Economics and Business Quarterly Reviews

Mattout, W., & Yesilada, F. (2024). Revolutionizing Healthcare Finances: Navigating the Impact of Innovative Technologies on Medical Claims Cost Containment in the MENA Region. *Economics and Business Quarterly Reviews*, 7(1), 41-54.

ISSN 2775-9237

DOI: 10.31014/aior.1992.07.01.558

The online version of this article can be found at:
https://www.asianinstituteofresearch.org/

Published by:
The Asian Institute of Research

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The Asian Institute of Research
Economics and Business Quarterly Reviews
Vol.7, No.1, 2024: 41-54
ISSN 2775-9237

DOI: 10.31014/aior.1992.07.01.558

Revolutionizing Healthcare Finances: Navigating the Impact of Innovative Technologies on Medical Claims Cost Containment in the MENA Region

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Abstract
Countries are actively developing more effective ways and policies to tackle the high costs associated with healthcare. The advancement in medical technology has received praise for enhancing the healthcare system. However, it has also been criticized for contributing to a surge in medical costs, which is one of the impending challenges faced by the healthcare system today. To sustain the utilization of innovative techniques and medication, pharmaceutical companies must embrace more sophisticated technologies, which may ultimately be passed on to patients. This encourages people to contact as many health insurance providers as possible. Therefore, the objective of this study is to examine the healthcare insurance systems and measures for controlling costs used by insurance firms. The study has gathered cross-sectional data by employing a semi-structured interview method. The participants in the study are thirty-five insurance professionals who possess significant expertise in their various positions. Four themes emerged from the study questions that were posed. Research has revealed that while innovative technology may be cost-effective, these technologies are also more sensitive and necessitate the expertise of technical specialists and professionals for their operation, ultimately leading to higher costs.

Keywords: Innovative Technology, Medical Claims, Cost Containment, Insurance Companies, MENA, Accessible Health System

1. Introduction

Many countries are working on forming better strategies and policies to address the high costs of healthcare. Several countries particularly in Europe have been exploring methods for cost containment by implementing strategies throughout the fiscal crisis. Furthermore; some other countries like France, Ireland, and Greece have also taken various actions to reduce the costs of visiting a doctor by reducing fees by 25%. Several cost containment techniques have been implemented to address various aspects of the healthcare system, including

market procedures, prices, demand, and supply. Nevertheless, the complex structure of the healthcare system hinders the accomplishment of objectives aimed at controlling costs. Price reductions can potentially lead to an increase in volume in other areas, as demonstrated by (Stadhouders et al., 2016). The advances in medical technology have been praised for enhancing the healthcare system. However, it has also been criticized for causing increased medical costs, which has contributed to some of the current challenges faced by the healthcare system. While modern medical equipment and technology may have a lower cost per unit compared to the technologies they replace, they are sensitive to specific techniques and require specialized training and specialists to operate them. Consequently, this leads to higher overall costs. Research has demonstrated that decreasing costs will enhance operational efficiency and, in turn, lower the costs incurred by customers (Agustina et al., 2019). Yet, it will have an adverse influence on the advancement of research and development in the field of effective and life-saving medical treatment.

Moreover, for the continued adoption of innovative methodologies and medications, pharmaceutical firms need to incorporate advanced technologies, which consequently shift the financial responsibility onto consumers. As a consequence, individuals are compelled to engage with multiple health insurance providers. Historically, various benefits and incentives were employed to acquire innovative and secure medical technologies beneficial for patients (Özdemir, and Hekim, 2018). This underscores the commitment of healthcare service providers to delivering enhanced patient care, addressing concerns about potential medical errors, fostering a technologically-oriented environment, and relying on a supportive third-party reimbursement system, wherein medical insurance companies play a pivotal role (Vatandsoost, and Litkouhi, 2019).

The implementation of the Medical Care Prospective Payment System (PPS) and other cost containment strategies has been initiated to restrict costs in the healthcare industry. Technological advancements in healthcare have not only improved overall health but also increased life expectancy and facilitated easier and quicker access to medical services (Ekelman, 1988).

Insurance companies, hospitals, and patients are motivated to embrace cost-saving technologies. There has been a lack of extensive research conducted to investigate the involvement of third parties, such as insurance firms, in implementing cost-containment strategies and innovative technologies in the MENA region. This study assesses the role of insurance companies in implementing cost-containment strategies and examines how hospitals, doctors, physicians, and patients might incorporate cost-effective technologies. This will provide clarification on medical expense claims and the involvement of insurance companies in technology purchases.

This research particularly aims to investigate and evaluate the influence of innovative technology on medical claims cost containment strategies in the Middle East and North Africa (MENA) region. The study further aims to investigate how emerging technological advancements impact the efficiency and productivity of healthcare cost management and to enhance our comprehension of the financial sustainability of healthcare in this particular region.

2. Literature Review

Mehta and Pandit (2018) state that technology plays a significant role in shaping the future of medical strategies in hospitals. Projections suggest that the digital health industry is expected to achieve an estimated value of 38 billion by the year 2025. According to Stratview Research (2021), the global allocation for digital health in 2020 reached a significant sum of $13.9 billion. This noteworthy information illustrates the healthcare industry's robust tendency to employ digital technologies in medical practices. Moreover, the countries in the MENA Region face significant financial challenges and lack the required funds to accommodate patients in hospitals. Consequently, the advanced technology employed in the hospitals of the MENA countries are prohibitively costly, leading to a detrimental impact on the overall expenses associated with patient admissions.

On the other hand, the introduction of advanced medical technologies leads to a substantial increase in overall costs for patients admitted to hospitals. The use of innovative technologies facilitates rapid and efficient patient

diagnosis, as well as effective treatment of different health problems. In addition, Yaqoob et al. (2022) assert that the viability of emerging technologies in the MEA countries depends on the overall costs imposed on patients. There is an urgent need for the development of innovative technologies to enhance the overall healthcare status of patients. It is essential to understand the entire influence of the latest developments in innovative medical technologies on patient care in the MEA region.

Medical claims cost containment is a crucial concern in healthcare systems globally, and various countries have used diverse solutions to tackle this issue (Atun et al., 2015; Martin et al., 2018; Agustina et al., 2019). Commonly employed strategies include encouraging the practice of preventative care, implementation of cost-sharing plans, utilization of technology, and negotiation of prices with healthcare providers.

Insurance companies in the United States have adopted cost containment strategies, including the use of management programs to evaluate the necessity and suitability of medical procedures, as well as disease management programs that focus on preventive care and the management of chronic diseases (Mulcahy et al., 2018). In addition, the US government has enacted the Affordable Care Act (ACA) to offer affordable health insurance to its citizens and encourage preventative healthcare.

Several European governments have adopted cost-containment strategies, including the promotion of generic medications, the use of technology, and price negotiations with healthcare providers (Blocher et al., 2019). For example, Germany has introduced the "reference price system," which limits the prices of medicines to the average price of comparable medicines in other European nations.

Asian countries like Japan and Singapore have adopted cost containment initiatives, including the promotion of preventative care, price negotiation with healthcare providers, and the implementation of cost-sharing plans (Chen et al., 2021).

A study conducted in Canada revealed that the implementation of telemedicine services in remote areas could lead to a reduction in healthcare costs and improve patient outcomes (Morse et al., 2019). Another study conducted in Europe showed that the adoption of the reference price system might substantially decrease medication costs (Levin et al., 2020).

2.2 Strategies used for cost containment in the healthcare industry

Cost containment strategies are employed in the healthcare industry to decrease total healthcare expenditure and enhance cost-effectiveness (Burns and Pauly, 2018). These strategies include a range of actions, including minimizing unnecessary medical procedures, establishing cost-sharing initiatives, advocating for preventive care, and utilizing technology to enhance efficiency.

Insurance companies play a significant role in cost containment by adopting new strategies and approaches that encourage healthcare providers to deliver quality care while limiting costs (Mossialos and Le Grand, 2019). Insurance companies can engage in negotiations with healthcare providers to establish more affordable prices for medical services, thus contributing to the reduction of the overall cost of healthcare. Additionally, insurance companies can employ cost-sharing mechanisms like co-payments and deductibles. These mechanisms can encourage consumers to choose more affordable treatments and prevent unnecessary medical procedures (Hansen et al., 2021). Insurance companies can further promote preventive care by offering incentives for routine check-ups, vaccinations, and health-conscious behaviors.

Innovative technology can also have a significant effect on initiatives aimed at controlling costs. Electronic health records (EHRs) have the potential to optimize healthcare professionals' methods and minimize administrative costs (Groves et al., 2016). Telemedicine can additionally reduce healthcare costs by facilitating patients to receive remote consultations and reducing the necessity for costly hospital visits. Hence, it is imperative to investigate the

influence of innovative technology on cost-containment strategies in the MENA region, as it has the potential to provide novel solutions for healthcare cost management while improving patient outcomes.

2.3 Strategies for cutting hospital expenditures via technological innovation

Zeadally and Bello (2021) argue that it is imperative to reduce healthcare costs to deliver appropriate medical care to patients in hospitals. Crucially, it is important to establish a fair pricing mechanism to ensure the provision of extensive medical care for patients. On the other hand, it is essential to offer comprehensive healthcare services to patients at a reduced cost to improve the relationship with the patients admitted to the hospitals.

The decline in healthcare practices serves as a symbolic representation of an efficient healthcare system, contributing to the rapid recuperation of patients in subsequent periods. Hospitals are compelled to adapt by formulating effective cost-reduction strategies facilitated by the integration of advanced technologies, aiming to enhance patient care.

Furthermore, Bekfani et al. (2021) assert that it is necessary to fully sequence the fundamental methods and technologies employed in hospitals for patient treatment. It helps in the analysis and identification of system shortcomings and provides better alternatives for the technology utilized in healthcare systems. This is done to optimize the use of low-cost and effective medical technology to meet the individual needs of patients. It enhances the overall health condition and reduces the cost of the technology employed in treating patients.

2.4 Healthcare System's Reaction to price-innovation Schemes

According to Price et al., (2021), there has been a substantial decrease in health care expenses implemented by hospitals. It has facilitated the establishment of a long-term relationship with patients and hospital administration in Middle Eastern countries. On the other hand, introducing price-reduction strategies has also diminished the quality of healthcare services provided to patients. The administration of hospitals has experienced a significant decline in preserving the quality of innovative technologies used for patient treatment.

Chen et al. **(**2021) stated that implementing a fixed payment system has turned out to help increase awareness among physicians. This facilitates the provision of improved healthcare services to patients at an affordable price. However, the MENA region has experienced a significant decline in living conditions. Consequently, hospital administrations are forced to carry out comprehensive cost-reduction initiatives to ensure adequate and cost-effective treatment for patients.

2.5 Insurance companies and their role in cost containment

Insurance companies play a vital role in cost containment in the healthcare sector (Mossialos and Le Grand, 2019). They can engage in negotiations with healthcare providers to establish more affordable prices for medical services which consequently can contribute to the reduction of the overall cost of healthcare (Denis and van Gestel, 2016). Insurance companies can make agreements with healthcare providers, requiring that the providers offer medical services at reduced prices. Insurance companies can also establish networks of healthcare providers who are willing to offer medical services at lower costs to patients on the insurance plan (Denis and van Gestel, 2016). Implementing such strategies may successfully reduce the costs associated with medical services and offer affordable healthcare alternatives to the insured population.

Additionally, insurance companies can implement cost-sharing mechanisms such as co-payments and deductibles, which may serve as incentives for patients to opt for more cost-efficient treatments and to avoid unnecessary medical procedures (Barua and Moir, 2022). Insurance plans may require patients to pay a percentage of the cost of medical procedures, which may encourage patients to choose less expensive treatment alternatives. Insurance companies might further encourage preventative care by offering incentives for routine check-ups, vaccines, and

adopting healthy lifestyles (Yao et al., 2015). By providing incentives for preventive care, insurance companies can effectively decrease the occurrence of expensive chronic illnesses and enhance general health outcomes. Furthermore, insurance companies might employ technology to improve cost efficiency and reduce administrative costs. Electronic Health Records (EHRs) can help healthcare providers streamline their workflows and reduce administrative costs, which can ultimately result in lower healthcare expenditures (de la Vega et al., 2019).

2.6 Changes in healthcare technology due to efforts to save costs

According to Gu and Shen (2020), patients' cost-reducing efforts have had a significant impact on healthcare system innovation. This has resulted in a decline in the overall quality of care provided to patients in healthcare institutions.

Lo et al. (2021) state that the cost attainment strategies impact the overall innovation of the technology such as the use of high-standard medical equipment and the provision of better health care for the patients admitted to the hospitals. Furthermore, in the adoption of non-standardized, unconventional, and cost-effective treatment methods for patients.

Moreover, it influences the establishment of a long-term relationship with patients and enhances the overall quality of the institution.

Furthermore, it is important to maintain and improve the quality standard of healthcare technology to ensure the fast recovery of patients in hospitals. Evidence suggests that the people of Middle Eastern countries suffer from poverty and inadequate access to healthcare services. Ensuring high-quality healthcare is crucial for establishing and sustaining long-term patient relationships.

3. Materials and Methods

The research methodology employed in this study focused on the collecting of qualitative data, which is a methodical approach that is well-suited for extracting valuable insights. One-to-one semi-structured interviews were made with 34 insurance industry professionals who have sufficient experience in their respective roles identified using purposive sampling.

3.1 Guiding Questions

The guiding questions were:
How can you explain the most effective strategies for medical claims costs? How do you evaluate an increase in medical costs associated with technology as a result of patient’s demand for new technologies? How do insurance companies, hospitals and healthcare providers deal with medical cost claims? How do Medical Insurance Companies adopt/use innovative technology to improve efficiency while reducing medical claims costs? What kind of possible contributions medical insurance companies would provide through big data analysis? How medical insurance companies should adapt the developments in Big Data to this sector? How do you evaluate the price innovation strategies on the healthcare system of the hospitals that will be beneficial especially for MENA Region? How do you evaluate the influence of innovative technologies as a tool containing the cost of medical claims? How do innovative technologies lower the demand for other types of medical services, which causes the overall cost of medical care to reduce? How innovative technology can bring positive or negative impact on medical claims costs and health trends? What should constitute planning for the adoption of innovative technology in MENA Region? What challenges do you see with the realization of innovative technology regarding cost containment strategies? As far as innovative technology is concerned, are there any other issues you would like to point out regarding cost containment strategies by insurance companies, hospitals, and healthcare providers in the MENA region?

The interviews conducted in this study facilitated participants in openly expressing their thoughts, promoting an atmosphere of open communication. The adaptable format of these interviews enabled a natural investigation of relevant topics, ensuring that the conversation remained on track. This method not only enhanced comprehension of the participants' viewpoints but also fostered mutual investigation between the interviewer and respondent. These interviews are an ideal method for gathering informative and detailed perspectives from the participants by promoting open communication, flexibility, and shared investigation.

Ethical considerations were taken into account to guarantee that the research would provide reliable results (Akaranga, and Makau, 2016). All participants who took part in the research gave their verbal consent during the interview. Upon being approached by the researcher, all subjects willingly agreed to participate in the study. Before commencing the interview, every query posed by each participant was addressed by providing a clear explanation of the study's aims and objectives. In a similar vein, the participants were given the option to leave the interview at any time while it was being conducted (Harriss et al., 2019). Similarly, the participants were provided with the opportunity to withdraw from the interview at any point during its execution (Harriss et al., 2019). Furthermore, before recording the interview, the participants were formally asked for their consent. Furthermore, the participants were explicitly informed that their personal information would be maintained in absolute confidentiality.

The data collected from the interviews was analyzed using a thematic approach. Thematic analysis is widely employed as a method of data analysis due to its ability to facilitate understanding of information gathered from interviews (Clarke, et al., 2015). In addition, the researcher can categorize relevant themes and subthemes that can be utilized while analyzing the collected data (Terry et al., 2017). Furthermore, the initial codes were developed to assess and understand the content of the studies. Subsequently, preliminary themes were established to better understand the background of the research. Similarly, all the themes were reviewed with a thorough examination to ensure precise interpretation and representation of the data.

4. Findings

Out of 34 respondents from 11 different Mena countries, 13 were medical doctors, 12 were executive managers and 9 were chief officers. More than half of the respondents had 20 and higher years of work experience (Appendix 1).

4.1 Content analysis results

Content analysis revealed four major themes: The role of insurance companies on medical cost claims, Innovative technologies for Insurance companies, Innovative Technologies for Cost Containment, and Challenges Insurance Companies face in MENA Region.

4.1.1 Theme 1 - Role of Insurance Companies on Medical Cost Claims

Table 1: Role of Insurance Companies on Medical Cost Claims (Theme 1)

Meaning Units	Condensed Meaning Units	Sub-Themes	Theme
Effective claim management is essential for cost containment	Claim management is key to cost containment	Claim Management	Role of Insurance Companies on Medical Cost Claims
Self-funding and third-party payers can reduce costs	Self-funding and third-party payers lower costs	Self-funding and Third-party Payer	
Advancements in medical technology have reduced costs	Tech advancements lower medical costs	Innovative Technologies	
Innovative technologies like telemedicine can reshape treatment	Telemedicine can reshape treatment		

Insurance companies use pay-for-healthcare to control costs	Pay-for-healthcare controls costs	Healthcare Affordability	
Insurance companies make healthcare affordable for people	Insurance makes healthcare affordable		

Four sub-themes leading to Theme 1 "Role of Insurance Companies on Medical Cost Claims" emerged as a result of the first question asked to the respondents. Respondent 22 stated, "*Technology related to medical treatment, Insurance companies should be open and adaptive to new treatment technologies as we have seen there have been a massive advancement is recoveries and health index of the patients receiving the treatment through cutting edge technologies, However the cost should be thoroughly analysed and should only reflect the actual service cost in the region."*

Respondent 5 highlighted, "*Annual savings of 5-20% are possible with self-funding or third-party payer plans, depending on plan design and funding methods*."

Regarding "Self-funding and third-party payers", Respondents 1 and 8 suggested, "*Machine and treatment costs have been reduced thanks to medical technology, which has reversed the trend of rising medical expenditures.*" Regarding the utilization of innovative technologies, respondent 12 has highlighted, "*When it comes to sharing data and making decisions about treatment plans and health outcomes; telemedicine, AI-enabled medical devices, and blockchain electronic health records have the potential to radically alter treatment practices. …., all communities will reap the benefits of new technologies in due time.*".

The fourth sub-theme was about the affordability of healthcare. According to respondent 25, "*Patients can pay a premium that is proportional to the average cost of medical treatment because insurance companies, hospitals, and other healthcare providers pool their resources to pay for people's medical care*". Whereas; respondent 18 put it as "*Health insurance lowers out-of-pocket costs.*"

4.1.2 Theme 2 - Innovative Technologies for Insurance Companies

Table 2: Innovative Technologies for Insurance Companies (Theme 2)

Meaning Units	Condensed Meaning Units	Sub-Themes	Theme
Innovative technologies can provide better service at low cost	Tech can provide low-cost better service	Adoption of Digital Technology and AI	Innovative technologies for Insurance companies
Insurance companies should promote their innovative technology to improve customer experience and drive growth	Insurers should promote innovation		
Insurance companies can adopt digital technology and AI to offer better products	Insurers should adopt digital tech		
Technology can improve customer engagement, lower costs, increase efficiency and expand insurability	Tech can improve engagement and costs	Tech and Customer Engagement	
Big data can bring benefits to insurers in underwriting, claim management, and settlement practices	Big data benefits for insurers	Big Data and Insurer Benefits	

Three sub-themes lead to Theme 2, "Innovative Technologies for Insurance Companies" as a result of the second question asked. Regarding the Adoption of Digital Technology and AI, Respondents 1 and 5 stated, "*Healthcare, nanomedicine, 3D printing, the internet of things (IoT), precision medicine, and virtual reality are just a few examples of the cutting-edge technology used by medical insurance firms to improve service while reducing costs. Insurance firms can better understand their clients' demands and provide better service with the use of these technologies*".

Furthermore, Respondent 30 mentioned, "*Insurance companies can enhance their client experience and expand their business by promoting their innovative and efficient technology*".

Regarding the innovative technology's application and adoption and customer engagement in insurance companies, Respondent 17 stated, "*Insurance firms may utilize more digital technology, AI, and the Internet of things to offer the best products and coverage*". Respondent 9 mentioned as, "*By leveraging technology, insurance companies may engage clients, reduce expenses, boost efficiency, and increase the number of people who can be insured*".

Regarding the third sub-theme, which is big data and insurer benefits, Respondents 18 and 15 emphasized, "*Data management systems for big data are challenging. The use of big data has the potential to enhance the underwriting, rating, and settlement processes of insurance companies.*"

4.1.3 Theme 3 - Innovative Technologies for Cost Containment

Table 3: Innovative Technologies for Cost Containment (Theme 3)

Meaning Units	Condensed Meaning Units	Sub-Themes	Theme
Strategic pricing assessment is essential for pricing strategy development	Strategic pricing assessment is vital	Cost-Effective Innovative Technology Selection	Innovative Technologies for Cost Containment
Providers should stress long-term cost-effective innovative technology selection	Long-term cost-effective tech selection		
DRG can estimate the cost of medical treatment	DRG estimates the cost of medical treatment	DRG Implementation	
Innovative technology can increase healthcare costs and demand for medical systems	Tech increases healthcare costs	Increase in Healthcare Costs due to Innovative Technology	
Innovative technology should be assessed in terms of efficiency and patient prognosis	Tech assessment should prioritize efficiency	Tech Assessment and Actionable Insight from Innovative Technology	
Innovative technology can provide actionable insight for early interventions	Tech provides actionable insight		

Questions related to cost of medical treatments, pricing strategy and use of innovative technologies particularly in the MENA region led to Theme 4 "Innovative Technologies for Cost Containment". According to Respondent 22, "*The initial stage in developing a pricing strategy that will help organisations and take advantage of market possibilities is conducting a strategic price evaluation. Complex as it may be, factors such as player price, citrate, packaging, public vs. private, and so on all have their advantages."*

Respondent 16 stated, "*Using an algorithm with predetermined base medical treatment charges, newly introduced DRG can estimate the process cost for insured patients individually.*"

Both the second question and its sub-questions pertained to the impact of cutting-edge technological developments on the management of healthcare expenditures, specifically about the impact of these developments on the control of medical claims costs and, by extension, the overall cost of medical treatment.

Respondent 19 highlighted, "*As a result of cost savings or high volume utilisation, innovative technology has the potential to lower medical claim expenses. Prioritising long-term, cost-effective innovation should be the focus of medical practitioners when selecting technology.*"

Furthermore; respondent 25 emphasized, "*Robotic operations have cut down on treatment times, while innovative devices like smartwatches can measure vital signs like heart rate and electrocardiogram. Plus, cancer is another issue that nanotechnology has the potential to resolve in a way that was previously impossible. Nevertheless, the demand for medical systems, pharmaceuticals, and surgical procedures has increased, and health care prices have risen as a result of novel medical technologies*".

According to respondent 29, "*It is important to assess new healthcare technologies for their ability to enhance patient treatment, decrease complications, and improve prognoses.*"

The third question and the related sub-questions addressed how innovative technology affects medical claims costs and MENA health trends. Respondents 7 and 24 stated, "*New ground-breaking technology has the potential to enhance patient health by providing actionable insights prior to any deterioration."*

4.1.4 Theme 4 - Challenges Insurance Companies face in MENA Region

Table 4: Challenges Insurance Companies face in MENA Region (Theme 4)

Meaning Units	Condensed Meaning Units	Sub-Themes	Theme
HIS system restrictions are hindering the usage of big data by insurers	HIS system restrictions hinder big data	HIS System Restrictions	Challenges Insurance Companies face in MENA Region
HIS system is not open to usage by insurers for better pricing	HIS system is not open to insurers		
Innovation technology faces challenges like high cost and abuse	Tech faces challenges like cost and abuse	Challenges in Implementing Innovative Technology	
Regulations restricting health data movement are a challenge	Regulations restrict health data movement		
Effective cost containment strategies are hard to identify and temporary	Hard to identify effective cost strategies	Challenges in Cost Containment Strategies	
New technologies are expensive and may not be covered by insurance	New tech is expensive and not insured		

The fourth theme extracted was "Challenges Insurance Companies face in MENA Region" The first question was related to any resistance to cost containment strategies for medical claims. According to respondents 16 and 30, "*Importantly, HIS system limits may force insurance companies to leverage big data for more accurate pricing. To increase utilisation, the majority of professionals employ referrals, tests, and treatments*".

Respondent 2 also agrees with the above statement by saying, "*Unfortunately, HIS is not open to insurance firms. When insurance businesses open up to big data, it can help them price policies better*."

The second question concerned cost-containment challenges for breakthrough technology. According to respondents 19, 5 and 7, "*The implementation of innovative technology to reduce costs is hindered by several factors, including high costs, misuse of indications, lower benefits than anticipated or intended, social awareness, and nation-specific issues with the economic, political, and regulatory bodies*".

On the other hand, respondent 26 thinks, "*There are issues with regulations. National health databases are becoming more common. A foundation of digitization and technology, cloud systems are forbidden by several regulations.*"

The last question was related to issues regarding cost containment strategies by insurance companies, hospitals, and healthcare providers in the MENA region. Respondents 9 and 17 state that "*It is challenging to discover*

efficient cost-control techniques since health cost-control measures only provide short-term relief until new technology is released. The main problem is that there is a lack of cooperation and open communication between the parties." Similarly, Respondents 22 and 31 stated, "*Insuring new technology can be a real challenge due to its high cost*."

5. Conclusion

In conclusion, it was found that while innovative technology is cost-effective, it is also more sensitive and necessitates the expertise of technical people, leading to higher expenses. Furthermore, effective management of claims and self-funding, strategic implementation of an ecosystem, integration of algorithms, AI, and machine learning, product design, financing, and proactive measures for prevention and reimbursement are essential strategies for managing medical cost claims.

Moreover, it has been shown that in many cases, patients demonstrate a preference for modern technology as opposed to conventional alternatives. However, the increasing medical expenses can be attributed to several factors, such as inadequate modifications of premiums to cover technological costs, improper utilization of medical indications, and a failure of health authorities to effectively control technology-related expenses, leading to unpredictable price fluctuations. The introduction of telemedicine, the use of AI-powered medical devices, and the integration of blockchain technology for electronic health records have greatly revolutionized the medical care industry. Governmental incentives, like as tax incentives and research and development (R&D) incentives, can promote the adoption of state-of-the-art technology.

To control medical costs, insurance companies employ automation and digitalization techniques, utilizing artificial intelligence and algorithms to reduce both medical costs and cases of fraud. Several other methods such as deductibles and co-payments can be used to control medical costs based on the client's previous records. Insurance companies are utilizing several innovative technologies, including Virtual Reality, Augmented Reality/Mixed Reality/Virtual Reality in Healthcare, Nanomedicine, 3D Printing, the Internet of Medical Things (IoMTs), and Precision Medicine, to deliver high-quality services at a lower cost.

All MENA countries are striving to enhance their healthcare infrastructure through investments in modern technology and cutting-edge equipment. Still, innovative technology also has its drawbacks. Overuse, abuse of indications, insufficient insurance coverage, and price reductions could potentially lead to an increase in medical claim costs and out-of-pocket payments.

It was further found that the MENA region has encountered numerous challenges as a result of inadequate infrastructure, economic and political instability, insufficient health authorities, and ineffective governance in managing the healthcare system. These challenges have caused an adverse impact on the proper utilization of innovative technology. Nevertheless, the MENA region is prepared to adopt and apply AI, big data, and automated systems in response to the increasing demand from clients for more sophisticated medical technologies.

The challenges stated as limiting the use of innovative technology in terms of cost reduction methods include substantial costs, misuse of indications, fewer benefits than expected or intended, public awareness, and specific characteristics of the country (such as economic, political, and regulatory factors). Moreover, the MENA region has significant challenges in terms of funds, investments, and the presence of qualified individuals and technical experts in the field of big data and artificial intelligence. These obstacles impede the progress and execution of innovative strategies for cost reduction.

6. Recommendations

This study investigated the impact of medical cost claims, the involvement of insurance companies, and the potential contributions of innovative technology. The study's findings will enhance the current body of literature on innovative technology by investigating a novel aspect of innovative technology in medical cost claims

and solutions for cost control. This study provides new insights while presenting a plausible explanation of how innovative technologies are being used in healthcare and their significance for medical costs. The findings will motivate insurance companies, healthcare providers, and hospitals to integrate innovative technology to improve the efficiency of medical cost claims and enhance the well-being of patients in the long run. These findings can contribute to the comprehension of how innovative technologies can be utilized to reduce medical costs.

Technological innovation in healthcare products has yielded numerous advantages for hospitals, doctors, and patients by enhancing their health outcomes and providing cost-effective technologies. The study's findings will be helpful for insurance professionals seeking to optimize the utilization of cutting-edge technologies like Virtual Reality or AR/MR/VR in fields such as Healthcare, Nanomedicine, 3D Printing, Internet of Medical Things (IoMTs), or Precision Medicine. These technologies can enable the delivery of high-quality services at a reduced cost. Medical insurance firms, health providers, and hospitals will have the capacity to gather a substantial volume of data regarding the patterns of medical claims and the health trends of their whole client base.

However, the main findings highlighted that insurance companies, healthcare providers, and hospitals can prioritize the use of innovative technologies to facilitate process automation and machine learning, leading to improved management of cost claims.

Additionally, the findings of the study might be employed to identify the possible challenges that the MENA region may face due to insufficient infrastructure, economic and political instability, poor health authorities, and ineffective governance in healthcare management. Identifying these obstacles will help relevant authorities address concerns that negatively affect the effective use of innovative technology. The results can also assist stakeholders and other relevant authorities in analyzing unidentified factors that affect innovative technology cost containment initiatives in the MENA region.

Author Contributions: All authors contributed to this research.

Funding: Not applicable.

Conflict of Interest: The authors declare no conflict of interest.

Informed Consent Statement/Ethics Approval: Not applicable.

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APPENDIX: Profile of the Interviewees

Table 5: List of Interviewees

Participant	Experience(Years)	Industry	Country / Region	Position
1	23	Insurance	UAE	C-Suite
2	34	Insurance	MEA	C-Suite
3	21	Insurance	Egypt	C-Suite
4	26	Insurance	META	Doctor
5	20	Healthcare Provider	Morocco	Doctor
6	20	Healthcare Provider	Lebanon	Doctor
7	20	Third Party Administrator	MEA	Doctor
8	20	Healthcare Provider	Bahrain	Doctor
9	16	Third Party Administrator	Egypt	Doctor
10	28	Third Party Administrator	Lebanon	Doctor
11	25	Third Party Administrator	MEA	Doctor
12	28	Third Party Administrator	MEA	Doctor
13	20	Insurance	Lebanon	C-Suite
14	16	Insurance	Egypt	Doctor
15	20	Insurance	Turkey	Doctor
16	26	Insurance	Lebanon	Doctor
17	16	Insurance	Lebanon	C-Suite
18	20	Insurance	MEA	Executive Management
19	18	Insurance	MEA	Executive Management
20	20	Insurance	MEA	Executive Management
21	18	Third Party Administrator	MEA	Executive Management
22	16	Third Party Administrator	Lebanon	Doctor
23	19	Insurance	Turkey	C-Suite
24	16	Third Party Administrator	Saudi Arabia	Executive Management
25	18	Insurance	Qatar	Executive Management
26	20	Insurance	UAE	C-Suite
27	20	Insurance	Morocco	Executive Management
28	23	Third Party Administrator	Egypt	C-Suite
29	19	Insurance	Bahrain	Executive Management
30	17	Insurance	Saudi Arabia	Executive Management
31	17	Insurance	Tunisia	C-Suite
32	15	RE-Insurance	MEA	Executive Management
33	15	Insurance	UAE	Executive Management
34	24	Insurance	Saudi Arabia	Executive Management

Note: MEA: Middle East & Africa; UAE: United Arab Emirates