

Effect of electronic prescription on medication process at Federal Medical Centre, Keffi

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Abstract

The study examines the effect of electronic prescription on medication at Federal Medical Centre, Keffi. The study adopts survey and documentary research design. The primary data were generated through the instrument of questionnaires while secondary materials were sourced from the past studies. The population of the study is the patients of the Federal Medical Centre Keffi who benefit from these services as well as Doctors and pharmacists who provide these services. The technique of data analysis was regression analysis. The hypothesis was tested at 5% level of significance. The findings from the analysis revealed that there is significance relationship between e-prescription that allows easy transfers of patient's records among the Physicians which enhanced efficiency in Patients treatment at FMC Keffi. The study further reveals that, electronic prescription service has reduced the number of patients who died as result of wrong prescription of drugs usually associated with manual prescription drugs in FMC Keffi, the study recommends that, The management of the Federal Medical Centre Keffi should ensure that, there should be security of Patient's data in all patient treatment to reduced error rates in term of further treatment.

Keyword: Electronic, Electronic-prescription, Electronic medical Record, Electronic-prescription of drugs and Patient's treatment.

Introduction

Physicians are disreputable for their handwriting. Patients face a tough time going through a paper-based prescribed medication. The introduction of electronic health records (EHR) brought a change in the way doctors prescribed treatment. The electronic health record platform enabled them to update medication details regularly. Electronic-prescribing (e-prescribing) is a step taken to increase utilization of health information technologies (HITs). Along with other HITs such as electronic health records and health information exchanges, e-prescribing is seen as a tool for improving patient-centered care. With the introduction of electronic health records, e-prescriptions are made



mandatory and this help other healthcare providers and pharmacy systems reduced medical errors and paperwork¹.

Electronic prescriptions have been an essential part of the patients care, enhancing safety, quality, and timely healthcare processing. e-prescriptions are computer-based, electronically filling of prescription forms and transmission of same from the caregiver to the pharmacy and other relevant users of the chrome books. The electronic prescription substituted paper and faxed prescriptions owing to its accuracy and on-time care delivery features. For any healthcare giver unit, a significant portion of prescribing happens according to the outpatient setting (facility that does not require hospitalization of patients). Outpatient setting is a considerable number of patients that comes on a daily basis for check-ups and thus this setting holds a great need for e-prescriptions². e-prescriptions have gained tremendous popularity and are growing rapidly not because of the technological advancements, but because of the significant benefits (enhance pharmacy dispensable, reduced medical errors, eliminate paperwork, enhancing safety, quality, and timely healthcare processing) it delivers to caregivers and patients. Though still at its nascent stage, e-prescribing is at its highest in the United States³

Many hospitals and healthcare establishments have switched to e-prescriptions for patient treatment. Initially, e-prescriptions were termed as a no-brainer, as it was computer ordered and people were doubtful whether they could read a physician's handwriting. The records and reports lead to a net positive effect of e-prescriptions; as they fulfill medical adherence. Lucidity is one of the most critical elements of e-prescriptions that deliver an expansive patient safety advantage⁴. The application of e-prescription on patient's medication services in Federal Medical Centre Keffi is one of the innovations introduced to patient's electronic medical record. The paper is interested to find out whether the e-prescriptions of drugs and pharmaceutical services have enhanced patient's medication.

There are challenges facing health care service delivery in Nigeria, and these includes; reducing preventable errors in the diagnosis of diseases, paperless prescriptions, manual drug prescriptions, lost files or folder, time wastage and other challenges⁵. It is in view of the above reason this paper seek to ascertain whether e-prescription can eliminate the bottleneck to effective patient's medication service at Federal Medical Centre Keffi. The main purpose of this research study was to explore the benefits that e-prescribing has had in improving the efficacy, accuracy, in patient's medication service.

¹Abdullahi M. and Dangana J. W. Effect of Electronic Medical Record System on Service Delivery at Federal Medical Centre, Keffi. NSUK Postgraduate Research Journal Vol.3 No.1 (2019).

²Abdullahi. and Dangana, ibid, 2019

³Mayank, Prakash. "E-Prescriptions: Making Patient Care Effective & Efficient." Malayisan.Unity Press. 2017.

⁴Abdullahi and Dangana, ibid, 28

⁵ Ibid, 23

It is in this regard the study wish to answers these interrelated questions. Thus, answers to these questions from the study could lead to the achievement of the study's objectives which include;

- i. What is the effect of e-prescription on easy transfers of patient's medication records among the Physicians at FMC Keffi?
- ii. Has e-prescription of drugs reduced medication errors in term of drugs dispensation at FMC Keffi? iii. Has e-prescription reduced medication errors in the diagnosis of diseases at FMC Keffi?

The study seeks to achieve the following specific objectives;

i.To ascertain the effect of e-prescription on easy transfers of patient's medication records among the Physicians at FMC Keffi. ii. To examine whether e-prescription of drugs has reduced medication errors in term of drugs dispensation at FMC Keffi.

- iii. To examine whether e-prescription has reduced medication errors in the diagnosis of diseases at FMC Keffi.

In line with the Research questions and research objectives, the following hypothesis was formulated to guide the study;

- i. There is no significance relationship between e-prescription and easy transfers of patient's medication records among the Physicians at FMC Keffi.
- ii. There is no significance relationship between e-prescription of drugs and the reduction of medication errors in term of drugs dispensation at FMC Keffi.
- iii. There is no significance relationship between e-prescription and reduction of medication errors in the diagnosis of diseases at FMC Keffi.

Conceptual Issues

e-governance

According to Musa⁶, Concept of e-governance which means electronic governance refers to the The use of digital technologies, most notably information and communication technologies (ICTs), for the purpose of improving and streamlining the delivery of government services, the sharing of information, and communication between various players in the public sector is referred to as electronic governance. E-governance is a strategy for modernising government operations with the intention of improving their efficacy, transparency, accessibility, and focus on the needs of the public. E-governance is a concept that refers to the application of information and

⁶Musa, Z..Effect of Integrated Payroll and Personnel Information System (IPPIS) on Pay Fraud in the Budget Office of the Federation Nigeria. In *Carnegie-Rochester Conference Series on Public Policy* ,(Vol. 11, No. 2)(2022, September).

communications technology (ICT) tools, such as the internet, mobile applications, and other digital platforms, to the process of transforming traditional systems of government..

e-prescribing

Amber, Kate and Alberto⁷ defined electronic prescription (e-prescribing) as the computer-based electronic generation, transmission, and filling of a prescription, taking the place of paper prescriptions. Most prescribing occurs in the outpatient care setting, where paper-based prescribing is most heavily used, so this type of community-based setting holds the greatest potential for e-prescribing to be achieved. E-prescribing is important for any nation to push to enhance the safety and quality of the prescribing process.

Electronic prescribing (e-prescribing) is defined by the US' Centers for Medicare and Medicaid Services (CMS)⁸ as [...] the transmission using electronic media, of prescription or prescription-related information between a prescriber, dispenser, pharmacy benefit manager, or health plan, either directly or through an intermediary, including an e-prescribing network. E-prescribing includes, but is not limited to, two-way transmissions between the point of care and the dispenser.

In many cases, e-prescribing software platforms also include point-of-care decision support that alerts prescribers to potential prescription errors at the time of prescribing. E-prescribing is one part of the larger move to increase utilization of health information technologies (HITs). Along with other HITs such as electronic health records (EHRs) and health information exchanges, e-prescribing is seen as a tool for improving patient-centered care⁹.

Abdullahi and Dangana (2019) opined that, e-prescribing has allowed prescribers to electronically send patients' prescription information to pharmacy; laboratory, radiology and other service units include account for payments. This process has decreased prescribing and medication errors and has resulted in fewer call-backs from pharmacies to physicians for clarification. Electronically sending and receiving prescriptions has streamlined the clinical practice workflow, and patient satisfaction and compliance have increased. Additionally, connecting physician and pharmacy systems has reduced paperwork and the associated mistakes that may occur from reliance on handwritten notes. This change has produced time and cost savings for all parties involved.

E-prescribing systems can be incorporated into electronic health record (EHR) systems or can be standalone systems in the treatment of patients. Electronic health record systems include patient information such as clinical notes, laboratory orders and results, and clinical decision support (CDS) functions that

⁷Amber P, E. Kate and C. Alberto. Electronic Prescribing: Improving the Efficiency and Accuracy of Prescribing in the Ambulatory Care Setting. USA. 2017.

⁸ US' Centers for Medicare and Medicaid Services (CMS), 2015

⁹ Ibid, 122

stand-alone systems do not provide. When e-prescribing is part of an EHR system, providers are able to access all patient information, not just prescription information. The Health Information Technology for Economic and Clinical Health (HITECH) Act of 2009¹⁰ proposed that healthcare professionals throughout the United States have access to EHRs and use them meaningfully according to standards set by the Centers for Medicare and Medicaid Services (CMS). The purpose of meaningful use is to use technology to coordinate and improve patient care. E-prescribing is a way of using EHRs meaningfully because the technology is used to enhance the quality of patient care. Allowing providers to access patient histories, diagnoses, and medication information increases patient safety by reducing medical errors¹¹.

Benefits of E-Prescribing

E-prescriptions can either be stand-alone applications or platforms for other units or can be integrated with the existing Electronic Health Record (EHR) systems. The reason many healthcare providers consider the integration of e-prescriptions with EHR is that it contains patient data such as clinical information, laboratory orders and pathology results, and clinical decision support system. If an e-prescription is a part of EHR, it becomes convenient for physicians to access all patient information and at the same time, they can share e-prescription with the pharmacist, ensuring efficacy and accuracy of treatment¹². Enlisted here are some of the many key benefits of e-prescribing according to (www.drfirst.com).

According to Centers for Medicare and Medicaid Services (CMS)¹³:

1. **Prevents medication errors** Many times it has happened that pharmacists tend to dispense wrong medicines due to incorrectly reading the handwriting on prescription and the pharmacists delivered medicines which sounded familiar to one mentioned. For example, Brillinta and Brintellix are different drugs but sound familiar, while the former is used for the coronary syndrome the latter treats depression. If these two are confused, may lead to patient death or any severe symptom. E-prescriptions in such cases are of a positive impact. E-prescription can eliminate medication errors that occur due to handwriting mistakes. Also, e-prescriptions allow physician and pharmacists to access a patient's previous medication and reduce the chances of dispensing wrong medication.

2. **Automates Clinical Decision Support:** E-prescription applications assist in lessening the risks linked with filling and generating prescriptions; helping in better clinical decision making. Genomics is the best example of a robust clinical decision support system. Genomics determines the effectiveness of a prescription of any patient based on their genetic codes. Tools like this also perform disease profiling through which it is easy to identify any patient who is

¹⁰ Health Information Technology for Economic and Clinical Health (HITECH) Act of 2009

¹¹ US' Centers for Medicare and Medicaid Services (CMS), 2015

¹² Ibid, 28

¹³ Ibid, 32

at risk of developing a particular symptom. This helps physicians to make informed decisions at the point-of-care.

3. **Speed Up Medication Process:**Traditional prescriptions or paper-based prescriptions may tend to lose medication history, making it difficult for clinicians and physicians to track medication details. Also, the entire process of tracking medical records was manual which made it difficult to reconcile medication information. With e-prescriptions, a patient's medication history can be instantly accessed. Every drug to drug interaction is saved in application memory. E-prescription applications fetch data from pharmacy benefit management and EHR platforms, to speed up eprescribing.

4. **Instant Notification and Medication Alerts:**E-prescribing assists physicians in gaining full visibility of the allergies and previously prescribed drugs; as everything is documented & stored within the application. E-prescription also provides alert to the providers if the newly prescribed drugs may cause any severe symptoms. Instant notifications through e-prescribing help physicians to provide alternate medication suggest substitute therapies and treat any allergies on time.

5. **Track Complete Medication** E-prescribing helps physicians to track whether patients have filled prescription forms and if in case it is not done, the providers can counsel on medication management. Also, e-prescriptions allow providers to understand the frequency of filling prescriptions for any particular controlled drug so as to stop possible drug mishandling.

6. **No Delays as No Lost Prescription** When patients receive prescriptions from the doctor chances are that they may forget to fill their medication intake, may never fill details or may have lost the paper. In such cases, the patient needs to, either revisit the physician to rewrite the prescription or visit the pharmacy to get the details from pharmacy management data. With eprescribing, the prescriptions are directly sent to pharmacy leaving no chances of errors from the patients.

7. **Greater Patient Satisfaction** E-prescriptions allows expediting the filling in prescriptions and reduced visits to pharmacies. Since refills are faster, there is less waiting time for patients to hear from physicians, and thus improving process satisfaction.

8. **Single Workflow Prescribing** Traditional prescriptions never spoke about controlled drugs in single-paper prescription history and required a separate prescription for controlled substances that went to special mail-order pharmacies or retail outlets. The entire manual process of managing prescribed controlled drugs and conventional drugs was very tedious.

E-prescribing software allows providers to send e-prescriptions to special mail-order pharmacies, through the same workflow as the regular drug pharmacies. The single workflow interface makes the process more efficient, enhance patient satisfaction, support medical adherence and create patient convenience.

9. **Better Utilization of Staff Time** Prescription refills requests are a burden for the healthcare staff. The clinical staff and physicians had to send several follow-ups to patients for a prescription refill, taking a lot of time to and fro. Sometimes, despite these efforts, the staff does not receive filled prescriptions and end up creating new ones. E-prescription enables healthcare providers to review, verify and share as many refill information within seconds.

Also, the e-prescriptions allow staff to perform an emergency refill in case the patient is in transit and left with no medication.

10. Reduced Re-hospitalization The notifications and alert feature in e-prescribing software make healthcare provider track any adversarial reaction of drugs on any patient that leads to hospitalization. E-prescribing reduces re-hospitalization as it ensures timely filing of prescriptions.

11. Enhanced Medical Adherence Medication adherence is the proper conception of treatment by patients. Patients tend to stop taking medications once they feel better or may end up reducing the dose of prescribed medication. E-prescribing enables faster filling of prescriptions increasing better medication adherence.

12. Faster Verification of Medical Insurance Traditional prescriptions and outstanding medical bills need to accompany together for insurance claims. Manual verification of prescribed drugs and billing invoice of similar drugs takes a lot of time and effort. E-prescribing software tallies the prescribed drugs and pharmacy invoice and authorizes the purchase for insurance claims.

Electronic Medical Record and Patient Treatment

According Abdullahi and Dangana¹⁴ electronic medical record (EMR) is really helpful in patient treatment. Going electronic not only ensures the security of patient data, it streamlines communication between physicians and allows them to seamlessly transfer patient records amongst themselves and other health caregivers. In a situation where a patient is unconscious or unable to communicate, an EMR can alert the clinician about life threatening allergies, conditions, and other critical information. EMRs provide access to information and resources that ultimately result in better approaches to treatments¹⁵.

According to Pan-African Conference¹⁶ assert that, electronic medical record (EMR's) can provide more information to physicians than ever before such as; patient's medical histories, lab results and recommended treatment options.

Patient care is directly improved where qualified EMRs can provide information in previously unavailable formats, physician can print and view values and graphs pertaining to weights, cholesterol levels, blood pressure, etc. and better keep track of changes. This directly improves communication and relationships between family physicians with medical notes and consultation letter templates provided by EMR's¹⁷. EMR can provide alerts to remind providers when certain prevention measures are due or out of date. Shortly and long term treatment goals can also be provided by EMRs. This results in better patient care which the patients themselves can track and appreciate. Clinical decision support also significantly improves patient care, especially in accidents and emergency

¹⁴Abdullahi and Dangana, ibid, 43

¹⁵Meinel, E. Improve health care service through the use of ICT in medical record system International journal medical record Vol. 3 (5). (2008). 33-42.

¹⁶ Pan-African Conference, on electronic medical record (EMR's). 2008.

¹⁷Abdullahi and Dangana, ibid, 37

departments. Clinical decision support can be integrated into EMR systems to help providers make decisions about treatments and overall courses of action for their patients. It can present the latest information on a drug and even advise on patient allergies. EMR equipped with clinical decision support and computer physician order entries reduce clinical errors and increase efficiency, which was previously unattainable (Meinel, 2008)¹⁸.

Empirical Reviewe-Prescription and Service Delivery in Hospitals

E-Prescribing is growing rapidly, not just because the technology has improved, but because of the substantial benefits for patients and physicians. Every state in the U.S. now allows e-prescribing, including [e-prescribing of controlled substances](#).

Over 70 percent of U.S. physicians have transmitted at least one prescription electronically, up from virtually zero physicians in 2007, according to the Office of the National Coordinator for Health Information Technology (ONC)¹⁹.

A major barrier to the growth of e-prescribing was removed when the Drug Enforcement Agency (DEA) implemented the Electronic Prescriptions for Controlled Substances (EPCS) interim final rule in 2010, giving practitioners the option to electronically transmit prescriptions for Schedule II-V controlled substances (10-11 percent of all prescriptions). The regulations also permit pharmacies to receive, dispense and archive electronic prescriptions. As a result, three states (New York, Maine, Minnesota) require virtually all drugs to be electronically prescribed²⁰.

According to Amber, Kate and Alberto²¹ in their study entitled Electronic Prescribing: Improving the Efficiency and Accuracy of Prescribing in the Ambulatory Care Setting. Electronic prescribing (eprescribing) is seen as an important part of nations to push to enhance the safety and quality of the prescribing process. E-prescribing allows providers in the ambulatory care setting to send prescriptions electronically to the pharmacy and can be a stand-alone system or part of an integrated electronic health record system. The methodology for this study followed the basic principles of a systematic review. A total of 47 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 issues²².

¹⁸Meinel, *ibid*, 247

¹⁹ Office of the National Coordinator for Health Information Technology (ONC)

²⁰ Drug Enforcement Agency (DEA). Electronic Prescriptions for Controlled Substances (EPCS). New York, Maine, Minnesota, 2007

²¹ Amber, Kate and Alberto, *Ibid*, 68

²² *Ibid*, 39

According to Caitlin, Megan and Margie (2017) in their study entitled patient perceptions of e-prescribing and its impact on their relationships with providers: A qualitative analysis. It reported positive perceptions and experiences related to convenience, cost, and safety and quality, and negative experiences related to prescriptions being sent to the wrong pharmacy, relationship and communication challenges with their pharmacist and prescribers, and feeling less control over their prescriptions. With e-prescribing resulting in loss of the prescription drop-off step, opportunities exist to better educate and engage patients at the point of prescribing to prepare them for their visit to the community pharmacy. Optimizing use of after-visit summaries and patient education materials already available through prescribers' EMRs could improve patient experiences with e-prescribing. Pharmacists should be aware of these potential challenges and opportunities related to e-prescribing.

e-Prescriptions and Medical Errors on Patients Treatment.

The Institute of Medicine reported that medication errors were estimated to have accounted for approximately 7,000 deaths in 1993 and caused one out of 131 outpatient deaths (Kohn, Corrigan and Donaldson²³. Since the time of that report, a great deal of attention has been paid to medication errors, and efforts have been made to improve patient safety. Not only do medication errors have a serious impact on patient well-being, they may also result in the loss of patient trust, disciplinary action by the medical and pharmacy boards, and even civil actions and criminal charge(Wittich, Burkle, and Lanier)²⁴. While most medication errors that reach the patient do not cause harm to the patient (Barker, Flynn, Pepper, Bates and Mikeal)²⁵ any technology or process that reduces errors in the more than 4 billion prescriptions dispensed annually is a clear benefit to the patient, prescriber, and pharmacist.²⁶

According to Ammenwerth, Schnell-Inderst, Machan and Siebert²⁷ researched on the impact of e-prescribing on medication errors has typically taken place in hospital settings or looked at specific populations or medications. There is some evidence to suggest that e-prescribing can reduce medication errors, however, some errors still persist. The most obvious benefit of e-prescribing on medication errors involves prescription legibility. To identify the types of prescribing errors in the ambulatory care setting, Abramson, Bates and Jenter²⁸ analyzed 9,385 paper prescriptions from 78 providers and found an overall prescribing error rate, excluding illegibility errors, of 36.7 per 100 prescriptions. Illegibility errors were very high, and inappropriate abbreviation

²³ Kohn LT, Corrigan J, Donaldson MS. Institute of Medicine. (1999) To Err is Human: Building a Safer Health System. Washington, DC: National Academy Press

²⁴Wittich C.M, Burkle, C.M, Lanier L.L. Medication errors: An overview for Clinicians. Mayo ClinProc, 2014.

²⁵Barker KN, Flynn EA, Pepper GA, Bates DW, Mikeal RL. Medication errors observed in 36 health care facilities. Arch Intern Med. 2002;162(16):1897-1903.

²⁶ Bates DW, Boyle DL, Vander Vliet MB, Schneider J, Leape L. Relationship between medication errors and adverse drug events. J Gen Intern Med, 10(4). (1995):199-205

²⁷ Ibid, 199-205

²⁸ Abramson EL, Bates DW, Jenter C. Ambulatory prescribing errors among community-based providers in two states. J Am Med Inform Assoc. (2012): 382-432.

and direction errors also occurred frequently. The study reviewers concluded that e-prescribing with clinical decision support could eliminate a vast majority of the errors. In addition Kaushal, Kern, Barrón, Quaresimo, Abramson²⁹ found a nearly sevenfold decrease in error rates, from 42.5 per 100 prescriptions before adoption of e-prescribing, or baseline, to 6.6 per 100 prescriptions one year after adoption.

Research conducted in the community pharmacy setting has focused on errors still found in e-prescriptions and how they can be alleviated. The most common e-prescribing errors observed and reported in literature are wrong quantity, wrong directions, wrong dosage, wrong dosage form, wrong days' supply, wrong drug, and wrong patient.³⁰ A number of factors may contribute to these errors. Several studies have noted the drop-down menus and pick-lists as an e-prescribing system challenges that may contribute to selection of the wrong information.³¹ Nanji, Rothschild and Salzberg³² identified 452 (11.7%) errors contained in 3,850 computer-generated prescriptions reviewed, 163 (35%) of which were considered potential adverse drug events. The errors were identified by reviewing prescriptions received by outpatient pharmacies. The evaluation did not include errors that originated within the pharmacy or the number of clarifications initiated by pharmacists to address errors that were identified during a pharmacist's review of the prescription. The inclusion of forcing functions to ensure that all required information is present and integration of drug decision-support systems such as maximum dose checkers and dose calculators into prescribing software have been recommended to reduce e-prescribing errors³³.

Discrepancies have also been described within an electronic prescription (e-prescription). For example, structured fields like dose may not agree with the dose entered into a free-text field. Prescribers may select a dose from a drop-down menu, but then type a different dose in an "Additional Instructions" field³⁴

Errors can also occur once the e-prescription is received by the pharmacy. E-prescriptions often require manipulation by pharmacy staff due to system

²⁹Kaushal R, Kern LM, Barrón Y, Quaresimo J, Abramson E.L (2010). Electronic prescribing improves medication safety in community-based office practices. *J Gen Intern Med*

³⁰Odukoya O.K, Chui M.A. E-prescribing: characterisation of patient safety hazards in community pharmacies using a sociotechnical systems approach. *BMJ Qual Saf.*

prescriptions: is the geriatric patient ready? *J Am Geriatr Soc.*;55(8):1254–1259

³¹Lapane KL, Dube CE, Schneider KL, Quilliam BJ. Misperceptions of patients' vs providers regarding medication-related communication issues. *Am J Manag Care.*;13(11) (2007):613–618

³²Nanji KC, Rothschild JM, Salzberg C. Errors associated with outpatient computerized prescribing systems. *J Am Med Inform Assoc*, Vol.45(2) (2011).

³³ *Ibid*, 232

³⁴Palchuk, M. B, Fang, E.A, Cygielnik J.M. An unintended consequence of electronic prescriptions: prevalence and impact of internal discrepancies. *J Am Med Inform Assoc*. vol. 7(5), (2010):82-91

design limitations, such as completing or editing certain fields, thus allowing for other opportunities for transcribing errors³⁵.

So while it is anticipated that the net effect of e-prescribing is a reduction in medication errors, there have been a number of studies examining the impact of e-prescribing on pharmacist workflow. Pharmacists serve as the final health care professional in the line of defense between the medication and the patient. One study measuring the intervention of pharmacists on e-prescriptions versus traditional prescriptions found an e-prescribing intervention rate of 11.7% and a handwritten prescription intervention rate of 15.4%; results were not statistically significant³⁶. Odukoya, Stone & Chui (2014) studied the processes by which pharmacy personnel recover from e-prescription errors and established that error detection was accomplished through a number of strategies.

These strategies included first double checking for accuracy by different pharmacy personnel throughout the pharmacy workflow, second printing out the hard copy of an e-prescription to allow personnel to more easily recognize errors, and third highlighting key information on the printed e-prescription to allow for easy identification of pertinent information. Researchers also identified ways in which pharmacy personnel explain and, finally, solve the error. Participants reported consultation with another pharmacy team member, review of patient's medication history, pharmacist consultation with patient, and use of online drug information as strategies for explaining e-prescribing errors. To solve the errors, respondents reported that contacting the prescriber by telephone was the most frequently used of the strategies. Others strategies reported by respondents included contacting the prescriber by fax or making an educated guess of the prescriber's intent, which respondents stated was particularly common with wrong quantity errors for creams and ointments³⁷.

Theoretical Framework Telemedicine Diffusion of Innovation

Telemedicine programs have diffused innovation and encouraged the adoption of information technology (IT) operations in the Blue Ridge states (North Carolina and the outer state borders of South Carolina and Georgia). Brewer, Goble, and Guy³⁸ wrote that rural communities spread across five major geographic regions: the Blue Ridge Mountains in the northeast, the Ridge and Valley Province and the Cumberland Plateau in the northwest, the Piedmont in

³⁵ Grossman JM, Cross DA, Boukus ER, Cohen GR. Transmitting and processing electronic prescriptions: experiences of physician practices and pharmacies. *J Am Med Inform Assoc.* (3) (2012):353-359

³⁶ Gilligan, Adrienne M., Kimberly Miller, Adam Mohny, Courtney Montenegro, Jacob Schwarz, and Terri L. Warholak. "Analysis of pharmacists' interventions on electronic versus traditional prescriptions in 2 community pharmacies." *Research in social and administrative pharmacy* 8, no. 6 (2012): 523-532.

³⁷ Odukoya, Stone and Chui, *ibid*, 27

³⁸ Brewer, Rena, GiGi Goble, and Paula Guy. "A peach of a telehealth program: Georgia connects rural communities to better healthcare." *Perspectives in Health Information Management/AHIMA, American Health Information Management Association* 8, no. Winter (2011).

central Georgia, and the Coastal Plain in the south. Georgia is the largest state east of the Mississippi River³⁹. Rural communities bear a greater burden of cardiovascular disease, cancer, diabetes, obesity, and infant conditions than their urban counterparts.⁴⁰

When rural, underserved patients become aware of local telemedicine services, their opinion of local quality care rises⁴¹. The emergence and maturation of technologies such as telehealth, distributed e-learning, moreover, electronic health records systems can transform health care and diminish disparities between urban and rural settings⁴². Given the state of health care in Georgia and the tremendous challenge of reaching the vulnerable communities, the Georgia Partnership for TeleHealth (GPT) utilizes telemedicine to improve the health outcomes of rural Georgians through access to broadband technologies.

The U.S. healthcare policy regulates the adoption of health innovation technologies and numerous advancements in information technology and has developed strategies to improve healthcare services and medicine for American Indians and Alaska Natives. Shore⁴³ found that American Indian and Alaska Native veterans have high rates of substance use disorders and posttraumatic stress disorder (PTSD), have the greatest proportional representation of all men in the military, and have the largest proportion of rural residents of any veteran group.

Shore⁴⁴ explained that because of these complex health system issues for Native veterans' exploration of alternative models of service delivery such as telemental health is critical. According to Shore (2012) research has demonstrated the utility of telemental health in rural locations, underserved areas, and difficult-to-access populations and has documented acceptable levels of patient and provider satisfaction.

A diffusion of innovation occurs within a social system through a process of communication among individuals and social networks.⁴⁵Ebbesen and Bonke⁴⁶ suggested an innovation should align with the organization's approach to their business practice. Some small rural hospital leaders and administrators lack

³⁹ Ibid, 78

⁴⁰ Ibid, 83

⁴¹ Brock-Martin, A., Probst, C. J., Shah, K., Chen, Z., & Garr, D. Differences in readiness between rural hospitals and primary care providers for telemedicine adoption and implementation: Findings from a statewide telemedicine survey. *The Journal of Rural Health*, 28, (2012). 8-15

⁴²Bish, M., Kenny, A., & Nay, R. A scoping review identifying contemporary issues in rural nursing leadership. *Journal of Nursing Scholarship*, 44, (2012). 411-417

⁴³Shore., S. Characteristics of telemental health service use by American Indian veterans. *Psychiatric Services*, 6, (2012). 179-181

⁴⁴ Ibid, 116

⁴⁵Rogers, Everett M. "Diffusion of Innovations: modifications of a model for telecommunications." *Die diffusion von innovationen in der telekommunikation* (1995): 25-38.

⁴⁶Ebbesen, Poul, and StenBonke."Identifying concepts for studying implementation of information technology in facilities management."In *Proceedings of CIB Facilities Management Conference*, pp. 417-429. 2014.

strategies to succeed in implementing information technology systems, because of miscommunication, misinformation, and misinterpretation that hinder adoption.⁴⁷ In small rural hospitals, as in almost every other social system, innovations often involve highly organized, institutionally sanctioned, and systematically regulated changes in the structure and delivery of services.⁴⁸

The telemedicine diffusion innovation theory could help explain the behavioral intentions of hospital leaders and administrators prior to the adoption of information technology and what strategies that were used to rise above adverse preconceptions such as IT performance expectations, energy anticipation, social pressure, and facilitating environment.⁴⁹

Methodology

The study used survey and existing data analysis method. The survey allowed the researcher to gathered data from primary source through the use of questionnaire. The sample interval was for three years period (2016-2019). The population of the study comprises of patients who are direct beneficiary of these services rendered and those who deliver such services like the doctors, lab officers and pharmacist. The researcher randomly selected sample size of one hundred and fifteen (115) through convenience sampling techniques. The choice of convenience sampling techniques was to select the number of patients present at the time of administering questionnaire.

A questionnaire was designed to retrieve information from the respondents. The data were presented in tabular form with their corresponding percentages. Regressive analysis was adopted for the study. The regression analysis was calculated at 5% level of significance. The Multiple Linear Regression model is stated as: $Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + e$

Where Y is dependent variable (or response variable) (Medication Process

Where β_0 is constant or intercept Where

B_1, B_2, B_3 , is the co-efficient of X

i.e β_1 is called coefficient of X_1 ; β_2 is called coefficient of X_2 Where

X_1, X_2, X_3 is the Independent variable where $e = 0$ or equivalently

⁴⁷Ajami, Sima, and Tayyeb Bagheri-Tadi. "Barriers for adopting electronic health records (EHRs) by physicians." *Acta Informatica Medica* 21, no. 2 (2013): 129.

⁴⁸May, C. (2012). Agency and implementation: Understanding the embedding of healthcare

innovation in practice. *Social Science & Medicine*, 78, 26-33

⁴⁹Raman, A., Don, Y., Khalid, R., Hussin, F., Omar, M. S., & Ghani, M. Technology acceptance on Smart Board among teachers in Trengganu using UTAUT model. *Asian Social Science*, 10(11), (2014): 84-91

Data Analysis Model specification $Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \mu$ **Table 1: Population Distribution**

Variable	Total	Sample Population	Percentage (%)
Doctors	372	37	32.2
Pharmacists	98	10	8.7
Patients	678	68	59.1
Total	1148	115	100

Sources: Field Survey, 2019

The table above shows 10% of the target population selected using purposive sampling technique. The breakdown of the table shows that, there are total of 372 doctors out of which 37 of them representing 32.2 were used as sample. There are total of 98 Pharmacists out of which 10 of them representing 8.7 were used as sample and there are total of 678 patients out of which 68 of them representing 59.1 were used as sample.

Table 2: Questionnaire Administered

Subjects	Total Sample Population	Returned	Unreturned	Percentage (%)
Doctors	37	28	9	75.7
Pharmacists	10	7	3	70.0
Patients	68	35	33	51.5
Total	115	92	23	

Source: Field Survey, 2019

The above table shows that out of 115 administered to Doctor, Pharmacists and Patients; only 92 questionnaires representing (80%) were completed and returned. Meanwhile, 23 questionnaires representing (20%) questionnaires were not returned. Meanwhile, out of 68 administered to patients only 35 questionnaires representing (51.5%) were successfully returned. Out of 37 questionnaires administered to doctors, only 28 representing (75.7%) were completed and returned while, out of 10 questionnaires administered to pharmacists, only 7 representing (70%) were completed and returned. e-

prescription and easy transfers of patient's medication records among the Physicians at FMC Keffi

			Valid Percent	Cumulative Percent
	Frequency	Percent		

Valid	Agreed	25	17.9	71.4	71.4
	Disagreed	8	5.7	22.9	94.3
	I'M not Sure	2	1.4	5.7	100.0
	Total	35	25.0	100.0	
Missing	System	105	75.0		
Total		140	100.0		

Source: Field Survey, 2019

The table a shows that, 25 respondents representing 71.4% agreed that, e-prescription has enhanced easy of transfers of patient's medication records among the Physicians in FMC Keffi. 8 respondents representing 22.9% while, 2 respondents representing 5.7 could not ascertain whether e-prescription has enhanced easy of transfers of patient's medication records among the Physicians in FMC Keffi.

e-prescription of drugs and the reduction of medication errors in term of drugs dispensation at FMC Keffi

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agreed	27	19.3	77.1	77.1
	Disagreed	5	3.6	14.3	91.4
	I'M not Sure	3	2.1	8.6	100.0
	Total	35	25.0	100.0	
Missing	System	105	75.0		
Total		140	100.0		

Source: Field Survey, 2019

The table a shows that, 27 respondents representing 77.1% agreed that, e-prescription of drugs has reduced medication errors in term of drugs dispensation at FMC Keffi. 5 respondents representing 14.3%, while, 3 respondents representing 2.1 could not ascertain whether e-prescription of drugs has reduced medication errors in term of drugs dispensation at FMC Keffi.

e-prescription has reduced medication errors in the diagnosis of diseases at FMC Keffi

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agreed	23	16.4	65.7	65.7
	Disagreed	8	5.7	22.9	88.6
	I'M not Sure	4	2.9	11.4	100.0
	Total	35	25.0	100.0	
Missin g	System	105	75.0		
Total		140	100.0		

Source: Field Survey, 2019

The table a shows that, 23 respondents representing 65.7% agreed that e-prescription has reduced medication errors in the diagnosis of diseases at FMC Keffi, 8 respondents representing 22.9%, while, 4 respondents representing 11.4 could not ascertain whether e-prescription has reduced medication errors in the diagnosis of diseases at FMC Keffi.

Efficiency of medication service in FMC Keffi

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agreed	37	26.4	64.9	64.9
	Disagreed	13	9.3	22.8	87.7
	I'M not Sure	7	5.0	12.3	100.0
	Total	57	40.7	100.0	
Missin g	System	83	59.3		
Total		140	100.0		

Source: Field Survey, 2019

The table a shows that, 37 respondents representing 64.9% agreed that e-prescription has enhanced efficiency of medication service at FMC Keffi, 13 respondents representing 22.8%, while, 7 respondents representing 12.3 could not ascertain whether e-prescription has enhanced efficiency of medication service in FMC Keffi.

Analysis and Result

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REGRESSION
/MISSING LISTWISE
/STATISTICS COEFF OUTS R ANOVA
/CRITERIA=PIN(.05) POUT(.10)
/NOORIGIN
/DEPENDENT T4
/METHOD=ENTER T1 T2 T3
/RESIDUALS DURBIN.
    
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Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.980 ^a	.960	.959	.09911

Predictors: (Constant), e-prescription and easy transfers of patient's medication records among the Physicians; e-prescription has reduced medication errors in term of drugs dispensation at FMC Keffi and e-prescription has reduced medication errors in the diagnosis of diseases at FMC Keffi.

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	20.994	3	6.998		.000 ^b
	Residual	.864	38	.023		
	Total	21.859	41			

a. Dependent Variable: e-prescription has enhanced the efficiency of medication service at FMC Keffi.

b. Predictors: (Constant), e-prescription and easy transfers of patient's medication records among the Physicians; e-prescription has reduced

medication errors in term of drugs dispensation at FMC Keffi and e-prescription has reduced medication errors in the diagnosis of diseases at FMC Keffi.

Coefficients^a

Model	Unstandardized Coefficients		Standardized Coefficients Beta	T	Sig.
	B	Std. Error			
(Constant)	-.045	.031		-1.437	.154
1 e-prescription allows easy transfers of patient's medication records among the Physicians at FMC Keffi	.099	.040	.116	2.489	.015
e-prescription has reduced medication errors in term of drugs dispensation at FMC Keffi.	.930	.044	.872	21.172	.000
e-prescription reduced medication errors in the diagnosis of diseases at FMC Keffi.	.008	.025	.010	.320	.750

a. Dependent Variable: e-prescription has enhanced the efficiency of service delivery at FMC Keffi.

The result from the analysis shows that, the calculated value of X^2 stood 0.99 which shows that there is strong significant relationship between the two variables and the level of significance is 0.00 is less than the estimated value of X at 0.05. Since the calculated regression value is greater than the estimated value of X . we will reject the null hypothesis which stated that; there is no significance relationship between e-prescription that allows easy transfers of patient's medication records among the Physicians and efficiency in Patients treatment at FMC Keffi and accept the alternative hypothesis which stated that, There is significance relationship between e-prescription that allows easy transfers of patient's medication records among the Physicians and efficiency in Patients medication service at FMC Keffi.

The result from the analysis shows that, the calculated value of X^2 stood 0.93 which shows the strong relationship between the two variables and the level of

significance is 0.00 is lower than the estimated value of X at 0.05. Since the calculated regression value is less than the estimated value of X. we will reject the null hypothesis which stated that; There is no significance relationship between e-prescription of drugs and the reduction of medication errors in term of drugs dispensation at FMC Keffi and accept the alternative hypothesis which stated that, There is significance relationship between e-prescription of drugs and the reduction of medication errors in term of drugs dispensation at FMC Keffi. Finding from the study further shows that, the number of patients who died as result of wrong prescription of drugs has reduced significantly as a result of e-prescription.

The result from the analysis shows that, the calculated value of X^2 stood 0.008 which shows that there is weak significant relationship between the two variables and the level of significance is 0.5 is greater than the estimated value of X at 0.05. Since the calculated regression value is greater than the estimated value of X. we will accept the null hypothesis which stated that; there is weak significance relationship between e-prescription and reduction of medication errors in the diagnosis of diseases at FMC Keffi and reject the alternative hypothesis which stated that, There is significance relationship between e-prescription and reduction of medication errors in the diagnosis of diseases at FMC Keffi.

Discussion and Finding

The study is aimed at exploring the effect of electronic prescription service as related to efficiency in patient's medication service at FMC. This is of course to ascertain how effective is the implementation of electronic prescription service has improve patient's medication service in term of disease diagnosis, drugs dispensation and easy transfer of medication record among physicians at Federal Medical Centre, Keffi. The findings from the analysis revealed that there is significance relationship between e-prescription of drugs has reduced medication errors in term of drugs dispensation at FMC Keffi, this medication errors is usually associated with poor interpretation of doctors' prescription by Pharmacists and lab scientists at FMC Keffi. This result shows that, electronic prescription service has reduced the number of patients who died as result of wrong prescription of drugs usually associated with manual prescription drugs in FMC Keffi. Finding of the study also shows that, despite the implementation of electronic prescription service in Federal Medical Centre, e-prescription has not reduced medication errors in term of diseases diagnosis. This may be due to lack of security of Patient's data and this has negatively affect efficiency in Patients medication service at FMC Keffi. Although, there is relationship between e-prescription and efficiency in Patients medication service at FMC Keffi but the implementation of the e-prescription on medication errors free diseases diagnosis has not been fully achieved in FMC Keffi. The study further reveals that, there is significance relationship between e-prescription that allows easy transfers of patient's medication records among the Physicians and this has enhanced the efficiency of Patients medication treatment at FMC Keffi. This means that, e-prescription have make it easy for Physicians or doctors to referred or transfers patient to another specialty among different units in FMC Keffi.

Conclusion and Recommendations

Electronic prescription has solved the problem associated with poor medication service at Federal Medical Centre Keffi. The e-prescription of drugs has reduced medication errors in term of drugs dispensation. This means that, medication errors usually associated with poor interpretation of doctors' prescription by Pharmacists and lab scientists has been resolved through the introduction of Electronic prescription.

Electronic prescription service has reduced the number of patients who died as result of wrong prescription of drugs usually associated with manual prescription drugs at FMC Keffi. The study concludes that, the implementation of electronic prescription service in Federal Medical Centre has not reduced medication errors in term of diseases diagnosis. This is as result of poor management of Patient's medical.

Hence, the e-prescription has lowered the error rates in diagnosis of diseases as well as improves quality of healthcare delivery patient.

This study therefore recommends that FMC should adopted accurate, reliable and efficient method of Patient's medical record system that will compliment other achievement such as electronic prescription service which has improve patient's medication service in term of drugs dispensation and easy transfer of medication record among physicians.

Consequently, there is an urgent need to build capacity in electronic health so as to improve the quality of healthcare delivery in the Nigeria healthcare system, as the wealth of a nation is highly dependent on the health of its people.

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