

## RESEARCH

# Receptionist input to quality and safety in repeat prescribing in UK general practice: ethnographic case study



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## Abstract

**Objective** To describe, explore, and compare organisational routines for repeat prescribing in general practice to identify contributors and barriers to safety and quality.

**Design** Ethnographic case study.

**Setting** Four urban UK general practices with diverse organisational characteristics using electronic patient records that supported semi-automation of repeat prescribing.

**Participants** 395 hours of ethnographic observation of staff (25 doctors, 16 nurses, 4 healthcare assistants, 6 managers, and 56 reception or administrative staff), and 28 documents and other artefacts relating to repeat prescribing locally and nationally.

**Main outcome measures** Potential threats to patient safety and characteristics of good practice.

**Methods** Observation of how doctors, receptionists, and other administrative staff contributed to, and collaborated on, the repeat prescribing routine. Analysis included mapping prescribing routines, building a rich description of organisational practices, and drawing these together through narrative synthesis. This was informed by a sociological model of how organisational routines shape and are shaped by information and communications technologies.

**Results** Repeat prescribing was a complex, technology-supported social practice requiring collaboration between clinical and administrative staff, with important implications for patient safety. More than half of requests for repeat prescriptions were classed as “exceptions” by receptionists (most commonly because the drug, dose, or timing differed from what was on the electronic repeat list). They managed these exceptions by making situated judgments that enabled them (sometimes but not always) to bridge the gap between the idealised assumptions about tasks, roles, and interactions that were built into the electronic patient record and formal protocols, and the actual repeat prescribing routine as it played out in practice. This work was creative and demanded both explicit and

tacit knowledge. Clinicians were often unaware of this input and it did not feature in policy documents or previous research. Yet it was sometimes critical to getting the job done and contributed in subtle ways to safeguarding patients.

**Conclusion** Receptionists and administrative staff make important “hidden” contributions to quality and safety in repeat prescribing in general practice, regarding themselves accountable to patients for these contributions. Studying technology-supported work routines that seem mundane, standardised, and automated, but which in reality require a high degree of local tailoring and judgment from frontline staff, opens up a new agenda for the study of patient safety.

## Introduction

Repeat prescriptions are traditionally understood to be those issued without a consultation between clinician and patient.<sup>1</sup> With electronic records, the de facto definition became “prescriptions printed by a practice computer from its repeat prescribing program.”<sup>2</sup> Repeat prescribing accounts for up to three quarters of all drugs prescribed and four fifths of drug costs in UK general practice; around half of all registered patients receive treatment by repeat prescription, and rates are rising.<sup>2-4</sup>

The quality and safety of repeat prescribing has long been recognised as an important concern.<sup>5-8</sup> Estimates on the scale of prescribing errors vary.<sup>9</sup> A recent systematic review based on UK research suggested an error rate of 7.5% across primary and secondary care. Repeat prescribing may allow errors to go undetected and contribute to polypharmacy, rising prescribing costs, and preventable drug related admissions to hospital.<sup>10-13</sup>

Research on repeat prescribing has been largely quantitative, comprising retrospective surveys of conditions, drugs, authorisation dates, clinicians’ views,<sup>2 14-17</sup> and experimental or

quasi-experimental studies of interventions aimed at improving efficiency or safety.<sup>18-22</sup> One small qualitative study explored general practitioners' perceptions of the causes of preventable drug related admissions to hospital.<sup>11</sup> Another reported that continuous quality improvement in one practice reduced the percentage of repeat prescriptions needing records to be checked by the doctor.<sup>23</sup> Repeat prescribing has been identified as a core element of the receptionist's role.<sup>24</sup> A small interview study documented receptionists' perceptions about causes of medication error.<sup>25</sup>

Electronic records are sometimes assumed to make prescribing safer by reducing human errors such as illegibility, inaccurate transcription, omissions, and use of dangerous abbreviations and arcane Latin.<sup>8, 26-28</sup> The assumption is that by increasing the automation of generating, checking, authorising, and issuing repeat prescriptions, safety will be improved. However, although computerised prescribing reduces some kinds of human error, it may introduce ones related to the technology itself.<sup>6, 29-35</sup>

Healthcare is a complex business; exceptions are sometimes typical. Technology embedded protocols with tight coupling of stages, restricted menus, and non-negotiable access controls may produce rigidity in the system, frustrate staff, and make it difficult to adapt to contingencies. One study argued from a complex systems perspective that although technology-supported automation can strengthen individual steps in a process, the process as a whole may be weakened if assumptions built into technology do not take full account of the "ecology" of healthcare work—for example, its real life demands such as constraints on time, space, and resources and the way in which "appropriate" actions emerge from the detail of a particular situation.<sup>29</sup>

It is time to critically question the assumption that semi-automated, technology-supported protocols form an effective and sufficient safety net for the common and risky task of repeat prescribing. We carried out an ethnographic study of repeat prescribing in general practice; described how the sociotechnical system (electronic records and the humans who interact with them) operates to generate, check, issue, and authorise repeat prescriptions; identified human and technical contributions to quality and safety in repeat prescribing; and contributed to the theoretical and methodological knowledge base in the study of medicines management and patient safety.

## Methods

This study was part of the Healthcare Electronic Records in Organisations study, funded by the UK Medical Research Council under a new methodologies call, which highlighted the limitations of experimental studies for certain research questions. The background, protocol, and details of governance and ethical approval for the study have been published previously,<sup>36</sup> along with a literature review and theoretical justification of ethnography in the study of technologies-in-use in healthcare.<sup>37</sup> Figure 1 summarizes the study protocol.

We studied four urban UK general practices (pseudonymised as Elm, Dale, Beech, and Clover), favouring what one researcher called "opportunity to learn" over "typicality."<sup>38</sup> We gained access to two practices through general practitioners inside the organisations (a legitimate approach in ethnographic work).<sup>39</sup> The other two practices responded to a primary care trust-wide invitation. The practices served mixed patient populations of about 6000 (Elm), 12 000 (Dale), 12 600 (Beech), and 11 800 (Clover). Dale operated from modern purpose built premises in a retail park, the others from converted houses in residential areas. Dale used the Vision clinical IT system; the others used

EMIS-LV (the most widely used system in the United Kingdom).

DS and MM undertook 395 hours of ethnographic observation (about four months in each practice), during normal working hours spread throughout the working week, usually in half day sessions. We shadowed 25 doctors, 16 nurses, 4 healthcare assistants, 6 managers, and 56 reception or administrative staff. We made field notes and elicited narratives from staff as they worked ("talk me through what you are doing"). Workers are typically unable to describe what they do unless they are doing it<sup>40</sup> so this approach was flexible and more sensitive to local contingencies than formal interviews. We explained that our interest was to learn about working routines and not to assess individuals' performance against prespecified standards. We made field notes during observations. We also collected documents on repeat prescribing at local and national level.

Field notes were anonymised, annotated with observational and theoretical notes,<sup>41</sup> and shared between members of the research team whose disciplinary backgrounds include general practice (DS and TG), social sciences (JR), and history (MM). This provided an opportunity for multidisciplinary reflection and enriched inquiry.<sup>42</sup> We applied the principle of the hermeneutic circle—that is, the need to analyse the parts in detail while maintaining awareness of the whole, relating new findings at the micro-level to an emerging wider picture.<sup>43</sup> In a preliminary data management phase, we collated relevant background text and material relating to repeat prescribing into interim documents informing a process of mapping repeat prescribing routines.

We built a rich ethnographic picture of each practice before using narrative synthesis to describe how repeat prescribing occurred within it. As new empirical data were added, we amended the emerging summary descriptions. We adopted an interpretive perspective of organisation. From this perspective, organisation (and organisational culture) comes about through organisational processes, constructed through patterns of relationships and meaning—a way of life.<sup>44, 45</sup> Our task was to experience how organisation was accomplished day by day.

We chose the organisational routine (repeat prescribing is one example) as our unit of analysis. Routines are "repetitive recognisable patterns of interdependent actions by multiple actors"<sup>46</sup> and are the way organisational life is patterned; they convey complex, tacit knowledge and serve to coordinate and control.<sup>36, 47</sup> Every routine is enacted differently every time, since human actors embody the routine, embrace or resist it, and put more or less creative effort into improving it or shaping it to the particularities of the here and now.<sup>48, 49</sup> The ethnographic study of mundane routines can illuminate how organisational change happens (or not).

In studying repeat prescribing routines we sought to identify and compare three things: local artefacts such as repeat prescribing protocols (the proxy routine); abstracted understandings held by staff of how a routine is enacted (the so called ostensive routine), arrived at by asking "what gets done, by whom, and how?"; and the range of ways in which the routine is actually enacted (the performative routine), arrived at by direct observation.

We analysed the convergence and divergence between ostensive, performative, and proxy routines within each practice. This enabled us to explore the tension between stability and change in routines and the scope for organisational learning and innovation.<sup>36, 47</sup> We also explored organisational power struggles highlighted in tensions between the three versions of the routine. We then compared routines across the four practices to highlight

variation and to identify potential for error and characteristics of good practice.

## Results

The dataset comprised over 800 pages of ethnographic field notes (around 20% of which related to repeat prescribing); up to 14 prescribing related artefacts for each practice, such as patients' leaflets and protocols; and national level documents from policy and professional bodies such as the National Prescribing Centre ([www.npc.co.uk](http://www.npc.co.uk)) and General Medical Council.<sup>50</sup>

### The organisational context of repeat prescription processing in general practice

Practice ethos varied from that of the traditional family doctor, with emphasis on personal relationships, continuity of care, and informal knowledge sharing (Beech) to modern business, with emphasis on uniformity, standards, protocols, and customer care practices (Clover); the other two practices (Elm and Dale) lay in between. All reception areas were divided into front stage (facing patients) the centrepiece being the reception desk, and back stage (not facing patients), where staff could talk confidentially. Time pressure and constraints on space were near universal.

In three practices (Elm, Dale, and Beech), the processing of repeat prescriptions took place in reception, which was busy, unpredictable, and characterised by frequent interruptions. Reception work often involved moving between cramped physical spaces, making do with materials and space available, and using apparently spontaneous (although sometimes strategically planned) encounters with clinicians to seek advice. In Clover, repeat prescribing work was the role of a "prescription clerk"; it occurred in an administrative office and was relatively free of interruptions. In all practices a formal division existed between reception and administration work; the latter was viewed as higher status (in one practice it attracted significantly higher pay), yet it was also seen by staff as more predictable and less stressful than reception work.

All practices were near paperless: computers were used for prescribing, booking appointments, clinical record keeping, item of service claims, and many other tasks. All were operating near their maximum computing capacity. Clover had a protechnology ethos and upgraded the various computers and peripherals often; use of personal smart cards and passwords was strictly observed and prescriptions were bar coded. But even here we observed the IT manager removing smart cards from computers in reception (disconnecting users from the national spine) to increase capacity on days when the system was running slowly. In another practice, computer screens regularly froze, requiring receptionists to make extensive handwritten notes until the screens unfroze.

### Practice protocols: the proxy routine

All practices had written protocols for repeat prescribing intended primarily for non-clinical staff. In Beech this had been written by one of the doctors a few years previously when studying for a diploma in therapeutics. It emphasised standards such as "precision, accuracy, promptness [and] alertness for potential errors," set a 48 hour turnaround for routine requests, and divided drugs into three categories: green (unproblematic requests for an item on the patient's repeat list), yellow (for example, requests for a change of dose or restarting a past drug), and red (including "any aspect of the request that you are not

sure about"), for which a repeat alert (fig 2↓) was to be completed and passed to a general practitioner. The other practices had similar protocols but placed more emphasis on technical tasks and less on how uncertainty would be managed.

### Descriptions of repeat prescribing: the ostensive routine

Staff in all four practices readily and consistently described what they understood to be the routine for repeat prescribing. Figure 3↓ shows the ostensive routine for repeat prescribing in Beech. This flow chart is not the practice protocol but our own synthesis, derived from staff accounts of who did what and who interacted with whom. Although the staff did not refer explicitly to the colour coding in their practice protocol, they seemed to have internalised this simple taxonomy along with the important message to refer on anything that they were not sure about. Staff in the other three practices described similar (but in some cases less detailed) routines.

### Repeat prescribing as it happened: the performative routine

Repeat prescribing as actually enacted exhibited greater variability than was suggested by practice protocols or ostensive routines. In many such cases these mismatches were not simple lapses of protocol but mindful and creative efforts to achieve a high quality and safe repeat prescribing service (and deliver other services), despite contextual constraints and the model-reality gap between what was assumed to constitute a repeat prescription by the software designers or author of the practice protocol and what actually unfolded in the here and now of real requests for repeat prescribing. Colleagues at adjacent computers often monitored each others' activity and helped to troubleshoot: "we bounce off each other for information and answering questions" (receptionist, Elm).

### Making requests for repeat prescriptions

The usual trigger for issuing a repeat prescription was a request from the patient or carer. Patients who discontinued a regular drug rarely came to the attention of staff. Although their electronic record would be automatically tagged to indicate underuse, there was no prompt for anyone to open that record and assimilate the information.

Most requests for repeat prescriptions in Beech (family doctor ethos) were submitted in person or by post using a tear-off attachment from a previous prescription, with relevant boxes ticked, but requests on scraps of paper were accepted and were processed almost as easily as the official artefact. Telephone requests were not accepted and this was made clear (in bold print) in the practice newsletter. Emailed requests, described by staff as part of the ostensive routine (fig 3) and promoted on the practice leaflet along with a dedicated email address, were little used. Such requests were unpopular with receptionists, who described them as "horrible" and a "waste of paper and time" and did not encourage patients to use them. This antipathy seemed to be explained by three things. Firstly, the email system in use (Microsoft Outlook) was not integrated with the clinical system, so staff had to move constantly between screens, which they found cumbersome. A function within the EMIS clinical system (EMIS Access) that could have integrated email prescription requests had been disabled because it was "just one more thing to check." Secondly, patients who requested their repeat drugs by email were perceived as expecting a faster turnaround than the 48 hour standard. But since receptionists simply printed off email requests (on the grounds that this made

them “easier to deal with”), the practice actually incurred a modest time penalty. Thirdly, the pace of activity in the reception area and the immediacy of many demands on receptionists (patients at the reception desk, telephone ringing, doctors’ requests) meant that checking email regularly was difficult to achieve in practice.

In contrast, Clover (business ethos) viewed technology as underpinning a quality service for repeat prescribing. Staff actively encouraged telephone requests; the practice leaflet presented this as a selling point over other local practices, and there was a dedicated telephone line for them. The person who staffed this line sat at a specific desk and (when undertaking this role but not at other times) was referred to as the prescription clerk. The enactment of this part of the routine was actively monitored. For example, we observed doctors being upbraided by the practice manager for making outgoing calls on the this line during the advertised time slot, and patients who phoned reception to make prescription requests were asked to redial using the correct line. Clover also encouraged electronic requests through EMIS Access (fig 4), and staff considered them easy to process—perhaps because this work was separated in both time and space from reception duties.

Dale did not formally permit receptionists to accept telephone requests from patients. This was explained on the practice website on the grounds of safety (because, it was believed, requests might be misheard or mistranscribed). We regularly observed staff instructing patients on this aspect of the routine. However, we also observed exceptions to this rule (for example, telephone requests accepted from care home staff, requests for oral contraceptives accepted provided an appointment was booked for a blood pressure check, and elderly patients asking for elastic stockings).

In Elm, the protocol stipulated that requests were to be in writing but acknowledged that there may be “rare exceptions” to this. We did not witness any telephone requests but did observe patients appearing at the front desk with “urgent” requests for medicines or devices needed that day. Nursing homes often faxed requests and the practice was preparing to go live with emailed requests.

## Issuing repeat prescriptions

Over half of the requests for repeat prescriptions, the processing of which we observed directly, were for items that either were not listed as repeats on the patient’s electronic record or were listed by a different name, at a different dose, or as due earlier or later than the date they were requested. Issuing repeat prescriptions without first passing them to a general practitioner for special attention required explicit and tacit knowledge, which was keenly sought by receptionists. For example, many were adept at using a formulary to match brand names with generic equivalents; they often telephoned patients to clarify ambiguous requests, and many kept (individual or shared) notebooks containing knowledge they had gleaned on the job. The box shows examples of receptionists’ use of initiative and judgment and the way in which they drew on local knowledge in dealing with problem scripts. The official repeat prescribing protocol in Clover had been written by a doctor, based on a (much longer) folder of informal notes, which had been collected on the job by the administrative staff. The doctor’s version served to confer legitimacy on the staff folder (which one clerk referred to as the idiot’s guide), but the staff folder remained the working artefact.

## Communicating with clinicians about problem scripts

Communication between administrative staff and doctors was crucial to the routine for repeat prescribing. The physical environment and relatively informal organisational culture of Beech afforded numerous opportunities for communication—for example, doctors almost always passed through the reception area on their way to and from their rooms. The doctors appeared to tolerate and even welcome such requests; receptionists were never told they were inappropriate. The repeat alert artefact in Beech incorporated three common contingencies (items requested early; overdue drug review; item listed in past drugs but not on the repeat list). Its incorporation into the ostensive routine meant that identifying such contingencies was the receptionist’s role, but resolving them remained the doctor’s role. It also meant that receptionists could process many exceptions promptly, allowing the routine to be completed within the 48 hour standard. This aspect of the routine also embodied an understanding in Beech that many prescription requests are (one way or another) not straightforward. The relatively high degree of autonomy afforded to reception staff meant that they often used the repeat alert to suggest a possible course of action for the general practitioner to endorse.

The other three practices tackled this need for close communication in different ways. Clover made extensive use of electronic messaging within the prescribing module in EMIS. The administrators shared an in-box for the prescription clerk role (general practitioners each had individual accounts). The clerk sent an electronic query (known as an “RI”) for any problem scripts to the patient’s usual doctor and stored a printed copy of the request form in a pending box next to the dedicated computer used for this work. Staff had learnt to include enough information in their original query to make this (and the doctor’s reply) meaningful to whoever was on the rota. They assimilated the information they deemed relevant, typing detailed accounts in their messages to doctors, and were mindful that electronic notes became part of the patient’s electronic record and thus were open to scrutiny.

This system in Clover seemed to serve a similar function to the repeat alert at Beech, but the ostensive routine was narrower and more rigidly defined. We did not observe a single instance of a prescription clerk issuing a prescription that was not on the electronic repeat list. All exceptions (about 50% of requests) were referred to the relevant doctor using the “RI” messaging system, and the reply was seen as an instruction pertaining to that specific request rather than to requests of this general type. Although staff found it frustrating that the ostensive routine did not incorporate common contingencies, the electronic messaging function allowed them to draw attention to problems, display their own knowledge of patients and prescriptions, and make doctors at least partially aware of the active and creative work they were doing to uphold quality and safety.

In Elm and Dale the ostensive routine was less well established and lines of communication (whether face to face or electronic) less clearly articulated. This resulted in much greater diversity in the performative routine and sometimes significant investment of time and effort by receptionists as they tried to resolve problems before issuing scripts for doctors to sign. Elm was characterised by a strongly hierarchical organisational culture. Receptionists in this practice referred to their repeat prescribing role as being “on the computer,” thus emphasising its technical aspects. Most were unaware of the existence of the practice protocol. No officially endorsed system was in place for seeking help from clinicians before issuing a prescription, and we never saw this happen. A perception among receptionists, born of

### Examples of initiative and judgment by receptionists and administrators when issuing automated repeat prescriptions

#### *Beech practice*

One patient requested cetirizine, which the receptionist recognised immediately as an antihistamine. This prompted her to take two actions. Firstly, she noticed as she got part way through issuing the prescription that it was cheaper to prescribe a single pack of 30 tablets than three packs of seven tablets, which was currently listed on the repeat list (the electronic record displays information on cost, which enabled her to make this judgment). She altered the prescription to a pack of 30 tablets. She also appended to the prescription a standardised letter advising the patient that these tablets could be purchased as an over the counter drug more cheaply than the cost of a prescription charge, but commented that it was always possible that the patient might qualify for free prescriptions.

#### *Clover practice*

The prescription clerk took a telephone call from a patient whose address she recognised as the local unit for homeless families. The patient was requesting co-codamol from the repeat list. When the prescription clerk looked at the prescribing screen there was an on-screen message below the repeat prescription list reading “?over-using co-codamol.” She spoke to the patient, saying that she recalled talking to her about it recently and remembered discussing the previous request with the doctor, who had increased the number of tablets available on her repeat list from 100 to 200. The prescription clerk said she would need to ask the doctor about it again. She put the phone down and started typing an electronic message to the doctor. However, this conversation had been overheard by an administrator, who was coding patient records at a nearby desk. The administrator called across the room, “Before you issue anything, check whether there is something from the local out of hours service. She had an urgent medication request with the out of hours service at the weekend.” The prescription clerk checked the consultation screen but found nothing relevant and concluded (in discussion with the administrator) that the letter from the local out of hours service had not yet been scanned in. She left a note to herself to revisit this query later that day.

#### *Dale practice*

A receptionist was dealing with a repeat prescription request for tamoxifen. The patient had submitted a written request using one of the surgery's request forms and had stapled it to an empty tamoxifen box. The receptionist explained to me that this was a drug for breast cancer and had been prescribed by the hospital so was not on the patient's repeat list. She looked back at the patient's past drugs to see if tamoxifen had been previously prescribed, but it was not listed. She looked again at the empty box and pointed out that it had been issued by the hospital pharmacy. She issued the script and placed it in a pile with other prescriptions awaiting the doctor's signature, adding “I know they will.”

#### *Elm practice*

The current request was for citalopram [antidepressant]. This was not listed on the repeat list but the receptionist found it in the patient's list of past drugs showing that it had been prescribed previously. She said she would issue it but attached a post-it note to the script and wrote “ok to give?” before placing it in the pile ready for signing by the general practitioner.

Next was a request for olanzapine [antipsychotic used in schizophrenia]. An alert popped up indicating that the patient was under-using this drug. Another receptionist said that they don't do anything with under-use and entered “aware” at the prompt. She went on to say that over-use was more important and that often you just had to use your judgment about whether or not to issue the drug. I asked how she made such decisions and she explained that she looked at the type of drug and when the last prescription had been issued.

experience, was that some doctors did not like being approached, and opportunities for raising queries were limited—for example, doctors did not generally pass through reception. Receptionists made extensive use of post-it notes attached to scripts, with the brief message “OK to give?”: a question that not only conveyed their uncertainty but concealed that they had typically made efforts to solve a problem before passing the script to the general practitioner for signing. The combination of culture, physical environment, tradition, and the absence of any endorsed feedback loop seemed to explain the more limited opportunities for individual and organisational learning in Elm and the high proportion of requests for repeat prescriptions, which played out as perplexing or problematic.

### Drug due dates and reviews

Attempts to issue prescriptions often resulted in an electronic message “patient over- (or under-) using [drug name], enter reason.” The record also showed percentage overuse (for example, “200%” suggested twice the prescribed amount) in red. In Beech, the prompt for overuse was usually bypassed by receptionists (by hitting the return key). All independently asserted that they would only act on overuse if the percentage exceeded 175%, and considered that if a patient were regularly overusing drugs the percentage figure showing in red would creep up with time. In Clover, making judgments about the percentages in the drug usage column was not seen as part of the clerk's role, and some were unsure what these figures meant. Elm and Dale lay between these extremes, with receptionists showing some flexibility with due dates and using post-it notes to flag (for example) “O/D [overdue for review].”

When we observed clinical consultations, we often encountered patients attending in response to an invitation for drug review prompted by the electronic record. Clinicians sometimes described these appointments as unnecessary, assigning

responsibility to the technology (as if the computer had recalled the patient). Most tended to enter the code for drug review with patient whether drugs were actively discussed or not—a practice that perhaps suggests they saw the review as a request to confirm that the patient was in an ongoing care relationship, rather than as a prompt to undertake a formal audit of drugs. In Clover, it was considered outside the role of the prescribing clerk to check when a drug review was due or to prompt the doctor (or patient) to take action. Administrative staff found this frustrating.

### Requests for non-repeat items

Not uncommonly patients sought to influence what was widely perceived to be an entirely doctor controlled and non-negotiable process—for example, by writing additional drugs beneath the ticked repeat boxes on the right hand side of their prescription. When this occurred in Beech, the receptionist consulted the list of current and past drugs on the electronic record to check whether it had been prescribed previously. If the drug had been prescribed in the past, the receptionist restarted the drugs (by keying “R” for restart), issued the prescription along with a completed repeat alert (fig 2), and placed it in the relevant doctor's in-box. This action may or may not be reversed by the doctor later in the routine.

In Clover, prescription clerks used the electronic messaging function to contact the patient's usual doctor whenever a non-repeat item was requested. They tried to include all relevant information to allow the general practitioner to make a judgment but were allowed minimal autonomy and did not seem to second guess the response; the prescription was not issued until the reply was received. Receptionists in Dale and Elm used post-it notes with the question “OK to give?” or “OK to go on repeat?” Thus, in all four practices, staff used a locally accepted artefact (the repeat alert, the “RI” messaging function, the post-it note)

along with their initiative and judgment to manage the issuing of non-repeat drugs through the repeat prescribing routine.

### Getting prescriptions signed

As one receptionist put it, the worst part of repeat prescribing work was “getting the things signed.” Some general practitioners were described as “really good” because they signed their prescriptions every day. Others were seen as needing coaxing or a special subroutine: “Dr M doesn’t like signing scripts in the afternoon so they have to try and make sure she gets hers in the morning” (field notes, Elm). Staff in all practices tried to process requests quickly, as they found it difficult and stressful when patients arrived to collect scripts that remained unsigned. When scripts went unsigned past the 48 hour deadline, a delicate act of brokering was needed, balancing the immediacy of a patient waiting at the front desk, the reluctance to interrupt consultations, and face-saving work on behalf of the doctor and organisation.<sup>51</sup> Urgent requests (for example, when the patient had run out of drugs) were not mentioned in the practice protocols or leaflets, but all practices had an established ostensive routine for them. For example, administrators in Clover printed these scripts and left them on the table in the doctors’ coffee room; such short-circuiting was tacitly accepted. Returning signed prescriptions to patients was generally straightforward: they were sent by post, picked up in person, or collected by a designated pharmacy. If a prescription request had been refused, receptionists felt a sense of responsibility to notify the patient and, as one put it, “soften the blow.”

### Responsibilities and training needs

Receptionists in some practices expressed concern that doctors did not check prescriptions thoroughly before signing. They believed that because of this they had a heavy responsibility to undertake safety checks themselves, although these were not recognised or remunerated. Examples of these (perceived) hidden responsibilities that we witnessed included checking when a patient who received antihypertensive drugs had last had a blood pressure check and confirming that the reading was acceptable; deciding whether a patient taking antidepressants needed to be seen; and whether to alert a doctor to under-use of antipsychotic drugs (box).

Several receptionists commented that the training they had received on repeat prescribing was oriented predominantly to learning the official protocol and how to use the technology. It did not cover the complex judgments that needed to be made in real time or the associated emotional pressure. As shown by the examples in the box, the day to day judgments being made by administrative staff presuppose at least a lay understanding of basic pharmacology. Many believed this was something “you pick up as you go along.” One clerk in Clover had been on a repeat prescribing course where she had learnt that, in general, drugs with addictive potential such as benzodiazepines and certain antidepressants should not be on the repeat list. She said this happened often in her practice but did not feel able to raise the matter with the doctors.

### Convergence and divergence between types of routine

In organisational life, divergences between what people say they do, what they actually do, and the official protocol are inevitable. We were struck in some practices by the broad convergence between ostensive, performative, and proxy routines, and in others by their noticeable divergence.

Beech was an example of relative convergence. The repeat prescribing protocol not only encouraged “alertness” in reception staff but also acknowledged the uncertainty inherent in many requests for repeat prescribing, and identified this uncertainty (“anything you’re not sure about”) as a reason to refer the request to a doctor. Staff described a working system for passing problem scripts to the doctor, and we observed this process working relatively smoothly and informally as doctors passed through the cramped but congenial reception space. An artefact (the repeat alert, fig 2) had been designed, which formalised and supported the “alertness” expectation, helped to achieve consistency between reception staff when applying judgment in uncertain situations, and formally designated the management of uncertainty as doctors’ work. We speculate that this low tech but organisationally sophisticated artefact explains why problem scripts in this practice were dealt with in a relatively unproblematic way.

Elm, in contrast, was an example of relative divergence between the different types of routine. Receptionists were unaware of the repeat prescribing protocol and often could not make sense of what they were supposed to do. They put in much emotionally laden work oriented to assuring quality and safety (as exemplified by the ubiquitous but largely ad hoc post-it notes). But importantly, no effective mechanism was in place for this work to be rendered visible to clinicians, who remained largely unaware of its existence—a source of stress and frustration among the receptionists.

### Evolving routines and organisational learning

Organisational life is never static: routines are always waxing or waning (that is, they are being actively shaped, refined, and improved by staff and patients, or they are slowly falling into disuse—and sometimes these opposing trends are operating in different parts of the organisation).<sup>47</sup> In Beech we were struck by the many examples of active shaping of the routine by staff (and, to a lesser extent, patients). Contingencies or problems likely to arise within the routine were planned for in the formal protocol and had become incorporated into the ostensive and performative routines in a way that created space for both individuals and the organisation as a whole to learn and change every time the routine was enacted. The repeat alert closed a learning loop almost every time a query was raised, since it structured a process whereby the receptionist received an instruction or comment from the doctor that might help solve future instances of similar problems. Seeking the informal advice of a doctor was also an expected and inevitable part of the routine; we observed many small scale instances in which receptionists gained explicit or tacit knowledge and (as they did so) their part in the routine evolved and sharpened.

In the other practices we observed some evolution of the routine over the observation period, but individual and organisational learning was less evident. During our observation in Dale, for example, the senior partner issued a request that when alerting the doctors to overdue drug reviews receptionists should also include the date and value of a patient’s last test or blood pressure reading. Although this may have increased efficiency by saving doctors’ time, the change was not accompanied by a feedback loop whereby receptionists would be advised whether their additional effort reduced the need for doctors to consult patients’ records.

### Discussion

Our study reveals the social complexity inherent in the task of repeat prescribing and the extent to which the quality and safety

of repeat prescribing depends not only on formal protocols and standard operating procedures but on collaboration between doctors, receptionists, and technology. This includes important “hidden” creative work by front line reception staff. Our findings raise some important areas for critical reflection that are relevant to practitioners and researchers.

The particular strength of ethnographic methods lies in the capacity for illuminating the details of real life practice as it actually happens. We explored the interplay and tension between strangeness and familiarity in an effort to make sense of everyday practices, and hope that this prompts new ways of looking at, and thinking about, repeat prescribing and issues of quality and safety for both practitioners and researchers. This study has taken us into areas of practice that are typically difficult to access and under-researched, despite being integral to prescribing practices in primary care.

With the exception of Elm practice, our study sites were larger (and potentially more complex) than the average UK practice, and the willingness of staff to be observed may reflect characteristics of practice that are atypical. If electronic health records become more widely integrated with pharmacy systems, then repeat prescribing routines will look different again. We make no claim that a detailed study across four practices yields generalisable truths about how repeat prescribing should be done in all practices. However, our study reflects daily realities that are likely to resonate with the experience of many practitioners in the United Kingdom and, by bringing new perspectives on what is often taken for granted, we believe that it can prompt critical reflection on research and practice, which is widely relevant and important, regardless of differences in local context.

### “Hidden” work bridges the model-reality gap

Our study found a substantial model-reality gap between, on the one hand, formal repeat prescribing protocols and the assumptions about roles and responsibilities that are built into the electronic patient record and, on the other hand, the real time activity and collaboration that actually unfolds around repeat prescribing, which is typically messy and unpredictable. Managing the demands of doctors and patients (which sometimes compete) alongside the tension between following a protocol and getting a job done is emotionally laden work. Receptionists and administrators assume responsibilities and make judgments (usually about when and how to prompt general practitioners to check particular items or make decisions) which are, on the whole, neither officially recognised nor remunerated. Despite not having formal accountability for certain aspects of quality and safety, reception staff consider themselves informally accountable to the patient, not least because in this regard they perceive deficiencies in the performance of clinicians.<sup>52</sup> Similar hidden work by relatively low status, mostly female staff has been described in relation to other aspects of healthcare<sup>53 54</sup> and the collaborative use of technologies<sup>55</sup> but not in relation to administrative input to repeat prescribing.

### Repeat prescribing is a fluid and negotiated category

Our findings challenge the notion of the repeat prescription as a definitive and unambiguous category defined in technological terms (“prescriptions printed by a practice computer from its repeat prescribing program,” as illustrated by Clover) and sometimes support a more traditional and pragmatic definition (“prescriptions issued without contact with a clinician,” as illustrated by Elm, Dale, and Beech). Our findings also challenge

the concept of the electronic patient record as a simple and reliable data container that faithfully records and assures past decisions made by doctors about who may receive a repeat prescription. The key finding here is not that the various categories on the electronic record (repeat, current, past) are being violated (which would prompt the conclusion that they should be more tightly defined and policed), but that these categories are more fluid and negotiated than the technology implies or previous research has suggested and that they evolve over time. A repeat drug may not be a repeat at all if the patient does not request it (or take it). Conversely, using the repeat prescribing routine to ask for a past drug opens up the opportunity for the drug to become a repeat.

### The protocol is only one aspect of safe organisational practice

Our study shows how routines are embedded in three types of organisational structure: technological or artefactual (for example, the electronic record, the repeat alert, and even the post-it note), cultural (for example, social hierarchies, practice ethos, and values as they are understood by staff), and coordination and control (infrastructures and ways of working that aim to achieve interdependence of different individuals and routines).<sup>56</sup> These structures exist in a dynamic interplay; they shape and are shaped by repeated iterations of routines.<sup>57</sup> Much potential to improve quality and safety in repeat prescribing seems to lie in the cultural and coordination and control structures. In particular, safety seems to be assured not merely by the protocols themselves but by an environment of effective, two way, and blame free communication, preferably with feedback loops that encourage and enable learning by all parties and that acknowledge what kinds of uncertainty may arise and whose responsibility it is to deal with these. In a noticeably hierarchical practice (Elm) in which lines of communication were not well established and were largely one way, the routine prescribing played out as perplexing and stressful for receptionists, and appeared vulnerable to error.

In the examples we witnessed the final decision about whether a drug became a repeat one was always made by the general practitioners, although they sometimes had actively to undo an action if they disagreed with the receptionist’s decision. The implications for patient safety here are more subtle than first appears. On the one hand the practice of a general practitioner being asked to endorse actions initiated by a receptionist (which seems common although not universal) contains potential for serious errors. On the other hand receptionists’ active rather than passive engagement with the repeat prescribing routine, and especially their ability to adjust it to the local contingencies they meet on a daily basis, is likely to contribute significantly to what Weick and Roberts have called “collective mind,” defined as “a pattern of heedful interrelations of actions in a social system” in which actors “construct their actions (contributions), understanding that the system consists of connected actions by themselves and others (representation), and inter-relate their actions within the system (subordination)” — a crucial component of a safety critical system.<sup>58</sup> As our findings from Clover illustrate, even in a well defined routine with clear lines of two way communication, prescribing clerks who are afforded relatively little autonomy may (understandably) fail to raise alerts when they see what they regard as undesirable practice.

This study has affirmed a previous observation that the use of computers to support individual tasks in the workplace is often a highly social process in which co-located staff help troubleshoot both the technology and the problem it is being

used to solve.<sup>59</sup> The design of new safety features for repeat prescribing needs somehow to embrace the reality of administrative staff discussing ambiguous cases in a crowded room while multi-tasking other activities.

We have also illustrated the ecological flexibility of paper and the contribution of mundane, low technology artefacts to assuring the quality and safety of the automated repeat prescribing routine. Other research has shown the value of paper in augmenting electronic formats in complex collaborative work, especially in a context where computing capacity and physical space are stretched almost to their limits and hot desking is the norm.<sup>60 61</sup> Although the electronic record seems to offer secure access, unambiguous categories and evidence based decision support, paper can be shifted physically to follow people or processes (for example, placed in a box designated as urgent or positioned strategically next to the coffee), annotated with free text, and used as interim material when the system is down. Paper is also free of the (perceived) constraints that electronic surveillance places on staff. In one nursing home study, a paperless system was introduced with the goal of improving safety around handovers, but paper records and artefacts (especially post-it notes) were subsequently reintroduced after a series of critical events.<sup>62</sup>

## One size does not fit all

The variability between the four practices in our sample (and the fact that certain components of the routine worked in one practice but not in another) suggests that there is no best way of running repeat prescribing. Telephone and online requests worked in Clover not because these methods were inherently safe and effective (indeed, telephone requests have been identified as particularly vulnerable to error<sup>63</sup>) but because the organisational context, physical layout, staffing structure, and accepted ways of working supported a technology dominant prescription request process. In Beech, all these factors played out differently and combined to make a technology-light process safer and more efficient in this organisational context.

The literature on patient safety suggests that inflexible safety features built into electronic records may actually threaten safety for several reasons, including creating over-reliance on the technology, over-simplifying complex processes, altering workflow practices, and reducing redundancy—that is, two separate individuals checking a process at different stages in a pathway.<sup>29 64 65</sup> This was illustrated in Clover with respect to drug review, where a tightly automated repeat prescribing routine was linked to the assumption that it is solely the doctor's job to check overdue drug review dates before signing (and that this is inherently safer) and to a wider organisational culture where technology and inflexible standards were highly valued.

## The importance of resourcing the routine

The literature on organisational sociology suggests that routines must be adequately and proactively resourced, not only with traditional allocative resources, such as money or knowledge, but also relational resources, such as trust, respect for skills, and complementarity.<sup>47</sup> The sophisticated repeat prescribing routine in Beech provides evidence that attention has been paid to this resourcing, and that the routine incorporates a balance of stability and yet scope for organisational learning (and therefore change). In Elm, it would seem that the routine has not benefited from the same resourcing, resulting in wide variation in performances, much additional demand on receptionists to draw on their own resourcefulness, less scope for wider organisational learning, and potential vulnerability to

error. Our research highlights the importance of ensuring that training for repeat prescribing goes beyond the technology and the protocol and embraces its inherent complexities, especially the management of uncertainty and the need for what one researcher has described as “practical judgment.”<sup>66</sup>

## Conclusion

In conclusion, reception and administrative staff make important “hidden” contributions to repeat prescribing in general practice. Although not formally accountable for prescriptions signed by doctors, these staff consider themselves informally accountable to patients for the quality and safety of these contributions. This research suggests that studying technology-supported work routines that appear mundane, standardised, and automated, but which in reality are socially complex requiring a high degree of local tailoring and judgment from frontline staff, opens up a relatively unexplored agenda for research in patient safety.

We thank the staff and patients in the general practices for their participation and our project steering group for support, guidance, and advice.

Contributors: TG, DS, and JR contributed to the research proposal, applied for the Medical Research Council grant, and conceptualised the study. TG and DS applied for the ethical approval. DS and MM made applications for National Health Service research governance approval. DS and MM completed the data collection. All authors contributed to the analysis of the data. DS and TG wrote the paper. TG is the guarantor for the paper.

Funding: This work was funded by a research grant from the UK Medical Research Council (Healthcare Electronic Records in Organisations, 07/133) and a National Institute for Health Research doctoral fellowship award (RDA/03/07/076) for DS. The funders were not involved in the selection or analysis of data, or in contributing to the content of the final manuscript.

Competing interests: All authors have completed the ICMJE uniform disclosure form at [www.icmje.org/coi\\_disclosure.pdf](http://www.icmje.org/coi_disclosure.pdf) (available on request from the corresponding author) and declare: no support from any organisation for the submitted work; no financial relationships with any organisations that might have an interest in the submitted work in the previous three years; and no other relationships or activities that could appear to have influenced the submitted work.

Ethical approval: This study was approved by Thames Valley multicentre research ethics committee (06/MRE12/81) in January 2007 and subsequent amendments.

Data sharing: No additional data available.

- 1 Audit Commission. A prescription for improvement: towards more rational prescribing in general practice. Stationery Office, 1994.
- 2 Harris CM, Dajda R. The scale of repeat prescribing. *Br J Gen Pract* 1996;46:649-53.
- 3 De Smet PA, Dautzenberg M. Repeat prescribing: scale, problems and quality management in ambulatory care patients. *Drugs* 2004;64:1779-800.
- 4 National Audit Office. Prescribing costs in primary care. Stationery Office, 2007.
- 5 Taylor RJ. Repeat prescribing—still our Achilles' heel? *Br J Gen Pract* 1996;46:640-1.
- 6 Spencer R, Avery A, Serumaga B, Crowe S. Prescribing errors in general practice and how to avoid them. *Clin Risk* 2011;17:39-42.
- 7 Garfield S, Barber N, Walley P, Willson A, Eliasson L. Quality of medication use in primary care—mapping the problem, working to a solution: a systematic review of the literature. *BMC Med* 2009;7:50.
- 8 Smith J. Building a safer NHS for patients: improving medication safety. Stationery Office, 2004.
- 9 Avery T. Avoidable prescribing errors: incidence and the causes. *Prescriber* 2010;21:52-5.
- 10 Payne RA, Avery AJ. Polypharmacy: one of the greatest prescribing challenges in general practice. *Br J Gen Pract* 2011;6:83-4.
- 11 Howard R, Avery A, Bissell P. Causes of preventable drug-related hospital admissions: a qualitative study. *Qual Saf Health Care* 2008;17:109-16.
- 12 Avery AJ, Rodgers S, Heron T, Crombie R, Whynes D, Pringle M, et al. A prescription for improvement? An observational study to identify how general practices vary in their growth in prescribing costs. *BMJ* 2000;321:276-81.
- 13 Saastamoinen L, Enlund H, Klaukka T. Repeat prescribing in primary care: a prescription study. *Pharm World Sci* 2008;30:605-9.
- 14 Zermansky AG. Who controls repeats? *Br J Gen Pract* 1996;46:643-7.



**What is already known on this topic**

The quality and safety of repeat prescribing are well recognised important concerns  
Electronic patient records and formal protocols are sometimes assumed to make prescribing safer by reducing human error

**What this study adds**

Repeat prescribing is a complex technology-supported social practice, requiring collaboration between clinicians and reception staff  
A model-reality gap exists between formal prescribing protocols and the real time activity of repeat prescribing  
Bridging the model-reality gap requires creative work by receptionists, of which clinicians may be unaware

- 15 Whitelaw FG, Nevin SL, Milne RM, Taylor RJ, Taylor MW, Watt AH. Completeness and accuracy of morbidity and repeat prescribing records held on general practice computers in Scotland. *Br J Gen Pract* 1996;46:181-6.
- 16 Howard RL, Avery AJ, Slavenburg S, Royal S, Pipe G, Lucassen P, et al. Which drugs cause preventable admissions to hospital? A systematic review. *Br J Clin Pharmacol* 2007;63:136-47.
- 17 Avery AJ, Savelyich BS, Sheikh A, Cantrill J, Morris CJ, Fernando B, et al. Identifying and establishing consensus on the most important safety features of GP computer systems: e-Delphi study. *Inform Prim Care* 2005;13:3-12.
- 18 Zermansky AG, Petty DR, Raynor DK, Freemantle N, Vail A, Lowe CJ. Randomised controlled trial of clinical medication review by a pharmacist of elderly patients receiving repeat prescriptions in general practice. *BMJ* 2001;323:1340.
- 19 Saastamoinen LK, Klaukka TJ, Ilomaki J, Enlund H. An intervention to develop repeat prescribing in community pharmacy. *J Clin Pharm Ther* 2009;34:261-5.
- 20 Newby DA, Robertson J. Computerised prescribing: assessing the impact on prescription repeats and on generic substitution of some commonly used antibiotics. *Med J Aust* 2010;192:192-5.
- 21 Wessell AM, Nietert PJ, Jenkins RG, Nemeth LS, Ornstein SM. Inappropriate medication use in the elderly: results from a quality improvement project in 99 primary care practices. *Am J Geriatr Pharmacother* 2008;6:21-7.
- 22 Avery AJ, Rodgers S, Cantrill JA, Armstrong S, Elliott R, Howard R, et al. Protocol for the Pincer trial: a cluster randomised trial comparing the effectiveness of a pharmacist-led IT-based intervention with simple feedback in reducing rates of clinically important errors in medicines management in general practices. *Trials* 2009;10:28.
- 23 Cox S, Wilcock P, Young J. Improving the repeat prescribing process in a busy general practice. A study using continuous quality improvement methodology. *Qual Health Care* 1999;8:119-25.
- 24 Hewitt H, McCloughlan L, McKinstry B. Front desk talk: a discourse analysis of receptionist-patient interaction. *Br J Gen Pract* 2009;59:571-7.
- 25 Hesselgreaves H, Lough M, Power A. The perceptions of reception staff in general practice about the factors influencing specific medication errors. *Educat Primary Care* 2009;20:21-7.
- 26 Wolf ZR. Pursuing safe medication use and the promise of technology. *Medsurg Nurs* 2007;16:92-100.
- 27 Benjamin DM. Reducing medication errors and increasing patient safety: case studies in clinical pharmacology. *J Clin Pharmacol* 2003;43:768-83.
- 28 Hidle U. Implementing technology to improve medication safety in healthcare facilities: a literature review. *J NY State Nurses Assoc* 2007;38:4-9.
- 29 Ash JS, Berg M, Coiera E. Some unintended consequences of information technology in health care: the nature of patient care information system-related errors. *J Am Med Inform Assoc* 2004;11:104-12.
- 30 Grimsmo A. [Electronic prescriptions—without side-effects?]. *Tidsskr Nor Laegeforen* 2006;126:1740-3.
- 31 O'Malley P. Think bar-code medication administration eliminates adverse drug events? Think again! *Clin Nurse Spec* 2008;22:269-70.
- 32 Chuo J, Hicks RW. Computer-related medication errors in neonatal intensive care units. *Clin Perinatol* 2008;35:119-39, ix.
- 33 Han YY, Carcillo JA, Venkataraman ST, Clark RSB, Watson RS, Nguyen TC, et al. Unexpected increased mortality after implementation of a commercially sold computerized physician order entry system. *Pediatrics* 2005;116:1506-12.
- 34 Savage I, Cornford T, Klecun E, Barber N, Clifford S, Franklin BD. Medication errors with electronic prescribing (eP): two views of the same picture. *BMC Health Serv Res* 2010;10:135.
- 35 Redwood S, Rajakumar A, Hodson J, Coleman J. Does the implementation of an electronic prescribing system create unintended medication errors? A study of the sociotechnical context through the analysis of reported medication incidents. *BMC Med Inform Decis Mak* 2011;11:29.
- 36 Swinglehurst D, Greenhalgh T, Myall M, Russell J. Ethnographic study of ICT-supported collaborative work routines in general practice. *BMC Health Serv Res* 2010;10:348.
- 37 Greenhalgh T, Swinglehurst D. Studying technology use as social practice: the untapped potential of ethnography. *BioMed Central Med* 2011;9:45.
- 38 Stake RE. Qualitative case studies. In: Denzin NK, Lincoln YS, eds. *The Sage handbook of qualitative research*. Sage, 2005:443-66.
- 39 Pope C. Conducting ethnography in medical settings. *Med Educ* 2005;39:1180-7.
- 40 Barley SR, Tolbert PS. Institutionalization and structuration: studying the links between action and institution. *Organ Stud* 1997;18:93-117.
- 41 Rose G. *Deciphering sociological research*. Sage, 1982.
- 42 Lee BK, Gregory D. Not alone in the field: distance collaboration via the internet in a focused ethnography. *Int J Qual Methods* 2008;7:30-46.
- 43 Klein HK, Myers MD. A set of principles for conducting and evaluating interpretive field studies in information systems. *Mis Quarterly* 1999;23:67-93.
- 44 Ormrod S. Organisational culture in health services policy and research: 'third way' political fad or policy development? *Policy Polit* 2003;31:227-37.
- 45 Czarniawska B. *A theory of organizing*. Edward Elgar Publishing, 2008.
- 46 Feldman M. A performative perspective on stability and change in organizational routines. *Ind Corp Change* 2003;12:727-52.
- 47 Greenhalgh T. Role of routines in collaborative work in healthcare organisations. *BMJ* 2008;337:a2448.
- 48 Feldman MS. Organizational routines as a source of continuous change. *Organ Sci* 2000;11:611-29.
- 49 Pentland BT, Feldman M. Organizational routines as a unit of analysis. *Ind Corp Change* 2005;14:793-815.
- 50 Anon. Procedures to simplify the work involved in issuing repeat prescriptions. Good medical practice. General Medical Council, 2008.
- 51 Goffman E. *On face-work. Interaction ritual: essays on face-to-face behaviour*. Pantheon Books, 1967:5-45.
- 52 Hor S, Iedema R, Williams K, White L, Kennedy P, Day AS. Multiple accountabilities in incident reporting and management. *Qual Health Res* 2010;20:1091-100.
- 53 Henwood F, Hart A. Articulating gender in the context of ICTs in health care: the case of electronic patient records in maternity services. *Crit Soc Policy* 2003;23:249-67.
- 54 Lee-Treweek G. Bedroom abuse: the hidden work in a nursing home. In: Johnson J, De Souza C, eds. *Understanding health and social care*. Sage, 1998.
- 55 Schwarz H. The hidden work in virtual work. Working paper 30. Program in Science, Technology and Society, Massachusetts Institute of Technology, 2002. Available at [http://web.mit.edu/sts/pubs/pdfs/MIT\\_STS\\_WorkingPaper\\_30\\_Schwarz.pdf](http://web.mit.edu/sts/pubs/pdfs/MIT_STS_WorkingPaper_30_Schwarz.pdf).
- 56 Howard-Grenville JA. The persistence of flexible organizational routines: the role of agency and organizational context. *Organ Sci* 2005;16:618-36.
- 57 Giddens A. *The constitution of society: outline of the theory of structure*. University of California Press, 1984.
- 58 Weick KE, Roberts KH. Collective mind in organizations: heedful interrelating on flight decks. *Admin Sci Quart* 1993;38:357-81.
- 59 Brown JS, Duguid P. *The social life of information*. Harvard Business School Press, 2002.
- 60 Luff P, Heath C, Greatbatch D. Tasks-in-interaction: paper and screen based documentation in collaborative activity. *Proc Comput Support Coop Work* 1992;92:163-70.
- 61 Berg M, Toussaint P. The mantra of modelling and the forgotten powers of paper: a sociotechnical view on the development of process-oriented ICT in health care. *Int J Med Inform* 2003;69:223-34.
- 62 Obstfelder A, Moen A. The electronic patient record in community health services—paradoxes and adjustments in clinical work. *Stud Health Technol Inform* 2006;122:626-31.
- 63 Green S, Goodwin H, Moss J. Problems in general practice—medication errors. Medical Defence Union, 1996.
- 64 Koppel R, Metlay JP, Cohen A, Abaluck B, Localio AR, Kimmel SE, et al. Role of computerized physician order entry systems in facilitating medication errors. *JAMA* 2006;293:1197-203.
- 65 Sittig DF, Ash JS, Zhang J, Osheroff JA, Shabot MM. Lessons from "Unexpected increased mortality after implementation of a commercially sold computerized physician order entry system." *Pediatrics* 2006;118:797-801.
- 66 Wagenaar H. "Knowing" the rules: administrative work as practice. *Public Admin Rev* 2004;64:643-55.

Accepted: 23 September 2011

Cite this as: *BMJ* 2011;343:d6788

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# Figures

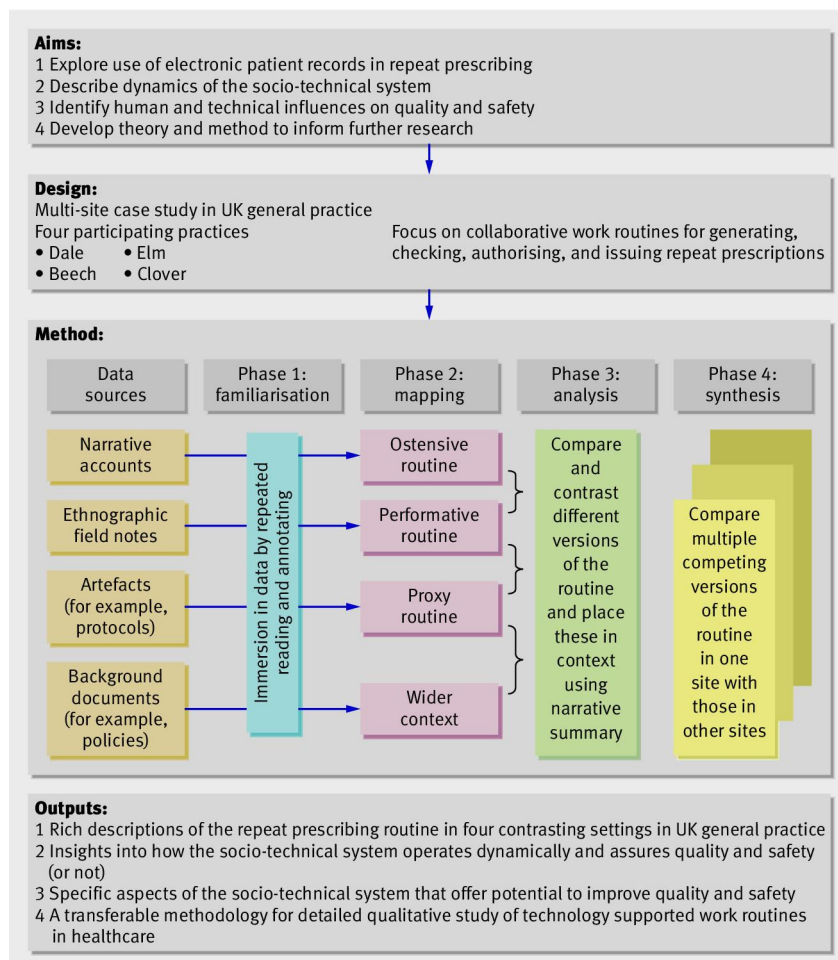


Fig 1 Study protocol

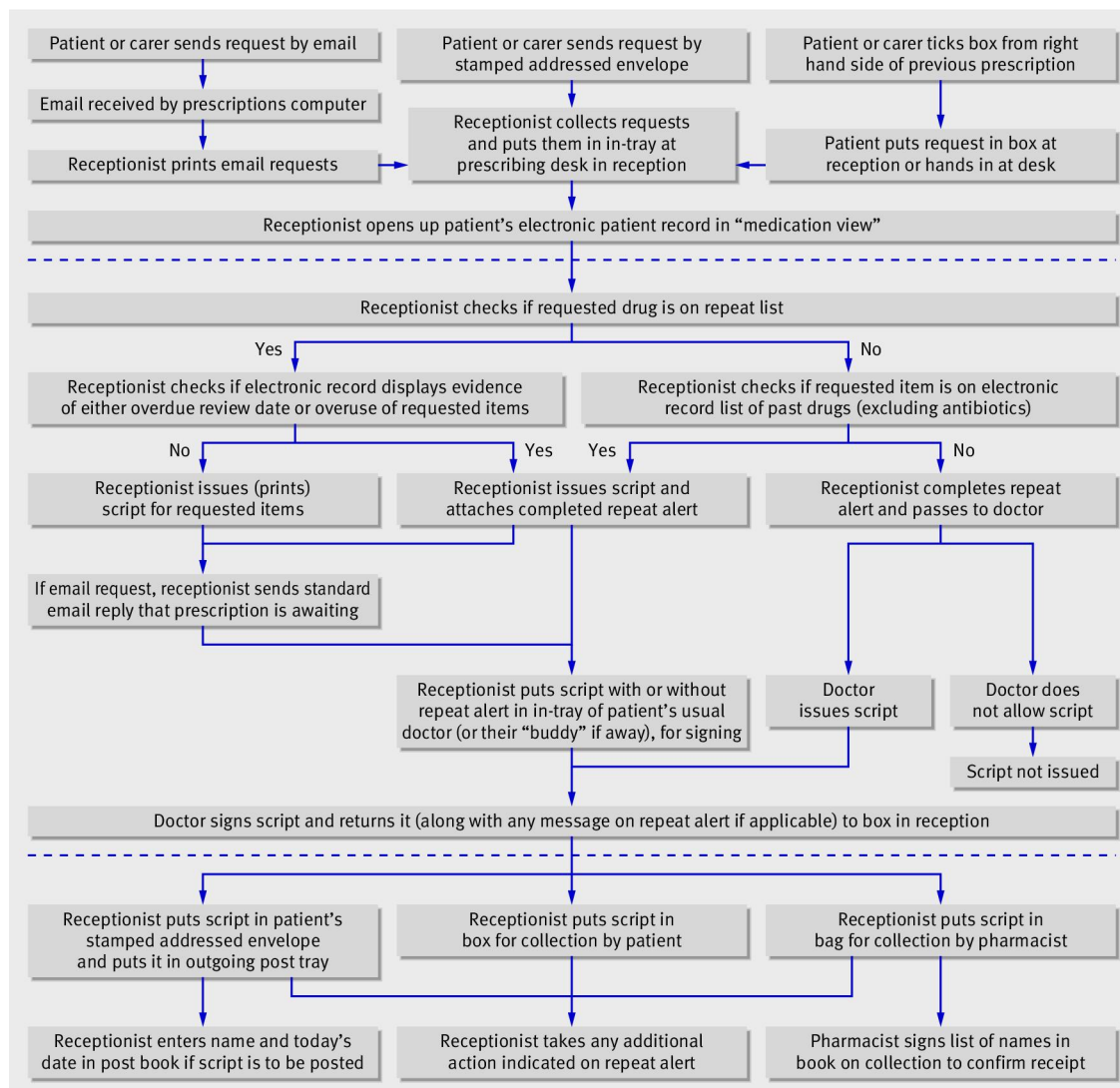
**BG JH GJ BT LY VR** [initials of doctors]

**Name:**

**Date of birth:**

Due for review	
Item over-requested	
Computer warning	
Patient requested	
Change to repeat	
See doctor next time	
See nurse next time	
Change review date	
Other	

Fig 2 Prescribing alert slip from Beech practice. This artefact, a photocopied slip of paper, had been developed by practice staff to manage requests for repeat prescriptions that were in some way problematic



**Fig 3** Ostensive routine for repeat prescribing in Beech practice. Area between horizontal broken lines represents the core part of the routine

**Your repeat medication**

Select the medicines you want to request, then click the "make request" button

<input type="checkbox"/> <b>Medicine</b>	<b>Details</b>	<b>Last issued</b>
<input type="checkbox"/> Paracetamol tablets 500 mg	One to be taken twice a day, 28 tablets	11.06.2008
<input type="checkbox"/> Calcipotriol scalp solution 50 µg/mL	bd, 40 mL	11.06.2008
<input type="checkbox"/> Ciprofloxacin tablets 500 mg	Two to be taken twice a day, 30 tablets	03.07.2008
<input type="checkbox"/> Salbutamol Cfc-free inhaler 100 µg/puff	As required, 1 inhaler	03.07.2008
<input type="checkbox"/> Beclometasone inhaler 250 µg/actuation	Two sprays twice a day, 2 x 1 inhaler	03.07.2008

If you would like to include a message relating to your request, please do so below:

If your doctor works at more than one place PLEASE remember to say where you usually collect your repeat prescriptions

**Fig 4** Repeat prescription request screen in electronic patient record in EMIS Access, accessible online by patient