The Barriers in Implementing Electronic Prescribing in The Health Care: a Systematic Review

Hambatan dalam Menerapkan Resep Elektronik di Pelayanan Kesehatan: Tinjauan Sistematik

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ABSTRACT

Medication error remain extremely common, and the health care system can do much more to prevent it. Electronic prescribing is increasingly being viewed by health care stakeholders as an important step toward improved medication safety, better management of medication costs, increased practice efficiency, and improved health care quality. However, the adoption of e-prescribing has been difficult to attain owing to numerous barriers throughout the industry. Even with all the benefits of e-prescribing, many providers and pharmacists remained hesitant about completely adopting an e-prescribing system. The main purpose of this study was to explore and to assess the barriers of electronic prescribing implementation. The methodology for this study followed the basic principles of a systematic review with PRISMA methode. From online database PubMed, using a keyword "barriers" OR "obstacles" AND "electronic prescribing" OR "electronic prescription" AND "implementation", six documents were selected by full text inclucion and assessed for eligibility. Meanwhile Using The Indonesian Publication Index (IPI) search engine, with a keywords "electronic prescribing", resulting in one document. The result of the study are inefficiency, the low uptake of the physicians, the cost of implementing the electronic prescription, system errors and the privacy and legacy. The conclusion from the studies should that electronic prescribing implementation barriers those divided into 2 groups : the user factors and the system factors of the electronic prescription. Vendors or the consultants to facilitate more adequately the adoption of e-prescribing by giving the physicians the free trial and provide evaluation and improvement according to the physicians' needs for the features in the e-prescription.

Keywords: barriers, electronic prescription, patient safety, systematic review

ABSTRAK

Kesalahan dalam pengobatan sangatlah umum, dan sistem perawatan kesehatan dapat melakukan banyak hal untuk mencegahnya. Peresepan elektronik semakin dipandang oleh para pemangku kepentingan layanan kesehatan sebagai langkah penting menuju peningkatan keamanan obat, manajemen biaya pengobatan yang lebih baik, peningkatan efisiensi pelayanan, dan peningkatan kualitas pelayanan kesehatan. Namun, penggunaan resep elektronik sulit dicapai karena banyak hambatan di seluruh industri. Bahkan dengan semua manfaat dari resep elektronik, banyak penyedia layanan dan apoteker tetap ragu untuk sepenuhnya mengadopsi sistem resep elektronik. Tujuan utama dari penelitian ini adalah untuk mengeksplorasi dan menilai hambatan implementasi peresepan elektronik. Metodologi untuk penelitian ini mengikuti prinsip-prinsip dasar dari tinjauan sistematis dengan metode PRISMA. Dari database online PubMed menggunakan kata kunci "hambatan" ATAU "hambatan" DAN "resep elektronik" ATAU "resep elektronik" DAN "implementasi", diperoleh 6 dokumen dipilih dengan menggunakan teks lengkap dan dinilai untuk kelayakan. Sedangkan dari Indeks Publikasi Indonesia (IPI), dengan kata kunci "resep elektronik", menghasilkan 1 dokumen. Hasil dari penelitian ini menunjukkkan bahwa hambatan implementasi peresepan elektronik adalah inefisiensi, rendahnya penggunaan oleh dokter, biaya penerapan resep elektronik, kesalahan sistem dan privasi, serta aspek hukum. Kesimpulan dari penelitian adalah hambatan implementasi resep elektronik menghambat dibagi menjadi 2 kelompok; faktor pengguna dan faktor sistem dari resep elektronik. Vendor atau konsultan untuk memfasilitasi penerapan resep elektronik secara lebih memadai dengan memberikan uji coba gratis kepada dokter dan memberikan evaluasi dan peningkatan sesuai dengan kebutuhan dokter akan fitur-fitur dalam resep elektronik.

Kata kunci: *hambatan, resep elektronik, keamanan pasien, tinjauan sistematik.*

INTRODUCTION

A major report by the Institute of Medicine (IOM) on medication errors suggests that, despite all the progress in patient safety since *To Err is Human*, medication errors remain extremely common, and the health care system can do much more to prevent them. Among the startling statistics from this report: more than 1.5 million Americans are injured every year in American hospitals, and the average hospitalized patient experiences at least one medication error each day (Aspden et.al, 2007).

Electronic prescribing is increasingly being viewed by health care stakeholders as an important step toward improved medication safety, better management of medication costs, increased practice efficiency, and improved health care quality. Many recognize that the increasing volume and complexity of prescriptions written in the United States, coupled with the rate of medication errors, pose threats to quality and safety that e-prescribing can help address (Barclay, 2008).

E-prescribing has allowed prescribers to electronically send patients' prescription information to pharmacy computers. This process has decreased prescribing and medication errors and has resulted in fewer call-backs from pharmacies to physicians for clarification (Porterfield et.al, 2014). Electronically sending and receiving prescriptions has streamlined the clinical practice workflow, and patient satisfaction and compliance have increased (Thomas, et.al 2012). Additionally, connecting physician and pharmacy systems has reduced paperwork and the associated mistakes that may occur from reliance on handwritten notes (Bigler, 2012).

Unfortunately, the adoption of e-prescribing has been difficult to attain owing to numerous barriers throughout the industry. Such acceptance barriers include lack of technology trust, associated system costs, and risk of un-securing patient health and medical information (Smith, 2006). Even with all the benefits of e-prescribing, many providers and pharmacists have remained hesitant about completely adopting an e-prescribing system. The main purpose of this study was to explore and to assess the barriers to electronic prescribing implementation.

SUBJECTS AND METHODS

Systematic Review with PRISMA methode was retrieved from online database PubMed using a keyword "barriers" OR "obstacles" AND "electronic prescribing" OR "electronic prescription" AND "implementation" founded 925 documents. Using a filter by five years backwards founded 660 documents. By the title reading, 47 documents were selected. By abstract inclusion, 22 documents were selected and finally six documents were selected by full text inclution and assessed for eligibility. Using Science-Direct search engine, with a keywords "barriers in electronic prescribing implementation" resulting in 266 documents selected by open access articles. More phrases were added "barriers in electronic prescribing implementation" AND "in healthcare", narrowing the results onto 170 results. Using a filter by five years backwards reduced the documents to 153. By a title reading, none documents were selected.

Using The Indonesian Publication Index (IPI) (local journal) search engine, with a keywords "electronic prescribing" resulting in 3 documents without any filters. By a title reading, all documants were selected. By abstract inclution, 2 documents were selected but by full text inclution, only 1 document was selected for eligibility.

Articles that included and assessed for the eligibility in this review was an article that show the barriers on the implementation of electronic prescribing in health care. It includes limitation that related to the implementation, or discouraging factors on the implementation of electronic prescribing. Articles that excluded from this review was an article that doesn't show the barriers on the implementation of electronic prescribing.

The problem (P) we are focused in this review was to conclude what are the barriers in implementing electronic prescription in healthcare, especially in electronic prescription, electronic system, paperless prescription not in the conventional, the paper based prescription. Our goal (O) is to diminished the barriers clearly to easier decreasing barriers in implementation to achieve improving the use of electronic prescribing system. The study was conducted

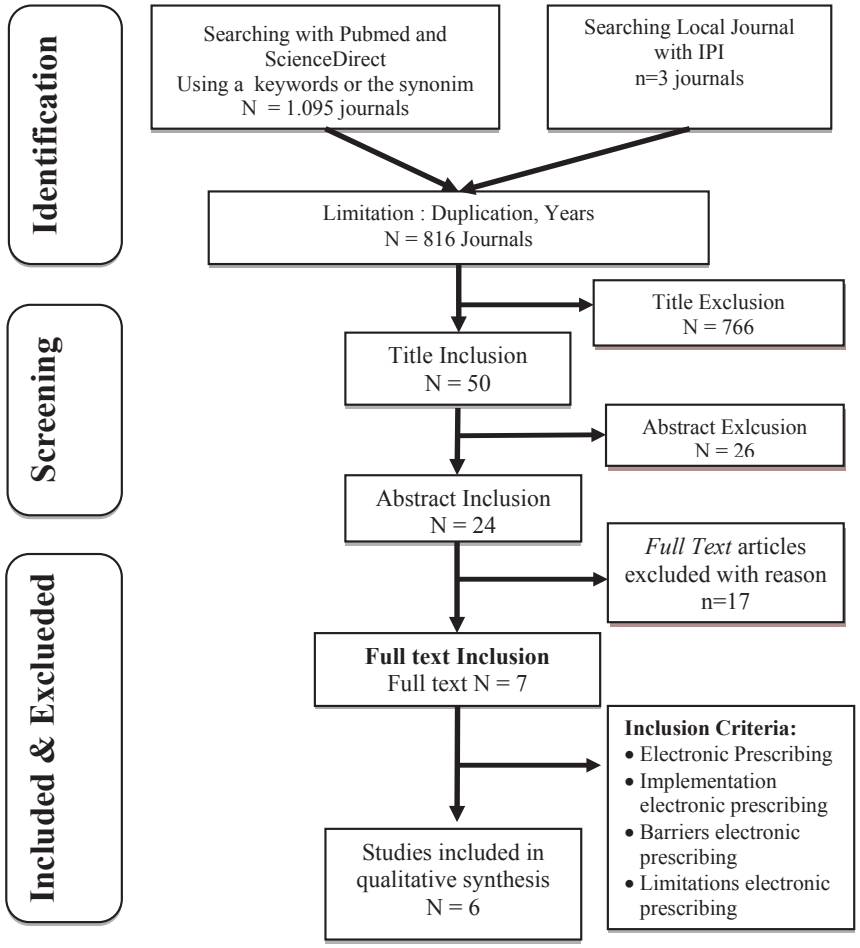

Figure 1. Flowchart of PRISMA Methods

in three phases: (1) searching and collecting the literatures and data, (2) analyzing and evaluating the literature and data found, and (3) categorizing and summarizing the literatures and data. A total of 6 sources were referenced. Results of this research study suggest that e-prescribing reduces prescribing errors, increases efficiency, and helps to save on healthcare costs. Medication errors have been reduced to as little as a seventh of their previous level, and cost savings due to improved patient outcomes and decreased patient visits are estimated to be between $140 billion and $240 billion over 10 years for practices that implement e-prescribing. However, there have been significant barriers to implementation including cost, lack of provider support, patient privacy, system errors, and legal issues.

RESULTS

Jariwala, Krutika et. al (2013) explain there are some factors *as a discouraging factors for* using e-prescribing technology. *Pre-implementation factor as a discouraging factor.* Respondents, regardless of adoption status, reported pre-implementation factors to be slightly discouraging, but physicians who have used e-prescribing for more than six months were less discouraged by pre-implementation factors than physicians who were planning to adopt e-prescribing in the next six months and physicians who have considered but were not planning to adopt an e-prescribing system.

All physician groups reported *cost factor to be slightly discouraging*. Physicians who have been using e-prescribing technology for more than six months were less discouraged by cost factors than physicians who were planning to adopt e-prescribing technology in the next six months and those physicians who had no intention of adopting e-prescribing in the near future.

Software features factor and patient factor as an encouraging factors. Interestingly, regardless of adoption status, respondents were

encouraged by software features and there were no significant differences between adoption categories on this factor. Because this study demonstrated that even non-e-prescribers were generally encouraged by software features, vendors may want to place increased emphasis on their software features to encourage adoption and enhance their own competitive position.

All respondents, adopters as well as non-adopters, were encouraged by patient factor. Respondents who had used e-prescribing technology for more than six months were more encouraged by patient factor compared to physicians who had no intention of adopting e-prescribing in the near future (Jariwala et.al, 2013)

Elliott and Lee (2016) founded some barriers and limitations on implementing the electronic prescribing at a residential aged care facility (RACF). The barriers and limitation were related to inefficiency, low General Practitioner (GP) uptake and training/support, and included slower prescribing compared to written orders, the need for GP-signed paper copies of the medication administration records (MAR), lack of integration with GP clinic software, and low GP motivation to use the system, especially GPs with few patients at the RACF (Elliot & Lee, 2016). Elliot and Lee conduct their study with retrospective audit, focus groups and in-depth interview/survey. Their study show three of seven GPs used the ePMMS to order medicines; 53/205(25.9%) medicines were ordered via the ePMMS by GPs.

With report methodology, Cresswell, Slee, & Sheikh (2017) explained the barriers on the implementation of electronic prescribing in health care according to the report in Scotland is central coordination is esssential to move forward in electonic prescribing application, espesially in reducing the time to deliver the benefits. The lack of this activities will slowing the adoption of technological system in healthcare. The system should also be important to implement and use in primarily pharmacy as equal in professions – in particular, doctors (who prescribe electronically) and nurse (who administer and record on the system). It needs to involve active participants of other professions in system choice or customisatin if we want to make it success. Internal capacity development using local staff and increasing their skill should be a priority to maintain the implementation of system.

Porterfield, Engelbert, & Coustasse (2014) describe that errors in medication prescribing and filling are some of the most common types of medical errors. These errors can occur in any part of the medication use process, which includes mistakes from prescribing to dispensing of the drug and monitoring of how it is taken. They explain the Barriers to Implementation of E-prescribing are Cost of Implementing an E-prescribing System, E-prescribing System Errors and Privacy and Legal Issues.

Harvey, et.al, found there were some essential user needs that were not met. These caused users to interact with the system in ways not intended by the system developers, and interfered with how CP professionals experienced the system. These were, 1) dispensing from printed-out tokens instead of screens, 2) using one Smartcard to log all dispensing activities by different staff, and, 3) problematic interface for claiming reimbursements

In this findings, Harvey, et.al, CP professionals' needs were not met, particularly in how the system was designed so they had to find ways to adapt them to their needs. The usability and user experience issues identified did not conform with key facilitators of technology adoption such as ease of use and compatibility. Studies have shown that national healthcare Information and Communication Technologies (ICTs) development such as Electronic Health Records (EHRs) tend to fail in user engagement. A key reason for this is, users tend to be excluded from the initial stages, and are usually involved only at later stages, thereby making critical modifications to the system design either expensive or impossible.

Using detailed commentaries from the study of early adopters, there have been some issues in the national healthcare system development from a community of pharmacy's perspective.

1. Pharmacy professionals needs were not meet in terms of the system design as they had to appropriate certain aspects of the system to suit their needs.
2. The process of involving users should be

made publicly available to reassure users and to make the development process transparent.

3. The result of this research suggest that involving real users in the service or system design from the initial stages and throughout the development life cycle could help enhance usability and user experiences, or at least flag up cases in which national policy will be detrimental to local activities

From another study in Iran, Ahmadi, Samadbeik, & Sadoughi (2014) shows that the results of the process documentation were analyzed using a conceptual model of workflow elements and the technique of modeling "As-Is" business processes. Analysis of the current (as-is) prescribing process demonstrated that Iran stood at the first levels of sophistication in graduated levels of electronic prescribing, namely electronic prescription reference, and that there were problematic areas including bottlenecks, redundant and duplicated work, concentration of decision nodes, and communicative weaknesses among stakeholders of the process. Using information technology in some activities of medication prescription in Iran has not eliminated the dependence of the stakeholders on paper-based documents and prescriptions. Therefore, it is necessary to implement proper system programming in order to support change management and solve the problems in the existing prescribing process. To this end, a suitable basis should be provided for reorganization and improvement of the prescribing process for the future electronic systems.

From another study in Indonesia, Kusumarini, Dwiprahasto, and Wardani (2011) tells us , that the perceptions of benefit have a greater impact on user attitudes than the perceived ease of receiving and using electronic prescriptions. This implies that in general the user is more receptive to the existing technological innovation form that is electronic prescription for seeing its usefulness, not from the convenience aspect.

The disadvantage of an electronic prescription system is it can not be used in the ER, less quickly with manual prescription and difficult for personalized medicine. In this electronic prescription, the alert system does not exist. Technical barrier perceived by the doctor, if network of the internet in peak hours becomes slow due to insufficient server.

DISCUSSION

This research study could be limited by the search strategy used and the number of databases searched, and publication bias may have restricted the articles that were available for this review. Researcher bias may have been an issue because articles were evaluated by the researchers to determine the relevancy to the study. Implementation of technological innovation rests largely on the readiness for change, and change is not always received positively (Kanter, 1991).. It was also happened in the implementation of electronical prescribing. The barriers could be divided into 2 groups which are user and system factors.

User Factors: Inefficiency

GPs felt that the electronic prescribing and medication management system slowed them down and did not offer a major advantage over paper-based prescribing (Elliot & Lee, 2016). The electronic prescription system cannot be used in the ER, less quickly with manual prescription and difficult for personalized medicine. In this electronic prescription, the alert system does not exist. Technical barrier also come when network in peak hours slower due to insufficient server (Kusumarini et.al, 2011). Security system, the pharmacist has already noted the medicine that are needed through the computer, could be accessed and downloaded by the patient, but, the pharmacist thinks that the patient would still need paper based prescription (Harvey dkk, 2014).

User Factors: Low GP uptake

According to Darrel L Butler and Martin Sellbom (2002), The rate of adoption usually starts low, accelerates until about 50% of the community has adopted the technology, then decelerates, eventually approaching zero, as nearly everyone in the community has adopted the technology.

A number of reasons for this were identified. Nurses and pharmacists reported that resistance and poor uptake by some GPs prevented the full benefit of the system from being realised. The need for paper copies of the medication chart (for the GPs' signature) and paper prescriptions

(for the pharmacy, to enable medicine costs to be subsidised) were seen as barriers to uptake of the electronic prescribing and medication management system (Elliot & Lee, 2016).

The use of different electronic medication management systems at different facility was also viewed as a barrier, as GPs with residents at multiple facilities would need to master multiple electronic systems. It was suggested that facility medication management systems should ideally be integrated with general practice clinical software. Some GPs, especially those infrequently using the system, reported difficulties using the electronic prescribing and medication management system, which led to reduced motivation and willingness to use the system, contributing to low uptake. The need for additional training and support was raised by GPs and nurses (Elliot & Lee, 2016).

The user's lack of understanding of the system because the switch to electronic prescribing is not just a single step process (Johnsonm & FitzHenry, 2006). Perhaps physicians who transitioned to e-prescribing became comfortable with e-prescribing and workflow redesign compared to physicians who have yet to adopt or who were in the process of adopting e-prescribing (Jariwala et.al, 2013). Perhaps the vendors can provide free trial of electronic prescribing software to help reduce the worries of the physicians to use the electronic prescribing. And make the physician who were planning to use the electronic prescribing more motivated to adopt the electronic prescribing.

System factors: Cost of Implementing an E-prescribing System

Treumann (2014) said that the adoption of any new technology does come down to a comparison of costs and benefits. Taft (2015) also said the number one barrier preventing IT from adopting significant technologies is budget limitation.

In this study, a major barrier, reported by more than 80 percent of primary care physicians, has been lack of financial support. New technology requires training and information technology support for installation and upkeep. A practice must take these costs into account when deciding whether to implement an e-prescribing system and also when choosing a stand-alone system or one that is integrated into an EHR system. Policies and financial rewards are not sufficient incentives for all prescribers to adopt e-prescribing (Porterfield et.al, 2014). From another study in America, Jariwala *et al*. (2013), reported that cost factor also to be slightly discouraging. While it is not likely that physicians may ever find the cost of e-prescribing encouraging, e-prescribing vendors may want to focus on emphasizing the value of their products and the value of e-prescribing in general, to lessen the 'pain' associated with e-prescribing costs.

The vendor should proved to the physicians the time effectiveness of using the electronic prescribing than using paper based prescribing, to lessen the "pain" associated with the cost.

System factors: E-prescribing System Errors

If an e-prescribing system has not been designed properly, new types of errors can occur. A major error is lack of alert specificity and overload of alerts, producing a phenomenon called alert fatigue: when presented with loads of alerts when each prescription is entered, prescribers tend to stop reading the alerts and just quickly scroll through them. When alerts are ignored, a major interaction can be missed (Porterfield et.al, 2014).

GPs faced two types of challenge. The first was to do with missing electronic prescriptions, which means, the patients would not be able to download the prescriptions so that it needs a system modification. The second was to do with long term design-specific issues. Pharmacists could only overcome these by using the system in ways not intended by the developers. Pharmacist's opinions are unnecessary during the process of designing the systems's development, this way, the pharmacist's professionalism are not fully used so the result will not be at the maximum quality (Harvey et.al, 2014).

In special patients requiring specialized therapy, such as hemophilia, multiple sclerosis, and thalassemia, transplantation, dialysis, should be made of special medical records and requiring internet verification. whereas with the previous system, verification can be done directly by the pharmacist. For reimbursement to insurance, will only succeed by completing some documentary requirements related to insurance. Duplicated work can be occurring in electronic prescribing.

It may result from user error or from the system (Ahmadi et.al, 2014).

System factors: Privacy and Legal Issues

Privacy of patient information can also be a concern for providers and patients. Most Electronic Health Record systems are web based, and some deliver information wirelessly. Information can be leaked at numerous points, and if proper firewalls and intrusion prevention systems are not in place, the opportunity exists for protected patient information to be stolen (Porterfield et.al, 2014).

CONCLUSION

From the studies and some articles above we can conclude that the barriers during implementing the e-prescription can be analyzed from 2 sides, from the users and the system of the electronic prescription. Review from the user side, the physicians felt that the e-prescription slowed the works speed and can not be applied in emergency unit. And the e-prescreption will be difficult if the prescription is a personalized or mixture prescription. Any kind of prescriptions still need physician's signature. Patients with special needs like hemophilia, transplantation, dialysis, etc would need a special medical record and has to be verified through their medical record. Patients' secret is not well-kept through the web system because the system could be accessed by anyone. The other side is the system. The lack of financial support for applying e-prescription, because it would need a special training for users and the system's maintenance. It is worried that at those times, the server would slow down and makes everything rough.

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Appendices. Reviewed articles

Journal Parameter	Krutika S Jariwala, 2013	RA. Elliott, CY. Lee, SY. Hussainy (2016)	Cresswell K, Slee A, Sheikh A (2017)
Title	**Factors that physicians find encouraging and discouraging about electronic prescribing: a quantitative study**	**Electronic prescribing and medication management at a residential aged care facility**	**Five key recommendations for the implementation of Hospital Electronic Prescribing and Medicines Administration systems in Scotland**
Method	Cross Sectional Study, Qualitative Study	Retrospective audit, Focus groups, in-depth interview/survey - Qualitative	Report
Variable	Primary care physicians' satisfaction	Uptake of the ePMMS by GPs at the study site, and the experiences and perceptions of GPs, nurses and pharmacists, with the ePMMS	Hospital electronic prescribing and medicines administration, implementation, strategy
Analysis	A description of the sample was provided by calculating means, frequencies, and percentages. Because the items comprising the encouraging and discouraging factors were collected from e-prescribing literature and were not acquired from a previously established scale, exploratory principal component analysis (PCA) using VARIMAX rotation was conducted to identify the underlying dimensions of the factor structure of the items The first objective was accomplished by calculating means for each scale of the influencing factor measure identified with PCA. In addition, an overall mean for each factor was reported for all physicians. The second objective was accomplished by conducting a multivariate analysis of variance. To determine more specifically which physician groups differed from others with regard to their perceptions of each factor, Tukey's post-hoc tests were conducted.	Over the evaluation period there were 205 new medication orders for residents under the care of participating GPs. Of these, 53 (25.6%) were entered by the residents' GP and 152 (74.1%) were entered by a pharmacist. Most of the GP-entered orders (n = 44, 83.0%) were from one GP, who cared for 38 residents. Four GPs did not enter any orders via the ePMMS. Of the 152 orders entered by pharmacists, the origin of the order was able to be identified in 128 (84.2%) cases: 53 were new orders initiated by the resident's regular GP; 33 were new orders initiated by a locum doctor, other GP, palliative care service or specialist; and 42 were pre-admission medicines that needed to be ordered on the RACF electronic MAR when a person was admitted (or readmitted) to the RACF from home or hospital..	Electronic health (or eHealth) functionalities associated with prescribing and medicines administration have been shown to improve the safety and quality of care and also to contribute to increasing healthcare efficiency. Developing and retaining expertise is important for implementing hospitals in order to help maintain and continually refine systems beyond the initial implementation period, while sharing expertise nationally can help to maximise existing resources. Increasing local staf skill at local level should be the priority in internal capacity development for the Scottish Government.
Result	Benefits : Respondents, regardless of adoption status, reported pre-implementation factors to be slightly discouraging, but physicians who have used e-prescribing for more than 6 months were less discouraged by pre-implementation factors than physicians who were planning to adopt e-prescribing in the next 6 months and physicians who have considered but were not planning to adopt an e-prescribing system. Perhaps physicians who transitioned to e-prescribing became comfortable with e-prescribing and workflow redesign compared to physicians who have yet to adopt or who were in the process of adopting e-prescribing. The findings of this study may enable consultants, vendors, and policy makers to facilitate more adequately the adoption of e-prescribing by directly targeting the factors that are most salient to physicians when physicians are the decision makers.	Three of seven GPs used the ePMMS to order medicines; 53/205(25.9%) medicines were ordered via the ePMMS by GPs. Two broad themes were identified: benefits of the ePMMS, and barriers/limitations. Benefits related to patient safety and workforce efficiency, and included GPs' ability to access and modify residents' MARs remotely, no need for nurses to fax orders to the pharmacy, and no need for pharmacy transcription of GPs' handwritten orders to create electronic MARs . **Barriers and limitations related to inefficiency, low GP uptake and training/support, and included slower prescribing compared to written orders, the need for GP-signed paper copies of the MAR, lack of integration with GP clinic software, and low GP motivation to use the system, especially GPs with few patients at the RACF .** Conclusions: GPs, nurses and pharmacists felt the ePMMS improved medication-safety and workforce-efficiency, however a number of barriers were identified that contributed to low GP-uptake and limited the benefit.	NHS Scotland has limited implementation and optimisation expertise, which may hamper efforts to successfully deploy and derive benefits from HEPMA. A central problem is that all too often external project managers are seconded to oversee implementations and then leave with the accumulated knowledge. In terms of deployment strategy, hospitals should pair up with those that already have implementation experience in relation to planning, direct implementation and ongoing optimisation.

Journal Parameter	Amber Porterfield, Kate Engelbert, Alberto Coustasse (2014)	Jasmine Harvey, Anthony J. Avery, Ralph Hibberd, Nicholas Barber (2014)	Maryam Ahmadi, Mahnaz Samadbeik, and Farahnaz Sadoughia. Iran J Pharm Res (2014)
Title	**Electronic Prescribing: Improving the Efficiency and Accuracy of Prescribing in the Ambulatory Care Setting**	**Meeting user needs in national healthcare systems: lessons from early adopter community pharmacists using the electronic prescriptions service**	**Modelling of outpatient prescribing in Iran: a gateway toward electronic prescribing system**
Method	Systematic review	Nonparticipant observations and interviews	Experimental
Variable	Benefits and advantages of e-prescribing implementation, efficiency of e-prescribing, cist saving associated with e-prescribing, increasing in patient medication adherence and patient cost saving	User-centric approaches, Electronic prescription service release two	Qualitative data
Analysis	Electronic prescribing or e-prescribing was limited to the ambulatory care setting. Only primary and secondary data from articles, reports, reviews, and research studies written in the United States were included. References were reviewed and determined to provide accurate information about e-prescribing with particular attention to the benefits of and bariers to its implementation.	EPS is a standardised system that has to be integrated with different pharmacy dispensing systems. CP professionals were overall positive about the system and wished for it to be retained and improved, instead of being discontinued. They were however facing two types of challenges with the system. The first type of challenge was caused by missing electronic prescriptions. The second type of challenge was considered long-term and was specific to the system design. Although these design specific issues were adaptable into work practice with 'add-on' designs, pharmacists thought these issues were present because they were not involved in the system design and development.	Paper-based prescribing prevents evaluation of medication-specific factors and patient-specific clinical and non-clinical factors, access to external resources, and the use of clinical decision support systems for the medication prescription process. Therefore, warnings about drug interactions, contraindications, medication allergies and repetitive medication do not appear at the time of prescribing. Also, it is not possible to calculate dosage automatically according to age, gender, weight, health history, and so forth. Prescription does not have a unique prescription number for identification and tracking. The volume and page number of the patient's insurance booklet is the only prescription identifier that has been used in pharmacy software systems over the years. However, Social Security Insurance Organization has recently started recording the 18-digit serial number and barcode (composed of the patient's National Identifier Number, insurance branch code, volume number and page number) on each page of the Social Security Insurance booklet in order to provide the required preparation for electronic health record implementation. There is no data element about the number and duration of refills on medication prescription. The physician cannot review and track the paper prescription after the drug is picked up by the patient. Therefore, it is not possible to modify and cancel the existing prescription, or discontinue a specific medication, if the patient's condition changes. Paper prescriptions are legally the only valid documents for dispensing and investigating medication prescriptions, and using electronic prescriptions is legally forbidden. This legal limitation has led to rework loops, redundant and duplicated work in this process.

Result	Errors in medication prescribing and filling are some of the most common types of medical errors. The ambulatory care setting is the most common place for prescribing errors to occur. Bariers to implementation of E-prescribing are: 1. Cost of Implementing an E-prescribing System A major barrier, reported by more than 80 percent of primary care physicians, has been lack of financial support. New technology requires training and information technology support for installation and upkeep. A practice must take these costs into account when deciding whether to implement an e-prescribing system and also when choosing a stand-alone system or one that is integrated into an EHR system. Policies and financial rewards are not sufficient incentives for all prescribers to adopt e-prescribing. 2. E-prescribing System Errors If an e-prescribing system has not been designed properly, new types of errors can occur. A major error is lack of alert specificity and overload of alerts, producing a phenomenon called alert fatigue: when presented with loads of alerts when each prescription is entered, prescribers tend to stop reading the alerts and just quickly scroll through them. When alerts are ignored, a major interaction can be missed. 3. Privacy and Legal Issues Privacy of patient information can also be a concern for providers and patients. Most EHR systems are web based, and some deliver information wirelessly. Information can be leaked at numerous points, and if proper firewalls and intrusion prevention systems are not in place, the opportunity exists for protected patient information to be stolen.	CPs faced two types of challenge. The first was to do with missing electronic prescriptions. The second was to do with long term design-specific issues. Pharmacists could only overcome these by using the system in ways not intended by the developers. Some felt that these issues would not exist had 'real' users been involved in the initial development. The issues were: 1) printing out electronic prescriptions (tokens) to dispense from for safe dispensing practices and to free up monitors for other uses, 2) logging all dispensing activities with one user's Smartcard for convenience and use all human resources in the pharmacy, and, 3) problematic interface causing issues with endorsing prescriptions and claiming reimbursements.	E Health Initiative (EHI) has outlined six different graduated levels of e-prescribing from basic reference systems to advanced systems demonstrated in a pyramid. Each level covers more functionalities than previous one. "The levels of the pyramid are: "1. Electronic prescription reference only, no prescribing capability; 2. Stand-alone prescription writer, with no medication history or supporting data; 3. Addition of basic supporting data, such as allergies, demographics, and formulary information, which can be used by the system to generate alerts; 4. Medication management, long-term tracking and monitoring of each patient's active medications; 5. Connectivity among practices, pharmacies, payers, pharmacy benefit managers(PBM's), intermediaries, and patients; 6. Integration with a more complete electronic health record" (78). Therefore, Iran is placed in the first graduated level of sophistication based on this model. Moreover, since drug information, dosage calculation and pharmacopoeia are accessible as free text or digitally but are not automatically displayed when prescribing, medical error reduction and prevention is extremely difficult in this system, although most commercial e-prescribing products at least provide significant features at levels 2, 3 and 4.

Journal Parameter	Putu Kusumarini , Iwan Dwiprahasto, PE Wardani (2011)
Title	**Doctors' Acceptance And Patients' Waiting Time On Collecting Medicine Using Electronic Prescription System Compared To Manual**
Method	Descriptive Study
Variable	Physicians' satisfaction, benefits and ease in using electronic prescription
Analysis	Doctors' acceptance research on the use of electronic prescriptions is descriptive research using quantitative analysis. Interview about the physician's experience in using electronic prescriptions and interviews with pharmacists on the role of electronic prescriptions in minimizing risks in the prescribing and transcribing phases by using qualitative analysis. The research of electronic prescription waiting time versus manual recipes is quasi experimental research
Result	Path analysis results showed that perceived use-fullness had bigger influence than perceived ease of use in term of acceptance of electronic prescribing. Most of doctors told that they have benefit of using electronic prescribing. Electronic prescribing could minimize the risk during prescribing and transcribing and also reduce the waiting time.