Modern Patient Engagement

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Abstract – *This paper covers the usage of big data to understand healthcare consumers in an attempt to better serve their demands and requirements and it also describes how Healthcare leaders can use machine learning, artificial intelligence, big data analytics, also including natural language processing, and to draw useful conclusions and ensure patients actively participate in their own care. This paper also covers some of the areas where this patient engagement technology are facing issues of preventing the implementation of Patient engagement technology and where healthcare should work more in order to implement patient engagement technology effectively.*

Keywords: Patient-centric, Clinical outcome, RTLS, Care Managers, risk-averse.

I.INTRODUCTION

Patient engagement holds the ability to convert care-seeking consumers into new patients and allows existing patients to become more involved in their health. It responds effectively to the qualities and demands of value-based and consumer-driven healthcare. Various patient engagement tools, procedures that foster patient engagement can directly impact patient's safety, cost and quality and patient experience. It can assist to accomplish timely access to care as well as development of performance and results. Better quality of life for patients and increased retentively and medication adherence are broadly considered as achievable goals of an effective patient engagement strategy.

Various technologies such as NLP and Machine learning, Artificial intelligence and big data, plays a vital role in the transformation of healthcare for patient engagement. It sets a standard for the systematic efforts toward engaging patients. Organizational processes that shows the technological competitiveness to effectively engage will not only help providers to grow and develop but could be necessary to survive. With the possibility of patient engagement solutions healthcare industry is witnessing these as a gift. It is possible that the new patient requirements will gradually help to improve patient engagement with healthcare technology, but might present some initial challenges for the healthcare providers. It is a significant factor for the betterment for healthcare consumers. It is required patients to maintain their well-being, they should take an active participation in their care and understand what they should do to stay healthy. In recent years, we saw several "beyond the patient's drug" examples of expanding patient engagement solutions deployed by life science companies. This also includes a wearable devices and mobile app to track activity like heart rate and bleeds to better manage human activity. These engagement methods are starting to show constant benefits irrespective of the drug, illness. These achievements are creating an acceleration of efforts by life science companies. Apart from this, patient engagement is considered as an important skill for patient's development in terms of health, and reducing costs of health care services and providing healthier experience of Patient care. Patients and service providers will continue to seek advice and support for themselves using various modern patient engagement methods. However, Healthcare company's risk-averse tendencies are an internal barrier to more aggressive adoption, even while these companies strive to be more patient-centric. Life science organization will also need to overcome patient and trust barriers. Furthermore, Patient engagement is gaining interest by majority of the disciplines Involved in health research and it is not just important, but somewhere mandatory to the business of providing healthcare services.

2. METHODS

2.1 Natural language processing application

NLP (Natural language processing) offers substantial opportunities to healthcare to advance medical processes and services. For many healthcare sectors, the strongest and most instant use cases for NLP are related to improve Patient service (impacting cost, service levels, and Patient satisfaction).As healthcare boost their NLP implementations, new skills should be explored. Data scientist talents might also be necessary given the increasing use of data science techniques in NLP applications.

Furthermore, current NLP opportunities exist for healthcare but are not as mature, or will require effort before they provide consistent returns on input just like application with EHR (Electronic Health record) or the application with unlabelled data, offer opportunities to improve operations and lower costs. However, these NLP-based solutions are less accurate than similar human-based options and may benefit in some cases from human involvement.

Initial projects should start with unassuming goals in order to demonstrate success. As knowledge is obtained, projects should iterate, and scope can increase. More accessible use cases include translation of documents, or mining text from consumer interactions for insights on sentiment or issues is one of the more accessible use case. The feature of NLP solutions offering knowledge-based consolidation, content mapping, search improvements and text summarization will vary. As a result, healthcare managers should test and verify the efficiency of these solutions before making substantial commitments. NLP will now be able play a necessary role in health Promotion and patient engagement soon.

2.2 Enhancing patient and clinical test engagement with artificial intelligence

Clinical patient engagement for clinical research can ease medical treatment by formation of new concepts with more precision, accuracy and Innovation for the diagnosis for harmful diseases.

To be a part of this research, patient needs to cover long distances to reach clinical centres, which results in less participation in this research. This problem can solved by Artificial intelligence by active patient participation, which provide a simpler way to recruit and connect with different patient populations. Technologies that are based on artificial Intelligence such as smart watches, and smartphone apps to support collection of active as well as passive data, which can considerably increase patient participation clinical research.

Furthermore, Digital technologies can transform how companies approach clinical development by containing valuable insights from several sources of data, fundamentally enhancing the patient healthcare experience, and increasing the amount and quality of data collected in observations. We can take the advantage digital technologies to reduce patient travel burdens and allow patients to participate in clinical observations from the comfort of their own homes. Additionally, AI can speed up the time-consuming process of matching patients to appropriate clinical trials, a challenge that is also associated with low patient participation rates. This can assist all patients to be screened for all available clinical trial opportunities.

The speed and accuracy of the tool and the team of screening coordinators allows physicians to proficiently improve medical treatment plans for patients that reflect the wide range of choices available to support their care. In clinical research, big data analytics tools can help investors across the care domain to enhance patient engagement. With NLP, AI, and machine learning, patients can actively participate in their own care, which is essential to improve care delivery and health outcomes.

2.3 Big data technology using radio frequency identification

Real time Locating System (RTLS) and radio frequency identification (RFID) technology and can be utilized to facilitate better patient engagement. We can use RFID wristbands and RFID-based printers to make patient tracking more reliable for readers and easy to operate. Generally, this technology can be integrated with Doctor's identification card as a results of which it can provide better connection between patients' health condition, Duration of doctor was with the patient. And with advantage of RFID patient's behaviour can be completely monitored. Apart from monitoring the behaviour of doctors or nurses, the data packets that are garnered from bedside monitors when a patient is in a hospital can be scrutinize to detect delicate but detrimental changes and alert medical staffs. It can also give the data regarding the distance travelled by doctor across the healthcare organization to provide their services to the patients and will reduce the travelling duration to provide quick services to their patients.

It is possible to detect patient's condition and behaviour by the attached devices such as health tracking sensors on the patient's body. These sensors can compute crucial state of patient's body and if required will inform doctor in critical conditions. The remote diagnosis in healthcare and treatment of patients with the help of telecommunications technology like telemedicine can be utilized for patients that have difficulties to reach hospital for the diagnosis. Harmful diseases such as Heart attack is possible identify from predictive analysis.

2.4 AI assistants are enhancing patient engagement at home

Today most of the companies are attracted in using voice as an interface for the smart solutions by the implementation of voice experience for AI. Top MNCs are already working with several other companies to add voice controls to any connected solution that has a microphone and speaker: Some companies are providing smart Voice Services, For the enhancement of smart voice experiences, a large number of companies in the developer section have taken charge of helping businesses design branded "skills" that are more complex and follow precise implementation process.

These skills are designed by the businesses or by the companies themselves through tools that facilitate voice-based home assistants to be used in more difficult settings. It is globally accepted that patient can recover much faster at home rather than in hospitals. Home AI Assistants are promoting interesting opportunities to deliver wide range of healthcare solutions at home. Just like age-related illnesses or people living at home independently can use AI assistants to control medicine intake and also they can schedule medical appointments with the doctors. Today, more and more healthcare service providers are introducing advanced approaches to home healthcare and assisted living, driven by the need to minimize the cost of healthcare services.AI assistants can also edify patient and record health indicators for nurses or doctors to analyse and act on.

AI assistants now a days are allowing healthcare service providers to improve the reach of medical treatments but the development of AI is still in the progress, meaning that AI assistants are not ready to provide medical diagnosis for all types of health issues, but rather assistance in relatively low-risk, non-life-threatening medical services such as playing music to relax a person with mental health issues or booking a doctor's appointment. Some of the commercial AI assistants at present can't even differentiate and identify users through which mismatch in medical intake of the patient such as right pill would be possible. Patients after having incorrect treatments can have detrimental health problems which is a major risk. If the whole voice experience is not designed and configured correctly then AI Assistants can potentially mislead patients and expose them to hazards. Any mistake in the design of the virtual experience can cost lives. That's why, implementation of safety standards and software quality assurance in healthcare sector is necessary. Despite of that, AI assistants will become a key component of home-based healthcare if it follows mandatory steps in the development process. Defective software may be fine most of the time in several Informational technology industries, but when dealing with healthcare, there should be no margin of errors.

2.5 Machine learning

Machine learning is the approach which is not just the big global technical companies but all major companies as diverse as health, oil and finance are using. This companies are using software of different generations, languages, and versions and is of variation in terms of quality especially in Healthcare system, in which a large amount of data is poorly documented and undertaking a digital transformation on it is often like working blind. If Healthcare companies do not have the budget, time and resources then it almost impossible. But in this competitive world, healthcare companies need to have clarity in this code and to analyse it to get visions that will help them improve their code base to compete more effectively. Here machine learning comes into the picture in order to analyse these software code with the help of algorithms. Code will be analysed as data for deep learning analysis of code structure, then transformation of code into the library to calculate multilingual sentence embedding's.

A new challenge that seems is the success of MI to build a real-world applications because managing the ML application lifecycle can be a tough task when number of applications begins to increase. The applications must be fed with data to operate, but if the data starts to diverge from the type of data which was used to train the MI Structure then this could affect the ML structure. With the help of SQL interface and Apache Spark large historic data sets of the healthcare system can be generated in the form of input to the ML representation.

The data should be continuously checked to make sure that the result can be trusted but it is again a problem and this major problem can be identified by machine learning Workflows on Kubernetes.

3. ASSESSMENT:-RISK INVOLVED

Inadequate or incorrect data will ruin any patient engagement strategy. Data accurateness is very crucial, and data from both internal and external facilities is required to create a complete and efficient patient engagement program. An important part of the initial planning level for patient engagement must include identification and categorization of the required data. Programs that is based on the giving and taking of personal health information must be carried out with the topmost level of protection of data from unauthorized access and should be according to HIPPA (Health Insurance Portability and Accountability Act) standard for patient data safety and protection. If a design is not accurate then executed patient engagement activities can harm more than anything. For example, patient engagement solutions gives clinical pathways using evidence-based procedures. Implementation of clinical digital patient engagement needs that clinical procedures reflect local practice standards. If patients receive inappropriate advice, they will not take the appropriate action. Patient engagement can reveal inconsistencies or variations in process that should be considered before they are exposed to healthcare patients.

4. RECOMMENDED ACTIONS TO BE TAKEN FOR FUTURE ENHANCEMENTS

By Evaluating your organization's capability to bring together patient engagement efforts onto a single platform, including change management that would need to occur. Work more on to identify and track patient activity, evaluate programs, and make recommendations on the next best action at the heart of successful patient engagement and work with existing patient engagement vendors to determine their ability today or accept the near future to provide a single platform for patient engagement and evaluate your organization's cultural ability to accept machine learning algorithms as a technology to help guide patients through their healthcare journey. It is more and more important that data from numerous sources including Biometrics technologies such as fingerprint scanners, facial recognition tech, palm vein readers, iris scanners and others should be incorporated, for the identification of patients and employees. Also we can evaluate a patient's progress across intervention programs as well as evaluate the effectiveness of the programs themselves through analytics. Digital patient engagement vendors are embedding machine learning into their products to engage patients in the conversation. Care managers can also engage patients in a conversation manually. The use of machine learning algorithms improves the granularity of a patient's profile and can also learn and understand how similar patients have medically treated from and can determine how to effectively communicate with a patient to generate optimal outcomes. Modern Algorithms are made to learn patient's answer to a question and serve up the either additional questions or make recommendations on next best actions. These applications are enabling bidirectional communication through scripted algorithms and alerts that may go to a care manager and then will initiate further conversation either through the application or another channel such as a Phone call.

Table1. Proposed actions and barriers for Patient Engagement Implementation.

Difficulties in Implementation of Patient Engagement	Recommended areas for Patient Engagement
Cost to Patients	Efficient Intergration with EMR system
Lack of intergration of modern technologies with EMR system due to complexity.	Lower cost , Easy to use and effective products
Patients Data Security.	Improved Security

5. CONCLUSION

This deals with the utilization of modern technologies to implement successful patient engagement. Today's healthcare system facing issues to achieve the requirements of patients as it troubles in continuity and personalization and Clinical outcomes is achievable for healthcare sectors nowadays. Successful patient engagement will be possible if modern technologies must be implemented efficiently and it's widely known but it has constraints in functionality and fragmentation. So, new aims of patient engagement is becoming a reality, which will engage patients in their health because of which they can learn modern strategies that provides better results is what is needed. Healthcare organizations have the possibility to adopt patient engagement platform, and to create great patient experience that both improves patient satisfaction and contribution towards clinical outcomes.

6. REFERNECES

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