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VALUE OF DATA
EMBRACING DARK DATA

A "Win-Win-Win" Through Dark Data And Hyper-personalization In Healthcare

Healthcare costs have been growing rapidly for many years in the United States. Under tremendous pressure, healthcare systems are seeking ways to provide quality healthcare at a lower cost as the industry shifts from volume-driven transactions to a more holistic value and quality measure for reimbursement. Dark data is a readily available and untapped information source that can be leveraged to improve patient outcomes (197M work sick days and 419M illness-related underproductive work days avoided from 2018 to 2030) and add value across the healthcare system (~$200B from 2018 to 2030). For many healthcare providers, it could generate faster benefit realization than complex and onerous clinical data initiatives, while for employers it could reduce the overall cost of employee health plans. This paper explores how healthcare organizations could unlock dark data to create hyper-personalized interactions that generate substantial value for patients, employers, and themselves.

Imagine a future where your healthcare provider could proactively prevent you from falling ill in a way that is integrated with your lifestyle. Imagine a future where if you do fall ill, your healthcare provider can proactively help reduce the length of your illness, integrated with your lifestyle. The following lays out how dark data can drive hyper-personalized health services to generate economic value and improve patient outcomes.

DEFINING DARK DATA

Healthcare organizations collect and store a myriad of data through the course of regular business activities.

Some of this data is used clinically, some for strategic insights, and some for administrative transactions and marketing outreach. However, some of this data, although collected and stored, is not used for any specific purpose, such as notes in a chart, or the arrival time of a patient, etc. This is the type of data that Gartner defines as dark data: "information assets that organizations collect, process and store during regular business activities, but generally fail to use for other purposes (for example, analytics, business relationships and direct monetizing)."[1]

Dark data is data that is not being used to its full extent. It represents a potential goldmine of information that, if leveraged effectively, can deliver value-driving insights for healthcare organizations, a hyper-personalized experience for patients along with economic value. According to one study, on average, 52% of all stored data is dark.[2]

Why does dark data exist?

Lost signal: Data is available but not being captured fully. For example, a security camera has 1080p resolution (a higher quality image) but stores in 720p format (a lower quality image). The 1080p signal exists, but the data is not captured.

Poor signal: Data is captured, but has limited or no known use cases or value identified. This poor signal could cause false positive results and degrades, rather than enhances value due to increase of "noise".

Institutional inertia: Potentially valuable data is captured and simply not used, often due to organizational culture, infrastructure or financial reasons.

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THE CASE FOR HYPER-PERSONALIZATION USING DARK DATA

The move toward personalization is ever evolving. Hyper-personalization is being implemented and refined in many industries, especially consumer-centric sectors such as consumer packaged goods and retail, and for good reason.

The more personalized an organization's product or service is to an individual's needs, characteristics and preferences, the more likely the individual will make a decision to use that product or service. Underscoring how important personalized products and services have become, a 2017 Accenture Strategy study stated that an estimated 41% of consumers switched companies in the United States due to poor personalization services and lack of trust.[3] And in the age of social media, the barrier to access information to help drive hyper-personalization and to have a deeper understanding of your customer has diminished.[4]

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The healthcare industry is not known to be at the leading edge of implementing technology compared to other industries. Yet, many healthcare organizations are deep into large-scale initiatives to corral and use clinical data more effectively. As they make these investments, the idea of tapping into dark data for value generation is simply not on many providers' radar. However, focusing on non-clinical dark data – such as the patient's location, social media data and health spend transaction history – may be faster and easier to implement and, consequently, be a "low hanging fruit" to generate patient benefits. Additionally, insights generated from this dark data can help providers present options for actions that patients are more likely to take. Indeed, using dark data to develop hyper-personalized customer interactions can bring us closer to the "holy grail" for healthcare – the mechanism to reach the right patients, at the right time, with the right treatment at the right dose.

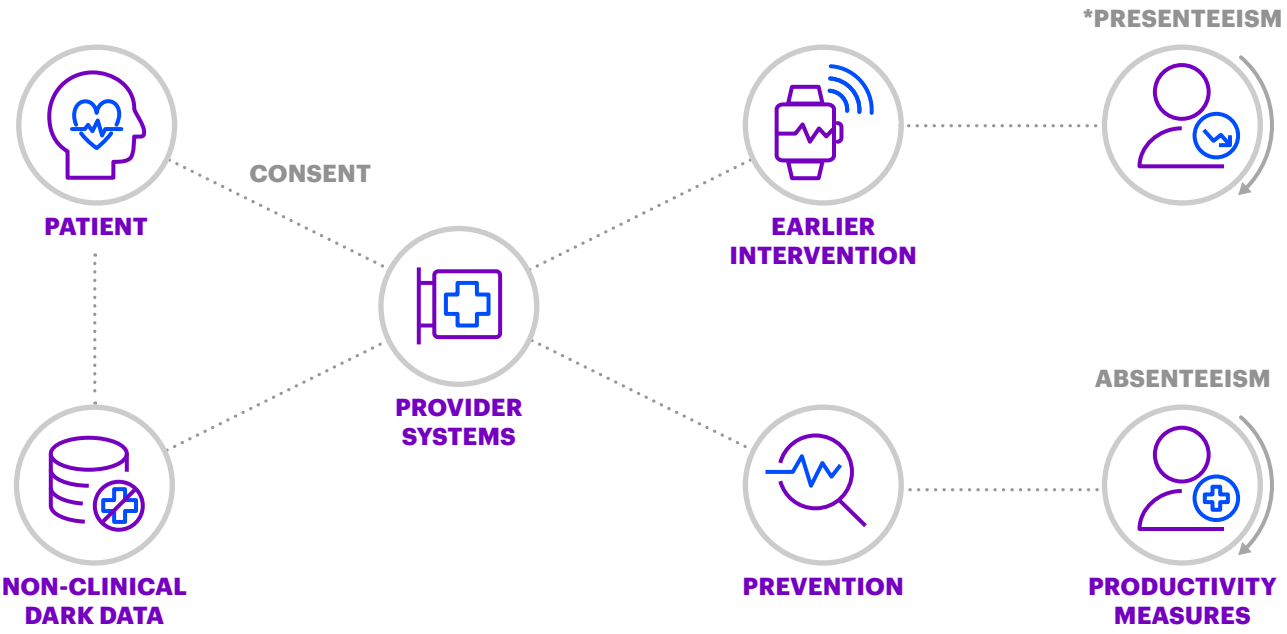
Using Dark Data to develop hyper-personalized patient services can bring us closer to the "holy grail" for healthcare – the mechanism to reach the right patients, at the right time, with the right treatment at the right dose.

USE CASES FOR HYPER-PERSONALIZED HEALTHCARE DELIVERY

Consider these scenarios. A patient consents to allow a healthcare provider to access certain non-clinical data, such as health spend transactions, social media and location data.

This non-clinical data supports two potential pathways to value realization for the patient: (1) earlier intervention or (2) prevention for common ailments such as influenza (flu), the common cold, and allergic rhinitis (allergies) (Figure 1).

Figure 1: Pathways to value realization



*Presenteeism: degree of productivity attained product of working in a healthy or unhealthy condition.

This diagram is for illustrative purposes only

For example, for earlier intervention, imagine a patient flies to Seattle on a work trip. The healthcare provider can see in real-time that the patient is in Seattle and that the area has a flu outbreak. Through an application on the patient's phone, the healthcare provider can proactively initiate contact with the patient via live text with a nurse. Based on analysis of the patient's social media data, a customized engagement plan could be created and leveraged to determine what channels are best to interact with the patient. As such, the application could suggest booking an outpatient clinic visit if the patient is already feeling ill. Alternatively, the nurse could propose to order over-the-counter flu medications, ones commonly found in the patient's health spend history, which can be delivered to the patient later in the day. In this case, treatment can begin earlier than if this access to non-clinical dark data did not exist, eventually leading to an avoidance in days the patient would go to work with reduced productivity due to illness, also known as presenteeism, which is a boost for the patient and his or her employer.

Dark data can also be used to prevent illness. Consider a patient who lives in Atlanta where there is a projection of high pollen counts earlier than when the usual season begins. Using the patient's health spend transaction history, which shows an increase in over-the-counter allergy medications correlated with high pollen counts, the provider can proactively send the patient a notification about the forecasted high pollen counts and suggest purchasing specific over-the-counter medicine to help prevent symptoms. The provider can also suggest a telemedicine video chat if he or she does not achieve symptom relief over the next few days. By using location data, social media data and health spend data to understand and better personalize how this patient would best respond to this information, this use case example illustrates the potential impact of this concept on preventing illness-related work sick days, also known as absenteeism.

Focusing on non-clinical dark data may be faster and easier to implement, and, consequently, be a "low hanging fruit" to generate patient benefits.

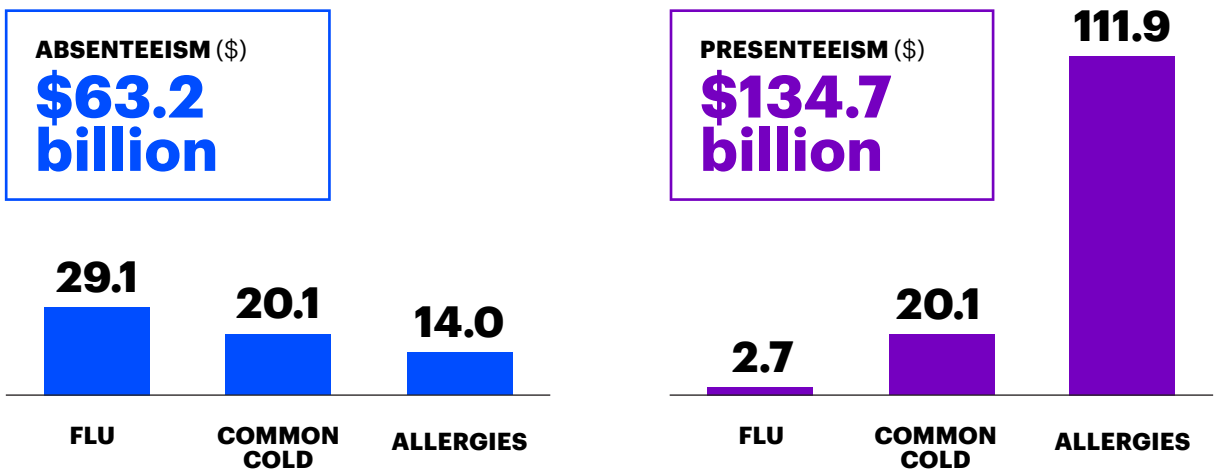
THE PAYOFF: CUMULATIVE OF $200B IN ECONOMIC VALUE REALIZED AND 197M AND 419M DAYS ABSENTEEISM AND PRESENTEEISM AVOIDED FROM 2018 TO 2030

The above examples are, of course, dependent on the healthcare organization having all the proper privacy and security clearances and appropriate implementation.

However, leveraging non-clinical dark data to hyper-personalize interactions for early intervention and prevention of common illnesses could bring as much as $17 billion in economic value from the avoidance of work days lost due to illness (absenteeism) and productivity lost due to illness (presenteeism) this year if looking only at the adult working population in the U.S. Extrapolating the benefits of this example to 2030, the cumulative economic benefit would be around $200 billion in today's dollars, representing around 6% of the U.S.'s health expenditure in 2016 (Figure 2), which is associated with almost 197 million absenteeism days avoided and around 419 million presenteeism days avoided (Figure 3)![5] Patients, employers and healthcare providers will each share in the positive impact of this illustration through increased time spent healthy, an increase in productivity, and through a share of the positive economic impact through reimbursement, respectively.

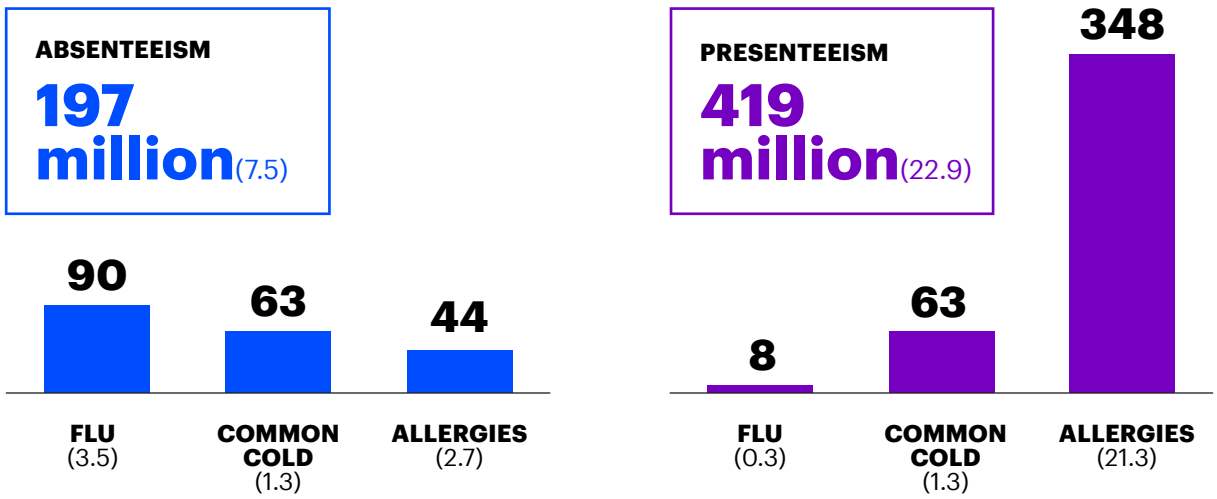
Highlighting non-clinical dark data applied to common ailments such as the flu, common cold and allergies is a wonderful way to show the potential value of hyper-personalization. But, as this concept is expanded to additional common ailments, the potential value magnifies. Then, imagine the potential impact that could be generated if this same approach were applied to dark clinical data and other serious medical diseases!

Figure 2: Cumulative potential economic value of using dark data for hyper-personalization 2018 to 2030



Note: Appendix A outlines a more detailed overview of our methodology, assumptions, and calculations. Approximate values.

Figure 3. Cumulative potential time value of using dark data for hyper-personalization by 2018 to 2030 (Individual Basis)



Note: Appendix A outlines a more detailed overview of our methodology, assumptions, and calculations. Approximate values.

OVERCOMING THE HURDLES

To unlock dark data and realize hyper-personalization benefits, there are critical factors that must be considered, especially for healthcare providers, such as:

Privacy: Use of personal health information is highly regulated in the U.S. and around the world. Information must be protected and secured to serve the patient in the best way possible in line with regulatory requirements.

Coordination of data storage and access: Using dark data to hyper-personalize healthcare is dependent upon collecting, storing and analyzing this data in compliance with regulatory standards, especially around security and access limitation. Having the appropriate data structure and infrastructure is also critical to incorporating dark data into healthcare providers' systems and workflows. Dark data should be in a format that can be incorporated into the healthcare provider's systems and accessed quickly to conduct real-time analysis and provide insights that drive value.

Talent and resources: Finding the right people with the "know-how" and funding this type of approach, especially as it competes with other investment priorities, will all be challenges. A proof of concept and pilot approach with a partner is a pathway to overcome the talent and resource gap.

> By focusing first on leveraging non-clinical data through an opt-in process, healthcare providers can limit their risk, especially around privacy, data storage and access regulations associated with personal health information.

Incentives: To ensure a program similar to the use case can get off the ground, healthcare providers must make sure all stakeholders (healthcare payers, employers, patients, and healthcare workers) are incentivized to participate.

Healthcare payers: Working with healthcare payers to communicate impact to patient outcomes and to understand the financial upside of implementation, especially in a quality and value-based reimbursement environment, is key.

Employers: Develop a strong relationship with employers by communicating the positive impact of the program on productivity and lower healthcare premiums to allow for secure exchange of information to determine effectiveness of implementation.

Patients: Build trust and understanding with patients by communicating the benefits of allowing healthcare providers to use non-clinical dark data, in this case, to help patients live healthier lives.

Healthcare workers: To make the cultural shift and achieve adoption, healthcare professionals need to understand this information provides value to them as well as patients and it must be seamlessly integrated into their workflow.

By focusing first on leveraging non-clinical data through an opt-in process (such as the examples above), healthcare providers can limit their risk, especially around privacy, data storage and access regulations associated with personal health information.

The illustrative use cases are just the tip of the iceberg

The cumulative total impact, from 2018 to 2030, could be up to $200 billion, representing around 6% of total U.S. healthcare expenditure in 2016, the most recent year available.

However, if this approach was not limited to three common ailments, and eventually if clinical dark data was used as well, the potential value to patients, healthcare stakeholders and the economy is enormous.

LIGHTING THE PATH AHEAD

With the potential to realize positive impact to the general economy in terms of productivity, to healthcare stakeholders as reimbursement shifts from volume to value, and to patients around better outcomes, healthcare organizations should think about incorporating dark data to drive hyper-personalized care.

Many use cases could produce quicker value realization than large-scale big data initiatives and provide an important, differentiated approach in the context of value-based healthcare.

To get started, healthcare providers must create proof of concepts or pilots to learn quickly, iterate, and build out an agile approach to the hyper-personalization journey, potentially leveraging partners that can bring experience and best practices to speed and ease the journey. Initiatives could be incorporated into corporate innovation plans already underway or could be spun out in a "move fast, fail often" approach. On either path, the objective is to unlock and experiment with dark data to provide hyper-personalized patient care.

To get started, healthcare providers must create proof of concepts or pilots to learn quickly, iterate, and build out an agile approach to leveraging dark data for the hyper-personalized journey, especially as reimbursement moves from a volume-based to a value-based model.

The transformation of healthcare organizations from models built on volume-based revenue generation to ones centered on quality and value-based outcomes is well underway. To help further this strategic shift, stem the tide of growing cost issues, and continue to provide the best care possible to patients, many novel approaches will need to be developed and implemented. The use of dark data for hyper-personalized services in healthcare is underexplored and, as our analysis shows, a powerful path to move the industry and patient care forward.

LEARN MORE

To learn more about technologies impacting healthcare, visit Data Makes Possible.

To learn more about dark data and hyper-personalization, visit Accenture Strategy's Health Practice and Accenture Strategy's Life Science Practice.

To learn more on how to value your data, visit Accenture Strategy.

AUTHORS

WESTERN DIGITAL CORPORATION

David Tang
SVP
Corporate Marketing
dave.tang@wdc.com

Judy Fujii-Hwang
Sr. Director
Corporate Brand and Thought Leadership
judy.fujii-hwang@wdc.com

ACCENTURE STRATEGY

Esther Colwill
Managing Director
Communications, Media, & Technology
esther.colwill@accenture.com

Shobit Arora
Senior Manager
CFO and Enterprise Value
shobit.arora@accenture.com

Aadhar Shah
Manager
Competitiveness Center of Excellence
aadhar.shah@accenture.com

Alvaro Mendizabal
Senior Consultant
Communications, Media & Technology
alvaro.mendizabal@accenture.com

Renzo Callejas
Strategy Analyst
renzo.o.callejas@accenture.com

APPENDIX A: VALUATION APPROACH

MODELING ASSUMPTIONS

- Patient provides consent to the healthcare system.
- The non-clinical data accessed is:
  - Health spend transactions
  - Location data
  - Social media data
- The dark data will be used for earlier intervention and prevention of common ailments:
  - Influenza (flu)
  - Common cold
  - Allergic rhinitis (allergies)
- The valuation is based on two productivity measures:
  - GDP output realized through avoiding absenteeism (sick days)
  - GDP output realized through avoiding presenteeism (when a sick individual is at work and has lower productivity due to illness)
- The population is limited to adults (18-65) that are participants in the workforce in the U.S.
- Appropriate growth and discount rates are factored in, as applicable.

DEFINITIONS

Average daily productivity (ADP): Average GDP per hour × Average hours worked by a U.S. worker

Absenteeism: Number of work-loss days due to illness; also known as "sick days"

Presenteeism: Percentage of productivity loss per day(s) due to illness

CALCULATION APPROACH

For absenteeism, the valuation is population affected by an ailment × average GDP productivity per day × associated days of work-loss for absenteeism × effectiveness of the use case

For presenteeism, the associated days of work-loss in the above is replaced with: associated days of productivity decrease for presenteeism × average productivity decrease during days related to the ailment

Affectability Calculation (for each common ailment: Flu, Common Cold, Allergies)

Absenteeism ($)

Population affected by illness	×	ADP	×	Days associated with work-loss day from illness	×	Effectiveness of use case

Presenteeism ($)

Population affected by illness	×	ADP	×	ADP percentage decrease	×	Days associated with productivity decrease from illness	×	Effectiveness of use case

*Time (in days) calculation is same as above without factoring in ADP and ADP Percentage Decrease.

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