

Research article

What does ePrescribing mean for patients? A case study of the perspectives of hospital renal patients

Cite this article: Lee L, Williams R, Sheikh A. What does ePrescribing mean for patients? A case study of the perspectives of hospital renal patients *J Innov Health Inform.* 2015;22(4):391-398.

<http://dx.doi.org/10.14236/jhi.v22i4.176>

Copyright © 2015 The Author(s). Published by BCS, The Chartered Institute for IT under Creative Commons license <http://creativecommons.org/licenses/by/4.0/>

Author address for correspondence:
Lisa Lee
Centre for Medical Informatics,
Usher Institute of Population Health Sciences and Informatics, University of Edinburgh,
Medical School, Teviot Place,
Edinburgh EH8 9AG, United Kingdom
E-mail: lisa.lee@ed.ac.uk

Accepted October 2015

Lisa Lee

Centre for Medical Informatics, Usher Institute of Population Health Sciences and Informatics, University of Edinburgh, Edinburgh, UK

Robin Williams

Institute for the Study of Science, Technology and Innovation, School of Social and Political Sciences, The University of Edinburgh, Edinburgh, UK

Aziz Sheikh

Centre for Medical Informatics, Usher Institute of Population Health Sciences and Informatics, University of Edinburgh, Medical School, Edinburgh, UK

ABSTRACT

Background Hospital ePrescribing systems are expected to improve quality of care for patients, yet the perspectives of patients themselves have seldom been explored in the context of ePrescribing deployments.

Objective We sought to understand the significance of ePrescribing for patients through a case study of renal in-patients on a hospital ward, before and after the introduction of an ePrescribing system.

Methods Three data sources were drawn on as part of the case study: interviews with representatives from national patient groups ($n = 10$), in-patients on a renal ward ($n = 11$ pre-implementation; $n = 12$ post-implementation) and fieldnotes ($n = 25$) of observations made on the case study ward. Data were analysed thematically focusing on: (1) perceived benefits of ePrescribing; (2) patient awareness and understanding of the medications prescribed and (3) patient views on medicines reconciliation at admission and discharge.

Results While ePrescribing was viewed positively overall, its implementation in the case study site failed to address the lack of patient involvement in the prescribing process and poor medication counselling upon discharge. Importantly, the limited impact of the ePrescribing system in these particular areas appeared to be the result of institutional and cultural practices rather than solely technological factors.

Conclusions The introduction of ePrescribing systems offers new opportunities to improve sharing of knowledge and communication with all those involved in the patient's care pathways, including patients, carers and healthcare professionals across diverse care settings. Achieving this will, first and foremost, require significant cultural and policy shifts in how the patient's role is perceived by clinicians in relation to medicines management.

Keywords: health information technology, medicines management, patient satisfaction

INTRODUCTION

The introduction of hospital ePrescribing systems is seen as a critical step in improving quality of care for patients as a result of anticipated increased safety^{1–4} as well as improved efficiency and communication between healthcare team members.^{5–9} There are still considerable sociotechnical issues and challenges^{10–19} to be overcome before these systems become commonplace across hospitals in England and the vision for a paperless National Health Service (NHS)²⁰ can be achieved. However, concerns about the negative impact of using clinical computer systems on the quality and amount of face-to-face interactions between patients and healthcare professionals (HCPs)^{21,22} underline how benefits realisation in one area may reduce quality of care in another. Indeed, even in countries like Denmark, which are seen as having more mature digital healthcare environments than in the UK,²³ ePrescribing systems still leave scope for important medication errors.²⁴

There is some evidence that patients have broadly positive attitudes towards the digitisation of healthcare.^{25–28} More specifically, they recognise, on the whole, the potential of electronic systems in enabling a paradigm shift in the patient–HCP relationship²⁹ through improved communication, knowledge, data and information sharing. Yet technology still needs to be used appropriately in order to deliver benefits such as improved communication,³⁰ and there is an urgent need, therefore, to better understand what ePrescribing in hospitals means for patients and what their priorities are when it comes to medicines management. In order to investigate this, we undertook a qualitative case study, designed to explore in detail patient perspective on ePrescribing. We report here on the main findings.

METHODS

Study design

The study was designed as part of a wider programme of work investigating the implementation, adoption and use of ePrescribing systems that offer varying degrees of functionality in the supply, administration, recording and prescribing of medication.³¹ The aim of the case study was to focus specifically on the patient perspective of medicines management and ePrescribing. The approach was both inductive and deductive, drawing on themes initially identified in the wider programme of work³¹ and through expert interviews with patient organisations (see topic guide 1, Appendix) and then explored through interviews of in-patients on a renal ward of a hospital studied in the programme.³¹ The patient organisation interviews were also used to refine the patient topic guide (see topic guide 2, Appendix). We chose to focus on the renal ward at the hospital for both strategic and practical reasons. First, renal patients were identified as one of the groups of patients at increased risk of experiencing events related to the introduction and use of ePrescribing systems due to the complex regimen of their medication and the co-morbidities

they may suffer from. Second, renal patients as frequent users of in-patient facilities were seen as most likely to notice changes in service delivery over time. As such, while these patients' prescribing experiences may not have been unique, they were seen as illustrative of the types of issues that may ensue in such complex cases. Third, the renal ward had been earmarked as an early adopter ward, where both pre- and post-implementation data could be collected within the timeframe of the study. The two-stage data collection design was used to allow changes in quality of care to be captured within the datasets. The case study was not intended to be representative of all patients' experiences and was instead seen as providing an in-depth exploration of localised experiences on a single ward, which could be combined with the broader perspective of the expert communities representing the needs of patients nationally to offer wider relevance.³²

Sampling and recruitment

Two categories of participants were recruited for the study to provide both breadth and depth of data.

Category 1: We drew up a sample of 13 patient organisations, whose expertise could be used to inform the findings from the interviews with renal patients. This included groups representing renal patients and other conditions these patients may concurrently suffer from.

Eight took part: Diabetes UK (hereafter referred to as DUK), British Heart Foundation (BHF), Anticoagulation Europe (ACE), The Carers Trust (CT), Neurological Alliance (NA), Lifeblood, National Kidney Federation (NKF), National Childbirth Trust and Healthcare Quality Improvement Partnership (HQIP). Ten representatives with sufficient expert perspectives on relevant questions from across the organisations were interviewed: medical directors ($n = 2$), head of policy ($n = 1$), head of advocacy ($n = 1$), senior policy adviser ($n = 1$), patient network members ($n = 2$), project development managers ($n = 2$) and trustee ($n = 1$).

Category 2: Individual patients were self-selected following a verbal invitation from nursing staff on the renal ward of a large urban hospital in England both before and after the implementation of an ePrescribing system. This was a specialist renal ward caring for patients with renal problems. Therefore, the main reason for the patients' presence on the ward was to receive treatment for renal conditions, although this did not preclude continuation of medication for other existing long-term health issues (e.g. diabetes). Only in-patients were included. Eligible patients were only included if available and if judged well enough by staff. Initial acceptance was taken first verbally by the nursing staff who supplied the patient with an information sheet. Written consent to take part was obtained by the researcher from each patient prior to each interview and any queries answered. In total, 15 patients were approached by the nursing staff before the introduction of the ePrescribing system, of whom 11 were interviewed. After implementation, a total of 14 patients were invited to participate in the study, of whom 11 were interviewed. There were across the two data collection

phases, four patients who declined to take part and three who were repeatedly unavailable at the times when data collection took place. Although most participants had been in-patients on the ward before ePrescribing was introduced, the timeframe of the study and the variability of the patient's admission schedule did not allow for the same patients to be interviewed twice. The number of interviews was determined by saturation, i.e. when no new themes were emerging from the data.

Data collection

Interview data (see topic guides, Appendix) were collected by the researcher (LL) between January 2014 and February 2015 and resulted in three interview data subsets. The first subset was intended to provide a general overview which could then be explored through patient interviews before ePrescribing was used on the renal ward (subset 2) as well as after (subset 3). Subset 1 involved eight telephone-based interviews and two face-to-face interviews with patient organisations. In subsets 2 and 3, 11 patient interviews were carried out before the ePrescribing system was introduced on the ward and another 11 additional interviews 4–5 months later. All patient interviews were carried out in a private space at the patient's bedside on the ward, either in a private single room or behind a screen. The collection of data for each subset lasted 4–8 weeks. Notes were also made of relevant observations on the ward resulting in 25 fieldnotes.

Data analysis

The interviews were audio recorded with the participant's consent, transcribed, fully anonymised and then analysed in NVivo 10 (QSR International Inc., Melbourne, Australia) to facilitate a systematic and integrated approach following initial coding by key areas of interest.^{25–30} The same thematic approach was used for both categories of interviewees. The coding framework was applied to the observational notes, although these notes were linked primarily to individual interviews and therefore used to provide contextual clarifications to help guide the analysis, elucidating details where appropriate. The analytical approach and study results were reviewed by the Programme's Patient and Public Involvement (PPI) Group in order to improve the robustness of the findings and the inclusion of the patient perspective throughout the study. PPI members provided feedback on the design of the study, topic guides and findings. This included a discussion of findings, during which, the results were found to resonate with perceptions of this group of patient representatives.

Ethical Considerations

Participation in the study was voluntary and informed consent obtained from each participant prior to the interview. Records of individual names were removed from all datasets prior to analysis. The study was approved by the NHS National Research Ethics Service Committee.

RESULTS

Perceived benefits of ePrescribing

The patients and patient organisations valued the potential of ePrescribing systems which they believed could improve speed, efficiency, accountability, clarity of information and support decision making. In particular, in a paper-based environment, errors relating to drug names and dosing appeared to be a commonly occurring problem across conditions and treatments. It was also pointed out that as well as making such errors less likely, the precision and clarity of information in an ePrescribing system (such as food intake for correct dosing of insulin) offered real potential for improved treatments. ePrescribing was further seen as enabling better compliance and use of available patient data. For instance, weight recorded on admission could be used to automatically calculate the appropriate dose rather than relying on estimates at the time of prescribing.

For many groups of patients, knowledge that such improvements would be happening in the hospital they are being cared for would be extremely reassuring as ... *"a lot of kidney patients have a fear of just going to an ordinary district and general hospital"* (NKF Head of Advocacy, Interview #40). It was also suggested that widespread use of these systems could lead to more effective information sharing by harnessing the opportunities offered by patients' growing smartphone use, or through data mining for example to identify the side effects of medication.

The patients interviewed on the renal ward at the case study site echoed this positive perception and referred to the ubiquity of computer technologies in everyday life. Indeed, for most, the thought that prescribing at the hospital would be or had gone electronic was seen as something that should be expected in this day and age. For others, ePrescribing was simply seen as reassuring and a good way to reduce the likelihood of prescribing errors being made.

Medication awareness and patient communication

The prescribing process was virtually invisible to most of the in-patients due to the complexity of drug regimens as well as the sometimes urgent circumstances of treatments. Overall patients ... *"assume that they're going to be looked after properly and that errors will be minimised if not zero"* (BHF Medical Director Interview #50). While many patients were described as *quite happy for the doctor to do whatever* (DUK Interview #49), others, especially those with long-term conditions such as diabetes, had clearly become experts of their own medication.

It was also explained how self-management was important because there was often a personal preference of how the patient wanted to feel, for instance, after taking insulin. The introduction of an ePrescribing system appeared unable on its own to either tap into patient expertise or to facilitate self-management. Such developments would depend above all on local prescribing policies and practices. The problem

was thus seen as cultural rather than simply a technical matter: “Historically a cultural problem, you went in hospital, you stopped whatever you were taking and we’ll decide what you should now be on so it was very much we know best” (NA Trustee, Interview #41). This lack of communication with patients was also described by one patient on the ward who explained how he had experienced two prescribing errors at the hospital in the past and that this had led him to showing greater assertiveness when prescribed medication:

They didn’t bother to ask me what I’d been taking for 10 years without any conflict they just decided to stop and then when I asked the pharmacist basically I’d been given the wrong type ... It means any time someone says something about medication I want to know why, when, how ... I’m the idiot that takes them. (Renal Patient, Interview #66)

The patient organisations interviewed further described the need for improved dialogue between HCPs and the patient, as well as a better understanding of the role of carers in the conversation:

That communication that a patient has with a doctor, something just might get discussed that had previously been forgotten about, ... unless there’s a conversation some patients would otherwise not have mentioned it. (Head of Advocacy NKF, Interview #40)

I’m completely on board with the safety improvements but I also think that human element of a doctor to his patient or patient to nurse, I think there’s room for both and I think ePrescribing shouldn’t dismiss ... those conversations that take place between the patient and health carer, it’s important to remember those.’ (Development Manager CT, Interview #47)

... there seems to be a bit of a shortfall about whose responsibility it is ... to counsel the patients about the actual drugs themselves and this is becoming quite critical. (ACE Development Manager and Long-term Warfarin patient, Interview #42)

I think there are huge issues now in patients’ understanding what they’re being prescribed, whether they understand what they’re taking and the reasons why they’re taking it. ... And you don’t have that recourse to go back to your prescriber and say excuse me can you just go through that again for me please, you’re not given permission to do that, another big failing in the process. (Patient Forum Member HQIP, Interview #45)

This lack of information, awareness and understanding highlighted according to some interviewees the issue of consent, especially when a medication was seen as ‘routine’.

There were concerns among some of the patient groups that ePrescribing could lead to a reduction in self-management,

which would represent a step back. Furthermore, it was not clear to many how ePrescribing systems could address the lack of communication which was seemingly deeply engrained in hospital prescribing practices. Indeed, it appeared that the ePrescribing system, by removing the physical presence of the paper chart, had diminished a patient’s ability to input to discussions about their medication:

... but it’s your body and, you know, and then if you see something wrong you can query it whereas you can’t get to the computer to have a look and see what’s going on, you can’t, you can’t query anything. (Patient Renal Ward, Interview #82)

It was also explained that this lack of communication meant that both patients and carers had a poor understanding of the medication regimens post-discharge, with potentially detrimental consequences for drug adherence levels.

Medicines reconciliation and discharge

Medicines reconciliation is a fundamental aspect of patient safety since it involves sharing, verifying and correcting information regarding a patient’s medication at admission, transfer and discharge.³³ The potential of computer-based systems to facilitate this process is seen as considerable.³⁴ The introduction of ePrescribing on the ward had made little difference, however, in improving the medicine reconciliation process, as it could not completely prevent human error. Patients felt frustrated that errors were being made with their regular medication, even though they had provided the correct information to the HCP.

Patients on the renal ward reported both before and after the introduction of the ePrescribing system considerable problems with “absolutely total lack of information” (Patient Renal Ward, Interview #97) between primary and secondary care. Discharge was also described in negative terms, the result of poorly designed processes where tracking progress on orders and checking drug availability was difficult. Surprisingly, the extended wait patients had to endure at discharge did not improve following the introduction of the ePrescribing system and were a continuing and visible matter of concern on the ward (Fieldnotes #62–65;79–83; 86; 97):

... whenever you’re discharged you have to wait a hell of a long time to get your medicine. The last time I was so fed up that I sort of went away and came back at eleven o’clock, I waited like five hours, six hours. (Patient Renal Ward, Interview #86)

Furthermore, medicine reconciliation issues at admission were not corrected at the point of discharge. These problems were compounded by sparse detailed information on the discharge summary, poor communication with the patient’s GP and the lack of medicine counselling given to patients pointed out earlier. There was a sense that a more personalised approach to prescribing at the point of discharge was urgently needed to ensure patient safety.

Quality of care and safety

Some respondents expressed concern that the use of an ePrescribing system on the ward may reduce quality of care, especially if the system's potential to replace clinical expertise was overstated or if the system allowed increased delegating of tasks. Patients themselves described how the introduction of the system had, immediately after roll-out on the ward, impacted negatively on the patient–HCP interaction:

I was in here late last year for an operation and because they weren't so adept at it they seemed more zombie-like ... they were afraid of making a mistake. It definitely was because they were so concentrated on getting it right on the computer that sometimes they forgot that you were there. (Patient Renal Ward, Interview #86)

While familiarity with the system did seem to improve with time, the quality of interactions between patients and HCPs and the speed of prescribing and administration had in some cases been reduced following the introduction of the system:

... before they'd get the drug chart out, it's all been signed and if a patient queries something she'd go straight to the doctor and get it signed there and then and come back but this time he's got to put it in the system, he's got to wait for it to come through the system (Patient Renal Ward, Interview #82)

Lack of hardware on the ward was mentioned by some patients as contributing to the reduced speed of prescribing, with queues forming at times to use the computer. This type of focus on the computer rather than the patient was noted also in the fieldnotes during data collection (Fieldnotes 80–85; 86; 95–98).

A nurse complains that some information has gone missing from the screen. Another nurse joins to help out, as they talk, the patient appears to have no place in the interaction and subsequent delay. (Fieldnote #86)

Some patients voiced their concerns (without prompts) regarding the security of the information stored and the procedures in the event of the system crashing.

DISCUSSION AND CONCLUSIONS

A central theme running through the patient perspective of the prescribing process in hospital is a lack of patient involvement which may become especially significant in an ePrescribing environment. The ePrescribing system did not in this case allow patients to access further information on their medication. By removing the paper chart at the end of their bed, patients had less access to information about their medication than before. It is clear also that an ePrescribing system does not in itself facilitate best practice in self-management; rather, what is needed is a care redesign.

There is a pressing need to address the lack of in-patients' involvement in prescribing and decision making,³⁵ yet the introduction of an ePrescribing system may be doing little to change such cultural norms. Those implementing ePrescribing in hospitals should be mindful that patients are more concerned with knowing that an opportunity exists to ask questions and input into decisions, rather than emphasising the existence of the new ePrescribing system itself.

The situation here may be the result of temporal and localised circumstances, reflecting in part the limitations of the study. Indeed, patient interviews were collected on one ward only and in a relatively immature ePrescribing context.^{10,11} That said, perspectives from the patient groups helped redress this by providing broad ranging perspectives in terms of medical conditions, geographical locations and time. What is more, lack of patient engagement is strongly embedded in organisational cultures that often ignore the complexity of the prescribing process.³⁶ Using new ePrescribing technologies to support this engagement will need to be accompanied by a cultural shift in how patients' existing knowledge or conversely lack of understanding of their medication can be addressed within the prescribing process. By so doing, safety benefits anticipated from ePrescribing systems in hospitals are more likely to be achieved, and drug compliance upon discharge improved, thereby reducing readmissions.³⁷

Acknowledgements

We gratefully acknowledge the input from our Independent Programme Steering Committee, which is chaired by Prof. Denis Protti: Prof. Munir Pirmohamed, Prof. Bryony Dean Franklin, Eva Leach, Rosemary Humphreys and Ailsa Donnelly. We thank the editor and two anonymous reviewers for their constructive comments, which have helped us to improve the manuscript. We also gratefully acknowledge the input of Rosemary Porteous who transcribed the interviews and the input of our patient representatives, including Antony Chuter, Jillian Beggs, Susan Howe, Paul Henry and Ember Vincent. We also thank the hospital that took part in the study and all the study participants for their time and responses.

Competing interests

None.

Funding

This paper summarises independent research funded by the National Institute for Health Research (NIHR) under its Programme Grants for Applied Research (Grant No. RP-PG-1209-10099). The views expressed are those of the authors and not necessarily those of the NHS, the NIHR or the Department of Health.

Collaborators

On behalf of the NIHR ePrescribing Programme Team: Dr. Jamie Coleman (Senior Clinical Lecturer Clinical Pharmacology, University of Birmingham), Prof. Tony Avery

(Professor of Primary Health Care, University of Nottingham), Dr. Laurence Blake (University of Birmingham), Dr. Kathrin Cresswell (Senior Research Fellow, University of Edinburgh), Dr. Sarah P Slight (Senior Lecturer in Pharmacy Practice, School of Medicine Pharmacy and Health, University of Durham and Visiting Research Scholar, Division of General Internal Medicine, Brigham and Women's Hospital/Harvard Medical School, Boston), Dr. Alan Girling (Senior Research Fellow, University of Birmingham), Prof. Richard Lilford (Professor of Public Health, University of Warwick), Dr. Lucy McCloughan (eHealth Research Manager, University of Edinburgh), Dr. Zoe Morrison (Senior Lecturer, University of Aberdeen), Dr. Hajar Mozaffar (Research Fellow, University of Edinburgh), Dr. Ann Robertson (Research Fellow, University of Edinburgh), Dr. Behnaz Schofield (Research Fellow, University of Edinburgh), Prof. Jill Schofield (Head of

The York Management School, University of York) and Ann Slee (Honorary Fellow, University of Edinburgh).

Ethical approval

This study was approved by the NHS National Research Ethics Service Committee London – London Bridge reference 13/LO/1202.

Contributions

Aziz Sheikh and Robin Williams conceived the study and oversaw all aspects of data analysis and of the writing and revising of the paper. LL collected and analysed the data, drafted and revised the paper.

Guarantor

Lisa Lee

REFERENCES

- Cresswell K, Worth A and Sheikh A. Comparative case study investigating sociotechnical processes of change in the context of a national electronic health record implementation. *Health Informatics Journal* 2012;18(4):251–70. <http://dx.doi.org/10.1177/1460458212445399>. PMID:23257056.
- Huckvale C, Car J, Akiyama M, Khoja T, Bin Khalid A, Sheikh A et al. Information Technology for patient safety. *Quality and Safety in Health Care* 2010;19:25–33. <http://dx.doi.org/10.1136/qshc.2009.038497>. PMID:20693213.
- Kaushal R, Shojania KG and Bates DW. Effects of computerized physician order entry and clinical decision support systems on medication safety: a systematic review. *Archives of Internal Medicine* 2003;163:1409–16. <http://dx.doi.org/10.1001/archinte.163.12.1409>. PMID:12824090.
- Smith DH, Perrin N, Feldstein A, Yang X, Kuang D, Simon SR et al. The impact of prescribing safety alerts for elderly persons in an electronic medical record: an interrupted time series evaluation. *Archives of Internal Medicine* 2006;166:1098–104. <http://dx.doi.org/10.1001/archinte.166.10.1098>. PMID:16717172.
- Department of Health. *Discharge from Hospital: Pathway, Process and Practice*. London: Department of Health, 2003.
- Moore C, Wisnivesky J, Williams S and McGinn T. Medical errors related to discontinuity of care from an inpatient to an outpatient setting. *Journal of General Internal Medicine* 2003;18:646–51. <http://dx.doi.org/10.1046/j.1525-1497.2003.20722.x>. PMID:PMC1494907.
- NHS Connecting for Health. *Electronic Prescribing in Hospitals – Challenges and Lessons Learned*. London: NHS Connecting for Health, 2009.
- Crowe S, Cantrill JA and Tully MP. Shared care arrangements for specialist drugs in the UK: the challenges facing GP adherence. *Quality and Safety in Health Care* 2010;19(6):e54.
- Schade CP, Sullivan FM, de Lusignan S and Madeley J. e-Prescribing, efficiency, quality: lessons from the computerization of UK family practice. *Journal of American Medical Informatics Association* 2006;13:470–5. <http://dx.doi.org/10.1197/jamia.M2041>. PMID:16799129; PMID:PMC1561797.
- Robertson A, Cresswell K, Takian A, Petrakaki D, Crowe S, Cornford T et al. Implementation and adoption of nationwide electronic health records in secondary care in England: qualitative analysis of interim results from a prospective national evaluation. *British Medical Journal* 2010;341:c4564. <http://dx.doi.org/10.1136/bmj.c4564>. PMID:20813822; PMID:PMC2933355.
- Sheikh A, Cornford T, Barber N, Avery A, Takian A, Lichtner V et al. Implementation and adoption of nationwide electronic health records in secondary care in England: final qualitative results from a prospective national evaluation in “early adopter” hospitals. *British Medical Journal* 2011;343:d6054. <http://dx.doi.org/10.1136/bmj.d6054>. PMID:22006942; PMID:PMC3195310.
- Cresswell K, Coleman J, Slee A, Morrison Z and Sheikh A. A toolkit to support the implementation of electronic prescribing systems into UK hospitals: preliminary recommendations. *Journal of the Royal Society of Medicine* 2014;107(1):8–13. <http://dx.doi.org/10.1177/0141076813502955>. PMID:24108534.
- Cresswell K, Coleman J, Slee A, Williams R and Sheikh A. Investigating and learning lessons from early experiences of implementing ePrescribing systems into NHS hospitals: a questionnaire study. *PLoS One* 2013;8(1):e53369. <http://dx.doi.org/10.1371/journal.pone.0053369>.
- Cresswell K, Bates DW and Sheikh A. Ten key considerations for the successful implementation and adoption large-scale health information technology. *Journal of American Medical Informatics Association* 2013 [Epub ahead of print]. <http://dx.doi.org/10.1136/amiajnl-2013-001684>.
- Robertson A, Cornford T, Barber N, Avery A, Sheikh A and NHS Care Records Service Evaluation Team. The NHS IT project: more than just a bad dream. *Lancet* 2012;379(9810):29–30. [http://dx.doi.org/10.1016/S0140-6736\(12\)60023-3](http://dx.doi.org/10.1016/S0140-6736(12)60023-3).
- Penoyer DA, Cortelyou-Ward K, Noblin AM, Bullard T, Talbert S, Wilson J et al. Use of electronic health record documentation by healthcare workers in an acute care hospital system. *Journal of Healthcare Management* 2014;59(2):130–44.

17. Hincapie A, Warholak T, Altyar A, Snead R and Modisett T. Electronic prescribing problems reported to the Pharmacy and Provider ePrescribing Experience Reporting (PEER) portal. *Research in Social Administrative Pharmacy* 2014;10(4):647–55. <http://dx.doi.org/10.1016/j.sapharm.2013.08.007>. PMID:24139956.
18. Rose D, Richter L and Kapustin J. Patient experiences with electronic medical records: lessons learned. *Journal of the American Association of Nurse Practitioners* 2014;26(12):674–80. <http://dx.doi.org/10.1002/2327-6924.12170>.
19. Takian A, Sheikh A and Barber N. We are bitter, but we are better off: case study of the implementation of an electronic health record system into a mental health hospital in England. *BMC Health Services Research* 2012;12:484.
20. NHS England. *Safer Hospitals, Safer Wards: Achieving an Integrated Digital Care Record*, 2013. Available from: <http://www.england.nhs.uk/wp-content/uploads/2013/07/safer-hosp-safer-wards.pdf> (last accessed June 2015).
21. Asan O, Smith P and Montague E. More screen time, less face time – implications for EHR design. *Journal of Evaluation in Clinical Practice* 2014;20(6):896–901. <http://dx.doi.org/10.1111/jep.12182>. PMID:24835678.
22. Makam AN, Lanham HJ, Batchelor K, Moran B, Howell-Stampley T, Kirk L et al. The good, the bad and the early adopters: providers' attitudes about a common, commercial EHR. *Journal of Evaluation in Clinical Practice* 2014;20(1):36–42. <http://dx.doi.org/10.1111/jep.12076>. PMID:23962319.
23. Currie WL and Seddon JMJ. A cross-national analysis of eHealth in the European Union: some policy and research directions. *Information and Management* 2014;51(6):783–97. <http://dx.doi.org/10.1016/j.im.2014.04.004>.
24. Hartmann Hamilton AR, Anhøj J, Hellebek A, Egebart J, Bjørn B and Lilja B. Computerised Physician Order Entry (CPOE). *Studies in Health Technology and Informatics* 2009;148:159–62. PMID:19745246.
25. Goldzweig CL, Orshansky G, Paige NM, Towfigh A, Haggstrom DA, Miake-Lye I et al. Electronic patient portals: evidence on health outcomes, satisfaction, efficiency, and attitudes. *Annals of Internal Medicine* 2013;159(10):677. <http://dx.doi.org/10.7326/0003-4819-159-10-201311190-00006>. PMID:24247673.
26. Anthony D and Campos-Castillo C. Do health care users think electronic health records are important for themselves and their providers?: exploring group differences in a national survey. *AMIA Annual Symposium Proceedings* 2013;2013:42–9. <http://dx.doi.org/10.1109/ichi.2013.33>.
27. Gu Y and Day K. Propensity of people with long-term conditions to use personal health records. *Studies in Health Technology and Informatics* 2013;188:46–51. PMID:23823287.
28. de Leon S, Silfen SL, Wang J, Kamara TS, Wu WY and Shih SC. Patient experiences at primary care practices using electronic health records. *The Journal of Medical Practice Management* 2012;28(3):169. PMID:23373154.
29. Bos LBE. Patient Empowerment: A Two Way Road. Wickramasinghe N, Bali RK, Suomi R and Kirn S (Ed) *Critical Issues for the Development of Sustainable E-Health Solutions*. Zurich: Springer Verlag, 2012, pp. 203–27. http://dx.doi.org/10.1007/978-1-4614-1536-7_14.
30. Baysari MT, Adams K, Lehnbohm, EC, Westbrook JI and Day RO. iPad use at the bedside: a tool for engaging patients in care processes during ward rounds? *Internal Medicine Journal* 2014;44(10):986–90. Available from: <http://dx.doi.org/10.1111/imj.12518>. PMID:24989476.
31. NIHR ePrescribing Programme. Available from: <http://www.cphs.mvm.ed.ac.uk/projects/eprescribing/index.html> (last accessed March 2015).
32. Lincoln YS and Guba EG. The Only Generalization Is: There is No Generalization. Gomm R, Hammersley M and Foster P (Ed) *Case Study Method*. London: Sage, 2000, pp. 27–44.
33. Vira T, Colquhoun M and Etchells E. Reconcilable differences: correcting medication errors at hospital admission and discharge. *Quality and Safety in Health Care* 2006;15:122–6. <http://dx.doi.org/10.1136/qshc.2005.015347>. PMID:16585113; PMCID:PMC2464829.
34. Moore P, Armitage G, Wright J, Dobrzanski S, Ansari N, Hammond I et al. Medicines reconciliation using a shared electronic health care record. *Journal of Patient Safety* 2011;7(3):148–54. <http://dx.doi.org/10.1097/PTS.0b013e31822c5bf9>. PMID:21857238.
35. Mohsin-Shaikh S, Garfield S and Dean Franklin B. Patient involvement in medication safety in hospital: an exploratory study. *International Journal of Clinical Pharmacy* 2014;36(3):657–66. <http://dx.doi.org/10.1007/s11096-014-9951-8>. PMID:24777838; PMCID:PMC4019827.
36. Barber N, Rawlins M and Dean Franklin B. Reducing prescribing error: competence, control, and culture. *Quality and Safety in Health Care* 2003;12:i29–32. http://dx.doi.org/10.1136/qhc.12.suppl_1.i29. PMID:14645746; PMCID:PMC1765766.
37. The Royal Pharmaceutical Society of Great Britain. *Moving patients, Moving Medicines, Moving Safely: Guidance on Discharge and Transfer Planning*, 2005. Available from: <http://psnc.org.uk/wp-content/uploads/2013/07/Moving20Medicines20new1.pdf> (last accessed June 2015).

APPENDIX

Topic Guide 1: Patients and Carers

1. Medicines reconciliation on admission.
2. In-patient prescribing experiences.
3. Perspectives and awareness on introduction and use of electronic prescribing system on ward.
4. Perspective on HCP–patient interaction and impact (if any) of ePrescribing on interaction.
5. Post-discharge medication concerns.
6. GP – hospital information flow.
7. Other issues raised by interviewee.

Topic Guide 2: Patient Representative Organisations/Charities

1. Interviewee's background.
 2. Issues faced by patients represented by organisation face in relation to prescribing and medicine management.
 3. Prescribing errors and other prescribing related problems prevalence and implications among patients represented.
 4. Role of ePrescribing in improving patient experience.
 5. Perceived impact of ePrescribing on safety, quality of care, efficiency in the delivery of care.
 6. Key areas concerns relating to the introduction and use of electronic prescribing systems in hospitals.
-