Digital Transformation: Impact of Claim Adjudication on Financial Stability and Operational Efficiency of Health Services Providers

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Abstract: *Process automation and artificial intelligence are considered as two of the most important fields for the prediction in any business now a days. The work focuses on the amount of insurance claims that are made by the clients of the healthcare services providers. Moreover, the study identifies the address impact of claims adjudication on financial stability and operational efficiency of the healthcare service providers. An extensive review of the state-of-the-art literature has been conducted which reveals that automation of the claim processing decision-making process in the insurance business by integrating AI technologies is crucial. Hence it is required to integrate AI process automation into the insurance claim procedure for policyholders in order to achieve high operational efficiency.*

Keywords: Process automation, AI, Insurance Claims, Adjudication, Financial Stability, Operational Efficiency

1. Introduction

In the United States, it is estimated that one in seven health insurance claims are refused; hospitals nationwide lose over $262 billion a year as a result of these denials. Patients are overburdened by this pervasive issue, which also severely disrupts cash flow. Preventing claim denials prior to insurance claim submission thereby enhances revenue cycle acceleration, boosts profitability, and promotes patient well-being[1]. As illustrated in Fig 1, the US healthcare system is complicated, with many needless administrative processes, including exchanging patient records between doctors, completing redundant paperwork, and handling correspondence with insurance companies. According to [2, 3], the US spends roughly 17% of its GDP on healthcare, which is nearly twice as much as the average of other high-income developed nations. This is thought to be primarily due to these administrative tasks. In the US, billing and insurance-related (BIR) expenditures—that is, the costs associated with filing, processing, and reconciling claims—account for 13% of this substantial yearly spending on healthcare [4]. Denials of health insurance claims, referred to as claim denials from here on, are one of the main causes of the rising costs of BIR [5].

In the healthcare sector, claim adjudication plays a crucial role in guaranteeing that medical professionals are paid on time and accurately for their services. The effectiveness and precision of claim resolution have a significant impact on the long-term financial viability of insurance companies as well as healthcare providers. Artificial intelligence (AI) and process automation have revolutionized claim adjudication in recent years, resulting in significant gains in accuracy, efficiency, and overall financial performance for all stakeholders involved [6].
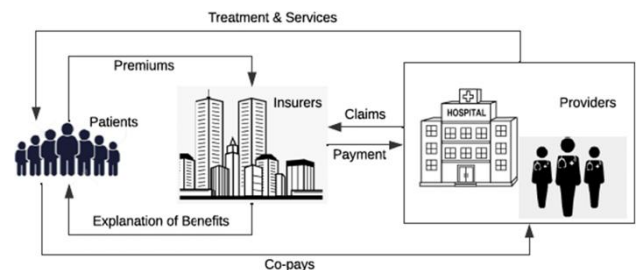

Figure 1: US Healthcare System [1]

a) *Financial Impact of Claim Adjudication on Healthcare Providers*

Healthcare providers' financial stability depends on timely and proper payment for their services. Payment delays can cause cash flow problems, restrict access to resources for improvements, and ultimately lower the standard of service delivered. It is essential to have a thorough understanding of how claim adjudication affects finances. In the United States, the average administrative costs for a refused claim were $375, per studies conducted in 2019 by the Healthcare Financial Management Association (HFMA) [7] and in 2023 by the American Council of Life Insurers (ACLI) [8]. This emphasizes the need for streamlined and effective procedures by highlighting the cost consequences of incorrect or delayed claim adjudication.

b) *Operational Impact of Claim Adjudication on Healthcare Providers*

Healthcare providers may face operational issues as a result of inefficient claim adjudication processes. The manual processing of claims is labor-intensive and time-consuming, which increases the possibility of errors. These obstacles may lead to backlogs, annoyance for providers, and trouble monitoring the status of claims. In addition, manual review procedures may cause delays in the timely provision of care since they may cause clinicians to put off treatment if they are unsure about payment.

c) *Process Automation and AI in China Adjudication on Healthcare Providers*

AI and process automation have become effective solutions for addressing the difficulties and inefficiencies that come with deciding claims for healthcare providers. Processes could be streamlined by automated technologies, which would minimize the requirement for human intervention and mistake risk. Furthermore, complicated medical data can be analyzed by AI systems, which can spot trends that point to fake or uncovered claims. This dual feature lowers the possibility of financial losses for healthcare providers while also greatly improving accuracy.

Numerous advantages have resulted from the use of AI and process automation in healthcare provider claim adjudication, including:
1) Decreased Claim Processing Time and Costs:
   - Automated solutions drastically cut down on the amount of time needed to process claims, which speeds up provider reimbursement.
   - This expediency also lowers the administrative expenses linked to protracted processing, which enhances cash flow.
2) Enhanced Claim Accuracy:
   - AI systems examine medical data more skillfully than human reviewers, which lowers the possibility of overpaying or underpaying.
   - Facilitates accurate reimbursement to providers, hence promoting financial stability.
3) Enhanced Provider Satisfaction:
   - Positive relationships between payers and providers are critical to the health of the entire healthcare ecosystem.
   - Accurate and efficient claim adjudication eases provider dissatisfaction, which improves satisfaction with the payer's handling of claims.
4) Enhanced Effectiveness of Operations:
   - By automating repetitive processes, automated systems free up staff members to concentrate on more intricate and valuable work.
   - This increase in operational efficiency lessens the workload for administrative staff members and enhances workflow in general.

Healthcare providers' claim adjudication processes are being revolutionized by a number of AI applications, such as:
1) Natural Language Processing (NLP):
   - NLP expedites the claim review procedure by extracting pertinent data from clinical and medical records.
   - By enhancing information extraction accuracy and efficiency, this technology speeds up the processing of claims.
2) Fraud Detection:
   - This program supports the financial integrity of insurance firms and healthcare providers by using AI algorithms to find trends in claim data that point to fraudulent activity.
   - This enables preventive steps to avert financial losses.
3) Medical Coding Assistance:
   - Artificial intelligence helps with medical coding, guaranteeing correct claim classification and precise provider payment.
   - Increase coding precision, lowers mistake rates, and expedites the reimbursement procedure.

2. Related Work

Numerous efforts have been made by various researcher to investigate the impact of insurance claim adjudication on financial and operational stability. These are delineated as follows;

a) *Insurance Claim Management and Fraud Detection*

Claims are essential to the management of healthcare since they are standardized records. However, frequent rejections and denials put a significant financial and administrative strain on payers as well as providers. Researchers' study [9] addresses these issues by introducing an automated method for identifying rejections and denials of claims using machine learning (ML). The study suggests a unique method for categorizing claims subject to denial based on distinguishing features by employing machine learning algorithms. This novel method, which uses Claim Adjustment Reason Codes (CARC) for feature engineering, made a substantial contribution to the creation of the first claim risk detection system driven by machine learning. Similarly, public and private health insurance systems are impacted by rising global healthcare expenditures, which can be linked to a number of factors. Notably, fraudulent activity inside these systems adds to insurance providers' unnecessary expenses. In response, a study by researchers [10] suggests a multi-step method for insurance firms to spot fraudulent activity. The steps include identifying inconsistencies, gathering information for a thorough risk analysis, and using a decision tree-based technique to ascertain the veracity of the claim. When applied to actual insurance data, the results show satisfactory outcomes.

b) *Global Healthcare Challenges and Ethical AI Implementation*

After ten years of implementation, Taiwan's National Health Insurance (NHI) system still faces difficulties in providing effective and reasonably priced medical care. To solve this, the "medical-claim payment auditing (MCPA) procedure" is introduced in a researcher's study [11]. MCPA offers significant benefits to the optimization of healthcare systems by promoting honest medical-claim payments, lowering auditing expenses, and promoting adherence to international standards by taking inspiration from well-established sample procedures. Researchers' study [12] reveals different dynamics for conventional and Islamic insurance models by examining consumer behaviors and claims patterns in Malaysia's medical and health insurance landscape. Ethical principles in Islamic finance drive honest behavior throughout the buying stage, while conventional policies are rejected with high rates of success. But when claims are submitted, a contradiction appears that raises questions about possible moral hazard. The study's conclusions apply outside of Malaysia and can be used to optimize business performance in comparable market environments. The investigation of machine learning technologies is prompted

by worries about growing health insurance costs worldwide as a result of errors made when managing claims. A proactive method to anticipate claim errors is suggested by the researcher's work [13], which makes use of Responsible Artificial Intelligence (RAI). The study highlights the possible advantages in terms of raising profitability, streamlining revenue cycles, and eventually boosting patient welfare.

c) Role of AI in Insurance and its Future

Health insurance firms in Brazil tend to arrange claims data according to service providers, which may cause them to miss out on important information about the activities of physicians and the patterns of patient referrals. A modeling strategy to find physician referral trends using actual healthcare insurance claims. The goal of the research is to influence policy-making initiatives and improve physician referral systems [14]. A sizable percentage of health insurance claims in the US are turned down. In order to anticipate possible claim denials, the study [15] suggests a Responsible Artificial Intelligence (RAI) approach that makes use of machine learning techniques. The results point to possible advantages in terms of lower operating expenses and more efficient claim procedures.AI-enabled healthcare claims data integration presents prospects for game-changing discoveries. The ethical and responsible application of AI in healthcare is emphasized by a researcher's work [16], which addresses concerns about algorithmic bias, data protection, and transparency. The findings portend a new age in proactive and individualized healthcare. The health insurance industry's adoption of AI is influenced by concerns about privacy and trust.

The study [17] examines the effects of both hidden and apparent AI interfaces and finds that when AI is used in a visible way, trust is significantly reduced. In order to build trust, the study highlights crucial user control and transparency when creating AI interfaces.AI has the power to completely change the insurance sector by optimizing customer experiences and releasing the potential of data. The suggested method by [18] investigates how AI may affect workforce dynamics, business operations, and social consequences. The report underlines how important it is to take a calculated strategy to addressing social inequality and possible job displacement. According to a study [19], the insurance industry has integrated automated chatbots, demonstrating how these technologies can add value for customers. The conceptual framework clarifies the many tactics used by chatbots by integrating AI, service logic, and the reverse use of consumer data. The study highlights how crucial it is to take end users' viewpoints into account when evaluating efficacy.

3. Conclusion

Healthcare claim adjudication procedures are entering a revolutionary era because to process automation and artificial intelligence (AI), which gives providers powerful tools to improve overall financial performance, accuracy, and efficiency. The industry may anticipate even more advanced applications that further improve the claim adjudication process as AI technologies develop, which will eventually benefit patients as well as payers and providers.

A more efficient, economical, and patient-focused healthcare environment is anticipated as AI and automation continue to be incorporated into healthcare operations.

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