"Advancing patient healthcare by the secured sharing of clinical information."

Solution Overview

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1. There exists the need to share patient clinical information across many types of clinical systems in a secured and controlled environment. The sharing needs to exist between clinical information systems of many different types, vendors, geographical locations and support multiple layers of security. HXiSynergy is uniquely designed to addresses this business need in a flexible, scalable, secured and controlled infrastructure.

2. The Business Problems

2.1. Since the beginning, medical settings have had the need to share patient information across organizational boundaries in support of patient care. The sharing took place via phone calls, paper, fax, etc. The emergence of Electronic Health Records (EHR) offered the promise of a seamless infrastructure to better respond to this need.

2.2. However, because of the disparate nature of EHR systems, a problem of compatibility exists between different vendor EHR systems such as Epic, Cerner, Meditech, etc. – not to mention the dozens of smaller and specialized vendors. The disparate nature of EHR systems allowed some implementations to better serve the specific needs of one type of organization over another type. The result being that one type of organization in an entity may have chosen one vendor's EHR system and another organization in the same entity may have chosen a different EHR system. There are stories about hospitals that use Cerner in their emergency rooms and Epic for their inpatient care. This leaves two organizations in the same entity, that cannot seamlessly share clinical data about their common patients.

2.3. Organizations such as hospitals have spent years and millions of dollars customizing their EHR systems to meet their individual requirements. Consequently, similar data may look very different in one system versus another, even if the systems are from the same vendor.

2.4. HXiSynergy solves this business problem by providing a backend brokerage system that facilitates the secure exchange of clinical information between disparate clinical systems.

2.5. This same business problem of seamless yet securely sharing of clinical information shows up in at least three different functional areas including A) the secure sharing of individual patient information between clinical systems, B) the secure sharing of anonymized ("de-identified") clinical data with authorized research entities and C) the secure sharing of identifiable information between clinical systems and authorized payment entities. Secure clinical information sharing in these three settings have a direct positive impact on patient care.

2.6. Since Covid, there has been a marked increase in the use of urgent care facilities to provide medical care to patients. These urgent care facilities may or may not be related

to a patient's primary care facility and may or may not be related to near by hospital facilities. Having the capability for urgent care providers to review a patient's primary care data can provide an urgent care facility with valuable information for doctors to make diagnosis and treatment plans quickly. The alternative has been to take long periods of time interviewing a patient with the hope that the patient did not leave out any pertinent information.

2.7. Today, accepted medical practices are based in the concept of evidence-based medicine. That evidence is obtained through research and studies. The larger the knowledge base of the research data the better the evidence. The larger the knowledge base the more refined and comprehensive the research results can be. With large enough data sets, it is more likely that the subtleties as to why some patients react one way and some react another can be identified.

2.8. Early days of Covid saw statistical reports being faxed to other organizations and conclusions drawn from those limited data sets in various organizations and geographic areas. It is possible that if seamless secure clinical data sharing had been around in 2020 it would have facilitated information sharing not only for the current medical situations but also the sharing of hundreds of individual patient parameters between numerous clinical organizations and Government organizations could have tamed Covid much earlier because of the availability of larger data sets with consistency of metrics.

2.9. Various payors, such as insurance companies, are constantly evaluating treatment scenarios versus outcomes as related to cost. This takes time to pull that information together from across large disparate clinical systems. Some insurance companies include in their contracts an agreement of point-to-point data exchange where the mechanism of that exchange varies from one contract to another. HXiSynergy's ability to provide such information securely and timely with an interface that works best for these systems and their systems can help reduce the amount of time between invoice

submission and payment. Such an interface can also provide enough detail data to explain the underlying differences that may have caused treating a condition for one patient to cost more in one scenario verses another.

3. The Solution

3.1. Numerous attempts have been made to exchange EHR data. Most of these attempts have centered around standardizing clinical information data sets to a single definition and a single exchange protocol. These attempts have had limited success for two reasons. A) It forces clinical system vendors and implementors to focus on a "least common denominator" approach which minimizes the actual amount of clinical information that can be shared between systems. B) It forces the clinical systems to implement data mapping and translations for each different clinical system it connects to. This eats into the available personnel and computing resources of each individual system. With each clinical system having to use direct point to point connections to multiple systems, the number of interfaces needed on each clinical system grows exponentially and becomes unsustainable in a large-scale solution.

3.2. Other attempts have been made to have all data collected and forced into a common data model at a central location. Limited success here has been because changes in various standardized clinical data storage models take a long time to implement across the board spectrum of diverse systems. A single data model is not flexible enough to deal with the speed that medical information types advance.

3.3. HXiSynergy is taking a novel approach to solve this business problems. HXiSynergy is designed as a secure information brokerage system. A brokerage system model allows HXiSynergy to have both a vertically and horizontally scalable system solution that can

handle very disparate systems of information. Such a brokerage system allows each organization to evolve and progress in the areas of their interest at the speed they desire and allows sharing of new forms of information along with older forms. HXiSynergy supports secured sharing across diverse exchange protocols and data structures that works best for each clinical entity. HXiSynergy is a back-end clinical information brokerage system that facilitates the secured sharing of clinical information between disparate clinical systems by utilizing flexible system interfaces.

3.4. Brokerage systems have been around for a long time. The two best known types are real estate brokerage systems and stock market brokerage systems. HXiSynergy manages the exchange of information assets between different organization systems without each of those systems needing to know details about the other. When a family buys a house, they usually go to a real estate broker that handles the details of the exchange of the asset. If someone wants to buy or sell stock in a company, they go to a stock broker who handles the underlying details and not have to worry about the differences in transaction details between one company and another.

3.5. HXiSynergy does the same. HXiSynergy handles the details about the information being exchanged. Each clinical system just has to deal with their data in a context that they control.

3.6. The HXiSynergy information brokerage system does not provide end user interfaces to the computer systems nor direct access to the shared data. Hospitals have spent years and millions of dollars implementing and customizing their EHR systems. Experience has shown that doctors and nurses do not want to learn yet another new user interface. HXiSynergy shares the data with each clinical system; not the individual users of those systems. It is up to each clinical system to determine the best way to present this additional data within their framework and in the way their customers want.

3.7. The same applies to researchers. HXiSynergy provides curated anonymized clinical data to authorized researchers for them to add their own analytic value without the researcher having to negotiate and execute procedures with each different clinical system for which they want to collect research data from. Each clinical entity has full control over what types of organizations as well as specific organizations they want to share data without having to worry about how to implement the sharing controls or what format that data needs to be in to get securely delivered. The clinical entity simply tells HXiSynergy the types or specific entities they want to allow sharing with. The sharing can be controlled at an organizational and personal level and applies to the details at a granular level.

3.8. HIPAA compliancy is built into every aspect of the HXiSynergy system not only at the infrastructure perimeter levels. HIPAA currently defines 18 items as "Personal Health Identifiers." HXiSynergy does not store any of these HIPAA identifiers with the clinical data nor are the identifiers even stored on the same physical infrastructure as the clinical data. Some states have additional data restrictions beyond HIPAA which HXiSynergy also handles at the item level. When research organizations use large amounts of clinical data, that data may have originated across multiple state lines and the research organization is then responsible for understanding any subtle differences in restrictions. HXiSynergy tracks the source and destination of the information and only provides data that is consistent with both localities' laws and regulations. Again, HXiSynergy does not provide any interfaces for retrieving patient identity information from the brokerage system.

3.9. HXiSynergy's handles the linking of common patient's data between multiple sources such as from "Hospital 789" and "Clinic 123" even though "Clinic 123" and "Hospital 789" use different unique identifiers in their clinical systems.

3.10. HXiSynergy does support patient specific research for targeted studies such as drug trials as well as demographic research based on patient demographics like neighborhood, state, age, sex, etc. Access to this patient specific information requires the appropriate filings, authorizations and releases for the multiple jurisdictions involved. HXiSynergy can provide an authorized researcher planning data consisting of number of patients that would be included in a curated result set, a list of the clinical items that would be included in that set as well as the formal authorizations the researcher might need.

3.11. Patients themselves, through their care providers and/or their individual patient portals, can opt-in or opt-out of any or all patient de-identified, identified or targeted research.

4. The Solution Structure

4.1. The structure of the HXiSynergy solution is designed to facilitate both horizontal and vertical scalability. Horizontal scaling is provided so system functionality and performance does not suffer as the number of entities using HXiSynergy grows. Vertical scaling is provided so new functionality can be added or expanded without redesign or impact to other HXiSynergy customers who are not ready to handle new data types or formats.

4.2. HXiSynergy's clinical system interface includes individual secured gateway access points and system specific translators. HXiSynergy's individual clinical system interfaces allows for horizontal and vertical scalability such that additional resources can be brought on board to implement a number of interfaces simultaneously with various levels of functionality.

4.3. HXiSynergy's granular metadata structure not only supports varying HIPAA and security rules at an item level but also allows leading edge clinical systems to share richer information even when others are not ready to embrace it. Individual translators allow organizations with more conservative mindsets to participate in the sharing of the richer information without having to change their systems.

4.4. The primary large scale EHR systems (Epic, Cerner, Meditech, etc.) all have some level of import and export capabilities. These import and export capabilities exist today and the HXiSynergy clinical system interfaces can utilize these existing capabilities and can and is willing work with EHR vendors to expand those capabilities. HXiSynergy encourages clinicians to continue to work with their EHR vendors to increase their overall system functionality to take advantage of the new information that becomes available to them through HXiSynergy.

5. There exists the need to share patient clinical information across many types of clinical systems in a secured and controlled environment. The sharing needs to exist between clinical information systems of many different types, vendors, geographical locations and support multiple layers of security. HXiSynergy is uniquely designed to addresses this business need in a flexible, scalable, secured and controlled infrastructure.