc), would need to be available from within the ePMA system or from the shared medicines repository. Prescribers should also be able to access information from earlier episodes of care recorded within the ePMA system, where these are still relevant.

Transfer of information from other systems within the same hospital, such as bespoke 'intensive care' systems or chemotherapy systems (where ongoing care with simplified regimes may be required) will also be important. (The recipient system should not be required to support the complex functionality of an intensive care system or a chemotherapy system).

It is likely that such flexibility will require further development of the existing systems and encouraging the alignment with the interoperability standards will undoubtedly require additional investment in the systems already procured but would be key to achieving digital transfer between systems within the hospital. The timing of this investment could be staged, once an ePMA system or systems had been procured and implemented.

To support this 'seamless' sharing of information the drug dictionary within the systems must align with, or seamlessly map to, the dictionary of medicines and devices (dm+d). Other information that may be recorded from within the ePMA system, such as allergies, indication for medicines must also follow a standardised coding system (SNOMED CT). A set of standards for 'interoperability' has been published by the Professional Records Standards Body (PRSB) and compliance with these standards would be important for systems across the 'estate'.

Inpatient prescribing

Once imported, it must be possible to 'manage' this list of medicines, supporting the continued use of some during inpatient care, 'suspending' others, for which the patient has an ongoing care need, but which are not required during inpatient care or stopping medicines that are no longer required for the care of the patient and are not to be reinstated after discharge. Changes to this list of medicines created on admission must be communicated back to the 'host' systems, from which the medicines information originated on discharge, together with reasons for the change.

It must be possible to easily transfer any relevant medicines from this list on admission to the inpatient prescription.

Clinical Decision Support

Creation of any 'prescription' should be supported by appropriate clinical decision support. It should be possible to configure the display of responses to reduce the risk of alert fatigue but without increasing risk to patients. Decision support does not exclusively relate to 'interactive alerts' but includes (ideally context specific) access to relevant information, guided prescribing, etc.

Interaction with other care systems should facilitate the presentation of medicines details in context (such as the availability of relevant laboratory or observational data, necessary to support the titration of doses of some medicines). An example might be the display of blood sugar values against dose for a 'sliding scale' insulin infusion.

Ideally, any clinical decision support system would also be able to make use of relevant clinical data from these other care systems to refine decision support alerts that are presented to ensure these are more 'context specific' and relevant to the care of the individual patient. So, if a medicine combination had the potential to cause a clinically serious increase in serum potassium, the system only alerts if the serum potassium starts to rise towards the upper end of normal (or if the clinician fails to monitor the serum potassium).

Where the patient's needs require the use of a different route of administration than that used for the medicine prior to admission, (or where a range of routes need to be specified), any system should support the ability to offer discretion to the nurse of a choice between a range of routes of administration, specified by the prescriber.

Medicines' supply

Where medicines need to be supplied to support the care of patients, it must be possible to identify which of these medicines need to be supplied (and in what form). This may be done as part of a pharmacy review process.

As systems evolve, a more integrated approach may allow the system to 'know' (either from an automated cabinet or from a pre-populated stocklist), which medicines needs to be supplied as soon as the prescription is created.

Messages about the supply of a medicine should be communicated seamlessly to the stock control system and to any automated supply systems.

Where automated supply systems are in use (e.g. electronic medication cabinets), any supply or resupply of a medicine should be updated within the system electronically. As the additional details included in the barcode on the medication pack under the Falsified Medicines Directive (FMD), or its replacement, become more widespread, it should be possible to ensure that expiry date information is retained within the system and used to ensure that medicines with a short expiry date are 'managed' (used or transferred to another location with a higher use of that medicine) before expiry, if possible.

Information about the 'status' of the supply (e.g., not yet received, in process, completed, received on ward) would facilitate awareness of whether the medicine is available and reduce the need for telephone calls, etc.

Medicines' administration

Medicines that are due for administration should be alerted to the relevant staff at the appropriate time. The documentation of medicines administration should be supported by an 'active' process (e.g., 'closed loop administration', where barcodes can be used to confirm the identity of the patient and to confirm the 'appropriateness' of the selected product against the prescribed item.

Where additional documentation is required to support care with medicines, such as recording of Controlled Drug administration, this should be supported electronically as part of the administration process.

Where ward stock details (and records of Controlled Drug supplies and administrations) are supported, it should be possible to support 'live' stock control, initially at least for Controlled Drugs, and subsequently for all medicines, using the unique identifier in the FMD barcode to ensure that administration of 'patient's own medicines' does not automatically decrement ward stocks inappropriately.

Changes to medication should prompt for a reason for the change to be recorded and for this to populate the medicines reconciliation elements of the discharge summary. Where a new medicine is originated, it should be possible to record the reason for that prescription (indication).

There should be a process to actively manage antimicrobial use, in line with local and national guidelines.

There should be a facility for patients to review their treatment at all stages of the process to allow informed consent and engagement in their care.

Discharge prescribing

Discharge should be facilitated by a medicines reconciliation process that allows medicines to be transferred from inpatient to discharge and prompts for medicines 'suspended' on admission to be 'reinstated' (but not necessarily supplied). Information about reasons for change or cessation of medicines should automatically populate the 'medicines reconciliation' list and it must be possible to export this to a discharge summary for seamless electronic transfer to the GP or other recipient system on discharge.

The system must support ongoing medication care requirements of a patient on transfer from the Emergency Department to an inpatient encounter (even where the PAS may treat this as a 'discharge and admission'). Similar arrangements for continuity of care must be available to support transfers between hospitals or to support ongoing care post discharge (such as where the responsibility to supply and administer certain medicines are retained by the 'hospital service', e.g. the administration of depot injections by community psychiatric nurses).

Outpatient prescribing

The system should support prescriptions for outpatients and, where outpatient appointments are conducted via remote consultation, support the seamless digital transfer of the prescription to a pharmacy (of the patient's choice) from where a supply can be made and, if necessary, delivered

to the patient's address. Similarly, prescriptions for medicines supplied via a Homecare arrangement should be supported.

A process to support medicines reconciliation for outpatient (and Homecare) encounters should be available to ensure that information about ongoing care with medicines is available to the prescriber in outpatients and can be used by the clinical decision support system to 'check' any newly prescribed items (without becoming part of the outpatient encounter or prescription). Communication of medicines reconciliation changes made in outpatients should be supported in a similar way to discharge prescriptions.

Interoperability with other hospitals systems

It would be important to encourage these systems to adopt the interoperability standard (particularly for ICU systems) as transfer of medicines information from system to paper or system to system when a patient is admitted to or discharged from ICU is error prone and clinician resource intensive.

Many of the available ePMA systems use proprietary data standards within their application. Whilst some have made efforts to map at least some of the medicines codes and descriptors to a dm+d equivalent, to support communication on discharge, if the desire is to be able to exploit the rich data that is associated with inpatient care, then a focus on open standards or an open platform approach should be a key requirement for any system. This is particularly significant when tracking the appropriate use of high cost and or high risk or specialist medicines used in hospitals.

4.3.1. Data availability

The open platform approach allows organisations to gain control of their clinical data; building systems where clinical data outlives the application that created it, allowing organisations to set up a vendor-neutral digital patient record for life.

Data must be readily available to support research and audit activities and the ability to access this data over the long term is a key consideration in system selection. In future, clinicians may look to machine learning (ML) and artificial intelligence (AI) to support clinical care. The availability, consistency and reproducibility of data is crucially important when considering such advances. There is a growing awareness that the quality of data input seriously affects the outputs generated by automated processes such as these. 'Translating' from proprietary data to another standard (such as dm+d) is not an ideal when considering the use of data to support processes such as AI.

4.3.2. Outline requirements

To achieve this, the following key 'requirements' must be met by any system.

The system is required to digitally support the prescription, pharmacy review and administration of medicines in hospital with appropriate clinical decision support and must:

- Be open platform or make use of open artifacts, ensuring that clinical data is not 'locked into' the system but is transportable, if a different system is procured in the future

- Be based on appropriate standards, which for medicines would be the dictionary of medicines and devices (dm+d)

- Support recently published interoperability standards (PRSB) for data sharing between systems (not just between secondary and primary care)

- Provide an ability to import medicines information from primary care (or other) systems using published interoperability standards

- Support the 'translation' of product-based prescriptions to 'dose-based' prescriptions where appropriate on admission to hospital

- Support end to end medicines reconciliation, requiring a reason entry for any change to medicines on admission

- Support the population of a discharge summary with the collated medicines reconciliation data

- Support the digital communication of this discharge information to GP and relevant community pharmacy systems

- Support pharmacy verification of prescribed medicines at all stages of the process

- Support a process for the 'ordering' of medicines supply to wards

- Support the production of interoperable messages to the dispensary system, in line with published interoperability standards

- Support digital information 'sharing' with other systems in use in the hospital (e.g. ICU or Chemotherapy systems)

- Support 'closed loop' medicines administration with positive confirmation (by barcode scan) of both patient and medicines to be administered

- Support outpatient prescribing and Homecare prescriptions with the ability to send prescriptions to external pharmacies

- Support the sharing of outbound prescriptions (discharge summaries and outpatient prescriptions) with other systems (such as a medicines repository or remote dispensary)

- Support specialist mental health requirements for care with medicines

- Support the management of antimicrobial prescriptions in line with guidelines for good antimicrobial stewardship

- Support 'guided prescribing'

- Provide access to data for secondary use purposes

4.3.3. Data flows

If an electronic prescribing and medicines administration (ePMA) system were to be deployed, it should be possible to import data about Medicines on Admission from GP systems, facilitated by an API using interoperability standards. This has been trialled in England as part of the 'GP Connect' project.

Exporting medicines data on discharge and incorporating any updates into the GP record could be facilitated by using the PRSB discharge standard, which uses FHIR messaging. The medicines content would need to comply with the dm+d standard.

Outpatient prescription messaging would be possible, either by following the current primary care process (paper-mediated) or by use of advanced electronic signatures to support the seamless digital transfer of prescription information. Prescriptions for Controlled Drugs have additional burdens as identified in the Legislation section.

Extracting (particularly inpatient) data for secondary uses is notoriously fraught if using a system with a proprietary medicines database. Any external messaging would need to be parsed through a dm+d 'lookup' table but for reporting purposes, the way the data are stored within most applications does not facilitate access for secondary uses, particularly if additional clinical data, such as indication, are required. An open platform solution, with a discrete, open standards data layer, should facilitate such access.

4.3.4. Legislation

The laws that apply to hospital prescribing are the same as in primary care, with some notable differences. The conditions of the Human Medicines Regulations and the Misuse of Drugs Act and the Misuse of Drugs Regulations vary somewhat is relation to hospital prescribing.

The first divergence is that an inpatient prescription is not actually a prescription, but an instruction to administer a medicine. The use of an 'inpatient prescription' to prompt for supply acts as a requisition, rather than a prescription, making legislation around inpatient prescribing something that can largely be policed internally.

Discharge prescriptions are commonly regarded as 'actual' prescriptions, as the medicines are supplied directly to the patient, but their legal status may not be so clear cut as they are considered to be 'an extension of inpatient care' and (in other jurisdictions where such rules apply) are not subject to a prescription charge. However, for Controlled Drugs a signed prescription is considered mandatory.

Outpatient prescriptions or other prescriptions routed to an external dispenser need to comply with the full requirements of the Human Medicines Regulations and the requirements for Controlled Drugs.

Where an electronic signature is to be used to authorise a prescription, this must adhere to the requirements of an advanced electronic signature, as defined in the Human Medicines Regulations legislation. If the prescription is for a Scheduled 2 or 3 Controlled Drug, the prescription (to an external body) would need to use the Electronic Prescription Service to 'transfer' the prescription to the dispenser. The legislation that permits the use of advanced electronic signatures for Controlled Drug Prescriptions in primary care, does not extend to hospital prescribers. An amendment of this legislation in being pursued by other Home Nations but progress has been slow.

4.3.5. Market opportunities

There is a number of newly emerging ePMA systems that are open platform. There is at least one, with a series of UK hospital deployments, which has most if not all of the features required for a hospital ePMA system In Wales. This system has been at the forefront of supporting the interoperability drive in England and is likely to be the first of type deployment for the 'hospital' version of EPS, based on open APIs and interoperable FHIR messaging.

As part of the work to define the scope of the requirements for Hospital ePMA, it would be sensible to engage with the market at an early stage to ensure that suppliers are aware of any development needs and enter into a collaborative dialogue can help positively refine the requirements.

4.3.6. Dispensing systems

DHCW has procured an all-Wales proprietary hospital pharmacy system from WellSky. Whilst the rollout of this system has begun, it is unclear how far this has progressed. Work to support the receipt of interoperable FHIR messages from (a variety of) hospital ePMA systems into the WellSky dispensing system is well advanced.

4.3.7. Automation

There are some robotic dispensing systems in use in hospitals in Wales and considerable use of electronic medicines cabinets. Data flows between these systems and WellSky is well established in other jurisdictions within the UK.

4.4. Priority C - Patient App(s)

The pharmacy vision document clearly identifies the need for greater patient involvement in their own care and the use of Apps, was identified by panel members as a key enabler of this level of engagement.

Welsh Government has already commissioned the development of the Wales Digital Patient and Public Services (DSPP) programme, which will provide a platform for a number of patient-oriented App developments. The DSPP will support patient identification and verification, key to allowing patients to be able to access their own confidential information (such as their list of prescribed medicines) safely and securely.

The App or Apps envisaged would be populated by a data feed from the GP system or from the dispensing system and would support the patient in their medicines taking (or support carers in the direct support of patients), prompting when medicines are due to be taken and allowing the patient to record that they had chosen not to take a medicine at a particular time.

The patient could then determine whether to 'share' this information with their care provider, and the App will facilitate timely reordering of (only) those medicines that need to be reordered, helping reduce the 'stockpiling' of medicines that are only taken 'as required'.

The App should be available in the patient's primary language (not only Welsh and English) and ideally, but the App would also support sight impaired patients or those with literacy issues using screen reader technology.

Any App should ideally include the following features:

- The ability to populate the list of medicines to be taken, from an interoperable API, from the GP or Pharmacy system
  - This will require patient ID authentication and other governance issues that may be provided by DSPP
- The ability to schedule the medicines to be taken at appropriate times

- Provide prompts for the patient, displaying a list of medicines to be taken at the times they are scheduled

- The ability to allow the patient to 'delay' medicines taking for a short period (effectively a 'snooze' facility)

- Allow the patient to identify they had taken the medicine by a simple process (swipe, or similar), ideally the system would also support the use of barcode scan to provide positive confirmation that the correct medicine is being taken, if desired

- Allow the patient to record that they had chosen not to take a particular medicine and to record a reason why, if they choose to

- Facilitate the reordering of repeat prescriptions of only those medicines that require resupply (so exclude 'as required' medicines, if the patient has not been taking them and has adequate stocks)

- Include the ability to 'share' information with selected individuals (family or other carers, GP or pharmacist) if desired

- Include an 'alert' function to SMS a nominated family member or carer if a patient has not taken their medicines for a defined period (this may indicate the patient had fallen or was otherwise unable to access their medicines)

- Support access to information about a selected medicine through a 'approved' site such as Medicines A-Z or the British National Formulary

- Facilitate access to the list of medicines prescribed in hospital (if the patient is admitted) to allow the patient to check if their medicines have been changed and ask questions about their treatment

- Update this list on discharge

- Ideally, the App would support the identification of any changes made during the hospital stay, as they are made, to allow the patient to ask questions if they wish to

5. The roadmap for change

The roadmap for change involves the coordinated delivery of four major priorities, each with a different set of delivery considerations as set out below:

A Seamless Primary Care E-prescribing Capabilities	**B Secondary Care E-prescribing Capabilities**	**C Patient App**	**D National Medicines Repository**
A set of capabilities for the seamless digital sharing of medicines information, prescriptions and dispensing records, between systems across all care settings	Hospital ePMA systems across Wales that build on a set of common set of open standards and principles that provide end to end e-prescribing secondary care capabilities together with interoperability with other care settings in Wales.	A patient app that allows data sharing from GP, community pharmacy and hospital systems to patient to allow the patient to be a full partner in their care	An open and accessible medicines repository that would include all current medicines and be accessible to all with a legitimate right of access (This is a fully open architecture and a longer-term solution building on priorities A and B)
Key Delivery Considerations • Multiple core architectural building blocks • Definitional design challenges / choices • Legislative challenges	**Key Delivery Considerations** • Delivery phasing and stratification • Market choices available to comply with DAR design principles	**Key Delivery Considerations** • Relies on A, B in the medium term, and C in the longer term for full functionality but may be phased. • Links with DSPP programme	**Key Delivery Considerations** • Links with NDR programme

Figure 13 – Key delivery considerations for the core digital priorities

5.1. Overall delivery approach

The roadmap should be built as major Programme of transformation delivery, within an overarching governance framework as it is not possible to deliver the recommendations of this report as coherent whole without a (fully funded) transformation programme structure focussed on longer term outcomes and optimising the interdependent risks and benefits of the individual projects. Each component of delivery will be undertaken as a Project within the Programme each working to a standard overall set of major phases as follows:

Phase	Focus	Key Outcomes
Foundation	• Confirming strategy and scope • Requirements definition • High level solution design • Building the Business Case • Planning and resourcing • Supply options	• Agreed Outline Business Case • Agreed Project Definition • Agreed Project Plan • Agreed Requirements • Agreed High Level Design • Agreed resources and funding • Agreed Governance
Design and Sourcing	• Project mobilisation • Detailed component design • Procurement activities and / or acquisition of subcomponents via other routes..	• Agreed Full Business Case • Revised Project Definition • Revised Project Plan • Resources and funding in place • Contracts in place

Phase	Focus	Key Outcomes
Solution Implementation, Adoption and Change	• Capability delivery to project plan	• Capabilities rolled out progressively • Benefits accrued
Optimisation	• Optimisation of capabilities in line with changing needs	• Further optimised capabilities

Table 2 Delivery model phases

5.2. Governance

The implementation of ePrescribing solutions in a single health care organisation is known to be a challenging exercise that requires careful planning and strong governance. Successful projects have all benefited from 'tripartite' leadership, with strong 'champions' from within the Executive team, a well-respected clinical leader and an effective project manager. At national level, those requirements for Governance are multiplied significantly, with positive Ministerial support another key ingredient.

This report recommends that there should be an overall programme of delivery for the blueprint described, within an overarching governance framework as set out below. In this we would see a continuation of the current expert panel members as part of the overall Design Authority which will – as part of its role look wider than the e-Prescribing transformation programme in order that co-dependencies can be managed effectively with other initiatives.

The overall governance mechanisms would need to in place and made active during the foundation phase for the overall programme – i.e. by mid Q1 21/22.

As noted above, the some of the elements of the Governance system already exist in some form. These were not examined as part of this review, but we recommend that they are reviewed to ensure there is alignment with the above high-level terms of reference, and their interfaces in order that they are appropriately constituted to support delivery of the roadmap. One aim of the Governance mechanisms should be to provide clear accountability at each level of delivery, and an escalation route for resolution of issues at an appropriate level of aggregation. Another key aim is to provide an ability to identify and deal with "lateral" dependencies across the wider transformation of Welsh Health and Social Care – principally through the work of an integrated Design Authority.

Welsh Government

- Appropriate oversight and assurance
- Business case approval
- Challenge to progress where appropriate
- Monitoring of exceptional strategic items and issues

E-Prescribing Programme Board

- Reports to Welsh Government
- Ensures priorities are delivered
- Ensure projects deliver transformational change
- Manages and resolves issues between projects
- Executive responsibility for benefits realisation

E-Prescribing Projects (One per Priority)

- Report to the Programme Board
- Responsible for project delivery
- Risk and project issue management
- Key decision making
- Budget and benefits realisation management
- Quality and safety Impact Assessment
- Programme Board progress reporting

E-Prescribing Design Authority

- Supports the Programme Board
- Ensures project is clinically lead
- Owns clinical process and documents design review and sign-off
- Provides clinical assurance to Governance Framework
- Ensures alignment with wider Wales architecture via WTSB and DHCW

Local Implementation Groups (For sites or groups of sites implementing e-Prescribing)

- Ensures engagement and involvement by end users
- Mobilises local project resources
- Source of Superusers
- Tests and signs-off key deliverables, including benefits realisation
- Manages and resources data migration
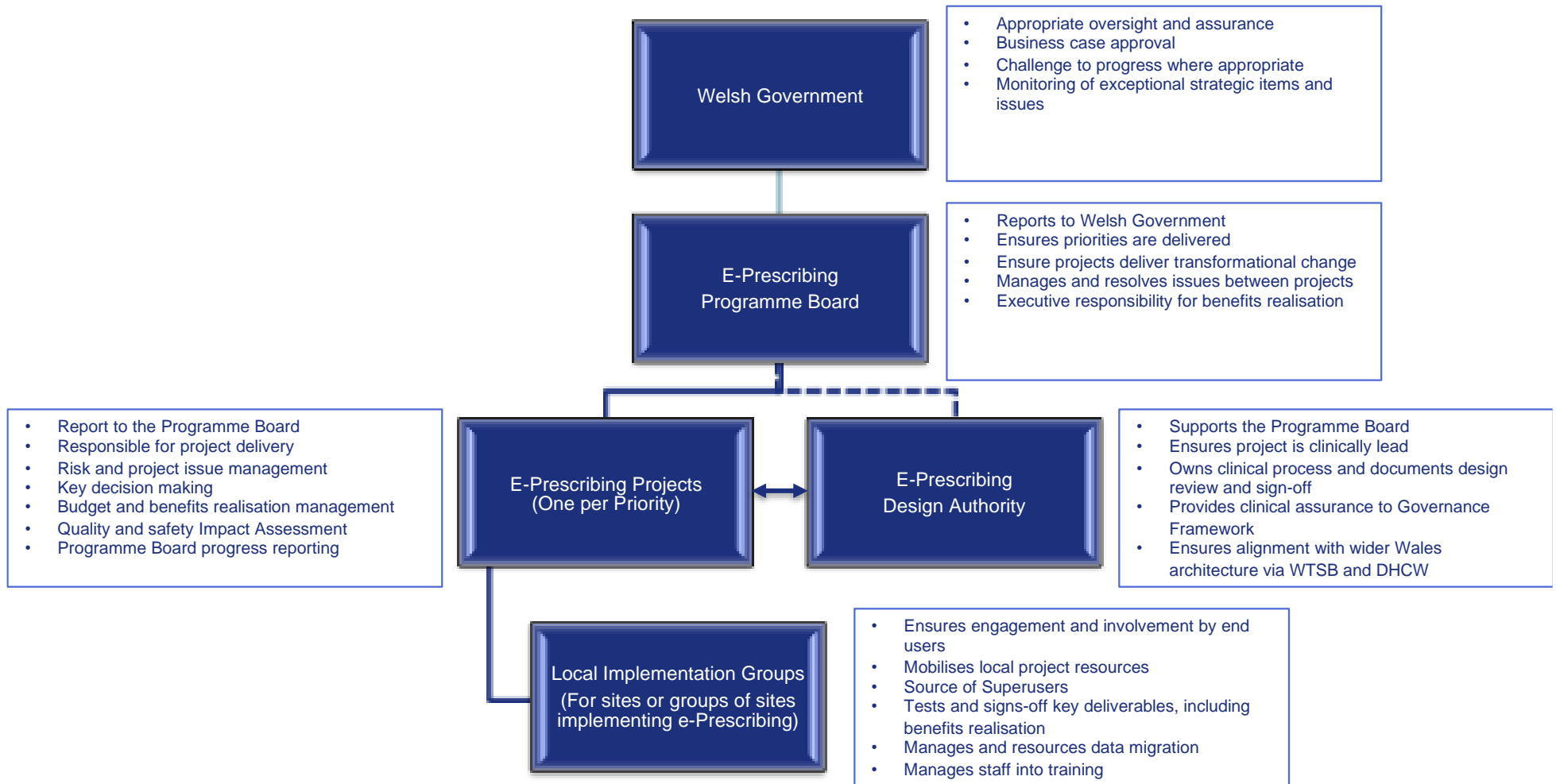- Manages staff into training

Figure 14 – Elements of the required Governance arrangements

5.3. Timeline

Each Project will have different characteristics within this broad lifecycle definition as follows:

Project	Key Delivery Characteristics
Seamless Primary Care e-Prescribing	• Wales wide capability delivered through one project with a critical interface with the National Medicines Repository, but with option to phase with initial delivery limited to prescription brokerage only. • Timeframe 1-2 years for core capabilities go live; 2-3 years for full rollout • This timeframe is dependent on the decision made as to how to proceed but it may be worth waiting until current developments to the existing Electronic Prescription Service are completed
Secondary Care e-Prescribing	• Multiple projects to a common approach with a common solution and product set at individual Health Board / Hospital level. • Likely to be focussed in the first instance to the top 10 acute environments. • Each implementation will differ depending on the complexity of the Hospital environment – an average implementation timescale of 12 months is suggested at this stage. • Likely to be very long term subject to funding and delivery capacity. • Timeframe 1-2 years for first "Pathfinder" go live; up to 5 years for initial rollout in key hospitals.
Patient App.	• With the DSPP project with alignment to other projects through open standards. • Timeframe 1-2 years for core capabilities go live; ongoing optimisation and rollout with patients depending on uptake thereafter. • The DSPP project is working with the NDR and DHCW to build an enabling platform for patient and clinically focussed apps over the coming financial year. That platform will provide a basis for Patient Apps developed through the programme and a dedicated project within that. The roadmap envisages the use of an agile delivery approach based around "time boxed" sprints that incrementally develop capability for use by patients.
National Medicines Repository	• Wales wide capability delivered through one project possibly as a workstream within the NDR Programme and aligned from the start of the overall programme. • Alignment with Seamless Primary Care e-Prescribing and Secondary Care e-Prescribing • Timeframe 1-2 years for core capabilities go live

Table 3 Roadmap characteristics

The indicative timeline for the delivery given this analysis is set out overleaf. It is intended as a basis for further refinement following initial discussions with the DSPP, DHCW architecture team, and the NDR programme. A key part of the roadmap is the inclusion of the overall programme in terms of set up, oversight of the delivery of projects and management of escalations, and the realisation of system wide benefits that we would expect to begin to accrue from mid 22/23 if the timescales proposed are maintained as indicated.

E-Prescribing Programme

| | Q1 21/22 | Q2 21/22 | Q3 21/22 | Q4 21/22 | Q1 22/23 | Q2 22/23 | Q3 22/23 | Q4 22/23 | Q1 23/24 | Q2 23/24 | Q3 23/24 | Q4 23/24 |

E-Prescribing Programme: Foundation, Programme Oversight, Programme Benefits Realisation

Project A - Seamless Primary Care E-Prescribing Capabilities: Foundation, Design and Sourcing, Implementation, Optimisation

Project B - Secondary Care E-Prescribing Capabilities: Foundation, Design and Sourcing, Implementation 1 (Pathfinder), Implementation 2, Implementation 3, Optimisation 1, Optimisation 2, Optimisation 3

Project C - Patient App (with DSPP): Foundation, Design and Sourcing, Implementation Iteration 1, Implementation Iteration 2, Implementation Iteration 3

Assumes agile iterative delivery sprints once core aspects of infrastructure are delivered

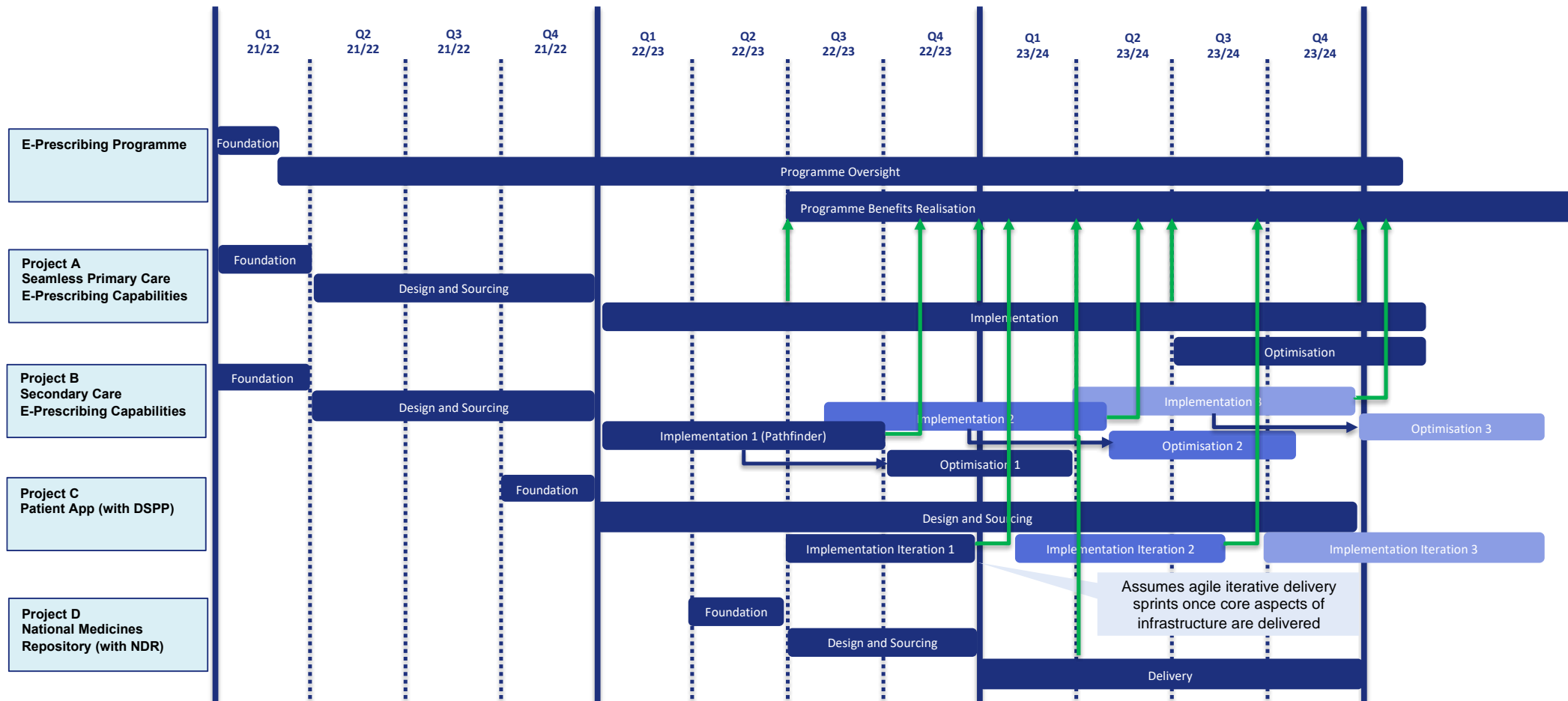Project D - National Medicines Repository (with NDR): Foundation, Design and Sourcing, Delivery

Figure 15 – Proposed high level roadmap

5.4. Key strategic risks

There are a number of key strategic risks associated with the future vision that are set out here:

Risk		Likelihood	Impact	Controls
Affordability	The transformation programme and individual projects may be unaffordable.	High	High	Agreement of minimum affordable set of projects and solutions that would progress the ambition in return for maximum benefits (e.g. an individual secondary care ePMA pathfinder). This will need to cover overall programme and governance costs.
Capacity and capability to deliver	There may not be the skills and capacity available in the system to deliver the ambition due to its scale and complexity	High	High	Identify core project teams during the foundation stage and re-assess priorities for each individual project within the transformation programme based on resource availability.
Business Transformation	There may be too much attention on acquisition and deployment of systems and insufficient focus on business transformation leading to poor implementation overall.	High	High	Identify core 'transformational' objectives as part of the benefits realisation requirements and ensure these are key elements for delivery Establish the overall transformation programme as focussed on transformation of prescribing rather than purely a "systems" programme.
Pan Wales coherence and workflows	There is a risk that the integrity of the pan Wales strategic solutions may be compromised if point solutions developed locally are not aligned with the overall design vision and national standards. This in turn may compromise patient safety and experience.	High	High	Control of the architectural vision in line with the Digital Architecture Review recommendations via the proposed e-Prescribing design authority (which must include digital capability at a national level), and the Welsh Technical; Standards Board.
Clinical User Interface	There is a risk that multiple clinical users interfaces may lead to prescribing errors and compromised patient safety if a common approach is not adopted to user interface standards for e-prescribing technologies in Wales.	Medium	High	Control of the user interface in line with standards set by the proposed e-Prescribing design authority, and the Welsh Technical; Standards Board.

Risk		Likelihood	Impact	Controls
Failure to progress	There may be a failure to make progress with the transformation programme due to delays in approvals and sponsorship.	Medium	High	Agreement of minimum viable set of projects that would progress the ambition in return for maximum benefits (e.g. an individual secondary care ePMA pathfinder). Seek strong sponsorship from the Welsh Government, and individual components of the system via the expert group assembled and the Health Boards.
Market readiness	There may not be solutions available in the market that meet the requirements of the vision for open architecture solutions.	Medium	Medium	There are known solutions in the market for each component, but they will need to be evaluated against their appropriateness in Wales during the Foundation stage of each project.
Legislative hurdles	There may be legislative hurdles to the progress of the project.	Medium	Medium	Legislation requirements to be incorporated into design phase and decision making processes with respect to solutions.

Table 4 Key strategic risks

5.5. Decision making framework

The capabilities outlined to deliver a transformed e-prescribing landscape in Wales will use multiple architectural building blocks – often comprised of one or more products. As choices for these products or classes of product are assessed, there is a need to assess the detailed risk of delivery against a consistent set of criteria beyond the technical and functional characteristics. The suggested decision making framework is set out below:

Assessment criteria
Timescale - Timescales for the delivery of benefits can be met.
Strategic alignment - Alignment with national and (where appropriate) local (e.g. HB) strategies
Functionality - Capable of delivering the full set of detail requirements for the architectural building block under consideration – e.g. an ePMA solution in a Health Board.
Affordability - Full lifecycle costs can be met within national or local constraints (as appropriate)
Benefits - The benefits locally and to the wider health economy across Wales from the solution align with those declared in the business case.
Capacity and capability - Resources with the expertise will be available to develop and maintain the solution.
Sustainability - The solution will be sustainable in the long term and provides a basis for a sustained development path.

Table 5 Decision making framework

6. Next steps

This report makes eight core recommendations as follows:

No	Recommendation	Ref.
R1.	Confirm the vision and scope for the transformation of e-Prescribing based on the four priorities set put in this report namely: A – Seamless e-prescribing capabilities in primary care B – Secondary care e-Prescribing capabilities C – Patient App development D – National Medicines Repository	Section 4
R2.	Establish a fully funded Wales wide e-Prescribing transformation programme in line with the recommendations in this report with due consideration to how existing bodies (the WHEPPMA Board, e-Prescribing Expert Panel, and Clinical Reference Group), are adjusted or evolved in line with the recommendations of this report.	Section 5
R3.	Consider combining the existing Expert Panel and clinical reference group – subject to Programme Board arrangements with respect to key personnel – as a Design Authority for the e-Prescribing Programme as a whole and consider interfaces with the Welsh Technical Standards Board for key aspects of design including, but not limited to, clinical workflow coherence and standard for prescribing users interfaces.	Section 5
R4.	Seek sponsorship from Health Boards for initial implementation targets for priorities A and B.	Section 5
R5.	Develop detailed plans for the programme including agreeing dependencies with and from the NDR and DSPP projects.	Section 5
R6.	Establish Projects for priorities A and B from the start of FY 21/22 with a specific focus on completing the Foundation stage of delivery in the first quarter of the year and specifically deliver the following by end June 2021: • Agreed Outline Business Case • Agreed Project Definition • Agreed Project Plan • Agreed Requirements • Agreed High Level Design • Agreed resources and funding • Agreed Governance	Section 5
R7.	Conduct a detailed review of the options for delivering seamless primary care e-prescribing including the potential adoption of an existing Electronic Prescription Service solution in support of Priority A.	Section 5
R8.	Conduct a market assessment to confirm options for open systems ePrescribing technologies in support of Priority B (secondary care)	Section 5

Table 6 Next steps

Appendix 1 – Stakeholders engaged

Name	Role
Andrew Evans (Chair)	Chief Pharmaceutical Officer, Welsh Government
Lynne Schofield	Deputy Chair, Head of Pharmacy and Prescribing Branch, Welsh Government
Lloyd Hambridge	Clinical Fellow Pharmacy and Prescribing Branch, Welsh Government
Gareth Cross	Head of Healthcare Technology and Innovation, Welsh Government
Chris Melhuish	Digital, Data and Technology, Welsh Government
Gareth Collier	Secondary Care Clinical Representative (Medical)
Rebekah Williams	Secondary Care Clinical Representative (Pharmacy)
Karen Pardy	Primary Care Clinical Representative (Medical/GP)
Gareth Hughes	Primary Care Clinical Representative (Community Pharmacy)
Alexandra Gibbins	NHS Wales 111 Wales/GP Out-of-hours Representative
Matt Armstrong	Community Pharmacy IT Group Representative
Paula Jeffrey	Welsh Ambulance Service Trust (WAST) Technical System Representative
Gary Bullock	Digital Health and Care Wales (DHCW) Technical System Representative
James Goddard	DHCW Secondary Care ePrescribing representative
Cheryl Way	DHCW Primary Care ePrescribing representative
Dr Gareth Oelmann	British Medical Association (BMA) Cymru/GPC Wales Representative
Judy Thomas	Community Pharmacy Wales (CPW) Representative
Rob Jones	DHCW – National Digital Architecture
Mark Frayne	DHCW – National Data Resource (NDR)
Stephen Frith	DHCW - Digital Services for Patients and the Public (DSPP)
Joanna Dunden	DHCW - Digital Services for Patients and the Public (DSPP)

Appendix 2 – Glossary

Term / Abbreviation	Meaning
API	Application Programming Interface a software application or service that allows one service to request a specific service of another piece of software in a standard way.
DAR	Digital Architecture Review
DHCW	Digital Health and Care Wales
dm+d	dictionary of medicines and devices
DSPP	Digital Services for Patients and the Public (transformation programme)
EMIS	Egton Medical Information Systems – a supplier of GP systems.
ePMA	electronic Prescribing and Medicines Administration (system)
EPS	Electronic Prescription Service (English NHS)
ETP	electronic transfer of prescriptions
FHIR	FHIR is the latest standard to be developed under the HL7 organisation. Pronounced 'Fire' , FHIR stands for Fast Healthcare Interoperability Resources.
NDR	National Data Resource (programme)
NWIS	NHS Wales Informatics Service (now Digital Health and Care Wales)
NWSSP	NHS Wales Shared Services Partnership
PMR	Patient Medication Record
PRSB	Professional Records Standards Body

Appendix 3 – References

The following key references were considered in the development of this report:

- Welsh Government. 2018. A Healthier Wales. Available at: https://gov.wales/docs/dhss/publications/180608healthier-wales-mainen.pdf

- Pharmacy: Delivering a Healthier Wales 2019. Available at https://www.rpharms.com/recognition/all-our-campaigns/pharmacy-delivering-a-healthier-wales/

- Digital Architecture Review Report 2019. Available at: https://digitalhealth.wales/events/digital-transformation-programmeHuman Medicines Regulations 2012 (and subsequent amendments)

- Misuse of Drugs 2001 and subsequent amendments

- National Health Service (Wales) Act 2006

- Welsh Language Act 1993

- Together for Health – A 5-year vision for the NHS in Wales (2011) (sets out NHS Wales Core Values)

- Prudent Healthcare (2014).

- Informed Health and Care: A Digital Health and Social Care Strategy for Wales (2015).

- Well-being of Future Generations (Wales) Act (2015)

- Operational productivity and performance in English NHS acute hospitals: Unwarranted variations. An independent report for the Department of Health by Lord Carter of Coles (2016).

- 3rd WHO Global Challenge: Medication Without Harm (2017)

- The Wales Audit Office Report "Managing Medicines in Primary and Secondary Care" (2016).

- All Wales Medicines Strategy Group Five Year Strategy (2018-2023), "Supporting prudent prescribing to obtain the best outcomes from medicines for patients in Wales".

- The Parliamentary Review of Health and Social Care (2018).

- Transforming Access to Medicines Review (2018).

- Electronic Prescribing and Medicines Administration Systems and Safe Discharge. Healthcare Safety Investigation I2018/018. Healthcare Safety Investigation Branch. (2019)

- Putting Value at the Centre of Health and Care in Wales - A Three Year Action Plan (2019)

- Health and Social Care (Quality and Engagement) (Wales) Bill (2019)

Appendix 4 – Digital Architecture Review considerations

The future vision has been developed against the context of A Healthier Wales and the Digital Architecture Review (DAR). The Digital Architecture Review recommends an Open Platform for all future digital developments in the Welsh Health and Care system defined in Terms of Target Architecture, Transition Architecture(s) and Architecture Building Blocks (ABBs). These terms are defined at a high level as follows:

- **Target architecture** - The description of a future state of the architecture being developed for an organisation. There may be several future states developed as a roadmap to the evolution of the architecture to a future state. In the context of this review, the Target architecture is the focus of this section.

- **Transition architecture -** A formal description of the enterprise architecture showing an "island of stability" between the starting position and the target. Transition Architectures are used to help individual work packages and projects to be grouped into managed portfolios and programmes. In the context of this review, the transition architectures are the focus for the.

- **Architectural building block -** A constituent of the architecture model that describes a single aspect of the overall model – ABBs are reusable components that work together to provide the overall information system. This is the most important component of the design approach. ABBs have a long term persistence as elements of the architecture, even if they are provided over time by different software solutions. In the context of this review, the ABBs at the highest level are the building blocks described as A to D above and potentially subcomponents of those..

Any solutions developed for the future ePrescribing landscape should also align with DAR "design principles" which are:

- **Make information available to whomever needs it** - Including: Clinicians, Patients, Health
and Social Care, 3rd Sector, Carers, Public Health and research, to facilitate joined up care and improve outcomes.

- **Liberate data -** Remove data silos and vendor lock-in; making data accessible to legacy and new applications.

- **Use open standards for interaction -** Define how internal and external consumers interact with the platform (standards include openEHR, FHIR, IHE, HL7, REST, SOA, OAuth, SAML).

- **Use open standards for data exchange -** This will facilitate Innovation and competition; lower barriers to entry for 3rd sector via shared Information model (Data stored in a proprietary database is not really open).

- **Adopt an open service model -** Specifications of APIs are available to everyone.

- **Design for national scale -** All components that may have a regional or national scale at some point in their development should be designed with national levels of resilience, reliability and performance in mind.

- **Consider appropriate use of cloud technologies -** Cloud computing is referred to by many other open platform initiatives as an enabler – this needs to feature in NHS Wales' longer term thinking.

- **Build services for re-use -** The digital system component could exploit APIs lower level to provide reusable service components, accelerating pace and standardisation across applications (e.g. a single web chat capability).

- **Adopt agile design principles –** prototype, test, learn. The aim should be to shorten cycle times and improve evaluation, innovation and learning.