



Implementation of Master Data Management in Healthcare Domain

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Abstract— Master data management is the process through which the data from disparate source systems is cleansed and consolidated to give you a golden record representing a single version of truth. It deals with handle data issues like data duplication, non-standardized data and challenges faced in combining data from different domain/source systems. MDM is being implemented in multiple domains, Healthcare being one of the major ones. In this paper we have done an in-depth analysis of the various challenges, domains of healthcare data and the proposed strategy for governing the data.

Keywords: MDM

I. INTRODUCTION

In order to have increased control over the patient information, a single source of truth is required to regulate the healthcare businesses according to the cost and also increase the population of patients enrolled, which is dependent on a multitude of factors like which is dependent on relationships between patients, their locations, their preferred care providers etc. Health care providers are trying to focus more on doctors/physicians, their geographic locations and check any outflow of referrals. The Executive class are inclined towards maintaining relationships amongst these distinct entities for growth of patient population. In order to improve the quality of care delivered to the patient, reduce the risks involved in clinical activities, reduce the burden of patient registration and increase revenue from billing and increase in referrals, facilities and patient data needs to be aggregated which can be best achieved through implementing master data management of both patient and provider data.

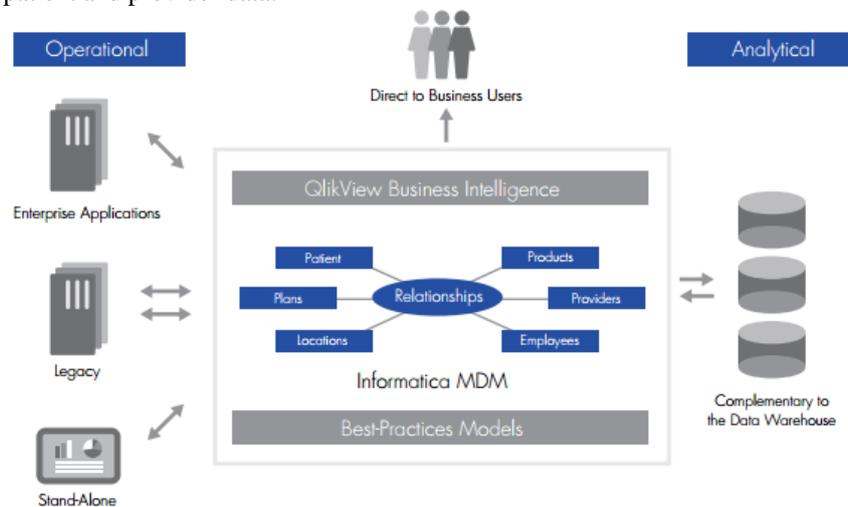


Fig. 1 Relationship between various entities involved in healthcare

II. DOMAINS OF DATA INVOLVED IN HEALTHCARE

There are various data domain falling under the healthcare system on which the master data management is to be implemented to provide a unified and more

>Patient/Person (Subscribers, dependents and patients) – This domain comprises of the Subscribers, dependants and patients who are being addressed for treatment or getting registered. It is imperative to aggregate the matching patients across disparate systems in a healthcare enterprise while dealing with the variations in their personal information like name, addresses.

>Provider – There are various providers who will be providing services and care which can be a small business group, an individual or an enterprise corporation. If this domain comprising of home health agency specialists, nurse practitioners, pharmacy etc. is not mastered well then it may have financial implications

>Insurer/Payer– Payers are the entities which pay the cost of or reimburses in place of the patients. There is increased focus on members and subscribers, the services offered to them and their satisfaction which calls for a need to master the data of the insured and the subscribers

>Reference data –Mastering reference data is another challenge, as there maybe various large health care systems acquiring small facilities or physicians aggregating their practices.
 >Location – In addition to having information about the provider's credentials, it is imperative to know the location of operation of these providers . There is increased emphasis on tracking any areas where infectious disease epidemic may occur, the location where the patients and the healthcare providers have interacted to the patients so that improved safeguards can be employed.

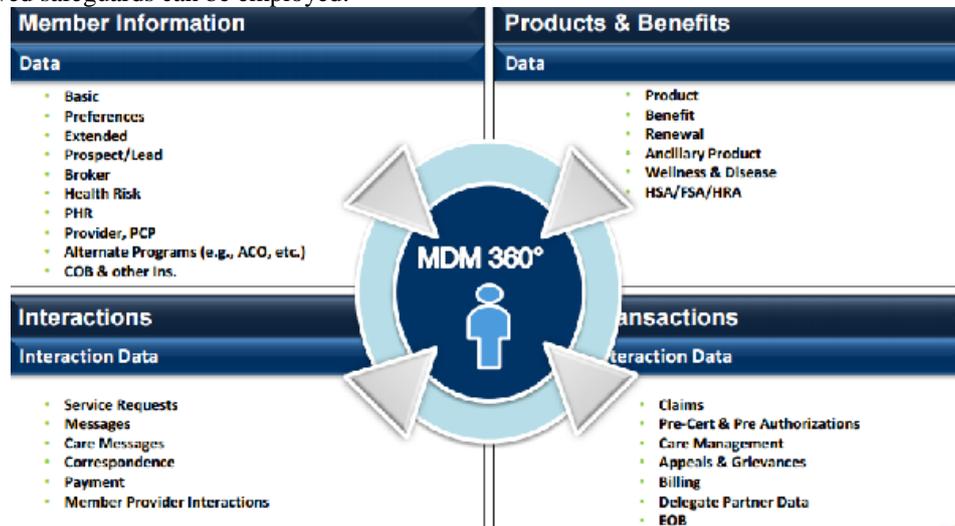


Fig. 2 Data domain in healthcare systems

III. MASTERING HEALTHCARE DATA

A. Challenges involved in mastering healthcare data:

The various challenges involved in mastering healthcare data are as following:

- >Patient and provider data coming from multiple source systems.
- >Data Inaccuracy and inconsistency: For example, in a healthcare organisation if there are 10 different systems that store member and provider data along with the information require for medical claim data. If there is an update requested by a member or provider in one of these systems, the other systems might not get updated due to lack of data centricity.
- >Tracking the relationship of patient to health systems, physicians to group practices or hospitals and derive insight from their relationships.
- >Data duplication which in turn hinders the integrity of analysis reports being generated.

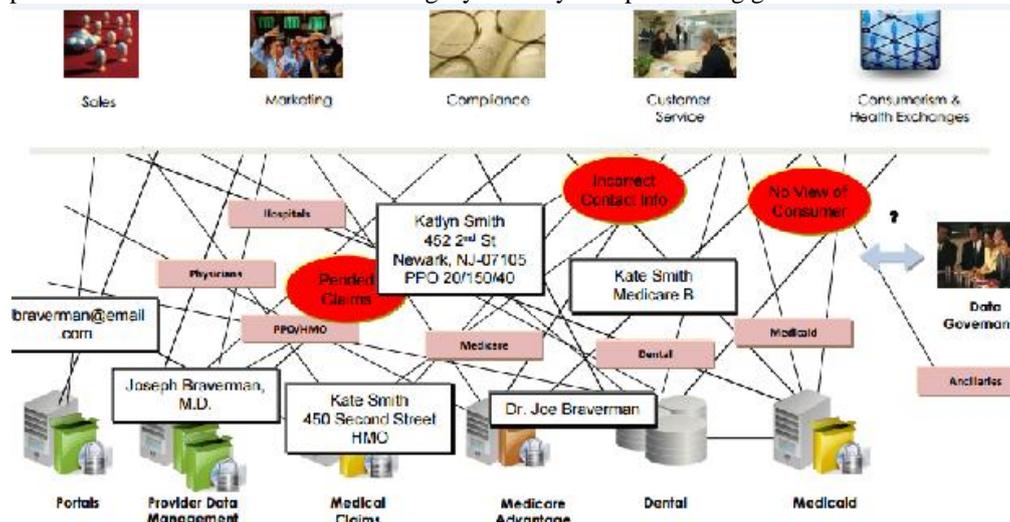


Fig. 3 Data from multiple source systems leading to inconsistency

B. Addressing the challenges through Master Data Management

- 1) Bring together data from multiple systems and build whole records and data sets using match & merge
 Patient and Provider Hubs allow Healthcare Providers to create a "Golden Record" view of the patient and provider, in order to properly link clinical and administrative information across multiple sources, which provides a "360" view and enhances data quality for clinical and billing purposes.
- 2) Handle data duplication: There can be data divergence if the same master data is present in disparate systems say for example, a patient record with Date of birth as 6/1/80 from system A, and 1/6/80 from system B. MDM consolidates all these data and forms one master record for the particular patient with every record from different source systems

contributing information. The value which wins for any particular field would depend on the trust configuration for that system.

3) Master data quality might degrade over time, so in order to improve data quality it is pre cleansed and standardized using inbuilt cleanse function.

4) Master data Management leverage the relationships data which is mastered in each domain i.e. patient, provider, payer etc.

IV. CASE STUDY

A patient named Candace, 50 years old, checks into a hospital complaining about chest pain. The physician attending the patient checks her vital signs and notices blood pressure higher than usual. When the doctor learns that she is already taking medication for the same, he decides to give her a different medicine and monitor the same. The hospital records verify Candace's high blood pressure but since there is no information exchange between the health care systems, there is no centralization of data. Hence the system records do not contain information about her recent diagnosis with Type-2 Diabetes which is why the prescribed medication is not effective. Due to this lack of mastering the data the following problems are faced

- 1) Degrades the quality of care provided to the patient.
- 2) Prolongs the time taken for diagnosis
- 3) Wasted Healthcare system resources and uncured additional costs.

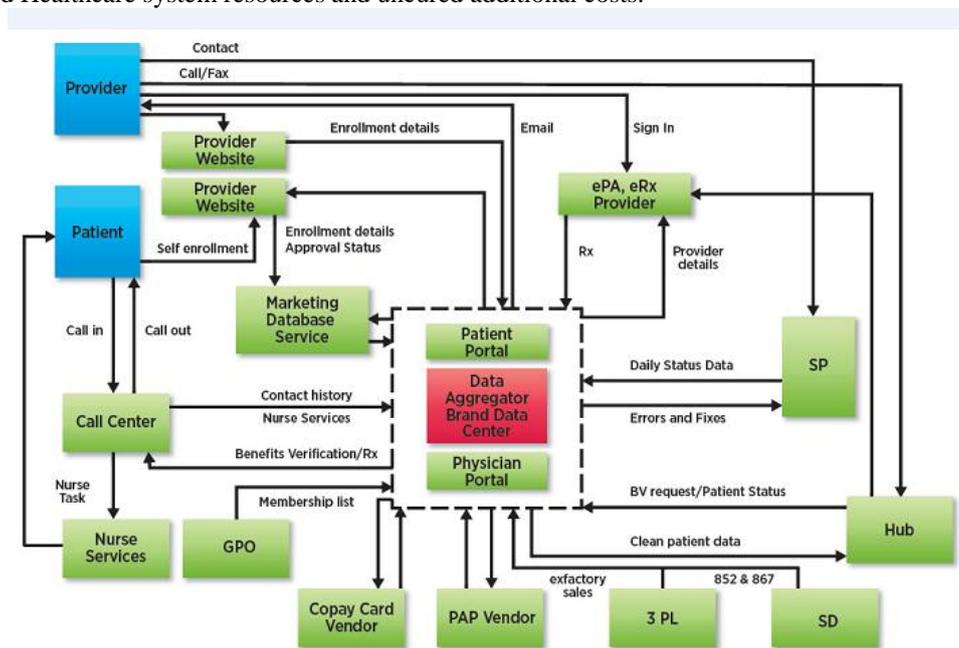


Fig. 3 Relationship Between various domain in healthcare system

Physicians <-> Patients <-> Members <-> Employer Groups

- 1) In the above implementation, we take advantage of the relationship between master data about patients , providers , claims, assets and improve care coordination between various providers who provide care to the same patient.
- 2) Also managing and tracking patient referrals for any particular provider facility.
- 3) Information regarding health plan stored for every patient and link the same to any upcoming procedures
- 4) Maintain the history of patients to enhance the process of making prescription.
- 5) Master information from the Hub is available to standalone systems which support in-patient registration or admissions.
- 6) Every transaction through online portals/websites of care providers creates data about patient, link yo yhe already existing data to create master view.
- 7) Identify the members who are also providers and dependents who are also subscribers.

V. MATCHING TECHNIQUES FOR PATIENT AND PROVIDER DATA

There are a variety of different approaches that can be used in a master patient index (MPI) to address matching the identities of individual patients that are scattered across many disparate care settings.

- Exact Match or the Deterministic model: This model considers a match between the attributes of two records as belonging to the same patient if there is an exact match in them, say for example the first_name, last_name , phone number. The drawback of this model is that it will not consider a match between “Robert” and “bob” where both name belong to the same patients, the latter being the nickname.
- Fuzzy match or the Probabilistic model: This model takes into account the probability of match between distinct entities giving room for error while inserting the record. It considers the probability of match, based on some

predefined set of rules and a certain level of score threshold with which the records should match. The higher the score, the higher the probability of the records to match.

There are various considerations to be made while adopting the Fuzzy match technique. For example, when there is information about both father and son for example both belonging to the same household with almost similar names, these records may end up matching and thereby end up linking as there is potential to match in case there is missing date of birth.

1) Potential Duplicate from the same source:

There is only a little variation in name but they are expected to match based on the overall information

MRN	NMAE	SEX	DOB	ADDRESS	PHONE	SSN
SFA 313	John Smith	M		8/13/1976 31, Avenue Street, London	410-222-656	123
SSA 314	Jon Smith	M		8/13/1976 31, Avenue Street, London	410-222-656	123

2) Potential Duplicate from a different source

Patient information registered through online portal and the registration done from the billing information, the

MRN	NMAE	SEX	DOB	ADDRESS	PHONE	SSN
SFA 313	John Smith	M		8/13/1976 31, Avenue Street, London	410-222-656	123
JHM 314	John Smith	M		8/13/1976 31, Avenue Street, London	410-222-656	123

3) Potential Overlay:

When there is an update on patient information (the patient information is already a part of match to other similar records) and the update changes the name from say in the below example from John to Greg, then we need to run revalidation to check if the patient still matches with the existing matches

MRN	NMAE	SEX	DOB	ADDRESS	PHONE	SSN
JHM 314	John Smith	M		8/13/1976 31, Avenue Street, London	410-222-656	123
JHM 314	Greg Smith	M		8/13/1976 31, Avenue Street, London		

VI. CONCLUSIONS

This paper analysed the data domains involved in Healthcare and the challenges faced while managing the data. Further we implemented the technique of mastering the data to give centralised patient and provider data to enhance business processes and efficiency and providing the quality of care provided.

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