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The Role of Technology in Shaping the Professional Future of Community Pharmacists: The Case of the Electronic Prescription Service in the English NHS

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Abstract. Information and communication technology (ICT) has been extensively proposed in the last decade as a means to reform, modernize and reshape national health systems around the globe. If it does these things then it will inevitably change work practices, and may thus have longer term consequences for health care professions. This paper considers how ICT may shape the professional future of community pharmacists drawing from ongoing research into a national project in England to establish the electronic transmission of prescriptions between doctors and pharmacies. The project illustrates how technology opens up various possibilities that may influence pharmacists' professional standing by shaping their work practices, jurisdictions, roles, values, power and boundaries. The aim here is not to evaluate these subtle and contradictory changes, which are in the future, but to develop an appropriate analytical framework, and to contribute to a debate concerning the role of technology in shaping professional futures.

Keywords: professionals, technology, community pharmacy, electronic prescriptions

1 Introduction

The future is already here - it is just unevenly distributed.
(attributed to William Gibson)

Information and communication technology (ICT) has in the last decade been extensively proposed as a means to reform, modernize and even reshape national health systems. Adoption of ICT based systems is expected to achieve cost-effectiveness, support clinical decision making, improve patients' privacy and safety, speed-up delivery and improve the quality of healthcare [1],[2],[3]. Adopting ICT is however not without consequences; ICT based systems challenge health professionals' work practices, the roles they occupy, the types of knowledge they use and the modes of collaboration they employ [4]. The focus of this paper is on the

possibilities that ICT opens up for reshaping pharmacy professionals' work, in particular that of the community pharmacist. Community pharmacists are those who serve the public in high street shops, supermarkets and some medical centres. They constitute the largest subgroup within the overall pharmacy profession, which includes also hospital pharmacists who provide clinical advice to hospitals and healthcare professionals and those who work in pharmaceutical research. From now on reference to pharmacy(-ists) will imply community pharmacy(-ists).

Our account here is a possible projection of professionalism in the future that is created from research interviews and by an amalgamation of people's recollections of the past, experiences from the present and expectations for the future. The motivation for the paper is found in the introduction of the Electronic Prescription Service (EPS) into primary care in the English NHS. This is a national programme to allow doctors to send electronic prescriptions to community pharmacists, and pharmacists subsequently to send them on for reimbursement by the NHS¹. The basic infrastructure for the project – networks, software, databases, and new operating procedures, are well under way. Phase 2 of the programme which will see the legal prescription shifting from signed paper to an electronically signed electronic message is rolling out through 2010. Thus ICT is taking on a stronger role as a mediator of the generation, transmission and receipt of prescriptions between doctors and community pharmacists, as well as serving the processes of reimbursement. We are interested here in exploring the role of this new technical intervention in shaping the pharmacy profession and in particular those members who work in community pharmacies. To do so we draw upon a part of our current research evaluating the adoption of EPS². We develop two particular arguments in this paper. First, we propose that EPS can shape six aspects of pharmacists' work; work practices, values, roles, jurisdictions, exercise of power and location of boundaries. Second, we see the consequences of this technology for the pharmacy profession are multiple and often contradictory; on some occasions technology strengthens and expands pharmacists' professional standing by fostering their values and expanding their jurisdictions, opening up opportunities for re-professionalisation. On other occasions technology blurs pharmacists' role, enables electronic monitoring of their outputs and challenges their professional boundaries by allowing new business models and logics to emerge, conditioning in that way possible de-professionalisation. We propose a framework that depicts how and in what ways ICT might shape the community pharmacy profession.

The paper is structured as follows. Section 2 presents our theoretical framework drawing upon the sociology of professionals, critical studies on technology and secondary studies on pharmacists' profession. Section 3 describes our research methodology. Section 4 provides an account of our research into EPS which is followed by a discussion. The paper ends with some concluding remarks.

¹ <http://www.connectingforhealth.nhs.uk/systemsandservices/eps>

² Reference to be added

2 Theoretical Framework

2.1 Conceptualising Professionalism

Professions constitute ‘...homogeneous group of occupations sharing a unique character and destiny’ [5] and are structured in line with certain mechanisms. First, professionals are typically organised into associations, which are established in order to promote and protect their interests and rights [6]. Second, professional associations define the skills needed in order to become a legitimate member, establish ‘career patterns’ and set up mechanisms that regulate entrance and operation in their profession [6],[7],[8],[9]. Implicit in this is the establishment of norms, values, and standards of occupational behaviour, what is understood as professional conduct [10]. The process of establishing a profession (professionalisation) is therefore a boundary-making process that binds professionals under a specific regime of work [11],[12]. Professionalisation is both a process of enactment, in as far as it depends on individuals acting their assigned roles as professionals, and a process of subjectification during which individuals are ‘made-up’ as professionals [13].

For Abbott [14] the most distinctive characteristic of professionals is the abstractification of their knowledge which distinguishes professionals’ claims from those of ordinary technical work [11]. This differentiation serves to create a relationship of dependence between professionals and laymen [5] and is thought to (re-)produce professionals’ power and authority [15]. Thus, abstract knowledge legitimises professionals’ status and prestige because it is typically associated with science, logic and future practical value. Of course professionals also undertake mundane tasks, rendering their work a hybrid of conceptual and manual activities [16].

Professional groups are expected to exercise high degrees of power and authority [17]. The power they exercise can be defined as the ability to ‘retain jurisdiction’ [6] e.g. to make decisions based upon ‘internalised norms and expert knowledge’ [18],[9], influence policy and decide on their remuneration [19]. Professional power is largely dependent upon the state’s support by, for instance, defining the type and mode of services they alone can offer [20].

Individual professionals’ power in institutional settings is influenced by specific standards, code of ethics and behavioural norms drawn from the profession but also, to degrees, from their employing organisations [21],[20]. Professionals’ power can be further limited by clients’ ability to organise themselves into powerful groups that set requirements, pursue their rights and demand certain types of service [5].

2.2 (Re-) Constructing Professionals through Information Technology

The introduction of ICT in any work setting promotes changes to work practices, roles and identities. Typically ICT is used to gather, maintain, process and disseminate data and information across temporal and spatial boundaries. ICT can achieve a parallel centralization and decentralization of data and information as it

renders it available to anyone, anywhere [22],[23],[24]. Further, such data can be statistically processed, ranked, compared, accumulated and inscribed into reports, generating in that way new types of information with new uses and users [7],[25],[26], [24]. One significant way in which ICT influences professionals' work is by rendering their outputs visible [27] for example concerning work aspects such as performance, outputs, time and date of work, and history of activities. This then renders professionals 'legible', in particular to managers [28]. This transparency that technology provides enables constant surveillance and control, which in turn may influence reward structures and hence the way in which professionals do their work. For instance Aarts et al (2007) [4] describe how the introduction of Computerised Physician Order Entry (CPOE) system impersonalized healthcare professionals' collaboration and made nurses lose visibility of, and thus power over, aspects of their work.

ICT is also used to automate processes and practices [22] with implications of simplification, rule following and tasks undertaken without human knowledge, judgment or discretion. This promotes predictability, quantification and centrally controlled rule-based decision making [29]. Automation is often associated with attempts to de-skill professionals and undermine their claims to professional status [27].

Beyond automation ICT intervenes in work organisations in order to transform work processes [22]. In these cases, ICT is not always perceived as a machine that automates but may be seen as an intervention that 'informs' work [24]. It does so by eliminating unnecessary activities, undertaking mundane tasks and then providing back to professionals processed information upon which they can act. In this way, ICT serves professionals in decision making and may encourage them to develop new capacities as they exploit the value of this new information [30]. This then conditions possibilities for re-skilling by expanding the breadth and depth of their responsibilities [24]. Thus in a study of a Health Information system in a cardiology department Cho et al (2008) [31] found that ICT provided opportunities for re-skilling nurses by allowing them to download patients' images and discuss them with doctors during ward rounds.

2.3 Pharmacists as Health Professionals

Unlike other clinical professions, pharmacists do not specialise in specific parts of the body and do not directly intervene in the body [32]. Their work is fundamentally technological³ [11] in that it deals at the primary level with material objects, namely chemical components and models, delivery devices, medications, prescriptions, tokens. What distinguishes pharmacists from other healthcare professionals who are involved with medicines is their knowledge (abstractification) about the ingredients of medicines, the way in which they work in the body and their effects on it. This knowledge constitutes for Barber (2005) [32] the 'pharmaceutical gaze'. Another critical feature of community pharmacists working in the high street is their hybrid

³ Technological is defined here as a *techne* i.e. the ability to use expertise and techniques in order to achieve particular objectives

role as both healthcare professionals with clinical expertise, jurisdictions and social-service orientation, and as business owners who look for the future viability of their business [27],[19],[33],[34]. The intrusion of the business orientation into pharmacists' profession is thought by some to condition de-skilling and standardisation, leading to the rise of what Bush et al (2009) [27] described as the 'McPharmacist'.

Nonetheless, through their training and their enactment of professionalization pharmacists tend to follow a scientific and rational model of thinking and acting that draws largely upon the law, and their own codes, rules and standard operating procedures and policy guidelines [21],[35],[9]. The profession is driven by two major values. The first is the value of managing medicines in a safe and reliable way [21], the second is treating the patient as a person with particular needs, values, culture and beliefs.

In practices, however, pharmacists' work is not as 'rational' and normative as it may look from the outside. Benson et al (2009) [21] present a number of examples which illustrate how pharmacists work in a non-prescriptive way in their attempt to deal professionally with complex situations. For instance, pharmacists often need to bend the rules in order to treat a patient in a 'better' way or they may ration services by prioritising some patients over others [21].

Traditionally pharmacists' skills and expertise is founded on finding and combining the right ingredients in order to compound medicines [11],[36],[19]. Industrialisation and increasing regulation of medicines reduced some medical risks, automated the production of many medicines, thereby increasing it, and led to the creation of new drugs with new adverse effects [32],[27],[19]. These changes limited the involvement of pharmacists in the production of drugs, which was now the responsibility of drug manufacturers [27], and reduced pharmacists' work to labeling and record keeping [11] and their role to 'mere dispensers' [35]. However, in the last few years the community pharmacists' role has been reconsidered and some have argued for it to be transformed from a 'product-focused' [37] profession into a more clinical profession with new responsibilities for the management of prescriptions, common ailments and long-term illness, and for the provision of medical advice on healthy lifestyles [11],[21].

Since the 1980s the English NHS has undertaken a number of initiatives in an attempt to re-professionalise pharmacists such as campaigns that prompt patients to turn to pharmacists for medical advice and initiatives to use their skills in order to assess patients' use and experience from medicines [35]. These initiatives however have not been successful in substantially strengthening the pharmacists' profession. It has been suggested that this is because community pharmacists' often have insufficient skills to undertake clinical responsibilities, the risk of potential conflicts with doctors, and their general weak professional power to shape public policy [11],[27],[19]. In contrast to such concerns about community pharmacists potential a recent official report on hospital doctor prescribing errors⁴ acknowledged that almost all errors are detected and corrected by pharmacists, illustrating the high level of clinical practice found in hospitals.

⁴ http://www.gmc-uk.org/FINAL_Report_prevalence_and_causes_of_prescribing_errors.pdf_28935150.pdf

3 Research Methodology

This research drew upon the qualitative paradigm [38],[39] and specifically interpretivism [40],[41]. This paper draws upon data gathered through interviews as well as documents. 19 interviews were conducted with a number of different organisations and their representatives involved in EPS such as software suppliers for dispensing systems, community pharmacists, clinical and local EPS leads, representatives of pharmacists' associations, and representatives of Connecting for Health, the agency commissioned by the Department of Health to manage EPS. Interviews took place from June 2009 until March 2010. They were semi-structured, recorded and when this was not possible notes were kept. Interviews lasted 60 minutes on average and were transcribed (when possible) verbatim. We drew also upon recent government documents and reports concerning pharmacy its future, contractual arrangements and business and workflow models. Documents were important in enriching our understanding of the context and substantiating the arguments that derive from our primary data.

Interview transcripts and notes from documents were continuously read leading to broad themes and sub-themes. These were then compared and contrasted with secondary studies [38]. Out of comparisons, some themes were merged, eliminated, further developed and refined. The sections that follow present our findings from interviews and documents.

4 The Case of the Electronic Prescription Service (EPS)

4.1 The Introduction of EPS in English Community Pharmacy

In England community pharmacies are contracted by the NHS to provide pharmaceutical services in the local community [35]. Their function is influenced by a number of other organisations responsible for working with them and protecting pharmacists' interests at a national and local level (National Pharmacy Association, Local Pharmaceutical Committees), negotiating their contractual obligations (Pharmaceutical Services Negotiating Committee) and reimbursing them (Prescription Pricing Authority). Community pharmacies are paid to deliver NHS services and have a contract to do so, just like family doctors who work in their own businesses. Yet, their relation to the NHS is at times a contested area; one of our respondents described community pharmacists as being '...in name only part of the NHS family' reflecting a view of them as independent enterprises or parts of multiple retailers rather than essentially of the health care system [33]. However, in most cases the majority of their income derives from fulfilling prescriptions for the NHS and their very existence is largely dependent upon NHS policy decisions which often open up critical business issues for them.

The EPS was started in 2003. It is a part of the National Programme for IT (NPfIT) for the NHS in England, which is delivered by the Department of Health agency Connecting for Health (CfH). EPS refers to the electronic generation, transmission

and receipt of prescriptions from a prescribing authority (e.g. doctor or nurse) to a dispensing authority (e.g. community pharmacist). EPS is being rolled-out in two releases. The first (EPS1) aimed to set up and test the central infrastructure and the second (EPS2) to achieve a paperless and fully electronic transmission of prescriptions⁵. EPS2 also introduced new electronic functionalities: electronic cancellation, repeat dispensing of prescriptions, and pharmacy nomination. We explore the last two and their potential consequences for pharmacists' professional work in the following sub-sections.

With EPS electronic prescriptions are sent via a central server, the Spine, which is linked to community pharmacies and general practices via the NHS own network N3. The Spine holds some patient demographic information and it is planned one day to hold a summary care record of each patient - the subject of another NPfIT project [42]. The spine is supported by a message handler and a broker whose role is to integrate and ensure consistency between the messages being exchanged. Prerequisite for accessing the Spine is EPS-compliant local systems and role-based access through personal users' smartcards. A number of manufacturers of software systems for both doctors and pharmacies have modified or are modifying their systems in line with centrally set specifications, to enable the creation and exchange of electronic prescriptions. EPS has been envisioned as a project that will bring considerable benefits to pharmacists' work such as cost reduction, legible prescriptions, faster dispensing process, faster access to information and time savings⁶. Most importantly for this paper, EPS opens up opportunities for (re-)shaping the professional role of the pharmacist within community settings by intervening in pharmacists' work practices, values and their business. This is discussed below.

4.2 Changing Pharmacists' Work Practices through EPS

Ideally, the introduction of EPS will automate aspects of the dispensing process (for example labelling) and reduce the amount of paper that is generated. In theory electronic prescription messages can be downloaded from the Spine and accessed and dispensed by any EPS-enabled community pharmacy across the country. It has been often argued that eliminating handwriting makes prescriptions more legible, and thus safer whilst also reducing the associated costs of paper⁷. A paperless process (or paper light) implies that pharmacists will dispense from information presented on screen.

In the non-EPS world the time of dispensing is mainly defined by the patient at the point of his or her request. Under EPS, dispensing becomes temporally dispersed; it can in theory start as soon as the prescription message is forwarded to a pharmacy. EPS2 allows repeat dispensing, the issuing of multiple instances of the same prescription for a patient to collect at the pharmacy as and when medication runs out, without the patient having to request a new prescription from the doctor each time⁶. Through repeat dispensing pharmacists may be able to pre-dispense and so manage

⁵ EPS Release 2 Business Guidance for Initial implementers, April 2009.
<http://www.connectingforhealth.nhs.uk/systemsandservices/eps/staff/guidance/release2guide.pdf>

⁶ Pharmacy in England: Building on strengths-delivering the future, White Paper, 2008

better their stock and time, reduce patient waiting time and potentially keep a patient as a repeat customer.

The prescription message populates the local computer record with patients' demographic details as well as the prescribed items reducing the need to enter this information for a patient who arrives at the pharmacy while ensuring data consistency. At the same time it may make a pharmacy's daily functions more dependent upon complex technology and infrastructures (N3, Spine, doctors software etc.). In case of a technological breakdown, pharmacies' function is likely to be brought to a halt with patients redirected to other dispensers (with possibly significant business implications).

4.3 Changing the Values of Pharmacy Work

Some interviewees described EPS as a means to render the relationship between doctors and pharmacists less dependent on personal acquaintance and familiarisation. A representative of a pharmacists' association argued that in the pre-EPS model the pharmacist who encountered a prescription error would, after a discussion with the doctor perhaps by phone, dispense the correct medication and wait for the correct prescription to arrive in retrospect. This process leaves the pharmacist in a limbo both legally and financially and renders professional trust essential. In the EPS world, however, when error is detected and changes agreed with the doctor, the pharmacist can expect the doctor to send in real time a new prescription – and indeed may not feel able to proceed until it is done. This manifests the secondary role that personal trust plays when communication between professionals is mediated by computers. As a community pharmacist told us:

'...at the moment I receive a prescription which clearly has an error I attach a note to that prescription, possibly write a note on it and send it back to the surgery telling the error and the reasons for the error. If you just cancel a prescription – which is effectively what you are doing by sending it back to the spine, then ... they become disconnected, which actually adds another weakness to the system possibly.'

In contrast to this view, other interviewees argued that EPS could be a mechanism that fosters trust between doctors and pharmacists through the functionality of repeat dispensing. In this case, as described above, doctors rely on pharmacists to dispense the correct medication, advise on the correct dosages, pick up patient concerns or queries, and continue dispensing for the prescribed period of time. Further, a dispensing software supplier argued that the possibilities for electronic monitoring that EPS enables could potentially allow doctors to monitor whether (or not) their prescriptions have been dispensed, fostering trust, though this functionality is not a part of EPS2.

Some participants highlighted the risks that may emerge as a prescription message gets modified while being transferred from a doctor to a pharmacist. This can be a major concern due to the different prescribing and dispensing software systems in use and their use of different dictionaries - especially in relation to how medicines and their dosages are coded. A dispensing software supplier explained:

'You don't have the proof of a piece of paper and the GP sees on his screen that he's typing out Gaviscon for instance, but what is actually sent in the message, he doesn't see that...'

Some participants suggested that pharmacists will be rendered liable for addressing these risks as they make their professional judgement about items they dispense without having all the necessary knowledge, such as patient history and current treatment. Professional judgement is also required with the current paper-based system, but the feeling expressed was that EPS could increase the volume of such cases.

The other new functionality that EPS2 provides is 'nomination' – a term coined to refer to a patient's choice as to which pharmacy to use. Patients are given the opportunity to nominate any EPS2-enabled pharmacy across England from which to collect their medication. In the patient interest, and in the interest of maintaining flexibility and competition among pharmacist, nominations can be easily changed. Assuming the patient does not change her nomination too frequently nomination may allow pharmacists to accumulate data concerning patients' treatment and thus to provide more customised advice, monitor patients' health and intervene whenever this is necessary. To a degree such data is already held by pharmacies, but the nomination process, may enable more complete information. As a representative of a dispensing software supplier said:

'It's sort of like a loyalty card in the sense that, I'll always come back to you and I'll always come and get my prescriptions from you. You're tied to the patient. Therefore, you get to know who Mr Smith is.'

Pharmacists, however, worry that nomination impersonalises the relationship between pharmacists and patients because it makes choice less reliant on personal acquaintance and more dependent on convenience of location. Thus nomination is expected to have a major impact on the geographical distribution of pharmacies and the business potential of pharmacies in residential areas. The representatives of a pharmacy chain argued that the empowerment of patients to nominate prioritises speedy collection of medicines over the provision of pharmacists' clinical advice. Thus some interviewees expressed concerns about the potential for 'script direction' suggesting that nomination opens up the possibility for a style of competition to improve the position of large pharmacies in the market and exclude smaller pharmacies. As an one interviewee said:

'pharmacies ... are scared of EPS, because they think that they are going to lose control and they are going to lose business. So what pharmacists are going to do, as soon as they become EPS enabled is they are going to start collecting nominations from every patient that walks in their door.'

Indeed, policy makers have attempted to address this risk by imposing new norms that guide prescribers and dispensers' behaviour. The 'EPS Release 2 Business Guidance for Initial Implementers' articulates how prescribers and dispensers should behave in relation to nomination:

[Dispensing staff] *'...shall not give or offer any gift or reward to encourage a patient to nominate them; this also includes the offering of share dividends of points, discounts and loyalty points... NHS Pharmaceutical Service Regulations 2005, prohibit pharmacists or their staff from offering inducements to encourage patients to nominate them'* (p. 41)

4.4 Changing Pharmacy Business

EPS2 constitutes a 'business critical' issue for most pharmacies, clearly linked to their future viability. Further, due to its potential to electronically connect pharmacists with the NHS, it renders them more of an identifiable part of it. As an official from CfH said:

'You put in the technology, so you are making them part of the NHS family technically. They are all connected to N3 either directly or indirectly. They are all having smart cards, so that they can be uniquely identified'

Connection to the Spine requires a large financial investment in purchasing new software and a commitment for its future maintenance. This, according to a representative of a dispensing software supplier, will squeeze pharmacies' profit margins in the future. But this can be seen as part of a wider shift in the ecology; access to the Spine may potentially give pharmacists access to a summary of patients' electronic health record (the Summary Care Record described above) if and when this becomes widely available. The director of an independent pharmacy saw this as very important both because it can inform pharmacists about patient conditions under which medicines are prescribed and allows them to judge the appropriateness of the prescription, as happens in hospital pharmacy. Visibility of patients' records may empower pharmacists and give them more control over their work and allow them to be more patient-oriented. Apart from just viewing this information, the opportunity for feeding information into a patient record was also highlighted by some participants as an important potential advantage for pharmacists of broader EPS enabled systems. A representative from a software supplier argued that, unlike doctors, community pharmacists know the type of deregulated and over the counter medicines that patients take beyond what is prescribed. Feeding this information back could give a more thorough view of the patient to the doctor and lead to better consultations.

Access to patients' records may thus influence community pharmacists' professional stance by making it more clinically-oriented. The dispensing process, we may hypothesise, would become more a back-office operation undertaken by non-professional pharmacy staff, such as Accredited Checking Technicians, as pharmacists make better use of their skills focusing on the provision of clinical care³. Indeed, the inclusion of more clinical services into pharmacists' work seems to be one vision for pharmacies in the future^{4,7}. As a CfH official said, reflecting on repeat dispensing, pharmacists are envisioned to be:

'...a first port of call for minor illnesses...and also as an additional service...for long term condition management'.

EPS can be seen in more disruptive terms. It could potentially give rise to new business models, such as web-based pharmacies, and allow existing and new stakeholders, such as Amazon, existing wholesalers or central supermarket online stores, enter into the pharmacy business in the future. These new models, which are less likely to get into the provision of clinical services, may in the future challenge pharmacists' current professional view.

⁷ Pharmacy in the Future – Implementing the NHS Plan: A Programme for pharmacy in the National Health Service, September 2000

Finally, the Spine has the potential to provide the Department of Health with real time information concerning prescribing and dispensing activity. This information, which was up until now obscured and estimated, may enable in the future a more effective governing of community pharmacies. This is despite the fact that EPS as a CfH official argued has not been intentionally designed for such a purpose:

‘...there is funny goings on in pharmacies and in prescribing that we don’t know about. We do know about, but we’ve got no evidence. It’s not the job of EPS to deal with that, but ... there will be better quality information, quality data which people, at some point can take action and look at in detail, should they wish.’

5 Analysis and Discussion

This section responds to our research question concerning the possibilities that technology opens up to transform community pharmacists’ profession. Table 1 briefly illustrates the core analytical remarks we make below.

The case of the EPS can be seen as a manifestation of the way in which professionals can be influenced by technological advancements [30],[35]. In summary, EPS can influence pharmacists’ work in three ways. To begin with, the parallel centralisation and decentralisation [23] of electronic prescriptions intends to eliminate paper and in doing so to dissociate the dispensing process from its material aspects. The strength of paper prescriptions is that they are mobile and combinable [26]; pharmacists hold a paper prescription throughout the dispensing process and check against it the medications they dispense. The mediation of technology, however, transforms them into ‘screen-level’ pharmacists, to borrow Bovens and Zouridis (2002) [43] term, who continuously need to consult a computer interface in order to conduct their daily activities.

Table 1. The implication of ICT in pharmacists profession.

IT possibilities	Field of Change in Pharmacists’ Profession	Features of Change
Centralisation/Decentralisation of information	Work practices	Immaterial aspects
		Temporal flexibility
		Elimination of manual tasks
Automation	Roles	‘Screen-level’ pharmacists
Generation of information	Values	Informatisation & Patient Orientation
	Roles	Delivery orientation
	Jurisdictions	Responsibilisation
Transformation	Jurisdictions	Clinical orientation
Computer Mediated Communication	Values	System trust & Impersonality

Visibility	Control and Power	Governing
		Inter-professional trust/control
Connectivity	Professional boundaries	Inclusion
		New business models

EPS might bring temporal flexibility to the dispensing process which has been typically a temporally and spatially bound process that starts with the receipt of a paper prescription and ends with the dispensing of medications. EPS however transgresses temporal boundaries by allowing pharmacists to decide when they dispense and perhaps where [44],[45]. Further, EPS also affords far more automation of the dispensing process by feeding complete data into pharmacists' systems eliminating manual data entry [22].

Unlike what literature suggests that automation leads to 'de-skilling' [30] EPS has the potential to generate data that 'informatates' pharmacists work [24]. Interviewees have suggested that through the functionality of 'nomination' pharmacists may be able to acquire large amounts of data concerning patients' treatment and develop a better understanding of them [21]. At the same time, the focus of nomination on patients' convenience may, in the long run, transform pharmacists from professionals into mere providers of pre-packed medications. This is likely to weaken their distinctive 'pharmaceutical gaze' [32], threaten their professional status and condition 'de-professionalisation' [30].

Our initial findings do suggest that EPS may expand pharmacists' jurisdictions by adding further responsibilities [30]. Electronic prescription messages may be modified while being exchanged between doctors and pharmacists. This can happen for instance due to possible mismatches in mapping data dictionaries. Pharmacists are then rendered responsible for interpreting the messages they receive and exercising their professional discretion, as they did in the past with the handwritten and often illegible prescriptions. With a high level of use of repeat dispensing, one of the main benefits claimed for EPS, pharmacists will become the primary health professional monitoring chronic diseases for periods of up to 12 months. This will often require making decisions when pharmacists have limited knowledge about the detail of a patient's case. Despite the risks that such a scenario may entail it is likely to raise the status of pharmacists' profession by prompting for their further re-skilling [30].

Further, a number of participants in this research argued, that EPS may provide pharmacists access to an electronic summary of a patient record. This would condition two possibilities. First, pharmacists are informed not only about what has been prescribed but also the reasons for its prescription. By knowing patients' diagnosis and treatments they also know when they should (and should not) provide specific over the counter medications based on possible adverse effects. They are thus able to make professional judgments and provide more clinically oriented services. One could therefore interpret pharmacists' possible access to a summary patient record as another government attempt to re-professionalise pharmacists by fostering the use of their clinical skills and professional judgment [19][35]. Second, and perhaps more important, pharmacists may be able to feedback to a patient's record information

about patients. For instance, concerning over the counter medications that patients buy (information which prescribing authorities can hardly know) pharmacists may generate information that assists clinical decision making across the prescribing and dispensing process [25],[26],[24].

Another consequence of EPS for the pharmacy profession concerns inter-professional trust. As our research indicated EPS has the potential to weaken personal trust by mediating between doctors and pharmacists and thus making them less inter-dependent. Specifically, personal and often intuitive ways of communicating are overtaken by electronic exchanges of messages between geographically distant recipients often unknown to each other. In this EPS brings impersonality, devalues interpersonal ties and fosters 'system trust' [44]. Yet we know that the extent to which technology can substitute for human professional judgement remains open.

Perhaps some inter-professional trust could be ensured through the (unintended) possibility that EPS provides for electronic monitoring. Specifically, provided that pharmacists and patients are compliant with what is prescribed, doctors may be able to monitor whether (or not) and when their prescriptions have been dispensed independently of personal acquaintance with either patient or pharmacist. By making pharmacists' outputs visible and legible [28], inter-professional trust is strengthened, which confirms Knights et al (2001) [46] argument that electronic monitoring technologies can substitute for the lack of trust in virtual environments.

Similarly, there is the under-explored possibilities that EPS may provide to the government for electronic monitoring of pharmacists' outputs [27]. The provision of real time data will shed light on previously obscure aspects of the pharmacy business such as mismatches between prescribed and dispensed items. This may in turn enable auditing and decisions concerning future health budgets. EPS could pave the way to more government intervention in pharmacists' work and to more effective control over professionals [30],[10]. Being connected to the Spine is a part of this, likely to bring about two consequences for pharmacists' professionalisation. By allowing pharmacists' access to NHS-related information, such as patients' demographic information and diagnoses and treatments, and by making them identifiable to and tractable by the NHS, it also renders them, to use a participant's words, a part of the 'NHS family'. This indicates one role that technology - as a boundary creating mechanism - might play in professionalizing pharmacists through deeper inclusion into the NHS [11]. At the same time this data also highlight the potential of technology to shift the boundaries of pharmacists' profession in other ways, e.g. by enabling new business models to emerge such as internet-based pharmacies using the internet, telephone and post.

Participants in our study particularly underlined the risks that new business models may bring for community pharmacists. They mentioned the potential for illicit competition and patient direction and the diffusion of a business logic that would corrode pharmacists' professionalism by re-directing it towards a profit driven delivery model. This aligns with a number of studies that emphasise the entrepreneurial character of many public service professionals [7],[47] and suggests that EPS could be perceived as an intensification of entrepreneurialism in healthcare – a feature of the recently elected Government health policy. Such risks are historically counter-balanced by governmental interventions that protect and maintain pharmacists' professional status [10], but should we count on it?

6 Conclusion

The paper discusses the possibilities that technology opens up to transform pharmacists' profession in the future. We have argued that technology has the potential to centralise and decentralise, automate and informate practices and processes, generate new information, mediate communication and render outputs visible. The six aspects of pharmacists' work we consider, work practices, values, roles, jurisdictions, power and boundaries are all open to adjustment. One possible interpretation is that pharmacists' work will become an immaterial, spatially and temporally dispersed computerised process, and that pharmacists will be transformed into 'screen level' professionals as providers of accurately specified medicines (or put more bluntly – they become call centre workers). But EPS could potentially bring about more fundamental changes, that run counter. For example, pharmacists' values may change to become more patient oriented as they develop more clinical roles. And system trust may be a powerful substitute for interpersonal trust as EPS strengthens their profession by expanding their responsibilities, and thus their jurisdictions. Further, EPS could provide nuanced forms of electronic control that can enable better monitoring and management of dispensing outputs and thus help build inter-professional trust.

These changes, presented in table 1, constitute the framework we have developed to project and analyse IT-mediated shifts in the professional roles and standing of pharmacists. We do not make a prediction about the processes of professionalization in the future. This is not just because EPS has not been nationally rolled-out but primarily because changes in professions and the way that professionalization is enacted are long-term, multi-dimensional and open to interpretation. They can hardly be known in advance.

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