Although there are countless applications of big data analytics for healthcare systems, I will focus on opportunities within the pharmacy division that I serve. Pharmacy is a foundational component of healthcare, as hospital patients typically encounter at least one pharmaceutical during or after their hospital visits. Pharmacy is the single largest group of supplies across our system, comprising a couple billion dollars of annual spend. The materiality and universality of pharmaceuticals makes it an executive priority for performance monitoring and improvement. The past year, our pharmacy organization was one of the largest contributors to margin improvements throughout the entire system. It is important to understand that business performance in pharmacy is not entirely focused on financials, as patient health outcomes are another primary performance consideration. Despite proven historical performance, Big Data has the potential to improve both financial and health metrics for our pharmacy organization.

Given the covid situation, our health system recently entered and vastly expanded telehealth efforts. In this scenario, patients interact with providers through smart phone or computer consultations. These same technologies, in addition to certain smart wearables, can be utilized to monitor patient health status and prescribe preventative medicine (Marr, 2015). Although health information is highly sensitive and protective, prevention is generally preferable to reaction. Another preventative measure mentioned by Marr (2015) is readmission prevention, where Big Data is utilized to increase medical intervention speed and efficacy, ultimately reducing the likelihood that patients will necessitate an incremental visitation. Readmission metrics are currently being monitored in managerial dashboards, as they are both costly and representative of poor initial outcomes, though using data to head them off at the pass is a desired future state we are not yet representing.

Outside of individual interventions, Big Data can improve formulary standardization efforts that dictate the type and brand of pharmaceuticals to be used across a health system (Ma, Smith, Chu, & Juarez, 2015). While our system already has formulary management practices, there is not yet a streamlined, centralized place to monitor the compliance thereto. Analyzing them appropriately will ensure accountability, improving outcomes and expenditures. Another aggregate example is within disease prediction, where region and social media data is monitored for disease prediction, such as with the CDC and Google Flu (Ma et al., 2015). Though our organization does not yet incorporate Big Data for annual influenza occurrences, it has started doing so during covid. They have made numerous covid metrics available for all employees in our health system, within a centralized covid portal. In addition to metrics, current research and mitigation documents are also available, ensuring providers across the system have the same information and recommendations.

Overall, pharmacy has a substantial opportunity to leverage Big Data to the benefit of costs and outcomes. Interestingly, although the current pandemic is unfortunate, it has already advanced the utilization of Big Data within our department. Hopefully, these advancements will continue after the epidemic subsides, as the value is being realized and additional opportunities await.

Ma, C., Smith, H. W., Chu, C., & Juarez, D. T. (2015). Big data in pharmacy practice: current use, challenges, and the future. Integrated pharmacy research & practice, 4, 91.

Marr, B. (2015). Big data: using smart big data, analytics and metrics to make better decisions and improve performance (1st ed.). Retrieved from https://redshelf.com/book/572147/big-data-572147-9781118965788-bernard-marr

**Examine your organization, or an organization with which you are familiar, for opportunities to improve its business performance. Discuss how the selected organization could utilize big data and analytics to take advantage of your identified opportunities.**

**Business Performance**

Transformation

* Better understand and target customers
  + By expanding on traditional data sets to include big data, structured and unstructured data such as social media, browser logs, and/or sensor data and applying text analytics and other tools companies are now able to better understand their customers and their behaviors and preferences
  + The big objective, in many cases, is to create predictive models.
    - Competitive advantage.
    - Target
      * Pregnancy predictor model that alerts them to the probability that someone buying a specific combination of 25 products is pregnant.
      * Social science has shown that most people make their buying decisions based on habit rather than choice – especially for the products sold by target.
      * When someone visits a supermarket they are not assessing the different types of butter on a ale and weighing the options; they are usually buying what they always buy.
      * Pregnancy is a period where old routines and habits fall apart causing buying behavior to be in a state of flux.
        + In fact, target knows THE moment when buying behavior is up for grabs – around the time of the birth of a child, when both parents are exhausted and overwhelmed.
        + They also know that timing is everything and by the time the baby is born it’s too late to serve those parents as customers because the minute the baby is actually born the birth becomes a part of public record and the parents will receive a barrage of baby-related offers and incentives to ad to their overwhelm.
    - According to McKinsey, retailers willing to use Big Data analytics to increase operating margins can do so by as much as 60 percent.
    - Telecom
      * Able to reap huge commercial advantages from their data to help them better predict and manage customer churn.
    - Insurance companies
      * Also using data analytics to better understand their customers and deliver much more tailored insurance solutions based on actual customer behavior rather than placing that customer info into a broad category.
        + Seeking to understand their market and the types of people has led to new data collection and product innovation.
        + To see which home insurance applications can be immediately processed, and which ones need a validating in person visit from an agent.
* Improve and optimize business process
  + Big data is also increasingly used to optimize business process.
    - Retail
      * **Are able to optimize their stock based on predictive models generated from social media data, web search trends, and wether forecasts.**
      * Walmart use data to understand what’s trending in social media, as well as buying patterns among similar types of customers and what competitors are changing in real time.
    - **Supply Chain or Delivery Route Optimization**
      * **Geographic positioning and radio frequency identification sensors are used to track goods or delivered vehicles and optimize routs by integrating live traffic data.**
        + For instance, if a delivery driver has a schedule of optimized deliveries that schedule will interact in real time with weather data and traffic data so that if there is a traffic jam, accident or reports of delivery impacting weather such as snow or storm the schedule will automatically re-calibrate an alternate route.
      * Anticipatory Shipping
        + **Amazon have become so good at predictive analytics that they believe they know when you will buy before you buy it, so they will ship it toward you before the item is even in your shopping basket.**
      * **Manufacturers are monitoring minute vibration data from their equipment, which changes slightly as it wears down, to predict the optimal time to replace or maintain.**
        + **Replacing too soon wastes money; replacing it too late triggers and expensive work stoppage.**
* **Improve people’s health and well-being**
  + Brain injury
    - When someone suffers a brain injury it’s extremely dangerous but it’s never usually the initial injury that does the most damage.
      * Electrical activity around the initial injury causes the surrounding brain cells to short circuit creating a secondary, often larger injury, which can be catastrophic.
      * Clearly, if doctors were able to tell when this secondary injury was going to occur they they could intervene and potentially limit the damage.
      * Result is a prototype brain monitor that measures brain activity in near real-time and converts that data to useful informationfor busy critical care staff to act on.
  + Cancer identification
    - An American teenager with no medical training was able to use technology and vast amounts of data to create a breast cancer diagnosis program that correctly identifies cancer in breast tissue biopsy’s 99% of the time.
      * 15 year old girl living in the US when she became interested in neural networks and computer programming.
      * Then tragedy struck her family when her cousin was diagnosed with breast cancer.
      * After school and in her spare time she created an artificial neural network that models the brain’s neural network.
      * Using a vast amount of different data points the network is able to learn and detect patterns that can’t be detected by the human eye.
      * For years doctors have found it incredibly difficult to diagnose breast cancer based on a biopsy but this program is set to change diagnosis forever.
  + Premature baby
    - Premature baby units are now able to monitor thousands of data points to predict infection, intervene early, and save precious tiny lives.
      * Brain scanning sensors that can predict and better manage the secondary brain injury, which can often follow the initial injury.
  + DNA
    - In 2003, when scientists decoded the human genome it took a decade of intensive work to sequence three billion base pairs of DNA
      * Today, the computing grunt of big data analytics enables us to decode that much DNA in a day.
      * This now allows us to predict the likelihoods of getting certain diseases, which in turn can lead to preventative actions and early interventions.
  + Disease outbreaks
    - Integrating data from medical records with social media analytics enables us to monitor flu outbreaks in real time, simply by listening to what people are saying.
  + **Apps and wearables**
    - **Personalized health monitoring through the use of apps and wearable devices will hopefully over time see a reduction in stress-related illnesses brought into the workspace.**
    - **Personal analytics and health monitoring devices such as the Up band, smart watches, or smart phones are set to change all that and give us real time insights into our own health and well-being.**
    - **We are on the cusp of a new wave of preventative medicine based on data, where we can access that data to better understand links between lifestyles and diseases.**
  + Medicine
    - **Hospitals are also analysing medical data and patient records to improve the business of medicine.**
    - **For instance, they can now predict which patients are likely to seek readmission within a few months of discharge.**
      * **The hospitals can then intervene earlier for this segment in hope of solving the issue for the patient and preventing another costly hospital stay.**