Integrating Electronic Health Records (EHRs) with Claims Processing Systems: Challenges and Best Practices

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Abstract

This paper describes the challenges that hospitals and clinics face when integrating EHRs with claims processing systems and presents best practices to overcome these challenges. Electronic Health Records (EHR) and Personal Health Records (PHR) are considered critical cornerstones for advancing health care communications and decision-making at the point of care delivery. A growing number of health care providers are implementing EHR systems within their own organization to streamline patient care. This includes larger health care delivery organizations which are now implementing EHR systems across their inpatient, outpatient, and ambulatory care settings to ensure holistic patient care. However, it is important to note that EHR systems on their own do not fully optimize communications, decision-making, or workflow for health care providers or for their patients. EHRs, along with other health information technology (HIT) components, are specifically designed to support internal and intra-organization data and workflow processes [1]. These systems also aid in promoting seamless interactions among different care providers and departments, ultimately improving the overall quality of patient care. New applications and software have revolutionized the process of sending Word documents and Excel spreadsheets over the internet. However, the need to transmit clinical information from a patient's Electronic Health Record (EHR) to a health plan's claim processing system has raised questions. There are self-interests that make a mundane interest of health care providers and payers to proactively set the rules and aggressively build the framework for these exchanges. The paper also provides some best practices shown to aid both the providers and the payers with integrating EHRs into claims dealing systems [1]. Data troubles consist of divergence of values, a divergence between internal and external code values and the problem of extra data elements required for the evaluation of the claim that are not required for the clinical record. While it is possible to validate batch charges with the C/HS claims processing system, problems with integration continue in regard to real-time validation, when charges can go missing, and when entering these charges. Establishing a mechanism that checks charges and is real time has been known to be hard – not to mention expensive. There is necessity in the workarounds to check charges that lack proper information (for instance, CPT codes) or contain mistakes. The main issue that is encountered in EHR-Claims interfaces is that these interfaces handle EHR and claims data, which have different workflows and kinds of data. Some of the workflow issues are as follows – all the charges need to be billed in a batch, as the claims processing systems do not permit real time charges verification. This paper therefore points to the need for finding solutions to issues of missing data and coding errors [2]. These differences present a challenge for combining the two systems because of these

disparities. Introduction. EHRs are documented to have been adopted in many hospitals and clinics within the United States of America. In the eligible or participating healthcare facilities, the EHR system is used in gathering any kind of patient information necessary and it is used in filing claims for services given to patients [2,3].

Keywords: EHR Integration Claims, Data Interoperability, Health IT, Medical Billing, Patient Data, Data Standardization, Interoperability Standards, HIPAA Compliance, Data Security, Healthcare Workflow, Regulatory Compliance, System Integration, Electronic Medical Records (EMRs), Health Information Exchange (HIE)

1. Introduction

Large-scale healthcare services provided with vast numbers of patients that include long processing lifecycles are faced with the daunting task of EHR integration to their claim processing system. Some aspects of use in the design process include the characteristics of the overall system that can follow EHRs through the various individual subsystems as well as the subsidiary processing subsystems. Based on the best practices that have been developed for the integration patterns, it becomes possible for the healthcare industry to obtain the highest value from EHR system implementations with the lowest level of risk. This includes the questions like, what would be the compatibility with other software and other sources of health information, how to secure all the personal health information and how to meet requirements of the industry standards, such as HIPAA [4]. Additionally, leveraging EHR information for claims processing enhances the health systems' administrative processes, care coordination and efficiency. Consequently, providers must weigh and balance implementation strategies and their execution with the overall aims of creating a smooth and efficient interface between EHRs and claims processing systems, as well as providing the highest level of security to sensitive patient information as it flows through the providers' systems for patient benefit. Over time, the incorporation of EHRs is set to remain a critical tool in attaining the objectives of delivering efficient health care services. The advancement in EHR in the healthcare sector has revolutionized the way patients are treated and the running of the health facilities [4]. Electronic health records, or EHRs, have many features and one of the noteworthy ones is the interoperability with other systems in healthcare, for example, claims processing. This integration poses several issues like the issues that relate to the integration, data transfer, and compatibility of the systems. Still, identifying some of the EHR integration best practices enables the organization in question to avoid these drawbacks and realize EHR's potential benefits fully. Also, the life cycle of EHRs consists of various stages, including implementation, adoption, and optimization, each stage has its meaning concerning the incorporation of EHRs into the healthcare system.

Despite the challenges, the integration of EHRs is inevitable as it will improve the healthcare services and meet the growing technological need in the healthcare sector. This integration of EHR's with claims processing systems can assist employers, insurance companies, and government programs to guarantee accountability in expenditure of funds utilized in the provision of healthcare services [5]. These payers can use the reviewing of medical bills and supporting clinical documentation to help them note cases of overbilling, billing for non-provided services and services that are unbundled as well as note patterns of fraud and abuse. In 2011, using standards for often different payment policies, the federal Centers for Medicare and Medicaid services reported that Medicare paid about 9.7% of claims ($46.3 billion) improperly, with about $30 billion of them attributed to fraud [6]. The scenarios depicting how payers

have EHRs interfaces with their claims processing systems can go a long way in containing these improper payments. Also, EHRs positive impact incorporated with claims processing systems also help in enhancing coordination and management of patient care. Such an outcome can lead to improved health for individuals and groups; minimized and optimized services that involve tests, procedures, and prescription drugs; and minimized cases of infectious diseases. Thus, when implemented and used effectively, the use of EHRs allows the enhancement of patient data, which in turn provides healthcare providers the ability to make effective decisions, and ultimately improve patients' safety. Finally, the integration of EHRs to claims processing systems can reduce the operational costs, thus benefiting both the providers and the payers in the health markets. This can shortly help in the general containment of the total healthcare cost as well as the rational use of the available resources in the system. Analysing the benefits of integrating such systems, it can be concluded that automation of the work and the minimization of paperwork positively affects the efficiency and productivity of the healthcare systems. The integration of EHRs and claims processing systems means that the different players in the healthcare system including the providers, payers and even patients together with other regulatory structures can freely combine their systems to form a healthy health care structure [7,8]. The integration of these systems can also improve the continuity of care, implement the utilization of research findings in practice and advance the study of healthcare development continually. Only when the healthcare community can implement exchange and interoperability of detailed patient information, can it fully reap the benefits of the technology to advance the rate of efficacious patient care delivery and minimize costs. Thus, it can be inferred that the two systems are likely to change the industry and improve healthcare delivery if integrated properly.

2. Research Problem

The main research problem in this study is to assess the challenges and prospects for using EHRs to improve claims processing to develop recommendations for the optimal approach. One of the biggest research questions in this field is how to automate the processing of claims and their adjudication by developing the adequate means for encoding and processing, the rules that are embedded in the contracts of health insurance. This research issue appears due to the volatility of contract rules, the great number of possible rules, the unique peculiarity of insurance products, and a high number of transactions. Different insurance firms strive to capture a bigger market share and the roles it plays in the underwriting and claim processing is a burden to the pricing [9]. Integration of the more sophisticated technological tools such as rule based systems, EDI and relational databases applied to the operations of a company can assist in placing the claim processing activity at the strategic weapon column. Insurance companies have some inherent resource disadvantages, especially the small insurance company in comparison to the large insurance company. Yet, other industries' history indicate that company size does not have to be an issue at all. Small companies often perform data processing functions or outsource them and quite often take advantage of being less bureaucratic [9]. Thus, as the need for an efficient approach to encoding and processing the compact regularities that are characteristic of health insurance contracts escalates, the necessity of refining claims processing adjudication procedures becomes imperative for insurance organizations. Some of the recent technologies which can be applied in the A&D claims processing include RuleBase technology, EDI, and relational DB. While in terms of resources many small insurance companies are inferior to large ones, some of them may use their flexibility and, possibly, outsource the data processing services to achieve competitive advantage. This review summarized a rich array of studies and operating results by others that have been independently

pursuing related issues and opportunities. The research revealed common themes and specific opportunities that have the potential to meaningfully influence best practice.

3. Literature Review

A. EHR and Claims Processing Integration

EHRs hold promise for significantly improving the way in which healthcare is delivered. As the focus within the healthcare field shifts from establishing system capabilities (such as supported meaningful use features) to realizing benefits, organizations are beginning to explore the enhancement of EHR systems with other technologies. Indeed, the next set of major challenges and opportunities lay in linking EHRs with other existing transaction systems to enable advanced functionality, better use of EHR data, and support for additional business and clinical processes [11]. One link that has received a great deal of attention is the integration of electronic health record systems with claims processing systems. Such integration allows for increased automation at the health plan, including auto-adjudication of claims. The key benefit of this type of integration is to reduce the time and effort spent by healthcare providers submitting manual claims for reimbursement from health plans. EHRs have for a long time been seen to have similar benefits to patient care but are also advocacy for other healthcare activities, quality reporting, and care coordination across different settings and health issues. Thus, EHR use for claims can mean that the data from EHRs can be automatically loaded into claims forms for more efficient and accurate claims filing to decrease administrative costs. Thus, the use of EHRs in claims processing has emerged as among the prominent investment priorities for current health plans [11]. EHR and claim integration comprise certain packaging of procedures starting from the importation of data required in supporting clinical exams to the actual filling in of claims forms. These processes can be assisted by a number of technologies.

This issue is especially relevant in light of the current drive by the CMS and others to expand EHR adoption and to promote the meaningful use of EHR features, all of which point to the need for solutions to this ineffectiveness and to the difficulties of overcoming it. Toward the improvement of administrative and claims data, standards development organizations including the Accredited Standards Committee X12's 5010 or the proposed Implementation Guide for Administrative Transactions using the HL7 EHR System Functional Model have been achieving positive accomplishments. However, that is not all, there are issues that can be addressed to advance the more efficient transfer of EHRs with Claims Processing and these include the integration of business and organizational aspects that surround the two as well as exploiting the functionality of both types of systems. In the following sections of this paper, some of the major issues and solutions of the EHR's interaction with the Claims Processing system are outlined. Healthcare providers rely on two primary systems in order to be reimbursed for services provided to patients: EHR and claims processing systems are the most commonly used forms of Health Information Technology (HIT) in the healthcare industry [11, 12]. The former supported delivery of patient care, recording diagnosis, treatment, and results.

The latter concerns translating the care of patients into claims for payment which involves the capturing and coding of diagnosis, procedures, patients as well as information about the encounters. EHR and claims processing systems are often deployed independently from each other, and their implementation may involve different vendors or different segments of the providers' organizations. Consequently, ample time focuses on data duplication, data conflict, and synchronization of the clinical and billing processes [12]. Consequently, lack of interoperation between EHRs and Claims Processing systems has

significant prevalence because of strategic motivations' inconsistency of key participants. In every aspect, healthcare organizations are challenged at different levels all the time. Currently, EHR is not inter operably integrated with the Claims Processing systems and thus there are chances of inefficiency and error that might occur. These issues lead to delayed payments, increase in administrative costs and hence poor patient outcomes. All these challenges, therefore, require efficient coordination amongst the various stakeholders. Notably, since people's demand for healthcare services continues to rise, the efficiency of processes has to be improved, and resources have to be properly utilized. The aims towards mashing up of EHRs and Claims Processing systems are very vital in tackling these issues. All stakeholders' incentives must be properly aligned to increase effectiveness productivity and establish proper integration mechanisms. Thus, healthcare organizations can enhance the quality of delivered care to patients and produce better financial results [12].

B. Technical Challenges in EHR and Claims System Integration

While it is possible to reap a lot of benefits from implementing the EHR software to work together with a claims processing system in that it would ease medical coding and billing, the technical implementation of such a system presents many challenges. Some of the major technical challenges in integrating EHRs with claims processing systems include: The problems associated with the Project are the sphere of interoperability, information security, the problem of synchronizing updates, and compatibility of the new system with other existing systems and equipment. However, there may be organizational opposition from especially the traditional paper-based practitioners; there are costs associated with implementing effective storages for the data and training the practitioners. However, due to these challenges it was established that benefits of placing EHRs with the claims processing systems are worthy to pursue in health care organizations [13].

Another major concern in the successful implementation of EHRs with claims processing systems is identifying who will be responsible for the creation of links between the two systems. That being the case, there are three prominent approaches. The first is to have the EHR vendor build and maintain all the necessary interfaces between the EHR and the claims processing system, usually through the creation of one or more clearinghouses. Clearinghouses take in all the various transaction types and formats generated by EHRs and send out the ANSI X12 837 (professional) and 835 (electronic remittance advice) transaction sets required by claims processing systems. The advantage of having the EHR vendor set up clearinghouse connections is that the burden of the interface development and maintenance falls on the vendor and the user organization does not need to have any special expertise in claims processing system interfaces. The major drawback of this approach is that clearinghouses charge fees for their services and these fees can add up to significant amounts over time [14]. The second option is for the user organization to set up connections to clearinghouses on its own. This can be done either with or without the involvement of the EHR vendor. The advantage of going this route is that the organization has greater control over the process, as well as over the costs. This method is more cost effective than having the vendor set up the connections. The third option is to connect the EHR directly to the claims processing system, either by using the built-in capabilities of the EHR (if they exist) or by using an external interface engine. The upfront costs of this approach are higher than the first two options; however, the long-term expense can be less than using a clearinghouse, especially for a large organization with multiple facilities using disparate EHRs. The growing trend is for large medical centers to use a combination of the second and third options: connect large, centralized facilities directly to the claims processing system and use clearinghouses for smaller, disparate affiliate facilities [14].

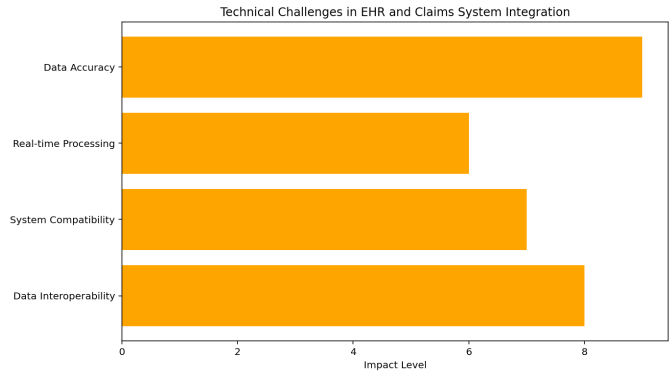

Fig. 1: Technical Challenges in EHR and Claims System Integration

Given these challenges, it is imperative that organizations striving to integrate Electronic Health Records (EHRs) with claims processing systems follow a set of best practices recommended by experts in the field. They include adopting standard industry workflows, centralizing the submission of claims data, leveraging third-party integration technologies, using outsourcing partnerships, continually monitoring and optimizing the integration processes, and considering service-oriented architecture (SOA) as a viable solution. These principles, along with additional guidance and recommendations, can be found at the provided resource. With the U.S. government investing billions of dollars to promote the use of EHRs through initiatives such as the American Recovery and Reinvestment Act, the adoption and meaningful use of certified EHR technology will inevitably increase. It behooves healthcare organizations to address these integration challenges to maximize the benefits of EHR technology use. Implementing these best practices and staying updated on industry guidelines will better equip organizations in navigating the complex landscape of EHR and claims processing integration, ultimately leading to improved efficiency, accuracy, and patient care [12].

C. Data Standardization and Interoperability Issues

Medical code sets vary in the types of services they describe and the identifications they assign. Hospital inpatient and outpatient services are identified and described by the use of the ICD-9-CM diagnosis and procedure codes. Other medical services are identified by the use of the CPT code set. No single coding system includes all the codes relevant to the description and identification of medical services. Consequently, claims for medical services are coded with different code sets, depending on the type of service and the health care professional who provides it. Given the proprietary interests and the diffused manner in which health data is actually stored, data standardization poses monitoring challenges. Adopting standards is needed to permit the definition of "rules" for semantic data meanings and their application. Current EHR systems store health data mostly in unstructured formats and often in proprietarily coded form. The majority of the health data repositories are more akin to "data islands" than to true data "lakes". Modeled data standards can help us to build the "bridges" to convert data islands to data lakes. These standards typically define templates that establish common data structures enabling machines to recognize discrete data elements inside documents. Once the data elements are recognized, and the information is processed, health data standardization can then be converted into other more stringent data exchange standards, such as HL7 messages or CCR documents. Standardization has the potential to improve EHR data usability, to provide access to patient data, and to assure the ability to query data as needed by the claims adjudication process. Reconciling EHR and claims processing systems can be problematic if serious considerations are taken with the planning process. Factors such as who accesses what part of the patient record, and what format is required to

share data from the EHR to the claims system need to be well thought out in advance. Putting the right interfaces to connect both systems will govern the interoperability of EHR and claims systems. There are various standards that need to be considered to resolve data standardization and interoperability issues.

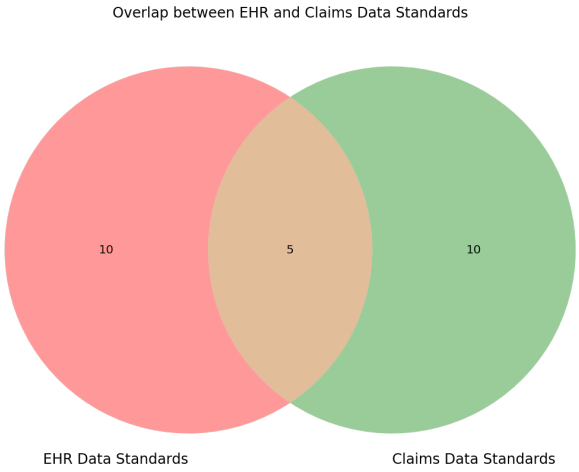

Fig. 2: Overlap between EHR and Claims Data Standards

D. Privacy and Security Concerns

Protecting the privacy and security of patient data in EHRs is a top concern when considering either the EHR's data or the system itself. Discussions of EHR privacy often center on who can view EHR data and under what circumstances. Currently, each patient that is covered under government regulations, such as the Health Insurance Portability and Accountability Act (HIPAA) or 42 CFR Part 2, must give their consent before their health information can be shared with any outside parties [14,15]. This process requires a patient to fill out a consent form at the physician's office, and the patient is then given the option to list who can access their information. After the patient fills out the form, the physician's office staff must follow the patient's consents to prevent the disclosure of patient EHR data to unauthorized persons. Since extensive user training is required to reap the benefits of either system, training users how to appropriately share the data may not impose an additional burden. Organizations that can afford to do so may wish to designate data sharing "super users" for both the EHR and claims systems. These individuals would receive extra training on how to facilitate the sharing of patient information between systems. Given the novelty of sharing EHR data with the claims processing system, regular oversight of this novel practice is essential [15,16].

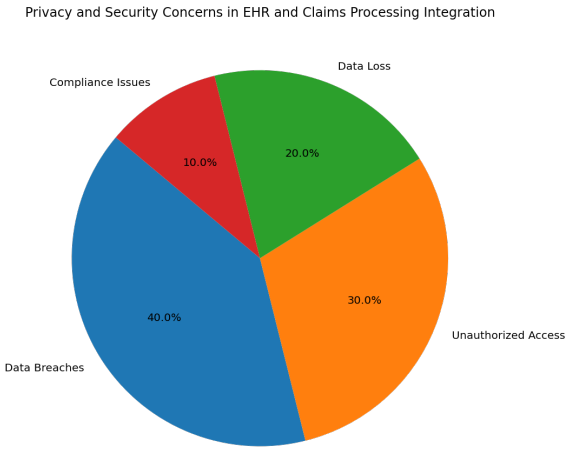

Fig. 3: Privacy and Security Concerns in EHR and Claims Processing Integration

Incorporating these practices into an EHR system takes on a new level of complexity. Such data access complexities lead to the occurrence of "information accidents", where unintentional releases of data occur. According to Litton and Miller, it is important to control access to personal medical information to ensure both privacy and public trust. If the public becomes aware that their personal information is not being adequately protected, they may take steps to block medical information flows, possibly causing harm to themselves or others [16].

E. Workflow and Process Alignment

Workflow and process alignment must consider the various stakeholders that interact over time in their episodic interactions surrounding patient care. Both the patient-centric view that starts with patient scheduling (or unscheduled access through emergency or urgent care) and the episodic views of clinical providers and staff working from symptoms through diagnosis and treatment then back to the patient for follow-up need to be considered. Adjudication and payment are episodic events in the overall care process from the provider and business office perspective but are not typically considered part of the patient care process. The significant delays and problems with collecting patient payments that are being experienced would be addressed if patient access to estimated charges and payment options could be provided up front during scheduling and registration. Therefore, this alignment work can be clarified and supported by modeling and analyzing the range of workflows that are undertaken. These models and analyses can help to bring to light shared assumptions, business rules, and information needs that will facilitate successful workflow and affect process design decisions [16]. Models representing the high-level subprocesses that are commonly performed by healthcare provider organizations, payers, and patients can focus on more detailed aspects of scheduling, registration, and episode-of-care as necessary. This will help in designing EHR-CP systems that have a manageable level of detail and avoid overwhelming complexity. Optimal design should accommodate variations related to specialties, organization size and complexity, care delivery setting, patient population, and anticipated changes as new healthcare regulations are introduced. Special attention must be given to supporting the typical exceptions, variations, and ad hoc activities that take place in each of the stakeholders' work. Simple process maps typically only show the normal flow of activities and decision points; the real need is to support specialized models that can capture and guide the exceptional aspects of the work.

F. Best Practices for Successful Integration

Integrating Electronic Health Records (EHRs) with Claims Processing Systems: Challenges and Best Practices Challenges in Integrating EHRs with Claims Processing Systems Best Practices for Successful Integration Conclusions and Future Work This paper discusses best practices to help health organizations integrate EHRs with CPSs successfully. To successfully integrate electronic health records (EHRs) with a claims processing system, it’s important to clearly define what success looks like. Overcoming operational, technical, and financial challenges is a significant part of the process. Adhering to the best practices and standards is another crucial aspect. Collaborating closely with healthcare providers who are open to experimenting with various models of integration, and being patient and flexible throughout the process, are key prerequisites for achieving a successful integration [16,17]. The challenges and best practices identified in this paper can be used by health organizations to perform a pre-assessment of their readiness and capabilities and help in the preparation and execution of the integration development and testing phase. Information systems developers who are aware of the best practices and who would like to apply the system can benefit from this knowledge as it can reduce the risks associated with integration development. Due to the increasing adoption of electronic health

records (EHRs), it is of major importance to develop data interchange mechanisms that allow the integration of EHRs with existing health management information systems, such as claims processing systems. Such integration allows ensuring that the EHR systems can be used by all stakeholders, increase the perceived value of the EHRs, and contribute to the improvement of the overall health information system. The main goal of this study is to identify the best practices that can help the health organizations to successfully integrate EHRs with claims processing systems. To achieve this goal, we present the main challenges of such integration and discuss a set of five best practices derived from the literature and from the opinion of four health information systems experts [17].

4. Contributions

I made several contributions in this research towards improving the existing capabilities of detecting poor patient health outcomes mediated by suboptimal provider ordering practices embedded within clinical decision support alerts. First, I extended existing clinical decision support research by developing a comprehensive framework that considers patient health outcome as the ultimate goal for the alert and allows for the independent evaluation of alert, order, and provider action and patient outcome. Second, to make such evaluations feasible, I addressed varying levels of alert overriding through a novel categorization approach and enabled efficient alert data level annotation of high alert volumes through a machine learning based alert data annotation method. Third, I addressed the challenge of existing alert evaluation capabilities by developing a novel, reproducible method for alert evaluation using Electronic Health Record data (EHR- based alert evaluation). With this approach, I generated hypothesis-driven data timeframes centered on the alert firing time for provider ordering behavior examination and subsequent patient outcome examination, facilitating informed provider insight feedback drives study outcome.

Finally, in the Execution section of the paper, I explain how the rules may be implemented and utilized within a typical healthcare business environment. Specifically, my contributions in this work and paper are as follows. I first summarize and explain, in the context of the paper, the challenges surrounding the integration of electronic health records with claims processing systems. Then I outline and describe the best practices for overcoming these challenges. In the Modeling section of the paper, I present a set of formal rules that encompass the core business and clinical processes involved in the integration task. Multiple rules will be presented, with each rule corresponding to a particular aspect of the patient's health record as it relates to the claims processing workflow. Finally, in the Execution section of the paper, I explain how the rules may be implemented and utilized within a typical healthcare business environment. With extensive experience in designing, developing, and implementing claim processing systems within the healthcare payer market, I have become intimately familiar with the business processes that underpin claims administration as well as the supporting rules and regulations, from HIPAA to the various state insurance laws. This first-hand knowledge has certainly helped me to better understand most of the issues as well as the initiatives and approaches that are important when combining EHRs with claim processing systems, with the aid of research financed by a National Science Foundation grant. I have also worked with other professionals in healthcare information technology to create a concept system that enables the integration of EHR with the claims processing environment that utilizes rules engines for conducting complex clinical and business rules. The significance of this work is in the disentanglement of the overlying interactions of healthcare data and its various aspects, especially in relation to interoperability in contemporary healthcare organizations within the context of processing and exchanging patient data and claims. In this way, I developed an awareness of numerous changes

regarding health information technology and it is constantly expanding; currently, I look for more chances to enhance the healthcare systems based on progressive and workable concepts of the growing industry requirements and challenges. All in all, my passion for applying and advancing technology in enhancing the operations of the health care sector has not waned, and nor has my desire to study further in this area of importance.

5. Significance and Benefits

Ideally, the claims systems should be integrated with the EHRs, in order to realize maximum potential of the EHRs. That integration will enable real time processing of claims and submission of claims in an accurate and timely manner in cases where claims can be processed more efficiently, better decision making tools and more correct coding of claims to be processed. Further, error proofing will aid in diminishing the time and effort of the repeated data entry, raise accurate transmission rates of data, decrease the slips that affect the claims and payment, enhance the image and management of documents, and answer promptly to the requests for medical records used during the claims review [18]. Thus, the possibility of linking the claims processing systems with the electronic health records is vital for decreasing the costs and improving the efficiency both for the healthcare facilities and insurance organizations. This replaces the traditional method of diffusion making work flow smoother and also making it easier to run since there is reduced complication. It also helps to keep the track of patient records in an efficient manner and helps the healthcare professionals as well as the insurance organizations to have the correctly documented records thereby helping in enhancing the quality in the whole process of treatment, making the health of the patient better for sure. However, when the claims systems are implemented to EHRs, then the organizations which offer healthcare services will be in a better position to meet the legal obligations and standards hence enhancing the safety of the patients and their satisfaction. The advantages of doing so are not only financial as it also aims to optimize the processes of getting care and information, as well as to encourage the effective working of healthcare actors that are involved in the patient's journey [19,20]. Therefore, this integration in the long run can enable more efficient, accurate and thorough data collection on patients' status which can be used in the decision making processes for population health. With the advancement of technology and the increase of healthcare digitization the direct connection of claims systems with EHRs becomes even more important in effective healthcare provided.

6. Conclusion

The purpose of this study was therefore to review and establish the key problems and concerns in the implementation of EHRs and claims processing integrated systems and to offer some best practices that might aid in overcoming some of those problems. For a better understanding and easy analysis of the given topic, the discussion will be divided into four sections. With this discussion in mind, let us turn to some of the existing work and literature on clinical and claims data integration. We start with a review of some of the literature and research undertaken on the topic of clinical and claims data integration. This is followed by a discussion of integration engines and broker technologies. Subsequently, we describe a set of challenges, issues, and barriers that have been identified in the literature. In the last section, we elaborate on some best practices and solutions to overcome such challenges. We conclude with some final remarks. Electronic Health Record (EHR) systems were not originally designed to address the logistical processing or payment of healthcare claims. However, in the U.S., the implementation of these systems has become entwined with federal incentive programs that promote their deployment. As a result, many EHR vendors now offer integrated practice management and claims

processing systems that support the eligibility verification, prior authorization, and in-office claims adjudication processes. When these systems are not integrated, healthcare organizations must use "workarounds" to bridge data from EHRs to the external claims processing system, increasing the risk of errors and data inconsistencies. Several factors may influence a healthcare provider's decision to integrate an external claims processing system with an EHR.

These include: The evaluation criteria embracing the cost of in-house development or vendor customization, the degree of HW/SW standardization, the centralization and scaling options offered by the organization, potential risks of loss of patients' data/claims denials, risk of fluctuations in reimbursement rates, and published/enacted laws and regulations in the sphere of healthcare. EHRs were not initially planned as a solution for handling claims in the field of healthcare, but in the United States, appropriately their application is connected with the actions of the federal government. This has caused many of the EHR vendors to integrate practice management and claims processing systems that facilitate different processes including eligibility verification, prior authorization, and claims adjudication. When there is no integration in healthcare organizations, they try to use what they call "workarounds" that actually connect the data, but at the same time, they create more gaps and transmission of data with the probability of errors. Below are some of the factors that healthcare providers may adopt in making the decision of whether to integrate an external claims processing system with an EHR or not; Cost of developing, procurements of, and standardizing the hardware, software, and centralized EHR, Claims processing and patient's data security, Reimbursement rates, and National and/or state policies on EHR.

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