Electronic Prescribing in the United Kingdom and in the Netherlands

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HEALTH IT

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Preface

This study provides an overview of the development of e-prescribing in the United Kingdom (UK) and the Netherlands (NL), with the aim of presenting evidence about how electronic prescribing (e-prescribing) has evolved in the two countries, how widely e-prescribing has been adopted, and most importantly, what type of policies have been put in place to foster adoption. The goal of this study is to provide information that could transfer lessons learnt to e-prescribing efforts in other countries. In particular, the objective is for the European experience to inform the implementation of e-prescribing in the United States. Where possible, the results will be incorporated into an e-prescribing implementation toolset that would help provider organisations implement and use e-prescribing systems effectively.

For more information about this document, please contact Lidia Villalba van Dijk. For further details on the RAND Corporation project "Building an e-prescribing implementation toolset," please contact Douglas Bell at the Santa Monica address below.

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Acknowledgments

Summary

The implementation of e-prescribing in primary care settings followed a similar pattern in the Netherlands and the United Kingdom. Early implementation of e-prescribing started in the 1980s in both countries, spurred by grassroots interest from practitioners who saw opportunities to reduce errors and achieve efficiencies in medication management. In the 1990s, more widespread adoption of electronic medical records (EMRs) was driven in both countries by two factors: (1) quality incentives or billing requirements that were difficult to meet without having EMRs and (2) direct reimbursements for the purchase of EMR systems that met minimum standards. These EMR systems typically included e-prescribing features that generated printed prescriptions. In both countries, efforts to integrate more guideline-based prescribing met with variable success.

Since 2000, e-prescribing policy has shifted in each country toward developing a national integrated system that would allow more seamless communication of patient data, including the transmission of prescriptions to pharmacies via a national network. The United Kingdom is making a particularly large investment with the National Programme for IT. The Netherlands is following a similar approach on a somewhat more incremental basis. However, both countries are facing obstacles, including concerns about the costs of these systems and the security and confidentiality of data. Many professionals are also wary of these efforts due to concerns that centralization of data will enable more-intrusive oversight of their professional decision-making.

These experiences with health IT policy offer substantial lessons for the United States, which is now launching its own large-scale EMR adoption program. U.S. policy includes the kinds of incentives that succeeded in Europe as well as efforts toward regional health information exchange, which have not yet succeeded there.

Abbreviations List

API: Application Programming Interface

AHRQ: U.S. Agency for Healthcare Research and Quality

AWBZ: *Algemene Wet Bijzondere Ziektekosten* (Exceptional Medical Expenses Act)

CfH: Connecting for Health

DH: Department of Health

DHV: *Districts Huisartsen Vereniging* (The Local Primary Care Association)

EHCR: Electronic Health Care Record

EMD: *Elektronisch Medical Dossier* (Electronic Medical Record)

EMR: Electronic Medical Record

EPS: Electronic Prescription Service

EVS: *Elektronisch Voorschrijf Systeem* (Electronic Prescription System)

GP: General Practitioner

HIS: *Huisarts Informatie Systeem* (General Practitioner Information System)

ICPC: International Classification of Primary Care

IT: Information Technology

LHV: *Landelijke Huisarts Vereniging* (The National Primary Care Association)

NICE: National Institute for Clinical Excellence (UK)

NICTIZ: Dutch Institute for Information Technology in Health

NIVEL: *Nederlands instituut voor onderzoek van de gezondheidszorg* (Dutch institute for health research)

NL: Netherlands

NPfIT: National Program for IT

NHG: *Nederlandse Huisarts Vereniging* (Dutch Association of General Practitioners)

NHS: National Health System (UK)

PCT: Primary Care Trust

PRN: Pro Re Nata (Latin for 'as needed')

SHA: Strategic Health Authority

UK: United Kingdom

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Chapter 1. Introduction

1.1 Definition and Scope of e-Prescribing

Electronic prescribing (e-prescribing) is a broad term. Its definition varies across disciplines and over time, depending on how the technology has developed. For the purpose of this report, we have taken up the definition by Bell et al. (2004): clinicians' computerized ordering of specific medication regimens for individual patients.

Dennis (2007) also provides a helpful description of the components of e-prescribing:

> E-prescribing can be grouped into core prescription capabilities, health plan information, and clinical alert:
> - Core components include a searchable medication list, instructions for patients, prescriber signature, number of authorized refills, DAW (dispense as written) or substitution permitted field, prescriber comments to pharmacist, and PRN field.
> - Health plan information components, known to the patient's health plan and necessary for prescribing and billing, include member eligibility, applicable formulary and corresponding prior authorization requirements, and medication history.
> - Clinical alerts based on the patient's demographics and medical history may include drug-drug interaction, drug allergies, age-specific warnings, and dose adjustments based on patient weight, and so on.

E-prescribing is used in many settings within health care. However, in this report, we only refer to outpatient care (as opposed to inpatient or hospitalized care). Outpatient care, sometimes called "ambulatory care," takes place at a doctor's office or at a day health care clinic.

The Scope and Aims of the Project on E-Prescribing

This report is part of a larger project commissioned by the U.S. Agency for Healthcare Research and Quality (AHRQ) entitled "Building an implementation toolset for e-prescribing." The purpose of the project is to develop and test an e-prescribing toolset that helps provider organizations implement and use e-prescribing systems effectively. As a first step in developing the toolset, we conducted an environmental scan and subsequently an analysis of existing e-prescribing initiatives in the United States and Europe. By studying existing initiatives, we hope to learn and understand the extent to which implementation success is attributable to government policies, key practices or features, prescription-related processes, standards and technologies or external factors. In particular, we hope to gain insight into success factors that might guide policy formation in the United States.

Within the study of existing initiatives, this report focuses on e-prescribing in the United Kingdom (UK) and the Netherlands (NL). The lessons learned from both countries, reflected in this report, will contribute to the wider project of building an implementation toolset. The e-prescribing toolset is expected to comprise guidance of

best practice and customizable aids, including workflows. Furthermore, the toolset (and other output) will be publicly available in early 2011.

Why Did the Authors Choose the Netherlands and the United Kingdom?

We chose to examine the UK and the Netherlands because these countries were among the earliest to achieve high rates of electronic medical record and e-prescribing adoption in Europe (Schoen et al., 2006). A certain element of convenience also influenced this selection. Language capabilities within the research team and cultural proximity to the United States were also factors. In addition, the UK was chosen because the British National Health Service (NHS) is currently implementing a nationwide Electronic Prescription Service (EPS), which represents an unprecedented effort to establish a system for the centralized exchange of standardized electronic prescription information.

Who Can Benefit From This Report?

We prepared this report to help a variety of stakeholders, including health care providers (ambulatory-care physicians, nurse practitioners, and pharmacists), patients, people in the information technology (IT) health industry involved in implementing e-prescribing systems, and policymakers.

Chapter 2. Background: The British and Dutch Healthcare Systems

2.1 The Dutch Health System

Overview

The total government expenditure in the Netherlands on health as a percentage of total government expenditure in 2005 was 13.2 percent (WHO).[1]

The Dutch health care system underwent a major reform in 2006. Before 2006, the Dutch health care system was a dual system in which around 60 percent of the population were insured by statutory health insurance funds (with sickness funds) and the remaining 40 percent were privately insured. More specifically, people earning above €30,000 per year (and their dependents) purchased private health insurance and were excluded from the statutory coverage by the publicly financed health insurance scheme (Protti & Smit, 2006). To create competition among insurers, the division between sickness funds and private health insurers was eliminated, and all insurers were allowed to operate nationally to provide both statutory and private health care policies. This became known as the 2006 Health Care Reform. Under the new reform, everybody, regardless of income, has to purchase, from a private health insurer, the Standard or Basic Health Insurance, which is regulated under the Health Insurance Act of 2006 (*Zorgverzekeringswet,* or ZVW). The statutory Basic Health Insurance legally provides a standard benefits package that covers basic medical care, such as care by general practitioners (GPs), hospitalization, dental care up to 18 years, maternity care, and medicines. Citizens are also offered additional packages by the health insurance companies to cover additional treatments, but these packages are optional. Any additional features on top of the Basic Health Insurance have an additional cost that is paid to a private health insurance company and is therefore regulated under private law[2] (Klazinga, 2008). However, expensive, chronic, and long-term care such as semi-permanent hospitalization and disability costs, including the use of wheelchair, and so on, are still covered by the state-run insurance accessed by all citizens, which is regulated through the Exceptional Medical Expenses Act (*Algemene Wet Bijzondere Ziektekosten,* or AWBZ).

The health insurance system is financed by a mixture of sources. On the one hand, the statutory Basic Health Insurance consists of a flat-rate premium paid to a private health insurer (approximately €1,200/year) (Protti & Smit, 2006). For those with an employer, the costs of the (public) AWBZ are financed through income-related contributions, where the rate is set at 6.5 percent of the first €30,000 of annual tax income. For those who are self-employed, the contributions are determined by the Tax Department

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[1] World Health Organization, 2008.

[2] Private law is the part of the legal system that regulates relationships between individuals. It is different from public law insofar that the latter involves the state.

(Klazinga, 2008). The contributions are collected centrally by the tax administration and then distributed to the various insurance companies.

General Practice in the Netherlands

In the Netherlands, a general practitioner (GP) or *huisarts* is the first port of call for any health problems. A GP provides primary care, specializes in family medicine and, if necessary, refers the patient to a specialist at a hospital.

As of 2008, there were approximately 8,800 GPs in the Netherlands, with an average number of patients per GP of 2,322.[3] The GPs work in about 4,200 practices. Most of these are very small, 42 percent being solo practices and 32 percent being two-GP practices (Kooistra, 2010). However, these figures have been changing rapidly, with the numbers of solo practices declining in particular. Out of the total number of practices, 650 also have a pharmacy function (13.5 percent).

Before 2006, GPs got their revenues from two sources: capitation fees and service fees. Service fees represented only a small percentage of a GP's income and came primarily from privately insured patients, who paid medical practice directly and then were reimbursed by their insurer. Capitation fees, which cover both income and practice costs for GPs, represent a form of payment based on the number of patients on the practice list, regardless of whether or not the patient consults the GP. Capitation fees were the prevailing form of income for GPs and were paid to the GP by the Sick Fund (*Ziekenfonds*), which got payments from employer and employee contributions (Van Weel, 2004). However, since the implementation of the 2006 health care reform, contracts between health insurers and GPs cannot be agreed at the national level. GPs now have to negotiate contracts individually with several health insurers. Negotiations depend on a variety of factors, such as number of patients, the geographical location, and the costs and quality of services. An appropriate and sophisticated information management system is therefore crucial to decrease costs and minimize the administrative burden on GPs (Protti and Smit, 2006).

2.2 The UK Health System

Overview

The British National Health Service (NHS) was founded in 1948, emerging from a commitment to offer equal access to health care for all citizens. All citizens in the UK have access to free basic care, and certain medicines are funded and covered by the NHS.[4] However, an important percentage of licensed medicines follow a co-payment

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[3] The Netherlands has an official population of almost 16.49 million people. Netherlands Centraal Bureau voor die Statistiek, 2010.

[4] The National Institute for Clinical Excellence (NICE) regularly publishes a national formulary, which is a list of prescription drugs covered by a drug benefit plan that has been developed taking into account a series of criteria including the cost, quality, and safety features of the drug being prescribed. Even in implementing guidance from NICE, Primary Care Trusts (PCTs) often work with Area Prescribing Committees to develop their local formularies, which are developed to reflect local circumstances. Furthermore, not every drug is accompanied by NICE guidelines,

scheme, where the patient pays a flat rate charge for each item dispensed. The flat rate does not relate to the cost of the medicines but is rather a part of a policy to avoid unreasonable use of medicines. Nevertheless, certain social groups are entitled to free NHS prescriptions: children under 16, young people between 16 and 18 following full-time education, people over 60, and people with defined health conditions or disabilities and people with low income (who are entitled to apply for the NHS Low Income Scheme).

Seventy-four percent of NHS funding comes from general tax revenues. The rest stems from the National Insurance payments (paid by working people and employers—approximately 20 percent of income), copayments for certain items, and other income-generating schemes (UK Department of Health, 2010b). Health authorities also raise funds from voluntary sources.

Many different organizations form the NHS. The highest authority is the Department of Health (DH), which is responsible for administering the resources and finances and running the NHS. The Strategic Health Authorities (SHAs) are responsible for developing strategies on health and ensuring high-quality performance at the local level. The Primary Care Trusts (PCTs) manage each region and are responsible for the local planning. PCTs receive their budgets directly from the DH. PCTs are responsible for making sure the appropriate health services are provided efficiently and effectively, which includes securing pharmaceutical services in the area.[5] In 2006, there were a total of 151 PCTs in England and slightly fewer than 8,300 GP practices throughout England (on average, 55 GP practices per PCT), and a total of 33,360 general practitioners.[6]

In 2001, because of criticisms of the quality of NHS care, the UK government committed to increasing NHS funding, from 7 percent of GDP toward the EU average at that time of 8.1 percent. Performance-based bonuses were also introduced, as described in the following section. By 2006, the NHS was spending an estimated £120 billion on health care annually, representing 9.4 percent of GDP (Griffin, 2007). Because of the current demographic and socioeconomic situation, cost growth has become a concern, with successive governments trying to improve processes to improve efficiency as well as quality. Evolution of the NHS has also been influenced by the evolving values of society, which have become more focused on patient autonomy and decision-making power. This confluence of factors has been driving health IT policy in the UK.

General Practice in the United Kingdom

The first point of contact in primary care is the GP. Citizens are generally assigned a GP based on the area in which they live. The average number of patients per GP is 1,500,[7] on average lower than in the Netherlands. Working practices are changing, with an increasing number of GPs working part-time, especially among female physicians.

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and new drugs may have emerged between NICE reviews. Consequently, subcommittees may decide on temporary formularies.

[5] UK Department of Health, 2010a.

[6] Selected Statistics by Primary Care Trusts (2007).

[7] The official population in 2001 for England was 49,138,831 (UK Office for National Statistic, 2010).

The size of general practice offices is bigger than in the Netherlands. In fact, on average, the number of GPs per practice in the UK is four, compared to 1.5 in the Netherlands.

The majority of GPs are independent contractors to the NHS (as opposed, for example, to employees at hospitals). GPs tend to hire their own staff and operate their own offices to provide medical services. GPs were traditionally remunerated via a wide range of financial incentives: fee-for-service (15 percent of total income), salary (30 percent), capitation services (40 percent), and capital and information technology (15 percent) (Smith and York, 2004). This form of contract, which encouraged more quantity than quality of care, was known as the Traditional Contract. Furthermore, the Traditional Contract, with fixed capitation fees as the main form of payment, discouraged GP's from seeking out high-risk patients or people living in disadvantaged areas. Hence, as an alternative to the Traditional Contract, GPs were offered the opportunity to work under locally negotiated arrangement known as 'Personal Medical Services' (PMS) contracts, where salary was based on local circumstances (Smith et. al, 2004).

In 2004, the New GP Contract was introduced. The most important difference, compared to the Traditional GP contract, is the promotion of the role of pay-for-performance. Although the Traditional Contract did include a couple of performance indicators, the New Contract ties approximately 25 percent of a GP's income to 147 performance indicators. Since 2004, these performance indicators have been revised— to 135 and 128 indicators in 2006 and 2008, respectively (Ashworth & Jones, 2008). In essence, the indicators combine the clinical management of certain long-term conditions with the managerial, organizational, educational, prescribing, and "patient experience" aspects of primary care. Achievement on performance indicators determines the financial reward a GP will receive. Health technology can help achieve those performance indicators by improving reporting and contributing to better clinical and management performance processes and outcomes.

Chapter 3. Methods and Data

To understand e-prescribing in the Netherlands and in the United Kingdom and identify barriers to and drivers of implementation, we performed two tasks, a literature review and a key informants interviews. We carried out a literature review, aimed at finding both relevant peer-reviewed articles and practical (official) documents about implementation such as toolkits, and so on. We also conducted semistructured interviews with key informants.

3.1 Literature Review

We searched for peer-reviewed articles and official Web-based documents. For peer-reviewed articles for both the Netherlands and the UK, the key search terms listed in Table 3.1 were entered into the PubMed database, more specifically into the MeSH (Medical Subject Heading Terms) database.[8]

Table 3.1. List of Key Search Terms

United Kingdom with:	Medical Order Entry Systems
	Medical Informatics
	Informatics
	Computer Communication Networks
	Organizational Innovation
	Utilization
	Technology
	Public Health Informatics

The Netherlands with:	Medical Order Entry Systems
	Medical Informatics
	Informatics
	Computer Communication Networks
	Organizational Innovation
	Utilization
	Technology
	Public Health Informatics

For the Web-based search, we mainly used Google™ as the search engine. In addition to the terms in the PubMed database, the following other key words were researched:

- Electronic prescribing Netherlands
- *Elektronisch voorschrijven.*

Following the listed key terms from the literature review, we identified and read 25 abstracts—14 about the United Kingdom and 11 about the Netherlands. The articles about the UK were published between 2002 and 2007; those about the Netherlands dated from 2001 to 2007. Articles older than the year 2000 were purposefully excluded, because e-prescribing is a relatively new field of study and lessons learned for its implementation depend significantly on the evolution of technology.

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[8] National Center for Biotechnology Information (undated).

The retrieved articles were overall very general in scope. For example, one article consisted of a conceptual map of e-Health research in general. Many other retrieved articles dealt with e-prescribing in the hospital setting (which is out of the scope of our study). Although this information was useful in improving our understanding of e-prescribing, drivers and barriers to the implementation of e-prescribing in the GP setting are different from those in the hospital setting. Overall, the articles focused more on the benefits and costs of e-prescribing than on the actual implementation.

In addition to using the key search terms, we navigated through the most important Web sites in the Netherlands and the UK containing information about e-prescribing, including the NHS Connecting for Health Web site (CfH, 2010) and the Nictiz Web site (Dutch Institute for Information Technology in Health, undated.)

During the key informant interviews (described below), we also asked subjects about what documentation that they thought they could share with us to learn about e-prescribing in their countries. We reviewed these documents and included relevant information from them in this report.

3.2 Key Informant Interviews

We conducted semistructured telephone interviews with key informants who were familiar with the history and evolution of health IT policy in the Netherlands and the U.K. Subjects were identified as experts in these areas using a snowball sampling approach, beginning from contacts within the U.K. National Health System or the Dutch Ministry of Health, and by contacting authors of relevant academic publications and government reports. A total of 4 U.K. and 4 Netherlands subjects were interviewed.

Semistructured interviews were conducted using an interview protocol (Appendix B) as a general guide. Interviewers could add or omit questions and/or probes during the interview at their discretion to follow up on emerging topics of interest or areas in which greater clarity was needed. The interview guide was sent to the interviewees in advance.

Each interview was conducted by a team of two interviewers (HD and LV), one of whom led the questioning and one of whom took notes. Both were bilingual in Dutch and English. The interviews were not recorded.

3.3 Research Questions

We analyzed the results from the literature review and the interviews to address four broad questions:

- How did e-prescribing develop and evolve in each country?

- What was the policy environment that fostered the evolution of e-prescribing (decision-making bodies, stakeholders and funding arrangements, incentives for adoption and policy levers used)?

- How widely has e-prescribing been adopted?

- What factors affect adoption of e-prescribing? What are the benefits and costs perceived by e-prescribing stakeholders? What other drivers and barriers determine e-prescribing?

Qualitative analysis followed a template organizing style. Given the relatively simple structure of the data and the straightforward research questions, we used the comments feature of Microsoft® Word rather than a qualitative analysis package to identify and track the occurrence of concepts.

The following two chapters (Chapters 4 and 5) present our findings for the Netherlands and UK, respectively. Chapter 6 compares and contrasts the state of e-prescribing across the two countries, and Chapter 7 offers our conclusions.

Chapter 4. E-prescribing in The Netherlands

This chapter presents the results of a literature review and four expert interviews about e-prescribing in the Netherlands. This chapter (and the next one on the UK) are structured according to the key questions presented in Chapter 2 regarding (1) the evolution of e-prescribing, (2) the stakeholders, (3) and the barriers and drivers to e-prescribing adoption. In section 4.4, we describe the extent of adoption.

4.1 Evolution of Health Technology in the Netherlands

The first computer at a Dutch GP office was installed in 1978. By 1990, 23 percent of GPs were using a computer. Today, 97 percent of GPs use a computer-based GP Information System (*Huisarts Informatie Systeem* or HIS). HIS is a computer-based program specifically designed for medical and administrative management in primary care settings, to which different modules can be added, including financial, medical, research, and prescription modules. Each module has a set of specific functions, but the modules are interrelated (van der Lei, 1993). Therefore, understanding the evolution of e-prescribing in the Netherlands is only possible in the context of the evolution of HIS (GP Information Systems).

Early Initiatives

GP associations in the Netherlands have traditionally been very active and have worked closely together on issues of common interest through professional associations such as the Dutch College of General Practitioners (*Nederlandse Huisartsen Genootschap*, or NHG), whose mission is to provide scientific support for the general practice, and the Dutch Association of General Practitioners (*Landelijke HuisartsenVereniging,* or LHV), which supports and represents Dutch GPs at the national and international level. In the mid 1980s, GPs and IT professionals recognised quickly the opportunities of IT in providing population-based services that would make processes more efficient. They joined together to form the Coordination Workgroup on Informatisation and Automation (*Werkgroep Coordinatie Informatisering en Automatisering* or WCIA). This workgroup, in collaboration with HIS vendors, set up the (minimum) requirements for the functioning and quality of HIS (or GP Information Systems). As a result of such collaboration, the developers of HIS agreed to make their systems compliant with WCIA. WCIA was a form of regulation that ensured a minimum set of requirements and shared common functionalities (a minimum degree of standardization).

This initiative, together with the opportunities offered by a computerised general practice, was soon recognised by the government. After conversations with the Dutch College of General Practitioners (NHG), the government implemented a policy by which GPs would get reimbursed for expenses related to the automation of their practices. In fact, if GPs proved to be using an automated and a WCIA-certified HIS, they were reimbursed for their IT costs from their health insurer. These financial incentives, together with the regulatory instrument of a standardised certification, resulted in high penetration rates of the HIS in the Netherlands.

E-prescribing was considered an essential module of HIS, but it has traditionally produced a printed paper script that the doctor signed. Over time, varying

functionalities have been added to HIS, such as decision support systems and the capability of sending and receiving prescriptions electronically through standard EDIFACT messages.[9]

EVS

In 1998, a separate e-prescribing application, the *Elektronisch Voorschrijf Systeem* (EVS), was developed to enable prescribing based on standard guidelines from the NHG. The EVS, which in English means electronic prescribing system, was originally distributed on CDs as a separate application and was later was integrated with some HIS systems. It advised on the most appropriate drug therapy based on the patient's diagnoses, expressed in the ICPC (International Classification of Primary Care) coding system, as well as basic data about the patient such as age and other characteristics (such as comorbity, history in family, and so on). The EVS crosschecks these indications with the guidelines and formulary, providing advice on the best and least expensive medication, and at the same time allows the GP to print out the prescription and store the information electronically. The EVS was available from 1998 to 2003, and later was integrated into some HIS systems.

The EVS guidelines and formulary continued to be available to HIS vendors after 2003. However, our interviewees did not agree about the extent to which the EVS knowledge base is currently being maintained and used (see Section 4.4).

New Initiatives

Demographic, technological and socioeconomic factors have changed the organizational working habits and routines of GPs. For example, GPs have increasingly been working in multidisciplinary centres rather than in solo practices.

Recent efforts have focused on the development of a nationwide system for the electronic exchange of medical data, the National Electronic Health Care Record (EHCR), which would ultimately link GPs, hospitals, physicians, and pharmacists. The EHCR is not a module of the GP IT system but a virtual network by which information can be stored and shared nationally.

The implementation of the nationwide EHCR was initiated by the National IT Institute for Healthcare in the Netherlands (NICTIZ), which was created in 2002. NICTIZ sets the legal framework for the exchange of patient information and for communication between GPs and other health providers (in terms of the national infrastructure, electronic messages, and safety). It also coordinates the implementation of health IT projects and provides a level of national support, including training, a helpdesk, and maintenance of Web-patient portals.

The implementation of a nationwide EHCR is still in its infancy, and discussions are ongoing between the different stakeholders in society. Therefore, for the remainder of this chapter, we will focus on earlier initiatives—more specifically, on understanding the barriers to and drivers of e-prescribing, including the EVS 'formularia' application.

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[9] EDIFACT stands for Electronic Data Interchange for Administration, Commerce and Transport, an international standard messaging protocol.

4.2 Stakeholders in e-Prescribing

General Practitioners' Professional Organizations

Both interviewees and the literature suggest that the nature and organizational structure of Dutch GPs have been among the main drivers for the rapid adoption of HIS. GP organizations in the Netherlands are typically organised into small groups of general practitioners who agree to regulate duties, offer training and education, peer review among themselves, and give other forms of support. More specifically, the GP guild is made up of the Dutch College of General Practitioners, the National Association of General Practitioners, and the District Associations of General Practitioners. Their functions and roles are separate but interlinked.

At the National Level. The Dutch College of General Practitioners (NHG) typically sets standards at the national level for medical questions for GPs and for pharmacies. The NHG was very active promoting EVS in conferences, through workshops and by means of a free CD by which the application was installed. The NHG is currently developing a Web portal for the EVS and has been negotiating with vendors of HIS to have an EVS expert-advice system incorporated into the GP systems.

The National Association of General Practitioners (LHV) is responsible for ensuring good quality of primary care for the whole population in the Netherlands. In 2004, the budget was drastically reduced, and as a consequence, the LHV no longer participates in information and communications technology (ICT) boards (Protti & Smit, 2006). However, at the time of the implementation of EVS, LHV and NHG were responsible for liaison with the different providers to make sure that EVS was compatible with the variety of different HIS.

At the Regional Level. The District Associations of General Practitioners (DHV), serve as an umbrella of smaller GP organizations at the local level that agree to regulate duties, ensure continuous training, and deal with other local matters. At the same time, each of the 23 DHV report directly to the national body, the LHV. In other words, the District Associations stand in between the local organizations and the LHV. (European Union of General Practitioners, 2010)

In the case of the implementation of EVS, the DHV was in charge of collecting information regarding the technical situation of GPs (e.g., whether they had a system, which type they had, the type of support GPs already had or needed for the implementation of EVS). In other words, DHV ensured coordination and compatibility of EVS with GP systems. To do this, the DHV had different local roles, including education (e.g., organizing courses on how to use the EVS) and promotion.

Ministry of Health, Welfare and Sports

The Ministry of Health, Welfare and Sports (*Ministerie van Volksgezondheid, Welzijn and Sport*, or VWS) is the principal body with the executive power for health and health care- related policies in the Netherlands. Although the VWS is an important source of funding for health-related policies, in the past it has not been a driving force for the adoption of computer technology more generally. As explained earlier, initiatives in the Netherlands during the early 1990s consisted of a policy by which GPs would be reimbursed up to 60 percent of the expenses incurred in the automation of the general practice, such as the implementation of WCIA-certified HIS (up to a maximum of approximately €3,000). Nevertheless, certain requirements had to be fulfilled to be able to claim back the automation expenses.

Only since the creation of NICTIZ in 2004 has the VWS started to devote more resources to the use of ICT in health care.

Health Insurance Funds

The Dutch Health Insurance Funds (*Zorgverzekeraars Nederland,* or ZN) play an active role in the structuring of the health insurance system, the supply of care facilities (including health IT), and their quality. The health insurers are particularly important because, as we explained earlier, they pay GP practices, via either a capitation fee or a per-service fee. The implementation of existing technology developments and applications can help make GP surgeries run faster, more efficiently, and more accessibly; hence, health IT becomes attractive to GPs and insurers.

Vendors

Vendors have played a key role in the adoption of HIS (and thus e-prescribing). In fact, by agreeing with GPs to develop WCIA complaint systems, a set of minimum standards and requirements were achieved in the market. Furthermore, by setting agreed minimum standards, a market with hundreds of providers was avoided, and a market with approximately 8–10 providers was created (Protti & Smit, 2006). We define *standard* here as "an agreed, repeatable way of doing something" . . . "a published document that contains a technical specification or other precise criteria designed to be used consistently, as a rule, guideline of definition" (BSI Group, 2010). If commonly agreed, standards do not necessarily hinder market entry or market innovation. In fact, standards may present important opportunities in the creation and shaping of network effects. However, the value of these standards will always depend on the quality of the standards, the strength of the network effects, and the complexity of technology. And standards can become distorted—if, for example, a vendor unilaterally sets standards that could result in monopolization and a failure of competition.

Patients

Patients also stand to gain from health technologies such as e-prescribing through reduced medication errors and cost savings from use of less-expensive medication

alternatives. Interviewees reported that the Chair of the Dutch Patient Federation has been very active and supportive of IT technologies.

4.3 Funding Arrangements

In the health system prior to 2006, practice automation among GPs was stimulated by an extra capitation fee for each Sickness Fund patient and a fee for service for each private patient if the GP used a computer. This stimulus plan was agreed on by NHG and the government and was intended to reimburse GPs for expenses related to the cost of automating their practices. However, to qualify for the funding offered, the GP had to comply with a series of requirements including the need to pass an evaluation by professional organizations, introduce the computer-based system within a specified period of time, and provide adequate data for health policy planning.

As an optional, stand-alone module, the development of EVS followed a different financing stream than HIS, although they are closely interlinked (we earlier said that the EVS sits is a module of HIS). In fact, the implementation of EVS, which took place between 1999 and 2002, received a one-off subsidy of approximately €13 million from the Dutch Ministry of Health, Welfare and Sports (Wolters et al., 2001).[10] It was expected that the EVS would significantly lower costs to consumers, GPs, and public finances. The savings would arise not only from prescribing cheaper drugs but also from providing more accurate doses. More specifically, the annual report of the VWS said that expected savings in prescription expenses stemming from the implementation of EVS were €150 million (300 million guldens). However, a separate evaluation report by NIVEL, the Dutch Institute for Research and Healthcare, calculated that the savings had been significantly overestimated.

4.4 Extent of Adoption

In the Netherlands, more than 96 percent of GPs use HIS, and basic e-prescribing is a standard module of the system. One interviewee cited a study showing that 80 percent of prescriptions were e-prescriptions in 1998, prior to the introduction of the EVS decision support system. Another interviewee indicated that e-prescriptions were used, in particular, for prescription refills, because of the time savings and the capacity to delegate refill functions to ancillary staff.

In terms of the specific EVS application, an official 2001 report published by NIVEL found that 97 percent of GP practices had EVS installed and integrated into their GP IT systems, but only 87 percent claimed to be using EVS effectively and only 46 percent used it daily (Wolters et al., 2001). However, interviewees disagreed about the current level of use for EVS decision support. One interviewer reported that EVS guidelines are underused for a variety of reasons, including poor integration with the available HIS, the system's demand for an accurate ICPC diagnosis to drive prescribing recommendations, and lack of faith in the guideline recommendations. One interviewee reported that the guidelines were no longer being updated and that EVS is "currently

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[10] At the February 26, 2009, exchange rate, this is equivalent to $16.6 million.

dead." However, another interviewee believed that the guidelines are still being maintained and that HIS users can and do still download new updates. However, this interviewee also said that physicians suffer from over-alerting, especially around drug-drug interactions, and this frequently leads them to ignore or turn off all decision support in their systems. A third interviewee expressed a belief that usage rates for the EVS module have not changed much since the 2001 report from NIVEL.

4.5 Barriers to and Drivers of e-Prescribing

Bearing in mind that that the adoption of e-prescribing needed to be understood in the wider context of the developments of HIS, the following section identifies the barriers and drivers of e-prescribing:

Drivers of e-Prescribing

- **Proactive and well-organized local GP professional associations fostered the early adoption of GP information systems** (and e-prescribing as a module of such systems). GPs established taskforces to develop general guidelines, evaluated available systems, and negotiated minimum standards and requirements with software developers. Furthermore, GP associations successfully managed to agree with the government to reimburse GPs for part of the expenses related to the automation of their practices (van der Lei, et al., 1993).

- **Stakeholders understand how technology adoption can benefit them.**
    - **Patients are aware that that adoption of technology in prescribing on average reduces medication errors.** Many of the errors in prescribing occur at the ordering and administration phase. In fact, many of the written prescriptions used to be illegible or incomplete. Interviewees identified the improved patient safety derived from e-prescribing as an important benefit of e-prescribing.
    - **General practitioners (and pharmacists) perceive that technology adoption in prescribing can result in better quality of care and reduced costs:**
        - **Fewer legal liabilities.** Interviewees mentioned that with e-prescribing, the legal costs of claims associated with adverse drug events decreased with the reduction in medication errors.
        - **Reduced administrative burden.** E-prescribing had the potential to reduce costs by improving workflow processes and reducing administrative burden from billing and from prior authorization compliance.
        - **Standardization.** The standard formulary, or set of pharmacotherapy guidelines, was identified as a way to directly reduce medication costs. Also, by standardising terminology and processes, training costs and errors were heavily reduced. Furthermore, communication problems between professionals were said to be eased by "speaking a common language."

- – **Improved communications through linkage with external systems.** Interviewees explained that electronic communication with external health and health care providers, such as pharmacies and laboratory systems, presented savings for health professionals.

- **Managing expectations about the introduction of technology and offering related training boosts buy-in from stakeholders.** It is important to explain the potential benefits (in terms of administrative burden, improved communication, and so on.) and costs (learning curve, organizational changes, and so on.), and to teach the users how to use technologies. The NHG and the LHV were aware of the need to educate potential users and offered training on computers to general practices (van der Lei et al, 1993).

- **Technology needs to be designed to fit with the user's daily work and adapt to socioeconomic and policy changes.** The interviewees noted that in the early stages of e-prescribing, the integration of an automated billing system into the GP IT systems was crucial for adoption, especially to save costs and streamline some of the administrative workload. In fact, billing was the main reason why GPs initially promoted the use of computer-based prescribing. Over time, other socioeconomic factors and government policies drove the agenda of health technologies such as e-prescribing. Most significantly, the Dutch Health Reform of 2006, which obliged GPs to negotiate individual contracts with insurance companies, was a driving factor in adopting more sophisticated GP systems that reduced the administrative burden and simplified processes and contracts. On the other hand, changes in the working patterns/organization among GPs influenced the recent discussions around the need to develop a national Electronic Health Care Record (EHCR).

- **Payment structures influence the developments of GP systems (HIS).** Interviewees revealed that, given the link between GPs' income and a set of established performance indicators, GPs are incentivized to adopt HIS that respond to their needs and requirements. HIS capture accurate and reliable statistics on performance and reduce costs and administrative burden.

Barriers to e-Prescribing

- **The initial learning investments and the cost of adopting new technologies are frequently identified as a barrier**. E-prescribing applications were said to have an impact on the workflow and workload of the GP. Although e-prescribing saves time along the whole process, GPs currently spend more time generating initial prescriptions via menu selections. In the past they could more readily delegate error-handling and follow-up tasks to support staff.

- **Bottom-up approaches create large differences in GP systems, making potential homogenization complex and costly**. Standardization of HIS required that each HIS had to have a "user group" which would represent GPs using a particular system. Such a requirement helped to address the issues and requirements emerging from the various HIS. However, over the long run, the fact that each system had its own user group resulted in important differences in GP systems. The differences in HIS also affected differences in the development of related applications and modules. In fact, the disparity between

adoption and use of EVS can be partially explained by the variations in the compatibility between HIS and EVS.

4.6 The Future of the EHCR

The opportunities of new technologies have changed the policy agenda since 2002, when NICTIZ was founded as a platform and national architecture to promote the use of ICT in health care. One of its objectives was to create the EHCR to enable the exchange of information amongst all Dutch health providers.

However, the implementation of the EHCR has been delayed because of diverging opinions about its desirability. Opponents perceive that the current systems work adequately and regard the new developments as immature and risky, possibly causing significant disruption. Furthermore, GPs do not currently enter information consistently across the country. GPs have been registering information in their own systems for years. One of the interviewees said that if the current information available at the regional level were to be migrated to a national EHCR, it would take GPs 20 minutes per patient to register the information into the nationwide system. Therefore, important changes and a significant amount of preparation still need to occur to migrate to a nationwide system.

Second, some of the interviewees argued that wider access to the EHCR raises privacy concerns over the possible exposure and abuse of private information. Furthermore, making patient information accessible to a wider group of stakeholders, such as pharmacies, changes the structure and relationship of incentives. Nowadays, patients go to GPs and expect the practitioner to prescribe the appropriate medicine based on their diagnosis. The diagnosis, together with the patient's history, and other relevant information in the patient's electronic record is currently stored locally at the GP level. However, when information on the patient is made accessible to other stakeholders, some interviewees said that incentives are changed. For example, GPs might not have the incentive to make their records accessible to other stakeholders like pharmacies because they may not want to share information about the reasons for which a drug has been prescribed. GPs may feel controlled by pharmacists if they need to share certain information, especially taking into account that pharmacists are specialists in medication. Hence, providing wider access to information can become an incentive for some stakeholders but a disincentive for others, potentially altering the balance of power in the "health market."

In contrast, one interviewee defended a nationwide EHCR as a more inclusive system (e.g., patients could access their own personal health information). Furthermore, a nationwide EHCR would make health information more transparent. It would allow better and continuous communication between primary and secondary care, for example, and also between health and social services. A nationwide EHCR could break the currently existing barriers between different health services "enclaves." Additionally, it would bring efficiency gains to patients and health and social care professionals by avoiding having to repeat patient information when patients are handed off among physicians. A different interviewee also argued that a nationwide system would positively impose certain minimum quality standards on GPs.

Despite the apparent differences between a nationwide EHCR and the already developed regional networks, NICTIZ intends to use the already existing infrastructure.

More specifically, it intends to use the regional networks as a bridge between the local and the national network. Current plans are to store patient records not centrally, but locally at the source, and access to the record would be by communication between local systems.

Chapter 5. E-Prescribing in the United Kingdom

5.1 Evolution of Electronic Medical Records in the UK

As in the Netherlands, GPs in the United Kingdom were among the first health professional groups to computerize. Mannan et al. (2006) report that, already in the late 1980s, primary care computing had started to be popular. These early systems featured simple functionalities. Furthermore, our interviews revealed that these early systems (including e-prescribing) were typically home-grown grassroots efforts initiated by GPs themselves who, appreciating the benefits computers could bring, decided to pay for the technology.

The 1990 GP contract contained two important provisions that introduced government support for computer systems. It provided direct reimbursement to GPs for about 50 percent of the costs of installing computer systems. More important, it introduced population-based "target payments" for two conditions, childhood immunization and cervical cytology. GPs were paid for these services only when they had reached 50 percent or 80 percent of their eligible patients, with the reimbursement for the higher target being about three times that of the lower target. This acted as a major stimulus for GPs to acquire computer systems, enabling them to create registers for recalling patients (Chisholm, 1990). An important part of the scheme was the Requirements for Accreditation, introduced in 1993, to ensure GP computer systems provided agreed core functionality and conformed to national standards (Protti, 2006). These standards determined whether reimbursement of system and support costs were allowable. Initially there were about 20 GP system suppliers in the market, but these gradually were reduced to three or four over the decade. By 2000, the large majority of GP practices were using these systems.

The GP systems also rapidly became popular for "repeat prescribing." At the time, physicians could not authorize automatic refills by the pharmacist. Instead, they needed to rewrite all prescriptions for long-term medications monthly or quarterly. Typically, patients would place a request. Then a receptionist would pull the paper medical record and begin the prescription by adding the patient information and routing it to the doctor to complete. With repeat prescribing computer programs, the prescriber could initially specify the number of issues he/she wished to permit from the prescription and the dispensing interval (e.g., monthly, quarterly), and then the system would automatically print complete prescriptions at the specified interval for the doctor to sign, without requiring a chart pull. The systems also typically issued flags recommending against further repeat prescriptions when patients were overdue for follow-up appointments. In a randomised trial, a repeat prescribing computer system reduced the time physicians needed to spend in reviewing and authorising repeat prescription requests from 1.3 minutes to about 6 seconds each (Roland, 1985). Staff saved about 1 minute per request in pulling charts and preparing prescription blanks, but the staff computer operator took about 1.5 minutes per request generating repeat prescriptions. The system also reduced pharmacy call-backs from 6 percent of repeat prescriptions to 1 percent. In a recent study, physicians and office staff still cited the time savings from repeat prescribing as the top advantage of their EMR systems (Schade et al., 2006). Although systems "merely replaced handwritten prescriptions with computer-printed ones," they saw the reductions in illegible and misspecified prescriptions as saving time and reducing medication errors. They had less faith in the value of warnings, such as alerts for drug-

drug interactions, saying that they rarely paid much attention to them (Schade et al., 2006).

Another critical factor driving early EMR adoption, cited both by Schade et al. (2006) and by our interviewees, was an improvement in physicians' ability to document their performance of services for the Quality and Outcomes Framework (QOF), a greatly expanded "pay for performance" program introduced in the 2004 GP contract. The QOF accounted for about 30 percent of a GP's income, and providing the documentation needed to meet the targets virtually required practices to have full EMRs. GPs needed to use e-prescribing to document for quality metrics that included prescription drugs. By 2005, it was estimated that 97 percent of GP practices were computerized, with virtually all using electronic prescribing (Protti, 2006).

5.2 Efforts Toward Integrated Electronic Prescribing: The EPS

A more ambitious vision for health IT in the UK had been introduced in the 1997 government White Paper: "The new NHS: modern, dependable." It proposed the creation of an "NHS information superhighway that links GP surgeries to any specialist centre in the country" (UK Department of Health, 1997). The White Paper led to a follow-up paper "An Information Strategy for the modern NHS: 1998–2005" (NHS Executive, 1998), which outlined a plan for developing technologies that would enable NHS professionals to have information to provide care and to improve public health and patients and carers to have the information necessary to make decisions about their own treatment. During the mid-term review in 2002, the Secretary of State for Health presented a progress report, "Delivering the NHS Plan" (Wright, 2002), which reported what had been achieved so far. Achievements were lower than had been expected. Historical underinvestments in skills and technology in the health service were still causing a shortfall in the capacity to deliver (Wright, 2002). As a consequence, the government announced in 2002 the need to devote substantially larger income to health care, including investments in technologies.

The NHS Information Authority (NHSIA), created in 1999, was the first body established to bring together NHS IT Information bodies to work together to deliver IT infrastructure and information solutions to the NHS and create a reputation for delivering products and services that satisfy stakeholder requirements. In 2005, the NHSIA was abolished and its work was divided between an executive agency, the NHS Connecting for Health (CfH), and a newly created Information Centre for Social and Health Care, both reporting to the DH. CfH was created "with the aim of supporting the NHS to deliver better, safer care to patients by bringing in new computer systems and services that improve how patient information is stored and accessed." CfH is mainly responsible for IT expenditure, developing central standards for data and IT, and better managing the National Programme for IT (NPfIT). The NPfIT includes the Electronic Prescription Service (EPS), as well as other IT modules, including Choose and Book, National Care Records Service, Medical Record Transfer Between Practices (GP2GP), and National Network for the NHS (N3).

The overall aim of the NPfIT is to develop and implement a national, integrated Electronic Medical Record (EMR), which will be able to be accessed from any point in the country. Our interviewees explained that the integrated health system will mean,

among other things, that an EMR will be able to be accessed nationally by all health professionals and, in the near future, by patients, who will be able to access their records through the so-called Health Space, an online personal health record. The development of the integrated health care system would be a substantial change from the current set-up, in which the GP's clinical system hosts the entire patient's clinical record, although some practices currently already share one common host system to share patient's information.

EPS is one of the modules of the NPfIT, described by the NHS as "a system that allows prescribers working in primary care settings to generate and transmit electronic prescriptions using their computer system" (CfH, 2007). The main reason for developing the EPS relates to efficiency gains that can be obtained by migrating from a paper-based system to an electronic system. Furthermore, the DH hopes to save time and reduce medication errors with the implementation of EPS while at the same time offering patients improved and modern care (CfH, 2007). The EPS has not yet been fully implemented, but once it has been, doctors will be able to send prescriptions electronically to the central storage and communication network called the Spine,[11] and whatever pharmacy the patient chooses could then download the prescription. Pharmacies would also submit claims through the EPS.

Implementation of EPS in the UK

The large CfH programmes to computerize the NHS, needed to be implemented in the context of the existing GP systems, created by the multiple suppliers. In fact, interviewees mentioned that GP practices differ widely not only in terms of the functionalities and features of their systems, but also in terms of the extent to which technology is being used at GP practices.

The EPS project has been divided into two "releases":

- In Release One (R1) (which has now been completed), a mechanism was developed whereby GP systems can download drug data automatically from the core network, but the system still uses a paper prescription infrastructure. Under R1, the GP prints the prescription, which has a barcode on it, and signs it. The patient then takes the signed prescription to the pharmacy. The pharmacist can scan the barcode on the prescription and downloads the prescription from the Spine, or they can manually enter the prescription data into their pharmacy system.

- In Release Two (R2), the main feature is the switch to an electronic encrypted signature instead of the traditional paper signature. The only physical item remaining will be a numeric or barcode token, which the patient can present to the pharmacist when picking up his or her prescription. The initial date for the delivery (or roll-out) of R2 was the end of 2008. However, its completion has been delayed. Our interviews identified different perceptions among stakeholders regarding the speed of implementation. For example, the national

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[11] The Spine forms the core network of the NHS Care Records Service, underpinning the patient's administration system and the creation and storage of electronic care records. Although the development of the technology is being subcontracted to a variety of vendors, the vertical and horizontal coordination of the implementation of the Spine is being done centrally by CfH.

agency claims that the implementation is moving ahead quickly, whereas stakeholders on the ground, such as the pharmacies, think the implementation is moving rather slowly.

Although technically the implementation was divided in two releases, in practice very little changes for the GPs between R1 and R2. However, R2 is a remarkable change for patients, who will be able to nominate a default pharmacy and consequently build a long-term relationship with the pharmacist (for example, repeat prescriptions could be sent automatically to the pharmacy, rather than the patient picking up a signed paper prescription). Differences in the functionalities between R1 and R2 are listed in Table 5.1.

Table 5.1. Differences Between Functionalities of R1 and R2

Functionality	Release 1	Release 2
Electronic transmission of prescription data between prescriber and dispenser	Y	Y
Barcode printed on prescription to allow retrieval of electronic prescription	Y	Y
Release and return of prescription messages	Y	Y
Enables automated repeat dispensing	N	Y
Cancellation of prescriptions	N	Y
Digital signing of prescriptions by prescribers	N	Y
Patient Nomination of dispenser for medication	N	Y
Electronic reimbursement of prescription costs to pharmacist	N	Y

Source: Barber (undated).

To pilot the implementation of EPS, different PCTs were chosen. Our interviewees identified available infrastructure and political will as the main criteria for selecting PCTs as pilots. In fact, despite all the efforts to reduce inequalities, GPs as well as pharmacies still differ widely in terms of their clinical systems, their capacity to work with service providers, and their readiness to participate in pilot projects despite the theoretical advantages EPS offers.

5.3 Stakeholders of EPS

Interests of the various stakeholders differ—sometimes in the opposite direction, sometimes in the same direction—influencing the pace at which technologies such as EPS are adopted. In the case of EPS, we have identified six main stakeholder groups: the government, general practitioners, community pharmacies, patients (or user groups), vendors, and, the so-called prescription pricing authority.

The Government

Despite the theoretical advantages of EPS for the various stakeholders, EPS is principally being promoted and pushed through by the NHS with the support of academics, who have published numerous articles about the benefits and costs of e-prescribing. To ensure efficient planning and implementation of the NPfIT (and hence EPS) a number of decision-making and monitoring bodies have been set up.

The Department of Health provides policy guidance for the NPfIT and consequently for the EPS. It coordinates and negotiates with ministries and organizations, such as the Department of Innovation, and is in charge of working on the legislation necessary to implement health IT systems. For example, the DH is in charge of making sure that the Medicines Act is being changed to ensure that the process of e-prescribing remains safe for the patient. The Strategic Health Authority (SHA) is responsible for managing a range of CfH programs for each region, as well as for ensuring that PCTs deliver what is required within the program set up. PCTs work with GPs, community pharmacies, patients, and the public. They are in charge of coordinating and implementing policy at the local level. They also support GPs in various ways, for example, by helping GPs find the most appropriate and suitable technology for their practice.

There are a variety of supervisory boards overseeing the implementation of EPS. There are also rigorous governance structures and defined processes for technical standards, clinical and patient safety, contractual environment of different providers, and so on. The governance boards are in place to make sure that the development of CfH is consistent with the overall NHS policies. For example, they make sure that the standards for the computer systems suppliers and the standards for data quality are in line with those set by the NHS.

General Practitioners

The GP user group is represented by various organizations: the Royal College of General Practitioners, the British Medical Association (BMA), and other Primary Care Specialist groups. Although GPs expect the EPS to save them time, the BMA has expressed concerns that the privacy protections in the CfH scheme overall are inadequate.

Community Pharmacies

Community pharmacies are mainly represented by the Royal Pharmaceutical Society. Pharmacies are also expected to benefit extensively from EPS. On the one hand, pharmacists can save time and efforts when changing to a system where reading hand-written prescription information is heavily reduced. With technology, pharmacists will also reduce costs of complicated business processes, including the prescription, dispensing and distribution of medications. Furthermore, with EPS, pharmacists will be able to streamline the workflow by preparing medications in advance, and reduce costs of submitting claims electronically. On the other hand, the inevitable learning process that EPS requires at the beginning is most likely to slow down the traditional workflow at a pharmacy. In fact, currently the pharmaceutical guild does not perceive that its members are gaining from EPS, because processes seem to have slowed down. Some

have expressed the perception that the response time for downloading prescriptions from the Spine can be 30 seconds or longer, which is more time than it takes to enter the prescription information manually.

NHS Businesses Services Authority

The prescription pricing authorities (now NHS business services authority) are in charge of reimbursements and capturing trends in prescribing activity, the needs of patients, and so on. Most of the reimbursement claims are currently being entered manually. With EPS, the NHS business services authority will be able to reduce prescription fraud and operate more efficiently (Mundy, 2004).

Patients/User Groups

Based on our interviewees, it seems that patients and the public user groups, represented by organizations such as the National Patient Safety Agency, have, surprisingly, advocated little for EPS despite the benefits that it is expected to bring to patients. Some of these benefits include fewer trips to the GP and to the pharmacy to request or collect prescriptions, less waiting time at the pharmacy (with EPS, pharmacists can prepare prescriptions in advance), and also reduced medication errors.

Vendors

Vendors are key to the development of EPS. It is important that vendors be involved from the beginning to match and coordinate regulatory standards and user requirements with available technology.

5.4 Funding Arrangements

As described in Section 5.1, the NHS provided substantial funding to GPs for EMR adoption throughout the last 2 decades.

Funding for EPS is part of the NPfIT, which is estimated to have cost approximately £10 billion in total so far. No official data exists about the disaggregated figure for the implementation of EPS. However, one interviewee gave a proxy for the implementation of EPS—£0.75 billion—including the amounts to be distributed for implementation nationally among the PCTs.

To promote EPS, the main two service providers involved, pharmacies and GPs, have been given financial incentives. Pharmacies, although not part of the NHS system, receive a monthly payment to enable the connection to the Spine. GPs, however, are paid through the PCTs on the basis of the New GP Contract. PCTs are responsible for providing financial IT support, and thus fund the purchase, maintenance (including the provision of support services) and upgrades of integrated IT systems. Any of such agreements are determined and negotiated locally between the PCTs and general practices.

5.5 Extent of Adoption

Adoption rates here refer to the percentage of GPs or pharmacies that have actually technically implemented EPS in their premises, whereas usage rates refer to the actual use of EPS (the EPS could be technically implemented, but not used). Although we found no updated official data on the adoption and usage rates of EPS for pharmacies and GPs, the interviewees provided unofficial estimates. These estimates differed widely among the interviewees.

One interviewee said that, in July 2007, EPS R1 was technically "live" in 66 percent of general practices and in 48 percent of pharmacies. Another believed that approximately 70–80 percent of prescriptions in British practices are written using EPS R1 but that only 10 percent of prescriptions are being downloaded electronically for pharmacies. EPS R2 was still being pilot tested at the time this report was written.

An evaluation of EPS is currently under way, led by a consortium of organizations in the UK independent of the NHS.[12] This evaluation is expected to be made public in approximately mid-2010. Despite the discrepancy of the available estimates, the numbers suggest that different adoption rates between GPs and pharmacies do currently exist, with pharmacies far behind, at least partly because of the slow downloading of records from the Spine.

5.6 Barriers to and Drivers of Electronic Prescribing and the EPS

In this section, we summarise the barriers to and drivers to adoption of basic e-prescribing and the EPS that we identified during the interviews.

Drivers of e-Prescribing

- **Benefits to GPs and pharmacies.** Basic and networked e-prescribing benefits include the following:

    o **Improved patient safety.** With basic e-prescribing, medication errors can be prevented, through the elimination of illegible handwriting, better dosage advice, and alerts for adverse drug-drug or drug-allergy interaction.

    o **Time savings for patients and pharmacies.** With EPS R2, prescriptions can be routed to pharmacies in advance, which in turn will enable them to prepare prescriptions in advance, thereby saving patients' time when going to the pharmacy. Furthermore, pharmacies will be able to streamline their work, allowing them to spend more time providing clinical advice and building a closer relationship with patients.

    o **Reduced liabilities, especially for pharmacists.** Eliminating manual entry of prescriptions at the pharmacy should reduce liabilities that are

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[12] The consortium is formed by the School of Pharmacy of the LSE and the University of Nottingham. For more information see The Evaluation of the Electronic Prescription Service (EPS) (undated).

due to incorrect dispensing. This is especially important because pharmacies are dealing increasingly with larger volumes of prescriptions.

- **The pay-for-performance structure in the UK acts as an incentive to adoption of EPS.** EMR technology enables efficient capture of the quality measures that are linked to professional reimbursement. Although only a few current measures are directly related to prescribing (e.g., "The percentage of patients with atrial fibrillation who are currently treated with anti-coagulation drug therapy or an anti-platelet therapy"), systems must be put in place to capture other quality measures. Once in place, e-prescribing must also be used to capture those prescribing-related measures that do exist.

- **National standards created consistency.** The EMR standards first introduced with the 1993 "Requirements for Accreditation" enforced a minimum bar for technology vendors, ensuring that they could support common billing and population management functions. Furthermore, national standards for IT also facilitated mobility of professionals, reducing training costs because people do not need to adapt and learn about new systems when they move or travel in the country.

- **EPS is a priority within the wider national vision of the NHS**. The government's endorsement and the high priority given in the policy agenda to EPS, and more specifically to the wider National Programme for IT, was identified as a crucial element for the implementation of such a complex system.

Barriers to e-Prescribing

- **Stakeholders currently do not see EPS as a business-critical issue.** Although most acknowledge that the benefits may come in the medium and long term after a period of adaptation, they currently regard EPS as costly and time consuming.

- **EPS is still considered an immature application.** For example, interviewees described EPS as intrusive and disturbing, especially with regard to the high frequency of medical alerts in e-prescribing when prescriptions are written. Hence, the application still need to mature and adapt to users needs. In addition, the downloading time to get records from the central network (the Spine) is perceived by pharmacies as being too slow.

- **Sociocultural and organizational barriers persist.** The introduction of technology is generally associated with change in work processes. However, the entrenched working culture and daily activities of organizations often slow down the introduction of technology. Furthermore, the fact that people are interconnected and form part of already existing working networks makes change even more difficult.

- **Coordinating technical and capability differences while at the same time responding to particular needs has been described as a challenging task.** In fact, interviewees said that large differences exist in terms of the clinical systems used by GPs and pharmacies—e.g., what functionalities the systems have and whether GPs and pharmacies are ready for the implementation—and in their capacity to work with service providers to help with training, and so on.

- **Incentives for the different stakeholder groups have not been put in place or properly measured.** For example, interviews revealed that no incentives have been provided to pharmacies because, at the time of implementation, it was assumed that the benefits EPS would bring to them would be sufficient to stimulate them to adopt the technology. However, adoption rates for pharmacies have been lower than for GPs. The main reason given by the interviewees is that pharmacies regard EPS so far as burdensome and time-consuming, due to the slow speed for downloading prescriptions from the Spine.

Chapter 6. Discussion

6.1 Lessons Learned from e-Prescribing in the UK and in The Netherlands: Similarities and Differences

In both the Netherlands and the UK, e-prescribing started as a grass-roots technology in the late 1980s and early 1990s through various local, decentralized initiatives of technology-minded GPs and pharmacists. In both the Netherlands and the UK, e-prescribing came into widespread use with substantial government support as one component of computerized systems for primary care physicians that encompassed both medical records and practice management systems. These systems offered clear benefits to GPs in the context of their payment requirements, and e-prescribing was an added benefit, saving time, in particular, with repeat prescriptions. In the Netherlands, the implementation of EVS, a separate prescribing decision-support module, was also subsidized by the Dutch government. In both cases, the involvement and the proactive role played by professional societies (especially the NHG in the Netherlands) were key in getting the governments' engagement.

Implementation in both countries has become more difficult, however, when more functionality was desired. For example, the EVS, which aimed to improve adherence to prescribing guidelines as part of existing e-prescribing systems, was not as widely adopted by Dutch GPs as initially foreseen. This was partly due to difficulties with the diagnosis-driven model of prescribing that EVS used and to its incompatibility with some of the existing GP IT systems.

After 2000, a more top-down approach was initiated by the governments in both countries in hopes of driving regional or national interconnection and data exchange among EMR systems. However, to date these efforts have been challenged and are not proceeding at the pace originally envisioned. In the UK, the implementation of interconnected e-prescribing (EPS) started in 2005 under the National Programme for IT. However, the EPS (and NPfIT) has suffered from delays and mixed outcomes. On the one hand, EPS Release One has been implemented, but adoption among pharmacists has been low. The reasons seem to include major technical difficulties in implementing large-scale systems and difficulties creating incentives for providers to share data. Implementation of EPS Release Two has been substantially delayed.

Efforts toward a similar top-down national approach in the Netherlands have been more limited (including several pilots of EMR interconnections that have been conducted). Although many in the Netherlands recognize the benefits of a nationally integrated system, including potential economies of scale and wider accessibility, others, especially GPs, have expressed resistance to such a system. They believe the current regional systems already respond adequately to the existing needs and that moving to a national integrated system would have significant costs without substantial benefit. Furthermore, the national system is not yet perceived as socially and technically mature.

The top-down integrated approach has also raised privacy and security concerns in both countries, with public opinion including significant concerns about patients' data being shared with enterprises, organizations, and insurance companies or possibly being used immorally. Furthermore, under extreme circumstances, an inappropriate architecture or mismanagement of information systems could lead to disastrous information leaks.

The difficulties in transitioning from a bottom-up to a top-down approach create a dilemma. If e-prescribing is left concentrated at the local level, the health systems will not able to reap the full benefits of e-prescribing—for example, in integrating outpatient with inpatient prescribing. However, more-forceful top-down intervention may continue to be hobbled by technical barriers and may serve to entrench resistance.

Our interviews also showed the importance, not only of analysing the benefits and costs for a society as a whole, but also of the way in which those benefits and costs will create winners and losers among stakeholders. For example, technology that reduces office visits would help GPs being paid by capitation but would mean less business for GPs being paid on a fee for service basis. Where GPs are in competition with mid-level providers, national accessibility to patient's records might offer a boost to these other health professionals. Thus, when considering e-prescribing, changes in the incentive structure for each of the stakeholders of the health service chain must be taken into consideration.

6.2 Comparison of Drivers for and Barriers to e-Prescribing in the Netherlands and the United Kingdom

The perceived benefits and costs as well as the drivers and barriers identified by the interviewees are summarised in Table 6.1. In brief, the adoption and use of e-prescribing has been largely driven by "bottom-up" demand from prescribers, who are in turn responding to the demands of their payment systems and the potential to save time in prescription management, as described in the previous section. Another major driving factor has been the existence of government subsidies for providers to independently select and purchase systems that have met certification standards. However, once the easily obtained efficiencies have been taken by these office-based systems, further progress toward national integration of e-prescribing in both countries has been stalled by sociotechnical barriers, including health information privacy concerns and business concerns from both pharmacies and prescribers. These findings offer substantial lessons for U.S. e-prescribing policy, with the United States currently launching its own large-scale program for EMR adoption. In brief, the provision of direct financial support and the ties to quality measures that are planned in the United States are likely to be positive factors. In addition, the United States is planning to regionalize rather than nationalize the networks that will handle the requisite health information exchange. However, these systems are still likely to face many of the same social and technical challenges being experienced in the UK and the Netherlands. Close attention will be needed to establish trust in the integrity and reliability of health information exchange, especially under the stress of short timelines dictated by funding cycles and rapid scaling up of transaction volumes.

Table 6. 1. Differences and Similarities Between The Netherlands and the United Kingdom

Netherlands	United Kingdom
Perceived Benefits and Other Drivers for e-Prescribing	
Government reimbursement for the purchase of certified EMR systems	Government reimbursement for the purchase of certified EMR systems
Automation and standardization reduce errors (and thus costs): • Improved patient safety • Reduce claims and liability costs	Reduction in errors: • Improved patient safety • Reduced liabilities Standardization contributes to economies of scale
E-prescribing is perceived to reduce costs (higher savings) at the general practice through integration with automated billing system and automated communication with pharmacy	E-prescribing is perceived as generating savings for GPs, for pharmacies and for patients
E-prescribing is perceived to save time: • Pharmacies can streamline their work and prepare prescriptions in advance • Patients save time picking up prescriptions	E-prescribing saves time: • Clinicians prepare medicines in advance • Clinicians can spent more time in providing clinical advise and building consensus
Health IT provides an important source of statistics, some of which are used for reporting performance indicators	EMRs enable performance monitoring, fulfilling the Quality Outcomes Framework (QOF). A few QOF measures require prescribing documentation.
Facilitates part-time work, contributing to better communication among team members	
	E-prescribing contribute to their competitiveness
Perceived Risks and Barriers to e-Prescribing	
Increase in the workload as implementation of IT changes functions and processes. GPs delegate less on their assistants to fill in prescriptions	
More risks are associated to security and patient confidentiality with IT adoption	Concerns about security and patient confidentiality within the NPfIT architecture.
GPs uncomfortable with nationwide ECHR data sharing; potential requirement for diagnosis data to accompany prescriptions could erode autonomy	Persistence of sociocultural barriers
	Implementation challenges; system regarded as immature (e.g., slow response at pharmacies)
	Failure to provide adequate implementation support (advice, workshops, training, and so on.)
	Key stakeholders do not perceive e-prescribing as a business critical issue; incentives not assessed.

References

Ashworth M, Jones RH. Pay for performance systems in general practice: experience in the United Kingdom. MJA 2008 (189) (2): 60–61. As of August 2009: http://www.mja.com.au/public/issues/189_02_210708/ash10534_fm.html.

Barber N (undated). Evaluation of the electronic prescription service in primary care in England. http://www.haps.bham.ac.uk/publichealth/cfhep/events/Nick_Barber_Evaluation_of_the_Electronic_Prescription_Service.pdf. Accessed December 2008.

Bell D, et al. A conceptual framework for evaluation outpatient electronic prescribing systems based on their functional capabilities. J Am Med Inform Assoc 2004;11:60–70.

The British Health System - health insurance business (undated). ESS-Europe. http://www.ess-europe.de/en/uk_health_insurance.htm. Accessed June 2010.

Available at: BSI Group. What is a standard? http://www.bsigroup.com/en/Standards-and-Publications/About-standards/What-is-a-standard/. Accessed June 2010.

CfH—*See* NHS Connecting for Health.

Chisholm JW. The 1990 contract: Its history and its content. BMJ 1990*;* 300(6728): 853–6.

Dennis L Stand-alone e-prescribing: Ready or not? http://www.azhec.org/BinaryData/PDFs/HII/Standalone %20e-Prescribing %20Ready %20or %20Not.pdf. Accessed June 2010.

Available at: European Union of General Practitioners. "The Netherlands. http://www.uemo.org/text_organisations.php?sec=10&cat=51. Accessed August 2010.

Available at: The Evaluation of the Electronic Prescription Service (EPS) (undated). http://www.epsevaluation.org.uk/. Accessed June 2010.

Griffin A. UK nears European average in proportion of GDP spent on health care. BMJ 2007; 3;334(7591):442.

Guthrie B, et al. Workload and reward in the Quality and Outcomes Framework of the 2004 general practice contract. Br J Gen Pract 2006; 56(532): 836–41.

Klazinga N. The health system in the Netherlands. Eurohealth 2008;14(1):8–10.

Kooistra S. GP Vocational training in the Netherlands. http://gptraining.eu/wp-content/uploads/2010/05/GP-Vocational-Training-in-The-Netherlands.pps. Accessed August 2010.

GPC, General Practitioners Committee. The new GMS contract explained: Focus on…. Personal Medical Services. January 2004. http://www.bedshertslmcs.org.uk/Focus %20on %20personal %20medical %20services.pdf. Accessed May 2009.

Elzen A. van den, et al. Receptenverkeer: Naar de digitale snelweg? Utrecht: NIVEL; 2007.

Mannan R, et al. Is primary care ready to embrace e-health? A qualitative study of staff in a London primary care trust. Inform Prim Care 2006;14:121–31.

Mundy D. Secure electronic transfer of prescriptions (ETP) for the United Kingdom National Health Service [dissertation]. Information Systems Research Institute.

Available at: National Center for Biological Information (undated). MeSH Database. http://www.ncbi.nlm.nih.gov/sites/entrez?db=mesh . Accessed June 2010.

Available at: Nictiz (Dutch Institute for Information Technology in Health) Web site (undated). http://www.nictiz.nl. Accessed June 2010.

Available at: Netherlands Centraal Bureau voor die Statistiek (Central Bureau of Statistics). Bevolkingsteller (Population Counter). http://www.cbs.nl/nl-NL/menu/themas/bevolking/cijfers/extra/bevolkingsteller.htm. Accessed June 2010.

Available at: NHS Connecting for Health. The National Programme for IT implementation guide: Designed for the NHS by the NHS, UK Department of Health, Version 5–July 2007. http://www.connectingforhealth.nhs.uk/systemsandservices/implementation/docs/national_programme_implementation_guide.pdf . Accessed June 2010.

Available at: NHS Connecting for Health. http://www.connectingforhealth.nhs.uk/. Accessed August 2010.

Available at: NHS Executive. Information for health: An information strategy for the modern NHS 1998–2005. http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_4007832. Accessed February 2009.

Protti D, et al. Primary care computing in England and Scotland: A comparison with Denmark. Inform Prim Care 2006;14:93–99.

Protti D, Smit C. The Netherlands: Another European country where GPs have been using EMRs for over 20 years. Healthc Inf Manage Commun 2006; 30(3): 8–10.

Roland MO, et al. Evaluation of a computer assisted repeat prescribing programme in a general practice. BMJ 1985, 291: 456–8.

Schade CP, et al. E-prescribing, efficiency, quality: Lessons from the computerization of UK family practice. J Am Med Inform Assoc 2006;13(5): 470–475.

Schoen C, et al. On the front lines of care: Primary care doctor's office systems, experiences, and views in seven countries, Health Aff (Millwood) 2006 Nov-Dec;25(6):w555-71.

Available at: Selected Statistics by Primary Care Trusts: England (2007). http://www.ic.nhs.uk/Webfiles/publications/nhsstaff2007/gp/PCT %20Level.xls. Accessed June 2010.

Smith P, York N. Quality incentives: The case of U.K. general practitioners. Health Aff (Millwood) 2004 May-Jun;23(3):112-8.

Available at: UK Department of Health. The new NHS: modern, dependable.: http://www.archive.official-documents.co.uk/document/doh/newnhs/contents.htm . Accessed February 2009.

Available at: Delivering the NHS plan: Next steps on investment, next steps on reform: http://www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/@dh/@en/documents/digitalasset/dh_4059526.pdf. Accessed August 2009.

Available at: Community pharmacy in England. http://www.dh.gov.uk/en/Healthcare/Medicinespharmacyandindustry/Communitypharmacy/index.htm. Accessed June 2010.

Available at: The National Archives. "Sources of Finance." http://Webarchive.nationalarchives.gov.uk/+/www.dh.gov.uk/en/Publicationsandstatistics/Publications/AnnualReports/Browsable/DH_5285429. Accessed August 2010.

Available at: UK Office for National Statistics. Census 2001. http://www.statistics.gov.uk/census2001/pyramids/pages/64.asp. Accessed June 2010.

Van der Lei J, et al. The introduction of computer-based patient records in the Netherlands. Ann Intern Med 1993; 119(10) 1036–41.

Van Weel, C. How general practice is funded in The Netherlands. MJA 2004;181(2): 110–1.

Wolters I, van den Hoogen H, de Bakker D. Evaluatie invoering Elektronisch Voorschrijf Systeem. Monitoringfase: de situatie in 2000, Nivel (Netherlands Institute for Health Services Research). http://www.nivel.nl/pdf/evs.pdf . Accessed September 2008.

Available at: World Health Organization (2008). Core Health Indicators: Netherlands. http://www.who.int/whosis/database/core/core_select_process.cfm?country=nld&indicators=nha. Accessed June 2010.

Wright K. NHS Funding and reform: The Wanless Report. Research Paper 02/30, May 3, 2002. Library of the House of Commons. http://www.parliament.uk/commons/lib/research/rp2002/rp02-030.pdf Accessed February 2009.

Appendix A: Respondents

For the United Kingdom	For the Netherlands
Professor Nick Barber School of Pharmacy, University of London	*Professor Jos Aarts* Institute of Health policy and management Erasmus University Rotterdam
Ms Jill Mathews Advisor to the Department of Health Assistant Director, Primary Care and Provider Development, East Midlands Strategic Health Authority	*Professor Marc Berg* Institute of Health policy and management Erasmus University Rotterdam
Mr. Stephen Goundrey Smith SGS PharmaSolutions	*Ms Khing Njoo* General Practitioner, Department of General Practice, Erasmus University Rotterdam Project Leader of EVS at NHG
Professor Tony Avery Nottingham University Medical School	*Professor Dinny de Bakker* Head of research department at the NIVEL Institute (Netherlands Institute for Health Services Research)
Dr. Darren Mundy University of Hull	*Renee Boogers* Zorggroep Almere

Appendix B: Interview Protocol

I. Introduction

- Introduce study, mention funder, role of RAND/RAND Europe.
- Obtain consent to record interview (recordings will be destroyed after completion of study, and all information will be treated confidential, respondents will not be identified in report).

II. Scope of the research

- Explain what we mean by e-prescribing:

1. E-prescribing systems features include
   - Basic supporting data such as allergies, demographics and formulary information which can be used by the system to generate alerts
   - Medication management, enabling providers to prescribe, transmit, dispense and monitor medications
   - Connectivity among practices, pharmacies, payors, PBMs, intermediaries and patients
2. The components of e-prescribing can be grouped into core prescription capabilities, health plan information and clinical alerts:
   - Core components include a searchable medication list, instructions for patients, prescriber signature, number of authorized refills, DAW (dispense as written) or substitution permitted field, prescriber comments to pharmacist, and PRN field.
   - Health plan information components, known to the patient's health plan and necessary for prescribing and billing, include member eligibility, applicable formulary and corresponding prior authorization requirements, and medication history.
   - Clinical alerts based on the patient's demographics and medical history may include drug-drug interaction, drug allergies, age-specific warnings, and dose adjustments based on patient weight, and so on.

- Explain the setting we are interested in:
   o only outpatient care
   o outpatient care delivered both in the hospital environment (e.g., outpatient surgery) as well as in offices (e.g., GP practices)

III. Scan for e-prescribing initiatives

1. What e-prescribing initiatives (either active or terminated) are you aware of in your country?

2. For each initiative, can you please list:
    a. The lead organization
    b. Other participating organizations
    c. Program governance
    d. Data exchange source and governance
    e. Timeline
    f. Financing source and duration
    g. Prescriber incentives
    h. Practice eligibility
    i. eRx technologies used
    j. Extent of adoption (incl. number of active prescribers)
    k. Extent of use (including Rx volumes and if available percent of Rx's electronic)
    l. Stated goals and achievement to date.

3. Can you please point us to any documents and reports related to these initiatives?

4. Who would you recommend us talking to in order to learn more about these initiatives? (Record contact details, preferably email address.)

IV. Factors related to successful e-prescribing adoption and use
1. To what extent did the following objectives of e-prescribing drive adoption among physicians? (If possible, answer separately for each e-prescribing initiative.)

    a. Increased cost savings and reimbursement
       Probe:

       Formulary compliance

       Reduction in duplicative therapies and prevention of drug-seeking behaviors

       Access to incentive pools

    b. Increased efficiencies
       Probe:

       Access to medication history, formulary and eligibility information

Streamlining of workflows such as pharmacy selection, pharmacy callbacks and handling of renewals

Support for complex calculations (e.g., dosages, sliding scales)

Effective communication across clinical, prescribing, dispensing and administering settings

Automated prior authorization

c. Improved patient outcomes
Probe:

Reduction in medication/prescription errors due to illegible handwriting

Reduction in preventable adverse drug events (ADE)

Increased patient medication compliance

Effective education about medication use including dissemination of expert knowledge

Better reporting and follow-up (e.g., locating patients for drug recall or follow-up on ADEs)

Generation of medication allergy alerts

Generation of drug-to-drug interaction alerts

d. Any other factors you would like to mention

2. To what extent do you consider the following factors to play a critical role with respect to adoption of e-prescribing among physicians? (If possible, answer separately for each e-prescribing initiative.)

a. Functionality (features, functions and usability)
Probe:

Data transmissions or support for electronic prior authorization

Possibility of e-prescribing for controlled substances

Clinical decision support alerts

Extent to which disruption for practice patterns can be limited

Extent to which interference with current applications and physician/ patient interactions can be limited

b. Data (integration of important data related to e.g., HER, lab, pharmacies)
Probe:

Consistency of formularies and availability of information from PBMs and payors

Extent of payor collaboration to make all patient data available in competitive markets

Availability of complete active medication lists

Extent of local or independent pharmacy connectivity

Availability of mail-order pharmacy connectivity

Existence of a clear integration roadmap from standalone e-prescribing solution to EHR applications

c. Knowledge (data standards and best-practice clinical decision support)
Probe:

Uniformity of references, rules and guidelines apply to medication treatment protocols

Availability of enhanced standards and vocabularies for e-prescribing clinical decision support

d. Cost (funding or support)
Probe:

Perception that value accrues to physicians

Capacity/readiness to implement and utilize e-prescribing technology

Availability of technology infrastructure such as hardware, connectivity, client PCs

Availability of user-friendly helpdesk or support during office hours

Availability of support for startup costs including training and lost productivity

Availability of a sustainable business model and/or incentives including clear performance measures or ones that are not subject to gaming

3. To what extent did stakeholder actions support the spread of e-prescribing adoption to a point of critical mass? (If possible, answer separately for each e-prescribing initiative.)

a. Actions taken by the government
Probe:

Establish unified standards through legislation and policies such as Medicare Part D standards requirements

Establish regulation or certification requirements for e-prescribing among practicing prescribers in California

Convene stakeholders around e-prescribing call to action

Incorporate e-prescribing into physician licensing and renewals

Use role as major purchaser to require e-prescribing

b. Actions taken by payors
Probe:

Establish clear business cases, especially for smaller physician groups, such as increased rewards in pay-for-performance programs for e-prescribing utilization or shared transaction fees

Fund or subsidize eRx systems implementation and support costs for physicians (e.g., NEPSI)

Establish and update information systems to provide clinical information to providers at the point of care (e.g., standardize formularies, enable real-time data access v. batch or periodical data feeds)

Establish mail-order pharmacy e-prescribing connectivity and capabilities

c. Actions taken by professional societies/public-private partnerships/foundations
    Probe:

    Fund or subsidize e-prescribing implementation and/or support start-up costs

    Publish and disseminate e-prescribing best practices and toolkits

    Create and support education campaigns among prescribers and patients to inform patients on the benefits e-prescribing and communicate practice guidelines

    Engage in ongoing development of consensus standards for e-prescribing systems such as drug interactions, standard drug allergies and the nature of allergic reactions

    Establish e-prescribing certification criteria to ensure interoperability, clinical decision support and integration with EHRs

    Establish helpdesk and technology support infrastructures to support e-prescribing

d. Actions taken by pharmacies
    Probe:

    Support independent and local pharmacy e-prescribing connectivity to established networks

    Establish bidirectional interfaces to support communications between prescribers and pharmacists

    Establish training programs to support pharmacy e-prescribing workflow changes

e. Actions taken by vendors
    Probe:

    Standardize e-prescribing functionalities and adhere to industry standards as they become available

    Offer low cost or free technologies to physicians by developing new payment approaches

f. Actions taken by consumer groups/employers

Probe:

Establish data privacy and security policies that enable e-prescribing

Educate and mobilize consumers on the benefits and risks of e-prescribing

4. Can you please explain to us how the e-prescribing initiative was financed?