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Big data analytics in healthcare and treatment of patients and health management

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Abstract--The implementation of Big Data Analytics (BDA) in the healthcare industry will make it possible to employ newly developed technology in the management of health as well as the treatment of individual patients. The purpose of this study is to conduct an investigation into the many ways in which Big Data Analytics may be used to the medical field. The research is predicated on an in-depth review of the existing body of literature, in addition to the presentation of a selection of the results obtained through actual research on the application of Big Data Analytics in clinical settings. The direct research was carried out in Poland on a sample size of 217 medical institutions using a research questionnaire as the primary data collection tool. Direct research has shown that medical facilities in Poland are moving towards data-based healthcare because they use structured and unstructured data, reach for analytics in the administrative, business, and clinical area, and studies of the literature have shown that the use of Big Data Analytics can bring many benefits to medical facilities. According to the findings of the research, medical institutions are actively working on both structured data and unstructured data at the same time. It is possible to differentiate the following categories and sources of data: data from databases, data relating to transactions, data relating to the unstructured content of emails and documents, and data relating to devices and sensors. However, the usage of data from social media is becoming less common since users are increasingly turning to analytics in their daily activities. This trend can be seen not only in the administrative and corporate spheres but also in the clinical one. It is evident from this that the judgments that are made in medical institutions are heavily influenced by statistics. The findings of the study provide credence to what has been discussed in previous research, namely that hospitals and other medical institutions are transitioning toward data-based healthcare and reaping the benefits of doing so.

Keywords---big data, big data analytics, health.

Introduction

This study's primary contribution is to offer an analytical overview of employing structured and unstructured data (Big Data) analytics in medical institutions in Poland. More specifically, the paper focuses on Poland. In their daily operations, medical institutions often make use of both organized and unstructured data. Structured data is vast, freeform, and may be presented in a number of different formats. It also has a set schema. In contrast, unstructured data, also known as Big Data (BD), does not fit into the standard format for data processing. BD uses the term "Big" to refer to this type of data. Big Data refers to an enormous quantity of data sets that can't be saved, processed, or evaluated with the same kinds of instruments that have traditionally been used. It is still being kept, but it is not being examined. It is difficult to search and evaluate such data due to the absence of a well-defend schema, and as a result, it requires a particular technology and strategy to turn it into value. Integrating data held in a variety of formats, including structured and unstructured data, may offer tremendous value to a company. A distinct strategy is required when dealing with an organization's unstructured data. As a result, there is hope placed in big data analytics (BDA).

Big Data Analytics refers to the process of analyzing and deriving information from large amounts of data using various methods and technologies. The conclusions drawn from the examination of Big Data may be utilized to make accurate forecasts. They also contribute to the formation of patterns concerning the past. When it comes to medical treatment, it enables the analysis of enormous datasets including information from hundreds of patients, the detection of clusters and correlations between different datasets, and the creation of prediction models through the application of data mining techniques. This is the first research to consolidate and characterize the usage of Big Data from a variety of angles, and this article represents that study. The first section presents the findings of a brief literature review on previous research on Big Data (BD) and Big Data Analytics (BDA), while the second section presents the findings of direct research that was conducted with the intention of determining whether or not medical facilities in Poland make use of big data analyses. Patients, medical professionals, healthcare decision-makers, pharmaceutical corporations, and hospitals are all examples of the various stakeholders involved in the healthcare system. In addition, this industry is restricted by several laws and regulations. However, in many parts of the world, one may witness a shift away from the conventional doctor-patient relationship.

The patient is also an active participant in the therapeutic process, which transforms the doctor into a partner. The treatment of patients is no longer the exclusive concern of those working in the healthcare industry. The promotion of appropriate health attitudes and the prevention of illnesses that may be prevented should be the top priority for those who make decisions. Especially during the Covid-19 outbreak, this entered into the public eye and had a significant role. The next obstacles that the healthcare system will need to overcome are the increasing number of individuals in their later years and the falling birthrate. The fertility

rates recorded in the country are determined to be lower than the reproductive minimum required to maintain a steady population.

The reflection of both impacts, specifically the increase in age and the decreased fertility rates, are markers of the demographic load, which is steadily increasing. According to current projections, it will be difficult to deliver healthcare in the same manner in which it is delivered today within the next 20 years. It is notably obvious now during the Covid-19 epidemic, when healthcare faced quite a problem connected to the analysis of massive data volumes and the need to identify trends and anticipate the spread of the corona virus. This is especially visible today. The pandemic made it increasingly clearer that patients should have access to information about their own health state, the option of performing digital analysis on this data, and access to reputable medical help online. Monitoring one's health and working together with one's physician to reduce the risk of sickness has the potential to completely transform the current healthcare system. Putting the patient at the centre of the healthcare system is one of the most essential components of the transformation that is required in the industry.

Technology alone will not be sufficient to accomplish these objectives. For this reason, adjustments should be made not only at the technology level but also in the management and design of comprehensive healthcare processes, and what's more, they should have an effect on the economic models of service providers. There has been a recent uptick in the number of businesses that are making use of big data analytics. Despite this, medical businesses are not yet capable of satisfying the information requirements of patients, physicians, administrators, and the policymakers who devise these requirements. The implementation of personalized and precise medicine that is based on individualized information that is supplied in real time and is adapted to specific patients would be made possible through the adoption of a Big Data strategy. In order to accomplish this objective, it is vital to put into place systems that will be able to acquire knowledge rapidly regarding the data that is produced by individuals in clinical treatment and in everyday life.

This will enable data-driven decision making, which will result in improved personalized predictions regarding prognosis and responses to treatments; a deeper understanding of the complex factors and their interactions that influence health at the patient level, the health system, and society; enhanced approaches to detecting safety problems with drugs and devices; and more effective methods of comparing preventative, diagnostic, and treatment options. There is a great deal of research that can be found in the published works that demonstrates what kinds of opportunities may be presented to businesses by big data analysis and what kinds of data can be evaluated. However, there are very few studies that demonstrate how data analysis is carried out in the field of healthcare, what data is utilized by medical facilities, and what analyses and in which fields medical facilities carry it out. The purpose of this study is to describe the findings of research conducted at Poland's medical institutions in an effort to fill this gap.

The purpose of this study is to investigate the potential applications of big data analytics in the medical field, with a focus on circumstances in Poland. In specifically, the purpose of this article is to investigate the types of data that are

processed by medical facilities in Poland, the types of analyses that these facilities do and the fields in which they do so, and how these facilities evaluate the level of their analytical maturity. In order to accomplish this objective, a review of the relevant literature was carried out, and the direct research was carried out with the use of a research questionnaire that was distributed to a representative sample of 100 medical institutions located in Poland.

Considerations on use Big Data and Big Data Analytics in the healthcare

Over the course of the past several years, there has been a discernible trend toward an ever-increasing need for solutions that provide efficient analytical tools. This pattern is also discernible through the examination of significant amounts of data (Big Data, BD). Many businesses are investigating the potential of big data in the hopes of enhancing their decision-making processes, gaining a competitive edge, or increasing their overall company performance. Big Data is thought to offer potential solutions to public and private organisations; however, not much is known about the outcomes of the practical application of Big Data in various types of organisations. Big Data is considered to offer potential solutions to public and private organisations. Even under the value-based healthcare delivery model, the focus of healthcare management throughout the world has shifted in recent years, moving away from a disease-centered model and toward a patient-centered approach. This shift was described before. In order to offer effective patient-centered care and satisfy the objectives of this model, it is required to handle and analyse the large amounts of data that are generated in the healthcare industry. The topic of the right use of big data is one that frequently comes up when discussing the application of data in the medical field.

Huge amounts of data have always been produced by the healthcare industry, but now, with the advent of electronic medical records and the massive amounts of data sent by a variety of sensors or produced by patients in social media, data streams are constantly growing. This is a direct result of the combination of these two factors. In addition, the healthcare sector is responsible for the production of vast quantities of data, which might include clinical records, medical pictures, genetic data, and information on health-related activities. If healthcare organizations make effective use of the data, they will be able to provide assistance for clinical decision-making, disease surveillance, and the management of public health. The processing of clinical data presents a number of challenges, the most significant of which are the quantity of data and the complexity of doing so. The term "big data" has been given a variety of interpretations in various pieces of written work. During the course of the past several years, this idea has developed, although it is still not completely understood. Nevertheless, in spite of the wide variety of definitions, "Big Data" can be understood as any of the following: a big quantity of digital data; enormous data sets; a tool; a technology; or a phenomenon (either cultural or technological).

Big Data is sometimes defined as "huge" and "continuously created" digital datasets that are the result of interactions with various forms of internet technology. The concept of "Big Data" may be defended by stating that it refers to datasets that are of such vast volumes that they provide difficulties for more conventional storage and analysis methods. Ohlhorst, who gave a similar

viewpoint about Big Data, believes that Big Data consists of extraordinarily massive data sets that are impossible to handle or analyse using typical data processing techniques.

Ohlhorst's viewpoint is comparable to that of Big Data. According to his point of view, extracting any value from a data collection becomes increasingly harder as its size increases. Knapp, on the other hand, saw big data as a collection of tools, processes, and procedures that enable an organisation to generate, analyze, and manage very massive data sets and storage facilities. According to this point of view, Big Data is seen as a tool that allows users to handle massive volumes of data by gathering information from a variety of databases and procedures. Carter demonstrates an understanding of the term "Big Data" that is comparable to ours. According to him, the term "Big Data technologies" refers to a newly developed generation of technologies and architectures. These technologies and architectures are designed to economically extract value from very large volumes of a wide variety of data by enabling high velocity capture, discovery, and/or analysis. Jordan combines these two approaches by identifying Big Data as a complex system. He does this by pointing out that Big Data requires data bases for data to be stored in, programmers and tools to be managed, as well as expertise and personnel who are able to retrieve useful information and visualize it in order to be understood. According to Laney's definition of big data, which can be found here, "Big Data" may be described as "a vast volume of data created in extremely quick motion and it contains a lot of information" (p. 43).

These types of data originate from unstructured sources, such as the stream of clicks on the web, social networks (such as Twitter, blogs, and Facebook), video recordings from stores, recordings of phone calls made in call centres, real-time information from a variety of sensors, RFID, GPS devices, mobile phones, and other devices that can identify and monitor something. Big Data is a powerful digital data silo that is raw, unstructured, and collected from a wide variety of sources. It is challenging or perhaps impossible to analyze using the standard approaches that have been applied up to this point to relational databases. When discussing what is known as "Big Data," it is impossible to ignore the fact that the phrase refers more to a phenomena than to a particular type of technology. As a result, rather than attempting to define this phenomena and explain them, an increasing number of writers are characterising Big Data by providing them with characteristics, which comprise a collection of V's connected to the nature of the phenomenon:

- Volume (refers to the amount of data and is one of the biggest challenges in Big Data Analytics),
- Velocity (speed with which new data is generated, the challenge is to be able to manage data effectively and in real time),
- Variety (heterogeneity of data, many different types of healthcare data, the challenge is to derive insights by looking at all available heterogeneous data in a holistic manner),
- Variability (inconsistency of data, the challenge is to correct the interpretation of data that can vary significantly depending on the context),
- Veracity (how trustworthy the data is, quality of the data),

- Visualization (ability to interpret data and resulting insights, challenging for Big Data due to its other features as described above).
- Value (the goal of Big Data Analytics is to discover the hidden knowledge from huge amounts of data).

Big data is an information asset that possesses large volume, velocity, and diversity, and its translation into value demands particular technology and approach. Big data is defended as an information asset that possesses these characteristics. Big data is a collection of information that has either a high volume, a high volatility, or a high diversity, and it necessitates new methods of processing in order to enable decision-making, the discovery of novel phenomena, and the optimization of processes. Big Data is too vast to be captured, stored, managed, and analysed using existing data-processing systems and software tools; as a result, it requires new technologies to handle (collect, aggregate, process) its volume, velocity, and diversity.

Big Data is unquestionably distinct from the traditional data sources that businesses have relied on up to this point. As a consequence of this fact, businesses need to address this kind of unstructured data in a different manner. First and foremost, businesses need to begin viewing data as flows rather as stocks; doing so will need the implementation of something that is known as streaming analytics. The aforementioned characteristics make it essential to adopt modern information technology solutions that enable the most efficient utilization of newly acquired data. The concept of "big data," which is inseparable from the enormous rise in the amount of data that is available to a variety of organizations or individuals, makes it possible to have access to useful analyses and conclusions and enables one to make judgments that are more precise. The Big Data idea is always being refined, and at the moment, its emphasis is not on enormous quantities of data but rather on the procedure of extracting value from these data. Big Data is obtained from a variety of sources, each of which contributes distinct data qualities. This information is then processed by a variety of organizational units, which ultimately leads to the formation of a Big Data chain. Big Data management, processing, and analysis are the primary focuses of these firms. Big Data streams in the medical field are made up of many different kinds of data, including the following sorts of information:

- clinical data, i.e. data obtained from electronic medical records, data from hospital information systems, image centers, laboratories, pharmacies and other organizations providing health services, patient generated health data, physician's free-text notes, genomic data, physiological monitoring data
- biometric data provided from various types of devices that monitor weight, pressure, glucose level, etc.,
- financial data, constituting a full record of economic operations reflecting the conducted activity,
- data from scientific research activities, i.e. results of research, including drug research, design of medical devices and new methods of treatment,
- data provided by patients, including description of preferences, level of satisfaction, information from systems for self-monitoring of their activity: exercises, sleep, meals consumed, etc.
- data from social media.

These data are given not only by patients, but also by organizations and institutions, as well as through a wide variety of monitoring systems, sensors, and tools. The healthcare industry has utilized both paper and digital formats for the storage of the data that it has created up to this point. Thus, the essence and the specificity of the process of analyzing Big Data implies that enterprises need to confront new technological and organizational problems. The healthcare industry has historically been responsible for the generation of enormous volumes of data. This is associated, among other things, with the requirement to keep medical records of patients. However, the difficulty with Big Data in healthcare is not confined to an overwhelming number of data; rather, it also includes an unparalleled diversity in terms of the types of data, the data formats it should be examined in, and the speed at which it should be studied. When dealing with unstructured data, it is challenging to use typical tools and techniques of management. It is necessary to have advanced analytical tools and technologies, in addition to Big Data analysis methods, in order to meet and exceed the possibilities of managing healthcare data. This is because the variety and quantity of data sources that are being collected are continually increasing. As a result, the promise is recognised in Big Data studies, particularly with regard to the issue of enhancing the quality of medical treatment, saving lives, or decreasing costs.

Methods

The research is predicated on an evaluation of the existing body of scholarly work, in addition to the presentation of a selection of the findings from primary investigation into the application of big data analytics in Polish medical institutions. The results of this investigation have been compiled and presented as part of a wider questionnaire about big data analytics. The interview questionnaire that the direct study was based on had 100 questions with a 5-point Likert scale (1—strongly disagree, 2—I rather disagree, 3—I do not agree, nor disagree, 4—I rather agree, and 5—I absolutely agree), as well as 4 metric questions. The research was carried out in the month of December 2018 at a total of 217 different medical facilities (110 private, 107 public). A specialist market research firm known as the Center for Research and Expertise of the University of Economics in Katowice was responsible for carrying out the study. In terms of the conduct of direct research, the organizations that were chosen comprised both publicly funded organizations (23.5% of the total), such as the National Health Fund, as well as privately owned and operated organizations (11.5 percent). More than half of the businesses that were studied are considered hybrid funded, meaning that their funding comes from a combination of public and private sources. The diversity of the study sample extends to the size of the entities as well, which is measured by the total number of workers. Taking into account the proportions of the entities that were surveyed, it is important to point out that in the structure of the sector, medium-sized entities (those with 10–50 employees, which made up 34 percent of the sample) and large entities (those with 51–250 employees, which made up 27 percent) predominate. The scope of the study encompassed the entirety of Poland, and the entities that were included in the sample were drawn from each of Poland's voivodships. The biggest group consisted of entities from the voivodships of ódzkie (32%), łskie (18%), and Mazowieckie (18%).

This is because these voivodships have the highest concentration of medical institutions. Single units were assigned to reflect the many other areas of the nation. The sample for the research was chosen in a random and tiered fashion. A database of medical facilities has been compiled, and as part of that database, several categories of private and public medical facilities have been established. The facilities that were targeted by the questionnaire were taken from each of these different groups. The GNU PSPP 0.10.2 programme was utilised throughout all of the studies that were carried out. The purpose of the research was to ascertain whether or not medical institutions in Poland make use of Big Data Analytics and, if so, in which sectors of the country it is utilized. Table 2 outlines the characteristics of the research sample to be used in the study. The research is not comprehensive since it is partial and has an uneven regional distribution of the samples, with three voivodeships (Łódzkie, Mazowieckie, and Łskie) being overrepresented in the data. The authors of the study are able to draw precise conclusions regarding the application of Big Data in the course of its management since the sample size of the research was sufficiently large (217 entities).

Table 2
Characteristics of the research sample

The form of ownership	
Public	49.31%
Private	50.69%
Type of services provided (due to reimbursement)	
Under a contract with the NFZ (payer)	23.51%
Commercial only	11.52%
Both forms	64.97%
Number of employees	
Up to 9	17.51%
10–50	34.10%
51–250	27.19%
251–500	13.36%
501–1000	5.53%
Over 1000	2.30%
Voivodeship	
Dolnośląskie	3.2%
Kujawsko pomorskie	0.9%
Lubelskie	9.2%
Lubuskie	2.8%
Łódzkie	32.3%
Małopolskie	4.1%
Mazowieckie	18.4%
Opolskie	1.4%
Podkarpackie	1.4%
Podlaskie	1.4%
Pomorskie	1.4%
Śląskie	18.4%
Świętokrzyskie	1.4%
Warmińsko pomorskie	1.4%
Wielkopolskie	0.9%
Zachodniopomorskie	1.4%

Table 3
Type of data sources used in medical facility (%)

Statement	1	2	3	4	5
Our organization collects and uses structured data (e.g. databases and data warehouses, reports to external entities)	6.17	7.93	23.35	47.58	10.57
Our organization collects and uses unstructured data (Big Data)	13.66	17.18	27.31	28.19	9.25

1—strongly disagree, 2—I disagree, 3—I agree or disagree, 4—I rather agree, 5—I strongly agree

Table 4
Collection and use of data determined by the size of medical facility (number of employees)

Statement	Number of employees	
	Kendall's Tau (τ)	p
Our organization collects and uses structured data (e.g. databases and data warehouses, reports to external entities)	0.16	<0.001
Our organization collects and uses unstructured data (Big Data)	0.23	<0.001

In order to accomplish the goals of this study, the following hypotheses regarding research were developed: (1) Polish hospitals and other medical institutions are dealing with both organised and unstructured data. (2) Medical institutions in Poland are beginning to realise the benefits of data-driven approaches to patient care. The following research questions and statements are posed in the article, and they correspond with the questions that were picked from the study questionnaire:

- From what sources do medical facilities obtain data? What types of data are used by the particular organization, whether structured or unstructured, and to what extent?
- From what sources do medical facilities obtain data?
- In which area organizations are using data and analytical systems (clinical or business)?
- Is data analytics performed based on historical data or are predictive analyses also performed?
- Determining whether administrative and medical staff receive complete, accurate and reliable data in a timely manner?
- Determining whether real-time analyses are performed to support the particular organization's activities.

Results and Discussion

Following the review of the relevant literature and completion of the research project, a number of inquiries and hypotheses pertaining to the investigated topic were conceived of. According to the findings of the studies, medical facilities obtain data for their operations from a wide variety of different sources. The data

that come from these sources are both organised and unstructured (Table 3). According to the information that was provided by the respondents, taking into consideration the first statement that was made in the questionnaire, almost half of the medical institutions (47.58 percent) agreed that they prefer to collect and use structured data (such as databases and data warehouses, reports to external entities), and 10.57 percent completely agree with this statement.

The proportion of delegates from medical institutes who responded with "I agree or disagree" ranged as high as 23.35 percent. Another 7.93 percent of medical institutions do not collect and use structured data, while 6.17 percent disagree strongly with the first assertion. Furthermore, the median value of 4, which was derived based on the findings that were collected, is evidence that medical facilities in Poland collect and make use of structured data (Table 4). As a result, 28.19 percent of the medical institutions polled agreed that they would rather acquire and use unstructured data, and 9.25 percent of those polled are in complete agreement with this statement. A total of 27.31 percent of delegates from medical institutes gave responses along the lines of "I agree or disagree." The first assertion is rejected outright by 13.66 percent of respondents, who maintain that other medical institutions do not collect and make use of structured data (17.18 percent).

When it comes to unstructured data, the median value is 3, which indicates that medical facilities in Poland gather and use this kind of data to a lesser extent than other countries. In the next stage of the investigation, it was determined whether or not the kind of ownership held by a healthcare organisation as well as the size of the medical facility had an effect on whether or not the organisation does unstructured data analysis (Tables 4 and 5). Calculations of correlation coefficients were carried out in order to arrive at this conclusion. According to the results of the calculations, it is possible to reach the conclusion that there is a negligible statistically monotonic link between the size of the medical institution and its collection and utilisation of structured data ($p < 0.001$; $r = 0.16$). This indicates that larger medical facilities are making somewhat more use of structured data than they did previously. According to the utilisation of unstructured data, the size of the medical institution is much more relevant ($p < 0.001$; $r = 0.23$). (Table 4.). The Mann-Whitney U test was utilised in order to answer the question of whether or not the ownership structure of a medical institution has an impact on the data gathering process. According to the results of the calculations, the kind of ownership does not have an impact on the data collected and utilised by the organisation (Table 5).

Table 6 provides an in-depth look at the various information gathering and utilisation practises employed by various medical facilities throughout the world. The results of the questionnaire indicate that medical facilities make extensive use of the information that is published in databases, reports to external units, and transaction data. However, these facilities also make extensive use of unstructured data obtained from e-mails, medical devices, sensors, phone calls, and audio and video data (Table 6). A limited amount of data is taken from social networking platforms, RFID readers, and location tracking systems. The literature research all come to the same conclusions on their findings. Based on an examination of the responses provided by the respondents, it has been

determined that more than half of the medical facilities had integrated hospital systems (HIS) in operation. 43.61 percent of hospitals employ integrated hospital systems, with 16.30 percent of those hospitals using it significantly (Table 7). 19.38 percent of medical facilities do not utilise it at all. This percentage represents examinee medical establishments. In addition to this, the majority of the analysed.

Table 5
Collection and use of data determined by the form of ownership of medical facility

	The form of ownership	N	Average	SD	Median	Mann-Whitney U test	p
Our organization collects and uses structured data (e.g. databases and data warehouses, reports to external entities)	Public	107	3.56	0.92	4.00	0.426	0.670
	Private	110	3.45	1.10	4.00		
	All	217	3.51	1.01	4.00		
Our organization collects and uses unstructured data (Big Data)	Public	107	3.15	1.05	3.00	1.330	0.184
	Private	110	2.90	1.32	3.00		
	All	217	3.02	1.20	3.00		

Table 6
Data sources used in medical facility

Type of data	1	2	3	4	5	Average	Median
Information publicly available in databases	2.64	3.52	19.38	46.70	23.35	3.88	4
Reports to external units	5.73	7.05	23.35	38.33	21.15	3.65	4
Logs	11.45	21.59	20.26	26.87	15.42	3.14	3
Transaction data	11.01	14.10	20.70	31.72	18.06	3.33	4
E-mails	8.37	10.57	28.19	30.84	17.62	3.41	4
Data from medical devices	11.01	11.45	21.59	29.07	22.47	3.42	4
Data from sensors	15.42	12.78	22.47	27.31	17.62	3.20	3
Social media	21.59	22.03	27.75	16.74	7.49	2.65	3
RFID codes	25.11	17.62	23.79	23.35	5.73	2.65	3
Geolocation data	30.40	19.38	23.35	19.82	2.64	2.42	2
Phone calls	11.45	14.54	21.59	28.63	19.38	3.31	4
Audio and video data	20.26	19.38	19.82	28.63	7.49	2.83	3

1—we do not use at all, 5—we use extensively

Table 7
The use of HIS and electronic documentation in medical facilities (%)

Statement	1	2	3	4	5
1. Integrated hospital system	19.38	3.08	13.22	43.61	16.30
2. Electronic documentation of patients	4.85	3.96	19.82	34.80	32.16

1—we do not use at all, 5—we use extensively

Conclusion

The quantitative analysis of the study that was conducted and presented in this article made it possible to identify whether or not medical institutions in Poland employ Big Data Analytics, and if so, in which parts of the country this practice is utilized. Because of the findings that were collected, it was able to draw the following inferences and conclusions. Structured and unstructured data, the likes of which are generated by databases, transactions, the unstructured content of emails and documents, devices, and sensors, respectively, are being examined and utilized by medical institutions. They use analytics not just in the therapeutic field but also in the administrative and business areas, according to the findings of analytics. It was very evident that the judgments that were taken were heavily influenced by the statistics. The findings of the study provide support for what has been discovered via previous research. Many hospitals and other medical institutions are making the transition to data-driven healthcare and reaping the benefits of doing so. In conclusion, the use of Big Data Analytics in the healthcare industry has the potential to have a beneficial influence as well as worldwide ramifications. In the future, research on the application of big data in medical facilities will focus on the definition of the strategies that medical facilities will adopt in order to promote and implement such solutions, as well as the benefits that they gain from the application of big data analysis and how the perspectives in this area are seen by those involved.

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