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Clinical documentation and health data quality in the adoption of electronic medical records: A review of varied scoping strategies

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ABSTRACT

Background/Objectives: Health data quality is the degree to which healthcare datasets meet data quality standards such as accuracy, accessibility (and so on), and are acceptable based on users' level of confidence at any health facility. Good quality health data enhances communication among all care givers and in effect, improves the quality of care rendered to the teeming patients, whereas, poor quality documentation may mean poor quality clinical care and repressively affect the patients. ***Design/Methods:*** A scoping review of literature relating to health data quality, clinical documentation processes and electronic medical record adoption was carried out. Search terms used were health data, data quality in health, health data quality, clinical documentation, health records, electronic medical records and electronic health records. Search engines deployed include Google Scholar, Pubmed/Medline and ResearchGate. ***Results:*** Electronic medical record has been said to have significantly improved the overall quality of the clinical notes and the quality of all its elements, including the core and non-core elements. The availability of electronic health data and new data collection tools provides both challenges and opportunities for deepening and expanding quality measurement and for improving health data quality. ***Conclusion:*** The implementation of EMR is considered a means for improving health data quality and quality of healthcare services to the teeming patients. In spite of challenges slowing down the pace of EMR adoption, maintaining better documentation and health data quality in EMR is far better and much easier than in paper-based health records system. There is need to improve the way healthcare systems are measured, the way healthcare data are collected and utilized and that collection of data not needed should be stopped.

Keywords: Clinical documentation; Electronic medical records; Health data quality; Health outcome; Patient's safety

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INTRODUCTION

Health data constitute a primary data source for patient treatment, continuity of care, communication between two or more healthcare providers and evaluation of care given. Health data is one major source of assessing the performance of the health sector in Nigeria and across the globe. Sound healthcare management decisions are based on sound health data therefore; effort should be made to ensure quality of health data.

Health data are a constituent part of the patient's health records. The health record generally contains two types of data: clinical and administrative. Clinical data document the patient's medical condition, diagnosis and procedures performed as well as the healthcare treatment provided. Administrative data include demographic and financial information as well as various consents and authorizations related to the provision of care and the handling of confidential patient information. These records are among the

basic clinical tools and they are to give a clear and accurate picture of the care and treatment of patients. The records also assist in making sure that patients receive the best possible clinical and health services care. Good records do more than support good patient care, they are essential to it[1].

Documentation in the patients' health records underpins a number of key activities in healthcare service delivery and research and it has to be of good quality to fulfil all the purposes of ensuring good healthcare services for the teeming patients. The task of written communication in healthcare is enormous and the care providers have not been giving it the required attention hence, the prevailing disjointed health data in health facilities across the globe.

Despite the discerning facts that electronic medical records have come to solve illegibility problems, EMR has created yet another problems, notably the copy and paste facility that results in errors being repeated throughout the record and very large volumes of notes to be perused by clinical coders[2].No feasible solutions are in place for these challenges, so the need to sensitize HIM professionals and other healthcare stakeholders in Nigeria on the need to ensure health data quality even in the wake of electronic medical records.

METHODS

A scoping review of literature relating to health data quality, clinical documentation processes and electronic medical record adoption was carried out. Search terms used were health data, data quality in health, health data quality, clinical documentation, health records, electronic medical records and electronic health records. Search engines deployed include Google Scholar, PubMed/Medline and ResearchGate. Science hub was used, when any article of interest could not be accessed through the first three sources. In total, 67 articles were retrieved for scoping, fifty one (51, 76.1%) of which are relevant.

RESULTS & DISCUSSION

Health data quality is the degree to which healthcare datasets meet data quality standards (such as accuracy, accessibility, comprehensiveness, consistency, currency, definition, granularity, precision, relevancy and timeliness) and are acceptable based on users' level of confidence at any health facility. Health data are maintained for the present and future care of the patient regardless of the level at which the service is provided. These data cannot be beneficial to the health of the patient, when it lacks good quality. The quality of that data is crucial, not only for use in patient care, but also for monitoring the performance of the health service and employees[3]. Progress in the healthcare systems depends on the availability of disaggregated health information systems and as such, improvement in health data quality should be the major priority of every healthcare system[4].

The government agency regulating the practice of health information management in Nigeria – Health Records Officers' Registration Board of Nigeria (HRORBN) has the mandate as enshrined in the decree that established it, to determine what standards of knowledge and skills to be attained by a person seeking to become a member of the profession of health information management and improving those standards from time to time as circumstances may permit[5]. This is expected of all other healthcare providers contributing to the patient's health records. Specifically, health data quality and good clinical documentation should be part of the formal training and subsequently, on-the-job training that serves a continuing form of education compulsory for all healthcare providers.

Documentation in the patient's health records serves as sites for silent evidence of how knowledge of healthcare providers and health policies are translated into practice[6]. This documentation is necessary to provide quality healthcare services and health information systems needed to balance administrative and clinical needs. The best clinical care service devoid of accurate and appropriate documentation poses danger to the patients and medico-legal threats to the healthcare providers.

Clinical documentation improvement program produced valid and reliable clinical documentation, said to be associated with improved surgical documentation and resulted in improved emergency care services[7]. This documentation in the patients' health records has been broadly defined as any notation made by medical practitioners and other healthcare professionals relating to a patient's symptoms, past history, test results or treatments[8]. It is the foundation of a patient's health records and it captures patient care

from admission to discharge. It is the recording of pertinent healthcare findings, interventions, and responses to treatment as a business records and form of communication among caregivers[9].

Fundamentals of clinical documentation and communication

The American Health Information Management Association (AHIMA), which is the foremost Association of HIM professionals, developed the general documentation guidelines as stated by Brickner: Every healthcare organization should have policies that ensure the uniformity of both the content and the format of the health records[1]. The policies should be based on all applicable accreditation standards, federal and state regulations, payer requirements and professional practice standards. The health records should be organized systematically to facilitate data retrieval and compilation.

Only individuals (physicians, nurses, physiotherapists, HIM professionals, and so on) authorized by the healthcare organization's policies should be allowed to document in the health records. Organizational policies and medical staff rules and regulations should specify who may receive and transcribe verbal physician's orders. Health records entries should be documented at the time the services described are rendered and the authors of all entries should be clearly identified in the health record. Only abbreviations and symbols approved by the organization and medical staff rules and regulations should be used in the health record. All entries in the health record should be permanent (written in permanent ink).

Errors in paper-based records should be corrected according to the following process: Draw a single line in ink through the incorrect entry. Then, print the word "error" at the top of the entry along with a legal signature or initials, the date, time and reason for change, and the title and discipline of the individual making the correction. The correct information is then added to the entry. Errors must never be obliterated. The original entry should remain legible and the corrections should be entered in chronological order.

Any late entries should be labeled as such, any corrections or information added to the health record by the patient should be inserted as an addendum (a separate note). No changes should be made in the original entries in the health records. Any information added to the health record by the patient should be clearly identified as a patient addendum. When errors in the EMR are corrected, the erroneous information should not be displayed however; there should be a method to view the previous version of the document with the original data.

All health records entries must be legible, otherwise, such entries may be misread or misinterpreted and may lead to medical errors or other adverse patient events. All entries in the patient health records must be complete. A health record is considered complete if it contains enough information to identify the patient, support the diagnosis or condition, justify the care, treatment, and services, and promote continuity of care among healthcare providers. The time and date of each entry (orders, reports and notes) must be accurately documented. There must be a method to establish the identity of the author of each entry. There must be a method to require that each author takes a specific action to verify that the entry being authenticated is his or her entry or that he or she is responsible for the entry and the entry is accurate.

Younger physicians get to know how to document and handle patients' health records through the documentation of more senior physicians and specialists. Likewise, nurses read through the notes of physicians and more senior nurses to get acquainted with clinical documentation. On a daily basis, HIM professionals read through clerking of physicians, nurses, senior HIM professionals and that of other healthcare providers. This is especially done in order to learn and know what was wrong with the patient, the reason the patient sought care and most importantly, to decipher principal diagnosis for proper assignment of code numbers to records. In addition, such task is carried out for HIM regular quantitative and qualitative review of records for documentation quality checks. In an EMR environment, conceptualizing clinical documentation as an information synthesis activity rather than a composition activity has direct implications for the design of electronic support, for documentation in the systems.

Virtually all healthcare providers, who are authorized to contribute to the care of the patients have onus to contribute to the patients' health

records notwithstanding, the three notable major contributors to these records are physicians, nurses and HIM professionals. There are three types of physicians in their participation in clinical documentation processes as described by Mamykina *et al.* in an American study[10]. The first group are the Early Documenters, who tended to complete their progress notes in the morning, immediately after patient visits (and occasionally before these visits) and before rounds. It helps to mentally synthesize patient case and crystallize their salient features for presentation during rounds. The second group consists of the Thorough Documenters, who tended to their daily notes at the end of a shift and upon completion of discussions and activities pertaining to the patient. These produce more thorough notes, as they include information that becomes available throughout the days. Physicians in the third group are called Opportunistic Documenters, as they are novices, who have a less structured approach to note writing. Often started in the morning but, interrupted by more pressing needs. Instead of waiting until end of the day, they continue writing notes opportunistically throughout the day. Nurses work hand in hand with physicians and one can say that they share similar features with physicians as regards categories of nursing documenters.

In a related development, one of the authors (AIT) has categorized HIM professionals involved in clinical documentation into three groups like those of physicians. They include Patients Initial Documenters or Patients' Health Records Initiators: these are HIM professionals, who work in care entry and thematic units of the hospital such as the general outpatient records unit, consultative outpatient records unit, accident & emergency records units, maternity records unit and the admission unit. They initiate the patient health records before any other healthcare provider can make any note writing in the records. They mostly focus on socio-demographic data during registration of new patients and at the time of clinic preparation in the consultative outpatient clinics e.g. medical outpatient.

The second group are Assembly and Discharge Analysts (or Admission & Discharge Officers): They conduct daily census at 12am, of all admitted patients, documenting their modes of admissions and routes of exit e.g. discharge, DAMA, transfer-out, transfer-in, refer-out, abscond and death. They document the admission outcome in the daily ward statement and as well, in the patients' health records. In addition, they identify any documentation errors by other contributors. In this, they use the 'Records Deficiency Memo/Slip' to communicate identified errors to the concerned physicians or other clinicians for appropriate actions.

The third group comprises of Clinical Coders (or Sonologists): HIM professionals in this category also review the patients' health records for quality checks, identify majorly, principal diagnoses, assign code numbers according to WHO-established criteria, index the records and facilitate scientific researches.

In her guidelines for health records and clinical documentation, the World Health Organization specifies the following: Clinical documentation includes all forms of documentation by a physician, nurse or allied healthcare professional recorded in a professional capacity in relation to the provision of patient care[11]. It must be patient focused and based on the professional observation and assessment that does not have any basis in unfounded conclusions or personal judgments. Appropriate documentation in the patient health records is a critical skill that medical residents and other healthcare providers need to attain during their training but, Pines and Braithwaite observed that only 4% of emergency medicine residents in their study were extremely confident in their ability to document charts[12]. The study also reported inadequate clinical coding and disinterest in documentation among these residents and other care providers.

Studies have shown how well two-way communication system has helped in sharpening providers' clinical documentation skills and improved chart documentation. For instance, Kim *et al.* established that when more senior personnel like specialist physicians give constructive criticism and prompt feedback to junior residents, residents' self-esteem boosted, their clinical documentation skills improved and this resulted in good quality documentation in the patients' health records[13].

Clinical documentation and health data quality in paper-based healthcare systems

Health data quality and documentation in the patients' health records has been a subject of discussion in healthcare industry. The original data

must be accurate in order to be useful. If data are not accurate, then, wrong impressions and information are being conveyed to the user. The central theme is that data quality is proportionate to the attainment of achievable improvements in healthcare[3].

In a study on documentation quality, Berglund and Norman found that there was unsatisfactory documentation in nearly half of the cases of child resuscitation in a neonatal healthcare service[14]. The study reasoned that the Patients' Bill of Rights has mandated detailed notes of advanced support for these children irrespective of difficulty in prioritization of documentation therefore, documentation of resuscitation procedures is mandatory. The reason for these requirements is not far fetched as whatever effort made at resuscitating the patient will not be appreciated if not well documented. This goes in tandem with a popular slogan that "what is not documented is not done".

Davies *et al*. also found inadequacies in documentation in some laboratory test results and progress notes. The diagnosis section was left blank and the e-discharge summaries were left uncompleted[14]. The study attributed these inadequacies to lack of knowledge in documentation standards. Lack of documentation skills and participants' inability to have proper grasp of the patient's dossier from medical history documented in the patients' health records, through examination and treatment to treatment outcome were equally advanced. The study also identified vividly that documentation-related training and retraining had improved overall qualities of discharge summaries and therefore, recommended mandatory continuing documentation education to improve clinical documentation in the hospital.

On the imperatives of clinical documentation and the necessity of its skills, studies have alluded to its exquisiteness and importance in ensuring good quality health data as well as its attendant challenges[15-17]. These studies admitted that clinical documentation serves as basis for organizing patient care plan and bench-marking clinical governance and that it promotes completeness of the patients' health records.

Furthermore, studies have shown some salient factors that positively contribute to the effective quality of clinical documentation. Palliative care checklist has played a significant role in the improvement of clinical documentation and health data quality in the patients' health records. This palliative care checklist has been reported to have promoted health records completeness with a resultant effect on improved medical care[17]. The study established that this checklist ensured efficiency in clinical documentation and enhances inter-professional communication. It is also reported that it reduced time spent in reviewing patient care.

Good quality health data enhances communication among all care givers and in effect, improves the quality of care rendered to the teeming patients, whereas, poor quality documentation may mean poor quality clinical care and repressively affect the patients. Conversely, many have perceived clinical documentation as a clog in the wheel of effective healthcare services. For an instance, in a scoping review of clinicians' burnouts in the wake of EMR, Adeleke *et al.* opined that non-patient directly impactful clinical documentation requirements such as billing and reimbursement are work-related issues that have contributed to clinicians' stress, decreased job satisfaction and eventual burnout[18]. The study therefore recommended limiting documentation requirements to basics of patients' direct clinical care. This is to avoid work overload and improve clinical care.

Another study has linked major barriers to quality patients' care and optimal residents' education to the highly demanding and imperatives of clinical documentation requirements[19]. The study also corroborated the assertion by Adeleke *et al.* (2020) on burnout that clinical documentation requirements contribute to physical stress and hampers the quality time to teach younger physicians[18].

The consequences of poor quality of data are often experienced in everyday life and awareness of the importance of improving the quality of data is increasing in many contexts. Statisticians were the first to investigate some of the problems related to data quality by proposing a mathematical theory for considering duplicates in statistical datasets in the 60's. They were followed by researchers in management, who at the beginning of 80's focused on how to control data manufacturing systems in order to detect and eliminate data quality problems. In the 90's,

computer scientists began to consider the problem of defining, measuring and improving the quality of electronic data, stored on databases, data warehouses and legacy systems[20].

Studies have shown that the DHIS2 used for data collection at the primary healthcare settings did not reflect the content as obtained in the facilities' registers in the domain, there were observed incompleteness of data and there were inconsistencies of data over time and between indicators[21]. This study however discovered that data quality metrics were not equally poor across indicators. Similarly, a more recent study observed that discrepancies in data affected performance rates in a healthcare setting and that when data were shared through identified high risks, patient safety was affected[22]. The study further advocated for a renewed focus on quality program for data sharing. This, the study believed will strengthen the values of interoperability and decrease the pressure on healthcare providers from unnecessary difficulty in locating patients' health records on point-of-care.

In a related development, Endashaw *et al.* discovered very poorly completed patient health records, especially, in date of birth (5%), follow-up plan (8%), allergy records (12%), mode of arrival (17%), past medical history (20%) and medication and diet (52%)[23]. Not all records retrieved per clinic in the study were returned to the central library, possibly due to manpower inadequacy, prevalence of poor health records tracking system, poorly completed discharge summaries, and inadequately staffed and insufficiently equipped HIM departments. In the overall, quality of patients' health records was adjudged as 30.6%.

In a pilot study of clinical documentation and coding of health records, Farhan *et al.* discovered that only 61.78% of audited health records met the benchmark for good quality of medical record (a score of eight)[24]. Clinical coding errors (incorrect coding, records not coded), which might reflect coder performance exceeded the documentation errors (inaccurate documentation, not documented), which reflect physician performance. There was slight positive correlation between accurate documentation and correct coding, suggesting that high quality documentation enhances coding accuracy.

Similarly, Doktorchick *et al.* noted that unwholesome clinical documentation was responsible for poor clinical coding process as identified by Farhan *et al.* (2005)[24,25]. The study established that illegibility of handwriting; unorganized chart and incomplete clinical documentation were responsible for poor clinical coding process and outcome. Other extenuating factors as found by the study include inadequate resources including human, contributed to dissatisfaction of clinical coding team members and compromised health data quality. Lack of continuing education, staff support, tight budgets and quick turnaround times and finally, lack of standardization of terminologies affected clinical coding quality.

In Australia, despite the critical values of high level skills, depth and currency of knowledge to good clinical coding and financial outcomes, one major problem identified in an audit of clinical coding process was that of poor health data rather than that of the quality of clinical coding itself[26]. The Australian study therefore recommended continuing professional development education, collaborations, stakeholders engagement and it proposed a data quality management method to better health data quality.

Similarly, a South Africa study reported under-diagnosis and under-recording of paediatrics Drug-Resistant Tuberculosis (DR-TB) in the electronic reporting system, which impacted poor healthcare services delivery[27]. In a related development, the overall clinical documentation practice in some private hospitals in Amhara region of Ethiopia was reportedly poor[28].

In Nigeria, researchers have found general mutilation of registers, inadequate clinical documentation practices, preponderance of paper-based health records with negative impacts on optimization of information management in healthcare. Generally, poor attitude toward recording and archiving patients' health records among user departments, health records department and to some extent, patients themselves were equally found[29-32]. To this end, health institutions in the Nigeria must facilitate regular analysis of patients' health records so that good patient care information systems are maintained[31].

Clinical documentation and health data quality in EMR environment

Ever since the Institute of Medicine pronouncement of "quality chasm" in healthcare, data quality improvement has become an important policy issue. Some studies have however, indicated that EMR have recorded greater quantity of poor data instead of improving the quality of data. The reason for this is not exactly clear[33]. The responsibility to ensuring health data quality in electronic health records is therefore rested on all healthcare providers contributing to the patients' healthcare and health records. As such, AHIMA identified that with the introduction of EMRs unlike the Paper Based Record system (PBRs), the role of data quality no longer rest largely on HIM professionals, but everyone from administrative and support staff responsible for specialty applications to direct caregivers who, document inpatient records[34].

Due to noticeable challenges of paper-based health records system, which has led to disjointed health information management system, there have been yearnings for the deployment of computers and computing technologies in the management of patients' health records and hospital-held health information vis-à-vis EMR[32]. It is hoped that when EMR becomes operational, health information management practices will become seamless.

Electronic medical record has been reported to have significantly improved the overall quality of the outpatient clinical note and the quality of all its elements, including the core and non-core elements. The availability of electronic health data and new data collection tools provides both challenges and opportunities for deepening and expanding quality measurement and for improving health data quality. Electronic health data could facilitate quality measurement though; lack of standardized terminologies, insufficient programming resources and inadequate healthcare providers' knowledge and poor skills continue to hinder better understanding of quality measurement improvement[35]. The EMR database also provided a large population data, which are collected over multiple time points. Further studies focusing on the content and completeness of EMR for a specific patient population and evaluate other dimensions of EMR data quality are needed[36].

Challenges with health data quality in EMR as reported by Dentler, *et al.* show that data were not available in structured format, there were incorrect data items records and that there was lack of relation between data items[37]. Others include incomplete view of patient history, inadequate attention to details and lack of standardization. The study further recommended that for data to actually determine the quality of care rendered, it must be in structured and standard format. Rather than keeping multiple entries, which may be error-prone and time consuming, data correctness must be ensured and adequate attention should be paid to patient/clinical documentation processes. Finally, the study posited that longitudinal view of patient history is paramount in order to initiate effective communication between the caregivers and the healthcare consumers. All these, the researchers reasoned may lead to an increased volume of high-quality data that can enable physicians and other healthcare providers monitor care process and ultimately, provide the best possible quality of care.

Abrampah *et al.* also suggested that to achieve effective health data quality, there is need to improve the way healthcare systems are measured; the way healthcare data are collected and utilized; and that we have to stop collecting data we do not need or use[38]. To further strengthen health data management systems capacity, decentralization of decision making processes and accountability would be paramount.

Computer-based nursing documentation system has been reported to have enabled nurses to easily document nursing intervention, intensive discussion on nursing documentation, changes in the documentation system (paper-based to EMR), nurses' turnover rates and their attitudes toward documentation were associated with overall improvement in documentation[39]. The study however, reasoned that computer support on itself does not improve documentation. This assertion is in congruent with Adeleke *et al*, that postulated that computer on itself cannot improve health data management without human operators therefore; HIM professionals should not be bothered about the adoption of EMR as it cannot replace human professionals[32].

Comparing the effectiveness of electronic documentation with paper-based, Linder *et al.,*

(2012) affirmed that physicians, who predominantly dictated their notes appeared to have generally lower quality of care than physicians, who used structured EHR documentation or typed free text notes[40]. Likewise, physicians, who interacted with structured EMR, had greater potential to see and respond to clinical decisions support system before, during and after the patient visit than those on typed free text or dictation. This is not to say that quality of electronic documentation is absolute, rather, care must be taken when deploying and using electronic documentation solutions.

Studies have shown challenges associated with the use of electronic documentation[2]. In a Dutch study for instance, Dentler *et al.* (2014) established incomplete and incorrect data items in EMR, missing information on the relationship between diagnoses and procedures in EMR. In a related study, Esheiba and Mohammed reported on different barriers inhibiting the use of electronic documentation among nurses in some Egyptian family health centres[40]. Personal barriers include lack of ICT knowledge and skills among nurses in the study and poor attitudes toward electronic documentation. Technical barriers faced were complexity of the system, lack of standardized terminology and lack of customizability. Organizational barriers were lack of management support, lack of expert support and staff shortage, and the feelings among the majority that electronic documentation will add to their workload.

More importantly, patients' satisfaction has been reported to have overwhelmingly improved as a result of EMR implementation against PHR implementation, likewise, physicians' attitude to pay attention to documentation details improved after EMR implementation. Patients tended to highly agree with privacy protection, system promotion and quality increment through information exchange but, with insufficient knowledge of exchange system[42]. The report of Wiang *et al.* was corroborated by Hau *et al.* that physicians displayed more negative attitudes than the patient toward the application of blockchain in managing medical information[43]. This is especially among physicians in private practices and physician-professors in academic whereas, patients held very positive attitudes toward the application of blockchain in managing medical information.

Furtherance to the adoption and use of electronic documentation, Kalayou *et al.* advanced the following as predictors of attitudes among physicians in Ethiopia: Ownership of computers, EMR training, computer literacy, lack of prior EMR experience, computer access at work and involvement in EMR activities. The study further emphasized that prior experience was inversely related with attitudes to EMR and that EMR training as well as access to computer at work enhanced attitude to EMR use[44].

It is an indisputable fact that electronic documentation can only thrive in a setting, where EMR is operational and healthcare providers in such settings are the key players to ensure seamless implementation. On this note, Mu'awiyyah *et al.* stated that EMR awareness was common among health workers in a Nigerian teaching hospital but, only a third of these workers posses good EMR knowledge[45]. They had positive perception that electronic charting will lead to better patient care and safety though, envisaged poor acceptability among colleagues. Providers in this hospital held concerns that EMR will negatively affect doctor-patient relationship and the study clearly admitted that non-physician healthcare providers were more knowledgeable about EMR than physicians.

In a related study, Ou *et al.* noted that physicians spent roughly equal amount of time looking at computer as looking at the patient each amount to one-third of the clinic visit and despite this, patients' satisfaction level was still high[46]. The majority of patients were comfortable (satisfied) with their physicians using EMR as they believed that their visit was more effective because of EMRs. Patients understood their medical conditions more by seeing health information in charts and graphs on computer. The study concluded that transition to EMRs in ophthalmology practice may change the physician-patient interaction but, may not affect patient satisfaction. Being younger in nursing profession, prior computer training and having enjoyed unhindered access to computers and computing technologies facilitated the use of electronic documentation among nurses in a Selangor study[47].

Traditionally, nurses are attached to patients' beds and bedding and would prefer electronic documentation done at the bedsides in spite of the

fact that the electronic documentation is structurally connected to the bed. There were inconsistencies in documentation in an ambulatory setting. For instance, Soto *et al*. reported high level of documentation and compliance for immunization but low level for medication, allergies and smoking habits[48].

In a study of clinical documentation among medical students in the United States of America, Wittels *et al.* observed significant variation in the patterns of review, feedback and assessment among clerkship, institutional policies were found to be the major reason medical students were not allowed to document on EMR[49]. In addition, disconnect exists between educational goals and institutional policies related to documentation, which may be due to concerns over medical liability. Furthermore, the findings indicate that the quality of healthcare services (expectation and perception) in EMRs-adopted hospital is higher than the quality of health service in non-adopted. The gaps between the perception and expectation of quality of health service were also lower in the EMR-adopted hospital. The study therefore recommended increase in the awareness about domains and function of EMR and its role in improving the quality of healthcare service[50].

Conversely, some studies have identified challenges with achieving quality of health data in electronic medical records. For instance, Singer *et al*. found that data quality was generally far below expectation for many chronic diseases, except for diabetes in the presence of prescriptions for hypoglycemic drugs in a Manitoba EMR study of data quality[51]. This trend was worse for fee-for-service clinics compared with salaried clinics. In the overall, the study concluded that data quality in Manitoba EMR systems will require improvements in order to be used reliably for research or surveillance purposes and to achieve maximum patient care benefits.

Limitations to the study

This is a health data quality study in a scoping review, whereas quality assessment approach are much more needed for better health data quality improvement.

CONCLUSION

The implementation of EMR is considered a means for improving health data quality and quality of healthcare services to the teeming patients. The availability of electronic medical data and new data collection tools provides both challenges and opportunities for deepening and expanding quality measurement and for improving health data quality necessary for improved healthcare services.

Although there are some challenges slowing down the pace of adoption and factors inhibiting near-perfect data quality on EMR, maintaining health data quality in an electronic medical records environment is far better and much easier than that of paper-based health records system. The adoption of EMR and other emerging Health ITs is therefore a worthwhile venture for better health for the populace. In the meantime, there is need to improve the way healthcare systems are measured, the way healthcare data are collected and utilized and that we have to stop collecting data we do not need or use.

Recommendations

1. Rapid adoption and implementation of electronic medical records system in all tiers of the Nigeria healthcare system.
2. Attitudinal change toward electronic documentation among healthcare providers in Nigeria.
3. Enforcement of existing digital health policies of the Federal Government has become essential to EMR adoption in Nigeria.
4. Provision of essential EMR equipment and tools and continuing Health IT education and advocacy.

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Authors Contribution:

AIT conceived of the study, initiated the design, participated in literature search, data abstraction and collection, analysis and coordination. UVE, ORO, SQB, ARA and AW participated in the design, literature search, records retrieval, technical process, data abstraction, data analysis and coordination and reviewed the final manuscript.

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