ACIS 5574 Healthcare Data Management
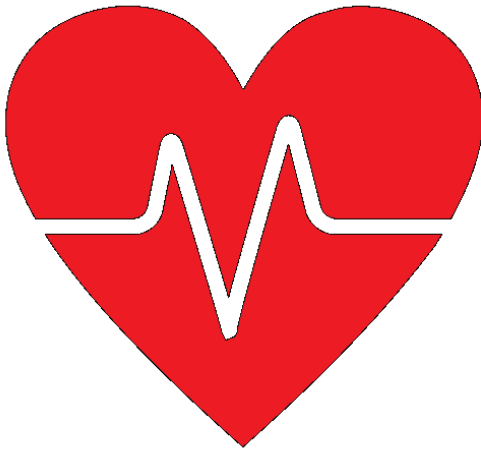
The Healthcheck Corp: <u>Solving the Opioid Epidemic through Data</u>

Write-up: Implementation Plan

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1. Executive Summary

The opioid epidemic is killing Americans at a higher rate than ever. As of 2017, an estimated 47,600 unique Americans have succumbed to an overdose death involving any opioid (National Institute on Drug Abuse, 2019). Compared to the total 2007 (18,515), we see an unprecedented leap in yearly deaths for Americans. Between 21% to 29% of patients misuse their prescribed opioids, 8% to 12% develop an opioid use disorder, and an estimated 4 to 6% eventually move from prescribed opioids to heroin (National Institute on Drug Abuse, 2019). It is now more important than ever to utilize IT in better collection information regarding the process flow and distribution of opioid within the United States. 'The Healthcheck Corp' has instituted an EHR to change and improve the tracking of opioid prescriptions to curtail the epidemic, detailed below.

Implementation Plan

The objective is to take an incremental approach to the three contextual levels (Organizational, Clinical Unit, and Individual) for each stakeholder. Each stakeholder: clinicians, researchers, and law enforcement, will need to be carefully assessed at each contextual level to implement a focused plan efficiently. Due to the minimal introduction of our system, growing from one healthcare facility to the other, the incremental approach must be taken to ensure user acceptance.

Quality Improvement

The progression of the opioid crisis in the US has not only been an issue of Americans perishing, but the cost of treating this illness has reached into the $100s of billions. The objective of our EHR is to improve upon the current systems which track this crisis. Aligning vital stakeholders to obtain information from a centralized and informationally dense database will help improve the existing quality/tracking of this ongoing crisis.

Data Quality

Creating robust data points to feed into our EHR was not only a team requirement but an industry standard within the healthcare field. Reliable and pertinent

data points to the problem at hand determine the value of EHR results. It's important to the team that data be accurately inputted and processed within the EHR.

Change Management

An issue many EHR organizations experience is that of replacing or phasing out legacy EHR systems. It is essential to realize that change management is unique for each stakeholder in terms of ready acceptance and system transition. Each of our stakeholders has various IT abilities, as well as unique organizational cultures, which further emphasizes the need for focused change management.

Error Reporting

Issues regarding the results of our EHR report essentially boil down to user error. The introduction of a new EHR system, as well as teaching the operation/nuances of an EHR, should be heavily considered as a risk to error reporting in the form of human input error. The beginning of the data input comes from the clinician, which is why training on operability and best practices is instituted. Without the initiation of best practices, we can see the brunt of error reporting coming from user error.

Reminders and Alerts

Alerts/Reminders are inherently built into the existing prescription platform. When a prescriber inputs inaccurate information, which is then sent to the dispenser, the prescription is rejected and sent back to the original prescriber. The data to be implemented into the EHR is not affected as the process is stopped at the dispenser point.

Predictive Analytics

Different data points from each patient deliver predictive analytics for each of our stakeholders. It is a focus of our EHR to utilize data points to be compiled and presented so that the resulting predictive analytics can be deemed useful. Our focus was to deliver analytics, which represents communities and their opioid prescription lifecycle. Predictive analytics aims to better robust existing research with unique data points derived at the community level.

2. Reflection: Evaluation of MS Access DBMS Solution

2.1   User Experience Reflection #1 (Bilal Ali)

In a sense, yes and no. While it would be inaccurate to say our one DBMS solution has solved the entire opioid epidemic, I believe we have laid the groundwork for a solution to be created. With the data collected, there are a variety of user groups that would benefit from our Opioid Database Management Solution. Doctors can identify when patients may be at risk of overdosing before an incident occurs. Hospitals can monitor their prescriptions written each day, so they may detect when doctors are overprescribing. Similarly, licensed Dispensers such as nursing homes or pharmacies who are abusing the system by dispensing medication at an unusual rate, will now be easily identifiable. Local governments can benefit from the research by taking a step back and looking at the amount of prescription medicine consumed in a region, to gain a better grasp of where there is a need for additional rehab/ help facilities. With more adoption, our solution will only scale to help address the needs of all of those impacted by the opioid crisis.

In terms of the raw data collected, our system has fully harnessed the entire scope of prescription medicine. This includes confidentially storing information from dispensers, prescribers, patients, and hospitals alike. The sheer power of analytics brought together with our database solution is enough to provide researchers with the foundation of where to focus their attention when crafting a solution. The other aspect our system addresses is the flow of prescriptions through this vicious cycle. From prescriptions being written to the time the orders are filled, analysts can track the exact point where the prescription medication industry is being abused. While our system is great at understanding the trends in distribution, it does fail to account for any fraud during the manufacturing phase. Our system was built understanding the primary use case of overdosing being from: individuals getting injured, receiving medication, then either they or a close family member forms an addition being in such close proximity to said medication. While this was intentional in design, it is an oversight if we hope to address the full scope of the issue.

2.2   User Experience Reflection #2 (Sharmesa Rogers)

The system design was not designed in this phase to be interoperable. The DBMS would be effective in small to medium hospital organizations that has multiple prescribing officials to monitor prescriptions by their prescribers. Our system would also be effective in identifying patient trends and analyzing treatment patterns. To solve our initial problem defined we would need a data warehouse with the ability to harness multiple agency and hospital information to fully impact the epidemic.

Our system aimed to help healthcare organizations mitigate the over prescribing of opioid medication while simultaneously monitors physicians and clinician prescribing patterns. The system did not successfully meet this criterion because the data relied solely on input from clinicians. Meaning, if a clinician or physician had a history of opioid prescription, they do not report certain prescription under patients of patients may refrain from being serviced at a hospital with the database in place. These actions would skew results and feedback from the DBMS and result in inaccurate reflection of the problem being addressed.

The data entry methodologies met our expectations and needs for data analytics. The tables and queries exceed expectations by giving our team easily readable data to interrupt about use patterns and identifying individuals and the role they may play in our fictitious healthcare organization.

2.3   User Experience Reflection #3 (Abuye Tsehay)

The DBMS solution we designed has tremendous potential to contribute to reduction of problematic opioid prescription patterns, misuse of opioid medication and improves the way opioids are prescribed. Such a system would ensure patients have access to safer, more effective chronic pain treatment while reducing opioid misuse, abuse, and overdose. Providers would make informed decisions on patient opioid related prescription. The database is designed to allow for quick, real-time transactional processing.

The DBMS also provides accessible wealth of data to researchers who would like to make a meaningful contribution to the reduction of opioid epidemic. It also alerts law enforcement agents for potential drug abuse and fraud in real time. The stakeholders incorporated in the DBMS system are the most important determinants in the opioid prescription process and thus makes the database comprehensive.

The requirement that exceed the expectation would be the idea of integrating the new DBMS solution to the existing EHR and pharmacy management systems so that it avoids the extra reporting requirement of the existing PDMPs databases. For PDMPs providers have to separately enter the prescription data into the state PDMP databases. This could lead to data entry errors or missing entry. The new DBMS solution seamlessly integrates to the existing EHR and pharmacy management system and removes extra burden of reporting requirement.

I strongly believe this DBMS solution would effectively contribute to the ongoing national discourse on establishing a well-designed, accessible, scalable, integrated and interoperable database system solution in order to effectively reduce the problematic opioid prescription pattern while ensuring patients have access to safer pain management treatment.

2.4   User Experience Reflection #4 (Jack Weber)

Yes. The proposed system was complete to our specifications. The objective of this EHR was to create a new form of tracking the opioid crisis. Success in this database is based on the frequency of use by communities and their surrounding municipalities. Creating an EHR with a centralized data source which can be used by key stakeholders to track the flow of prescription opioids was our goal. We have met the goal of solving/enhancing the existing EHR solutions to this healthcare problem.

In order for this EHR to be successful, stakeholder information would need to input within our proposed EHR system. Creating an easy to input interface for stakeholders to load their information to create our data points would most likely need to improve upon. If user error is present, then the data is at risk of becoming 'void' since it does not accurately reflect the data point. Further investigation into developing a user-

friendly interface for alerts and reminders (outside of existing practices) should be developed in order to prevent delay in patient receipt of their needed medication.

The system did a great job identifying key stakeholders and the process flow of a prescription. This in turn allowed us to create a more robust database, further tracking the full lifecycle of opioid and their distribution from prescriber to patient. A tracking system which is built for many stakeholders with a robust structure exceed my expectations.

2.5 Team Reflection

The overall team reflection of the EHR/DBMS is that of a positive step in the direction of a unified system which can assist various stakeholders. Our EHR lays the groundwork in identifying opioid issues within stakeholder communities. The key words, as to the value proposition of our EHR, comes from identifying and tracking the flow of opioids through data points pertinent to our stakeholders. Identifying and tracking are only the beginning steps to solving a present opioid issue within a community. Errors can occur if prescriber inputs correctly and this can cause data reliability issues with our system. Additional safeguards and reminders in order to prevent data manipulation or inaccurate inputs.

3.　Quality Improvement of Current Problem

Drug overdose deaths continue to increase in the US. On average, 130 Americans dies every day from opioid overdose. Around 68% of the more than 70,2000 drug overdose deaths in 2017 involved opioid (CDC, 2017). Moreover, according to the same source, 36% of all opioid overdose deaths involve a prescription opioid. Figure- 1 below shows the three waves of the rise in opioid overdose deaths.
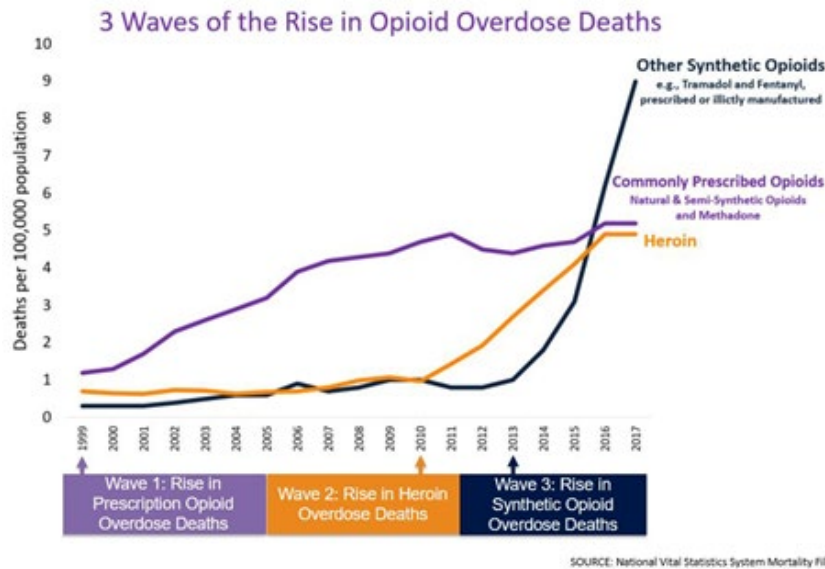
Figure-1 Three waves of Rise in Opioid Overdose Deaths

In terms of economic costs, since 2001 it is estimated that the opioid epidemic has cost the United States more than a trillion dollars and is projected to cost an additional $500 million over the next three years (DISA 2019). Health care expenses linked to opioid use has totaled more than $215 billion since 2001 and stems mainly from ambulance cost, emergency room visits, and the use of naloxone which is used to reverse the side effects of an opioid overdose quickly (DISA 2019). In addition, the emotional toll on individuals, families, and society is also negatively impacting the wellbeing of the society and to the loss of productivity.

Thus, the epidemic is real and needs a technology-enabled and data-driven solution to develop and implement effective prevention, mitigation, and intervention policies. Improving the data quality and tracking trends help to better understand and respond to the epidemic. Availability and utilization of quality data contribute to effective prevention, mitigation, fraud, and abuse prevention policy developments need to be guided by scientific results. Prescription Drug Monitoring Programs (PDMPs) is one of the most standard solutions to the crisis so far. The database is designed to track prescriptions by patient and provider. However, the effects of PDMP implementation have been challenging to assess, which led to inconclusive and contradictory results. This is mainly attributed to data quality and a lack of standard research protocol.

Our database management system, ODMS, could help improve data quality and tracking trends to better understand and respond to the epidemic. The database collects information on related opioid medication at the point of dispensing, and data are available to authorized users in real-time. The database management system is an inclusive platform for the most important actors in the opioid prescription process, including physicians, pharmacy, law enforcement agents, and researchers. The database management system is in sync with the existing pharmacy management system and providers EHR system so that real-time alerts and trends proactively notify law enforcement agents and researchers. Physicians and pharmacies are also able to make an informed prescription decision as the system is capable of retrieving data on the patient's history of medication and identify potential drug-to-drug interaction.

3.1　Models for Improvement

Six Sigma Model

The principles of Lean Sigma are being used in a range of industries to improve process efficiency by eliminating waste and reducing defects. Healthcare industry is no exception. Healthcare industry processes are more sensitive than other sectors as defects or medical errors in healthcare term can easily mean the difference between life and death. In the US, medical errors are the third leading cause of death next to heart diseases and cancer. According to a recent Johns Hopkins study, more than 250,000 people in the U.S die every year from medical errors. Most argue that 'It is the system more than the individuals that are to blame' for this unacceptable number of deaths each year. This costs the healthcare industry an estimated $17.1 billion each year. A system defect or a preventable adverse effect, mix-ups with the doses or type of medications administered to patients are among the leading cause of medical errors across the continental United States.

Six Sigma methodologies, i.e., DMAIC (Define, measure, analyze, improve, control), are highly data-driven processes designed to steer the improvement work and eliminate defects. Six Sigma requires the right data at the right time to make the process efficient and reduce medical errors.

Our DBMS is inspired by six sigma methodologies to make an impact on the ongoing opioid epidemic. The opioid prescription process needs a scientific overhaul to eliminate the current opioid epidemic by quickly notifying providers about the patient medication history, potential drug-to-drug interaction effect and reporting law enforcement agents for possible drug abuse and fraud in real-time. The system also needs to be capable of providing quality data at the right time to researchers. The six-sigma process, as process excellence, helps to understand the current state of process and also to measure the performance of the future state of a project.
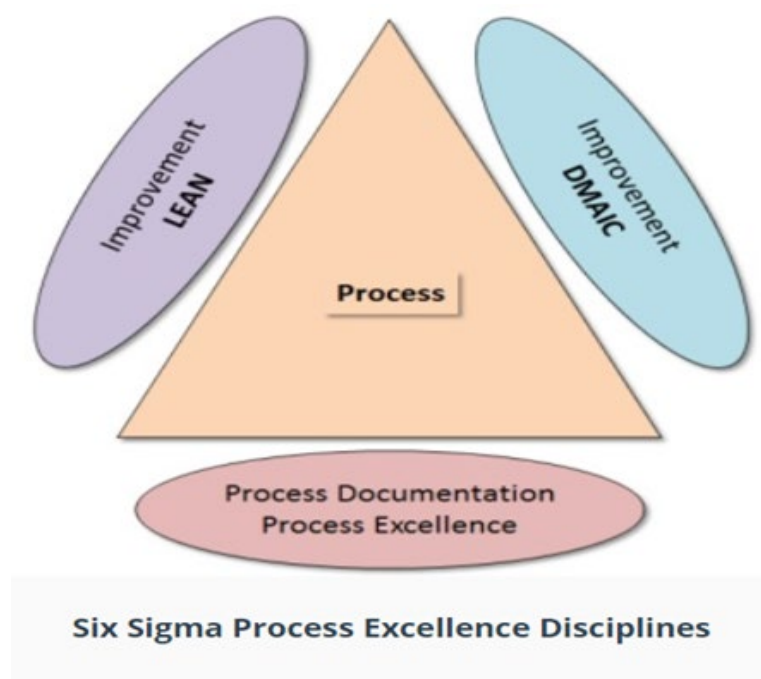

Figure-2 Process Excellence using Six-sigma Model

In the **Define phase,** we clearly defined that the opioid epidemic is a real problem facing the nation, and the prescription process needs urgent system improvement. The goal of the project in this regard is to contribute to the reduction of the current opioid crisis through technology-enabled and a comprehensive database system.   In the **measure phase,** the database system pulls, compiles and tracks the baseline data from all stakeholders and provides a real-time alert to providers, pharmacies, law enforcement, and researchers to make an appropriate opioid prescription decision. Law enforcement uses the database system to react to potential drug abuse and fraud proactively. In **analysis phase** researchers critically analyze the process, trend by various patient

demographic group, geographic region, type of medication, etc. During data analysis critical question, we raised during the first deliverable could be answered. The **improve phase** mainly involves brainstorming potential solutions to the findings of the analysis phase. During the **Control phase,** stakeholders develop an overall control plan to and sustain the improvements obtained during opioid prescription process.

Our DBMS also leverages from lean management model in the way that lean is about creating a system in which all stakeholders empowered to collect and measure data and to create their own. Physicians, pharmacies, law enforcement, and researchers gather and measure data meaningful to them in an integrated way.

3.2   Measure-Change-Learn Cycle

Our database system has many reporting capabilities, generally, aimed at reducing the opioid epidemic at the national level. Specifically, the DBMS's high-quality reporting interface could help to view the trend of opioid prescription by region, patient demography and by dispensing facilities.

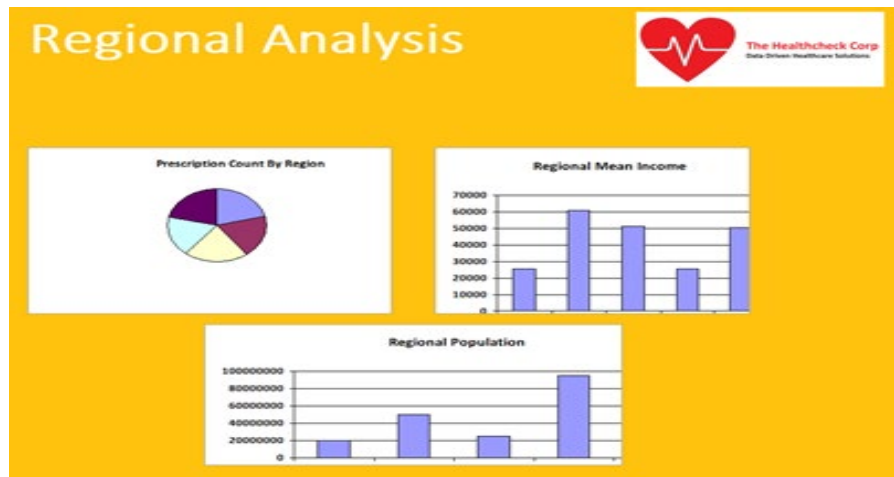**Figure-3** Reporting Interface of the DBMS

We use three types of measures in order to study the impact of the new DBMS. For this deliverable we set to lower the number of drug overdose deaths by 25% for hard hit region in 1-year period of time.

Set the Aim: *Reduce drug overdose related deaths by 25% in one year using the system's real-time reporting capability for highly impacted region.*

Outcome measures help to answer questions like How does the new database system impact the collection and monitoring of opioid prescription process? What are the implications on the stakeholders such as physicians, pharmacies, law enforcement, and researchers? Specifically,

- What is the average number of drug overdose-related deaths by region compared to the previous year?
- What is the average number of related opioid prescriptions by patient demography, by region?

Process Measures focuses if the system is performing as planned or if we are on track in our effort to improve the opioid prescription process? Specifically,

- Percentage of pharmacies and physicians utilizing the new system compared to the planned?
- What is the percentage of patients who received a consultation for alternative medication due to the system alerts providers for negative drug-to-drug interaction?
- What is the percentage of law enforcement notification for potential drug abuse and fraud compared to previous years?

Balancing Measures looks at the system from a different dimension. Generally, such measures check for the side effects of the new system. Is the new database system designed to improve the opioid prescription process causing further problems in other parts of the system? Specifically,

- How well the new database system integrated with the existing EHR and pharmacy management system?
- How is the new system data interoperability functioning?

4.   Implementation Plan

The proposed EHR, as it relates to opioid examination, is complex and requires an adequate transition from current operating legacy systems. The elements in which make up our proposed EHR are built for and around various stakeholders. Due to the complexity in both the structure of the EHR and our stakeholders, the implementation strategy would best be operated under "incremental." Below is how our team would tackle the various implementation context challenges.

From an 'Organizational Context,' we have to look within our market and qualify various attributes of what the organizational context is made up of. We also must look at the 'Clinical Unit Context' as this will help us understand the various attributes of how the team would interact with our EHR. Lastly, we must also examine the 'Individual Context', which explores the unique was the individual operates or will operate with utilizing our EHR. The idea is for our EHR to be used as the central and only input/output of data relating to the opioid crisis as it relates to clinicians, researchers, and law enforcement.

From a clinician standpoint, the organizational context culture would be generally attributed to that of care focused but also a fiscal bottom line. The resources available would most likely be minimal, and the IT experience would vary from clinician/administrator. The implementation of our EHR system would have to be operated at the doctor/administrator level to ensure accurate and timely reporting within our system. In the pursuit of good health, our system would promote the mission and ideologies of the healthcare profession; however, we may see that the leadership involved in deciding to use our system may not see the aggregate benefit of system. utilization. The clinical unit of how a team would operate under our system should also be considered for clinicians. Clinicians administer care, however there is a need for administrators to operate the business side of a healthcare facility. Consideration for the size and user skill levels of the EHR would need to be considered on a facility by facility basis. Similarly, to the clinical unit context, the individual context breakdown the team into its individual parts. It would be imperative for the successful implementation of our

EHR that facilities be examined for various forms of communication, collaboration, and personal ability to operate within an IT system.

The general organizational context standpoint of researchers would be that of a focus on the quality of data, as well as how it were presented. Once should infer that researchers have the resources and means to access IT systems. Since researchers seek knowledge, the culture would be that of discovery with a mission to uncover the truth of a problem through the means of data accumulation and comparison. Leadership may vary from one organization to another. However, our system is for the single inquiry of data which can be performed by a single or group of individuals. In the same vein as an organizational context, the clinical unit context of researchers is that of small units of individuals who focus on the pursuit of knowledge. One would find that a researcher should welcome the use of IT to better enhance their data sets in the pursuit of a solution to a problem. The contextual context of researchers should be very much considered. The jargon used by researchers may differ from those in a clinical or law enforcement setting. How information is displayed is paramount to researcher use and understanding, which a focus is placed on using generalized terms so all stakeholders may understand the data.

A law enforcement setting regarding organizational context can be quite challenging. Each department will have various resources, IT experience, and size/location. However, the organizational structure and mission can be categorized very similarly regarding the chain of command and tasked to protect the public well-being. The clinical unit level should also be a significant focus. While law enforcement uses IT through many aspects of their daily jobs, the implementation of our system will have to come from a bottom-down approach so that leadership can dismantle legacy systems and begin use of our new system. Unit leadership within each law enforcement department needs to be prioritized, and the attitude regarding a change in IT systems considered. While each department may function and communicate differently, the policies and rules handed down from legislators and high-level leadership should normalize the individual context within our systems implementation. Following procedures, law enforcement should have no problem accepting our system if orders are coming from the top in the chain of command. Although there are various methods

in communicating, the focus should be on general terms in searching/results within the DBMS.

4.1 EHR System and Technologies

The proposed EHR system breaks down the various data points to track and display information regarding the flow/presence of opioid in a community. The idea is to track the opioid prescription from the prescriber to the patient. The flow and process at which the opioid is prescribed to how it was filled when it was filled, and in what area will give our stakeholders a better idea on how opioid is being utilized in their community. Our enterprise system is built to be enhanced in efficiency; the more users operate the system. A collective of opioid tracking information, by many regions, eventually turns into data that can be collected at the state/multi-state level. Having such localized and general data will not only help communities keep track of opioids but also identify abuse of said opioids to prevent public health crises.

4.1.1 Error Reporting

An example of when an error can occur is that at the initial input stage, where the prescriber inputs incorrect information about the patient in our system. If the address, name, or insurance provider is inaccurate, this can prevent the filling of a prescription or give inaccurate information in regard to the location of opioid use/dispensing. The repercussions of this error in input would affect the system from beginning to end, not reporting data correctly. It's possible for the prescriber to input information inaccurate and steps are taken to avoid said discrepancies. if the prescriber enters incorrect information about their patient, then the pharmacy won't be able to fill the prescription. This forces the prescribed to ensure data is either inputted correctly the first time and protects the integrity of our DBMS by not allowing inaccurate information to make its way through the final results. Education of how important/significant initial accurate reporting to the prescribers is a focus of our team and should be the existing training of prescribers as a best practice.

4.1.2 Reminders and Alerts

The most significant issue for error within our EHR comes from user error. Unfortunately, the system relies on accurate reporting from the prescriber when the prescription is sent from the point of care to the dispenser. The existing safeguards in place, which will not allow the filling of prescriptions if patient information is inaccurate. The current alert is in a place where the prescription will not be filled by the dispenser, which in turn is a safeguard against data moving down the flow process of our EHR. The alert of this change will come from the rejection of the dispenser so the prescriber can reinput information that is correct so the patient may receive their prescription. Regarding nuisance or fatigue alerts, our system would not add to the existing issues above as they would be pre-existing if the prescriber is experiencing said issues.

4.2 Change Management

The implementation of a new EHR system within an existing organizational culture will be a challenging one. The current organizational IT climate of clinicians, law enforcement, and researchers makes it difficult for transitions to new systems. This is due to various methods of data gathering and no one central repository for information regarding the use of opioids available. The integration will need to come from the local level and move its way up to the region, state, and eventually national level (unless mandated use at the federal level). It is essential for the EHR system to unify locally and produce tangible evidence of efficiency/reliability to build confidence within communities. Once established and confidence gained, this will allow for the push to other local areas until a regional unit is formed. The phasing out of old systems will have to come with time and adaptability from each local community unless legislators/policymakers intervene in implementing regulations to mandate our EHRs new use.

5. Data Quality Improvement

5.1 Impacts of Poor Data Quality

Data quality is critically important in healthcare industry. Bad data quality can lead to inaccurate and slow decision making. In healthcare industry this can lead to the difference between life and death. Thus, a reliable information derived from high quality, specific, complete and accurate data is a critical tool for the success of any new system like our DBMS. According to Hersh etal, data of poor and variable quality can lead to excessive noise in datasets and spurious outcomes (Hersh etal, 2013).

Data quality in healthcare needs to consider the following characteristics including accuracy, consistency, relevance, completeness, timeless, conformity, and integrity.

Figure-4 Characteristics of Data Quality

Since the new DBMS is sourcing data from multiple data sources including hospital EHRs, pharmacy management systems it is designed in the way real time data exchange between the systems is realized. Data interoperability is one of the most important concerns in the healthcare industry.

Physician could make order dosage entry error or order the right dosage for the wrong patient. As our DBMS automatically pulls the data from the hospital EHR system it

collects the incorrect information and stores in database and negatively impacts the analytics and reporting. This can lead to death of patient or cause adverse health incident while it also impacting future policy developments using the system.

Pharmacist may misinterpret the prescription or deliver the order to the wrong patient and this still causes incorrect data entry and negatively impacts the reporting and analytics in the backend. Incorrect data entry could also send false alarm on drug abuse and fraud to law enforcement agents. Such inaccuracy can easily mis-led researchers on the interpretation of the collected and analyzed data. This would lead to the design of incorrect policy framework to curb the epidemic.

5.2   Accuracy of Data

In the study of data accuracy in EHRs the American Health Information Management Association said that "the delivery of quality healthcare depends on the availability of quality data. Poor documentation, inaccurate data, and insufficient communication can result in errors and adverse incidents". Data accuracy is invaluable in the healthcare industry. As discussed above medical errors not only have numerous safety concerns but also increase the cost of the healthcare industry. Appropriate data accuracy improvement steps need to be employed to make any system to work as intended.

Our database system uses sensitive patient medical information and privacy and security of patient data is secured by multilevel authentication methods. Data validation and integration techniques were employed to make the system collect and store accurate data from stakeholders. Right data source selection techniques were also employed to improve the quality of incoming data to the database management system from hospitals EHR system and pharmacy management system. Our system is also designed in a way to adopt a robust data entry quality standard such as matching, data monitoring, data profiling, linking, etc. Referential integrity rules are also in place to make sure consistent data is collected at all times.

5.3   Comprehensiveness of Data

Our database system is designed to collect the most important data elements regarding the opioid prescription process. We believe that our specifications for the data element are standard and can fulfill our original problem description requirements. We carefully selected the most important actors of the opioid prescription process so that our record is complete enough to study and recommend solutions to the ongoing opioid epidemic.

The database management system interfaces with the hospital's EHR system and Pharmacies management system in order to create a complete record of patient's opioid medication prescription process.

6.   Predictive Analytics

A scenario in which predictive modeling and analytics could be utilized would be through a stakeholder, researchers. Researchers look for data points and compare against other data points in pursuit of a solution to a problem. The analytics derived from our system once implemented will allow researchers to further compare and contrast against other data points more effectively. The example scenario can be described using the five-question framework of: Who, What, When, Why, and How.

Who:

The actors involved would be any form of researcher that is scholarly or governmental. Researchers that wish to analyze the current opioid climate and how local, regional, and statewide are affected.

What:

Data collection and the display of said data in a cohesive/digestible way is important for researcher use. Researchers need data points that contain verifiable data

which can be used in comparable models. Opioid prescription tracking data is needed to make inferences by researchers studying opioids.

When:

The model could be used after the individual data points have completed the process of being logged throughout the lifecycle of our system. Once all data points have been captured by the system, the data points can be deployed at the discretion of the system authorized researcher.

Why:

Parts of the United States are experiencing an opioid crisis with no slowing down in sight. It is imperative that the means at which we as a nation distribute opioids be heavily tracked to prevent or curtail drug abuse. Being able to identify high level concentration of opioid areas will better help researchers determine which communities are affected by this epidemic and to what ends.

How:

Researchers will be able to use the information provided by our system to compare and contrast against other data sources. The more robust and accurate information, the better the proposed solutions by researchers. Decisions will be made from the output of our data through reports generated by the system upon inquiry. These reports will then be used as a source of evidence to inferences and assessments of the opioid crisis.

7.   Vendor Survey

Opioid epidemic is a national crisis and almost all healthcare providers are primarily depending on their EHR vendors in the collection, analysis and management of problematic opioid prescribing pattern. To the best of our internet search there is no single vendor fully dedicated in the design and development of systems specifically to collect, store, monitor opioid related medication or prescription pattern. It is the hope of most

providers that their EHR vendors will improve their capabilities to help providers with their opioid stewardship strategies by integrating the existing EHR system to opioid dedicated database management system.

Prescription Drug Monitoring Program (PDMP) database is the only and most promising state level intervention to improve Opioid prescribing pattern, inform clinical practice and help protect patients at risk of developing opioid addiction using alternative medication. PDMO is an electronic database that tracks controlled substance prescriptions in a state. According to the CDC website PDMPs provide health authorities timely information about controlled substance prescription and patient behavior. Universal use, 'real time', actively managed, easy to use and access are the most promising features of PDMPs.

Figure-5 Prescription Drug Monitoring Program Design

However, findings regarding the positive impact of PDMP in prescribing behavior and decreasing substance abuse treatment admissions are mixed. Researchers succinctly concluded that the effects of implementation of PDMPs have either proven difficult to assess or the data quality problems of PDMPs led to inconclusive and contradictory results (Harwitz etal, 2018)

Our DBMS is inspired by PDMPs in the way it is dedicated only to Opioid related medications and focusing on opioid stewardship strategies. We design a system that is integrated with the existing EHR system and pharmacy management systems so that real-time data on opioid prescription pattern can be collected and tracked. The system also alerts law enforcement agents in real time for potential drug abuse and fraud. We

believe that our database system 'idea' would contribute to the national discourse in the development of more advanced and scalable database management system. Vendors could use it as a springboard to design a system that is fully integrated into the existing CDS system.

8.   Conclusion

The implementation of an EHR system to solve a healthcare problem is no easy task. Data quality, which is maintained and gathered under a strict established protocol, is formed to better understand or fix a healthcare problem. Without robust data sources and systems which reinforce standards in how said data is processed, analytics that derive from a data model can be misleading or plain wrong. EHR systems which deliver analytics based off this robust data need to be developed with a focus of their end user. We do so by analyzing our customer needs and environment to capture the essence of their need. A perceived problem can be a symptom. A perceived symptom can be a problem. It is the duty of EHR specialists like us to diagnose issues and subsequently use technology to better the lives of our customers.

At 'The Healthcheck Corp', we have created an Opioid Database System to help communities recognize and solve current opioid crisis in their communities; through meeting the needs of our stakeholders with robust accurate data, delivering analytics for leaders to make informed decisions. The United States as a health crisis on its hands that is spinning out of control. It is the duty of and responsibility for EHR systems, provided by The Healthcheck Corp, to meet this crisis head on with accurate, robust, and predictive analytics to defend the American people.

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