

THE EVALUATION OF THE ELECTRONIC PRESCRIPTION SERVICE IN PRIMARY CARE

Final Report on the Findings from the Evaluation in Early Implementer Sites

This report has been prepared by Tony Cornford, Ralph Hibberd and Nick Barber on behalf of the team conducting the evaluation

This report draws on work undertaken as part of The Evaluation of the Electronic Prescription Service in Primary Care. This work has been conducted by Nick Barber, Tony Cornford, Bryony Dean Franklin, Rachel Elliott, Justin Waring, Sarah Armstrong, Matthew Boyd, James Davies, Sara Garfield, Jasmine Harvey, Ralph Hibberd, Melanie Linn, Valentina Lichtner, Rajnikant Mehta, Dimitra Petrakaki, Matthew Reynolds, Stacey Sadler, Sarah Slight, Sarah Thum-Bonanno, Will Venters, and Tony Avery

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EXECUTIVE SUMMARY

1. This report presents the findings from *The Evaluation of the Electronic Prescription Service in Primary Care*, a Connecting for Health Evaluation Programme commissioned project. The project's aim, as stated in the proposal, was to evaluate Phase 3 (Release 2) of the Electronic Prescription Service (hereafter EPS R2) to determine effects on patient safety, satisfaction with care, work processes and economics. The methods used were a blend of ethnographically informed quantitative and qualitative approaches.
2. The Electronic Prescription Service Release 2 (EPS R2) is an informatics initiative undertaken in the English NHS. The role of EPS is an ostensibly simple one. It allows the transmission of prescription messages, digitally signed, from primary care prescribers, via a central network and server infrastructure (the Spine) from where they can be downloaded by dispensing contractors including community pharmacists, dispensing appliance contractors and dispensing doctors. The prescriptions are subsequently passed on electronically to NHS Prescription Services for reimbursement to the dispenser.
3. The Connecting for Health Evaluation Program called for research into the implementation and consequences of EPS R2 in June 2007, just before it was due to be implemented. However implementation was delayed. This evaluation project commenced January 2008 and, after several revisions, finished in March 2013. Delays to the research were caused by a much slower implementation of EPS R2 than anticipated, and by Byzantine research governance.
4. The implementation of EPS R2 revealed itself as a very large, disparate and complex project. As is common in national evaluations of new information systems, we had to have a flexible approach to research and to take the best opportunities available to progress the work as events stalled and unfolded. In this way, in line with the original aims set out at the start, we were able to study the effects on GP and Pharmacy working practices, on patients, on safety, and looked to the possible future(s) of the service.
5. The purpose of this final report is to inform health professionals, policy makers, IT professionals, patients and others interested in the progress of EPS R2. The report is supported by a number of research papers that have been or will be published in the scientific literature and which give greater level of detail on methodology, theoretical underpinnings, and findings. A list of these publications is given in appendix C.

6. The purpose of this final report is to inform health professionals, policy makers, IT professionals, patients and others interested in the progress of EPS R2. The report is supported by a number of research papers that have been or will be published in the scientific literature and which give greater level of detail on methodology, theoretical underpinnings, and findings. A list of these publications is given in appendix C.
7. The first chapter tells of the origins of EPS, its expected benefits and the sociotechnical approach we took to studying the adoption and use of EPS R2. The second chapter describes how dispensing workload has been increasing and gives a detailed account of the design, features (functionality) and deployment of the service. Chapter three contains the research findings and chapter four looks to the future.
8. Over 80% of pharmacies were EPS R2 enabled by July 2013. In the very early period of use Pharmacists were often frustrated as software and other operational problems were being identified and addressed. However once the software systems had become more stable - dispenser systems but also prescriber systems and the Spine infrastructure - they generally liked them and several respondents felt that EPS R2 helped smooth the workload through the day. Some pharmacies, those which can fully embrace this technology, integrate it into their work practices and align it to their business goals, may see greater benefits.
9. GP practices saw an impact on the processing of repeat prescriptions as expected in the original business case for EPS R2. Based on data from a small number of practices using different GP software systems EPS seemed to reduce the time administrative staff needed to spend on repeat prescriptions. There is however additional work to be done at the start of using the system, including training, revising procedures and practices, and encouraging patients to nominate a pharmacy. The initial workload could inhibit uptake by GP practices, which up to mid 2013 has been slow.
10. Some patients liked the service and noted that it appeared to be quicker than the current service. For others, particularly those who currently have their repeat prescriptions collected for them by a pharmacy, it made little difference. Some patients were annoyed when they reached the pharmacy before their acute prescription, and the service is probably most suitable for repeat prescriptions/repeat dispensing. Views on nomination (the specifying by the patient of the pharmacy to which the prescription should be sent) split patients, with some feeling that it constrained choice whilst others felt that it would facilitate choice.
11. It had been assumed that EPS R2, which could deliver information straight from the electronic prescription to the medicine's label, would reduce labelling errors and pharmacy work. We studied 15 pharmacies every three months for up to three years; 16,357 prescribed items were checked against their prescription. Overall, we identified labelling errors in 5.4% of 16,357 dispensed items, and content errors in

1.4%; enhancements to the doctor's instructions were made for 13.6%. Pharmacists also edited the label for a further 21.9% of EPS R2 items. Electronically transmitted prescriptions had a higher prevalence of labelling errors (7.4% of 3,733 items) than other prescriptions (4.8% of 12,624); odds ratio 1.46 (CI 1.21-1.76). There was no difference for content errors or enhancements. The increase in labelling errors was mainly accounted for by errors (mainly at one pharmacy) involving omission of the indication, where specified by the prescriber, from the label. A sensitivity analysis in which these cases (n=158) were not considered errors revealed no remaining difference between prescription types. We conclude that EPS R2 neither significantly increases nor decreases the probability of a labelling error.

12. In the final chapter we address the future and factors and understandings which we think are critical to the integration of EPS R2 into primary care. We address a number of baseless or challenging beliefs, which we term “canards”, and which may lead people to have inappropriate expectations of EPS R2. When these canards exist it is likely that people will be disappointed with the system, and experience problems with implementation. We also note that the assumption that “the market” will drive up quality and usability has little foundation in the cases of general practice and pharmacy computer software systems, which increasingly form oligopolies.
13. EPS R2 works technically, however it so far offers weak benefits to most stakeholders. The main beneficiaries of EPS R2, which is fundamentally an infrastructure project, are likely to be Department of Health and NHS as a whole. Given the challenge of successfully implementing EPS R2 in GP practices we have seen, there may be a need for central intervention to sustain momentum.
14. For EPS to become successfully embedded and integrated into medicines use practices will require regular and active monitoring of problems and mechanisms to promote creative innovations that exploit the service and the data it produces - a multifaceted improvement approach. This work must be linked to the wider NHS informatics strategy within which, and in combination with other developments, EPS can deliver enhanced value for multiple stakeholders.
15. There is also an urgent need for more research into primary care prescribing and dispensing. The extant literature is very thin and we are woefully ignorant about an aspect of the NHS that costs over £9Bn per annum, handles over a billion of medicines orders and is central to achieving the highest quality of management for long-term and chronic conditions.

Chapter by Chapter summary

Chapter 1

In Chapter 1 we explore the development of the Electronic Prescription Service (EPS) in the context of current trends in informatics. We look at the benefits that are ascribed to the service and the manner in which we have investigated these. Following this, we explore the origins of the EPS, and its potential role in the context of current prescribing and dispensing practice. Throughout this chapter, we emphasise that prescribing and dispensing are complex processes that involve a diverse range of stakeholders.

Chapter 2

Chapter 2 looks at how the workload that is placed on community pharmacies and dispensing appliance contractors (DACs) by prescriptions has changed. In this context we then look at the design of the Electronic Prescription Service (EPS), both the infrastructure in use and the manner in which this service supports the transition from paper to electronic prescriptions through the two releases of EPS. We then look at the benefits ascribed to EPS, and the manner in which the service has been deployed.

Chapter 3

This Chapter reports findings related to the implementation of the service as it moves from a prolonged period of testing through its initial implementation to widespread deployment and 'business as usual' implementation. The chapter begins with a brief review of the history of this evaluation and the academic and practical challenges of conducting an evaluation of a national informatics service. We go on to look at our findings in relation to changes in practice within GP practices and consequences of this for workload and prescription management. Following this, we look at change in community pharmacy work practice following from the introduction of the service, change in perceived safety, the distribution of work and safety in dispensing practice. We then consider patient perceptions and expectations of the service. The chapter closes with an exploration of the wider potential consequences of the service for businesses and other organisational stakeholders.

Chapter 4

Chapter 4 considers what the future might hold for the EPS and how the service might develop. We look at the understandings that various actors hold about the service and the institutional forces supporting adoption and integration of the service as well as those factors that might militate against this. We draw on Normalisation Process Theory⁽³⁾ as a framework for exploring the way the practices of using the service may become embedded in healthcare institutions. Finally, we look at three alternative scenarios for service adoption and development set within alternative visions of health care.

1

INTRODUCTION

IN THIS CHAPTER

In Chapter 1 we explore the development of the Electronic Prescription Service (EPS) in the context of current trends in health informatics. We look at the benefits that are ascribed to the service and the manner in which we have investigated these. Following this, we explore the origins of the EPS, and its potential role in the context of current prescribing and dispensing practice. Throughout this chapter, we emphasise that prescribing and dispensing are complex processes that involve a diverse range of stakeholders.

The Electronic Prescription Service (EPS), as developed for the NHS in England over the past decade, provides for digital transmission of prescriptions between prescribers (e.g. doctors or nurses) and dispensers (e.g. pharmacies and dispensing appliance contractors) and then onward to reimbursement by the NHS Prescriptions Agency. The function of the EPS is to change how prescription messages in primary care are communicated, moving a significant percentage from printed paper to a secure digital format including legally valid digital signatures. The expected consequences of this are a clinically superior, more efficient and safer means for patients to obtain the medicines they need.

The technology used is considered standard now in many other areas, and the core changes for doctors/prescribers, patients and pharmacists are at first sight simple. Already the majority of primary care prescriptions are computer generated, though they are then printed on paper and passed via the patient to the dispenser. Similarly, all dispensers have local computer systems to coordinate the dispensing of medicines, allow stock control and hold customer information. EPS prescriptions (with digital signatures) can remain at all times as digital messages. They can be sent efficiently and directly from prescriber to dispenser, computer system to computer system, over a secure digital network. Once dispensed, prescriptions can then be digitally endorsed by the dispenser and sent on to NHS Prescription Services for automated reimbursement.

What could be simpler or more obviously able to improve efficiency? This is after all the type of e-commerce system that has emerged in other facets of life and which we willingly use on a daily basis – for example when booking a train ticket or ordering a DVD online.

That said, we must understand that it is for good reasons that patients' access to medicines is embedded in a professionally mediated knowledge chain, helping to ensure that medicines prescribed are appropriate, those dispensed are as specified, and that they are able to be safely used by the patient.

EPS may indeed allow many efficiencies and conveniences for GPs and their practices, for patients and their carers, for pharmacies, and for pharmacists. Beyond efficiency or convenience it may also support a safer, more personalised and patient centric set of services to support patients' understanding of and adherence to their medicines regime. Safety issues are particularly significant in the accurate dispensing and labelling of drugs and their easy access by patients. EPS should also be able to provide efficiency gains in the reimbursement processes by which pharmacies are paid for the medicines they provide. All these potential benefits are seen to some degree within the practices that have emerged as EPS is implemented – improvements but not transformations. EPS can also offer a live stream of real-time data that relates to the single most costly and valuable clinical intervention within the health service – prescribing medicines. Use of this data resource in research, service management, audit and enhanced supply chain logistics may in time bring further substantial benefits.

The evaluation reported here has as its purpose to assess all the general assertions made in the paragraphs above. This has been achieved by assessing various aspects of EPS in the early stages of implementation and use and then projecting them into possible futures, informed by our findings. In particular, the data collection upon which this report is based, commenced in January 2008, and was completed at the end of March 2013. Thus our data and our presentation reflect the then structures of the NHS in primary care (e.g. PCTs). From the 1 April 2013 a number of significant organisational changes were introduced for the English NHS which we do refer to in our prospective analysis.

The Evaluation of the Electronic Prescribing Service in Primary Care was one of the projects commissioned under the Connecting for Health Evaluation Programme. The main focus in this report is on the vision that the EPS encompasses, its consequences for the ways in which medicines are supplied (prescribed and dispensed), and on the business processes of relevant health care and pharmacy institutions. The approach adopted in this study has been broadly based, including hypothesis testing research designs for quantitative data such as error rates in dispensing, and more sociotechnically and ethnographically influenced qualitative work to understand the way EPS is experienced by people within specific locations, and the processes of change that EPS R2 conditions (see Box 1).

In the chapters that follow we explore the emerging story of EPS R2. This chapter examines the potential role of electronic prescription transmission in the context of current dispensing practice. In the next chapter we examine the design of EPS and the various elements of its

underlying infrastructure. The third chapter presents the service as it presently stands, through the main findings of the evaluation. This chapter includes our research into the activities and perceptions of community pharmacies, GP practices, patients and other stakeholders. In the final chapter, we examine some of the potential futures of EPS R2 and invite readers to consider their own most likely or most desirable scenario.

1.1 Origins of EPS

EPS was first announced by the Department of Health in 2003 following earlier pilots and trials. The means of delivering the service (the EPS project) was established in 2005 as one part of the National Programme for IT (NPFIT). The NHS Spine, the secure network used by EPS, has been developed in parallel by another part of this programme and serves a number of other national systems and services. The EPS project has been managed through the period of its establishment and development by Connecting for Health (CFH), an agency of the Department of Health (DH) in collaboration with Strategic Health Authorities (SHA) and Primary Care Trusts (PCT). As this final evaluation report is completed, in August 2013, based on data collection that concluded in March 2013, the EPS is starting to gain growing volumes of prescriptions, with growing numbers of GP practices and Pharmacies able to use it (see Figure 1 and weekly updated deployment map now at <http://www.hscic.gov.uk/epsmap>). At this time the wider NHS and Connecting for Health are being reorganised. Primary Care Trusts are phased out and Clinical Commissioning Groups are coming to replace them. As part of these changes the national responsibility for EPS, passed from CFH to NHS England, with the the Health and Social Care Information Centre (HSCIC) www.hscic.gov.uk commissioned to undertake its delivery.

The launch of EPS realised a long-held goal of the NHS to achieve the electronic transfer of prescriptions (ETP – see Box 2) between GP practices, dispensing contractors (pharmacies) and the reimbursement agency (NHS Prescription Services). Early policy suggested the delivery of a national ETP service in England by 2004, and later, by 2007.^(53, 75) The assumptions upon which these estimates were based proved optimistic, and the EPS as evaluated here has an expanded scope relative to earlier ETP pilot projects. Today in 2013 the service and its underlying infrastructure have come through a stage of intensive development and pilot use to a point where the move towards implementation on a national scale is gathering pace. The trends illustrated in Figure 1 show (as of November 2012) that approximately 81% of community pharmacies and 8 % of GP practices have working software, and just over 1% of prescription items are dispensed from EPS R2 prescriptions.*

* At the conclusion of the evaluation in March 2013, the number of community pharmacies that had EPS R2 had increased to 82%, the number of GP practices using the service to 8%, and the percentage of dispensing appliance contractors using EPS R2 to 25%.

Box 1: A Sociotechnical View of Electronic Prescription Transmission

The sociotechnical approach as adopted in this work is concerned with studying the combination of some new technology, various social groups, and diverse but interlinked organisational and work contexts. This is in contrast to approaches that privileged one aspect and ignore others, for example, privileging the technology (does it work in its own terms, is it reliable and maintainable) or narrow professional interests (do doctors need or like EPS?).

Sociotechnical ideas are traditionally associated with a particular style of systems design (e.g. prior to use) in which individual user groups' interests are represented through participative processes, and in which the final shape of a new work system is able to be negotiated (even optimised) at the time of design in ways that accommodate human and social interests within technology's constraints. The primary focus in this tradition is on work teams and groups.^(12, 13)

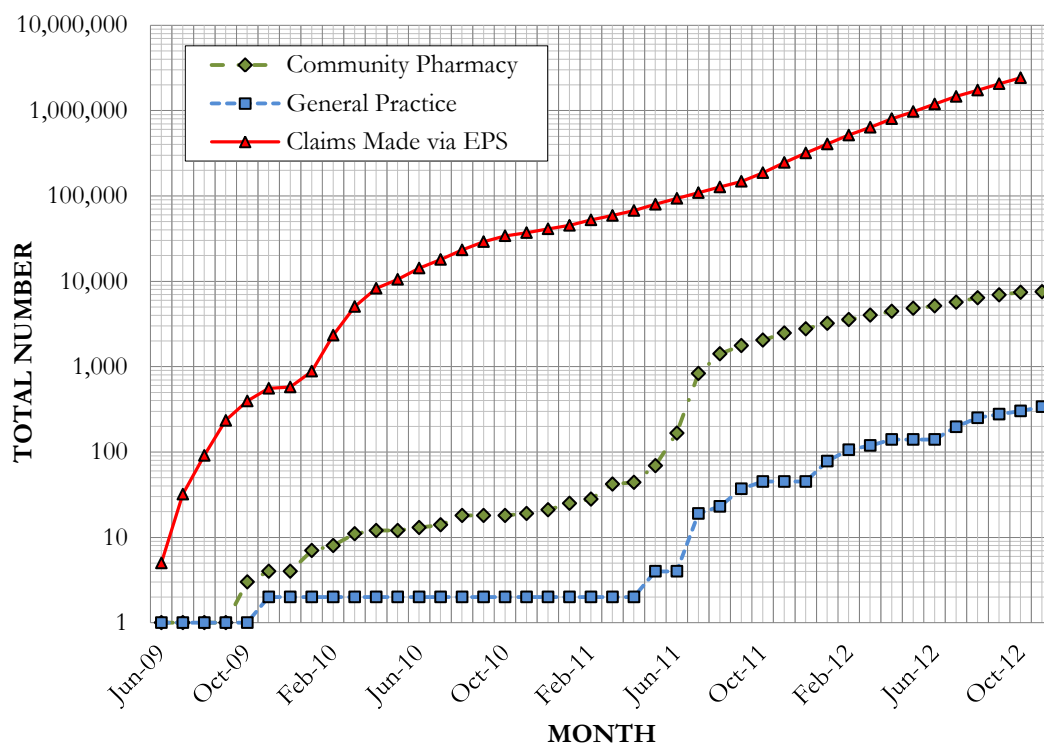
In this study the sociotechnical perspective we adopt has a broader importance. It allows the policy maker, manager, engaged professional, or in this case independent evaluator, to balance a concern with technical functionality *per se* with the ways such functionality might be introduced to a work place, be adopted or not by user groups and work teams, and the cumulative and integrated consequences that emerge as new sociotechnical systems of work (practices) are established and achieve stability - for example the regular use of electronic repeat dispensing.

In the extreme case technical functionality may be present (implemented, usable) but not ever used (adopted, integrated into practice), or more subtly it may be there but used in ways that the designer/sponsor did not foresee, with unexpected or unpredictable positive or negative organisational consequences.^(33, 35) This reflects an understanding that contemporary health information systems such as EPS are not essentially or deterministically shaped in *ex ante* processes of analysis and design, or by careful selection of the 'right' software. Nor are their consequences clearly apparent at the time of initial implementation or tied principally or exclusively to their technical functionality. Rather the sociotechnical 'working out' of a technology within the organisational setting, what May et al call normalisation,⁽⁹⁾ continues over time, perhaps many years, and might be better seen as a set of improvisations or enactments that shape and reshape both the technology and the work, rather than as an ordered linear path to a pre-defined style of use.^(50, 51)

Thus it is not just or even principally the technology that is 'worked out', but aspects such as the work flow, job descriptions and team structures, pace of work and temporality, professional demarcations and the way that various organisations relate to each other. In this way EPS clearly exhibits Coiera's first two rules for the reinvention of health care: 1. Technical systems have social consequences; 2. Social systems have technical consequences.⁽⁵⁷⁾

As a technical infrastructure EPS exists to enable the communication of digitally signed electronic prescriptions as they move from a prescriber's local software system to that of a dispenser - a community pharmacy or a dispensing appliance contractor. Prescribers are mainly but not exclusively General Practitioners - there being increasing numbers of nurse prescribers

and other health care professionals with limited prescribing rights. Once the prescription message arrives a dispenser can, if appropriate, use the digitally encoded data it contains directly in their own local computer systems to support dispensing processes. Once the medicines are dispensed and ready for the patient, including having suitable labels printed and affixed, the dispenser can electronically add an endorsement to the prescription message, which indicates what was dispensed, and present it electronically to NHS Prescription Services for reimbursement. We see from this that a certain level of computerisation of the prescriber and the dispenser are key prerequisite factors for EPS, as well as the presence of a reliable, secure and widely available network.



Source: NHS Prescription Services and NHS Connecting for Health

Figure 1: Deployment of EPS Release 2 and Number of Electronic Prescription Claims from June 2009 to November, 2012 (Logarithmic Scale)[†]

[†] By March 2013, there were 9,459 community pharmacies that could receive EPS R2 prescriptions, 687 GP practices, and 29 dispensing appliance contractors. At this point a total of 4,306,931 claims for prescription items dispensed had been made, with 1,625,694 patients having set a nomination for their EPS prescriptions.

Box 2: Electronic Transmission of Prescriptions

The digital transmission of prescription data is usually termed in the wider world ‘electronic transmission of prescriptions’ or ETP. This term is however not in universal use, and in the research literature such systems are often confused with or rolled up into more common but less appropriate terms such as ‘electronic prescribing’, Computerised Physician Order Entry (CPOE) or terms focused on the artefact ‘electronic prescriptions’ (e-prescriptions). Surescript, the largest provider of broadly comparable services in the USA, as a 3rd party service supplier, uses the term ‘Prescription routing services’ though this includes support for fax transmission (see <http://www.surescripts.com/about-e-prescribing/e-prescribing-services/prescription-routing.aspx>) . ETP is also often introduced and discussed as one part of the more general networking of health care – eHealth - and an emphasis on the potential for sharing health data across organisational and institutional borders.

This confusion over the appropriate designation of a system such as EPS has led to a proposal from within this project to establish a new MESH term aimed at distinguishing the generation and storing of the prescription via computers (electronic prescribing), from the transmission of the prescription (see <http://etpworld.wordpress.com/supporting-an-etp-mesh/>).

Whatever name is used, and none is really adequate to capture this complex and intersecting set of medicines supply and use activities, the use of a digital format for a message implies that at least two parties have a computer-based system to generate or receive the message. For example, a computerised prescriber can issue to a patient a paper prescription with a bar code printed on it. The patient does not need access to a computer but a dispenser can subsequently read the bar code and thereby locate the prescription details on some shared database. This approach was the basis for England’s EPS Release 1 (EPS R1), which is described in chapter 2.

Traditionally across the various NHS systems in the UK communications in direct support of patient’s access to medicines and devices, and pharmacist reimbursement, has been based on paper forms (prescriptions) passed from the prescriber to the patient and then physically carried by the patient to a dispenser, usually a high street pharmacy. In the pharmacy the paper form is used to manage the dispensing process including selecting stock and preparing labels. The form may also be signed by a patient claiming one of a number of exemptions and thus make no payment for the medicines. Thereafter the same paper forms are bundled up on a monthly cycle to be physically shipped to the reimbursement centres of NHS Prescription Services and on this basis the pharmacy is paid (reimbursed).

For over a decade England’s familiar paper prescriptions – using the green FP10SS (Figure 2) – has been generated by computer either during consultations or in response to requests to GP practices. There are a number of variations in the way these

prescriptions are produced and processed which EPS needs to reflect. For example, in a paper-based world a prescriber may send a prescription directly to a dispenser rather than (or in addition to) passing it via the patient during a consultation. This may be the case, for example, if a patient requests a repeat of an existing prescription by phone, and the dispenser then picks up the prescription directly by arrangement. Some prescribers also act as the dispenser – named as ‘dispensing doctors’ and found particularly in rural areas where patients do not have easy access to a pharmacy. However, at this time whilst dispensing doctors prescriptions are in scope for EPS, there has been slow progress in the provision of EPS R2 compliant prescribing systems for dispensing doctors that support management of both prescribing and dispensing.

The diagram illustrates the layout of the FP10 Prescription Form, divided into two main sections: the Left Hand Side and the Right Hand Side.

Left Hand Side of Prescription:

- Pharmacy Stamp:** Located in the top left corner.
- Age:** Fields for NN (National Number) and D.o.B (Date of Birth).
- Title, Forename, Surname and Address:** Fields for TITLE INITIAL SURNAME, ADDRESS LINE 1-5, and POSTCODE.
- NHS Number:** Field for NHS NUMBER.
- Endorsements:** A large central area for listing medication items, including:
 - MEDICATION ITEM DESCRIPTION 1, QUANTITY 1, DOSAGE/FREQUENCY 1
 - MEDICATION ITEM DESCRIPTION 2, QUANTITY 2, DOSAGE/FREQUENCY 2
 - MEDICATION ITEM DESCRIPTION 3, QUANTITY 3, DOSAGE/FREQUENCY 3
 - MEDICATION ITEM DESCRIPTION 4, QUANTITY 4, DOSAGE/FREQUENCY 4
- Signature of Prescriber:** Field for the prescriber's signature and Date.
- For dispenser No. of Prescriber on form:** A checkbox and fields for DR INITIAL SURNAME, GP CODE, SURGERY ADDRESS LINE 1-3, POSTCODE, TELEPHONE NUMBER, PCT CODE, and PCT NAME.
- FP10 SERIAL NUMBER:** Located at the bottom of the left side.

Right Hand Side of Prescription:

- Personal Details:** Fields for TITLE FORENAME SURNAME, ADDRESS LINE 1-4, D.O.B, Postcode, DATE OF ISSUE, Page N of (N), and NHS NUMBER.
- Medication Item Descriptions:** Four rows, each with a description, quantity, dosage/frequency, and a checkbox for selection.
- MESSAGES FOR THE PATIENT:** A designated area for patient communication.
- PATIENTS – please read the notes overleaf:** A box at the bottom right.

Arrows at the bottom indicate the division into 'Left Hand Side of Prescription' and 'Right Hand Side of Prescription'.

Figure 2: Layout of the FP10 Prescription Form Used in English Primary Care Settings

Other important communication links and message flows exist within the overall medicines supply process: from dispenser to reimbursement body to initiate reimbursement as noted above; from reimbursement body to prescriber for a

retrospective prescribing review (e.g. ePACT or ePFIP reports) allowing monitoring of prescribing trends at GP, practice or PCT level; from dispenser to prescriber when a query is raised on a prescription; or patient to prescriber (or even to dispenser) to request reissue (repeat) or amendment of a prescription. Thus, while EPS has a primary focus on efficient communication from prescriber to dispenser and on to NHS Prescription Services, it is part of a system with multiple message flows, existing or potential. To the extent that EPS influences these other communication flows it may become a catalyst for wider change in this central and ubiquitous aspect of primary care.

Basic data provided by the NHS Information Centre confirms the scale and ubiquity of medicines in primary care.

- Over 942 million prescription items were dispensed in primary care in the year to September 2011.
- This suggests over 400m bits of paper are handled per year given that the average number of items per prescription is 2.2.
- Expenditure on these medicines for primary care was £8.81 Bn in 2011.
- The vast majority were dispensed at a community pharmacy, with 5.8 million items dispensed by Dispensing Appliance contractors in the financial year ending 2011, and, we estimate from available figures, approximately 60 million items from dispensing doctors' practice in the calendar year 2010.

Although the reporting periods for each of the dispensing contractors varies, making detailed comparison difficult, these figures nevertheless show vividly the sheer volume of dispensing activity that occurs and the centrality of community pharmacy in servicing this. Furthermore these figures are not static – the volume of dispensing has been increasing at an average of 5% per annum over the last decade.

1.2 EPS as a Project within NPfIT

EPS has been developed in two main versions, named as EPS R1 and EPS R2 (EPS Release 1 and Release 2). EPS R1 established the fundamental technical infrastructures of message transmission while retaining the paper prescription as the legal document. In EPS R1 the FP10 form was modified to include a space on which a barcode could be overprinted. This barcode contained a Globally Unique Identifier (GUID) that identified the electronic version of the prescription. The patient took the paper form to the pharmacy, while at the same time the digital version was uploaded to the Spine. A dispenser could, if they wished, read the barcode from the paper form and retrieve the prescription message from the NHS spine for use in their patient medication record software (PMR) running on the dispenser's computer system. EPS R1 helped to prove

parts of the technical infrastructure, and was adopted into work practices by some pharmacies, allowing more automatic label printing for example. This report, however, is principally concerned with EPS R2, in which the digital message with its digital signature becomes the legal message and the printing of a prescription token only becomes a legal requirement under certain conditions, such as when a patient requests a copy of the prescription, when a patient is provided with a repeat dispensing prescription, or when a declaration of non-age related prescription fee exemption or prescription fee paid is required from the patient. It is however possible for a prescription token to be printed if it serves some purpose, either by a prescriber or a dispenser, for example as part of the work flow in a dispensary.

EPS has been distinctive among the major programmes run within NPfIT in a number of ways. First it has a diverse and extensive set of stakeholders. To succeed EPS must rely upon the active contribution of a number of independent bodies, businesses, and various professional and administrative staff - what we identify as the core actors or stakeholders. These comprise GP practices, pharmacies - ranging from small independent businesses, medium and large chains, and major supermarkets, the software suppliers serving both GPs and pharmacies, network providers, PCTs and their CCG successors, and professional staffs in particular doctors, nurses and pharmacists. Each of these stakeholders has their own interests, available resources and time scales, and we cannot and should not assume that any one of these core actors are fundamentally committed to EPS as a central element of their strategy. Nor are they for the most part under executive control of the NHS/DH. Beyond this core group (the boundary of which may be debated) is an extensive further network of other interests including, for example the PSNC, Royal Colleges, professional associations, and software suppliers and service companies.

1.3 What EPS might provide

Just as the stakeholder map is many and diverse, so the benefits that accrue from EPS will in all probability be diffuse and multi-faceted. As we write this final report (August 2013), and with 798 GP practices able to use EPS and 9,848 community pharmacists (10 and 85 % of the national total respectively) the scale and location of direct benefits are still mostly conjectures or contingent upon both EPS' continuing uptake, growing transaction volumes, and some specific future vision of healthcare. Thus, at this time no stakeholder within the core group can confidently look forward to specific quantifiable returns from their engagement with EPS, and yet no stakeholder can ignore the potential it offers.

While ultimate benefits are at present conjectures, we are more confident, based on our research, that using EPS does imply changes in the work practices of all the principal

stakeholders involved in the provision of health services in primary care in England. For example, based on research reported here, changes are seen in how medicines related tasks are organised in GP surgeries and how work is sequenced in high street pharmacies and their business processes, as well as in levels of performance including safety and quality measures, in means of regulation and management. Beyond this we start to see some changes in the structure of markets (e.g. for software and services) and business supply chains as reflected in the scenarios presented in chapter 4. As we argue in this report, EPS has potential to influence how medicines are used by patients, such as through the use of repeat dispensing prescriptions, how activities are organised in health care institutions, what interactions between patient and HCPs occur and how, and the way regulation develops, expenditure is controlled and markets for medicines and devices are structured in the future.

1.4 Issuing Prescriptions in English Primary Care

There are a range of prescriptions in use in England for the supply of devices and medicines to patients.⁽⁷⁶⁾ In this report we focus on the type of prescription that are used for dispensing of items that are currently within the scope of EPS, the FP10SS (see Figure 2).^(63, 76) The designation ‘SS’ stands for ‘single sheet’ and refers to a prescription that is printed on pre-printed forms set up in a desktop printer. EPS R2 removes the need to print a prescription for items in scope, but printed prescriptions are required for all items that are currently out of scope of EPS R2. These include; personally administered items, private or bulk prescriptions[‡], controlled drugs as defined under schedules 2 and 3 of the Misuse of Drugs regulations, or if the item is not represented in the online Dictionary of Medicines and Devices (dm+d).[§] The absence of some Schedules of controlled drugs from EPS is a longstanding issue of contention for some GPs and pharmacists who see the improved procedures and accountability that a digital prescription can offer as a natural fit.

As explained in Box 3, there are various types of prescription that may be issued; acute prescription for one off provision of medicines, repeat prescription where the expectation is for a reissue by the doctor, or repeat dispensing prescription where the reissue process over a designated time period is managed by a pharmacist. Each of these prescription types represents different assumptions made by the prescriber about the course of the indicated problem to be managed and who will do this work and how. Thus each type has some implications for how EPS works and is seen by the various stakeholders.

[‡] Bulk prescriptions are prescriptions issued to a school or an institution. Rather than requiring a prescription for each patient, a single prescription is created for the site.

[§] dm+d is an online database service, accessible as part of the NHS Spine. It provides the coding of medicines, packs, manufacturers etc. upon which EPS R2 relies. Items not represented in dm+d cannot be specified and processed using EPS R2. See <http://www.dmd.nhs.uk/>.

Box 3: Issuing Prescriptions

An FP10SS prescription can be issued either as an acute prescription (AP), a repeat prescription (RP) or as a repeat dispensing prescription (RDP). Each of these represents different assumptions about the course of the indicated problem that the prescriber is attempting to manage.

The acute prescription will typically be issued to the patient following a consultation with the prescriber, to alleviate acute illness and with an expectation of not being repeated. In most cases, an acute prescription will be conveyed to a community pharmacy directly from the GP practice by the patient or the patient's representative. Exceptions may be in the case of a dispensing doctor who fulfils both roles.

The repeat prescription may be used in the case of patients with a chronic illness and where the expectation is that it will be repeated in whole or part. The repeat prescription is authorised by the prescriber for issue by the GP practice at regular intervals for a set number of issues without requiring a consultation with the prescriber.⁽¹¹⁾ Still, acute prescriptions might be used initially to identify which medications represent the most effective treatment for a diagnosed chronic condition. There is local variation in the repeat prescribing process within the GP practice but there are a number of generic steps that are identified in Appendix B and which may be undertaken in part by practice staff. In all cases the process of issuing a repeat should include the opportunity for a review of the continued need for the medication prescribed,⁽¹¹⁾ although there has been concern over the adequacy of control in this process.⁽²⁸⁾

Repeat dispensing prescriptions (using paper) were introduced in England in 2005 as alternative means of managing recurring prescriptions^(39, 40) This allowed a prescriber to print and sign a batch of prescription forms (up to one year's worth), and usually to pass these in bulk to a dispenser who would hold them on file and use to supply medicines. Repeat dispensing prescriptions offer a mechanism potentially to improve patient convenience and adherence. They were also viewed as a potential mechanism to save time for both GP practices and community pharmacy as well as providing pharmacists with greater opportunity to apply their knowledge. This was a stated desire of the 2003 DH paper, *A Vision for Pharmacy in the new NHS*,⁽⁴⁶⁾ as well as in subsequent papers, including the 2008 DH paper *Pharmacy in England: Building on Strengths - Delivering the Future*.⁽⁴⁹⁾

It has been estimated that over 80% of repeat prescriptions could be dispatched as repeat dispensing prescriptions.⁽⁵²⁾ However, in 2006, only 1% of prescriptions were issued as repeat dispensing prescriptions.⁽⁵⁸⁾ By 2010, this figure had increased to 4% in England as a whole, although in some Primary Care Trusts repeat dispensing prescriptions were issued to over 20% of patients.⁽⁶⁴⁾

The use of repeat prescriptions is intended to improve access to medicines for patients with chronic conditions and to reduce prescribers' work load, but it does require effort on the part of the patient or their representative to help manage this process. Community pharmacies

reduce some of this by offering to submit orders (repeats) to the GP practice on behalf of the patient, using prescription counterfoils left with the pharmacy for this purpose. They then collect the new-signed prescriptions from the GP practice, dispense, and may even deliver the medicines to the patient. Thus, an administrative burden is accepted by the community pharmacy as part of their service to customers. The handling of repeat prescription requests by pharmacies, and their delivery to GP practices in bulk, may also offer some support for GP practices.

Further relief for GP practices is possible by the use of repeat dispensing prescriptions. A paper based model of repeat dispensing was introduced in 2005 for the NHS in England and was expected to provide more effective monitoring of patient adherence than repeat prescription arrangements, which were criticised in a report of practice in 1996.⁽²⁸⁾ The introduction of repeat dispensing prescriptions, coupled with supplementary prescribing rights for pharmacists, were seen as a mechanism by which using this type of prescription community pharmacists could monitor and intervene where necessary at every dispensing event.^(39, 77) Indeed this model for prescription management was initially proposed as long ago as 1992,⁽⁷⁸⁾ and is in use elsewhere for example in Australia. The limited evaluations undertaken in England (focused on the paper-based version) have not been unequivocally positive about the model.^(79, 80) National evaluations of the initial implementation of the repeat dispensing service in 2006 suggested that whilst this service involved labour in gaining patient consent to use the service, it did allow for greater monitoring and opportunity for the conduct of medicines use reviews, and did reduce the level of routine contact between GP practice and patient, which (we assume) was taken to indicate that management processes by pharmacists were effective.⁽⁷⁷⁾ For community pharmacists, repeat dispensing provides a potential opportunity to increase their clinical role. In all other respects though, the process of assembling and dispensing prescriptions remains unchanged as does the work to arrange reimbursement (Appendix B).

It is very reasonable to expect that the adoption of a network infrastructure would allow new opportunities for the capturing and sharing of data to support the management of prescriptions, and that some of these possibilities would be pursued. These may be seen in better and more efficient ways of undertaking specific tasks, such as prescribing and repeat prescribing, dispensing and repeat dispensing. It may also be seen through enhanced services for patients and NHS contractors, in particular in synergy with other concurrent innovations in electronic patient records. For example, by allowing new approaches to medicines use reviews and various possibilities for enhanced levels of pharmacist-delivered care achieved through access to a patient facing summary care record. The potential for change also extends to the ways in which pharmacist are reimbursed and remunerated, the timeliness of this process, and the policy goals that it expresses.

However, in the EPS as we have it today, many of these possibilities are still essentially 'potential' and would need sustained efforts at organisational and cultural change in order to

be realised. Thus whilst there may be a strong administrative, efficiency and clinical case for the use of repeat dispensing prescriptions in preference to repeat prescribing, in practice in the six years it has been available, repeat dispensing has not reached the level of deployment expected across the NHS, but has been taken up in certain geographical areas (see Box 3 and Table 1). Official figures indicate that between the years 2008/09 and 2011/12, 152 PCTs showed an increase in the level of repeat dispensing prescriptions used. These figures show that 10 PCTs had over 10% of their dispensed items from paper based repeat dispensing prescriptions in 2011/12 with one PCT having over 30% of (largely paper) prescriptions issued as repeat dispensing prescriptions.

What this suggests is that it is not just the existence of the choice to prescribe this way, but also the specific commitment to exploit this in a particular health setting or health economy that drives uptake. This is relevant to this study given that EPS R2 is expected to allow a more efficient (in administrative terms) repeat dispensing process based on the repeat dispensing model that could deliver significant time savings for GP practices. However, as discussed in Chapter 2, it has not so far been extensively used and its potential in the future with EPS needs to be carefully assessed.

Table 1: Numbers of Prescription Items Dispensed from paper based Repeat Dispensing Prescription in England for the Financial Years 2008/09 – 2011/12

	Financial Year			
	2008/09	2009/10	2010/11	2011/12
Number of Items Dispensed from Repeat Dispensing Prescriptions	18,160,359	26,034,455	35,394,931	48,592,437
Total Number of Items Dispensed	841,857,746	866,572,034	925,712,015	956,594,502
Percentage of Items Dispensed from Repeat Dispensing Prescriptions	2.16%	3.00%	3.82%	5.03%

Source: NHS Prescription Services

1.5 Exploring the Consequences of Service Introduction and Use

The development of EPS has focussed on direct change in the process of transmitting prescription data between prescriber, dispenser, and reimbursement agency, but the possible consequences of service introduction extend beyond this. Most visibly, the inclusion of repeat dispensing can lead to change in the manner in which prescription data is gathered and the manner in which it is processed. This might have consequences for the management of

expenditure within the NHS, and the organisation of markets for the supply of medicines and devices.

The evaluation described in this report provides an overview of the service as experienced and perceived from its initial implementation to mid 2013. EPS R2 is presently moving from a period of limited usage to wider national deployment and eventual “business as usual” operation. This will require new management infrastructures to follow on from the work of CFH in the deployment of the service.

The evaluation provides a unique multi-faceted view of the service, a detailed study unique to the English language literature on ETP. We begin our exploration of the service with a description of its operation, before turning to the findings from our evaluation and our examination of the potential future for the service. In the next chapter, we examine the design of EPS, the infrastructure underlying the service, and the context of dispensing and prescribing practices. This will provide further background to the story of EPS, our findings and the conclusions we offer regarding the future of the service.

1.6 The Electronic Prescription Service: A Brief Timeline

Before we proceed to the next chapter, we provide an overview of England’s attempts to introduce a system for the Electronic Transmission of Prescriptions (Figure 3.1-3.6). This illustrates a process of continual development that led to the Electronic Prescription Service with its current scope which goes beyond the simple transferring of prescriptions from GP practices to community pharmacies and on to NHS Prescription Services, the remuneration agency. In this report, we illustrate this complexity by laying out what we believe to be the most important events in the time-line below.

This timeline provides a brief overview of the three programmes for a primary care ETP programme in England, together with the associated developments in both informatics, such as the HealthSpace and Summary Care Records programmes, and the changes to the management of these programmes. The timeline also acknowledges the changes in community pharmacy that have been anticipated, and which could potentially be promoted through the use of ETP. As becomes apparent from even this simplified description of the programme, the scope of EPS and its precursors extends beyond the simple replication of the process for transferring information about prescribed and dispensed medicines between the key stakeholders of prescriber, dispenser and remuneration agency.

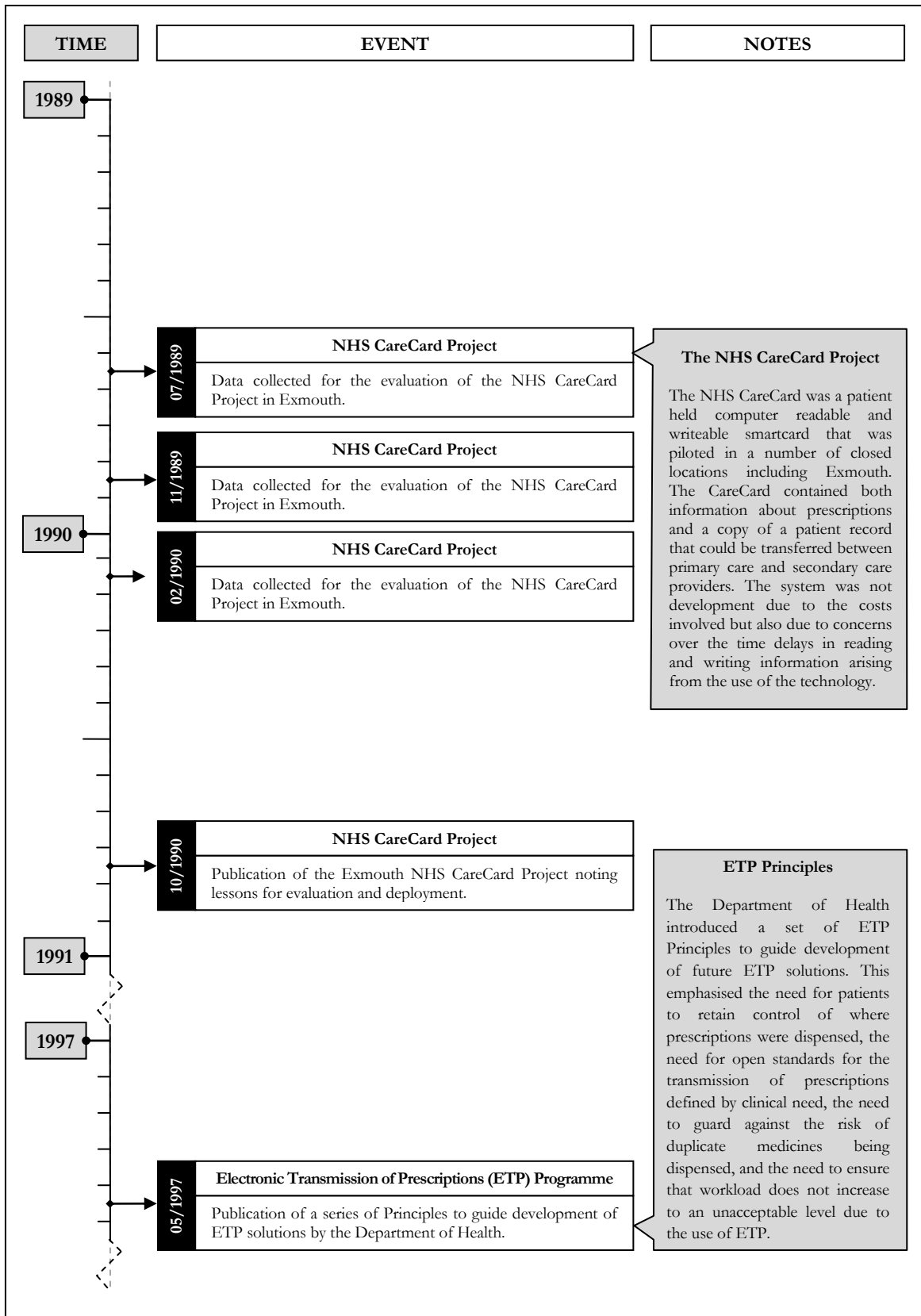


Figure 3.1: The Development of Electronic Prescriptions in England

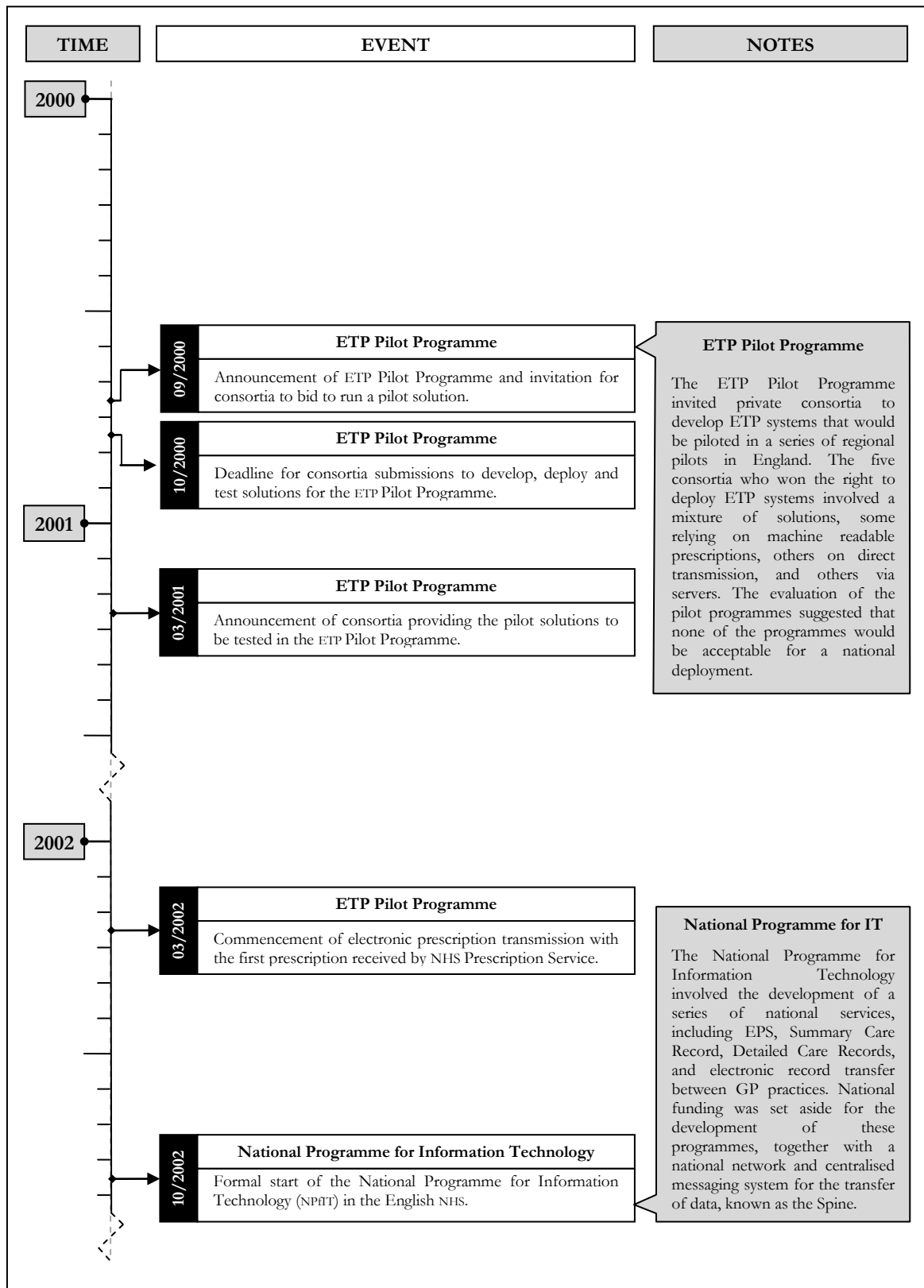


Figure 3.2: The Development of Electronic Prescriptions in England

The Evaluation of the Electronic Prescription Service in Primary Care

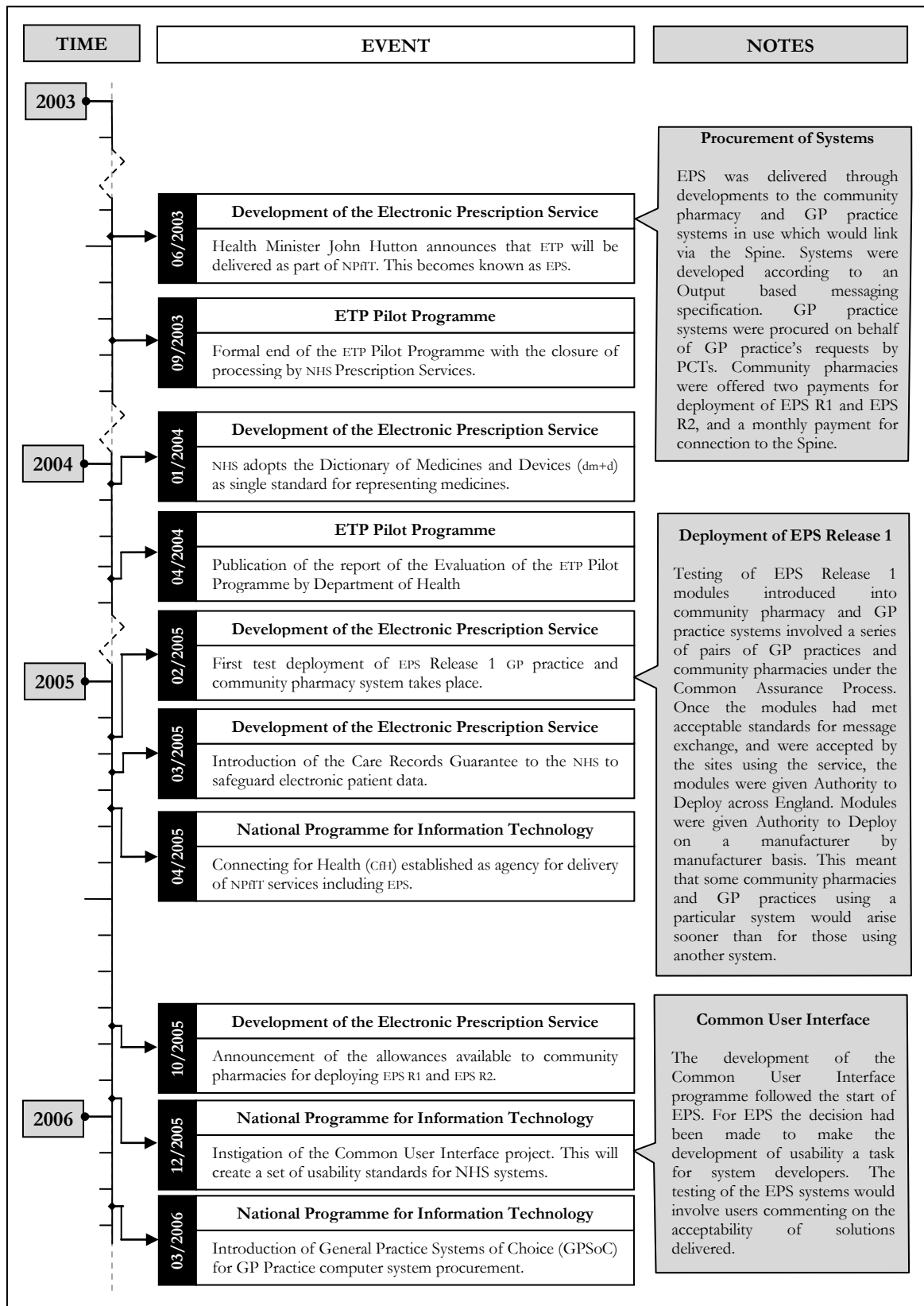


Figure 3.3: The Development of Electronic Prescriptions in England

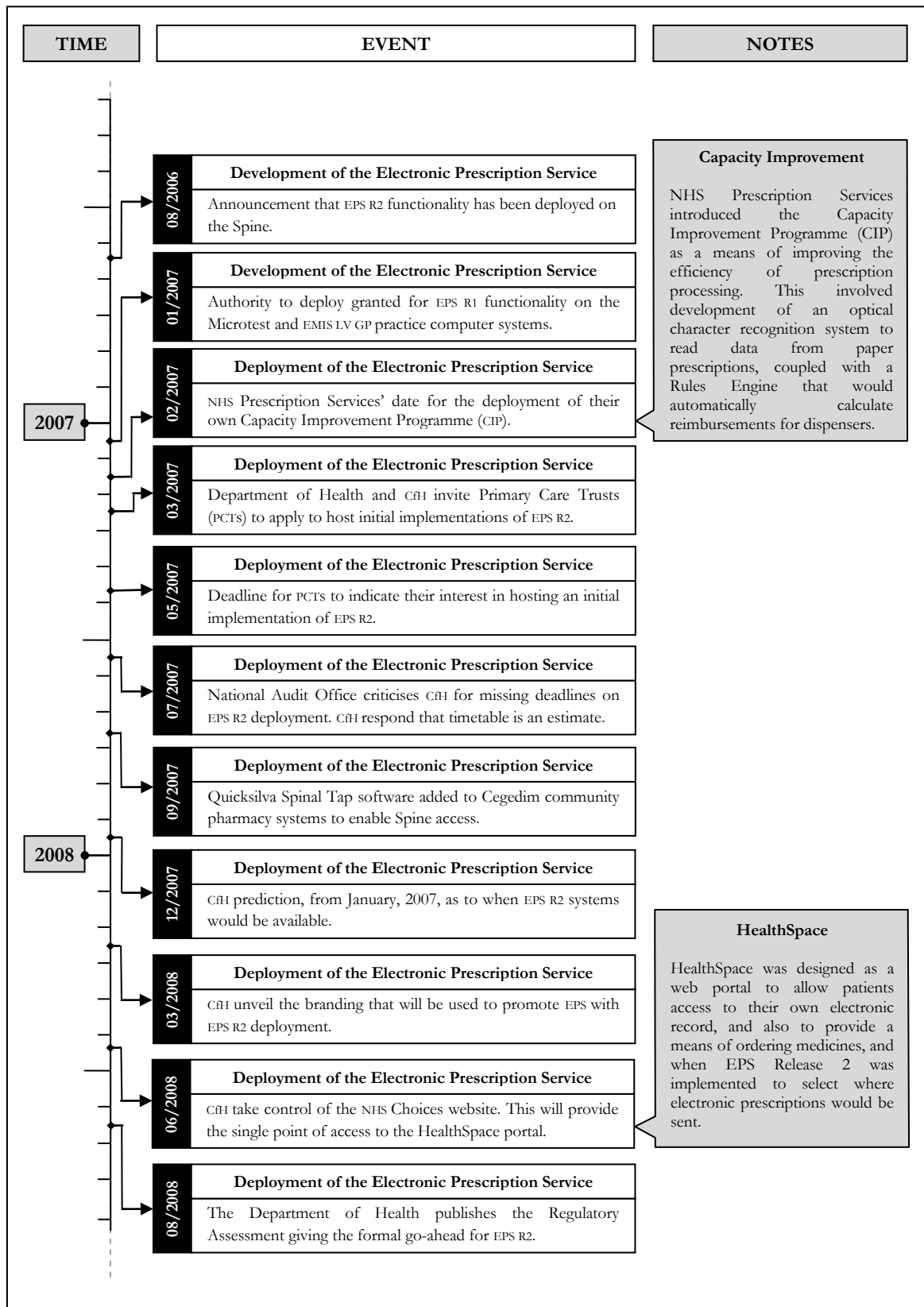


Figure 3.4: The Development of Electronic Prescriptions in England

The Evaluation of the Electronic Prescription Service in Primary Care

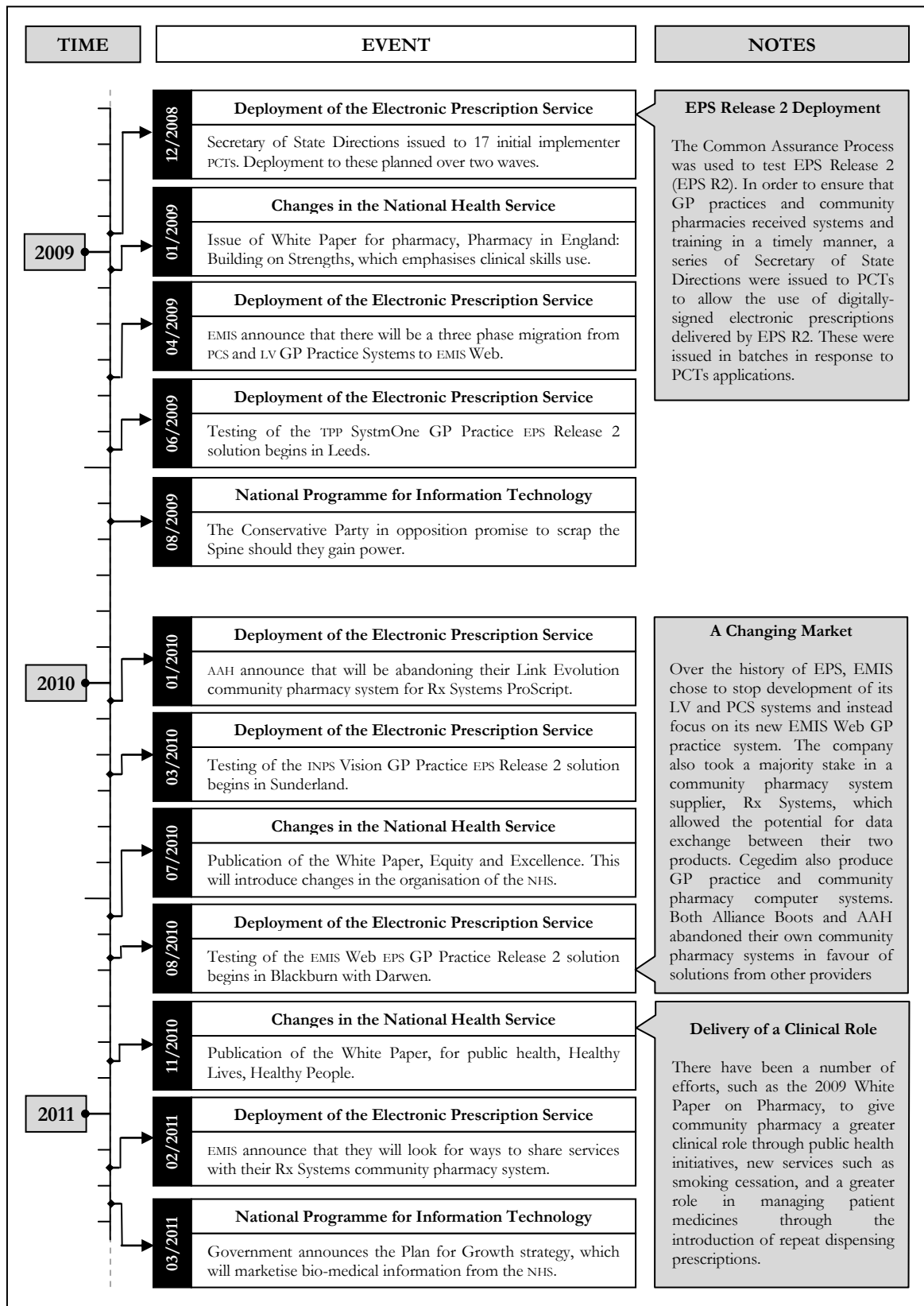


Figure 3.5: The Development of Electronic Prescriptions in England

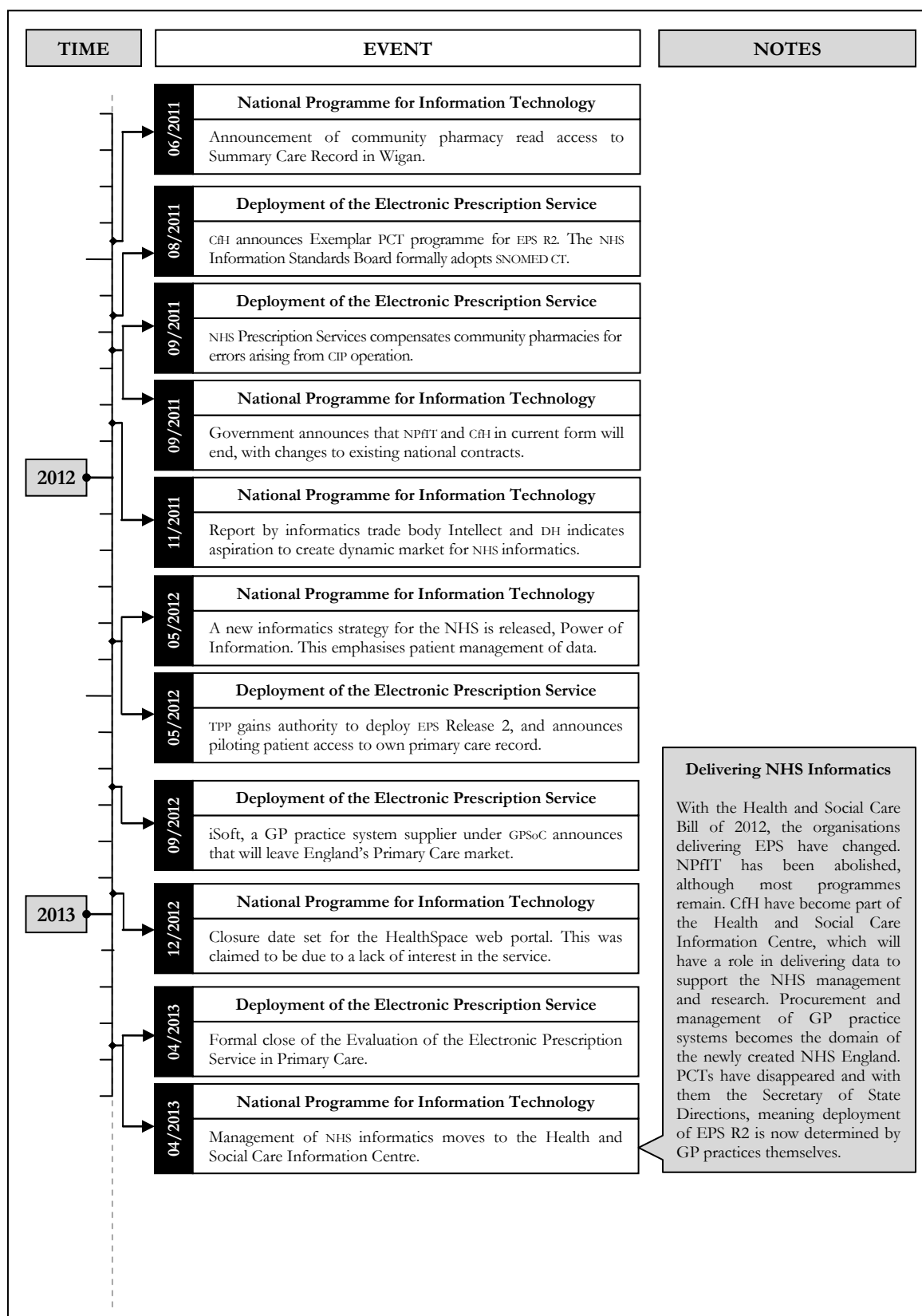


Figure 3.6: The Development of Electronic Prescriptions in England

2

THE ELECTRONIC PRESCRIPTION SERVICE

IN THIS CHAPTER

Chapter 2 looks at how the workload that is placed on community pharmacies and dispensing appliance contractors (DACs) by prescriptions has changed. In this context we then look at the design of the Electronic Prescription Service (EPS), both the infrastructure in use and the manner in which this service supports the transition from paper to electronic prescriptions through the two releases of EPS. We then look at the benefits ascribed to EPS, and the manner in which the service has been deployed.

Primary care computing is well developed in England, building on over forty years of research and development (see Box 4). Perhaps surprisingly, whilst the vision of transferring prescription data between prescribers and dispensers is not new, it has not been widely deployed. The EPS represents the first effort to deploy a national service for England and represents the most extensive deployment of an ETP service in the country to date.

As with primary care computing in England, ETP has a long history and the EPS represents one of a number of systems for computerising prescriptions and their transmission that have been explored in England over the course of the last two decades (see Box 5). The present programme emerged following the closure of a series of pilot ETP schemes that ran between 2002 and 2003.⁽⁷⁾ These schemes were replaced by a new commitment to ETP service in 2003 as part of a new National Prescription Service,^(53, 81) and become part of the then nascent National Programme for IT (see Box 6).⁽⁵³⁾ In this chapter, we begin by examining the rationale for the service, the development and functionality of EPS principally with reference to its operation in GP practice and community pharmacy, and the benefits expected from this service.

2.1 The Context of Operation

The development of EPS has arisen at a time when there were increasing demands being placed on dispensers by England's population of over 53 million.⁽⁸²⁾ Between 1999 and 2012, the number of prescription items dispensed in primary care has increased from over 529 million items to 973 million items,^(82, 83) and this trend has shown no signs of abating, with the latest available figures for the period December, 2011 to November,

2012 indicating the dispensing of over 998 million prescription items with a net ingredient cost of nearly £8 billion. Of these, the last available complete figures on exemptions from prescription charges, in 2007 showed that only 11.4% of prescribed items in primary care attracted a prescription charge.⁽⁸³⁾ Over the course of 13 years, there has been an 88% increase in the number of prescribed items that have been dispensed in primary care settings.

Growth in prescription numbers has been seen in the case of both dispensing appliance contractors (DACs) and community pharmacies. In the case of DACs the number of prescription items handled has increased from 1.66 million in the financial year 2001-2002 to over 5.80 million in 2010-11 and 6.40 million in 2011-12.^(82, 84) This is despite a fall in the number of contractors from 179 in the year 2001-2002 to 125 a decade later.⁽⁸⁴⁾ There are currently 135 DACs in England.⁽⁸²⁾

Community pharmacy has also seen an increase in prescription volumes, in an era in which there has been a change in expectations about the role of the community pharmacist and greater emphasis on use of their clinical skills.^(46, 49) In the case of community pharmacy, volumes of prescription items dispensed have increased from over 432 million in the financial year 1994-1995,⁽⁸⁵⁾ to over 538 million in 2001-2002,⁽⁸⁶⁾ to over 850 million in 2010-2011,⁽⁸⁴⁾ and to over 885 million in 2011-2012.⁽⁸²⁾ In short in the course of 17 years, the volume of prescription items dispensed in community pharmacy has increased by over 96%. There has also been growth in the number of community pharmacies over the same period of 14%, from 9,787 to 11,236.^(82, 84, 85)

Unfortunately, we cannot comment on the change to the number of prescriptions provided by GP practices, given that these statistics have not been compiled until relatively recently. However, in the financial year 2010-2011, there were over 80 million prescription items issued by GP practices directly.⁽⁸⁴⁾ In the calendar year 2010, nearly 18 million prescription items were personally administered in GP practice, which suggests that there are approximately 60 million prescription items dispensed at dispensing doctor practices.⁽⁸³⁾

In their Impact Assessment for EPS, the Department of Health (DH) note the need for this new service as a means of reducing risk to patients, and also as a means of improving on a paper-based process that is both inefficient, and which was described as inconvenient for patients.⁽⁸⁷⁾ The increase in prescription volumes has also led NHS Prescription Services to search for efficiencies in their operations. This resulted in the introduction of their own programme of automation, the Capacity Improvement Programme (CIP). The CIP makes use of both intelligent optical character recognition to capture data from paper prescriptions, and also a 'rules engine' to automatically apply the reimbursement rules to prescriptions using this data.^(67, 68)

Box 4: The Computerisation of Primary Care in England

Fundamental to the development of EPS has been the high level of computerisation of primary care in England. The history of informatics in English primary care stretches back over forty years, beginning with the first experiments with GP practice computing in Whipton in 1970, and the first experiments with a wholly paperless GP practice taking place at Ottery St. Mary in 1975.⁽⁴⁾ It was estimated by 1996 that over 96% of GP practices had been computerised,^(16, 17) a figure that has since been exceeded according to the figures on GP practice EPS deployments.⁽²²⁾

Community pharmacy in England has also demonstrated a high level of adoption of computers and seen increasing levels of functionality introduced over the past three decades. From the early 1980s onwards stock control systems provided by community pharmacy wholesalers - originally to facilitate stock ordering processes - have also provided functionality to support clinical use.^(33, 37) This functionality has emerged in response to requirements that labels on dispensed medicines should be computer printed and requirements that an electronic medication record be kept for a sub-set of the community pharmacy's vulnerable patients.⁽³⁷⁾

NHS Prescription Services, the body responsible for calculating reimbursements and remunerations for dispensing contractors and for settling accounts with these on behalf of the NHS also has a long history of computer use for operational purposes and to generate information on the use of medicines.⁽⁴⁸⁾ NHS Prescription Services has for many years provided reports to support primary care prescribing with data presented at all levels from prescriber level, to GP practice level, to regional level and to national level.⁽⁵⁹⁻⁶¹⁾

The use of computers in the processing of prescription data at, what was to be eventually known as NHS Prescription Services, began in the 1970s. It was reported by Shepherd that this arose in response to difficulties in recruiting sufficient workers to effectively continue the manual processing that was then in place.⁽³⁷⁾ Further system development since then has included a capacity improvement programme (CIP) in 2007 which introduced automated management of the paper prescriptions submitted for reimbursement.^(67, 68)

EPS could be seen as an infrastructure to tie together these three mature domains of computerisation - with electronic prescriptions conveyed electronically between these three stakeholders, for fulfilment and for reimbursement purposes. However, despite, or because of their extensive and long-standing use of informatics, each of these three stakeholders has historically developed and maintained their own silos of electronic information. In the systems in use up to the establishment of EPS, transmission of information between these silos has relied upon human intermediaries and paper.

Box 5: Ancestors of the Electronic Prescription Service

In the early 1990s, the NHS Care Card project trialled the use of a smartcard that would be issued to patients. This smartcard contained both a summary health record and any prescriptions that had yet to be dispensed to the patient.^(1, 6) Whilst this project was regarded as successful, it never gained national adoption due to concern over the costs national implementation would have entailed.⁽¹⁶⁾

Following the experience of the NHS Care Card project, a further trial of ETP in England was announced by the Department of Health (DH) in 2000.⁽²¹⁾ In this programme private consortia were invited to submit proposals for an ETP service and if accepted into this programme, to undertake development and deployment of this service at up to fifty general practices.⁽³⁴⁾ By March 2001, from the seventy expressions of interest in participating in the ETP three consortia had been selected to develop and deploy their solutions.^(43, 44)

The three pilot schemes took different approaches to the delivery of prescriptions. These included a model in which there was direct transmission of prescriptions to a nominated community pharmacy, a model in which repeat prescriptions were sent to the patient's nominated community pharmacy but where acute prescriptions were sent on bar-coded paper prescriptions, and a model which used a relay, or server for storing prescriptions. In this last model prescriptions were downloaded by the community pharmacy from this relay.⁽⁴³⁾

The pilot schemes were closed in 2003, with none of the options presented being developed for a national implementation.⁽⁵³⁾ These schemes had demonstrated the use of digitally signed electronic prescriptions and the transmission of prescription data accurately between general practice, community pharmacy and NHS Prescription Services, but were not deemed to be satisfactory by the independent evaluation that had been commissioned by DH.⁽⁶²⁾ Indeed none of these schemes appeared to conform to the requirements laid out in a series of principles on the use of ETP first published by DH in 1997.⁽⁶⁶⁾

The introduction of CIP at NHS Prescription Services should have brought with it a more efficient service that benefitted dispensers and DH. This has not been borne out in practice, and there have been numerous articles written about its operation and NHS Prescription Services offering compensation for failures of the system.⁽⁸⁸⁻⁹⁴⁾ Whilst the system could have reduced workload for staff within community pharmacies, this might not be the case as community pharmacies have to invest more effort in preparing prescriptions for reimbursement. At present, in order to ensure scanning proceeds smoothly, community pharmacies should remove any notes attached to the prescription.⁽⁹⁵⁾ Given the problems inherent within CIP, a case could be made for an alternative approach to prescription processing, an alternative that could be provided by EPS. Indeed, the original intent of the CIP was to develop the software for reading prescription data and processing payments, a rules engine, which would be used with

electronic prescriptions. Although there have also been more radical proposals suggested that would place more emphasis on the processing of prescription data using dispensing contractors' computer systems.⁽⁹⁶⁾

Box 6: The National Programme for Information Technology

The programme that EPS was to form part of, NPfIT, officially began in October 2002 with the establishment of a unit to procure and deliver the new informatics systems. The formal opening of the agency for the delivery of this programme, Connecting for Health (CfH), taking place in April 2005.⁽⁵⁾ Connecting for Health was founded as an executive agency, with a limited life-span, its role ending at the very latest by 2010.⁽⁸⁾ NPfIT encompassed a number of programmes including EPS and a nationally available electronic summary care record (SCR) and the Secondary Uses Service (SUS). Although NPfIT officially closed in September, 2011,⁽¹⁸⁾ many of the programmes begun by it, including EPS, have been continued initially under CfH and now under the Health and Social Care Information Centre.⁽²⁴⁾

NPfIT had followed previous efforts to instigate national informatics programmes in England in both 1992 and 1998.⁽³⁰⁾ It had been suggested that whilst the 1992 programme failed due to an absence of interoperable solutions, the 1998 programme did provide interoperable solutions but failed to gain adoption due to concerns regarding functionality and funding of these systems. Further impetus for the instigation of the NPfIT also arose from Wanless' 2002 report into the future resource needs of the NHS which recommended protected budgets for informatics,⁽⁴¹⁾ which was reinforced by the National Audit Office's assessment of local procurement of clinical systems which apparently precluded rather than promoted data sharing in the NHS.^(5,33)

The technical architecture that would be delivered as part of NPfIT and which would support the services the programme encompassed was based around a set of applications which would enable the networking of computer systems in over 18,000 care locations in the NHS.⁽⁸⁾ These applications, and the associated hardware, which were known as the Spine, would be linked with the computer systems in the NHS via a National Network for the NHS (N3) delivered by the National Infrastructure and National Application Service Providers.⁽⁵⁶⁾ These would be complemented by a series of five Local Service Providers (LSPs) who would identify where new computer systems would be required, and where existing systems could be used to interact with The Spine.⁽⁵⁶⁾

The format of messages exchanged with The Spine was described in the confidential document, the Ten Page Specification. This document described the Electronic Business using eXtensible Markup Language (ebXML) encoding that would embed Health Level 7 standard messaging, and would enable transmission of messages via The Spine. The format of the prescription messages that would be exchanged between primary care computer systems, N3 and the Spine's EPS functionality were defined separately, with the proviso that these must be expressed in an ebXML format. The design of the EPS also exploited the Dictionary of Medicines and Devices (dm+d) which provided a standard format for the expression of both the identity of medicines and devices and set a standard format for setting quantities and expressing this.^(63,70,71)

2.2 The Electronic Prescription Service

The goal of EPS is to replace the paper prescription with an electronic document that will stand as a legal entity against which dispensing contractors can dispense and claim remuneration. This stands in contrast to the national health services of Northern Ireland, Scotland and Wales, where paper is retained as the legal entity but on which machine readable information is added (see Box 7).

In the case of EPS, given the decision to move from paper to electronic prescriptions, it was planned to deliver the service over two releases, which would differ in the functionality offered. In EPS Release 1 (EPS R1), the focus was on establishing a messaging infrastructure, whilst with EPS Release 2 (EPS R2) the focus shifts to deployment of functionality that would be of clinical benefit as outlined below (see Table 2). In the next section we shall look at the operation of the service and the implications of this for the management of prescriptions.

THE INFRASTRUCTURE AND FUNCTIONALITY OF THE SERVICE

It might be argued that the EPS was conservative in its design. The design of the service appeared to follow the processes used for processing paper prescriptions, and indeed each prescription is composed of a maximum of four prescription items under both EPS R1 and EPS R2 even though technically there should be no limit to the number of items that can be placed on an electronic prescription. However, this assumes EPS R2 is a paperless service, which in reality this is not the case in all situations (see Box 7). Consequently, there was a need to ensure that messages could fit into the existing prescription forms and thus the four item limit was retained.

The EPS was designed to make use of the existing infrastructure and software architecture that was available or under development. Electronic prescription messages would be transmitted between prescribers, dispensing contractors and NHS Prescription Services using the National Network for the NHS (N3) and the Spine. It was expected that EPS functionality would be added to the prescribing and dispensing computer systems in use within the GP practices and dispensing contractors in England.

In order to manage the transmission of the electronic prescription message, there are three services provided by The Spine that supported EPS and a number of other services. These were the Transactional Message System which routes messages between the users of the service; the Personal Demographics Service (PDS) which captures basic demographic data about patients including their unique national identifier, their NHS number; and the Identity Agent, which was designed to provide endpoint authentication. The spine also provided EPS with a temporary store of data as prescriptions were issued and awaited collection or routing to a dispensing contractor.⁽⁹⁷⁾

Box 7: Approaches to Electronic Exchange of Prescription Data

In the United Kingdom, there have been four main approaches used to the electronic exchange of prescription information, as each of the four national bodies responsible for healthcare have adopted their own approaches. In Northern Ireland and Wales, they have looked at the use of bar-coded paper prescriptions as a means of transferring information between general practice and community pharmacy computer systems.^(9, 10) Both services use two-dimensional barcodes to encode all of the data on the prescription in a machine-readable form. When scanned at the community pharmacy all the data from the prescription would be added to the community pharmacy dispensing computer system. This obviously saves the re-keying of information at the community pharmacy which mitigates against a potential source of human error.⁽¹⁹⁾

A different approach was taken in NHS Scotland, with the prescriptions being issued with an electronic prescription message that would be electronically transmitted to a dispenser. In NHS Scotland, whilst the paper prescription is retained, this also features a barcode. ⁽²⁷⁾ However, rather than representing the content of the prescription, the barcode actually contains an identifier for the prescription, which allows the community pharmacy computer system to pull down from a central repository the electronic prescription message. The system in Scotland has been designed to support both acute and repeat prescriptions through the Acute Medication Service,^(33, 42) and also repeat dispensing prescriptions through the Chronic Medication Service.^(27, 47) In this system, the opportunity to electronically cancel and amend prescriptions is available to prescribers, which is not available in either of the systems used in Northern Ireland or Wales.

The solution adopted in England is the most radical of the four nations in terms of its technical ambition. As with Scotland, an electronic message is generated and sent via a central repository, with all the advantages this provides including electronic cancellation and the ability to easily issue and feasibly amend repeat dispensing prescriptions. However, in the English system, the electronic message becomes the legal entity and as such means that there is the option of transmitting the prescription to any dispenser within England in advance of the patient attending that dispenser.⁽⁵⁴⁾

It should be noted though that there is a caveat to this vision of a paper-less prescription service in England, as circumstances to arise where there is a need to issue paper copies of the prescription. Patients might receive a paper copy of the prescription from the prescriber, as an aide memoire, or as a device to enable the download of a prescription where no nomination of a dispenser to whom the prescription has been sent. Similarly, paper copies of the prescription might be provided by the dispenser, dispensing tokens, in order to provide an order form for new prescriptions or to capture the patient's signature where the patient is not age-exempt from prescription charges.⁽⁶³⁾

These components provide essential functionality to meet the agreed specification of the service, and the needs of service users. The Identity Agent (IA) software was introduced in response to the need to address perceptions of poor data confidentiality prior to the introduction of NPfIT.⁽⁵⁾ This software was designed to support the obligations of the NHS with regard to the protection of patient data.⁽⁹⁸⁻¹⁰⁰⁾ This software only allows access to the PDS through the use of a Smartcard

and personal identity number based system. In addition, the IA also controls who can record which sites patients are nominating as their preferred dispenser. The nomination sets where it is that the prescription will be sent. These nominations, recorded on the PDS, can be audited to check for potential direction of prescriptions against patient preference. Again this would contravene the principles underlying EPS use,⁽⁶⁶⁾ a concern of community pharmacy that business was being directed elsewhere.⁽¹⁰¹⁻¹⁰³⁾

This new infrastructure introduced new requirements that developers of community pharmacy and GP practice computer systems had to meet. These requirements defined new standards for connection to and information exchange with the national applications and infrastructure. Suppliers were expected to demonstrate their ability to achieve this through a new accreditation programme, the Common Assurance Process (CAP).⁽²⁾ In line with perceived best practice at the time, developers of prescribing and dispensing systems worked to an output-based specification which described the format of messages that should be exchanged between the different components of EPS.^(5, 70, 71)

THE OPERATION OF EPS RELEASE ONE

As already noted, it was proposed that EPS would be developed and deployed over two releases. These would be deployed in a four phase roll-out, over which the functionality described previously would be integrated into the prescription service. In phase 1 and 2 of deployment, EPS R1 functionality would be introduced. Phase 1 represented the implementation in a set of pilot sites whilst Phase 2 represented national roll-out. A similar distinction is drawn for EPS R2 functionality. In Phase 3, EPS R2 functionality is deployed in England, whilst in Phase 4, EPS R2 gains national deployment. In Phase 4, additional functionality is introduced into the service to enable use by all patients.

Although EPS R1 was only expected to provide a test of the communications infrastructure of the service, benefits have emerged from this early phase of the deployment as the following description of the patient's experience of community pharmacy services during the four phases of implementation illustrates.

In the case of EPS R1 use (see Figure 4), for an electronic prescription message to be generated, the prescription items included had to be represented by a standard dictionary, the dm+d and had to be within scope for EPS. Where these conditions were met, EPS R1 was designed to produce an electronic prescription message, to assign a Global Unique Identifier (GUID) to this and to upload this message to The Spine. When these conditions were met, the system was designed to print the prescription onto an FP10 form together with a barcode which contained the GUID. The bar-coded GUID would provide the unique identifier for a dispensing contractor to retrieve the electronic prescription message from the Spine.⁽⁷⁰⁾

Table 2: Functionality of the Electronic Prescription Service⁽⁵⁴⁾

Functionality	System	
	EPS Release 1	EPS Release 2
Prescriber able to generate an electronic prescription message that can be received by a suitably equipped computer at a dispensing contractor.	YES	YES
The dispenser or prescriber can create a prescription token which is used to capture a declaration from the patient that he or she has paid a prescription charge or to record a claim from this co-payment for a reason over than an age related exemption.	Not Applicable as Paper Prescription Remains the Legal Entity	YES When Required
Prescriber can generate an electronic prescription message that replicates the structure of the repeat dispensing prescription.	NO	YES
Upload of electronic prescription messages can be undertaken by prescribers and the upload of prescription messages against which dispensing has taken place by dispensing contractors. Electronic prescription messages that have been used for dispensing can be downloaded by NHS Prescription Services.	YES	YES
Cancellation of electronic prescription messages by an authorised prescriber, or an authorised person acting on behalf of the prescriber.	NO	YES
The prescriber is able to add a secure advanced digital signature to the electronic prescription message which will give this message the legal status of a prescription that can be dispensed against and endorsed to allow for reimbursement to the dispensing contractor.	NO	YES
Patient nomination of a preferred community pharmacy, dispensing appliance contractor and a dispensing doctor to whom electronic prescription messages can be sent automatically where this is appropriate	NO	YES
Dispensing contractor can annotate the electronic prescription message and upload this to the Spine so that it can be transmitted to NHS Prescription Services to claim for reimbursement.	NO	YES

In the case of EPS R1, the legal entity remained the paper prescription, and this could be handled by the dispensing contractor in the same way as any other prescription presented on an FP10 form. At the community pharmacy, if a site has an EPS R1 compliant system, the barcode on the prescription could be scanned. This action would lead to the dispatch of

the prescriptions GUID electronically to The Spine and the dispatch from The Spine of the electronic prescription message to the community pharmacy dispensing system.

The data received could be used to populate the dispensing computer system's Patient Medication Record. This data could be used to produce the labels that would need to be added to dispensed items without the need to re-key data. In addition, this functionality was exploited to add prescription data to the Patient Medication Record. As prescriptions contain the unique identifier associated with each patient, the NHS Number, stored in the PDS, this allows dispensing contractors to reconcile any locally-held records on the dispensing computer system with a single unique identifier.

The introduction of EPS R1 was also expected to provide community pharmacy with an opportunity to test another part of the EPS infrastructure, the transmission of prescription data from the dispensing contractor to NHS Prescription Service, via the Spine, which would form the communication channel for reimbursement to dispensing contractors for electronic prescriptions issued with EPS R2. However, this activity had no practical benefit for dispensing contractors. However, this data was used by CFH to gain an estimate on the numbers of electronic prescription messages processed by community pharmacy, and by implication, usage of the service.

Although no clinical benefit was expected from EPS R1, the creation of prescription messages containing the standard unique patient identifier for the NHS, the NHS Number, provided a mechanism to reconcile their current records and to ensure that they have only one patient record for each patient. It also appeared to us that this system could be used to reduce the potential for fraud within the service, by making visible discrepancies between the paper and electronic prescription. However, whilst there is clearly some clinical benefit from EPS R1, contrary to one very prominent report on healthcare informatics in the NHS,⁽¹⁰⁴⁾ the main clinical benefits were expected to arise from EPS R2 and the adoption of electronic repeat dispensing.

THE OPERATION OF EPS RELEASE TWO

The delivery of EPS R2 itself was planned as a two phase roll-out, phases three and four of EPS programme deployment. Phase three covered the period from the testing of EPS R2 compliant dispensing and prescribing systems in a small number of paired prescribing sites and dispensing contractors where electronic prescriptions would be exchanged under tightly controlled test conditions (see Figure 5), whilst phase four describes the business as usual operation when EPS R2 is adopted as a national service (see Figure 6).

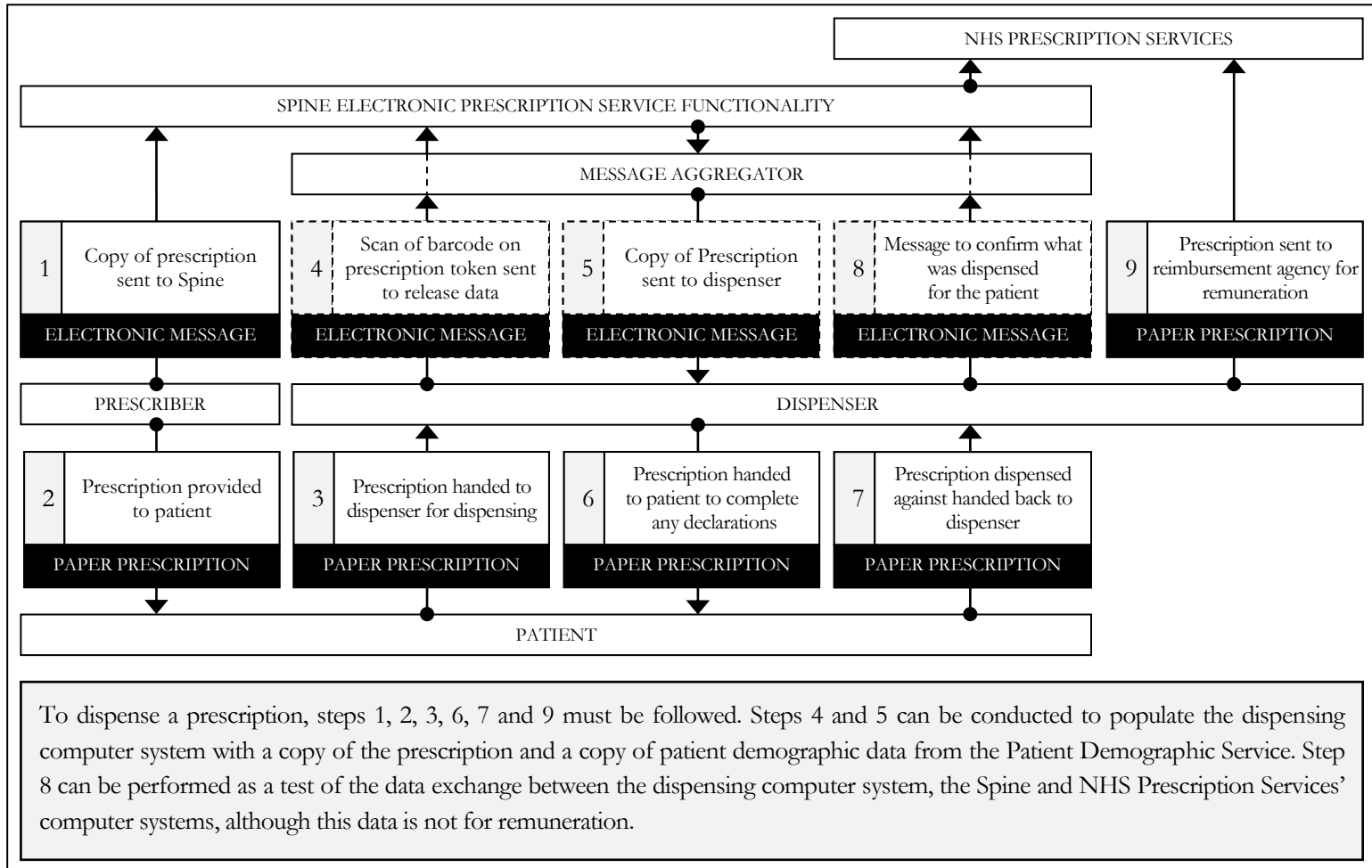


Figure 4: Electronic Prescription Service Phase One and Two Operation Using Release 1 of the Service

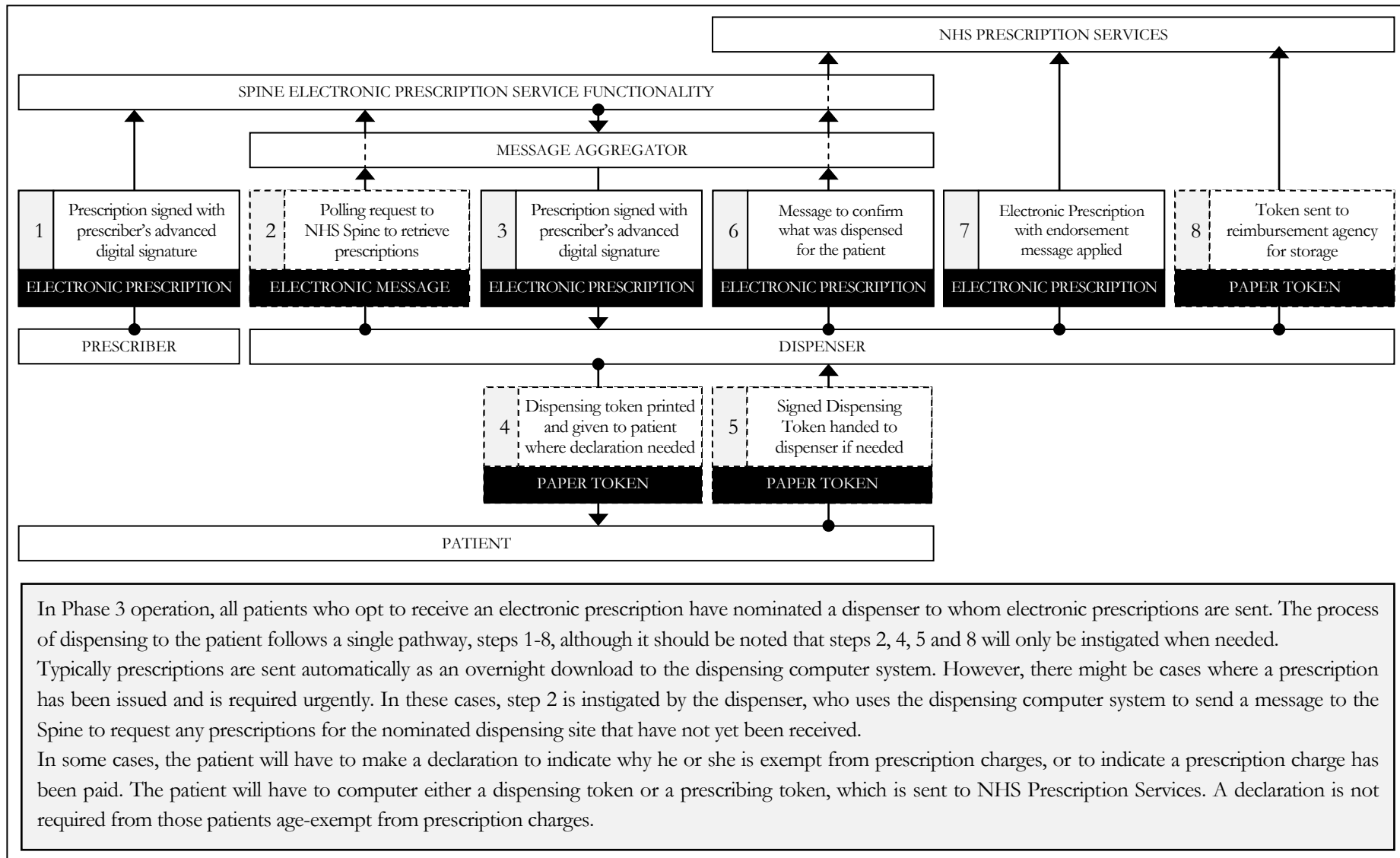


Figure 5: Electronic Prescription Service Phase Three Operation Using Release 2 of the Service

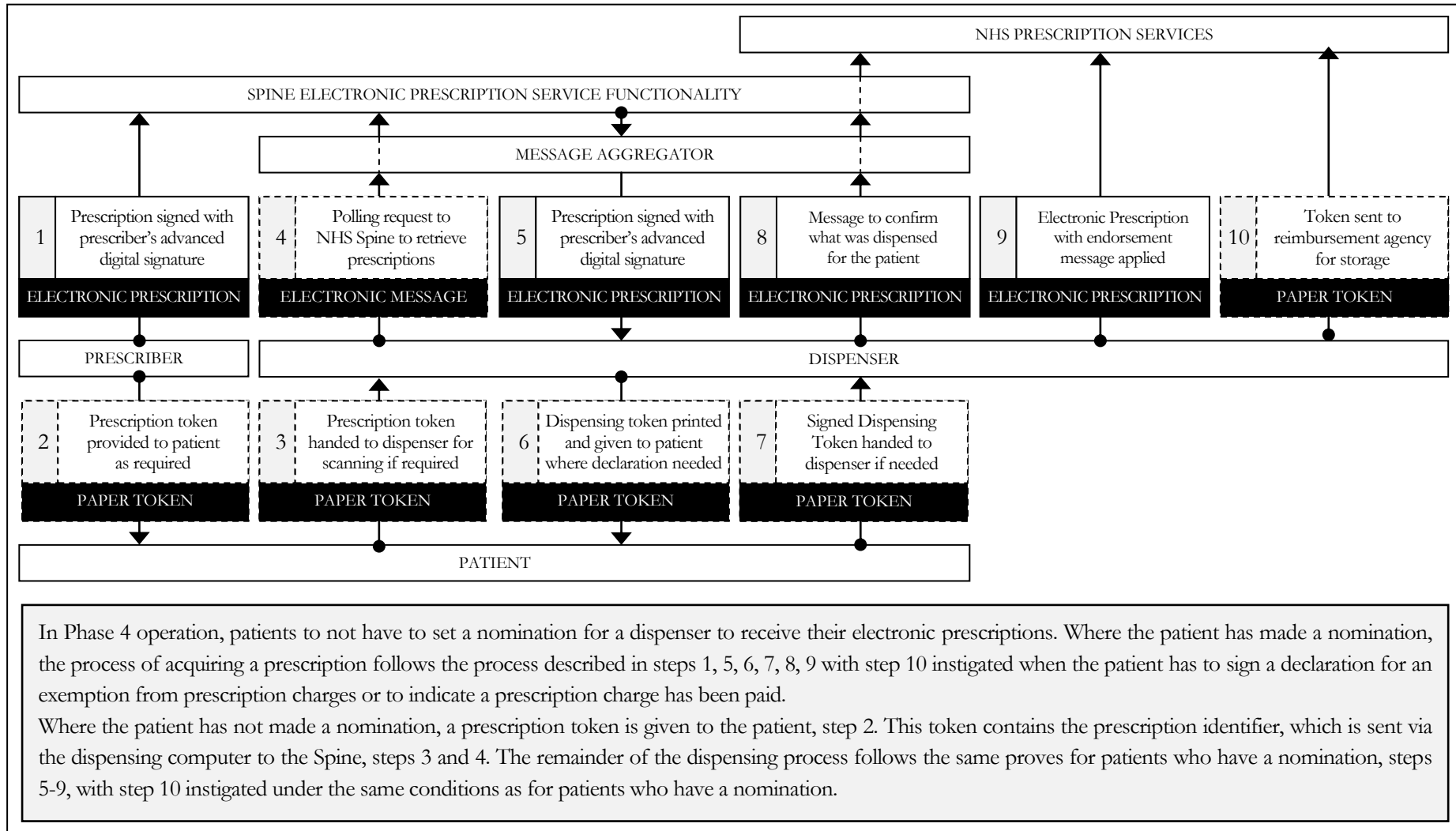


Figure 6: Electronic Prescription Service Phase Four Operation Using Release 2 of the Service

With the deployment of EPS R2, new functionality began to gain usage. In this release, the prescription was no longer a physical artefact but an electronic prescription message that was signed with what was called an advanced electronic digital signature. The service would allow for the introduction of electronic repeat dispensing prescriptions. These, like the other forms of electronic prescription had the advantage that they could be cancelled by an prescriber, or an authorised member of staff at the prescribing site, up to the point at which dispensing occurred at the dispensing contractor. It had been expected that the introduction of electronic repeat dispensing would generate greater use of repeat dispensing.

The introduction of EPS R2 also led to change in the way in which communication between prescribers, the dispensing contractor and the patient is managed. For prescribers the option exists to add to the electronic prescription messages that are meant solely for use by the dispensing contractor. As with the current paper repeat prescription, a message can be added to the prescription for the patient, which would be printed on any paper copies of the prescription. If there is a clinically-relevant message on the prescription for the patient, the dispensing contractor should pass this on to the patient.

The third phase of EPS operation marked the transition between the use of paper prescriptions and electronic prescriptions in a limited number of dispensing sites. In order to use EPS R2 during the third phase of implementation, the patient was required to nominate the dispensing contractor that he or she wished to use. For those sites participating in the initial implementation of prescription and dispensing system functionality as part of the Common Assurance Process (Appendix A) this choice would be limited to one or two dispensing contractors within the close vicinity of the GP practice, and to which a large proportion of prescriptions from the GP practice would typically be sent. The patient would be able to set their nomination at either the GP practice or dispensing contractor, and change this at any time, or choose to halt their use of EPS should he or she wish.

At the time at which the patient makes the nomination, he or she should be briefed on the operation of EPS. Publicity materials had been prepared by CFH to introduce the service to patients, although the GP practice or dispensing contractor might wish to produce their own. For the patient, the experience of using EPS R2 should not differ markedly from their present experience of the service. If a prescription is issued during a consultation, the patient's prescription would be sent directly to the dispensing contractor. The patient might be handed what was termed a prescription token, an unsigned piece of paper that looks like an FP10 form and contains all the details on the prescription and the GUID for the electronic prescription on a barcode but which does not have any legal value.

At the community pharmacy, the prescription might have already been downloaded in advance of the patient, or the prescription token might be scanned to retrieve the

prescription from the Spine. Typically, the community pharmacies would be expected to make intermittent requests to the Spine from their dispensing computer system for any prescriptions that should be sent to them immediately.

In order to assemble and dispense the prescription to the patient the community pharmacy might use the prescription token if there was one, or alternatively the community pharmacy had the option to print a copy of the prescription, known as a dispensing token. This would also be required if the patient needed to complete a declaration that he or she had paid the prescription charge or to claim exemption from this co-payment for a reason other than as an age-exempt patient.

Similarly, where a patient received a repeat prescription, there would be little difference in their experience of the service with regard to ordering the prescription. As with paper prescriptions, the patient would have the same mechanisms for ordering as before, which might include asking the community pharmacy to submit a request to the GP practice, submitting a paper or electronic request to the GP practice, or possibly making a telephone call to the GP practice where allowed.

The most noticeable difference for the patient using EPS R2 would be the removal of the need to collect paper prescriptions from the GP practice, although some patients might request a prescription token, which provides a paper copy of the information on the electronic prescription. At the community pharmacy, the patient also has the option of receiving a dispensing token, which again would provide a paper copy of the electronic prescription information. As with a prescription issued during a consultation, the patient might be asked to sign a declaration, and a dispensing or prescribing token could be made available. In those cases, where the patient required an order form for their repeat prescription items, a dispensing token would be made available on request to the patient, which would contain a copy of the prescription counterfoil that the patient could use to re-order their medication.

The main change in patient's experience of the prescription service was expected to be with repeat dispensing prescriptions. As noted already, it is possible for prescribers to issue a paper repeat dispensing prescription for medicines dispensed at a community pharmacy. This comprises a repeatable prescription and a series of batch issues which allows the dispenser to provide the medicines on it to the patient for a set number of times. The repeatable prescription is signed and represents the legal prescription. The batch issues represent copies of the prescription that are used by the pharmacy to indicate what was dispensed to the patient and to claim remuneration from NHS Prescription Services.

The advantage for the patient of the repeat dispensing prescriptions is that the batch issues provided as part of a repeat dispensing prescription provide authorisation to dispense items from the repeatable prescription without the need to order a new prescription each month

from the prescriber. In the case of electronic repeat dispensing, the batch issues for the prescription are held on the Spine, and can be downloaded by the nominated dispensing contractor as they are required. If the prescriber does not manually set an interval, a default dispensing interval of twenty-eight days is set. In order to allow the dispensing contractor sufficient time to prepare the prescription, each batch issue would be downloaded seven days before the due date for the next issue, although, the next batch issue could be downloaded earlier if the previous batch issue had been dispensed.

Although there would appear from this partial description that patients would benefit from EPS R2, CFH have not recommended the use of this service for all patients,⁽¹⁰⁵⁾ even though it was expected that EPS R2 would become the default means of issuing prescriptions.⁽⁵⁴⁾ In their 2009 guidance, CFH suggested that the service should be used for those patients who received regular medicines and who typically used the same community pharmacy.⁽¹⁰⁵⁾ However, with the national deployment of the service, during phase four, it was expected that it would be the norm for patients to use this service.

In phase four, in order for those patients who do not have a nomination to receive a prescription, a prescription token would be issued (see Figure 5). This prescription token would feature a barcode containing the GID for the prescription. When this barcode is scanned at the community pharmacy this would enable the download of the electronic prescription from The Spine, and allow for it to be dispensed.

Repeat dispensing and repeat prescribing using EPS R2 was expected to provide a more convenient service for the patient. In the case of both, the digitally signed electronic prescription would be automatically sent overnight to the community pharmacy dispensing computer. If a mistake is made in the prescription, or there are changes required, a prescription could be cancelled and re-issued before it was received by the community pharmacy, or dispensed against.

For community pharmacy, the service can provide the opportunity to receive a prescription in advance of the patient. This could provide sufficient time for the community pharmacy to ensure that all the stock required to fulfil the prescription was at the pharmacy, reducing the need for owing notes, although it was possible for a prescription to be partially dispensed if the community pharmacy had to owe the patient some of their medication.

However, the design of the process for managing electronic prescriptions is different to that for paper prescriptions. The first change was with regard to repeat dispensing prescriptions. With EPS R2, repeat dispensing prescriptions would now be mobile, following the patient nomination. With the paper-based system, as each batch issue could only be used for dispensing if the community pharmacist had the repeatable prescription, this limited the patient to use one community pharmacy for the life of the repeat dispensing prescription. In EPS R2 there was no such restriction, with each batch issue representing a prescription in its own right.

This feature appears to exist contrary to the need to provide greater management of the prescription through monitoring by the community pharmacist.

The other change that was introduced into EPS R2 was in the manner in which dispensing contractors would claim reimbursement for prescription items dispensed, which could have an effect on the patient's experience of electronic repeat dispensing. With EPS R2, as the prescription is transmitted from GP practice to community pharmacy and to the reimbursement agency (NHS Prescription Services) data is appended to the electronic prescription to capture what action has been taken. At the community pharmacy, an endorsement message would be added to the electronic prescription to indicate which prescription items the community pharmacy intended to supply to the patient.

When all the prescription items that the community pharmacy had intended to supply to the patient had been supplied in a dispensing event, a dispense notification message, indicating what had been dispensed, would be added to the electronic prescription, and the electronic prescription would be sent to the Spine and then to NHS Prescription Services for reimbursement. This process appeared to be designed on the assumption that the dispense message would be sent immediately after a dispensing event had occurred, in order to ensure that the repeat dispensing cycle is maintained and that prescriptions would be available in a timely manner for patients. Where this assumption is not met, we understand that delays have arisen in the receipt of the next issue of the electronic repeat dispensing prescription at the nominated community pharmacy.

A mention should also be made at this point with regard to the collection of declarations from patients, as to whether a prescription charge was paid or not, on dispensing tokens or prescription tokens. The patient declaration is sent electronically as part of the prescription sent to NHS Prescription Services for reimbursement. However, at present NHS Prescription Services have also requested that dispensing tokens and prescribing tokens with completed declarations on them should be returned with paper prescriptions, so NHS Protect can use them for counter fraud purposes.

THE OPERATION OF THE EPS FOR OTHER DISPENSING CONTRACTORS

So far, we have focused on the experience of GP practices and community pharmacies. However, EPS was intended to cover two other constituencies, dispensing appliance contractors (DACs) and dispensing doctors. In the case of these two constituencies, the patients' experience would not be expected to vary to the same degree as would be expected for GP practice or community pharmacy.

In the case of DACs, items are requested by patients from the DAC, and the prescription is requested by the DAC from the prescriber. These prescriptions are sent directly to the DAC. For the prescriber, the prescription would be like any other electronic document, and for the DAC, we would expect that this would be managed in the same manner as

any other dispensing contractor, although we have yet to observe the business process at a DAC that was processing electronic prescriptions.

In the case of dispensing doctors, we would expect a similar case, with the patient not coming into contact with his or her prescription when either paper or electronic prescriptions, given these are sent directly to the practice dispensary. We would expect that the experience of the patient at the GP practice dispensary would be similar to that at the community pharmacy, with declarations captured from the patient in the same manner. The only difference is that in the case of the dispensing doctor, the patient would not have access to repeat dispensing prescriptions, but would have access to repeat prescriptions.

BENEFITS CLAIMED FOR THE ELECTRONIC PRESCRIPTION SERVICE

Over the course of its history a changing constellation of benefits has been ascribed to EPS. At the outset of the project we were told these were largely associated with efficiency gains at the national level and in particular in the processing of reimbursement. These claims were also made in the 2005 All Party Pharmacy Group (APPG) report on informatics and changes to the community pharmacy contract. This report claimed that there would be financial savings for NHS Prescription Services with regard to both staff and resources. The APPG also believed that the introduction of ETP would lead to more accurate prescription processing and faster remuneration.⁽¹⁰⁵⁾ However, these claims regarding faster remuneration and more accurate prescription processing have never been presented by CFH as an actual benefit of EPS.

There were two documents that we found in the public domain^(87, 106) that documented the potential benefits arising from the implementation of EPS R2 for the core stakeholders of patients, general practitioners and dispensing contractors. For example, EPS R2 provided functionality that would allow the prescriber to cancel items from a prescription prior to that prescription being received by the dispensing contractor. Indeed, whilst the prescription might be composed of four prescription items, in EPS R2 the cancellation operation acted at the level of the prescription item. This would not simply provide a means of removing prescriptions from the Spine, or identifying to which dispensing contractor the prescription had been sent, this functionality could provide the prescriber with an automatically generated medico-legal record of decisions made with regard to the prescription issued.

Our own review of the history of EPS in England suggested that the benefits associated with the service have continued to shift and develop. Parties other than CFH have formed their own views with regard to the potential positive effect of EPS implementation. For example, it has been claimed that data collected using EPS could be used to provide an indication of patient adherence to medication.⁽⁵⁶⁾ However, this would require either the population of data on dispensing in the Summary Care Record or that data on dispensing was sent back to GP practice systems and integrated in their patient record, which as far as we know has never been anticipated in the technical architecture

or in the work flow. We believe there might be significant problems if patients felt they were under surveillance in this way.

The introduction of EPS was expected to improve patient safety, most directly through the transmission of full digital prescription data from prescriber to dispenser, which could then be used to populate the labels as prescription items are assembled. This was expected to remove the need to rekey data at the community pharmacy and was recognised as a safety feature in the ETP pilot schemes run in England in 2003. The requirement upon the prescriber to use electronic prescribing, which was integral to all prescribing systems, would ensure that only complete prescriptions can be sent, which would be expected to include all the information the patient required to make the best use of the dispensed item.

However, whilst the dm+d sets a common standard for describing most prescription items prescribed at the time of this study, there was no standard set for the transmission of the instructions to the patient. Rather dispensing contractors rely upon prescribers to adhere to the British National Formulary (BNF) good practice guidance, and to adopt the features available in the GP practice computer system.^(70, 71) However, the BNF's inclusion of a list of Latin abbreviations appears to suggest that Latin abbreviations should be expected by dispensers. In both cases, the dispensing contractor has to act to ensure that these instructions are in a form that can be understood and acted upon by the patient, deleting the text that has been transmitted and replacing it with clear instructions.

Other benefits that have been proposed are based on broader quality of care or safety considerations seen within the overall medicines use process. Thus, increased confidence in and use of repeat dispensing prescriptions by GP practice could potentially lead to beneficial consequences for community pharmacy and in particular an enhanced clinical role for pharmacists. This might allow a greater contribution from community pharmacy to the clinical management of chronic conditions, which may support improved monitoring of patient adherence and ensure that patients are using their medicines appropriately.⁽⁷⁷⁾

The EPS has also often been presented as a system for supporting the administration of prescriptions (process efficiency),⁽¹⁰⁴⁾ but this too is often linked to benefits in respect of patient safety and the timely provision of appropriate medicines (outcome effectiveness). As noted above, prescribed medicines can be withdrawn or cancelled in EPS, and a new prescription raised in the interim between the patient consultation and attendance at the community pharmacy. This ability could potentially foster greater communication and integration between community pharmacy and GP practice staff.⁽¹⁰⁶⁾ The use of electronic repeat dispensing prescriptions also potentially provides an opportunity for prescriptions to be received in advance of the patient at the community pharmacy which may alleviate stock-shortages and ensure that all prescription items can be issued to patients without the community pharmacy having to owe the patient an item.^(106, 107)

The introduction of EPS was expected to improve patient safety, most directly through the transmission of full digital prescription data from prescriber to dispenser, which could then be used to populate the labels as prescription items are assembled. This was expected to remove the need to rekey data at the community pharmacy and was recognised as a safety feature in by the research team evaluating the ETP pilot schemes run in England in 2003.^(108, 109) The requirement upon the prescriber to use electronic prescribing, which was integral to all prescribing systems, would ensure that only complete prescriptions can be sent, which would be expected to include all the information the patient required to make the best use of the dispensed item.

For patients, the core stakeholder in this service, the main benefits, aside from improved safety, are in the realm of convenience and potentially in providing greater access to their own information through integration of EPS with the Summary Care Record and potentially to an electronic health record such as proposed for the now defunct HealthSpace programme.

As already noted, whilst the prescription is principally a message designed for the management of the issue of medicines to patients and the reimbursement of prescription costs to pharmacies, it has two, potentially three, other functions. Firstly, the prescription allows the prescriber to describe to the pharmacy what the indication is, allowing them to decide how to counsel the patient if this is deemed necessary. Secondly, the prescription counterfoil might also contain information of use to the patient, such as the review date for her or his prescription, notices of services available at the GP practice. Thirdly, the prescription serves as a form for the selective re-order of prescriptions.

When a repeat dispensing prescription reaches the end of its life and is in need of re-authorisation or re-issue, this information needs to be communicated to the patient. In guidance, it has been noted that where there is no flow of paper, as is the case with EPS R2, this information should be communicated to patients by dispensing contractor staff. However, it was also noted that the prescription counterfoil might also contain non-clinical information, which dispensing contractors were not obliged to pass on.⁽¹¹⁰⁾

The review of the various benefits of EPS above is intended to suggest that this is revealed in a quite complex picture, with many potential advantages that may be seen by a number of stakeholders. No one benefit alone offers the ‘killer punch’, and each remains today as more a conjecture than an established fact. Indeed a substantial part of this project has been devoted to exploring these conjectures – for example in the process benefits of electronic repeat prescribing at the GP practice level.

What our own review has shown, and as suggested in Box 8 where benefits issues are considered from an international perspective, is that benefits of ETP can be conceptually divided into a number of categories based on the fundamental understanding of the mechanisms it invokes.

Box 8: Benefits from Electronic Transmission of Prescription Messages

In England, a range of approaches to electronic transmission of prescriptions have been tested. These have included the use of smart cards to carry prescriptions,⁽¹⁾ to the use of paper tokens to carry prescription data in an encrypted machine-readable form,⁽⁷⁾ to the use of servers to transmit prescriptions as an email,⁽⁷⁾ to the current EPS R1 and EPS R2 services, where a server is used to route prescriptions and prescription messages to dispensers of the patient's choice.

The question arises as to why there has been such persistence in attempting to adopt electronic prescription transmission. England is not alone in this regard, as all three UK nations have implemented systems for electronic exchange of prescription data in primary care, as have Australia,⁽²³⁾ Canada,^(25, 26) the United States⁽²⁹⁾ and also many European nations⁽³¹⁻³³⁾ including Denmark,⁽³⁸⁾ Estonia,⁽⁴⁵⁾ Finland,⁽³⁸⁾ The Netherlands,⁽³²⁾ Sweden⁽⁵⁵⁾ and Spain,⁽³²⁾ although this has not been unproblematic.⁽⁶⁵⁾ It appears from a review of the literature on these international programmes, that there have been a number of drivers for ETP, which to a large extent have determined the architectures of these programmes.

Underlying the electronic transfer of prescriptions is the basic notion that data can be transmitted more accurately, and that this data can be subject to more reliable additional processing than is presently the case. For example, in the United States electronic transmission appears to have an advantage over the current mechanisms of sending prescriptions, which included hand-written orders, as well as faxed and verbal orders to community pharmacists over the telephone.⁽⁶⁹⁾

There are clearly problems with these traditional approaches. Receipt of orders via the telephone can be inefficient.⁽⁷²⁾ From research in other domains we also know that there is an opportunity for transcription and transposition errors to arise which could affect patient safety. Similarly, in the case of written prescriptions, the interpretation and keying in of data can also bring with it risk.

Other potential benefits identified include improved efficiency and safety in the prescribing and dispensing process.⁽²⁹⁾ These services have been associated with the potential creation of a complete medication history for patients,^(29, 55) which could include non-prescribed medications,⁽⁷³⁾ and could potentially be shared between care providers.⁽⁵⁵⁾ In the case of Northern Ireland, a system for the electronic transfer of prescription information was introduced to counter patient-initiated fraud.⁽⁷⁴⁾

The nature of the benefits desired defines the nature of the architecture used. For example, in the case of NHS Wales' system, a system for the electronic transfer of prescriptions, the paper prescription is retained but includes a barcode that contains all the prescription information. This reduces the need for rekeying of data and should promote improved accuracy in the transfer of data between the prescribing authority and the dispensing contractor. In the case of Northern Ireland's system where the emphasis was initially on counter-fraud measures, a bar-coded paper prescription is used, but the data from this was captured and sent via a network for checking against the claimant database in Northern Ireland to ensure the patient did not have to pay prescription charges.⁽⁹⁾

We identify here six assumptions that these benefits statement are built upon. Each of these is founded in two domains – that of the generic digital technology, and that of the medicines use process.

- Digital data is transmitted more accurately and speedily than data on other media
- Transcription of data leads to errors
- Digital data is the basis for improved efficiency in organisational processes
- Improved quality of care is associated with fuller data (e.g. complete medication history)
- Digital data is sharable and supports coordinated inter and intra-team work
- Digital data allows value-adding additional processing

2.3 The Deployment of the Electronic Prescription Service

The delivery of these benefits is dependent upon the widespread adoption of EPS. At the time of writing this report in April 2013, the service was moving towards national implementation and there had been rapid expansion of EPS in community pharmacy. The latest figures we have from Connecting for Health indicate that there are 9,315 community pharmacies which can receive EPS R2 prescriptions, from a population of 11,560 sites. Similarly, there are now 29 dispensing appliance contractors able to receive EPS R2 prescriptions. However, of the 8,316 GP practices in England, at present 672 of these can send EPS R2 prescriptions. This represents a massive expansion in the service since September, 2011, when we reported that there were only ten GP practices able to use the service.

Prior to the changes within the NHS, we noted that there were areas in England where there had been widespread local deployment. The Isle of Wight and Bexley both deployed their systems as part of the exemplar PCT programme. However, other PCTs appeared to operate outside of this scheme and achieve substantial levels of deployment, Medway PCT being one such area brought to our attention.

DEPLOYMENT TO OTHER CONSITUENCIES

Deployment over the period covered by this report was limited to GP practices and community pharmacies. There was no deployment to DACs during this period, however, they were in a position to begin adoption of EPS R2 from June 2012 onwards. Dispensing Doctors did not have access to an approved EPS R2 dispensing module.

Deployment to the DACs differed from that of community pharmacy. In community pharmacy, there were a number of suppliers providing dispensing computer systems with a number of suppliers signalling their intent to offer EPS R2 functionality. In the case of DACs the case was different. Amongst independent DACs there was widespread use of a

DAC specific dispensing computer system called MEDOP. Initial attempts to integrate MEDOP with the EPS were abandoned as it became apparent that this was a challenging and potentially expensive endeavour.

This approach was abandoned in favour of the adoption of a dispensing computer system developed for community pharmacy, which would be linked with the MEDOP solution in place. The MEDOP system was retained for management of prescriptions within each DAC, whilst the other dispensing computer system would provide an interface with EPS and be able to provide access to EPS R2 electronic prescriptions.

Whilst the problem of access to EPS R2 was solved for DACs, the integration of EPS R2 with the practice of dispensing doctors has proved more problematic. In the case of dispensing doctors, there is a dispensary in the GP practice, for which GP practice software suppliers have designed dispensing modules. These modules allow the GP practice to add the endorsements required for the reimbursement of prescription items dispensed, and to also update GP practice records. Implementation of EPS at these sites requires either the introduction of new functionality to the dispensing software that forms part of the GP practice systems in use, or the purchase of a dispensing computer system, of the type that community pharmacy currently uses.⁽¹¹¹⁾

At the time of writing, there had been no dispensing modules completed for EPS R2, despite the fact that the first example of a dispensing module was due to begin testing in November, 2009, but had not been delivered a year later.^(112, 113) One organisation claimed that this problem had arisen because the original specification had not taken into account the manner in which dispensing doctors would work.⁽¹¹⁴⁾ Advice from CFH suggested that dispensing doctors could choose to adopt a dispensing system or wait for their prescribing system supplier to provide a dispensing module.⁽¹¹¹⁾ This latter approach potentially poses the problem of managing the identity of the dispensing practice, which would need to be identified by two site, or ODS codes, one as prescriber and one as dispenser.

2.4 The Consequences of Deployment

In this section, we have examined the available literature on EPS. This has focussed upon the transmission of data between GP practices and community pharmacies. Whilst we expect to see other constituencies use this service, including dispensing appliance contractors and dispensing doctors, the focus of the initial implementations described in this study appear to reflect this. For GP practice and community pharmacy, the introduction of EPS appears to have been predicated on the possibility that new clinical relationships could be supported through this service, which could improve both process efficiency and patient outcomes. In the case of EPS R2, improvements in outcomes would be expected to follow from both reduction in time spent managing transcription errors, and also through increased monitoring of medication use by community pharmacies. In the next chapter we explore the actual experience of the service at initial implementer sites and whether there is evidence to support these outcomes.

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3

FINDINGS TO DATE

IN THIS CHAPTER

This Chapter reports findings related to the implementation of the service as it moves from a prolonged period of testing through its initial implementation to widespread deployment and 'business as usual' implementation. The chapter begins with a brief review of the history of this evaluation and the academic and practical challenges of conducting an evaluation of a national informatics service. We go on to look at our findings in relation to changes in practice within GP practices and consequences of this for workload and prescription management. Following this, we look at change in community pharmacy work practice following from the introduction of the service, change in perceived safety, the distribution of work and safety in dispensing practice. We then consider patient perceptions and expectations of the service. The chapter closes with an exploration of the wider potential consequences of the service for businesses and other organisational stakeholders.

Here we lay out the major findings of our studies while in chapter 4 we look to the future consequences of the introduction of EPS R2. In this chapter we have concentrated on the findings that are most relevant to the evaluation of EPS R2 and its implementation, rather than listing everything found in our study. Some of the detailed findings have already been published, the rest will be published in a series of research papers (Appendix C).

Here we concentrate on the experiences that can:

- Inform the continued roll out and development of EPS R2 in England
- Help those involved with the adoption or use of EPS R2 to understand it better and get more out of it
- Allow the NHS and Department of Health to learn how better to roll out computer technologies (in support of the policy aim of becoming paperless in the NHS)
- Help other countries developing or planning the implementation of the electronic transmission of prescriptions.

3.1 History of the Evaluation

This evaluation was commissioned in the summer of 2007 with the expectation that the first sites would be going live that autumn. The 2.5 year contract started in January 2008,

however the roll out was delayed and so the contract was extended in March 2010 (by which time EPS was still only working at three sites) to December 2011, with some decrease in scope and size of research team. It was given a further year's extension in December 2011 for the length of 2012, in the expectation that we would get greater numbers to test for dispensing errors, and be able to have EMIS Web in the sample; there was also a further decrease in scope. In December 2012 the project was given a further 3 month, no cost extension to allow deeper analysis of some data and also to obtain more recent patient experiences. A consequence of these changes is that the qualitative work was predominantly conducted in the early stages of the adoption of EPS R2 in pilot sites.

The design was based on the original roll out plan of us studying six PCTs from the first wave of 17 planned to go live. However there were significant delays of more than a year before the first pairing of a GP practice and pharmacy was consummated in Leeds in June 2009. Because we had designed the evaluation based on the original roll out plan we had been getting permissions to research in different PCTs, and started to collect "pre-implementation" data from sites in which we expected EPS R2 to be delivered in the early stages of roll out. In the event few of these sites did implement during the period of our study, and we were left without the before and after data which we had expected.

Our ability to adapt to the new and rather agile roll out, in which at any time several sites were working closely with CFH and any one of them could go live (and some others not go live for a long time), was hampered by the Byzantine research governance arrangements in which we found ourselves embroiled. Our work fell under the relatively new, at that time, classification of "service evaluation" and hence did not require approval by an ethics committee. However the work was clearly research that involved patient and information about them – there were patient interviews, hypothesis testing and observation of patients' medication labels. We therefore checked with an ethics committee that we did not need to get their approval and they confirmed this. Unfortunately this put us outside several processes which could have helped progress the study. Not least, several PCT research managers refused for a long time to accept the work as research and to grant us access to work in their PCT. Others were just confused by the lack of ethics committee approval and commonly took months before granting us access. This was exacerbated by the plans to abolish PCTs in 2013, many people were unsure whether they would have a job in the future, and were understandably not prioritising an external study. Because we had not got ethics committee approval we were concerned that others, including editors of research journals, might consider our work with patients unethical. We therefore started engaging with Caldecott guardians, one of whom refused us permission to speak to patients or look at their prescription labels – this in one for the PCTs planned for the first phase of roll out. We had to abandon plans to work with that PCT.

The consequence of these challenges was that, while CFH were of necessity adopting a very agile approach to roll out, we were unable to respond at the same rate and so found ourselves talking to pharmacists, GPs and patients at sites where EPS ended up not being implemented within the study period, and sometimes missed the early stages of adoption at other sites. Nevertheless we feel that, from talking to a wide range of stakeholders, we have captured the key issues.

Another challenge was that our carefully planned evaluation of the prevalence of errors in the dispensed medicines was based on a stepped wedge design, which would follow pharmacies from before their implementation of EPS, through to their mature use of it. However as the planned implementation sites kept changing after we had started data collection in the early sites, we had to recruit some new sites once they had already started using EPS; the statistical modelling has taken this into account. This illustrates the substantial challenge associated with trying to conduct a highly structured experimental design when it runs up against the rapidly changing political and practical issues associated with national projects in which there are many autonomous stakeholders. The same problems beset the study of the national roll out of patient records in secondary care, the original careful design being in ruins after just a few months of rapidly changing policy. We have attempted to draw some general lessons from this for future large scale IT evaluations.⁽¹¹⁵⁾

3.2 Structure of the Findings

We present our findings in a linear order. We start with the GP practices' experiences, then go on to the pharmacies' then the patient's views and experiences and finally we deal with Risk and Safety.

Before going into the detail of our findings it is important to mention the dearth of literature on the current repeat prescribing and associated dispensing processes. It seems incredible that processes that for primary care in England handle around 1 billion prescription items in a year, from prescribing through dispensing and reimbursement (to the value of about £9 billion a year), are associated with such a miniscule research literature. When we started our study we only found one significant study on repeat prescribing processes in general practice⁽²⁸⁾ and only one 'gold standard' study of dispensing errors,⁽¹¹⁶⁾ which had checked the final items against the prescription. The consequence of such a lack of structured knowledge is that, for those wishing to develop new systems (technological or human), their knowledge of normal practices, their effectiveness and efficiency is little more than personal experience, anecdote and assumption.

In the absence of research evidence it is extremely important that robust methods are used to ensure the range of activities in practice are adequately represented to the developers and implementers. The usual practice in the development of a new technology to support

clinical practice is to have representatives of relevant professions in meetings or form small groups to advise. The effectiveness of these approaches is limited by the experiences of the members and their understanding of, and representativeness of, the range of real (rather than local or idealized) practice that occurs daily. Even then it is not clear whether some representatives know the detail of practice within their own organization – eg does a GP know the exact functions of, and decisions made by, receptionists and administrative staff in their practice? The consequence of limited knowledge and understanding can be the design of software that is ill fitted to the realities of a range of normal practices.

In the sections that follow we explore:

- The processes of managing repeat prescribing and dispensing in GP practices, the way work is organized, and the effect of EPS R2 on this and on the time of staff. The views of dispensing doctors are represented. The uptake by GPs of EPS R2 is commented on.
- The work practices of community pharmacists, including an ethnographic study leading to a typology of pharmacies with respect to technology. Observations and interviews with early and later adopters. Speculation on the effect of EPS R2 on the future professionalization of community pharmacy.
- Patients' experiences and views of EPS R2, from interview and questionnaire.
- An exploration of issues of safety and risk. The main focus is a substantial step-wedge design study of the dispensing errors made by pharmacists, and work they do to enhance prescriptions, with and without EPS R2. There is a small study of pharmacists' communications with GP practices about problem prescriptions. We also consider the various stakeholders' perceptions of the risks associated with EPS R2.

3.3 Methodology Overview

The results that follow represent five years' work and include visits to, and engagement with staff in, 40 pharmacies, 11 GP practices, 18 PCTs, 13 CFH staff and 7 software suppliers, as well as other stakeholders including Royal Colleges, representative bodies and other NHS staff. We have elicited the views of over 80 patients and have checked 16,357 prescribed items against their prescriptions to identify errors (the largest study of its kind in the world).

In this chapter are a mixture of focused studies, such as counting the number of dispensing errors, for which we describe the methodology as part of describing the study; however the whole of this report and many views in it are underpinned by a range of research activities designed to understand EPSR2 and its implementation. These activities included extensive

analysis of relevant documents and policy and 80 semi-structured interviews with stakeholders.

There were far more stakeholders than at first imagined. We developed a mind map of them (see Figure 7); we developed this as we went through the interviews and document analysis, using a basic diagram of stakeholders and getting interviewees to describe the relationship between them, and to inform us of any that were missing (an example is shown in Figure 8).⁽¹¹⁷⁾

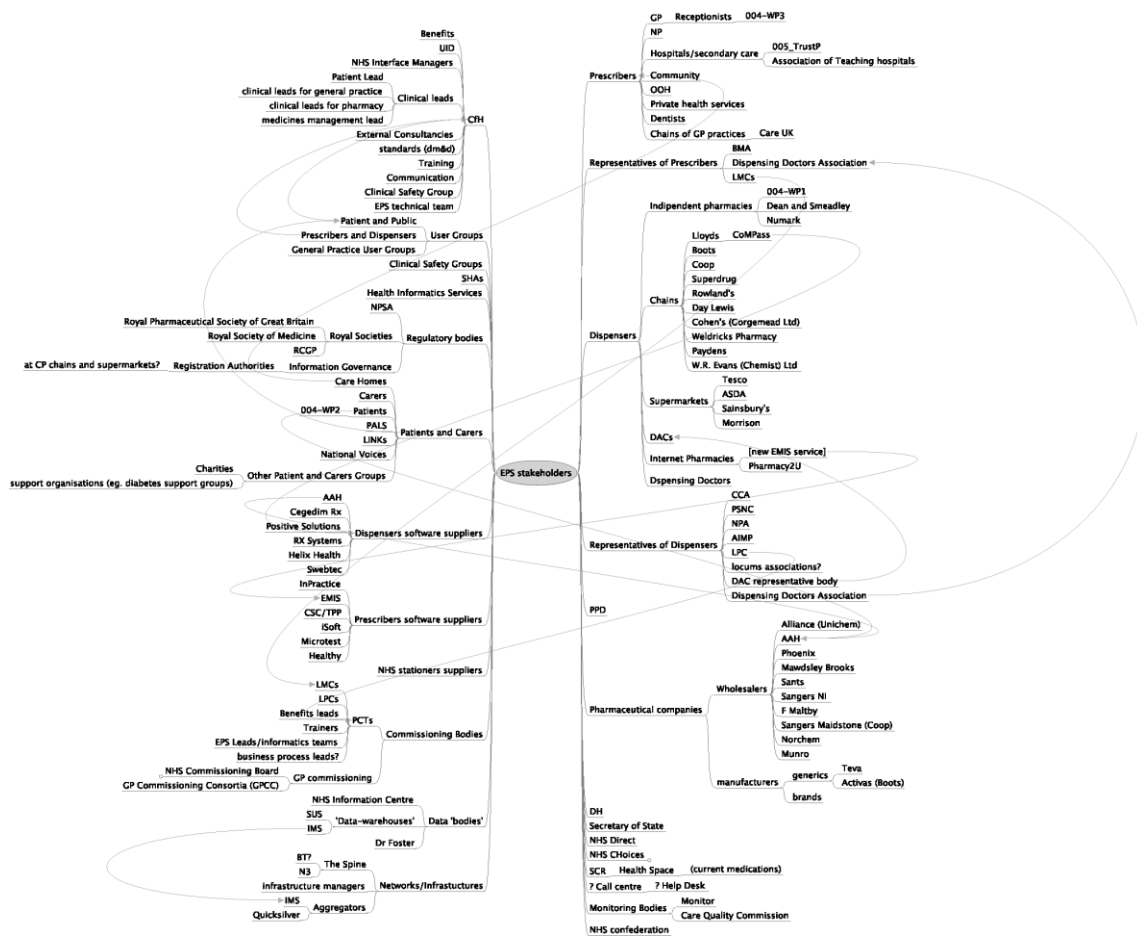


Figure 7: Stakeholder Mindmap Used as a Sampling Tool**

Interviews (sometimes with more than one representative of a body) included representatives of professional bodies (17 meetings), software suppliers (9 meetings), practitioners (17

** Marked in green organisations whose members were already interviewed or contacted for potential interviews as of May, 2011.

meetings) and health informatics (37 meetings including architecture, service design, installation). In addition we attended monthly CFH Implementation Board meetings (2008-11), closed meetings restricted to representatives of those PCTs that represented the initial implementation sites, representatives from the DH and the Pharmaceutical Services Negotiating Committee (PSNC). This became the EPS Implementation Group (attended 2011-12), which featured representatives of PCTs that had or were deploying EPS, Strategic Health Authorities, DH and PSNC. Quarterly EPS Forums were also attended (2011-12), where discussion included nomination of patients, progress in deployment, business continuity, spine procurement, business change and process continuity. Membership included the DH, PSNC, trade-bodies for dispensing appliance contractors, community pharmacies, dispensing doctors, GP practices, and patients.

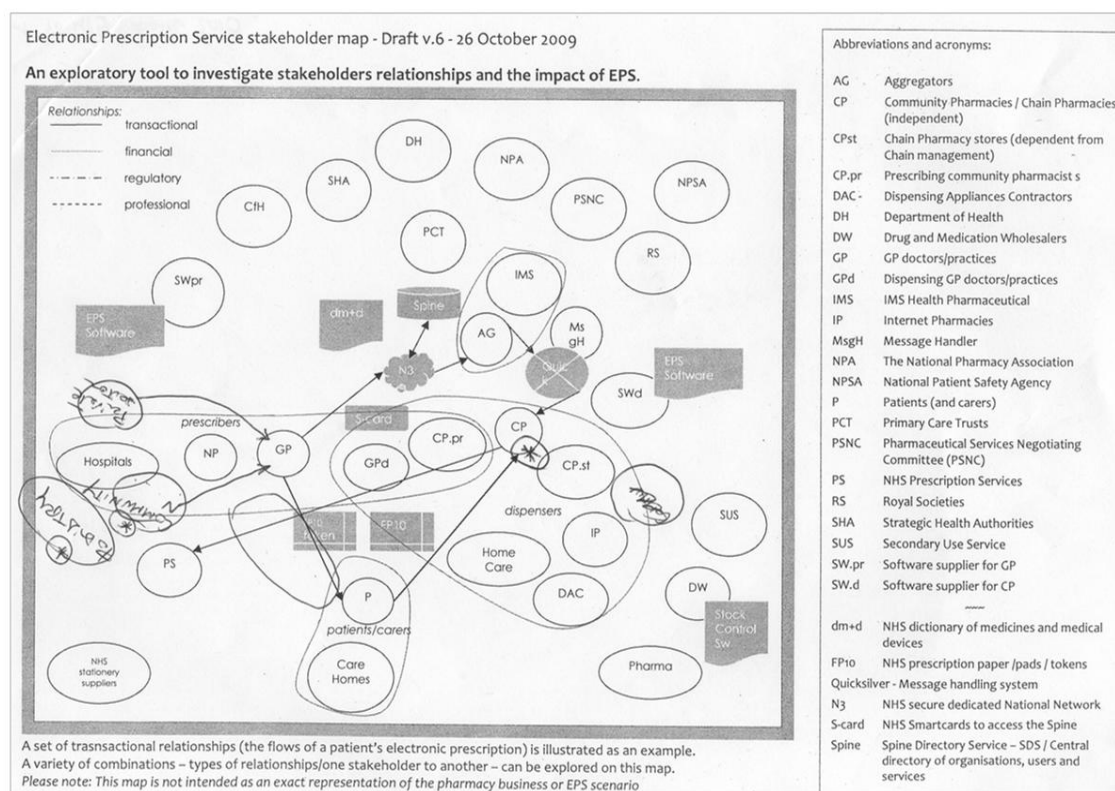


Figure 8: Example of Stakeholder Maps Used During Interviews, with Annotations of Participants' Views

3.4 Findings

EPS in General Practices

BACKGROUND

England is one of the most advanced nations in the world in its deployment of informatics in primary care. Informatics are typically introduced into GP practice on the presumption that these will accelerate work, and that this will save time.⁽¹¹⁸⁾ This assumption also appears to underlie much current informatics policy in the NHS.⁽¹¹⁹⁾ In this part of the study we addressed three main research questions. Firstly, how does EPS R2 influence GP practice work practices? Secondly, what potential does EPS R2 have for reducing workload on prescribers, here represented as time in activity? Thirdly, what other relevant factors are there that may change GP practice? These appear to be pertinent given concerns over GP practice workload,⁽¹²⁰⁾ and the new informatics services being introduced into primary care such as Choose and Book, GP2GP and the Summary Care Record.

METHODS

For this part of the evaluation, a multi-method approach was adopted to predominantly examine the management of repeat prescribing and repeat dispensing prescriptions. This part of the evaluation also attempted to characterise the manner in which work is organised within different GP practices, the time spent in processing prescriptions, and also the flow of the prescription through to the community pharmacy.

A range of methods was used, including interviews and observations in GP practices, and interviews with professional institutions and other stakeholders. Timing of activities was conducted of both the prescription processing tasks conducted by prescription clerks or receptionists, and where possible the time GPs spent in signing prescriptions outside of the consultation. GPs were also asked to complete a prescribing diary form to record the amount of time spent in signing electronic and paper prescriptions. In order to capture how long it took for electronic and paper prescriptions to navigate the prescription process, a tracking sheet was attached to a sample of prescription requests. An authoritative stakeholder stated that in his GP practice missing prescriptions were a significant event, taking half an hour a day to find; we therefore created a 'missing prescription' log to use in GP practices to try and capture the time spent in searching in this activity.

PARTICIPATING SITES

Following the delays to the roll out of the service, we could only collect data from four of the sites that were using EPS R2 by the end of our data collection in September 2011,

although we also studied three sites that had not gone on to use EPS R2. The EPS R2 practices varied in size, with one site having 4,000 patients, another with 8,500 patients and the remaining two with 12,000 patients. These practices used one of the three prescribing systems that were then undergoing testing, EMIS Web (2 sites), INPS Vision and TPP SystemOne.

FINDINGS

The repeat prescription process was deconstructed into five main stages, with a sixth stage that was enacted when a prescription was reported as missing by the patient or the patient's representative (see Table 3); this generic model disguises considerable variation between sites with regard to the manner in which prescriptions were managed. For example, one site favoured the receipt of prescription requests over the telephone, whilst the other three preferred written requests but were willing to except housebound patients from this requirement and receive their requests by telephone.

Sites also varied in the personnel involved in the process. In one site, any queried prescriptions had to be reviewed by the practice nurse who would then pass these onto a GP, whilst at another site, a medicines management technician would receive any prescription requests which were due for review. In most cases, a request for a prescription would lead to the printing of the FP10 prescription form, or the creation of an electronic prescription form for signing. However, this would not always be the case, for example if a medication review was due, items were requested too soon or if there is a request for a change in dosage written by the patient. Only two of the sites were regularly issuing electronic repeat dispensing prescriptions.

There were a number of factors that affected the time taken to produce new prescriptions. This included time-lags in the prescribing systems themselves and whether staff were able to multi-task in the production of a prescription. The manner in which time is used in the GP practice also changed. Paper prescription forms are typically processed and distributed to a set cycle, with distribution to prescribers occurring at set times during the day outside of their time seeing patients. In the case of electronic prescriptions these could be sent to the prescriber or practice nurse at any time, and signed promptly in between patients. However, there is a question as to how sustainable this is. In two practices, the time taken for GPs to sign electronic prescriptions was quicker than for paper, whilst in other two it appeared to take longer.

Unfortunately, only limited data was available on missing prescriptions, two of the four sites failing to return data. At one site, over the course of 55 days, only two prescriptions were reported as missing, whilst in another, a prescription was lost every two days. The time spent in searching on average was between five and seven minutes per prescription.

TIME SAVINGS AND LOCAL PRACTICES

Our timings of administrative staff to print-off or send prescriptions to general practitioners appear to support the view that electronic prescriptions are quicker to process overall (see Table 1), and were generally quicker to sign. Based on data from diaries filled in by the GPs, at three of the GP practices electronic prescriptions were faster to sign, with paper prescriptions taken an average of 39 seconds, 29 seconds and 22 seconds to sign, and for EPS R2, an average of 7 seconds, 20 seconds and 13 seconds in the respective sites. However, in the fourth site, the trend was reversed with the paper prescription taking on average 13 seconds to sign per item, and the electronic prescription 24 seconds.

Table 3: Overview of Time Spent at Reception Producing Prescriptions from Prescription Requests Received at Four GP Practices

		Number of Prescriptions	Number of Items	Total Time Spent	Average Per Item	Average Per Prescription
Prescription Type	Electronic	40	124	00:35:22	00:00:17	00:00:17
	Paper	94	314	01:49:16	00:00:21	00:01:10

Although the data we present here is suggestive of an advantage for the processing of electronic EPS R2 prescriptions over paper, we need to note these are preliminary findings from a small and partial sample of early adopting practices and of patients deemed suitable for EPS R2.

We found that it was difficult to get a reliable estimate of the time taken in the administration of prescription requests, given the limited numbers of electronic prescriptions managed at sites and also that some of the activities related to the management of prescriptions are interspersed with other activities. For example, at two sites there were prescription clerks dedicated to the printing and sending of prescription forms to be signed, but the receptionists were responsible for filing these amongst their other duties. At another site we visited, there were no dedicated prescription clerks, so the processing of prescriptions was undertaken whilst the staff were also managing other telephone queries from patients.

Another potential confounder is that there is also multitasking at the computer systems. On one of the systems there was a delay between the request for a patient record, the first step in processing a prescription, and the return of this by the computer. This provided the

prescription clerk with an opportunity to put together the prescription and the original request, and to place this in the appropriate pile in her workspace. There appeared to be a few seconds between the record being displayed and the process of compilation being completed.

However there could be benefits with regard to processing of requests electronically. At one practice in which there were dedicated prescribing staff, it was estimated that the time saved by EPS R2 could be around 20 minutes per batch, in what was a serial process at this site. At this site, prescriptions were printed and then compiled together with the original requests after all requests had been dealt with either by printing or sending a prescription or raising a query. We suggest that there are potential time savings to be made through EPS R2, as shown below (see Table 4).

Table 4: Potential Time Savings from Electronic Prescription Use in the Process of Supplying Medications to Patients

Stage in Process		Description of Stage
1	Prescription Requests processed on General Practice Prescribing Computer System	No major difference in the process for issue of paper or electronic prescriptions. There is no difference in the ways requests are received for electronic prescription or paper prescriptions.
2	Processing of Paper Prescriptions for Distribution to Prescribers	Potential time-saving through use of electronic prescriptions as removes the need for compiling prescriptions and the prescription requests received. However, these savings might be mitigated by work-arounds required to ensure that prescribers are aware that there are electronic prescriptions waiting to be signed and/or queries to be checked.
3	Processing of Prescriptions for Signing by Prescribers	The potential time saving from electronic prescriptions depends on a number of factors including interface design and the degree to which prescribers effectively use the embedded electronic workflow management system (where available).
4	Filing of Paper Prescriptions and Rejected Requests for Collection	There is a potential time-saving here from electronic prescription use.
5	Collection of Paper Prescriptions	Again, there is a potential here for time-saving from the use of electronic prescriptions.
6	Search for Lost Prescriptions	There should again be a potential time-saving from the use of electronic prescriptions.

REPEAT DISPENSING

In addition to repeat prescriptions, which are typically renewed at the GP practice every month, there are also repeatable prescriptions, usually known as “repeat dispensing”. Repeat dispensing consists of the pharmacist being authorised to provide, for example,

six months worth of prescriptions, one month at a time. This reduces the workload to the GP practices, and is common in some similar health systems such as Australia. In England repeat dispensing was first suggested in 1993, and implemented in 2005. However uptake of the paper-based system has been very patchy; it varies widely between PCTs although it represents a minority of prescriptions in all PCTs. Figures provided by Pharmacy Voice (personal communication) show that in August 2012, 5.4% of all prescribed items were from repeat dispensing, however there was a wide distribution, from Rotherham (0.02%) to Richmond (34%).

It was assumed that EPS R2 could make repeat dispensing more attractive. We did see it in use, however interviews with seven GP practices suggested there were still several reasons why it was not more widely used. These included disagreements about the expected benefits with respect to workload, safety and waste; patients finding starting the process cumbersome and deciding it was not worth it, or signing up and still going back to their GP practice; difficulties with drugs or doses changing, and difficulties with synchronising the dates for all the different items on a prescription so that they could all be renewed at same time.

The ability of repeat prescribing to reduce workload in the GP practice can be compromised by the way the software is designed. We saw one EPS R2 system which staff said was just as difficult as paper; observing them we could see that the interface design did not facilitate their work. On the other hand, one GP told us that he had gradually converted others in his practice to repeat dispensing, and they were now all firmly committed to it.

To accelerate the uptake of repeat dispensing there is the need for some solid research to generate evidence of the workload involved in setting it up and maintaining it, from both the GP and pharmacy perspectives. If this is found to be positive then there needs to be national engagement with the software suppliers, probably by a Royal College, to ensure simple, efficient systems. Finally there needs to be a pragmatic users' guide for GPs, pharmacists and patients on the steps involved in making it work. This could also be an area in which a 'meaningful use' payment could be made to GP practices. Meaningful use payments have not been entirely successful in the USA in growing the use of technology, however in the UK we already have far wider use of technology in primary care, and we think their use should be explored. Alternatively there could be an exploration of whether computer system suppliers could be incentivised to produce systems which better supported the process.

DISPENSING DOCTORS

By law doctors can only dispense if there is not a pharmacy within a certain distance of the patient's home. As the doctor's dispensary is a few yards from the surgery, and the

dispensing computer system is an extension of the prescribing system, it is hard to see the immediate attraction of upgrading their system to cope with EPS R2 (although there may be benefits in some circumstances). Some dispensing doctors we spoke to wished to have it because it brings electronic reimbursement. However at the time of writing, as far as we could establish, EPS R2 was not available on dispensing doctors' systems.

UPTAKE OF EPS R2 BY GPs

There has been widespread uptake of EPS R2 by pharmacies, so the uptake of EPS R2 by GP practices seems to be the rate limiting step in the national roll out. Although uptake is increasing, it has been very slow for most of our study period. There are several causes of slow uptake:

- One of the leading GP software systems, EMIS, only included EPS R2 in its new product, EMIS Web, which only became available outside development sites in 2012. For customers of EMIS, the rate of adoption of EPS R2 will depend on the stage at which they are able to take on the substantial task of moving to a whole new practice system; the rate of roll out will also depend on the company's ability to support each new implementation and may take years.
- There is as yet little evidence to convince a GP that EPS R2 is worth engaging with. Our results suggest that there may be savings in time for a practice, but that may be amongst the administrative staff and not impact on the experience of a GP. Indeed, there may be initial work to adopt the system, such as nomination, and getting used to and troubleshooting local computer and human systems until the systems works well; although not a large barrier, it may be perceived as such. If a practice is feeling stressed they may not prioritise EPS R2 if they are not willing to face the initial disruption.
- Repeat dispensing may also not be engaged with because it requires an initial investment of effort to set it up, and many practices remain to be convinced that it yields benefits.
- There is, as ever, a weak line of communication between GP practices and the pharmacies their patients visit; they are all part of the same system and need to communicate to work together to improve the system. Our evidence was mixed on this, with weak evidence in each direction. However on the relatively rare occasions when an electronic prescription 'vanishes' there tends to be a blame game between the practice and the pharmacy. The difficulty of tracking prescriptions exacerbates this.
- The limitations of EPS R2 add an extra layer of decision making into what was a relatively straightforward part of the GP consultation – printing the prescription and handing it over. The GP now needs to consider whether the patient has a nominated pharmacy, whether they want a token (even if nominated), whether all the items on

the prescription can be transmitted electronically (eg controlled drugs cannot be), and whether the item is an acute prescription and may be better delivered as a paper prescription rather than sent electronically. This may affect the uptake and efficiency of the system.

In our view the drivers for GP practices to adopt EPS R2 are quite weak. It may be worth considering some form of ‘meaningful use’ incentive payment, perhaps a single payment that is delivered once a given proportion of prescriptions are delivered via EPS R2 over an agreed time. Alternatively supplier inducements could be considered so it was in their interests for practices to use the software.

Pharmacy work practices

Surprisingly little work exists on the work practices of community pharmacists in England (or elsewhere). Our plan was to explore the effects of EPS R2 on work practice qualitatively and quantitatively. We studied how pharmacists spent their time by work study methods – however we were only able to obtain data before the introduction of EPS R2. We also studied pharmacies ethnographically – using observation by a trained researcher, which included field notes, sketches, observations and chatting to staff. After the introduction of EPS into the early adopter sites the ethnographer returned to observe and talk to staff. Around a year later, when EPS R2 was better established, and used in more sites, we conducted an additional telephone survey of pharmacists using the service. At the end we speculate about what EPS R2 might mean for the professionalization of pharmacy.

HOW PHARMACISTS SPEND THEIR TIME

We had hoped to test whether there were any differences in how pharmacists used their time before and after the introduction of EPS R2 by quantitative work study experiments. We had used these successfully in hospitals in the past, however community pharmacies are a very different work environment in many ways so we had to adapt the original methods. We wanted pharmacists to report their own activities, as this allows the capture of cognitive activity. We developed a novel method for community pharmacy in which pharmacists were given mobile phones and were texted at random intervals in the day by an automated service. When they received the text they responded with a code number representing their activity. This system worked, however the pharmacists found the texts intrusive if they were sent too frequently. Given the time required to capture sufficient data, and the frequently changing implementation plans, we were unable to capture sufficient data to allow quantitative comparisons before and after the introduction of EPS R2. We captured significant amounts of data from three pre-EPS R2 and five post-EPS R2 pharmacies, however differences between the nature of the pharmacies and the relatively small sample size meant it was inappropriate to compare pre- with post- data. However we have

established a novel data collection method – the first in the world of its type as far as we have been able to determine, which could be a tool for further studies.

Given the challenges of the self reporting method we decided to conduct another study to determine how pharmacists used their time pre-EPS R2. Trained observers spent time in 10 community pharmacies, recording activities every minute for 4h a day over one week. There were 12,306 observations. The pharmacies were open for an average of 61.4h per week (range 49-100h). The commonest two activities were assembling and labelling of products (median 25% of time; quartiles 19-31) followed by monitoring prescriptions for clinical appropriateness (11%; 7-15). This demonstrates that community pharmacists' most frequent activities are related to dispensing prescriptions. In the next section we understand more about these activities.

THE SOCIO-TECHNICAL ORGANISATION OF COMMUNITY PHARMACIES

We have very little formal knowledge of how social and technical processes are used in dispensing and community pharmacy, and how core technical artifacts are adapted into work practice.

METHODS

We studied 15 pharmacies ethnographically, which involves a researcher spending half day periods in the pharmacy observing activity and chatting with staff. A total of 2 to 3 days observation was conducted at each site and the field notes were converted into case studies for each site. The sample included a wide range of locations, from villages to inner-city areas and shopping centres. They were also a mixture of large chains, local chains and independent pharmacies. Most had delivery drivers, and the total number of staff in the pharmacies during the observation period was typically between 2 and 5. The observations and case studies followed a number of themes, such as the physicality of the pharmacy (its location, size, layout), the workflow, the workload, the resources available, engagement with electronic aspects of dispensing, and the social elements of dispensing.

FINDINGS

The analysis proposed that there were 3 models of community pharmacies in their approaches to work – these are described in detail in a research paper⁽¹²¹⁾ and outlined in Box 9. If valid, our analysis would suggest that the culture and established work practices of these pharmacies may affect their willingness and ability to take on EPS R2. Technically orientated pharmacies would be likely to look forward to its introduction, and implement it in a systematic way. Those with an improvising approach may be willing to take it on, but disappointed if it does not quickly deliver benefits, and may be less able or motivated to work through problems. The socially orientated pharmacies, all other things being equal, would be less likely to be early adopters, but may be more likely to adopt EPS R2 when it becomes

more of a social norm amongst their peers. We stress that this is speculation as yet, as we have not been able to test it empirically.

Box 9: Three Models of Community Pharmacy Approaches to Work

Technically Oriented Approach: In pharmacies illustrating this approach dispensing was driven by technical elements rather than social ones. High-technology artifacts such as advanced software, problem-solving software, system remote control tools and (in one case) a robot, were used to propel work. They were usually associated with a range of supporting protocols such as prioritising work through dispensing baskets, structured communication systems between staff and between staff and customers, highly structured physical space and regimented transport arrangements. These staff looked forward to EPS R2 as a novel artefact.

Socially Oriented Approach: Here the social elements drove matters more than the technical elements. Dispensing depended on interaction between staff. These staff were indifferent to EPS R2 and showed little knowledge about it.

Improvising Approach: These pharmacies did not appear to have a particular approach or organisation to work. They tended to use every resource available to aid work, although in an apparently unsystematic way. These pharmacies were often trying to achieve high work output with limited resources. These staff were eager for EPS R2 and were hoping that it would help them achieve work targets.

INITIAL OBSERVATIONS AFTER EPS R2 IMPLEMENTATION IN PILOT SITES

Eight of the sites which had been observed in the pre-implementation phase were visited after implementation, the pharmacists and staff were interviewed. At these sites it was estimated that between 10% and 40% of prescriptions were dispensed by EPS R2. They had generally positive attitudes about EPS and wanted to retain it. They felt it helped reduce owings (when there is insufficient stock to fulfil a prescription completely by the time the patient collects it) and improved the workflow and workload. In general EPS R2 was not being delivered in a paper free manner. Pharmacists would print tokens as a physical object to be used to help compile the medicines for dispensing, and for someone to check the dispense medicines against. Given that some patients who had their prescriptions sent by EPS R2 also received a token from their doctor, the consequence was that more paper was being used with this system, rather than less. Smartcards were also seen as troublesome, given the rapid multitasking that goes on within a pharmacy. The pharmacist would tend to insert their own personal card at the start of the day and leave it there for all staff to use. Generally their views were that patients were accepting the system, however some patients had bad experiences, for example when they arrived before their prescription, or in cases in which the prescription had apparently gone missing, and so a few patients had chosen to take away their nomination. It would appear some, but not all,

of these cases were related to teething problems with software or its use. On the other hand pharmacists felt that patients had fewer items which were owed to them, and hence did not have to return to the pharmacy as often.

The problems that were recorded, which may well reflect the fact that these pharmacists were the pilot sites for the new technologies, related to missing prescriptions, problems with the downloads and the perception of the system as a whole being 'down'. This last point could be particularly frustrating as pharmacists did not appear to have access to parts of the NHS web in which problems with the spine were posted, together with updates on when they were resolved.^{††} Some pharmacists expressed concern that their income would be affected, either because patients spent less time in the pharmacy, and hence a fall in associated sales, or because the reimbursement for printing costs was a flat fee, irrespective of the number of items dispensed.

MORE RECENT INTERVIEWS

In 2012 thirteen community pharmacists who had participated in EPS R2 deployment were interviewed, 11 of which had received EPS R2 prescriptions, 8 of them had also received repeat dispensing prescriptions. Their motivations for adopting EPS R2 included external stimulus from their head office or PCT, and internal motivators such as perceived business benefits and reduced time managing prescriptions. Training seemed to have come from a variety of sources, most commonly the software provider (9/13). One had received no training, four others thought training had been too early or too late.

When asked about benefits 10 mentioned a reduction in errors, 8 of whom went on to specify a reduction in labelling errors; three thought there was a more even workflow. Seven reported an improved relationship between general practice and pharmacy.

The problems they listed included: temporary loss of EPS R2 (n=12), the splitting of prescriptions into paper and electronic forms (8), problems with nominations (7) and with smartcards (5: 2 not working, 2 cases of locums without smartcards, one problem with a card expiring). The problems with nominations included the patient having been nominated to a different pharmacy; the patient being told to go to the nearest pharmacy without having checked it was their nominated one, a case where the patient was nominated without her knowledge, and a case in which the nomination was temporarily changed and not changed back.

^{††} Note that there is now an alerting service available to community pharmacies from HSCIC which informs community pharmacies of any disruptions to the Spine or N3.

THE ROLE OF EPS R2 IN THE DE/RE PROFESSIONALISATION OF PHARMACY

The automation of some types of work can lead to the loss of status for the people who had the skills automation replaced. It is important to explore the consequences of the introduction of EPS R2 on the profession of Pharmacy (it is hard to see that it will affect most GP practices, although it might ultimately lead to a challenge to the legitimacy of the dispensing doctor role). The threat comes partly from the automation of tasks that were previously done by a skilled person, and partly from the reorganization of work and the drive for efficiency and profit. Electronic ordering could just be used to increase the throughput of pharmacists, and they could become more of a 'dispensing factory'. The greater potential for internet pharmacies and efficiencies of scale could (as has happened with bookshops), lead to a reduction in the number of community pharmacies.

On the other hand there are forces that could lead to an enhancement of the pharmacist's role. The Department of Health has for some years been trying to extend the clinical role of the community pharmacists, in the way that hospital pharmacists became clinically focused decades ago. Interestingly the involvement of community pharmacy in the EPS R2 roll out has been seen, as one interviewee put it, as 'bringing pharmacy into the NHS family'. This is interesting because pharmacy has always been as much part of the NHS family as any other primary care contractor – they are mainly small to medium sized 'for profit' organisations (as are GP practices), however pharmacy has been seen by some as an outsider.

In addition to the psychological element of being seen as 'in' the NHS, access to the Spine could allow pharmacists to use the Summary Care Record (as is being piloted at some sites). This would allow better checking of prescriptions (as happens in hospitals; GP prescribing error rate is around 5%)⁽¹²²⁾ and more support for patients when they ask about their therapy. It would also be a major change in that pharmacists with prescribing rights would be able to provide a wider range of treatment to patients with greater safety – something the Office of Fair Trading suggested in 2007 to open up the market.⁽¹²³⁾ The smoothing of workload (particularly if enhanced by an extension of current legislative changes which could allow the pharmacist out of the pharmacy for longer periods of time) could give the pharmacist more time to consult with patients within and outwith the pharmacy. The use of repeat dispensing, combined with existing services such as medicines use review and prescribing rights, could lead to the GP delegating more management of patients to the pharmacist, adding adherence and other monitoring to the supply function to optimize medicines use for the patient and the NHS and reduce GP workload. In Scotland pharmacists already have some patients receiving medicine for chronic conditions registered to them for management of elements of their condition. The themes in this section are discussed from a sociological perspective in our paper in *Social Science and Medicine*.⁽¹²⁴⁾

OVERVIEW OF PHARMACY FINDINGS

Pharmacies are busy, reactive places, responding to the flow of customers and their needs. They are also at the end of the ordering and supply chain and so problems anywhere in the system tend to be made visible in the pharmacy. The introduction of EPS R2 has been a significant change, requiring more than one system of dispensing (paper and electronic) to work in parallel. There were many problems in the early pilot sites, however as understanding grew amongst all the stakeholders, and human and technical systems were improved, there is more recognition of the benefits to work scheduling and that some of the new problems are balanced out by a reduction of old ones, such as unsigned prescriptions.

There are many possible combinations of GP and Pharmacy computer systems, aggregators, patients, and GP and pharmacy human systems, so it is too early to generalise, however we have seen signs of a trend towards general improvement in the effectiveness of the system and signs that it would be beneficial if more widely used. Later in this chapter we consider risk in pharmacy and also the possible risks for pharmacy as a profession.

Patients' Perspectives

This study explored patients' and representatives' (hereafter patients) experiences of EPS, as well as the perceptions of patients who have chosen not to use the service. A complex picture emerged of service adoption and potential consequences of service use.

BACKGROUND

Prior to the conduct of this evaluation, little was known as to how patients might experience the electronic transmission of prescriptions. Some surveys had been done in the UK of the potential consequences of adoption of ETP,^(108, 125) and latterly EPS.⁽¹²⁶⁾ Outside of the UK there were three limited evaluations that looked at patient experiences, a study of geriatric patients' experiences of ETP in the United States,⁽¹²⁷⁾ and a series of Swedish studies on their e-Receipt service that focussed on non-collection of electronic prescriptions⁽¹²⁸⁾ and patient experiences.⁽¹²⁹⁾ Interesting the last study seemed to indicate that patients were unaware of how their prescriptions were being sent to the community pharmacy, and continued using the service despite concerns over its potential benefits.

METHOD

Patients were interviewed either face-to-face or over the telephone following an introduction to the researcher by community pharmacy or GP practice staff. Face-to-face interviews were held at these location and notes made at the time and immediately afterwards. Interview data were analysed using content analysis. Observation of the process of managing electronic and paper prescriptions was also conducted at community

pharmacy and GP practice sites. This work was conducted in the early stages of uptake of EPS R2 when prescription volume could be quite low, hence it was unsurprisingly difficult to get a large sample using this method. We had originally planned a national survey of patient experiences, however this was abandoned because of the slower than expected rate of uptake of EPS R2.

Data obtained from interaction with patients included basic demographic data, information about the type of prescription raised, the process used to order and obtain medicines, the frequency of contact with healthcare providers, and the patients' views of the EPS.

PARTICIPANTS

In total, 58 patients participated in the study (20 male and 38 female), of whom 32 had received an EPS R2 prescription. The ages of participants ranged from over 25 years to over 65 years, with the largest group of participants falling in the latter age group. The vast majority of prescriptions collected were from repeat prescribing.

A COMPLEX PICTURE

The qualitative analysis presents a complex picture of patients' responses to the service, which appear at times to be in contrast to the business case for the study. For example, not all patients value a more convenient service where convenience is associated with a reduction in travel to community pharmacy and GP practice sites for prescriptions. Rather, some patients prefer to submit the prescription request in person and to take this in person to the community pharmacy. There were four main reasons for this. Firstly, some patients preferred the contact with GP practice and community pharmacy staff. Secondly, the patient might wish to portray themselves as someone who meets their obligations with the GP practice by adopting the role of the good patient. Thirdly, some patients appeared not to be comfortable with the thought of the use of computers to transfer prescriptions. Finally, some patients thought that their prescriptions might not be suitable for transmission via EPS R2 as their prescriptions frequently changed and they were close to a GP practice, so might have to wait longer if they had an EPS R2 prescription than if a paper one.

Nomination

A complex picture emerges in part because of patients' perceptions of the flexibility of the process. The majority of patients who expressed an opinion on nomination, eight, were generally happy with nomination as they did not foresee an occasion on which they would use an alternative community pharmacy. In contrast three patients felt that EPS R2 would reduce the flexibility of the service. In the case of one of these, the patient worked across the region so would want to drop in the prescription wherever he could. Another patient wanted to choose a pharmacy based on which were open at the time he finished work. Two

patients had concerns that their community pharmacy might not be able to meet their request in a timely manner. One patient preferred the option of taking the prescription to another pharmacy if her nominated pharmacy was too busy. Another patient expressed concern about having her prescription sent to a nominated pharmacy when she was not sure if they had the stock to fulfil it.

Paperless Prescriptions

Some patients using EPS R2 had to ask their community pharmacy for a dispensing token in order to obtain a copy of the prescription counterfoil, although not all patients wished for this. Two patients commented on the use of the prescription counterfoil as an aide-memoire for them and as a means of transferring information on their prescriptions between care-settings; another felt the lack of a counterfoil reduced the level of control he had over the prescription ordering process.

Service Reliability

Concern was raised by some of the patients over the reliability of the service, particularly when receiving acute prescriptions. Two other patients reported problems they experienced with the transmission of repeat prescribing and repeat dispensing prescriptions. Problems also emerged when some of the items on a prescription were sent electronically and other items printed on a paper prescription; this is called a split prescription. The creation of a split prescription can arise for a number of reasons, for example when an item on a prescription is a controlled drug or when an item on a prescription is not mapped to the dm+d. This splitting of prescription items can prove inconvenient for the patient, and led to one patient abandoning the service.

The response to these problems from two patients who used the service was to first telephone the community pharmacy to check that the prescription had been received. In contrast one patient had not been provided with information by the community pharmacy that the repeat dispensing prescription had come to an end. Apparently, the first that the patient knew of this was when he attended the community pharmacy and the issue he was expecting was not there.

These interviews were in the fairly early stages of the service being adopted at pilot sites. They should not be taken quantitatively, as some issues with the service have been addressed, and some were specific to the use of electronic repeat dispensing as a new service; however they are indicative of the problems that can occur.

Service Security

Four patients commented on the perceived security of the service. Two had little concern over confidentiality as it was expected that there would be safeguards in the

community pharmacy, and also within the system. Interestingly in the latter case, the perceived provenance of the service as a national NHS service was viewed as indicating the service would be secure. Another patient did not express any concern about security as the prescription was not felt to contain any confidential data. One patient did express concerns over the security of the service given his bad experiences of a 'secure' internet payment system.

Speed and Convenience of the Service

Some patients were already using a service from their pharmacy in which the pharmacy ordered, picked up and dispensed their repeat prescriptions, sometimes also delivering them to their home. The introduction of EPS made no appreciable difference to these patients. Eight patients who used EPS volunteered that the delivery of prescriptions had become faster. Two patients noted that prescription items were ready to be dispensed when they attended the community pharmacy, which was within the same period that it had previously taken to collect prescriptions. Similarly, another two patients noted that the problems that they had experienced with regard to the supply of medicines had been reduced. We should also note that there were two patients who were prepared to recommend the service on the basis of the convenience that repeat dispensing brought to them.

RECENT STUDY OF PATIENTS

We were asked in December 2012 to obtain another sample of patients now that EPS R2 is more established. We sent out a total of 680 questionnaires (with reply paid envelopes) to 17 community pharmacies with a high volume of EPS R2. Only 34 were returned. With such a low response rate these do not warrant analysis, however we would observe that the responses we received raised similar issues to the findings above.

THE FUTURE FOR PATIENTS

Whilst it was claimed that the norm would be for prescriptions to be sent via EPS,⁽⁵⁴⁾ the original publicity for the service for patients suggested that the service would be suitable for some patients but not all.⁽¹⁰⁵⁾ It is still too early to be definitive about how patients will use EPS R2. Questions that will need to be addressed are whether it is, or should be, used for acute prescriptions? Whether nominations prove too inflexible for some; whether repeat dispensing is experienced as an attractive service by patients; and whether, as proposed originally, patients would be able to set their own nominations via the NHS website HealthSpace (now defunct), or some equivalent method.⁽⁶³⁾

Issues of Safety and risk

There has been the expectation that EPS R2 would abolish the transcription of a printed instruction and, by allowing the GP's information to flow directly through to the label, there would be fewer labelling errors. We have tested this in the study below – by far the largest of its type in the world that uses ‘gold standard’ methodology. We then describe a small study of pharmacists’ interventions on prescriptions. Finally we discuss Risk more generally and how and where it may manifest itself, including a consideration of software and its suppliers.

DISPENSING ERRORS AND ENHANCEMENTS

We wished to know whether EPS R2 reduced labelling errors. There was an expectation that the direct transmission of the labelling instructions from the GPs prescription to the pharmacy label would reduce the amount of keying in and menu choice errors by the pharmacy staff.

METHODS

Given the information which we had about the expected sites for roll out of EPS R2, and the expectation that once enabled, most of the items at these pharmacies would be dispensed using EPS R2, we designed a trial which would detect a reduction in labelling errors from 1.6% (based on the only other study using the same method) to 1.2%. We decided on a design called the “stepped wedge” in which a number of sites are expected to adopt a new intervention one at a time; all of them studied until all the sites have adopted the intervention, each site that has not yet adopted it acting as a control for the other sites which have adopted it. As the plans for roll out changed, and often the site that was next expected to be going to adopt EPS R2 changed on, sometimes, a weekly basis, the limitations of the original design became clear. We continued with the sites that we had started with, but soon added new sites that we knew were dispensing EPS R2 prescriptions in order to get a sufficiently sized sample. This change in design has been accounted for in the statistical modelling.

Studies of pharmacy dispensing errors are typically based on spontaneous reporting, which is often estimated to catch only about 1 in 100 to 1 in 1000 errors. One of our team developed a ‘gold standard’ method in which the dispensed items waiting for collection are matched to the prescription by a skilled pharmacist or qualified checking technician using a practitioner developed definition of a dispensing error.⁽¹¹⁶⁾ It is based on unintended deviations from the prescription and includes content and labelling errors; an unintended deviation from professional or regulatory guidance is also considered a dispensing error. During piloting we became interested in other deviations from the prescription as defined by the doctor, and added a definition for

“enhancements” (a deviation made by the pharmacy staff which gives additional beneficial information to the patient or caregiver, beyond that required).

Four research pharmacists and a checking technician visited the pharmacies approximately every three months. They would examine all the dispensed, completed items awaiting collection or delivery available in the pharmacy on that day (excluding controlled drugs and monitored dosage systems) and compare them to the prescription. Typically they would examine and categorise around 200 items per visit. There were regular meetings of the wider research team to discuss items where there was uncertainty as to whether an item was an anomaly or not, and if so, which type. These meetings were documented and built into “case law” which was used to ensure consistent categorisation of similar cases found later in the study. The current (at the time of each dispensing) versions of the Royal Pharmaceutical Society’s Medicines Ethics and Practice guide and the British National Formulary were used as reference sources for additional labels and statutory requirements.

Data were analysed by a regression model comparing labelling errors of EPS R2 with non EPS R2 (EPS 1, computerised, handwritten) prescriptions. The model adjusted for the number of visits and the pharmacy (both random effects).

FINDINGS

Fifteen pharmacies were recruited from five primary care trusts and studied between November 2009 and September 2012. There were a mean of 6.3 visits per pharmacy (range 3-11) in which 16357 prescribed items were examined for error; these came from 8242 prescription sheets for 6,409 patients. Most prescriptions were EPS 1 (54%), next were EPS R2 (23%, remembering we deliberately recruited some sites that dispensed significant numbers of EPS R2 prescriptions), 22% were computerised, but not EPS, and 0.5% handwritten.

Overall, 885 (5.4%) of 16,357 items had a labelling error, 222 (1.4%) had a content error, and 2,225 (13.6%) had an enhancement made by the community pharmacy. The extent of anomalies is shown below (see Table 5), together with the associated odds ratios produced by the models (Table 6), confirming no significant changes in enhancements, labelling and content errors. Of the 3,733 EPSR2 items, an EPSR2-specific intervention was made in 817 (21.9%) cases.

The final analysis shows that there was no significant difference in labelling errors between EPS R2 and non-EPS R2 prescriptions, with an odds ratio of 1.04 (95% CI 0.84-1.20).

An initial analysis of the data showed no significant difference between non-EPS R2 and EPS R2 prescriptions in content errors or enhancements, but a statistically significant 46% relative increase in the probability of there being a labelling error with

EPS R2 when compared with all non-EPS R2 prescriptions. We inspected the raw data to explore the cause of this difference and found that the largest absolute and relative percentage increase was attributable to one specific type of labelling error, all but three of which occurred at one pharmacy. GPs in a local practice to this pharmacy were in the habit of specifying the required directions on the prescription to include the indication (eg “One to be taken every morning for high blood pressure”) - in our view a style of labelling to be encouraged. However, 14% (158 of 1,097) of the labelling errors identified (whether or not delivered by EPS R2), concerned the omission of this indication information from the dispensed item (eg the label would simply become “One to be taken every morning”). Since this pharmacy accounted for a high proportion of EPS R2 items, this resulted in a disproportionately large influence on the findings relating to EPS R2 labelling errors. As a result, 98 (29%) of 335 labelling errors on EPS R2 prescriptions were errors of this nature, in which extra information relating to the medication’s indication had been excluded. We confirmed that these met our definition of an error - an analysis of the pharmacy concerned showed that the message reached the pharmacy computer correctly, and in talking to the pharmacy staff we could find no valid reason for them excluding the extra information on the label. Interestingly, the computer could have automatically accepted these fuller instructions if it had been set up and used differently.

Table 5: Types of Prescription and Associated Anomalies

			Prescription Type					
			Hand Written N=81	Computer Generated N=3,654	EPS Release 1 N=8,889	Overall Non EPS Release 2 N=12,624	EPS Release 2 N=3,733	Overall N=16,357
Anomalies	Labelling Errors	N	9	160	439	608	277	885
		%	11.1%	4.4%	4.9%	4.8%	7.4%	5.4%
	Content Errors	N	1	75	94	170	52	222
		%	1.2%	2.1%	1.1%	1.3%	1.4%	1.4%
	Enhancements	N	6	454	1,232	1,692	533	2,225
		%	7.4%	12.4%	13.9%	13.4%	14.3%	13.6%

Because of the disproportionately large effect of this one type of error on the EPS R2 labelling error sample we conducted a sensitivity analysis in which all errors of this type were recoded as not being an error, and the data reanalysed. The resulting odds ratio

was 1.04 (95% CI 0.84-1.20), indicating no significant difference in the prevalence of labelling errors between EPS R2 and non-EPS R2 prescriptions.

Table 6: Odds Ratios of Each Type of Anomaly (EPS R2 vs. Non-EPS R2)

Outcome	Odds Ratio
	(95% Confidence Interval)
Labelling Error after sensitivity correction	1.04 (0.84 to 1.29)
Content Error	1.16 (0.77 to 1.75)
Enhancement	1.02 (0.90 to 1.16)

There were two categories of labelling error that between them accounted for over half of the labelling errors in both the non-EPS R2 and EPS R2 groups. Incorrect addition or omission of additional warnings (eg May cause drowsiness....) was the most frequent category (283/630 errors non-EPS R2; 135/335 errors EPS R2), followed by erroneous dosage instructions (167/762 errors non-EPS R2; 130/335 errors EPS R2).

The content errors (generally too many or too few tablets) were similar in frequency to the previous study that used the same methodology (1.4% in this study, 1.7% in the previous one), however labelling errors were significantly greater in this study than the previous study (5.3% vs 1.6%), which had used a smaller sample of pharmacies. The difference seemed to be because of inappropriate warnings on labels, mostly for omeprazole (swallow whole and/or avoid indigestion remedies). These warnings are put on automatically by the pharmacy computer system, so it suggests that the problem either lies with slow updating of the software by the manufacturer, or failure to update/upgrade the software by the pharmacy. Anecdotally we heard of some pharmacy systems being several updates behind the current version of the software. It can take a lot of time to update a pharmacy system, and, given the long hours that pharmacies are open and dependent on their system, this can be a barrier to upgrading. This illustrates how the quality and safety of a professional service is embedded in the quality of the software and the way it is used in the pharmacy. Speed and ease of upgrade is important in the design of pharmacy software, as is education of the pharmacists about the importance of keeping software up to date.

There was a non-significant trend for two items on the label to be less frequently erroneous with EPS R2: the patient's name (0.6% of non-EPS R2; 0.1% EPS R2) and the product name (0.5% of non-EPS R2; 0.2% EPS R2). The automatic population of these fields by EPS R2 may have reduced error in these cases.

The results were not as expected. There was an assumption among many that the direct transmission of data from the GP's prescription to the label would reduce error, and several pharmacists who used EPS R2 believed this too. It could be that the reduction in errors involving the patient and product name – the sort of things pharmacists pick up when checking prescriptions – give the impression of fewer errors. However there is also significant additional work that is done to make the labels of the right professional standard to be intelligible and clear to patients.

While some of the label content is automatically populated with information from the prescription, pharmacy staff still had labour to do editing prescriptions in which the GP's dosage instructions were inappropriate, and also adding information to many prescriptions (some of this would be added electronically). As so often in primary care, there seemed little communication between GP and pharmacist – neither side asking or telling the other what would work well. There was no sense that the two parties were part of the same system. There needs to be a better, and shared, understanding on both sides for EPS R2 to deliver improved labelling; the software companies producing GP and Pharmacy systems need to be brought into these discussions.

PHARMACISTS' INTERVENTIONS

We were interested in the actions pharmacists take because of a failure in the prescribing, dispensing or supply system.

METHODS

We studied this by asking pharmacists to fill in a diary of events over a fortnight. Of the 15 pharmacies from a range of settings that we invited, eight sent data; three of these did not receive EPS R2 prescriptions, the remainder received a mixture of non-EPS, EPS R1 and EPS R2.

FINDINGS

69 issues were reported (0.58% of items dispensed). The commonest were clinical issues (33/69), closely followed by failure of the prescriber to sign paper prescriptions (30/69). The more serious clinical errors including prescribing an incorrect insulin pen, and prescribing two drugs that interacted. Eight errors were judged to have been caused by EPS2 and one by EPS1 (a GP reissuing a prescription already dispensed). Of the EPS R2 errors four, all at the same pharmacy, showed a dose on the token which did not appear on the screen. There were also two missing prescriptions caused

by incorrectly setting up the nomination of the community pharmacy. There was one case in which a patient arrived having been told their prescription has been sent electronically however it transpired it was a paper prescription which was still at the surgery, possibly a consequence of a patient who normally received EPS R2 prescriptions having something prescribed for which there was no dm+d code.

While we recognise that the methodology would be expected to under represent the true incidence of problems, the findings are a useful reminder of the extent to which there are relatively frequent supply problems with paper-based prescriptions.

Perceptions of Risk

When a new technology is introduced into healthcare it is natural for people to ask 'Is it safe?'. While the technology can be inherently unsafe (although there are many processes and tests to establish elements of safety), it is often the interaction between a technology and the way(s) it is used by different people in different settings that leads to safety problems. The unsettling of established work patterns, issues of interpretation, and the establishment of workarounds and unanticipated latent hazards can lead to worsening safety in technologies intended to improve safety or at least maintain it.⁽¹³⁰⁻¹³⁷⁾ At the time of the study we were not able to quantify risks, so in this section we focus on the perceptions of risk, which can affect attitude and may drive behaviour.

METHODS

Our study aimed to understand how different actors from various stakeholder groups perceived risk in the introduction and use of EPS. From these different views we considered how EPS enabled different ways of seeing risk and what implications these may have for social control in healthcare by looking mostly into the possibilities of blame it creates. This section draws predominantly on 36 semi-structured interviews with a wide range of stakeholders in 2009-2011, and additional document analysis. We used a purposive sampling strategy from stakeholder groups and then used a snowballing approach, getting our first interviewees to recommend others. The final sample included pharmacists (6), doctors (3), software designers (8) and representatives of policy-makers (4) responsible for overseeing the implementation of the NPfIT. We also conducted interviews with representatives of national pharmacists and doctors' associations (9), reimbursement authorities and local health authorities (6). Interviews were typically an hour long; around half could not be recorded and detailed notes were taken. A wide range of documents were also included. The analysis was an iterative process of reading, comparing and contrasting all material and grouping it into themes and sub-themes.

FINDINGS

RISK AND PHARMACY

Pharmacists saw themselves as the end of the process – they were left to identify and solve any problems ‘upstream’ of them, and might have to deal with patients, who would assume any problems were their fault. Several risks emerged:

- Pharmacy staff experienced problems with the layout of computer information on their screens, and a design which meant they needed to go through several screens to find relevant patient information.
- An important source of risk was that safety in the pharmacy dispensing process has depended on the prescription always acting as the source document for dispensing and checking. In the absence of a paper prescription the use of screens was found impractical, and pharmacy staff had to print a token to dispense against (and thus nullifying one of the aims of EPS R2 to reduce paper).
- Smart cards represented another form of risk, both the business process and security. The multi staff/multi tasking nature of pharmacy meant that the pharmacist would put their card in and everyone would use it – a potential risk to confidentiality and accountability. In addition problems with supply of smart cards, their use, and the problems of getting locums who had a card all contributed to a new risk that EPS R2 prescriptions may not be able to be dispensed at some point. This also carried an economic risk for the pharmacy.
- Finally there were the risks of failures of prescription transmission, which could range from problems with dm+d coding in the GP system, through failures by aggregators to stream the right prescriptions to them, to a telegraph pole being knocked down, leaving the pharmacy without any contact with the Spine for a week (the PCT, who had responsibility for the continuity of service, had downgraded the level of response for which they paid the telecom company). While these problems were more prevalent in the early stages of rollout, they remain a risk, and a challenge for business continuity planning.

RISK AND GP PRACTICE

GP practice representatives highlighted two risks associated with EPS: what they saw as its flexible design standards, and missing prescriptions. They were concerned with medicines having to be mapped on to the incomplete dm+d coding. Where the code existed this usually involved the software supplier having made a ‘look-up’ table to map their own product codes onto dm+d. Doctors were worried that these might not be accurate, and some gave examples in which the wrong drug had appeared. It is to be expected that dm+d mapping problems and lack of codes would reduce over time.

Their concerns about practice related partly to the time involved in dealing with missing prescriptions, and the ‘blame game’ that could occur when they knew a prescription had left their practice but the pharmacy had not received it.

RISK AND PATIENTS

The patient interviews predominantly focused on the risk of supply delay or failure. Arriving before the prescription, finding the nominated pharmacy out of stock or closed, missing electronic prescriptions and failure of the pharmacy to remind them that their repeat dispensing prescription had finished were all mentioned. There was little concern expressed about the risk of breach of confidentiality.

RISK AND SOFTWARE

Software designers supplying pharmacy and GP systems described, for example, how national guidance required EPS design to comply with a broad specification to ensure system-wide inter-operability and integration. However there was no contract, leaving the power with CFH. Producers of dispensing systems, which are fairly simple usually stand alone systems, now required network infrastructure which was unaffordable to small software houses. The result was a reduction in the number of providers of such software.

Software designers had considerable autonomy as to how they could (re-)design their systems in line with both national specifications and local business needs. However, they argued the flexible and autonomous design of EPS they enjoyed could condition errors and risks for which other stakeholders (doctors and pharmacists) could formally be held responsible. Designers also reported that the lack of detailed specifications and centrally imposed standards led to the creation of prescribing and dispensing EPS systems that could not integrate with each other unless they were further redesigned. For example one designer of a pharmacy system stated that their system met the required specification, but the GP system did not for a particular product, so he had to make his own software noncompliant so it would work with the GP system. Designers also worried about the corruption of electronic messages by technical failure or the challenges of communication involving with multiple actors using multiple systems.

There were a number of processes to ensure the quality of software. Software suppliers would assure the quality of their software by their own process. This included using the Common Assurance Process, a multi-stage testing approach which included testing of functionality in both laboratory and live environments using a package of synthetic prescriptions, sent between GP practice, dispensing contractor and NHS Prescription Service, prior to a trial that would involve an examination of performance in transmission of live prescriptions. If these went well, and the trial demonstrated that 2,500 live prescriptions could be transmitted flawlessly between sites, as assessed by the

CFH Clinical Safety Group for EPS, then the software would be approved for use (Appendix A)

While recognizing the value of the above processes, we have been struck by the power held by software companies. GP practices and pharmacies have limited choice when considering a software system for their practice. There are now very few system suppliers, and many GP practices have, in effect, been mandated to take a certain system by their PCT. Although CFH had a series of quality standards for data etc, they did not assess usability – this was left to the companies producing the GP or pharmacy system and was recognised as a concern by CFH. These companies therefore mediate how GPs, pharmacists and their staff spend their time and how safe and effective their systems are. For example, one GP system seems to have as an option that all repeat prescriptions can be authorized in one action, rather than individually. Given the many accounts we have heard of the rapid and sometimes tokenistic signing process undertaken by some GPs (eg mischievous staff inserting bogus prescriptions for cartoon characters or writing prescriptions for ‘One fluffy bunny to be taken at night’, all of which were signed), it may be argued that this is a useful timesaving option that does not further compromise safety. However we would ask where is this debate held? Beliefs that market forces will drive up quality need to be challenged on this occasion. It is a stretch of the imagination to believe that market forces will drive quality within an oligopoly, and alternative methods should be explored.

3.5 Conclusions

The introduction of EPS R2 is a substantial and complex enterprise, which has been enacted against a background of continuous policy change in both health, and health informatics. This has led to challenges in its evaluation, however we have been able to adapt reasonably well to this environment. The multiple stakeholders and the large range of ‘for profit’ primary care contractors and government enterprises that coalesce around this project make for a very diffuse power structure in which to enact change.

From our data (end March 2013) we would conclude:

1. EPS R2 works technically; not perfectly, but sufficiently.
2. It offers relatively weak benefits to the great majority of stakeholders (GPs, pharmacists, patients) and stronger benefits for a few (NHS Prescription Services, anti fraud office, those interested in big data).
3. Stakeholders need to adapt to the new risks and benefits of the service. Benefits are there for those sufficiently organised to seize them.
4. There may need to be inducements for GP practices to do the initial work to get the service running well. Any inducements should be based on performance rather than capability.

5. For EPS R2 to grow and develop it will require ‘reflexive monitoring’ – a process by which all stakeholder groups are engaged in establishing performance and improving it. This is important, but will need resource to achieve it in the diffuse power relations of primary care.
6. EPS R2 is part of a wider informatics strategy, the full benefits of which are most likely to be delivered when the many initiatives interact and synergise. If pursued, EPS R2 is likely to deliver benefits greater than the sum of its parts.
7. The NHS is woefully ignorant about the systems and processes that handle billions of transactions about billions of pounds worth of medicines. Practically oriented research in his field has the potential to deliver a better service for patients and more profit for NHS contractors by reducing inefficiencies. NIHR should, as a priority, fund research in this area.

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4

THE FUTURE OF THE SERVICE

IN THIS CHAPTER

We explore what the future might hold for the EPS and how the service might develop. To do this we draw on Normalisation Process Theory⁽³⁾ as a framework for exploring the way the practices of using the service are embedded in healthcare. We look at the understandings that various actors hold about the service and the institutional forces supporting adoption and integration of the service as well as those factors that might mitigate against this. Finally, we look at three alternative scenarios for service adoption and development set within alternative visions of health care.

In this Chapter, we examine the possible futures for EPS based on our research findings. We focus first on the short to medium term prospects for EPS and the factors we have identified that may drive or limit deployment of the service across primary care. We then turn to the longer term prospects and assess EPS and its evolution within evolving visions of health and social care and care provision. To help guide this discussion we draw upon normalization process theory (NPT). We use elements of NPT to provide a framework within which to understand “the social organization of the *work* (implementation), of making practices routine elements of everyday life (embedding), and of sustaining embedded practices in their social context (integration)” (author’s emphasis).⁽³⁾ NPT emphasises the work that stakeholders undertake to make a system become a taken for granted ‘way things are done’. It offers a staged model of change with a temporally oriented perspective i.e. by implementation work to embedding and finally integrating a new practice. The NPT model identifies four primary generative mechanisms by which or through which a new material practice (e.g. use of EPS) comes about and which transcend the three ‘phases’.⁽³⁾ These are: coherence of the new practice, cognitive participation by relevant stakeholders, collective actions to enact the practice and reflexive monitoring to appraise and adjust the practice over time (see Figure 9). As the figure suggests, these generative mechanisms are not fundamentally sequential, but interlinked in feedback loops with actions (work to make EPS work) at the core. They also sit within a broader context of organisational and social structures, drawing on various skills, relationships and experiences that shape norms and beliefs.

The opening chapter of this report suggested that the electronic prescription service may be seen as an example of a simple even familiar model of electronic ordering but applied here to medicines. Seen through the NPT lens this might suggest that EPS directly presents a coherent

(understandable and meaningful) set of functionalities which invite cognitive participation by individuals and groups (engagement) and thus lead to collective action to make EPS work – a case of ‘if we build it they will come!’ However, drawing on experience with familiar forms of online ordering (e.g. use of Amazon) to establish coherence and promote cognitive engagement may lead all stakeholders to underestimate the significant complexities and challenges faced in bringing this specific new service into widespread national use across multiple organisational and institutional boundaries and alongside multiple parallel change programmes and legacy practices. In NPT terms, and even if the coherence of EPS and stakeholders’ cognitive participation in it are taken as given, the challenge remains of achieving the complex mesh of collective actions across multiple stakeholder groups. To sustain EPS over time and develop its full potential requires the final mechanism that NPT proposes, reflexive monitoring to steer the service into the future. This raises the question of who will do this and how.

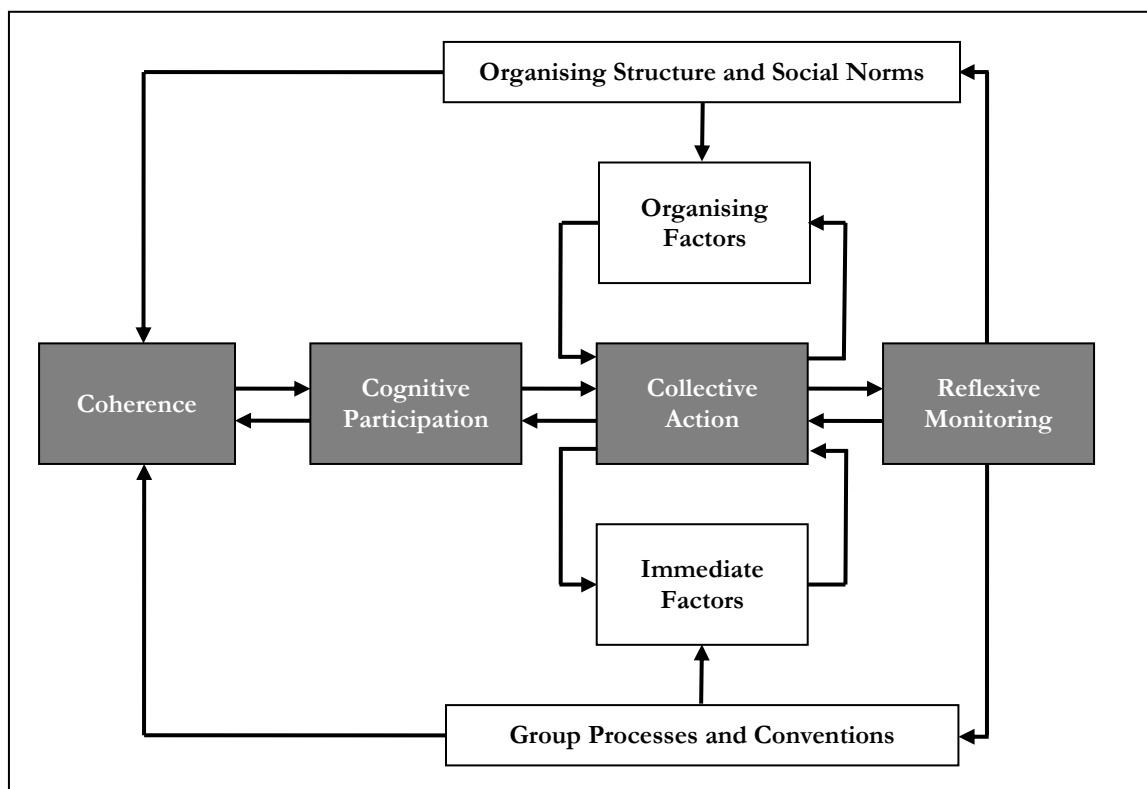


Figure 9: Normalisation Process Theory after May and Colleagues⁽³⁾

In the rest of this chapter we use the broad framework of NPT to provide a prospective view of EPS as it may evolve. At the start of the Chapter we focus on how the generative mechanisms work, based on the field research for this evaluation. In the second part we consider the wider cultural, institutional and structural context within which EPS exists. Finally, in the third part we develop three scenarios for a future with various putative versions of EPS.

4.1 Coherence

The last three or so years have seen the development and release of EPS compliant software for GPs and Pharmacists and its validation against specifications, clinical assurance processes, beta testing and first of type implementations. This has along the way led to much snagging and some upgrades of infrastructure (see Chapter 2). There has also been much dedicated support for those changing their work practices as a consequence of the introduction of the service. Finally there has been a sustained and at times quite critical coverage of EPS matters in the trade press. On this basis we can say that the coherence of the ideas behind EPS are established and their limits fairly well understood. However, to achieve national scale uptake of the EPS R2 will require that EPS development look beyond the specific support offered by the current central implementation team (now a part of HSCIC) and PCT or CCG resources. The exact role that may be played in the future by CCGs, LPCs or CSUs, and the devolved powers that GP practices now have, is not at present fully clear and this lack of clarity is one primary reason that the future trajectory of EPS is uncertain.

The rate of adoption achieved by March 2013 reflects the efforts of the implementation team and some enthusiastic local PCTs over the previous few years to establish and support pilot sites. From mid 2012 to the time of writing – rollouts began to be scaled as PCT-wide endeavours (i.e. a large proportions of GP practices and community pharmacies within a geographic area). This moved the overall project beyond the initial (essentially beta testing) stage of limited pairings between GP practices and a small number of local pharmacies.

A necessary condition for achieving the critical mass required to integrate EPS in primary care structures as the implementation team withdraws and scales down its efforts is to generate internal momentum within both GP practices and pharmacy, in particular to achieve high levels of prescription transaction volumes (see below). This momentum needs to be sufficient to encourage others (GP practices and Pharmacies) to take the route of the early adopters, relying on less direct support but with the benefits of what has been learned, reconfigured and adapted, and then communicated and shared. It is important to remember that the core stakeholders (doctors, patients, pharmacy) still retain some degree of choice as to the degree of their commitment to EPS R2 and thus its degree of integration into clinical strategies (e.g. in managing chronic conditions) and new hopefully more efficient or effective working practices.

4.2 EPS stakeholders, Cognitive Participation and Collective Action

As described earlier in this report, EPS has a very large stakeholder community, and each of them has some incentive to engage with EPS (cognitive participation). However, to achieve a national scale EPS requires that they act individually and collectively to embed and develop the service. We consider here some of the core stakeholders in this light, in turn pharmacies, GP practices, patients, and NHS policy makers and central bodies.

From the outset of EPS, as reported to us, it was assumed that “the market” would drive adoption in community pharmacy and among other dispensing contactors. Pharmacists would become eager to use EPS R2 so as to secure the regular trade delivered as a result of the nomination process and the established patient-pharmacy relationship it implies. Our evidence shows that this has, to a limited degree occurred, helped by a payment to each pharmacy towards the cost of software upgrade, and the defensive strategy of obtaining the software if not committing at the outset to optimise its use. Current figures bare this out with over 80% of pharmacies able to process EPS R2 prescriptions. We have also seen that a significant proportion of pharmacists who have used the system so far like the way that, with sufficient throughput, it can smooth out their workload. This emphasis on throughput, however, carries a message. To attract the pharmacy stakeholders and convert the capacity to dispense EPS R2 prescriptions to a willingness or enthusiasm for it, EPS needs to offer volume, and volume is found in repeats (estimated as around 70% of prescriptions written). It is GP practices that are able to ‘turn up’ this volume. This perspective also suggests that competition among pharmacies may intensify and shift as first they compete for nominations in pursuit of volume and a secured customer base. Looking a little further ahead, to when phase 4 of EPS is launched and patients can use a GP provided token in *any* pharmacy they choose, nomination may become less important from a patient perspective. Then the character of the ‘market drive’ may shift - from relationship to convenience.

At present, the forces leading GPs to wish to adopt the service or use it more, or for patients to press for it, are weaker. Our research offers some evidence to suggest that there can be direct efficiency benefits for GP practices, for example those with problems of lost (perhaps better described as mislaid) prescriptions. In such a case EPS R2 may offer evident and immediate improvement, reducing the time spent searching and thus releasing administrator and doctor time and allowing a better quality of patient service. Our results also suggest, drawing from a small sample of GP practices, that adopting EPS R2 may speed up and save time spent on repeat prescribing by practices as a whole. But it also implies some new time-consuming activities associated with the early stages of adoption, such as handling the original nomination of patients, cleaning up patients’ medicines records and adjusting repeat dates, quantities etc. to smooth the use of repeat prescribing and/or dispensing. More fundamentally, getting value from EPS R2 for a GP practice will often require reorganisation of the very diverse current work practices around repeat prescribing. This will require innovation and change in the established work flow and the policies (explicit or implicit) it reflects – a significant effort we believe in many cases.

EPS R2 may also, by enabling a practicable electronic repeat dispensing regime that is seen as clinically valid, remove altogether some workload from GP practices e.g. the work they currently undertake to process repeat prescription requests, as or if they move patients to electronic repeat dispensing. However, our research into repeat dispensing shows very mixed opinions and practices among GPs, with some taking the view that only well

organised patients on stable medications are suitable for repeat dispensing – a group of patients that may be too small to justify giving much priority. In any case, to make EPS R2 work in such terms (e.g. as an innovation in medicines management of substantial clinical value and with efficiency benefits) most GP practices will need to rethink and substantially redesign their clinical practices.

For patients there are, or may be, benefits from EPS. However these seem to be as yet relatively weak, and counterbalanced by some patients who have experienced problems using EPS. In policy terms, EPS might be understood as a part of a broader vision of the expanded role of patients in their own healthcare, for example contributing to personal or summary health/care records, and specifically taking more responsibility for managing their own medicines. For example, as GP practices move to providing online patient records and other services, as is current policy, some but certainly not all patients may be able to take a more direct role as managers of their repeat regime. However, EPS in its current form does not facilitate online interaction between patient and pharmacist, and for example cannot easily become a patient's route into participation in repeat dispensing. Later in this chapter we develop this theme in one of our future scenarios.

Finally we do see a sustained appetite centrally for EPS. It continues as a part of national strategy as evidenced in its being highlighted in the 2013 PWC report.⁽¹³⁸⁾ From this perspective its projected role goes beyond support for doctors, patients and pharmacies and providing better services. From the centre it has a role in helping the re-engineering of 'back office' functions such as managing reimbursement and fraud detection, but more importantly in the potential that a live stream of prescribing and dispensing data can offer: the ability to monitor, influence, control and conduct research into the commonest form of treatment in the NHS and its second most expensive resource.

As described here, there are positive aspects of EPS for major stakeholders that contribute to its coherence and may invite stronger collective action. However, none are overwhelming and the evidence base with which all people are working is currently weak. Nonetheless, these positive pressures may be able to align together. In summary this might combine a GP commitment to improved repeat/chronic prescribing on clinical and efficiency grounds, pharmacies exploiting increased volumes of electronic prescriptions (and having available better software), CCG managers who wish to use EPS data to drive efficiency, care quality and cost savings, and hardest of all perhaps, substantial numbers of patients who see direct value.

4.3 Understandings and Beliefs about the Electronic Prescription Service

If the wider NHS and its patients do wish to realise the EPS R2 possibilities described above some significant challenges will still have to be overcome. We identify here several that, to a greater or lesser extent, could limit the widespread integration of EPS in primary care. We have split these into two. First we present a number of beliefs or understandings which we have encountered which can potentially adversely affect

integration. In terms of the NPT model these ideas can be seen as a reflection of the degree of coherence of the ideas embodied in EPS and the intersubjective and negotiated cognitive frames that are developed to understand it and which guide various stakeholders actions. Then we go on to discuss some broader institutional factors that may work against EPS R2 adoption.

In undertaking this research we have encountered a number of beliefs and assumptions about EPS R2 that we have found to be widely held, but which, in our view, are not always true or that reflect some particular interest or perspective. If people inappropriately hold these beliefs or over emphasise them then they will plan inadequately, be frustrated at implementation and be disappointed in the service as they use it. On the other hand we should not simply dismiss these as being wrong or a result of basic misunderstanding. To the extent that these beliefs are reflections of attitudes that devolve from particular interests, expectations or experiences, they need to be taken into account as the service is developed.

We call these beliefs ‘canards’, and see them as issues you cannot duck or dismiss. They are collected in Box 10.1-10.2 with a brief explanation for each as to why they may not always be true or what we see as the implication of the belief being held. In this sense we see collecting and exploring these canards as reflecting a fundamental aspect of the reflexive monitoring of the service – allowing us to see how the service is imagined, understood and assessed by various actors.

The canards in Box 10.1-10.2 can be seen as offering evidence for two distinct and somewhat contradictory sets of beliefs about EPS (and perhaps technology more widely), which might drive different stakeholder groups to stronger or weaker adherence to the service. The canards almost all show some level of technological determinism – a belief that a new technology and the practice it supports will embody and cause a certain kind of direct change. This is often expressed in terms such as a direct assumption of efficiency, time saving or other resource saving, unambiguous and universal task completion, data quality and adequacy. More fundamentally still is the belief that technology is reliable, rational, and will work how we expect it to work, doing what we expect it to do. The sociotechnical approach to EPS taken in this evaluation, and our attention to how people go about their jobs, work together and approach change, has been able to reveal such beliefs and offer some substantial account of the thinking that underlies them. In this sense each of these canards invites some response that looks beyond ‘re-education’. In NPT terms, for EPS to become integrated into primary care, the beliefs that people hold (such as these canards) are an expression of their sense of EPS as a coherent new practice that fits in with or gently reshapes their existing practices, and thus their understanding of how they might wish to use it and who they relate to in adopting it. Such cognitive participation drives (to degrees, and in various directions) action as EPS is used alongside other established practices, parallel change programmes and within wider institutional structures.

Box 10.1: Canards of the Electronic Prescription Service

With EPS all the information required on the label is input by the GP, so will be transmitted directly to the pharmacist's label and thus save time and errors of transcription.

GPs may use abbreviation when writing the prescription, these will appear unchanged on the label, or they may omit information. Consequently the texts need editing to create an acceptable label. Moreover, it is the pharmacist role to actively review and check medicines.

An electronic message will get to the pharmacy faster than a paper prescription.

Patients in GP practices very close to the pharmacy may find they arrive at the pharmacy before the prescription has been downloaded, because of delays in uploading, or because pharmacies believe that they are not allowed to frequently access the Spine to see if prescriptions are waiting. The EPS operates as a hybrid 'push' and 'pull' systems, with urgent prescriptions processed by the Spine as quickly as possible, and available to be pulled from the Spine on the day they are issued, and routine prescriptions being sent directly to the nominated community pharmacy as an overnight download. To pull a prescription, the dispensing contractor has to manually send a poll command to the Spine on their dispensing computer system.

EPS R2 in particular is designed to support electronic repeat dispensing; this will now take off rapidly because it saves time for GPs.

There appear to be several barriers to repeat dispensing working effectively, and a minority of GP practices seem committed to this partly because they see clinical issues raised, not just efficiency. In any case it is a functionality that will probably be taken up after initial EPS R2 experience.

All primary care prescribing will, in time, be through EPS R2.

Controlled drugs and other products, prescriptions written by hand during home visits, etc will continue to be paper based for at least the near future. Some people also suggest that EPS R2 is not suitable for acute prescriptions (estimated as approx. 25% of all prescriptions in primary care). As noted above, if the patient wishes to go directly to the pharmacy, as most acutes do, then the network cannot guarantee to deliver a prescription faster than the patient can walk. If GP practices must retain paper prescribing capacity they have weaker incentives to adopt EPS R2.

With EPS, pharmacists have less need to communicate directly with doctors about prescriptions.

Pharmacists have an important role in screening and checking prescriptions. Electronic repeat dispensing will considerably expand this role. There will always be problems that need to be resolved, such as 'lost' prescriptions, potentially inappropriate prescribing etc. EPS in its current form does not support any reverse flow for messages from dispensers to prescribers, though this may become a rational requirement as and when pharmacists take on a larger role in supporting patient's medicines usage as may direct patient-dispenser (bi-directional) message flows.

EPS is a communication system between GP practice and pharmacy.

Apart from the transmission of prescriptions in one direction, EPS does not act as a conduit for communication. All other queries, orders etc need to be communicated as they are at present.

Box 10.2: Canards of the Electronic Prescription Service

EPS offers no support for communication other than for prescriptions from GP to Pharmacy and Pharmacy to Reimbursement.

Pharmacists will benefit from information generated by EPS, which can deliver itemised billing against which to reconcile their dispensed items.

Pharmacies still receive a lump sum reimbursement and no detailed breakdown. More generally, EPS offers little managerial support for the business.

dm+d provides a comprehensive coding system for medicines to be used by EPS.

dm+d is not fully inclusive of all products that are dispensed. Most GP and pharmacy software systems have an internal mapping of their codes to dm+d as well as to the drug tariff, which has potential for error. Both these resources (dm+d and Drug Tariff) could potentially be developed as open Application Programme Interfaces for direct integration into future systems.

GP computer packages are mature software and ready for EPS R2 to be added or updated as a 'plug and play' module.

GP software systems continue to develop (eg EMIS Web was a new product in 2011), they expand to cloud computing, offer new patient interfaces etc, as well as integrating other CFH initiatives. The addition or upgrade of EPS R2 capability takes time and requires training of several members of the GP practice. It also needs to integrate with other facets of such software, such as workflow/inbox systems.

EPS starts after the point that a prescription is written: thus it does not have consequence for doctors' work practices in particular their prescribing behaviours.

EPS substantially affects the work practices of doctors and their staff.

EPS R2 is paperless.

If anything, at present it seems to increase paper usage. A single sheet . green FP10 . Has coordinated activity across the previous supply process. In the paperless EPS R2 world a prescription can be printed two or three times as various actors require or expect a physical token.

4.4 Institutional Factors that May Limit Integration

In addition to the canards discussed above there are other structural and contextual issues that present challenges and which may limit the wider adoption of EPS R2. The restructuring of the NHS and (at the time of writing) the levels of uncertainty about the structures and roles of Informatics within it will, we predict, lead to hesitation and

uncertainty. Whatever the long term consequences of the NHS changes undertaken in 2013, they are likely to have a negative effect on the short to medium term implementation of EPS as new structures are set in place and new roles are created. In particular CCG will inevitably have significant priorities of their own, and EPS is not going to be inevitably one of them. They may well take the view that EPS is not a packaged technology ‘solution’ to some evident ‘problem’, and it cannot just be delivered or ‘rolled-out’, ‘switched on’ and work. Indeed they would be right to see its implementation, embedding and integration within a local health economy as requiring specialist labour, time, training etc in order to support substantive changes in GP and community pharmacies practices.

Our research findings suggest that, when finding their own way to use EPS and obtain benefit from it all sites must to some extent work it out for themselves over time (a part of reflexive monitoring). In other words, it requires time and care to set up EPS R2 (implement) and embed it in a changed work flow in ways that promote efficiency and good practice, improve safety or empower patients. It takes yet more to make it integral to ‘how things are done’. In needing this support and attention over an extended time period EPS will be competing for time and resource with other initiatives within clinical commissioning groups (CCGs), within GP practices, within pharmacies and in the rankings of development priorities by software and service suppliers. If the benefits of EPS to the local health economy are perceived to be weak or unclear, it will be at risk of becoming a low priority in what will be a very challenging period of change in primary care.

The culture of “benefits realisation” inherited from PCTs may also work against EPS, which is primarily an infrastructure (i.e. a service). As such, it offers the potential for enabling benefits and savings but not for actually delivering them. Locally, nationally and cumulatively, substantial benefits may only accrue through the support EPS can offer to other initiatives, now or in the future. Some of these benefits will not be delivered until there is a ‘critical mass’ of use and complementary change programmes. Those within CCGs charged with finding benefits and driving them forward may well anticipate that few will be directly found arising from EPS in any local context, and may sideline EPS because of this.

We also need to carefully assess assumptions that “the market” will drive EPS R2 forward, or more specifically lead to improvement and innovation in the software used or service provided. It is not clear that the suppliers of GP or pharmacy software have suitable incentives to develop their systems rapidly or compete strongly for business. In most cases the disruption of changing GP or pharmacy software system is so great that there is little customer mobility in the marketplace. The policy of some PCTs in the past to have all GPs using the same software further distorts the market. Finally, pharmacies seem to have little if any formal presence in any influential user groups, which at the least may be detrimental to improved usability of this software.

Some new functionality is currently being proposed for the next-generation Spine, based on a set of requirements that emerged from the experiences of conducting first of type

testing at sites. These are currently being consulted on with stakeholder groups and could potentially provide the means to include greater levels of feedback as to the location and status of prescriptions held within EPS linked systems. This kind of improved functionality and any resulting improved usability may in time help promote integration. We can also see procurement models changing with time. For example the current contracts for GP System of Choice (GPSOC) concluded in March 2013.

As noted in the previous chapter, one of the leading GP system suppliers only offers EPS support as part of its new system. The rate of EPS adoption in this community will therefore, at its fastest, match the migration of users from the older systems to what is a significantly different new one. This in turn will be limited by factors such as the company's capacity to provide and install new equipment and train staff. Uptake of EPS in GP practices may thus be slower than expected, and come as part of a major upgrade. When an upgrade does occur the EPS functionality may be ignored for a period of time while other more central functionalities are assimilated.

Finally, and perhaps significantly for EPS R2 in the future, we see that the impetus that comes from the centre may be declining. This is in part a reflection of wider policy shifts (e.g. from informatics monumentalism to attenuated localism). While the use of EPS was previously mandated from the centre in the NHS Operating Framework this is no longer the case. At the time of writing EPS appears not to be mandated for primary care in the NHS, though we are assured that this is not the direct implication. This may in any case be of little concern as power and responsibility is re-distributed in the reforms of 2013. And people will find their way to use a well-designed, reliable and useful service that fits into their business or professional practice – if we build it (well) they will come.

4.5 The Future

In undertaking this evaluation we have learned a lot about the capabilities of the service, the strength of its various technical parts, the complexities that are revealed as operations start, and the ways that early adopter organisations and people implement and embed EPS R2 (cognitive participation and collective action in NPT terms). But to gain insight into the future of EPS we need to place all these elements together and reflect on where their generative potential may lead. In NPT terms we need to understand how into the future EPS may be maintained as something coherent and meaningful, how and why people will become enrolled into it, and how they may engage in reflexive monitoring that helps EPS to better reflect their contemporary context.

To explore this further we present here three contrasting scenarios for the EPS of 2016 – 3 years hence. These are based on our findings of current structures and emerging conditions, reflection on feedback received from stakeholders upon presentation of our preliminary findings, and our own discussions within the project research team. They bring together a number of issues and mechanisms we have seen. We then invite the reader to

construct his or her own scenario on the basis of their own understanding and knowledge of the EPS and the wider NHS.

SCENARIO 1 – BUSINESS AS USUAL

This scenario is the easiest to present. It reflects more or less a continuation of what is described in this report within the period from 2010-2012.

DATELINE MARCH 2016

EPS was fairly rapidly taken up by CCGs from their creation as an existing and useful service ready for wider use. Using available resources and skill sets CCGs have managed in three years to drive up usage by GP practices to over 90%, and more impressively volumes of EPS R2 prescription to over 45%. Community pharmacies soon became converts to EPS R2, pressing for more volume and urging GPs to trust them with repeat dispensing. The introduction of phase 4, un-nominated prescriptions, together with Spine upgrades, has now started to build volume in acute prescriptions as patients have taken electronic prescriptions increasingly for granted. EPS is also starting to add impetus to the still small online pharmacy sector. In the last year an experimental EPS research service has been established to enable online access for appropriate secondary uses of the prescription and dispensing data.

However, EPS is now more or less stalled. It operates as essentially a stand-alone service that transmits one kind of message in one direction only. Future innovations are hard to see and the small group of software suppliers who service GP practices and pharmacies (smaller still after mergers across the GP-pharmacy divide) seem uncommitted to do more than keep it ticking over.

SCENARIO 2 – DIGITAL BUSINESS MODELS

This scenario is about EPS as innovation in business models. It reflects change driven by digital materiality, combined with a localisation agenda.

DATELINE MARCH 2016

EPS was ignored by CCGs for the first year of their existence, and the future of EPS was indeed in doubt as transaction volumes stagnated and take-up by GPs actually went into reverse. But unremitting budget pressures and news of a small number of health economies achieving significant efficiencies and saving money, returned attention to EPS. In particular it was seen to allow CCG managers some active control of medicines expenditure and allowed them to rigorously pursue inappropriate use of expensive medicines. Today (2016)

many CCGs have set tight medicines usage targets and mandated EPS use by GPs as a means to monitor this. Usage by GP practices is into the 90% range and volume of EPS R2 prescriptions is over 70% including much mandated use for acute prescribing – justified as for management purposes. Some high street community pharmacies are achieving very high volumes of electronic prescriptions. They are also helping to deliver substantial cost savings working as the primary managers of chronic conditions using repeat dispensing.

Other trends are apparent too. Smaller and less agile pharmacies are closing with loss of employment of skilled professionals in the pharmacy sector while the growing numbers of online pharmacies are winning bids for CCG-wide chronic condition management contracts. While some patients enjoy the autonomy and efficiency provided by these digital business models, many miss the contact and continuity they once saw from their local pharmacy.

For some EPS is now a success, so much so that there is a strong lobby by CCGs and others for its further development or replacement, in particular in ways that consolidate control over budgets, and support the ability to outsource and contract. One proposal, supported by a group of software suppliers, service hosting providers and pharmacy consortia is to build a new parallel EPS as a cloud based platform service working directly with GP Practice software and in association with pharmacy consortia. In this proposal participating pharmacies would have (potentially and as needed) full access to the GP patient record, allowing even more delegation of routine care to pharmacists. But the potential for this parallel private system has started to undermine commitment to the national system.

SCENARIO 3 – PLATFORMS AND PATIENTS

This scenario is about EPS as part of a national eHealth platform and serving to deliver a more patient centric style of care. It reflects a future for EPS driven by policy, scale, and services.

DATELINE MARCH 2016

EPS works today as one of a range of digital services that together are a key part of the NHS health platform that provides a virtual patient record across the NHS. The volumes of transactions being achieved are now in the region of 55% and still rising. Almost all GP practices make some use of EPS, and many have increased their usage in response to patient pressure.

Spine upgrades and enhancements, and increased usage of electronic prescriptions, allow what is in effect a national patient medicines record holding both prescribing and dispensing data. EPS works in conjunction with dm+d, Drug tariff, demographics and hospital trust portals, as well as services that access social care systems, to allow a patient medicines history to be constructed ‘on the fly’. Building on this service architecture a

number of patient facing services are now becoming available, including a national ‘manage your meds’ site that offers secure personalised medicines information, ordering of repeats, GP surgery bookings and message exchange with nominated pharmacies. This service also works with a growing number of EPS smartphone Apps that can receive and forward prescribing tokens.

Another new portal allows pharmacies to process reimbursements and log their delivery of new value added services including repeat dispensing and the national medicines service. Pharmacies are now lobbying for a portal service to allow them, or their intermediaries, to review and manage reimbursement transactions and track individual items.

4.6 Planning for Success

To be a success under any scenario EPS R2 must be able to deliver real benefits to the NHS, patients and the wider array of businesses that serve to supply medicines. The above scenarios suggest in outline aspects of what success might look like. Technology-based service innovations on this scale inevitably come to mean different things to different stakeholders.

Success to a patient may mean easier access to medicines while having full confidence in safety and security and access to advice and information;

To a pharmacy it may be smoothed workflow efficiently processed, safer dispensing and release of time for new clinical activities with patients and other customers;

To a GP practice it might be reduced workload and time savings, but also the consistent achievement of better patient management standards;

To the NHS organisation, both central and local, success may reflect reduced operational costs, enhanced managerial control and development of the high street pharmacy as a flexible option for delivering services; If and when the system is widely used, there may be the potential to monitor , influence and research prescribing and dispensing in real time;

To the software and service suppliers success may mean a stable and usable product based on a clear and minimal specification resulting in software that is easy to maintain and to integrate with existing products, and requires to be updated infrequently.

4.7 Conclusions from the Evaluation

As noted in the final section of chapter 3, the introduction of EPS R2 is a substantial and complex enterprise, which has been enacted against a background of rapid policy change in both health and health informatics. EPS is also distinct in the multiple stakeholders involved; the large range of ‘for profit’ primary care contractors and government enterprises that coalesce around this project make for a very diffuse power structure in which to enact change. The translation of the EPS specifications into a

nationally adopted technical system has proved to be far, far more complex than was anticipated at the outset. The programme is some way behind its original timetable. However the implementation team, the software suppliers and the early adopting health professionals have learned much and continued to develop the service. This is indeed what should happen with new technology based services and is in line with the model of normalisation processes set out at the start of this chapter.

Our summary of findings from the period of study and as first of type implementations took place (see chapter 3) are fairly optimistic. Thus EPS R2 works technically; not perfectly, but sufficiently. There are benefits to its various stakeholders, if often relatively weak, and these are more available to those who adapt to the new risks and benefits of the service and are sufficiently organized, reflective and proactive to seize them.

As discussed further below, we see a continuing need for inducements for GP practices to do the initial work to get the service running well, indeed the case may be stronger as more reluctant practices are drawn in. Any such inducements should be based on performance rather than capability (e.g. a 'meaningful use' criteria). Equally significantly, for EPS R2 to grow and develop will require collaborative 'reflexive monitoring' – with all stakeholders establishing and sharing understandings of the performance of EPS and working for improving it. This too will need resource made available to achieve it, not an obvious outcome in the diffuse power relations of primary care.

The result of the efforts to date is that we now have an EPS that "works" both technically and organisationally, although there are still a number of issues to be resolved. This current success has been mostly worked out at sites willing to pilot the system. The immediate challenge for the next year or so is to encourage or drive widespread adoption during a period of enormous organisational change for primary care in the NHS. In our view it is likely that some forms of national support and local incentive structures will need to be in place if EPS is to overcome these challenges and go on to deliver the wider benefits to the NHS as a whole which, depending on your choice of scenario, may be expected.

As shown in the section above, each stakeholder has specific criteria for success, but success for the overall system requires some level of collaboration between stakeholders or convergence of interests. The degree and specific nature of such collaboration may shape the future of EPS – as suggested in the various scenarios above. The scenarios also suggest that, whereas some local benefits can be delivered through local implementation activity, national benefits require scale and a critical mass - as with many data-centric infrastructure innovations there is a need to 'feed the beast' before it can deliver. We thus suggest that the DH needs to reflect on what they would consider as (realistic) measures of transactional success for the whole EPS given alternative scenarios; 30% of prescription items sent electronically by the end of 2014? 60%?, 90%?; national repeat dispensing at 20%? In any event, the most direct and critical limiting factor seems to be use by GP

practices, which in turn may be limited by availability of implementation and training resources.

Our research leads us to understand that EPS R2 is, or should be, just one part of a wider NHS informatics strategy, the full benefits of which are most likely to be delivered when many initiatives interact and synergize. In this way, if pursued, EPS R2 is likely to deliver benefits greater than the sum of its parts. Finally, as suggested in chapter 3, we must repeat the cliché of researchers suggesting that more research is required. It is indeed surprising that so little is known about this fundamental part of modern health care.

Ethical Review

The Evaluation of the Electronic Prescription Service in Primary Care was submitted to the Cambridgeshire I Research Ethics Committee (REC) under REC Reference Number 08/H0304/58. This project was classed as a service evaluation by the REC. Conduct of the study was undertaken following consultation with local Research Governance offices in each of the PCTs where we planned to do work, and with the permission of the sites and consent of staff, patients and representatives at each of these sites.

Disclaimer

This report is independent research commissioned by the National Institute of Health Research. The views expressed in this publication are those of the authors and not necessarily those of the NHS, the National Institute for Health Research or the Department of Health.

APPENDIX A

A HISTORY OF SERVICE DEVELOPMENT AND DEPLOYMENT

In this part of the report, we shall briefly examine the history of deployment of the Electronic Prescription Service (EPS) and the state of deployment at the time this report was written. We shall begin with the key stakeholders in the process of deployment, before examining how general practice and community pharmacy systems have been procured, and the local processes that must be engaged in to provide EPS functionality to a region.

Governance and Oversight of the Programme

Overall oversight of the EPS programme is provided by an EPS Programme Board, which provides a forum for both policy makers in the form of England's Chief Pharmacist, representatives from the Department of Health's Medicines, Pharmacy and Industry Group, as well as representatives from the agency responsible for delivery of the service, which was Connecting for Health (CFH) at the time this research ended.[#]

The description of Connecting for Health that was given in August 2011 was that of an agency responsible for the development of a national infrastructure for NHS health informatics, which included both national services and national applications, including the EPS, the National Network for the NHS (N3) and the Spine.⁽¹³⁹⁾ This rather simple statement obscured the more complex role that CFH actually had to fulfil. The delivery of EPS requires the introduction of a central system for the transfer of data, the definition of a structured message set, the management of system releases by system suppliers using an accreditation framework, known as the Common Assurance Process (CAP), as well as the delivery of a set of products to support guidance, communications and implementation. Oversight of the programme was also provided by a series of user groups, established and convened by CFH, that represent community pharmacy, general practice, and patients.

Organisations represented on these user groups included the BMA, CCA, DDA, INDAC NPA, PSNC, RCGP amongst others. Between them, these organisations provided a professional view from the perspectives of trade-bodies, regulatory associations, as well as contractual organisations. The user groups provides an opportunity for representatives of the two professions, and professional representatives of patients and service users to comment on the design of the service, and to review its implementation and potential change to business practices.

[#] On the 1st. April, 2013, Connecting for Health closed as an agency and its responsibilities were taken over by the Health and Social Care Information Centre.

Over the course of this programme, further consultative groups have been created in order to support implementation and development of the service. This includes the EPS Implementation Board, which was populated by representatives from Primary Care Trusts (PCTs) and the umbrella Strategic Health Authorities (SHAs). This board provided an opportunity to learn about other PCTs experiences of implementation and to respond to these, as well as share resources which are regarded as being of use or benefit to sites. The Implementation Forum represented one incarnation of a board that was previously known as the First of Type Implementation Board, which provided a communication channel between PCTs and CFH, its SHA equivalent, the SHA Implementation Forum, and an earlier EPS Implementation Board.

Delivery of the service to primary care providers required the expertise and resources of CFH, PCTs, software suppliers as well as the engagement and participation of prescribers and dispensing of contractors themselves. It appeared to be the case that the deployment would be managed by PCTs, although with the First of Type sites which contributed to the testing of systems as part of the CAP process, additional technical and business change support came from CFH. Support was in place at these sites until systems gained full roll-out approval.

Underlying this model was the view of the CFH mission as a time-limited one with regard to EPS. The remit of the organisation was to deliver systems to the start of having full roll-out approval for EPS, although it is not clear what arrangements will be in place in the future to support EPS in business as usual operation. Over the course of the programme, CFH have increasingly emphasised the need to capture lessons learned from implementation with regard to business change and the need for engagement with all stakeholders implicated in the process of system delivery.⁽¹⁴⁰⁾ Recently, CFH have changed their approach to deployment with the instigation of an exemplar PCT programme. In this programme, PCTs are given support in the rapid deployment of EPS to a large proportion of their estate. Whilst, this like all other deployments aside from First of Type deployments is led by the PCT, CFH promised to provide business process change guidance and support, additional support on the ground, and support with regard to both engagement with primary care providers and in the deployment of the service.

Procurement of Systems for the Electronic Prescription Service

The evolution in the management of the implementation of the programme has also been mirrored by change in the procurement process for ensuring the delivery of EPS compliant systems. In the original plan for NPfIT, it was proposed that in addition to a national application and infrastructure provider responsible for delivery of N3 and the Spine, there would be five Local Service Providers (LSPs) which would cover a cluster of SHAs.⁽⁵⁶⁾ The 28 SHAs in England were founded in 2002 with the remit of developing

local services within a region.⁽⁸⁾ Within the SHA there would be a number of PCTs, as well as acute, ambulance and mental health trusts.⁽¹⁴¹⁾ There were also a number of foundation trusts which resided outside of SHA control. The PCTs, which were founded in 1997, gained responsibility for commissioning local services in 2002.⁽⁸⁾ Over the course of the EPS programme, they have also acquired responsibility for the procurement of general practice systems.

With regard to the development of general practice systems, a number of initiatives have been used to encourage the use of computers in general practices, including government-led initiatives⁽¹⁴²⁾ and commercial initiatives that involved the provision of computer systems in return for post-marketing data.⁽¹⁶⁾ More recently there have been a range of initiatives for funding of general practice computer systems by the government which have focussed on procurement of systems that meet specific requirements, firstly through the Requirements for Accreditation (RFA) programme,⁽¹⁴³⁾ and more recently through the General Practice Systems of Choice (GPSoC) programme.⁽¹⁴⁴⁾

The procurement strategy that has emerged illustrates the conflicts that emerge between policy amongst the partner institutions. Attempts to implement a single supplier policy under NPfIT with systems supplied by the National Local Ownership Programme gave way to a programme where an alternative supplier would be provided, before this gave way to the current GPSoC programme.^(5, 144, 145) Primary Care Trusts whilst financially the clients of system suppliers were obliged through the GPSoC programme to meet clauses in the General Medical Services and Primary Medical Services Contracts that covered general practice computing. These clauses allowed general practices free choice of accredited systems, provided these technical and functional requirements set by CFH even though call-off agreements are agreed between the PCT and system supplier.⁽¹⁴⁶⁻¹⁴⁸⁾

These developments placed two constraints upon general practice computer system suppliers. Firstly, as previously, suppliers were obliged to meet a set of stringent functional requirements set out in the GPSoC maturity model (Table 7),⁽¹⁴⁴⁾ compliance with which would be assessed using the Common Assurance Process (Box 11). The introduction of the RFA programme had previously led to a reduction in the number of systems and companies operating in the general practice space,⁽¹⁴³⁾ and this outcome was replicated with the development of the new functionality (Table 8).

Secondly, software suppliers were obliged to provide a set of systems that included functionalities that were defined for them rather than through collaboration. This stands in contrast to the approach used by NHS Scotland where there was a dialogue with suppliers to define e-Pharmacy applications that they were confident that they could meet. It is unclear as to whether this was an intentional artefact of the development process in England or not, but could potentially be seen as a barrier to the development of timely EPS solutions.

Table 7: Levels of the General Practice Systems of Choice Maturity Model

Maturity Level	Description of Required Functionality
0	Functionality of the general practice computer system must provide the core set of functionalities described in the RFA99 requirements.
1	Addition of both Choose and Book and Personal Demographics Service functionality to Level 0 functionality.
2	Addition of Electronic Prescription Service functionality to Level 1 functionality.
3	Addition of GP2GP electronic record transfer functionality to Level 2 functionality.
4	Addition of data hosting to Connecting for Health standards to Level 3 functionality.
5	Level 4 functionality with future services.
6	General practice system integrated with Local Service Provider detailed care record system.

In the case of EPS, whilst the N3 and Spine, delivered under a centrally procured contract with BT were ready for EPS R2 in August 2006,⁽¹⁴⁹⁾ with Prescription Services announcing they were ready in September 2007,⁽¹⁵⁰⁾ the same cannot be said of general practice and community pharmacy systems. The original aspiration to deliver EPS by the close of 2007 was not met, although rapid progress has been made over the last three years.

For general practice computer system suppliers the development of EPS would be necessary for continued access to the general practice market. Upon entering an agreement to supply general practice systems under this contract, the supplier was obliged to ensure that certain functionality would be available within 12 months of the contract being signed.^(151, 152) Meeting these requirements provide to be an obstacle to two of the system suppliers who left the GPSoC programme and consequently NHS primary care contracts.^(153, 154)

For community pharmacy suppliers, there was also incentive to supply systems through a model of of indirect reimbursement to suppliers for each deployment of a community pharmacy dispensing system with CAP accredited EPS R1 and EPS R2 functionality.⁽¹⁵⁵⁾ Again, the requirements placed upon system suppliers has led to a pruning of systems available to community pharmacies (Table 9).

Table 8: General Practice Systems Adopted and Currently Available

Supplier	System	EPS Release 1 Compliance	EPS Release 2 Compliance	
			Reference Stage Testing Begins	Full Roll Out Approval
CSC ° TPP	SystemOne	Yes	Jul. 2009	May 2012
EMIS	LV	Yes	Discontinued	Discontinued
	PCS	Yes	Discontinued	Discontinued
	EMIS Web	Yes	Jun. 2010	Jul. 2011
In Practice Systems	Vision	Yes	Apr. 2011	Sep. 2011
iSoft	Premier	Yes	Uncertain	Uncertain
	Synergy	Yes	Uncertain	Uncertain
Microtest	Evolution ^{§§}	Yes	Aug. 2011	May 2012 Oct. 2012
	Practice Manager	Yes	Pending	Pending
Healthy	Crosscare	Yes	Pending	Pending
SeeTec	GP Enterprise	Yes	Discontinued	Discontinued

The need for new functionality and the introduction of remote hosting of medical records has also required the re-design of some general practice systems. For example, EMIS abandoned further development of its existing LV and PCS solutions in favour of a new internet based system, EMIS Web. It was claimed that as there had been such a gap between the original coding of and the specifications requiring the re-design of these to meet GPSoC requirements that it was not possible to upgrade these systems to meet these requirements.

Implementation within Primary Care Trusts

Aside from the capability of community pharmacy and general practice system suppliers to introduce appropriate new functionality, the implementation of the service was also dependent upon the ability of Primary Care Trusts to support the introduction of the service.

^{§§} Microtest's deployment took a distinct approach. Each module for the NPfIT programme was developed and underwent first of type testing separately, which for EPS R2 was initially completed in May 2012. The integrated code which combined these functions underwent deployment verification testing again, which was completed in October, 2012.

Table 9: Community Pharmacy Systems Adopted and Currently Available

Supplier	System	EPS Release 1 Compliance	EPS Release 2 Compliance Discontinued	
			Reference Stage Testing Begins	Full Roll Out Approval
AAH	Link Evolution	Yes	Discontinued	Discontinued
	Proscript Link	Yes	Nov. 2010	Mar. 2011
Ascribe	Park Systems Ascribe	Yes	Discontinued	Discontinued
Boots the Chemist	Smartsript	Yes	Discontinued	Discontinued
CegeDIM	MediPhase	Yes	Discontinued	Discontinued
	NexPhase	Yes	Jun. 2010	Sep. 2011
	Pharmacy Manager	Yes	Jul. 2009	Aug. 2010
Helix Health	QicScript	Yes	Pending	Pending
Lloyds Pharmacy	COMPASS	Yes	Jun. 2010	Jul. 2011
Pharmacy Plus	CAPA	Yes	Pending	Pending
Positive Solutions	Analyst PMR	Yes	Feb. 2011	Aug. 2011
Rx Systems	Proscript	Yes	Nov. 2010	Mar. 2011
Swebtec	Pharmasys	Yes	Pending	Pending

In order to effectively deploy the service, a number of measures have to be put in place to ensure that deployment of the service is coordinated locally, can be achieved within the resources available to community pharmacy and general practice system suppliers, and meets all necessary infrastructure requirements, as outlined below. The main mechanism for ensuring that PCTs have in place appropriate infrastructure to support the service is the issue of Secretary of State Directions (SSDs). These represented the necessary first step for the deployment of the service, and make legal within the PCT to whom these are granted the issue of prescriptions that feature digital signatures.

FIRST OF TYPE SITES

The first set of SSDs were issued to a set of initial implementer PCTs who were expected to host the first of type testing that would form part of the CAP, and would be the first sites to demonstrate roll-out of the service. These first of type tests, conducted between

pairs of community pharmacies and general practices provided in-vivo evidence that the systems under test could accurately send and receive electronic prescriptions. As a consequence, the requirements for SSDs were more stringent than would be the case for those sites that would follow.

In the case of the initial implementer PCT applications, the PCTs had to show sufficient capacity for undertaking the project including a named EPS Lead, a Registration Authority function, as well as a local helpdesk, training and business-change support. The PCTs also had to show in their application that there was an effective partnership between the PCT and local professional representatives from the Local Medical and Local Pharmacy committees, as well as patient representatives and primary care computer system suppliers.⁽¹⁵⁶⁾

These applications also had to include details of the community pharmacies and general practices that might participate, with emphasis placed on sites that could demonstrate that they had appropriate data quality in the case of general practice, business continuity and disaster recovery plans, and also some evidence that the site had experience of repeat dispensing.⁽¹⁵⁶⁾

SUPPORTING THE SERVICE IN PRIMARY CARE TRUSTS

The deployment of EPS in any PCT requires that there are a number of infrastructures in place, which must be in the process of planning and development for SSDs to be issued. The PCTs need to demonstrate that they have plans to put in place appropriate infrastructures for the delivery of the EPS service. These include the development of a policy governing how nominations will be captured and who from, a policy for the management of business process change in both community pharmacy and general practice, communication plans, business continuity and disaster recovery plans, as well as policies for the issue of Smartcards and the distribution of stationery for community pharmacy and general practice.⁽¹⁵⁶⁾

The delivery of the service in primary care trusts relies upon a number of functions, including a National Service Helpdesk, system suppliers' helpdesks, local Registration Authorities, which are responsible for the issue of Smartcards for access to EPS R2, as well as any local support for informatics. In addition, as the programme has progressed a number of resources have emerged to assist PCTs in their deployment of EPS including an implementation toolkit and a catalogue of lessons learned from earlier implementations. For the participating community pharmacies and general practices, the other consideration that needs to be taken into account is meeting the Information Governance requirements, and which need to be met in order to use EPS R2.

Box 11.1: The Common Assurance Process

All computer systems that wish to be connected to N3 and The Spine, either to use Spine functions or to exchange information with other systems via the Spine,⁽²⁾ have to undergo a process of assurance testing, called the Common Assurance Process (CAP). In fact this should be more accurately referred to as Common Assurance Processes, as each programme has their own process tailored to the needs of that programme.^(14, 15) The CAPs replaced both the NHS CFH Compliance scheme from 2004, and also the Requirements for Accreditation programme used to assure the functionality of general practice systems.⁽²⁰⁾ This process was supported by an NHS CFH Release Manager and is overseen by a number of groups within CFH including staff representing Technical Assurance, Information Governance, Service Introduction and Service Management, Clinical Assurance and Service Deployment, as well as NHS Prescription Services and CFH's own Clinical Safety Group (CSG), Programme Delivery Group (PDG) and National Change Assurance Board (NCAB).⁽¹⁴⁾

These processes were designed to provide what CFH term a clear and transparent approach to the development of high quality and clinically safe systems.⁽³⁶⁾ For each system this process was concluded when a system gains Full Roll-Out Approval, at which point a system can be connected to the Spine at all locations in England wishing to use that system and associated services.⁽¹⁴⁾ System providers wishing to develop for the Spine need to be nominated for inclusion in the CAP programme by sponsoring NHS organisations such as the Department of Health and PCTs.⁽²⁾

The CAP for EPS involved a five stage process, which begins with a phase that NHS CFH termed the Preparation Stage. ⁽¹⁵⁾ This stage involved all CFH functions aside from the CSG, PDG and NCAB in the definition of the CAP that would be appropriate for the EPS programme. The next stage, known as the Scope phase involved the same CFH functions involved in the Preparation Stage and the system suppliers. In this phase, the system suppliers obtain agreement and understanding of their roles and responsibilities within the EPS programme. This stage involves representative end-users of the system in a Patient Safety Assessment Workshop, which identifies potential risks arising from the introduction of the system.

In the third stage of the CAP, the Design and System Test Stage, the suppliers approach to the development of the system was looked at by CFH. This stage provides an assurance of system suppliers' approaches to design, testing, maintaining patient safety, as well as communication and training plans. ⁽¹⁵⁾ In their literature, CFH noted that this stage involves a check that suppliers' tests will verify all possible solutions and requirements. A Patient Safety Case was also produced by the supplier, which indicated how potential risks to patients through introduction of the system are mitigated. This is reviewed by the NHS CFH Clinical Assurance Manager. If this documentation was satisfactory, Authority to Proceed would be granted that allows testing of the system under development.

Box 11.2: The Common Assurance Process

The fourth and fifth stages of the CAP involved all the functions of CFH that have already been described as well as the CSG, PDG and NCAB.⁽¹⁵⁾ In the fourth stage, the Integration Test, there was a test of the system suppliers' EPS solution in the National Integration Centre, known informally as the Sandpit. This stage of testing involved the conduct of pipe-cleaning testing, which provided a test of the ability of the service to integrate with N3 and the Spine without disrupting other services. In the Integration Test, an end to end test was conducted using synthetic end-points representing prescribers, dispensers and NHS Prescription Services. A set of 600 test prescriptions, 80 of which were sent to NHS Prescription Services, were generated, and transferred between a simulated prescribing and dispensing system and NHS Prescription Services. These were checked to ensure that the system processes data in the expected manner. A report, the Clinical Safety Closure report was produced by an accredited clinician working for the system supplier. The next stage of the CAP could only be undertaken when there had been review by the CSG and the PDB. Where the performance of the system is deemed satisfactory by the CSG and PDB, the CFH Release Manager produces a Development Milestone Achievement Certificate was issued allowing access to the final stage of testing.

The final stage of testing was known either as the Deployment Stage, or as First of Type (FOT) Testing.⁽¹⁵⁾ FOT testing involves a two part process, and can involve up to five pairings of geographically near GP practices and community pharmacies for the purposes of testing each dispensing or prescribing system. The first part of FOT involves the transmission of synthetic prescription data from the GP practice to the community pharmacy and then on to NHS Prescription Services in what is known as Reference Testing. This part of the testing process provides an end to end test of prescription data using a range of prescribing and dispensing scenarios capturing EPS functionality for prescriptions within the scope of EPS operation. The Reference Test is unique to the CAP for EPS and should last for around five days.

Successful completion of Reference Testing, leads to the final stage of testing, the Deployment Verification Period. In this phase, real patient prescriptions were used.⁽¹⁵⁾ For the system to gain permission to be deployed beyond the FOT test pairings of GP practices and community pharmacies, 2,500 prescriptions had to be transmitted seamlessly between each system. Once a pack of 2,500 prescriptions had been sent and received correctly, provided these represent a diverse enough sample, the Clinical Safety Group at CFH might issue the system with a Deployment Verification Certificate to enable national roll-out, although in the past some of these have had caveats attached that restricts their deployment to specific numbers of sites, as happened in the case of Cegedim and their Pharmacy Manager community pharmacy system.

Although the focus was on meeting the requirements defined in the messaging standards for EPS R2, the CAP scope also encompasses system acceptability and usability for system users, although no usability standards were set to check the systems against. We understand that the

Box 11.3: The Common Assurance Process

philosophy taken was one in which the system suppliers were the experts in delivering usable systems for their clients. It should also be that the programme to develop usability guidelines for NPfIT programme, the Common User Interface (CUI) programme was not completed until after the specifications for EPS R2 had been completed and development was well under way.

Although the process might appear to be a purely technical exercise, there were two points at which the Clinical Safety Group and the service users exercise their judgement with regard to suitability of the service for Full Roll-out Approval. The Clinical Safety Group reviewed the items that have been sent and received to ensure that it contains a sufficiently diverse range of items to represent its typical operation, including items sent as acute, repeat prescribing and repeat dispensing prescriptions.

This process does not discount the potential concerns about usability or clinical safety that system users might have. Over the course of the Deployment Verification Phase, the users of the system would hold regular teleconferences with the system suppliers and CFH to identify any problems in operation that might affect clinical safety and to resolve these. The process aims to identify those usability problems which would be shared by other sites rather than issues that simply relate to personal preferences of prescribing or dispensing staff. To attain the Deployment Verification Certificate, the first of type site needs to complete a Deployment Verification Report. This stage in the process indicates that the site is satisfied with the operation of the system that they have received, although there might be enhancements made, which are not critical to clinical safety which might be expected to be completed following deployment.

The significance of aspiring to gain EPS R1 and EPS R2 accreditation for software suppliers becomes apparent if we look at the procurement model. This has led to the development of a complex environment in which there remain multiple system suppliers. This diversity would be expected in the case of community pharmacy, where there are no restrictions on procurement by contractors, but not necessarily in the case of general practice. However, attempts to restrict the choice of general practice computer systems met with resistance creating the current, complex deployment model for EPS.

The above suggests a need to reach agreement locally as to the approach to be taken towards the local implementation of EPS R2. Indeed, there have been local ETP implementation boards created within PCTs to manage this process. As might be expected there is representation from both the Local Pharmaceutical Committee and the Local Medical Committee, which are concerned with professional representation for their respective communities. In addition, representation might also include community pharmacy and general practice users, as well as representatives from the PCTs informatics departments, the local Registration Authority and also the PCTs medicines management functions.

THE EXEMPLAR PRIMARY CARE TRUST PROGRAMME

In a more recent development, CFH undertook a range of wider installations of EPS R2, beginning with the Isle of Wight PCT in late 2011, and moving on to Bexley PCT in 2012. In these deployments, the aim was to have a full roll-out of EPS across the community pharmacies and general practices in the estate. Additional support for these programmes was provided by CFH through additional training resources at individual sites and also through local webinars that provide opportunities for sites to raise concerns and learn from others in the region about particular aspects of the service.

The Exemplar PCT deployment in the Isle of Wight was completed in a matter of a month, with all sites being ready to send and receive prescriptions in the PCT. Consequently, this represents the first opportunity for patients to test the process of nomination change. This deployment also provides an opportunity to audit the performance of the service. In January, 2012, a CFH business process management team visited the Isle of Wight to conduct a baseline audit, which involved an assessment of the time spent in the management of prescription queries by both dispensers and prescribers.

The Current Level of Deployment

With regard to the level of deployment, at the time the study ended, there was only limited deployment within GP practices with a much higher level of deployment within community pharmacy (Figure 10). The difference in the degree of roll-out was only to be expected, given that for community pharmacy, the main process changes are associated with the receipt of prescriptions and the collection of exemptions, and the recording of prescriptions as dispensed and sending the appropriate claim message when a prescription has been dispensed. In short, the business process change requirements might be more limited in the case of community pharmacy than in the case of general practice.

However, deployment does not necessarily represent use of the system in a clinically meaningful manner. Given the discrepancy between community pharmacy and general practice roll-out it might be the case that community pharmacies might wait many months before receiving an electronic prescription.

Indeed, in the case of community pharmacy it has been suggested that there is a two phase approach to training which is determined by whether or not the site expects to receive electronic prescriptions from nearby general practices. In the first phase of training, sites are given training in managing electronic prescriptions received, whilst in the second phase, the site is provided with training to support the management of nominations.

Determinants of Level of Service Deployment

There are three main factors which determine the level of roll-out of EPS, which have historically been separate but with the move from PCTs to Clinical Commissioning Groups might become less so. These were the readiness of PCTs to adopt EPS, the availability of

SSDs and the level of resource available for implementation from community pharmacy and general practice system suppliers.

One of the purposes of the Secretary of State Directions was to support community pharmacy software suppliers by indicating in which areas they should concentrate their resources with regard to deployment and training. However, with the delays experienced in general practice system delivery, it became apparent that this mechanism no longer had much benefit for software suppliers, as they could no longer effectively predict where resource should be invested. This led to the suspension of further issues of Secretary of State Directions in May 2011.⁽¹⁵⁷⁾ However, these were resumed in July 2012,⁽¹⁵⁸⁾ with the final set of applications for SSDs being received in October, 2012 and announced in November, 2012 for a February, 2013 deployment.

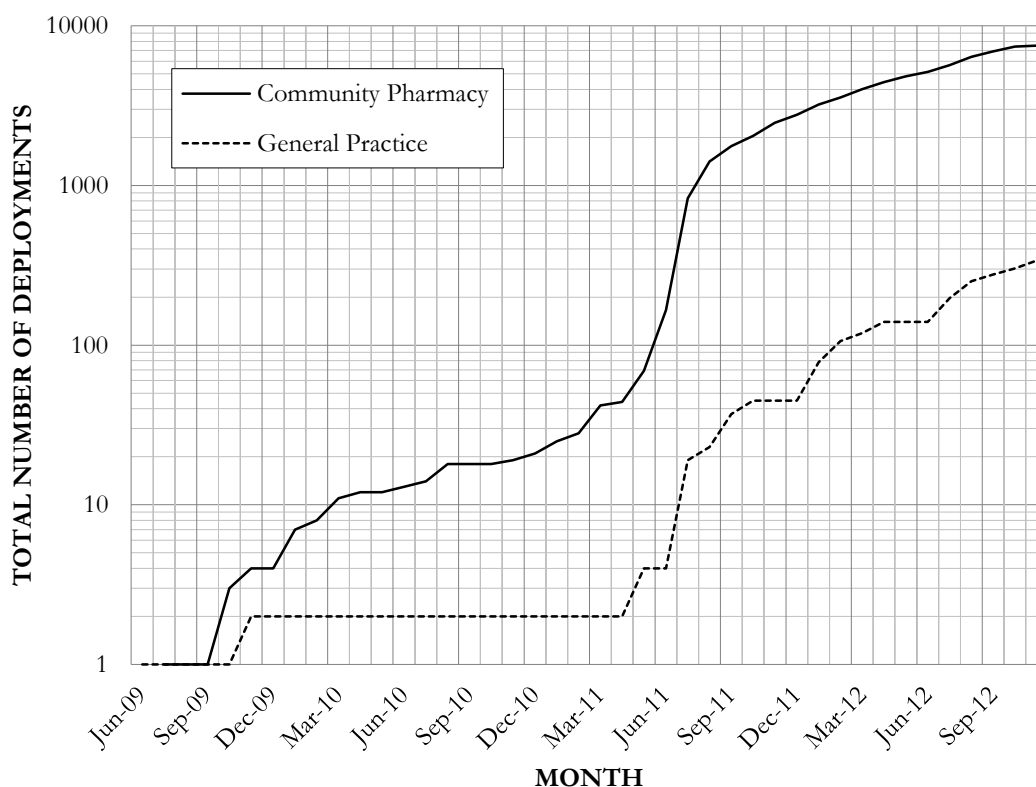


Figure 10: Community Pharmacy and GP Practice Deployment of the Electronic Prescription Service Release 2 from June 2008 to November 2012 (Logarithmic Scale)

There were been six issues of Secretary of State Directions, between November, 2008 and December, 2011. The first issue of Secretary of State Directions was in response to a call from

the Department of Health for PCTs willing to participate in the first of type testing of EPS R2, which covered seventeen PCTs.⁽¹⁵⁹⁾ Five further calls for PCTs to apply for Secretary of State Directions yielded a total of 136 PCTs who could deploy EPS R2.⁽¹⁶⁰⁻¹⁶⁴⁾

Future Deployment of the Electronic Prescription Service

In review, the history of the implementation has seen the successful delivery of EPS R1 and EPS R2 functionality to the delivery of general practice and community pharmacy computer systems. Similarly, the number of sites able to send and receive electronic prescriptions has steadily risen, although the deployment to general practice has been at a slower pace than in community pharmacy.

In short, the model adopted by CFH saw successful deployment of the service, but deployment does not necessarily equate to meaningful clinical use. This problem has also been recognised with regard to deployment of new informatics solutions in the United States and has led to the suggestion of meaningful use criteria in the HITECH Act.^(165, 166)

Notwithstanding the promotion of meaningful use of the services questions also arise as to the ability of PCTs to develop the service within the context of changes to the structure of the NHS. We expect that the effects of these changes will emerge over the course of the final year of the evaluation.

The Changing NHS and its Potential Effects

At the time this report was completed, the new structures for governance in the NHS were just beginning to emerge. Primary Care would no longer be managed by Primary Care Trusts, with oversight from Strategic Health Authorities, but local commissioning would be passed on to the NHS Commissioning Board, the Commissioning Board's Local Area Teams, Clinical Commissioning Consortia and Commissioning Support Units. These changes also saw the end of CFH, its functions being passed on to the Health and Social Care Information Centre (HSCIC)

In terms of practical change, the main changes appear to affect the manner in contractual relationships will be managed, specifically in relation to community pharmacy informatics. With the amalgamation of CFH's functions with those of the Information Centre, the new HSCIC will engage in both the collation of health data and in the definition of the communication standards and the accreditation of these. This combined role reflects a renewed emphasis on increased use of informatics in healthcare, from the use of digital patient records, to patient accessible primary care health records, to the introduction of tele-health services, and to increased integration of disparate records through the use of portals.⁽¹⁶⁷⁾

For GP practices, there appears to be little change in the contracting of primary care informatics in the new NHS, with the Commissioning Board taking responsibility for delivery of systems under the three contracts governing commissioning of primary care

services, and GPSoC continuing until the end of 2013 although a new contract was in process.⁽¹⁶⁸⁾ The Clinical Commissioning Groups themselves will become responsible for procuring informatics systems, and for providing business support.

Registration Authority functions that were previously part of the remit of PCTs would be commissioned by the Commissioning Board Local Area Teams from CSUs.⁽¹⁶⁹⁾ Although it was also suggested that the number of organisations that would be allowed to undertake this task, with a plan to encourage organisations to set up pilot Registration Authorities being announced in December, 2012.⁽¹⁷⁰⁾

In most respects, it appears that there is little change in the services offered. The tracking database remains, as does the National Service Desk, and the Nomination Audit Reports. Indeed the same arrangements remain in place over the ownership of systems, with allowances to dispensing contractors for EPS use remaining, and for the escalation of issues remained. In the case of dispensing contractors, despite funding for systems coming from CFH, management of faults with the service appear to be between the dispensing contractor and the system supplier.⁽⁶³⁾

There is one fundamental difference between the two services, and that is with regard to management of deployment. The main tool for managing deployment of EPS R2 to GP practice sites were Secretary of State Directions. With the abolition of PCTs, these no longer had any force, and thus any GP practice in England would be able to issue prescriptions with a digital signature. The expectation was that GP practices would provide their EPS Lead, which might be at the level of Commissioning Board or CCG, with eight weeks notice of any planned date for deployment of EPS R2. This date would be placed on the tracking database, and it was expected that local community pharmacies would be informed of this.⁽¹⁷¹⁾

In some respects this is akin to the process that was in start at the beginning of the EPS R2 deployments, when six weeks notice would be given to dispensing contractors of any local GP practice deployments. However, this does eliminate the rationale for introducing SSDs, the need to provide a geographically managed deployment that would allow system suppliers to use their resources in the manner that would best support deployment.⁽¹⁵⁷⁾

However, for dispensing contractors there are some concerns that will need to be addressed. With the introduction of EPS, the opportunity existed for the first time to monitor which community pharmacies were collecting prescriptions for which patients. The possibility that GP practices might direct patient prescriptions to one or more preferred community pharmacies had been raised as a concern. EPS R2 provided a mechanism for obtaining reports of which community pharmacies were nominated, Nomination Audit Reports, and PCTs were given the task of proactively monitoring these. It had been envisaged originally that PCTs would be able to download their own Nomination Audit Reports, although as the required functionality was not in place, instead,

PCTs were required to ask CFH for these, drawn from the Secondary Uses Service. With the abolition of PCTs, and the requirement that they would proactively monitor nominations, the NHS Commissioning Board will take over this responsibility, but will only act where a specific complaint is received rather than proactively. ⁽¹⁷¹⁾

The Future for the Electronic Prescription Service

After a gestation of over a decade, EPS R2 is now in a position where a slow national deployment looks to be a viable possibility. Month on month deployments to GP practices continue to rise and the majority of community pharmacies now have access to the service, with some DACs also introducing the service. However, there are still uncertainties around the programme. The replacement for GPSoC has still to be announced, dispensing GP practices have yet to access the service, and some concern might be raised as to the adequacy of the model adopted for supporting community pharmacy contractors.

It is clear that there is continued support within Government for the service. Despite earlier negative reports as to the benefits of EPS, ⁽¹⁰⁴⁾ recent reports suggest there is a belief EPS R2 can deliver cost-benefits. ⁽¹³⁸⁾ For CFH, there appears to be recognition that EPS R2 is an evolving entity, through their mooted, “Where’s My Prescription” website, which provides community pharmacies and GP practices with information in the previous hinterland that existed between the GP practice system, the Spine and the dispensing contractors computer system, and a possible re-examination of the model used for nomination of sites by patients. As such it appears that the future of EPS R2 remains an unpredictable one.

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APPENDIX B

THE MANAGEMENT OF PRESCRIPTIONS IN PRIMARY CARE

There are three main models for the issue of prescriptions in English primary care, as acute prescriptions, as repeat prescriptions and more recently as repeat dispensing prescriptions. The former might be issued as a one-off prescription to manage a new chronic condition or for an acute condition. The other two models, involve the issue of medication for set durations outside of a consultation. With the repeat prescription, the monitoring and control of the prescription reside with the GP practice, whilst with repeat dispensing prescriptions, the management of the prescription is delegated to the community pharmacy.

Management of Repeat Prescriptions

Although there is local variation in the process of managing repeat prescriptions, there are a number of generic steps that can be identified. In all cases, clients would receive an FP10, signed by the prescriber and including a prescription counterfoil that provides an order form for prescription items that the prescriber has authorised for issue as a repeat prescription. Depending on local practice, the patient might have a number of options for the re-order of prescriptions. The patient would typically have the option of submitting a paper request for her or his repeat medication to the GP practice, or might be able to telephone in a request, or possibly even the option of submitting a prescription request using a form on the GP practice website. At the GP practice, a number of administrative checks will be conducted to ensure that it is appropriate to issue the prescription, the key ones being to ensure that medicines are not being over-used by the patient, and that where a medication review is due it is conducted.

Although the repeat prescription removes the need for a consultation with the prescriber, as this type of prescription is managed outside of this process, the administration of the process can lead to the processing of the repeat prescription request taking up to two working days. The output of the process will either be a new signed prescription, or a note from the prescriber as to why a particular prescription request was not accepted. In either case the prescription would be collected from the reception of the GP practice.

In terms of management of the repeat prescription request this is distributed between administrative staff and a prescriber. The administrative staff will either create a new FP10 form that contains all the prescription items that were requested for a patient and distribute these to appropriate prescribers in the practice for review and signature, and/or prepare a note of any concerns about the prescription request.

This might include a review of the level of use by the patient which might provide an indication of potential problems in using the medication. The data for this decision

would be based on the GP practice computer systems own estimate of patient adherence based on number of prescriptions created for particular items authorised for issue as repeat prescription items. The prescription forms and notes generated by the administrative staff are distributed to the appropriate prescribers within the GP practice, and signed as appropriate.

In a non-dispensing GP practice (the vast majority), signed FP10 forms, and where appropriate, notes for the patient, are returned to reception by prescribers for collection. This process might entail two to three journeys for the patient in order to have the repeat prescription filled (see Figure 11). These could include two journeys to the GP practice and then the community pharmacy. In cases where the community pharmacy does not have all the prescription items in stock, potentially another journey is needed to collect items that might not have been dispensed when the patient first submitted her or his prescription.

It should be noted that the process for managing repeat prescriptions might vary in the case of items that are dispensed by dispensing appliance contractors (DACs) and dispensing doctors. In the case of the former, the request for the prescription is handled using the postal service, and would not necessarily involve any activity on the part of the patient in the process of managing the prescription. In the case of the dispensing doctor, for those patients to whom the GP practice dispensary can provide medication, the prescription would not leave the GP practice.

Management of Repeat Dispensing Prescriptions

Repeat dispensing prescriptions were introduced as a potential mechanism to save both GP practice and community pharmacy time and to provide pharmacists greater opportunity to apply their professional knowledge. Again, the use of this form of prescription is agreed by prescriber, patient and also with the community pharmacy who undertake a greater role in the management of that prescription.

In the case of the two types of prescriptions discussed so far, the left-hand side of the prescription are the same, authorising a dispenser to provide specific products for the client. These prescriptions are used for a single dispensing of prescription items and then endorsed for items dispensed for the patient prior to their dispatch to the reimbursement agency. For those patients, whose prescriptions appear to be stable for and unlikely to change, the prescriber might chose to issue a repeat dispensing prescription, which can be used to dispense items to a prescription on a number of separate occasions.

The paper repeat dispensing prescription is composed of a repeatable prescription, an FP10 form signed by the prescriber that states the types of prescription items and how many times these can be issued to the patient, and a number of batch issues. The batch issues are FP10 forms that do not feature the prescriber signature that is required to make these legal prescriptions, but which do contain all the data on the repeatable prescription. Each of the batch issues is used for reimbursement purposes, and will be endorsed in the manner that other prescriptions are when dispensing takes place.

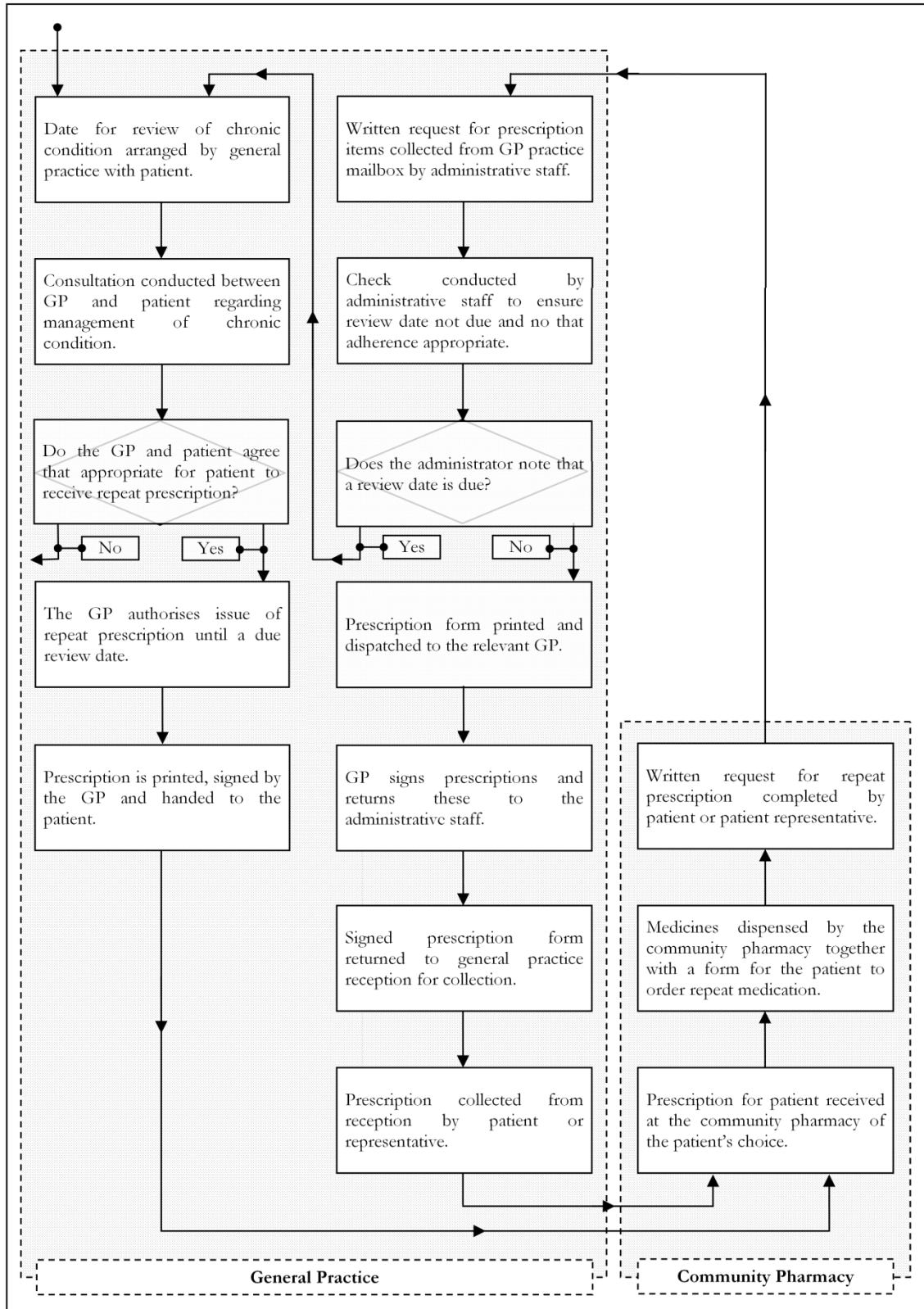


Figure 11: Management of Paper Repeat Prescriptions

Repeat dispensing prescriptions can last up to a year and have been presented as a means of providing a safer and more convenient service to patients, as the process of reordering prescriptions is eliminated during the period between authorisation of the prescription and the need for a clinical review of the patient's medication. Rather, the patient's interaction will be with the community pharmacy team who receive the repeatable prescription and who may also hold any of the batch issues that have not been dispensed for the client (see Figure 12).

Although a repeat dispensing prescription might feature a defined interval between issues set by the prescriber that indicates the number of days that have to elapse between dispensing against each batch, this does not have to be set. This means that unlike the repeat prescription process, the decision-making as to whether it is appropriate to dispense a particular item to the patient is a negotiation between the community pharmacist and the client in order to ensure there is an appropriate balance between patient convenience and the potential risk of over-supply of medication.⁽⁴⁰⁾ Should a patient's medication be required earlier than the interval that might be implied in the prescription, then a community pharmacist can use their clinical judgement to decide if this would be appropriate for the patient or not.

There are two other differences between repeat prescriptions and repeat dispensing prescriptions that should be noted. Firstly, the repeat dispensing prescription can only be dispensed by one community pharmacy for its duration, unlike repeat prescriptions which can move. Secondly, the need to order a new repeat dispensing prescription is indicated to the client when the last of the authorised issues has been dispensed, at which point a new clinical medication review by the prescriber would be required. It is immediately apparent that there are both potential benefits and vulnerabilities that emerge from these characteristics of the process.

Processing of Prescriptions in the Community Pharmacy

As is the case with prescribing practice, it is possible to also note a number of generic processes underlying the management of prescriptions at the community pharmacy. Waterfield provides an idealised description of the dispensing process in community pharmacy.⁽¹⁷²⁾ This model describes a process in which there is careful control of the selection of medications for issue to the client which might employ up to four different groups of staff. This also illustrates the critical role of the paper prescription in the management of dispensing for patients, even though it is conceivable that a computer printed label could be used in place of this.

Waterfield's description of the dispensing process begins with the receipt of the prescription by the community pharmacist or medicines counter assistant. At this stage, the main concern is to establish that the prescription is printed on a form recognised as legal, that details are legible and that the details held by the community pharmacy dispensing system's patient medication record about the patient are accurate. It was also

suggested at this point, the client should be informed of how long it might take for the prescription to be fulfilled.

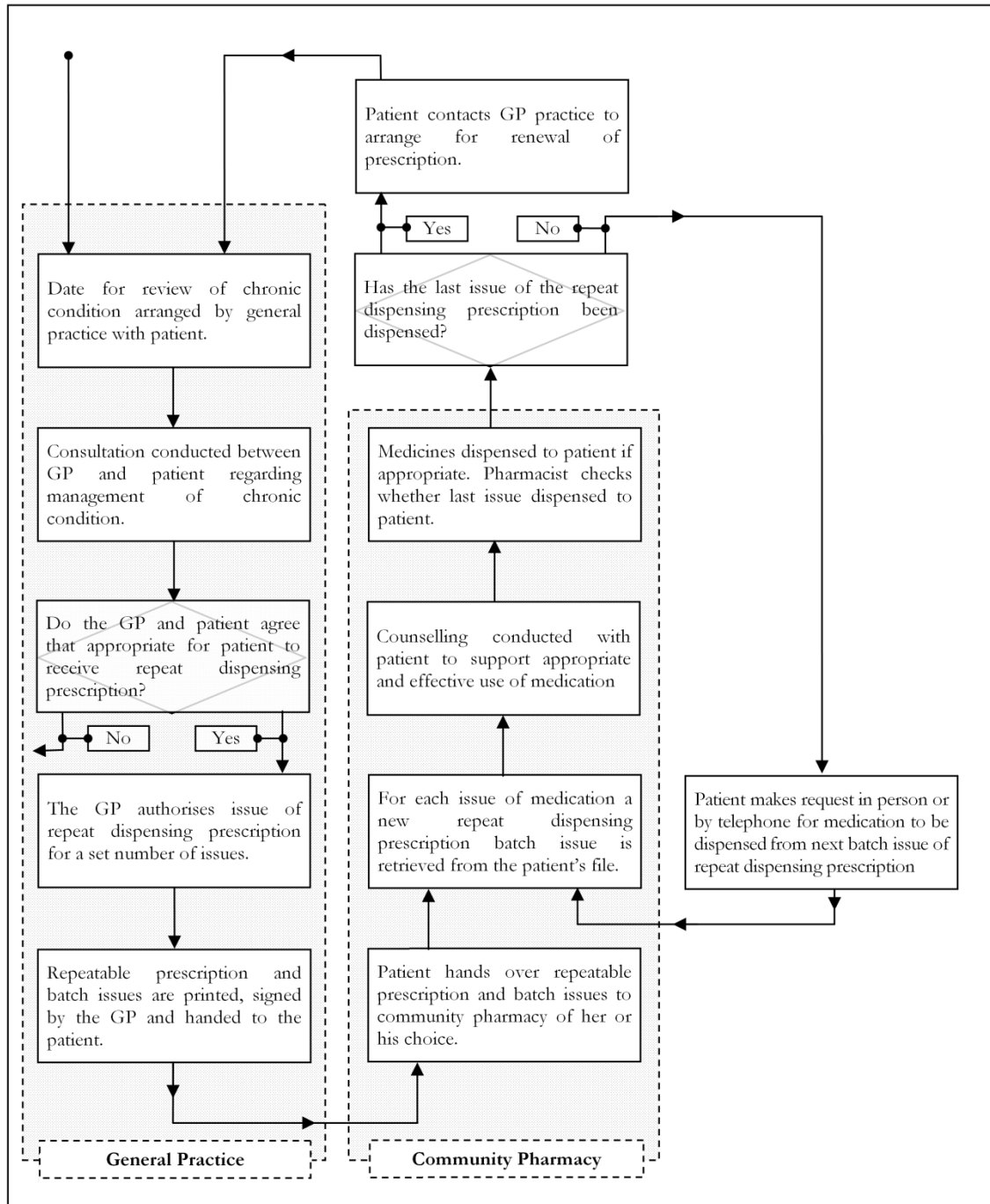


Figure 12: Management of Paper Repeat Dispensing Prescription

If it has been agreed to dispense items against the prescription received, legal and clinical checks are conducted by the community pharmacist. This will include a check of the date on the prescription to ensure that it was issued within a six month period. At this point, the community pharmacist will use their clinical knowledge to ensure that patient receives the

correct medication in an appropriate dose and formulation. The community pharmacist also has to interpret the prescriber's wishes at this point. This might include translation of instructions to patients that are written by the prescriber in Latin in an abbreviated form. Community pharmacies might also plan to add warnings and advice to the labels that are applied to items to be dispensed to patients.

Each item that is to be dispensed to the patient will feature a label that includes the patient's details, the item dispensed, as well as to the instructions for the patient together with any advice and warnings for the patient. In the assembly of the prescription items for dispensing to the patient, and subsequent checking of these, a dispensing technician would be expected to refer to the paper prescription and not to any labels that had been printed from these. The final check of the content, strength and labelling of the item by either the community pharmacist or an accredited checking technician also relies on the presence of a paper prescription against which to check these details.

Prescription items would be assembled and labelled by dispensing technicians once it has been confirmed that the prescription is a legal document and the items are clinically appropriate for the patient. In this phase of the operation, the prescription could be used as a list against which to pick items for dispensing to patients, and also to check that the details on the patient medication record held in the dispensing computer system are accurate. The prescription provides an opportunity to ensure that all data pertinent to the production of accurate labelling are held on the system.

Waterfield's description also alluded to one of the potential problems with this system, that of managing out-of-stock items. In some cases, the community pharmacy would only be able to partially dispense the items on a prescription, leaving some items that need to be ordered to dispense the quantities stated on the prescription. In these cases, the client might wish to take the prescription to another community pharmacy and have nothing dispensed from the community pharmacy he or she initially presented the prescription at, or can take some of the dispensed items together with an owings note that can be presented when adequate stock is available to receive the rest of the required medication. Clearly, owings represent another potential source of inconvenience for the patient.

Once the prescription has been dispensed, the community pharmacy team will need to endorse the prescription to state precisely what had been dispensed to the client. These prescriptions are required for reimbursement and remuneration to the community pharmacy and are sent in a monthly bundle to one of NHS Prescription Services' processing centres.

In these batches, prescriptions are sorted by prescriber, and then by type of prescription. The community pharmacy has to declare the number of prescription items dispensed and the numbers of those that are exempt on a form, known as the FP34. This form is sent by post together with the prescriptions endorsed to NHS Prescription Services. The FP34 captures the number of prescription items that were handed to patients which the patient was exempt from paying a prescription charge for and those that were not.

APPENDIX C

AN OVERVIEW OF REPORTS, DRAFT PAPERS AND PUBLISHED PAPERS PRODUCED BY THE PROJECT

Over the course of the project, papers summarising findings over the course of the project have been produced. In total, 23 papers have been referred to in this report. All of these papers have either been published as conference or journal papers, in the process of being prepared for publication, or have been submitted for publication. The following provides a summary of these papers segmented according to five main topic headings which provide a means of capturing common areas of interest in papers.

Papers Related to the History of the Evaluation and the Service

- 1 Lichtner, V. & Venters, W. (2011) "Journey to DOR: A retro science-fiction story on researching e-Prescribing." In: Chiasson, M., Henfridsson, O., Karsten, H. & DeGross, J. (Eds.) *Researching the Future in Information Systems - Proceedings of the IFIP WG 8.2 Working Conference, June 2011 Turku, Finland*. Springer: Hiedelberg, Germany.

The first paper from this project presents a short story, where the medium of science fiction is used to reflect on and explore the nature of the evaluation that was underway. This story is presented as a reflexive means to explore the feasibility, meaning and impact of researching future technology. The story itself describes the journey of a group of scientists to study an experiment being conducted on a complex machine, but who find that despite the advances research tools at their disposal facets of the system being studied appears to remain opaque.

- 2 Hibberd, R., Cornford, T. and Barber, N. (2013) *The Evolution of a Solution for the Electronic Transmission of Prescriptions in the National Health Service*. Working Paper prepared at UCL School of Pharmacy and London School of Economics and Political Science.

This paper and the two that follow explore what is known about the design and deployment of service for electronic exchange of prescription information. In the first paper, attention is given to the three programmes that have tried examined the use of electronic prescriptions in English primary care from the late 1980s onwards. It examines the strengths and limitations of the architectures in use both for supporting the process of dispensing, the clinical management of patients' use of medicines, and prescribing practice. A comparison of the systems with regard to the three criteria of service availability, service confidentiality and service integrity, based on previous work for the ETP pilot programme by Chadwick and Mundy⁽⁷⁾ is presented.

- 3 Hibberd, R., Cornford, T. and Barber, N. (2013) *The Evolution of a Solution for the Electronic Transmission of Prescriptions in the National Health Service*. Working Paper prepared at UCL School of Pharmacy and London School of Economics and Political Science.

In this paper we describe the four national systems that have been adopted for the electronic exchange of prescriptions in England, Northern Ireland, Scotland and Wales. In this paper, we explore the motivations for these systems, the manner in which information is distributed amongst stakeholders, the uses to which this information is placed and the possible consequences for patients, and for the application of community pharmacists' clinical skills.

- 4 Hibberd, R., Cornford, T. and Barber, N. (2013) Experiences and Beliefs Regarding the Electronic Exchange of Prescription Information in Nations Outside of the United Kingdom. Working Paper prepared at UCL School of Pharmacy and London School of Economics and Political Science.

In this paper we examine the published academic literature that is available and the lessons that can be drawn from this for other national deployments of services for the electronic exchange of prescription information. The review illustrates that whilst there are a number of systems in development and use, within the English language literature there is limited reporting of any evaluations of these, and where evaluation has been conducted the focus appears to be on isolated aspects of the service. In the paper, we note previous work looking at the consequences of service introduction for patient experience, changes in work practices, attitudes towards the service, expected use of the data, and organisational change. The paper illustrates the need for a holistic approach to evaluation and for a greater number of studies in this area.

Papers Related to the Perceived and Measured Safety of the Service

- 5 Armstrong, S., Avery, A., Barber, N., Boyd, M., Dean Franklin, B., Hibberd, R., Mehta, R., Reynolds, M. & Sadler, S. (2013) The effect of the electronic transmission of prescriptions on dispensing errors and prescription enhancements made within UK community pharmacy: a naturalistic stepped wedge study. Draft paper being prepared for submission to BMJ Quality and Safety.

This paper reports on the study of changes in dispensing errors following the change from paper to electronic prescriptions. The study examined the change in prevalence of labelling errors, where the information on the label for the dispensed item deviates from the prescription, the prevalence of content errors, where the dispensed item does not match the prescription, and the prevalence of enhancements, where action by the dispenser improves the quality of the instructions presented to the patient on the dispensed items. The paper notes that theoretically electronic transmission of prescription data should lead to a reduction in labelling errors as there is less need to manually input data at the community pharmacy.

The design of this study, was based on a previous study conducted by Franklin and O'Grady.⁽¹¹⁶⁾ In this study dispensed items awaiting collection were compared with the prescriptions received by the community pharmacy for both labelling and content errors. This study expanded on this through the comparison of error rates for items dispensed using paper prescriptions, and those using electronic prescriptions delivered via EPS R2. The study also included an examination of changes in the rates of enhancements made by the community pharmacy team, which had not previously been studied.

Conduct of data collection involved periodic inspection of prescriptions and dispensed items at a number of community pharmacies that were either expected to use EPS R2, had begun using EPS R2, or which switched to EPS R2 over the course of the study. Data collection was conducted by two research pharmacy staff over the period of three years. Community pharmacies participating would be visited every twelve weeks for data collection.

This data collection process yielded a sample of 16,357 prescription items for analysis, of which 3,654 (22.0%) were printed prescriptions created on the GP practice computer, 81 (0.5%) of which were handwritten, 8,889 (54.0%) of which were generated as EPS R1 prescriptions, and 3,733 (23.0%) which were EPS R2 prescriptions. Data were analysed using two multi-variate mixed-effects logistic regression models fitted to each of the three outcome variables, presence of content errors, presence of labelling errors and presence of enhancements. The analysis compared the rates of each outcome for EPS R2 compared to non-EPS R2 prescriptions. Analytical models used controlled for both the identity of the community pharmacy from which the data was collected, and time of data collection.

The analysis showed that there were 869 labelling errors, 222 content errors and 2,235 enhancements present in the 16,357 prescription items analysed. There were no significant differences found for rates of either content errors or enhancements. However, there was a significant difference in labelling errors, with a 39% increase found in EPS R2 prescriptions. Following further investigation, it was found that this result appeared to be the result of local practice, with a community pharmacy not including some of the data in the instructions for patients on the dispensing label, in this case the indication for what the prescribed item was for. This error appears to fall outside the scope of the operation of EPS R2 but is related to local configuration of the service. In a subsequent sensitivity analysis, we found that exclusion of these cases removes this significant difference in the rate of labelling error between EPS R2 and other prescriptions.

- 6 Franklin, B.D., Reynolds, M., Sadler, S., Hibberd, R. & Barber, N. (2013) Community pharmacists' interventions with electronic prescriptions in England. *International Journal of Clinical Pharmacy*, 35, 1030-1035.

Paper reports on the first study in the United Kingdom to look at types of interventions made when prescribing problems identified at the community pharmacy. This follows earlier work by Hawkworth and colleagues,⁽¹⁷³⁾ and Chen and colleagues looking at paper prescriptions.⁽¹⁷⁴⁾

Prescribing problems identified by community pharmacy staff and reported in self-completed booklet. This booklet was completed by eight community pharmacies over a two-week period. Over the study period, 69 issues were found with 68 prescriptions.

The problems described in the booklets returned were classed as to whether the problem was related to the operation of the informatics, legal problems, clinical problems or organisational problems.

Problems reported included the use of Latin abbreviations rather than prescribing in full in English, ^(N=1) the creation of a paper prescription when an electronic prescription had been expected, ^(N=1) paper prescriptions received unsigned, ^(N=30) prescriptions received incomplete, ^(N=1) missing prescriptions, ^(N=1) and cases where an electronic prescription was issued but no doses appeared when viewed on screen despite these being visible on the token.^(N=4) Note that EPS should remove the presence of unsigned and incomplete prescriptions.

- 7 Garfield, S., Hibberd, R. & Barber, N. (2013) Pharmacists' experiences of using the Electronic Transmission of Prescriptions. *BMC Health Services Research*, 13:435

This paper reports community pharmacists' experiences to date as users of the Electronic Prescription Service (EPS). It is based on interviews with 13 community pharmacists who participated in EPS deployment either as a first of type site, or as part of a Primary Care Trust (PCT) wide deployment. Note that of these 11 had received EPS prescriptions, with 8 receiving electronic repeat dispensing prescriptions. Motivations for use of the service included a number of external factors, such as PCT or Head Office requirement, and internal factors such as perceived business and reduced time managing prescriptions.

Respondents' received training from: Software provider,^(N=9) Connecting for Health,^(N=2) Community pharmacy multiple head office,^(N=1) or self-paced manual-based training.^(N=2) It was reported that one community pharmacy had not received any training. Training methods included the use of face-to-face,^(N=6) on-line,^(N=3) video,^(N=2) or paper-based training.^(N=4)

It was felt that there was a need for more comprehensive training in some cases, that it was too early,^(N=2) or too late,^(N=2) although some felt that the timing of training was appropriate.^(N=3) In order to introduce EPS there was report of changes to standard operating procedures by some sites.^(N=6)

Reported benefits of using electronic prescriptions included: Reduction in errors,^(N=10) reduction in labelling errors,^(N=8) more even workflow,^(N=3) and an improved relationship with patient.^(N=1) Note that there was no real change seen in the pharmacist's professional role.^(N=9)

It also appeared that there was change in the relationship between the general practice and community pharmacy,^(N=7) with reports of better relationships with GP practice administrators and clinical staff,^(N=1) a greater appreciation of the role of pharmacy,^(N=1) faster access to prescriptions,^(N=2) and reduction in need for prescriber-initiated emergency supplies.^(N=1)

Problems identified included: Temporary loss of EPS,^(N=12) splitting of prescriptions onto electronic and paper forms,^(N=8) codes not being recognised,^(N=8) problems claiming for prescriptions,^(N=8) smartcards not working,^(N=2) smartcards expiring,^(N=1) locums at work without a smartcard,^(N=2) no means of managing dosette boxes,^(N=1) potential to miss messages to patient on prescription right-hand side,^(N=1) and problems setting nominations.^(N=7)

In the case of nomination, problems included: Cases where patient given nomination for a different community pharmacy,^(N=3) cases where the patient was told to go to their nearest pharmacy without checking this was the nominated one,^(N=2) cases where the patient was nominated without his or her knowledge,^(N=1) and cases where nomination not changed back after temporary change to this.^(N=1)

A number of recommendations were suggested by pharmacists including: Further training for GPs,^(N=2) electronic messages to GPs,^(N=1) promotion of EPS use at the GP practice,^(N=1) improving the way in which systems handle directions from GPs,^(N=1) addition of messages on the dispensing system to indicate if a paper or electronic prescription,^(N=1) and the ability to download repeat dispensing prescriptions earlier than when needed.^(N=1)

Papers Related to the Patient Experience of the Service

- 8 Hibberd, R., Cornford, T., Thum-Bonnano, S. & Barber, N. (2012) Patients' and patients' representatives' perceptions of the Electronic Prescription Service at initial implementer sites. Working Paper prepared at UCL School of Pharmacy and London School of Economics and Political Science.

Report of findings from qualitative patient interviews at early implementer sites for the EPS. Views sought from a range of users^(N=30) and non-users^(N=28) of the service with regard to potential drivers and barriers to use. Note that whilst the interviews highlight some interesting issues, there is no indication of the prevalence of these amongst the wider population.

The results seemed to suggest the main benefit from EPS was identified as faster delivery of repeat prescriptions^(8 Users) and better access to medicines.^(2 Users) However, the use of EPS does introduce the potential for split prescriptions, which posed problems for one participant. Security was mentioned as an issue,^(2 Users and 1 non-user) but only led to one participant refusing to use the service.

Repeat dispensing whilst welcomed by some participants who had not used it as a means of reducing forgotten repeat prescription requests^(4 Non-users) was viewed as potentially leading to medicines stockpiling.^(2 Users and 1 Non-user) It was also noted that this might not be suitable for all patients due to prescription instability.^(1 User) This was also viewed as a potential barrier to EPS use by some participants,^(2 Non-users) although the service has value if a prescription is written during a telephone consultation.

It should be noted that the use of electronic prescriptions was associated with the use of electronic prescription ordering,^(3 Users and 2 Non-users) loss of contact with healthcare providers,^(3 Non-users) and slower delivery of acute prescriptions.^(2 Non-users)

The value of nomination was questioned by some participants, with some feeling it lacked appropriate flexibility,^(3 Users and 1 Non-user) with others noting it would make little difference to their choice of pharmacy.^(2 Users and 6 Non-users) and others wanting to choose their dispenser after the prescription has been issued.^(1 User and 2 Non-users) These findings suggest potential applications of informatics to deliver a service with the level of flexibility that users of prescription services would like to see.

Papers Related to Change in Community Pharmacy Practice

- 9 Harvey, J., Avery, A., Waring, J., Hibberd, R. and Barber, N. (2011) A Constructivist approach? Using formative evaluation to inform the Electronic Prescription Service implementation in primary care in England. In A. Moen, S.K. Andersen, J. Aarts & P. Hurlen (Eds.) *User-Centred Networked Health Care (Studies in Health Technology and Informatics Vol. 169)*. IOS Press: Amsterdam.

This study looked at the beliefs that community pharmacies had about EPS Release 2 prior to receipt of the service. Respondents expected that the system would lead to improvements in workflow, from prescriptions being received in advance. It was also expected that sites would benefit from reductions in levels of dispensing errors, although the community pharmacies planned to dispense from prescription tokens.

The study found that there was a tendency for walk-in requests to be prioritised over prescriptions received via the Prescription Collection Service, or due for dispatch as a delivery to the patient. It was also noted that the size of the dispensing team at each pharmacy reflected the relative workload at each.

Problems encountered revolved around delays in receipt of electronic prescriptions. Also, there was concern over the reliability of terminals when there was constant logging-in and out of the dispensing system and EPS.

- 10 Harvey, J., Avery, A., and Barber, N. (2012) A qualitative study of community pharmacy perceptions of the Electronic Prescription Service in England. Forthcoming in *International Journal of Pharmacy Practice*.

Study looked at the experiences of early adopter community pharmacies which received more than 5% of their prescriptions electronically. Respondents noted that the system had led to improvements in workflow, which resulted from prescriptions being received in advance.

It was noted that the main problem with EPS was with delayed prescriptions. There were two concerns with this. Firstly, no-one knows where the prescription is. Secondly, patients will turn up at the community pharmacy expecting their prescription to be there. However, despite problems participants reported that they wanted to retain the system, as it makes life easier, expecting improvements in the systems offered.

- 11 Harvey, J., Avery, A., Waring, J. and Barber, N. (2012) The socio-technical organisation of community pharmacies as a factor in the Electronic Prescription Service Release Two Implementation: A Qualitative Study. *BMC Health Services Research*, 12: 471.

The paper explores the introduction of EPS in community pharmacy and presents the key contention that it is not possible to simply introduce an informatics system and its associated standard operating procedures and expect it to work as designed. Rather there is a need to take into account the socio-technical organisation of the community pharmacy and how the resources provided are translated into work practices.

In this paper, community pharmacies are classified according to the manner in which work is organised into three types, referred to as the [1] Technically-Oriented Approach, [2] The Socially-Oriented Approach and [3] The Improvising Approach. The consequences of each approach for the integration of EPS with existing work practices are discussed.

Community pharmacies that are Technically-Oriented approach were expected to feature greater standardisation of activity, with dedicated staff for the management of different parts of the dispensing process. It was expected that these organisations would be able to integrate new technology into their work-flows more easily than the other two approaches, but would be vulnerable to process disruption should there be a failure in this technology.

Those community pharmacies with an Improvising approach were characterised as having a loser organisation, with staff under-taking a range of tasks as required. It was suggested that the working practices in these community pharmacies might appear chaotic. In this environment, resources including EPS are used as required, although it was felt that integration would require the development of new standard operating procedures.

Community pharmacies adopting a Socially-Oriented Approach were characterised as having the lowest level of multi-tasking compared to the other two approaches, with technology not being viewed as integral to workplace activity. For these sites, EPS was viewed as potentially transforming the nature of work, placing the new technology at the centre of activity.

- 12 Elliott, R. and Boyd, M. (2013) Evaluation of Community Pharmacy Work Practices. Working Paper prepared at University of Nottingham.

This paper focuses on the evaluation of the expectation that EPS could allow community pharmacists to spend more time in clinical activities. However, noted that attempting to place a value on the time saved through the introduction of new technology is not straightforward. It was suggested that rather than try to attempt to cost staff time at a marginal rate, that is would be more meaningful to establish what activities are displaced or curtailed as a consequence of the introduction of new technology.

The paper describes the multi-dimensional work sampling protocol that was introduced. In this case, community pharmacies were asked to respond to a text message to a cellphone supplied by the research team with a code that indicated what they were doing at the time the message was received. There were seven community pharmacies studied in four PCTs, each receiving 10 messages a day over a 10 day period. The classification scheme for work activities was an extended version of work by Bell and colleagues, and McCann and colleagues.^(175, 176)

The researchers noted a number of issues that affected response rate including the inability to send a response during certain activities, such as when counselling a patient, technical problems such as the cellphone being inaudible and usability issues with the cellphone interface. Despite this the paper reports that 700 observations were collected, which represented a 94% response rate.

In the paper it is noted that community pharmacies receiving EPS R2 prescriptions appear to spend more time in dispensing activities, rather than less as might be expected. No effect was found for time of day from this data, as might be expected with prescriptions received in advance of patients. However, it was noted that EPS R2 prescriptions represented the minority of items at these sites and so, changes in the proportion of time spent in different activities might change as EPS R2 becomes the norm.

- 13 Davies, J.E., Barber, N. & Taylor, D. (2013) What do community pharmacists do?: A work sampling study. Forthcoming in *International Journal of Pharmacy Practice*.

This paper presents a further work sampling study from community pharmacy that attempted to address the degree to which community pharmacists were making greater use of clinical skills as expected under Government initiatives for the sector.⁽²¹⁾ In this study, trained observers undertook fixed-interval observation of a community pharmacy's activities over the course of a week. Pharmacy activity was recorded against one of 18 pre-defined codes.

This study yielded a total of 12,306 observations from the ten community pharmacies studies. The study found that the majority of pharmacist's time was spent on the assembly and labelling of products, and the monitoring or the clinical appropriateness of prescriptions. Clinical services and counselling appeared to take up a much smaller portion of the pharmacist's time.

Papers Related to Change in GP Practice Work Practice

- 14 Lichtner, V., Venters, W., Hibberd, R., Cornford, T. & Barber, N (2012) The fungibility of time in claims of efficiency: The case of making transmission of prescriptions electronic in English general practice. *International Journal of Medical Informatics*, 82, 1152-1170.

Paper examines the consequences of introduction of EPS to a series of first of type GP sites. The Information Centre's 2007 report noted that a large proportion of GP practice staff-time invested in managing repeat prescriptions, so clearly an issue of consequence. This paper describes a qualitative study of GP practice staff, and the manner in which EPS would lead to changes in workflow, the management of tasks and redistribution of responsibilities.

Noted that in the processing of routine repeat prescriptions, is a time-saving in terms of administrative tasks, removal of stages for filing and distributing prescriptions. This is most pronounced for routine prescriptions where the items on the prescription have been authorised, the prescription is being ordered on time and there is no evidence of over- or under-use.

It was noted that in the case of prescribers, that EPS could lead to change in the manner in which prescriptions are signed. The signing of prescriptions varies between prescribers, with some preferring to sign prescriptions at reception, others in their office, some signing at the end of the day, or after surgery.

The paper suggests that the signing of individual routine prescriptions would not be any faster with EPS, although in the case of non-routine prescriptions, it was suggested that there might be a reduction in time spent as the record for the patient is hyperlinked to the electronic prescription. It was suggested that EPS allowed greater flexibility in when prescriptions are signed, between consultations as well as at the end of the day, and where prescriptions are signed, through the provision of secure laptops.

In terms of prescription turnaround, electronic prescriptions appear to be received at the dispenser more quickly. The use of a common workflow list also allows for ad-hoc redistribution of prescriptions. Electronic prescriptions also removes the need to keep an audit of electronic prescriptions at the GP practice as this is maintained automatically.

There are a number of administrative activities that need to be undertaken in order to provide electronic prescriptions to patients, including: [1] Ensuring that prescription items are mapped to Dictionary of Medicines and Devices (DM+D), [2] Ensuring that the dispenser would be able to receive the prescription in a timely manner, [3] Addition of nominations for patients, and [4] Updating of the Personal Demographics Service for the patient record.

- 15 Lichtner, V. (2013) The Electronic Prescription Service and repeat dispensing: Reflections and preliminary findings. Working Paper prepared at London School of Economics and Political Science.

Paper notes repeat dispensing prescriptions introduced in 2005, and was presumed to provide better monitoring and reduce numbers of adverse drug events. System relies on prescribers trusting community pharmacies to inform patient of when review needed. Although prevailing wisdom that repeat dispensing should be based on identity of medicines or prescription stability no consistent view. Suggested promotion of service should be with community pharmacy. Also that this could lead to better control of medicines budget. Challenge to delivery of service was problem of maintaining synchronisation of medicines.

- 16 Garfield, S., and Barber, N. (2012) Primary Care Trusts experiences of introducing repeat dispensing prescriptions. Working Paper prepared at UCL School of Pharmacy.

Paper reports on interviews with medicines management leads from PCTs from the 83 PCTs able to deploy EPS. The response rate to our request for interviews was limited.^(N=5) However, the interviews did reveal that there was limited deployment of the service in the PCTs who agreed to participate.

Respondents noted some of the benefits associated with repeat dispensing including the potential reduction in processing, improved monitoring and the reduced need for emergency supplies with electronic repeat dispensing, but also some of the drawbacks of this process. This included potential set-up time, possible concerns over loss of staff, patients refusing to take the service, and the potential that patients would get all their issues at the same time. Concern was also raised that some community pharmacies might not check that patient getting what wants from each issue and just giving out all medicines on the issue.^(N=3)

Concern was expressed over retrieving cancelled paper issues but alleviated in the electronic world. Good GP practice and pharmacy relations seen as prerequisite to repeat dispensing,^(N=4) as was better pharmacy training.^(N=2) An alternative suggested to repeat dispensing was the issue of longer-duration prescriptions.^(N=2)

- 17 Lichtner, V. (2013) Evaluation of the Introduction of the Electronic Prescription Service in General Practice: Research Methods and Reflections on Methodological Challenges. Working Paper prepared at London School of Economics and Political Science.

In this paper, the research team reflect on the experiences of conducting a study of the implementation of EPS R2 into general practice, with reference to gaining accurate data on the change in time-taken to manage repeat prescriptions.. The paper describes the challenges to this form of study, and the degree to which these mitigate against a before and after study. This paper also describes how data was collected, the problems of accurately capturing timing data and the comparison of sites using different systems. The paper also reflects on the analysis of data conducted, which focussed on the principle stages of the repeat prescription processing cycle.

Papers Related to Business and Organisational Change

- 18 Petrakaki, D. (2012) [Electronic Prescription Service] and institutional changes in the field of English primary care. Working Paper prepared at London School of Economics and Political Science.

Paper looks at the changes that EPS could condition in the institutional field. Following the work of Rojäs and Hayes,⁽¹⁷⁷⁾ the paper focuses on the possibilities that EPS might present with regard to opportunities for organisational change, or deinstitutionalisation. Key changes were expected from the introduction of nomination and electronic cancellation functionality in EPS. It was expected that there would be: [1] Reduction in paper used in the processing of prescriptions, [2] Reduction in workload from removal of the need to re-key information, [3] Possibility of pre-dispensing, [4] Reduced patient waiting time, and [5] Possibility of new business models.

For community pharmacy, EPS was expected to promote competitiveness in pharmacy services, can intensify competition, and may lead to the rise of new business models such as internet pharmacy. It also introduces the need to monitor nominations. There might also be an advantage for sites that receive EPS compliant systems earlier than others.

Changes in work habits were identified for five main groups of service adopters: [1] GP practices were expected to see the end of paper repeat dispensing, and also change in the way tasks are organised and their workload, [2] Dispensing Doctors feel that EPS is not suited to the way in which they work, given it de-integrates their informatics system and introduces functionality that they do not need such as nomination and repeat dispensing, [3] Prescription Services expect reductions in costs and reimbursement problems, [4] Software suppliers found it difficult to work to Output-Based Specifications, which has led to a reduction in the number of suppliers and inequitable access to test environments, and [5] Patients' relationships with community pharmacies might change as there is expectation of faster, or immediate prescription delivery to the nominated dispenser.

It was concluded that EPS would not lead to deinstitutionalisation, but that there were a number of changes that will be noted: [1] EPS has to be adopted for future community pharmacy viability, [2] EPS will help regulate reimbursement, [3] New accountability relationships will emerge between clients and software companies, [4] Smaller software companies will be marginalised, [5] Community pharmacies will have a more customer-centric focus through use of more efficient ordering, and [6] Removal of paper will trigger cognitive-cultural change.

- 19 Petrakaki, D., Barber, N. and Waring, J. (2012) The possibilities of technology in shaping healthcare professionals: (Re/De-)professionalization of pharmacists in England. *Social Science and Medicine*, 75, 429-437.

This paper presents itself as a longitudinal study of the introduction of EPS and the potential effects on the de-/re-professionalization of community pharmacy. In the literature review it was noted that the introduction of automation has been associated with attempts to de-skill staff, although in effect this might also lead to professionals developing new capabilities and engaging in more conceptual activities. It was noted that the professions exist within their own ecology of work with its own logics.

It was noted that the professional status of healthcare staff could be affected by the increased access to information that the public has which could transform professional status. It was also noted that there were new standardised, rationalised and managed means of organising expert work, which was expected to lead to a potential de-professionalization, with professional staff losing their distinct status in the face of efficiency, productivity or customer service. However, it was noted that this might also support re-professionalization, in the way in which the profession can act to retain or retain their influence.

The introduction of EPS was expected to lead to a number of changes in pharmacy which were associated with potential reinforcement of the pharmacist's professional role, including: [1] Opportunities for dispensing in advance, which could allow for workload redistribution, [2] Use of repeat dispensing, allowing community pharmacists to take a greater professional role, dispensing as and when appropriate, [3] Division of dispensing and consulting role, such as in internet pharmacy

where pharmacists do what they can only do, and [4] Monitoring the quality of prescription transmission. The use of nomination was also expected to create opportunities for ongoing relationships with patients, and the capture of records of patient medicines. However, it was also felt that the service could lead to degraded inter-professional relationships where prescriptions were delayed in transit through EPS, and also when prescriptions needed to be changed. The other point made in the paper is that the introduction of EPS will enable access to the NHS N3 and eventually read-write access to the Summary Care Record (SCR).

The paper closes by noting that there is no clear indication as to what the future will be. De-professionalization might emerge from: [1] Change to temporal, spatial and manual aspects of work, [2] Mediated inter-professional communication leading to de-personalisation and erosion of trust, [3] Making healthcare work visible and open to Government control, and [4] Electronic connections opening up the professional boundaries of activity to other occupational groups. However, re-professionalization might emerge from: [1] Removal of mundane tasks through automation, [2] Expansion of community pharmacy jurisdiction and the opportunity to exercise more discretion and professional judgement, and [3] Electronic connection providing opportunity for community pharmacy to be more integrated into the healthcare team.

- 20 Petrakaki, D., Waring, J. and Barber, N. (2012) Technological affordances of risk and blame: The case of the Electronic Prescription Service in England. Forthcoming in *Sociology of Health and Illness*.

This paper takes view that technologies themselves should not be viewed as inherently risk-producing, but rather that risk emerges from the interaction of technology with social practices located in a given cultural context.

There are three forms of risk identified in the paper: [1] Risks associated with the lack of a national standard, [2] Risks associated with using EPS when it is interleaved with other technologies, and [3] Risks associated with changes to professional practice and inter-professional collaboration.

Risks noted by pharmacy representatives included: [1] Screen layout and usability, [2] Potential for misuse of Smartcards and uncontrolled access to patient information, and [3] Potential errors in prescription transmission. It was noted that there were concerns over use of electronic prescriptions, as pharmacists would be accountable to patients for delays, and there were concerns that use of electronic prescriptions to dispense against posed a risk.

For GP practice representatives, concerns were expressed with regard to: [1] Potential mismatch between DM+D codes and the prescribing system database, [2] Poor understanding of setting durations for items on electronic prescriptions, and [3] The need for additional steps to cancel and re-issue prescriptions. System designers recognised that the risk of output-based specifications required them to change how they engaged with clients, but also placed on clients the responsibility for acquiring a system of appropriate quality. Designers also noted the problems of ensuring that systems could work with N3 and each other.

It was noted that whilst EPS was presented by policy-makers as a mechanism to ensure prescriptions were not lost en-route, for the stakeholders identified, it appeared the service introduced a host of new risks.

The paper concludes noting three effects of risk-distribution in the domains of design, communication and professional/inter-professional communication. With regard to design, there is potential for blame-sharing over design decisions. With regard to communication in prescription transmission, blame-gaming might arise as a result of messages being altered or being delayed. With regard to the enactment of the professional role, it was suggested there would be blame-shifting, arising from risks due to uncontrolled access to EPS and from the digitalisation of dispensing.

- 21 Lichtner, V. (2013) Waiting for EPS: Business Views, Expectations, Hopes and Concerns Or The role of business critical technology in primary care imperfect markets. Presented at Leeds Health Informatics Network seminars series on Wednesday 6th February 2013.

Paper reflects on the potential use of EPS as an innovation which has the potential to be what Christiansen referred to as a destructive technology; a technology that could lead to dramatic changes of relations within the market, and potential for failure in leading companies. The paper draws on interviews during initial implementation of EPS R2.

The paper notes the increase use of services as a means to respond to a reduction in pharmacy income from dispensing. It was also noted that in addition to this threat were the potential for changing models of distribution, such as direct to patient, which would sideline community pharmacy, and also the impacts of parallel trading. Community pharmacy has also been affected by changes to the control of entry regulations, which this paper notes were relaxed.

EPS was expected to bring with it a number of effects including: [1] Providing greater opportunities for internet community pharmacies, [2] Promoting use of robots, [3] Promoting use of warehouse or hub and spoke dispensing [4] Opportunities for retaining customers through the use of nomination, and [5] Opportunities for telephone-based prescribing, such as had been offered by NHS Direct.

Smartcards were viewed as a means of making community pharmacy part of the NHS family, although there were conflicts within this. Firstly, prescriptions can carry messages for patients promoting GP practice services, running in competition with community pharmacy services. Secondly, there is the potential for access to SCR. The latter innovation was of concern to some smaller community pharmacies as it was expected to increase workload

- 22 Lichtner, V and Petrakaki, D (2012) Investigating the Electronic Prescription Service[’s] wider context: Research methods for [Work Package 4] Working Paper prepared at London School of Economics and Political Science.

In this paper, the researchers describe the methods used to investigate the business and organisational consequences of EPS R2 introduction. The researchers introduce the manner in which stakeholder mapping was used as a tool to support the sampling of respondents, as well as the data that supported the conclusions drawn including interviews and document analysis.

- 23 Lichtner, V., Petrakaki, D., Hibberd, R., Venters, W., Cornford, A. & Barber, N. (2010) Mapping stakeholders for system evaluation – the case of the Electronic Prescription Service in England. In: C. Safran & H. Marin (Eds.) Proceedings of the 13th. World Congress on Medical Informatics, Cape Town, South Africa. Amsterdam: IOS Press, p.1221-5.

This paper discusses the process of identifying stakeholders for the evaluation of health information systems through a map. Defining the multiplicity of stakeholders associated with a new system as well as the nature of their relationships is an important aspect of evaluating any intervention. We report a study of the Electronic Prescription Service (EPS) in primary care in England. We describe the complexity associated with the process of identifying stakeholders and illustrating their dynamic relationships. Reflecting upon our experience of map-making and map-using, we discuss the role of a stakeholder map to generate and communicate knowledge. The EPS stakeholder map – in its variety of possible alternative representations – reveals the complexity of the electronic prescribing scenario and the challenge of its evaluation. Recognising the drawbacks of a static two dimensional

representation, we argue that a dynamic use of a stakeholder map and a reflective map-making practice is useful and important for the evaluation of IT programmes in healthcare.

GLOSSARY

AMS Acute Medication Service

The AMS is the electronic service used by NHS Scotland for the transmission of prescription data on acute prescriptions in primary care. The focus of the AMS is on pharmaceutical care and on any counselling or advice associated with acute prescriptions in primary care.⁽⁴²⁾

ATD Authority to Deploy

The term ATD has been used on some documents by Connecting for Health as a synonym for Full Roll Out Approval.⁽¹⁴⁾

ATP Authority to Proceed

This is also known as the Development Milestone Achievement Certificate and forms part of the Common Assurance Process. As part of the test of the dispensing and prescribing systems, the systems are tested in situ in real-life general practices and dispensing contractors premises. This testing process involves the pairing of sites deploying dispensing and prescribing computer systems and allows for the test of the accuracy of message transmission between prescribing site, dispensing site and the reimbursement agency, NHS Prescription Services.

APPG All Party Pharmacy Group

The APPG is a parliamentary group that aims to both raise awareness of the pharmacy as well as promote current and future contributions that pharmacists could make to the nation's health.⁽¹⁷⁸⁾ The officers of the APPG are drawn from both the membership of the House of Commons and the House of Lords, with funding received from a number of bodies including the CCA, NPA, PSNC, and the Royal Pharmaceutical Society. The meetings of this group take place in public, according to the structures of select committees, and call upon government officials, health professionals, industry groups, patient groups, representatives of PCTs, as well as representatives of SHAs.

BMA British Medical Association

Doctors and medical students can choose to be represented by the BMA, an organisation that was established to look after the professional and personal needs of the profession.⁽¹⁷⁹⁾ The BMA claims to be in constant contact with the Governments and administrations of the UK nations. The organisation emphasises its aim of promoting high quality healthcare and the promotion of both medical and allied sciences. To support these aims, the BMA produces policies covering areas of interest such as public health, ethics and NHS inter-alia.

BNF British National Formulary

The BNF is a reference for those prescribing, dispensing and administering medications that are generally prescribed in the UK.⁽¹⁸⁰⁾

BT British Telecommunications PLC

BT were awarded contracts to deliver the N3 in 2004⁽¹⁸¹⁾ and the Spine in 2003.⁽¹⁸²⁾ The company has delivered both of these service infrastructures. The contracts for both of these services are due to end in 2013,^(183, 184) with a re-procurement of N3 already announced.⁽¹⁸³⁾

CAP Common Assurance Process

CAP provides a generic end to end process for all not provided by LSPs, which covered at least 80 different clinical systems that were not delivered by LSPs.⁽¹⁸⁵⁾ The CAP provides an end-to-end process for checking that systems are of sufficient quality and are clinically safe.⁽¹⁴⁾ This process included requirements for the basic level functionality related to connectivity with the Spine, and also functional and clinical requirements.⁽¹⁸⁵⁾ The requirements for CAP are tailored to each service introduced, and are defined during a period of NHS CFH Preparations for the service, involving a number of NHS functions including Technical Assurance, Information Governance, Service Introduction and Service Management, Clinical Assurance, Deployment Assurance, as well as NHS Prescription Services.

CCA Company Chemists' Association

The CCA represents the large companies that operate in community pharmacy, with the current membership composed of nine large multiple community pharmacy chains, representing over 50% of the UK market. The stated aim of this organisation is to create an environment in which pharmacy can flourish through fair and equitable competition.⁽¹⁸⁶⁾

CCG Clinical Commissioning Group

The CCGs were introduced in the 2010 White Paper Equity and Excellence: Liberating the NHS.⁽¹⁸⁷⁾ These consortia of general practices and other clinicians would take responsibility for commissioning NHS services for their local populations, with oversight of these by a national level NHS Commissioning Board, now known as NHS England.⁽¹⁸⁸⁻¹⁹⁰⁾ These organisations would provide local level commissioning in place of PCTs which were to be disbanded by 2013, and SCRs, which were to be disbanded in 2012.⁽¹⁸⁷⁾ It was expected that the NHS CB would work in partnership with local CCGs to ensure that health and wellbeing needs are met. The CCGs were expected to have a role in supporting the NHS CB in improving the quality of primary care.⁽¹⁹¹⁾

Cegedim Rx

A subsidiary of the Cegedim Group SA,⁽¹⁹²⁾ Cegedim Rx supplies two dispensing computer pharmacy systems in the UK, Nexphase and Pharmacy Manager.⁽¹⁹³⁾ It is claimed that the company supplies computer systems to over 6,500 community pharmacies in the UK, which represents over 50% of the market.⁽¹⁹²⁾

CfH NHS Connecting for Health

CfH was founded as the executive agency for the delivery of NPfIT in April 2005,⁽⁵⁾ with the expectation that the agency's role concluded in 2010 by the very latest.⁽⁸⁾ At the time of writing, CfH forms part of the Department of Health's Information Directorate, with no formal announcement yet made over its end-date. Over the course of its history, the agency has had to change from one responsible for the centralised delivery of informatics to one in which the strategy is to connect existing

informatics solutions into the national infrastructures of N3 and Spine to support national applications including Choose and Book, EPS, GP2GP, and SCR inter-alia.⁽¹⁹⁴⁾ The agency is presently responsible for maintaining and developing the national infrastructure in support of these programmes.⁽¹⁹⁵⁾ From April 2013 the informatics delivery functions of CfH will become part of the functions held by the Health and Social Care Information Centre.⁽¹⁹⁶⁾

CfHEP Connecting for Health Evaluation Programme:

The CfHEP was established in 2006, with the goal of informing the deployment of the products from NPfIT through a series of evaluations of particular components of the programme. It was hoped that CfHEP would deliver high quality, objective, third party insights into the lessons learned from the implementation of the NPfIT programmes.⁽¹⁹⁷⁾ This programme concluded in 2012.⁽¹⁹⁸⁾

CIP Capacity Improvement Programme

CIP involved the introduction into NHS Prescription Services of automation to capture and interpret data from paper prescriptions. The CIP, which was expected to go live by February, 2007, would use intelligent OCR to read data from paper prescriptions, and a computerised rules-engine to calculate reimbursement for prescription items on the basis of item dispensed, quantity, strength and other factors that affect reimbursement as described in the Drug Tariff.⁽⁹⁵⁾ However, it was recognised that prescription processing could not be fully automated and that there would be items that could not be read by the OCR, or items that required checking, such as where the patient or representative has signed a declaration indicating exemption from prescription charges.⁽¹⁹⁹⁾ The CIP was part of a plan to reduce the number of prescription processing sites from nine to three, with a reduction in staff from 2,800 to 2,580. This was expected to generate savings of £20 million that could be put into patient care.⁽⁹⁵⁾ However, a later estimate of the savings suggested that the integration of CIP with EPS would generate savings of £15 million.⁽¹⁵⁰⁾

CMS Chronic Medication Service

NHS Scotland's CMS is akin in structure to electronic repeat dispensing used in England. This service allows for the pre-authorisation of prescriptions lasting for a period of up to 48 weeks, to be dispensed at regular intervals to the patient.^(27, 47) The patient can only use the service if they give both explicit consent to the sharing of information and has a twelve week dispensing history with the community pharmacy they wish to use, although this can be changed over the life of a CMS prescription.^(27, 47)

CPOE Computerized Physician/Provider Order Entry:

CPOE has been deployed in acute care settings in the United States and other nations as a means of supporting accurate medication ordering for patients by physicians. Such systems can support the process of ordering prescriptions through the provision of menus of possible medications, default dosage levels, and be ensuring that the medication order is complete by specifying that all fields on the prescription order are completed.⁽²⁰⁰⁾

CSC Computer Sciences Corporation

CSC took over the LSP contract for the North, Midlands and East Cluster for the NPfIT in 2007.⁽²⁰¹⁾ They subsequently bought their main contractor for the programme, iSoft in August, 2011.⁽²⁰²⁾

CSU Commissioning Support Unit

CSUs have emerged from the re-organisation of PCTs. These will provide to CCGs a range of services including medicines management services, IM&T services, and commissioning contract support. The NHS CB would be responsible for employing CSS staff until 2016.

CUI Common User Interface

The CUI programme, which began in December, 2005, was a programme to define a series of standards and guidance for the design of healthcare computer systems' user interfaces deployed in England.⁽²⁰³⁾ The user interface guidelines cover standards for the display and entry of data, standards for the safe display and interaction with medication, and the management of use of technology. It is expected that interface guidelines for the display and entry of data have been mandated by the ISB for use by 2015.⁽²⁰⁴⁾ This project has been described as platform agnostic, meaning that the guidance and standards should apply to all systems used in the NHS.

DAC Dispensing Appliance Contractor

DACS are organisations that are able to dispense appliances for patients against NHS contracts. In order to operate as a DAC, an appropriate licence needs to be obtained from the Primary Care Trust, although the numbers of these are limited.

DDA Dispensing Doctors Association

The DDA provides dispensing doctors with advice on dispensary management, access to discounted training for dispensary staff, and also represents the interests of the profession through interaction with DH, General Practice Council, and the PSNC.⁽²⁰⁵⁾

Dispensing Doctor

Dispensing doctors are usually general practices based in rural areas who will dispense medicines to patients.⁽¹¹⁾ In order to become a dispensing patient, a patient must both live in an area which is rural in nature, and also at a distance of more than one mile from the nearest community pharmacy.⁽²⁰⁶⁾ As of 2008, it was estimated that there were 1,170 dispensing doctor practices in England.⁽⁴⁹⁾

DM+D Dictionary of Medicines and Devices

The dm+d is designed for use throughout NHS care settings as a common format for the identifying and describing medicines and devices.⁽²⁰⁷⁾ The dm+d emerged from previous work begun in 1999 to develop an electronic drug dictionary for primary care by NHS Prescription Services in order to support primary care prescribing and ETP and the United Kingdom Clinical Products Reference Source (UKCPRS) programme of the NHS Information Authority.^(208, 209)

The UKCPRS had been established as part of an initiative to standardise descriptions of appliances, devices and medicines and to link this knowledge in order to provide decision-support.⁽²¹⁰⁾ This programme was given the task of delivering dictionaries for primary care drugs, secondary care drugs, and devices. These were integrated into a single database released in December, 2002 as dm+d.⁽²⁰⁹⁾

Prior to the introduction of dm+d there was no common data standard used throughout the NHS for the transmission of information about devices and medicines.⁽²⁰⁷⁾ The dm+d was also expected

to support the development of both electronic prescribing systems and automated dispensing systems.⁽²¹¹⁾ Aside from the expected role that a shared drug dictionary would have in reducing costly medication errors,⁽²¹²⁾ research projects associated with the development of dm+d have included the integration of dm+d data with International Article Number barcodes provided on products to monitor products within the supply chain,^(211, 213) and also the development of a standard format for dose instructions.⁽²¹⁴⁾

The need for dm+d was emphasised in three Government reports on NHS Informatics and medicines management from the early 21st. Century.^(210, 215, 216) The continued use of dm+d as the standard for the transfer of drug information has been supported by the latest DH information strategy, published in 2012.⁽¹⁶⁷⁾

DVP Deployment Verification Period

In order to assure the quality of dispensing and prescribing systems, the CAP involves in-situ testing of systems between pairs of community pharmacy and general practice systems. Up to five pairs of community pharmacy and general practice sites can participate in this process. This phase of testing follows Reference Stage Testing in which the community pharmacy and general practice system has been tested with a test-pack of 600 prescriptions representing a range of scenarios. To gain authority to deploy the system across England, 2,500 prescriptions, representing a range of different types of EPS R2 electronic prescriptions must be sent from the GP practice, to the community pharmacy and on to NHS Prescription Services reliably. There is also a need to ensure that users are satisfied with the operation of the system. Review of the operation of the systems is conducted by the Clinical Safety Assurance Manager through the comparison of the prescription as prescribed and the prescription as received following processing at the dispensing contractor. Final approval is given for the roll-out of the service across the estate of sites using the system under test is given by the EPS Programme Delivery Board.⁽¹⁵⁾

DVR Deployment Verification Report

At the conclusion of the DVP of the CAP, the general practices and community pharmacies participating in the first of type testing programme need to complete a DVR to indicate that they are satisfied with the system and to allow it to progress to the next Clinical Safety Review prior to receiving FRA status.⁽¹⁵⁾

ebXML Electronic Business using Extensible Mark-up Language

The ebXML standards were developed to enable enterprises of any size to conduct business using the internet.⁽²¹⁷⁾ This standard is an open XML standard that enables data transfer as well as provides tools for definition and registration of business processes.

Electronic Transfer of Prescriptions

Rather than produce an electronic message that is transmitted over a network from the general practice to a community pharmacy, some systems encode prescription data as machine readable data on to a paper prescription. This type of system has been deployed by NHS Wales⁽¹⁰⁾ and the Department of Health, Social Services and Public Safety in Northern Ireland.⁽⁹⁾

EMIS Egton Medical Information Services Limited

EMIS have focused on the supply of general practice computer systems since the 1980s, with three current product lines, the command-line based EMIS LV,⁽²¹⁸⁾ the windows based EMIS PCS,⁽²¹⁹⁾ and more recently, their cloud-based solution EMIS Web.⁽²²⁰⁾ The company claims to have deployed their systems to 53.1% of general practices in the UK.⁽²²¹⁾ According to information from CfH, only EMIS Web will be developed to meet the demands of GPSoC.⁽²²²⁾ The EMIS Web system received FRA for EPS Release 1 in September, 2010, and for EPS Release 2 in March, 2011.^(223, 224)

EPS R1 Electronic Prescription Service Release 1

The first release of the EPS, involved the modification of general practice prescribing computer systems and dispensing contractor dispensing computer systems to include the ability to generate and receive an electronic copy of prescription issued. Data was transmitted via N3 and the Spine. The service also provided the ability to send copies of prescription message from dispensing contractors to NHS Prescription Services. This service provided the opportunity to test the infrastructure that would allow the transmission of electronic prescriptions from prescriber to dispenser to remuneration and reimbursement agency.

EPS R2 Electronic Prescription Service Release 2

The second release of EPS saw the electronic prescription message become the legal entity authorising dispensers to supply devices and medications to the patient with the option of creating a paper copy of the prescription using a prescribing or dispensing computer system. This release of the service, which used the same infrastructure as its predecessor, EPS R1, provided new functionality including electronic repeat dispensing prescriptions, and the ability to cancel prescriptions at any point up to their receipt by the dispenser.

e-Receipt

e-Receipt is Sweden's ETP solution, which began operation in its present form in 2000.⁽⁵⁵⁾ In this system a prescription is sent from the electronic prescribing system used by a physician to the community pharmacy via a secure national network, Sjunet.⁽⁵⁵⁾ By 2004, the system had been designed to include a mailbox configuration which allowed prescriptions to be sent directly to the community pharmacy selected in advance by the patient, or to a mailbox from which these could be downloaded by the community pharmacy the patient attends.^(55, 225) The service has been presented as a successful implementation of ETP. Between August 2000 and September 2005, monthly electronic prescription volumes rose from 100,000 to 1,200,000.⁽⁵⁵⁾ By 2008, over 75% of prescriptions were sent from a doctor's office to a community pharmacy electronically.⁽²²⁶⁾ Use of the service were expected to be the removal of illegible prescriptions, time saved through use of e-prescribing, reduction in fraud risk, improved patient drug information and the avoidance of duplicate prescriptions.⁽²²⁵⁾

ETP Electronic Transmission of Prescriptions

ETP is used to refer to any prescription or prescription message sent electronically via a computer network from a general practice to a dispensary in the community. In the case of England, this can include a community pharmacy, a dispensing appliance contract, or a dispensary within a dispensing doctors' practice.

Exemplar Primary Care Trust

In August 2011, a new approach was adopted in the implementation of EPS R2.⁽²²⁷⁾ Prior to this date, implementation had either been as part of first of type testing for the CAP or had been on a general practice by general practice basis, with support provided by the Primary Care Trust, with local community pharmacies being supported by their system suppliers and provided with information by PCTs as to when general practice sites in the vicinity would be expected to use EPS R2. The Exemplar PCT programme focussed on deployment at the level of the PCT, with PCTs invited to participate in a programme in which there would be deployment to a significant number of prescribing and dispensing sites in an accelerated manner. The process was expected to allow for a more overt demonstration of the benefits of EPS. In return for ensuring that sufficient resource and support was in place locally to support this process, CfH would offer direct support for PCTs with regard to engagement with clinical teams, business process change and faster resolution of issues during the implementation.

Exmouth Care Card Project

The Exmouth Care Card Project was a pilot project instigated in 1989 which investigated use of a patient-held smartcard as a mechanism for transfer of patient information between primary care and acute care providers.⁽⁶⁾ The smartcard contained prescriptions and a summary medical record. The pilot scheme involved general practices, pharmacies, diabetes and emergency care departments in local hospitals, and a dental practice.

FOT First of Type

As part of the Common Assurance Process (CAP) that assures quality of the systems, an in-situ test of the ability of each dispensing and prescribing system must be conducted.⁽¹⁵⁾ This involves the exchange of test prescriptions, and later real electronic prescriptions prior to the system receiving Full Roll-out Approval if all conditions of the CAP are met. This stage involves a two part process, a Reference Stage Test and a Deployment Verification Period.

FRA Full Roll-out Approval

FRA represents the last phase in the compliance testing process of the dispensing and prescribing systems in use, the Common Assurance Process. This is also known Full Roll-out Approval. This gives authority for the dispensing or prescribing system to be deployed at sites outside of the First of Type sites. However, there might be temporary caveats that limit the number of systems that can be deployed.^(228, 229)

GMS General Medical Services Contract

GMS is a contract for the provision of general practice services to the NHS, and is one of three procurement contracts that were in place at the time of this report, the others being APMS, and PMS.⁽¹⁴⁶⁾ The GMS provided a number of funding streams for general practice. This included essential services which all general practices were expected to provide and covered the management of patients who might be ill or who were ill with acute, chronic or terminal illnesses, additional services and enhanced services which were commissioned by PCTs in response to local health needs. Additional services included provision of immunisation, child health services amongst others. General practices did not have to provide additional services but would be expected to provide a portion of the monies available for commission of these services from other providers. There are a variety of funding streams for general practices including premises fees, a

dispensing payment for general practices with a dispensary, payments for senior staff, a global sum based on patient population, and the Quality and Outcomes Framework (QOF). The QOF was introduced as a voluntary scheme in which general practices would be paid against their achievement on evidence-based clinical indicators.

GPSoC General Practice Systems of Choice

GPSoC represents the latest of three procurement strategies for computer systems in general practice. Previous approaches in which general practices would be offered by the NPfIT LSP, and a successor programme which offered an alternative system in which LSP area were abandoned, as these did not meet the requirements of the GMS Contract.^(5, 147, 148) GPSoC instead offered general practices access to any system, paid for through PCT contracts, provided the system supplier met RFA99 and was willing to implement specific functionalities defined by NPfIT including EPS, and SCR.^(142, 144) The GPSoC contract was due to end on 1st. April, 2013 but has been extended until 31st. December, 2013.⁽¹⁶⁸⁾

HSCIC Health and Social Care Information Centre

The Health and Social Care Information Centre was established as a Special Health Authority, but will change status to a Executive Non-Departmental Executive Body in April, 2013.⁽²³⁰⁾ At this point, the remit of the HSCIC will expand from its present role as providing a focal point for the collection, linking, secure storage and publication of health indicators required to support health and social care in the NHS. HSCIC, to one that will also include support for national informatics services already commissioned. This latter role, will involve the transfer of some functions performed by CfH to the HSCIC and will include maintenance of the NHS Spine as well as the delivery of other services critical to national health informatics services, such as the creation of informatics standards. The role of the HSCIC will also include programme delivery, the design of solutions and the underlying architectures, the assurance and accreditation of systems including clinical safety, and leading on the development of processes to ensure information governance is maintained.⁽²⁴⁾ The HSCIC will continue the development of the SUS and also will be working on secure data linkage services to provide aggregated patient outcomes data.⁽²³¹⁾

HealthSpace

HealthSpace was designed to allow patients to access their SCR from home, and whilst the service did not allow patients to amend information, it did allow patients to add comments to their records.⁽²³²⁾ It was also reported that the service would provide online communication with general practices.⁽²³³⁾ An announcement was made that the service was to close in December, 2012 due to lack of interest in the service from patients.⁽²³⁴⁾

Helix Healthcare

Irish company that supplies dispensing computer systems. This company supplies the dispensing computer systems that are used by the internet-based community pharmacy, Pharmacy2U.

HITECH Health Information Technology for Economic and Clinical Health Act

HITECH was introduced into legislation in the United States as part of the 2009 American Recovery and Reinvestment act. It aims to support the meaningful use of electronic health records

by United States' physicians through a series of measures including incentive payments for meaningful use of systems, training of healthcare informatics professionals, accreditation of systems, and the development of a national information technology system.⁽¹⁶⁵⁾

iSoft

iSoft was a subcontractor to CSC as part of NPfIT, before becoming a wholly-owned subsidiary of CSC. Renamed Healthcare Group of CSC, the company had previously supplied informatics solutions for primary care and acute care as part of NPfIT.⁽²⁰²⁾ It was reported in September, 2012 that the company was withdrawing from UK primary care systems market, although there was no formal announcement of this by the company.⁽²³⁵⁾

INDAC Independent Dispensing Appliance Contractors

Representative body for dispensing appliance contractors, who have held roles in the EPS User Groups. and the EPS Forum.

INPS In Practice Systems Limited

Supplier of prescribing computer systems that is part of Cegecim, which also supplies dispensing computer systems.

Initial Implementer

This term has been used in two ways in CfH documentation. It has been used to refer to the community pharmacies and general practices that represented the earliest adopters of EPS R1 and EPS R2.^(63, 107) However, in the case of EPS R2 this term has been used to refer to the seventeen PCTs which were expected to host the FOT testing that would form part of the CAP, and which would be the earliest sites to deploy the service.⁽²³⁶⁾

Initial Implementation

As part of the first of type testing conducted for the Common Assurance Process that Connecting for Health instigate, real electronic prescriptions will be exchanged between up to five community pharmacy and general practice sites using particular dispensing computer or prescribing computer systems.⁽¹⁵⁾ In order for the dispensing or prescribing computer system to gain national deployment, 2,500 electronic prescriptions need to be flawlessly transferred between the general practice, community pharmacy and NHS Prescription Services.

Intellect

Intellect was founded in May 2002 as the trade association for the UK technology industry. The organisation stated that its goal was to develop capability to support a strong and growing technology sector, and to improve business performance through insight into markets, sharing best practice, and engagement with Government and regulators.⁽²³⁷⁾ In September, 2011, the Department of Health Information Director and Intellect published a joint plan with the goal of developing a healthy and vibrant health informatics market.⁽²³⁸⁾ This strategy would include work towards a new healthcare informatics strategy, the development of support for NHS management and healthcare professional in their ability to procure informatics, and to support work on standards for systems, information sharing and governance.

ISB Information Standards Board for Health and Social Care

The ISB represent the body that is responsible for defining information standards in England. This organisation is responsible to the Director of Informatics in the Department of Health. It was expected that the Health and Social Care Bill for 2011 would establish a duty on health and social care organisations to follow the information standards approved for use by the ISB.⁽²³⁹⁾

LMC Local Medical Committee

The LMCs represent GPs in their local NHS organisations.⁽²⁴⁰⁾ These committees work to define and support the local implementation of the General Medical Services Contract, working with primary care organisations, including PCTs and SHAs.⁽²⁴¹⁾

LPC Local Pharmaceutical Committee

The LPCs represent the local organisations in England for community pharmacists and community pharmacy owners. These independent organisations liaise with the Local Medical Committees in order to work on the delivery of services for patients from community pharmacy and GP practice, as well as local dental committees and local optical committees. The role of the LPC was to work with primary care commissioners, including PCTs, and other healthcare professionals in the provision of services.⁽²⁴²⁾

LSP Local Service Provider

A series of five LSPs were awarded contracts for provision of regional informatics services as part of NPfIT in 2003. These would provide the patient administration and prescribing systems required to meet the needs of the Care Records Service.⁽²³²⁾ They were also originally asked to provide a solution for general practice informatics. This approach was later replaced by GPSoC.⁽¹⁴⁴⁾ Each LSP was contracted to look after a particular geographical region, which spanned a number of SHAs.⁽²³²⁾

Meaningful Use

In order to incentivise the appropriate use of healthcare systems in the United States, a programme has emerged under the HITECH Act to encourage adoption and use of these services.⁽¹⁶⁵⁾ A three stage process has been developed, each stage being associated with incentive payments for clinicians. Stage one incentive payments were associated with recording of appropriate data, stage two incentive payments with the use of data in the improvement of processes of care, and stage three incentive payments with the changes in the outcomes of care.⁽¹⁶⁶⁾

MESH The Medical Subject Headings Classification

MESH represents the United States National Library of Medicines' hierarchically ordered controlled vocabulary thesaurus. This is used for the indexing of articles from bio-medical articles and is used to enable searching of the MEDLINE and PubMed databases.

Message Aggregator

All communications between dispensing contractor, namely community pharmacies and dispensing appliance contractors, and the Spine is mediated by a message aggregator. This will aggregate messages from a number of dispensing contractors and transmit these to the Spine.

Similarly, the message aggregator will receive messages from the Spine and re-transmit these to the appropriate dispensing contractors.

Microtest

Supplier of prescribing computer systems to both dispensing and non-dispensing general practices based in Cornwall.

N3 National Network for the NHS

The N3 provides a network infrastructure for the sharing of information between healthcare sites within both the NHS and Scottish NHS.⁽¹⁸¹⁾ N3 represents the network infrastructure that provides the broadband networking capacity to enable the transfer of data for services including Choose and Book, the EPS, SCR and the Picture Archiving and Communications System.⁽²⁴³⁾

NHSCB NHS Commissioning Board

The NHS CB is responsible for the commissioning of NHS services across England in a consistent manner, and in a way that makes use of best practice to deliver continuous improvements in health.⁽¹⁹¹⁾ In order to discharge its responsibilities that NHS CB will work through 27 Local Area teams working in partnership with local CCGs.⁽¹⁶⁹⁾

From the 1st. April, 2013, the NHS CB will become responsible for the delivery of the primary care informatics systems mandated under the AMS, GMS and PMS primary care contracts. The NHS CB will take responsibility for setting overall direction, strategy, budget as well as monitoring the national infrastructure. The NHS CB will be responsible for the development of IT infrastructure, the national service desk and support for national systems. In addition the NHS CB will be responsible for current GP practice service agreements including GPSoC and locally determined strategic and discretionary support services. CCGs will be responsible for general practice business support, as well as procuring appropriate systems from IT providers. Provision of RA services will be commissioned by the NHS CB Local Area Teams from CSUs.⁽¹⁶⁹⁾

NLOP National Local Ownership Programme:

In response to criticism of a procurement model in which all contracts for NPfIT were managed nationally, in 2006, there was a devolution of responsibility for local systems implementation and management of LSP contracts to the SHAs.

Nomination Audit Report

PCTs were given responsibility for ensuring that there was no evidence that patient prescriptions were being directed to specific community pharmacies from GP practices using EPS R2.⁽²⁴⁴⁾ Guidance issued to PCTs reported that Nomination Audit Reports would be available via the Secondary Uses Service.⁽²⁴⁵⁾ However, in reality, this functionality was not delivered and PCTs had to request Nomination Audit Reports from Connecting for Health. With the removal of Secretary of State Directions from 1st. April, 2013, there is no longer any expectation of proactive monitoring of nominations, although the NHS CB will be responsible for responding to specific complaints about abuse of nominations.⁽¹⁷¹⁾

NPA National Pharmacy Association

Trade association for community pharmacy which aims to support professional activity as well as providing a representative voice for the sector. The organisation also provides products and services to community pharmacy, including advice on standard operating procedures.

NPfIT National Programme for Information Technology

NPfIT was instigated in 2002 as a ten year programme.⁽²³²⁾ The initial focus of the programme was on the delivery of the Summary Care Record and Detailed Care Record (collectively referred to as the National Care Records Service), Choose and Book, the Electronic Prescription Service, the Secondary Uses Service and the supporting infrastructure of the National Network for the NHS (N3) and the Spine. The programme later included the GP records transfer, the Picture Archiving and Communications System, and the Quality Management Analysis Systems to audit GP performance against targets.⁽²³²⁾ This approach was introduced as it was viewed as the most efficient mechanism for promoting inter-operability and consistent development of informatics in the NHS. In 2005, responsibility for delivery of NPfIT was moved from DH to CfH.⁽²³²⁾

OCR Optical Character Recognition

OCR is the process of using computer systems to scan, recognise and encode data that takes the form of alphanumeric characters.⁽²⁴⁶⁾

ODS Organisational Data Services

The ODS code identifies organisations within the NHS, including community pharmacies, general practices and other NHS Trusts.⁽²⁴⁷⁾ This code is used to provide endpoint authentication of sites that wish to connect to the Spine via N3.⁽²⁴⁸⁾ The Smartcards used to access the PDS include a set of roles associated with the ODS.⁽²⁴⁹⁾ Spine Directory Services allows sites to obtain organisational data on another from any site that is connected to the Spine. The ODS code is used to identify the source and destination sites for electronic messages, including electronic prescriptions.⁽²⁴⁷⁾

PCT Primary Care Trust

PCTs have been responsible for the commissioning of local services since 2002, and are responsible for ensuring that the requirements of the NHS Operating Framework and the Informatics Planning Document are met.^(8, 119, 250) The PCTs were founded in 1997, but were abolished in April 2013.^(8, 187)

PDS Personal Demographics Service

The PDS provides a centralised record of basic demographic details for patients including name, address, date of birth, current GP, and the unique identifier for patients adopted throughout the NHS, the NHS number.⁽²³²⁾

PMS Personal Medical Services Contract

PMS is one of three contracts for the commissioning of general practice services in operation at the time this report was written. This contract allows for the commissioning of services from general practices by PCTs.⁽¹⁴⁶⁾ The same funding mechanisms are in place as for GMS aside from these sites not receiving a global sum, but rather a contract payment.⁽²⁵¹⁾

Positive Solutions Limited

Supplier of integrated electronic point of sale and patient medication record systems to community pharmacy. At the time the report was written the company was owned by Mawdsley, a pharmaceutical distribution and wholesaling company.

PSNC **Pharmaceutical Services Negotiating Committee:**

The PSNC negotiates the terms for the provision of NHS community pharmacy services through liaison with DH and other representative bodies for the NHS. The organisation's goal at the time of writing this report was to enable community pharmacy to offer an increased range of high quality and fully funded services.

Quicksilva

Supplier of electronic message brokering systems that enable community pharmacy systems to link to N3 and the Spine.^(252, 253)

RA **Registration Authority**

The RA is the organisation responsible for the administration of the issue of smartcards within a particular health community. This organisation, which might be part of a PCT, a local community service or a shared service, is responsible for verifying the identity of NHS staff wishing to access Spine systems, the registration of these members of staff and their roles, and the issue of smartcards.^(254, 255) It was announced on the 22nd. December, 2012 that the RA role could be performed by a number of alternative organisations including local authorities, independent sector and other non-NHS organisations and was looking for organisations to host pilot schemes.⁽¹⁷⁰⁾

RCGP **Royal College of General Practice**

The RCGP represents general practitioners in both DH and Government committees. The organisation aims to support both general practitioners and to improve patient care.

Reference Stage Test

This is part of the Deployment Verification Period of the First of Type Test that forms part of the Common Assurance Process.⁽¹⁵⁾ In this state of testing, a pack of 600 prescriptions, representing synthetic patients is sent between pairs of GP practices and community pharmacies participating in FOT testing. These test prescriptions need to be transmitted flawlessly between the prescriber, the dispenser and NHS Prescription Services, for the next stage of testing to begin. This pack tests for a number of scenarios including nominations, the electronic signature, prescription cancellations, patient death, repeat dispensing as well as the RBAC requirements underlying service use.

RFA **Requirements for Accreditation:**

RFA introduced to ensure the quality of informatics systems introduced into general practice.⁽¹⁴³⁾ The RFA standards were introduced in 1992, covered messaging from general practice to laboratory and to health authorities, data standards and prescribing criteria.⁽¹⁶⁾ General practices would only receive reimbursement for computer systems from the NHS if they met these standards and hence this provided a commercial incentive to suppliers to meet these standards. In order to enter into a GPSoC contract, it was expected that the computer system offered would meet the last of the RFA standards, the RFA99 standard from 1997.⁽¹⁴⁴⁾ It was claimed that the

introduction of RFA and changes to arrangements for funding of general practice prescribing systems had lead to a reduction in the number of system suppliers in the market.⁽¹⁴³⁾

Repeatable Prescription

This term is used as a synonym for Repeat Dispensing Prescription, but can also be used to refer to part of the repeat dispensing prescription itself.

Repeat Dispensing Prescription

A repeat dispensing prescription is a prescription that allows patients to obtain regular medications for up to twelve months without the need to order a prescription from their general practices. This system operates slightly differently for paper and electronic systems. In the case of the paper repeat dispensing system, the patient would be issued with both a repeatable prescription and a number of batch issues. The repeatable prescription is the document signed by the prescriber which identifies the items that the community pharmacist can dispense to the patient, and the number of occasions on which this action can arise. The first batch must be issued within six months of the date on which the repeat dispensing prescription is signed and the last batch issue can be dispensed against up to twelve months after the first dispensing event. Each batch issue is an unsigned copy of the repeatable prescription and is used to capture the endorsements made by the community pharmacist to indicate what was dispensed to the patient. In the paper system, as the repeatable prescription is the legal authorisation to the community pharmacist to dispense medications to the patient, dispensing can only take place at one dispenser. In the case of electronic prescriptions, a similar system is in operation, but each batch issue represents a digitally signed electronic prescription, which means that each batch issue could be dispensed at a different community pharmacy.

Repeat Prescription

A repeat prescription allows patients to obtain regular repeat medication without the need for a consultation with a healthcare professional on each occasion that he or she requires medication. The prescription would be authorised for a set period of time until a medication review is due for the patient, which might be for a period of up to a year. The authorisation of the prescription for issue means that administrative staff and prescribers can provide the patient with a new prescription for a set of regular medications on each occasion an order is placed for the patient.

Rx Systems

Supplier of community pharmacy dispensing computer systems,⁽²⁵⁶⁾ which is co-owned by EMIS as majority share-holder with a 78.9% stake in the company, and Phoenix Medical Supplies, a pharmacy wholesaler, as a minority shareholder holding the remaining 21.1% of the company.⁽²⁵⁷⁾

Secretary of State Directions

Prior to 1st. April, 2013, in order to issue electronic prescriptions, a GP practice needed to be within a Primary Care Trust that had Secretary of State Directions authorising the issue of prescriptions with a digital signature. The abolition of PCTs from 1st. April, 2013 means that Secretary of State Directions will no longer apply. Rather, any GP practice will be able to issue digitally-signed prescriptions provided that there is a minimum eight week notice period between a GP practices' intention to use electronic prescriptions and their deployment of these.⁽¹⁷¹⁾ This

notice period provides local dispensing contractors the opportunity to prepare for the receipt of electronic prescriptions and to ensure patients are nominated for the service. The planned date at which the GP practice is expected to issue electronic prescriptions is added by the local EPS Lead to the Tracking Database. Prior to the 1st. April, 2013, this would have been the EPS Lead for the PCT. After the 1st. April, 2013 this task will be managed by a local lead for EPS deployment drawn from either the CCG or the NHS Commissioning Board.⁽¹⁷¹⁾

SHA Strategic Health Authority

The SHAs are regional organisations within the NHS, which were founded in 2002 in order to develop local services within that region.⁽⁸⁾ Within the area covered by the SHA there would be a number of PCTs, as well as acute, ambulance and mental health trusts, over which the SHA would have strategic oversight.⁽¹⁴¹⁾ It was expected that SHAs would be abolished at the latest by 2013.⁽¹⁸⁷⁾

Spine

The Spine contains a series of national applications which underpin the five main informatics services for care providers in the NHS including Choose and Book, EPS, GP2GP, Summary Care Record and the Secondary Uses Service. At present, the Spine provides services in support of 60 million patients and links over 20,000 healthcare sites.⁽²⁵⁸⁾ The current contract for The Spine is due to end in 2013.⁽¹⁸⁴⁾

Surescripts

Surescripts provide a private national network for ETP in the United States.⁽²⁹⁾ The service is built from two networks provided by RxHub and Surescripts, which began operation in 2002 and 2003 respectively. It is estimated that at present approximately 25% of prescriptions in primary care are transmitted through this network, with 98% of multiple community pharmacies and 73% of independent community pharmacies being linked to the Surescripts network. The Surescripts network provides both prescription routing to any community pharmacy linked to the network and also a medication history for each of the patient using the service.

SUS Secondary Uses Service

The proposed SUS would collect data from the new National Care Records Service applications and aggregate data in support of management, commissioning, clinical audit and research.⁽²³²⁾

Swebtec

This company designs and supplies a web-based dispensing computer system for community pharmacy. The company is unique in that it entered the market to supply dispensing computer systems after the announcement of the EPS programme.

TPP The Phoenix Partnership

TPP was founded in 1999 and presently produces SystemOne, a general practice computer system, which has been delivered as a wider vision of a system that would provide a single electronic record across healthcare providers.

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