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Xin Tian
Old Dominion University, xtian@odu.edu

Sean Schwartz
Old Dominion University, sschw013@odu.edu

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Xin Tian
Old Dominion University
xtian@odu.edu

Sean Schwartz
Old Dominion University
sschw013@odu.edu

ABSTRACT

As BI products and services increasing, the cost for collecting data and storing data is reclined. Enterprises could get the data source from customer transactions, website logs and product reviews. BI technology is used in many fields, such as in manufacturing for order shipment and customer support, in financial services for claims analysis and fraud detection, in transportation for fleet management, in retail for user profiling to target grocery coupons during checkout, in utilities for power usage analysis, and health care for outcomes analysis.

The profession of pharmacy will be more reliant upon the information that can be extracted from data analytics and BI tools. There is a great opportunity in pharmacy to develop an analytical platform to suit both business needs in retail and the delivery of patient care in pharmacy. This paper proposes a analytical platform to identify valuable interventions in retail pharmacies.

Keywords

Business Intelligence, Analytical Platform, interventions, retail pharmacy

INTRODUCTION

In the past decade, data analytics (DA) and business intelligence (BI) platforms have become increasingly adopted by large businesses as a tool to identify competitive advantages. BI comprises an integrated array of IT capabilities that allow users to transform complex data into informed actions (Ferranti et al., 2010). The analytic platform has emerged as a powerful format to help businesses analyze large volumes of unstructured data across multiple business units and databases. The speed, affordability, and flexibility of the analytic platform have made it a widely adopted tool for generating business intelligence (Adrian et al., 2010). Ultimately, the goal for BI is to generate timely information and support for assisting organizations in making better-informed decisions more quickly to navigate in the changing business environment.

As BI products and services increasing, the cost for collecting data and storing data is reclined. Enterprises could get the data source from customer transactions, website logs and product reviews. BI technology is used in many fields, such as in manufacturing for order shipment and customer support, in financial services for claims analysis and fraud detection, in transportation for fleet management, in retail for user profiling to target grocery coupons during checkout, in utilities for power usage analysis, and health care for outcomes analysis (Chaudhuri et al. 2011).

The need for the healthcare industry to modernize has been widely recognized. In 2001, the Institute of Medicine (IOM) Call to Action identified several areas in need for adopting the use of IT technology. A few of the specific needs listed addressed the benefits of adopting electronic health records, utilizing computerized physician order entry, and creating integrated databases. In 2009, the American Recovery and Reinvestment Act and the US Department of Health and Human Services specifically addressed the need for improving the IT infrastructure in healthcare, seeking to strengthen the use of databases to improve clinical services and to support the adoption of evidence-based medicine by healthcare providers (Ferranti et al., 2010). Overall, the goal of the combined efforts to modernization of healthcare is to improve efficiency, safety, and outcomes.

Healthcare delivery in the United States is challenged by demands of access, safety, quality, and cost (ACCP). Healthcare can be delivered by many providers and is increasingly being delivered by pharmacists. Pharmacists play an integral role in providing healthcare services. Pharmacists provide patient education about the appropriate medication use, monitoring of patient safety through drug utilization review, and improving medication adherence. The collective efforts reduce healthcare costs and improve patient outcomes (ASHP). The profession of pharmacy will be more reliant upon the information that can be extracted from data analytics and BI tools. There is a great opportunity in pharmacy to develop an analytical platform to suit both business needs in retail and the delivery of patient care in pharmacy.

BACKGROUND
Business Intelligence

BI uses analytical software to extract information from large sets of data from a variety of sources. The data to be analyzed can be from multiple databases (e.g. in-house, data warehouses, data marts, etc.) and from different data types (e.g. structured, unstructured, videos, text, etc.). The data for BI tasks often comes from different sources—typically from multiple operational databases across departments within the organization, as well as external vendors. Thus the problems of integrating, cleansing, and standardizing data in preparation for BI tasks can be rather challenging. Efficient data loading is imperative for BI. Moreover, BI tasks usually need to be performed incrementally as new data arrives, for example, last month's sales data. This makes efficient and scalable data loading and refresh capability imperative for enterprise BI. These back-end technologies for preparing the data for BI are collectively referred to as Extract-Transform-Load (ETL) tools. Increasingly there is a need to support BI tasks in near real time, that is, make business decisions based on the operational data itself.

BI could not only help the enterprises but also their customers. In retail pharmacy, BI technology is used to identify drug interactions and predict further. Today, pharmacies are recording more and more information, and that information (or data) is growing, consuming more and more storage space and becoming harder to manage. The reasons vary for the need to record such massive amounts of information. Sometimes the reason is adherence to compliance regulations, at other times it is the need to preserve translations, and in many cases it is simply part of a backup strategy. Those data storage costs time and money. Ohlhorst (2012) states the big challenge is how can business to find the value of the data and to explore data sources in more interesting and applicable ways to develop intelligence that can drive decisions, find relationships, solve problems, give best suggestions, increase profits, productivity, and even the quality of life.

Analytic Platform

Analytic platforms have emerged to simultaneously address the need for data management and data storage from processing large volumes of data from a variety of sources to improve their business intelligence. The analytic platform is a system design for addressing the needs for companies driven by information generated from data with the need for quick processing. Analytic platforms contain two essential elements; a database management system paired with the analytic processing programs.

The analytic platform features of speed, affordability, flexibility, and reliability make it a desirable tool for creating BI. The platforms leverage higher bandwidth connections and use modern container constructs in memory, which allows the coordination of multiple processes to operate efficiently in parallel (Adrian). For example, IBM Netezza has an analytical platform with preconfigured hardware-software system that is able to perform complex analytical queries 10 to 100 times faster than traditional systems (Laudon). The hardware required is inexpensive and can be integrated without having to disrupt daily operations (Adrian). Simultaneously as data is generated, the analytic platform is able to update the information into the appropriate database(s). As the strategy and scope of the business expands or shifts, the analytic software costs can adjust according to usage and complexity to better suit the needs of the organization.

Pharmacy

Griffiths et al. (2012) argued that online social networks and professional networks have the potential to change patterns of health inequalities and access of health care, and lead to a reformulation of the role of health professionals. In particular, those who suffer from living with chronic illness and disability are disproportionately affected. Patients with chronic illness have greater reliance on the care directly provided through appointments with their physicians and consultations with retail pharmacists. Often health care consumers do not have sufficient knowledge of health care to adequately manage their chronic conditions, and it is not uncommon that customers do not know the normal range of their blood pressure or their blood pressure goals. The availability of pharmacist to deliver consultations make this a widely service to fortify a patients resources for decision-making. Pharmacist provides suggestions to the patients/customers when they come to ask them. The consultations do not charge customers, making this free consultation costly to provide.

In the healthcare industry, BI services are widely utilized for outcomes analysis (Chaudhuri et al. 2011). BI could not only aid business operations but also patient care. In retail pharmacy, BI technology is used to identify drug interactions and predict further. Today, healthcare systems are recording more and more information, and that information (or data) is growing in the form of consuming more and more storage space and becoming harder to manage. The reasons vary for the need to record such massive amounts of information. Sometimes the reason is adherence to compliance regulations, at other times it is the need to preserve translations, and in many cases it is simply part of a backup strategy. Data storage costs time and money. Ohlhorst (2012) states the big challenge is for business to find the value in data and explore data sources in more interesting and applicable ways to develop intelligence that can drive decisions.

The improved adherence increases costs on drug but leverage the larger reduction in medical costs. In retail pharmacy, customer or patients are likely consult their health care consideration with pharmacist. This process happens many times per day and the questions are mostly related to chronic diseases. Pharmacist provides valuable suggestions, educates drug therapy to their customer or patients and motivates behavior changes. Adherence intervention could provide valuable suggestions to the patients and may change their behavior. However, this procedure cost pharmacist much time and the cost is high for the pharmacy per se. Patients need talk to the pharmacist less time and pharmacist could identify valuable interventions after several tries. There is little study for the costs of adherence interventions. We are focusing on how to reduce costs of adherence interventions and then patients and pharmacy get the benefits from it. Although medication adherence reduces the most of amount of expenditures, it still has costs itself. Patients or customers visit retail pharmacy and consult their problem with pharmacist. This procedure would generate extremely large data set that have grown beyond the ability of management and analyze them with traditional processing tools. If we can capture those data and store them in a database, those will bring to the retail pharmacy more valuable information. Using these data, we can analyze them using BI technology to identify the valuable interventions and provide the results to pharmacist and customers. Then, create a new platform utilizes those data and results with data from existing database.

OBJECTIVES

The goal from this research paper is to propose the adoption of using an integrated analytic platform as a way to improve the efficiency of providing pharmaceutical care and capturing valuable interventions in retail pharmacy. The results of this paper will:

- Outline a procedure for a typical encounter
- Identify the types of resources that could be accessed and made available during the encounter
- Offer a theoretical framework for how the analytic platform will function
- Describe the types of outcomes as a result from the encounter

PROPOSED WORK

In this proposal, our goal is to use BI and analytics to help patients and customers better manage their conditions when making decisions and to reduce to cost for both patients and pharmacy. This will require sophisticated data analysis techniques and to deliver new functionality, such as personalized offers and services to customers or patients. The analytic platform will be adopted for enhancing a customer-service platform driven by pharmacists. Secondarily, the platform will streamline and document the delivery of pharmaceutical care programs in conjunction with other healthcare-service related platforms. Lastly, the accumulation of data and sequencing will be able to generate healthcare BI for creating new programs to improve healthcare services.

The proposed work does not fully address issues related to patient privacy (HIPAA), governance of healthcare databases, the additional risk shared between client, provider, and business, or the legal parameters within the scope of practice of pharmacy as defined by state boards of health.

DATA COLLECTION

The goal for data collection procedures is to collect only relevant information in a timely manner. Expedient delivery of the service with the acceptance of the advice will be critical for the success of this platform. Figure 1 illustrates the process for delivering the service.

Once the customer presents, the pharmacist will use a personal assistant device with a touch screen (such as a tablet) to begin the process. During the session, the pharmacist can enter the required data into the blank fields or the information can be retrieved from the electronic health records (EHR). The patient will then characterize what type of service is being requested
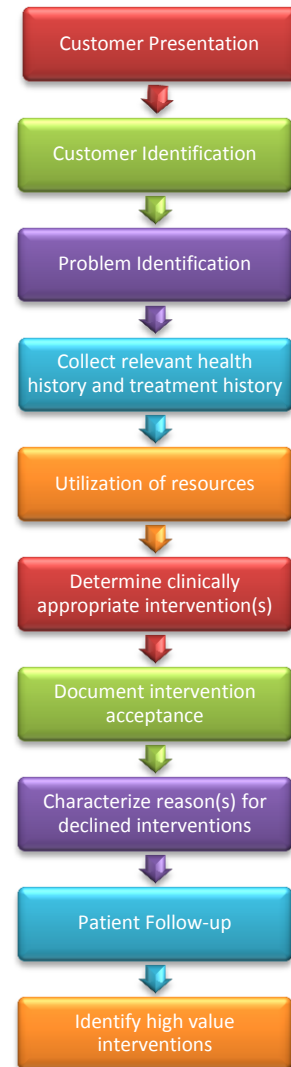
Figure 1 Stepwise Process of Service Delivery Model

(e.g. product selection, safety, general health advice, screening, etc.). The pharmacist will then identify the areas of concern for the customer in order to prioritize the most appropriate set of recommendations for the intervention. Following the delivery of the service, the pharmacist will document whether the advice was accepted or declined with an attempt to characterize reasons for non-acceptance. Any supporting operations required for complete service will be initiated at this point (email product, requested information, contact doctor, etc.).

The delivery of healthcare services will relay data in real time by using a digital touch-screen personal assistant device as illustrated in figure 2. The personal assistant device can retrieve essential information from the EHR through its application program interface (API). As the service session occurs, a set of concerns by the patient will be generated. The relevant demographic, medical, and prescription information can then be uploaded and paired with the concerns. The set of possible solutions will then be filtered by screening for any of the alerts identified (Drug interactions, age considerations, health conditions, etc.) collected from the electronic health records database. The final set of options will consider best practices (clinical), most utilized (non-clinical), out-of-pocket cost, and risk assessment. The pharmacist will document the patient selection and attempt to characterize rationale for choice. Once the session has reached its conclusion, the session will be uploaded back to the server. Identification of valuable interventions will help assess demand for services and drive service design.

IMPACT AND DISSEMINATION

The ability of the analytic platform to retrieve information across multiple platforms quickly would allow the pharmacist to help the patient make informed decisions. The device used by the pharmacist will have access to multiple drug information and healthcare resources. In theory, this would assist the patient to achieve superior outcomes through the delivery healthcare intelligence. The American Society of Health-Systems Pharmacists (ASHP) has identified five key areas for pharmacists to be able to enhance coordinated care and improve healthcare efficiency: 1) Medication management 2) Medication Reconciliation 3) Preventive Care services 4) Education and Behavior Counseling 5) Collaborative Care Models. Adopting the proposed analytic platform would achieve the goal for meeting these areas of opportunity.

Adherence and Education

The platform would address adherence by sending a push message from the platform based on claims. When delivering a consultation, the pharmacist could recommend that the prescription be refilled while offering advice as requested. It is possible that the concern leading to the patient presentation for treatment could be due to non-adherence of a medication that was prescribed. Reasons for non-adherence could be identified and uploaded through the analytic platform. This would create an opportunity for the pharmacist to intervene and address issues related to education about the role and use of the medication, cost of medication, or resolving the medication reconciliation. During the session, the intervention could be identified and uploaded to the services platform. The pharmacist could use the cloud platform to access an action plan for addressing adherence and the database platform to monitor for improved outcomes.

Preventing Avoidable Healthcare Costs

Self-care is a will continue to be a strong presence in healthcare. Consumers of healthcare services are frustrated by limited access to their primary care physicians, the cost of copays, long wait times and crowding of medical facilities and are demanding care that is more convenient and readily accessible (Kaissi). When patients may not have affordable access to their doctor, they often rely upon the advice of a pharmacist. The consistent delivery of proper problem identification paired with an appropriate over the counter approach has the chance to prevent unnecessary medical and prescription claims. Alternatively, the proper emphasis on prompt medical attention can also prevent an avalanche of additional medical expenses. Any consultation that assists the patient to self-manage their condition and prevents further medical costs could be considered a valuable intervention.

Identification of Valuable Pharmacy Interventions

In retail settings, pharmacists are frequently consulted for advice on self-care. Using the analytical platform, the pharmacist would be able to offer evidence based advice for the patient. Many symptoms and conditions can be cost effectively managed with first line OTC treatment recommendations (acid reflux, constipation, seasonal allergies, etc.). When providing this information that proves to be beneficial to the patient, the decrease in total healthcare consumption can be seen as a favorable outcome for all stakeholders as a result of this intervention. There are many opportunities in retail pharmacy to identify valuable interventions as a result of the consultation. One frequent OTC consultations would be in assisting a patient with a concern related to constipation. The following study highlights the opportunity pharmaceutical care.

In February of 2014, Cai et. al. published a study in the Journal of Medical Economics evaluating direct healthcare costs attributed to chronic constipation. The study evaluated medical and pharmacy claims from 14,854 commercially insured patients and compared the direct healthcare costs between patients without chronic constipation against the costs for patients with chronic constipation. Adjusted incremental all-costs associated with chronic constipation were $3508 per patient per year. The authors concluded this is a substantial burden attributable to chronic constipation.
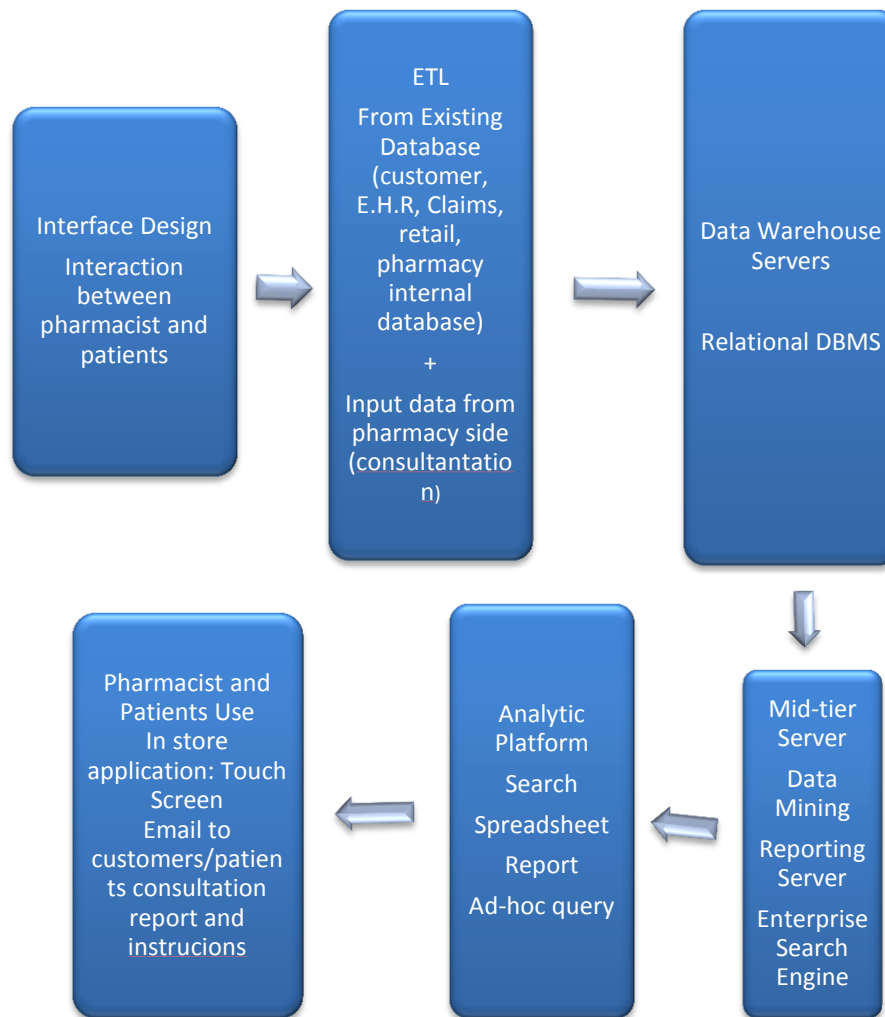
Figure 2. Data Processing Steps

CONCLUSION

As the modernization of the healthcare industry gains momentum, the valuable services that pharmacists provide will grow in demand. The power of the analytical platform is in its ability to access multiple databases with the analytic processing program. The importance of expediently gathering relevant information to personalize care is a valuable service for all stakeholders. With the profession of pharmacy placed at the intersection between retail and healthcare, pharmacists have the enormous potential to use this technology to continue to improve an increasing number of patient outcomes. The adoption of this analytic platform will give pharmacies the visibility in demonstrating the value of pharmacist-led interventions.

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